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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 15

TECHNICAL AIR-TO-GROUND VOICE TRANSCRIPTION

Prepared by  
Test Division  
Apollo Spacecraft Program Office

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MANNED SPACECRAFT CENTER  
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## INTRODUCTION

This document is the transcription of the technical air-to-ground (TAG) voice communications of the Apollo 15 mission. The transcript is divided into three columns — time, speaker, and text. The time column consists of four two-digit pairs for days, hours, minutes, and seconds (e.g., 04 22 45 12). The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.

The time used by Mission Control Center (MCC) and indicated as ground-elapsed time (GET) in the flight plan may be updated to both the spacecraft and MCC computers but will not be updated to the telemetry downlink pulse-code-modulated bitstream or other time-recording devices. This GET updating will be performed only to correct significant changes in the flight-plan time occurring as the result of delayed lift-off, midcourse corrections, or spacecraft burn-time differences (trajectory dispersions).

Should these updates occur, the Apollo elapsed time (the true mission-elapsed time) may not agree with flight-plan and MCC times. Users of this transcript are cautioned to apply the appropriate time-update deltas for the updated periods.

Communications recorded from the primary communications network (GOSS net 1) comprise the bulk of this transcript. During periods when the lunar module (LM) and command module (CM) are physically separated, it is occasionally required that communications with both spacecraft be available simultaneously. To accomplish this, another communications network (GOSS net 2) is activated. At such times, this transcript will include the simultaneous but separate communications. To indicate the period of GOSS net 2 usage, a heavy dark line will be used alongside the time column.

A series of three dots (...) is used to designate those portions of the text that could not be transcribed because of garbling. A series of three asterisks (\*\*\*) is used to designate those portions of the text that could not be transcribed because of clipping caused by the voice-actuated (VOX) mode. One dash (-) is used to indicate a speaker's pause or a self-interruption and subsequent completion of a thought. Two dashes (- -) are used to indicate an interruption by another speaker or the point at which a recording was abruptly terminated. Words given unusual emphasis by the speaker are underlined.

The Apollo 15 mission was flown July 26 to August 7, 1971; lift-off occurred at 13:34:00.79 G.m.t. (9:34:00.79 a.m. e.d.t.) on July 26.

Speakers in the transcript may be identified as follows.

Spacecraft:

CDR	Commander	David (Dave) R. Scott
CMP	Command module pilot	Alfred (Al) M. Worden
LMP	Lunar module pilot	James (Jim) R. Irwin
SC	Unidentified crewmember	
MS	Multiple speakers	

Mission Control Centers:

CC	Capsule communicator (CAP COMM)
MCC	Unidentified speaker, other than CC, in the Mission Operations Control Room or a Staff Support Room
LCC	Launch Control Center
F	Flight director
S	Surgeon

Remote sites:

AB	Airboss (Recovery aircraft)
CT	Communications technician (COMM TECH)
OKI	USS Okinawa
P-1, P-2, etc.	Photographic helicopters
S-1, S-2, etc.	Swim teams
R-1, R-2, etc.	Recovery helicopters

When the CDR and LMP are in the undocked lunar module or on the lunar surface, their speaker designations will be suffixed by either LM or EVA to indicate their status (e.g., CDR-EVA or LMP-LM). Voice calls during this mission were assigned in accordance with the following station operating procedures: "For all phases when only the CSM is manned, the AS-510 call sign will be Apollo 15. When both vehicles are manned, the voice call will be Endeavor for the CSM and Falcon for the LM. The calls for the CDR and LMP during lunar surface operations will be the individual crew's first names."

Transcription of these tapes was managed by David M. Goldenbaum, Test Division, Apollo Spacecraft Program Office, to whom inquiries regarding this document should be referred.

#### ACRONYM LIST

Because specialized readers of the Apollo 15 transcription, such as the principal investigators, may not be thoroughly familiar with the acronyms used during the mission, the decision was made to define those acronyms that probably will be encountered. For obvious reasons, no effort was made to include every acronym that conceivably could be used; only those acronyms that are considered likely to be used are included here.

AEA	Abort electronics assembly
AGS	Abort guidance system
ALHT	Apollo lunar hand tool
ALSCC	Apollo lunar-surface closeup camera
ALSD	Apollo lunar-surface drill
ALSEP	Apollo lunar-surface experiments package
AOS	Acquisition of signal (or of site)
AOT	Alinement optical telescope
AP	Alpha particle (spectrometer)
APS	Auxiliary propulsion system (S-IVB) or ascent propulsion system (LM)
ARIA	Apollo range instrumentation aircraft

ARS	Atmosphere revitalization system
ASE	Active seismic experiment
ATCA	Attitude/translation control assembly
BEF	Blunt end forward
BMAG	Body-mounted attitude gyro
BSLSS	Buddy secondary life-support system
CCGE/CCIG	Cold cathode gage experiment/cold cathode ion gage
CM	Command module
CMC	Command module computer
COAS	Crew optical alinement sight
CP	Control point
CPLEE	Charged particle lunar environment experiment
CSC	Close-up stereo camera or contingency sample collection
CSM	Command and service module
CWEA	Caution and warning electronics assembly
DAC	Data acquisition camera
DAP	Digital autopilot
DEDA	Data entry and display assembly
DET	Digital event timer
DOI	Descent orbit insertion
DPS	Descent propulsion system
DRT	Dome removal tool
DSE	Data storage equipment (CM)
DSEA	Data storage equipment assembly (LM)

DSKY	Display and keyboard
DTO	Detailed test objective
ECS	Environmental control system
EI	Entry interface
EMS	Entry monitor system
EMU	Extravehicular mobility unit
EPS	Electrical power system
ETB	Equipment transfer bag
EVA	Extravehicular activity
EVT	Extravehicular transfer
FDAI	Flight director attitude indicator
G&C	Guidance and control
GCTA	Ground-commanded television assembly
GDC	Gyro display coupler
GET	Ground elapsed time
• GETI	Ground elapsed time of ignition
HGA	High-gain antenna
HFE	Heat flow experiment
HTC	Handtool carrier
IMU	Inertial measurement unit
IP	Initial point
IPI	Integrated position indicator
ISA	Interim stowage assembly
IU	Instrument unit

IVT	Intravehicular transfer
LCG	Liquid-cooled garment
LCRU	Lunar communications relay unit
LEB	Lower equipment bay
LEC	Lunar equipment conveyor
LEVA	Lunar extravehicular visor assembly
LGC	Lunar module guidance computer
LM	Lunar module
LOI	Lunar orbit insertion
LOPC	Lunar orbit plane change
LOS	Loss of signal (or of site)
LPD	Landing point designator
LRV	Lunar roving vehicle
LSM	Lunar surface magnetometer
LRRR	Laser ranging retroreflector (also LR cubed)
MC	Mapping camera
MCC	Mission Control Center or midcourse correction
MESA	Modular equipment stowage assembly
MET	Mission event timer
MSFN	Manned Space Flight Network
MTVC	Manual thrust vector control
OID	Octal identifier
OPS	Oxygen purge system
ORDEAL	Orbital rate display earth and lunar

PC	Panoramic camera
PDI	Powered descent initiation
PGA	Pressure garment assembly
PGNCS	Primary guidance, navigation, and control system (CM)
PGNS	Primary guidance and navigation system (LM)
PI	Principal investigator
PIPA	Pulsed integrating pendulous accelerometer
PLSS	Portable life-support system
PRD	Personal radiation dosimeter
PSE	Passive seismic experiment
PTC	Passive thermal control
RCS	Reaction control system
RCU	Remote control unit
REFSMMAT	Reference to stable member matrix
RLS	Radius of landing site
RTG	Radioisotopic thermoelectric generator
SCE	Signal-conditioning equipment
SCS	Stabilization control system
SECS	Sequential events control system
SEF	Sharp end forward
SIDE	Suprathermal ion detector experiment
SIM	Scientific instrument module
SLA	SM/LM adapter
SM	Service module



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SPS	Service propulsion system
SRC	Sample return container
SWC	Solar-wind composition
SWS	Solar-wind spectrometer
TDS	Thermal degradation sample
TEC	Transearch coast
TEI	Transearch injection
$T_{\text{ephem}}$	Time of ephemeris
$T_{\text{ig}}$	Time of ignition
TLC	Translunar coast
TLI	Translunar injection
TPI	Terminal phase initiation
TSB	Temporary stowage bag
TVC	Thrust vector control
UHF	Ultrahigh frequency
UHT	Universal handtool
VHF	Very high frequency

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

Day	Hour	Min	Sec		MILA (REV 1)
00	00	00	01	CDR	And the clock is running.
00	00	00	02	CC	Roger.
00	00	00	12	CMP	... Clear the tower.
00	00	00	13	CDR	And we have a roll program.
00	00	00	15	CC	Thank you.
00	00	00	18	CC	You have good thrust on all five engines.
00	00	00	21	CDR	Thanks, Gordo. Roll's complete.
00	00	00	24	CC	Roger.
00	00	00	27	CDR	And we have a pitch program.
00	00	00	28	CC	Roger. Pitch.
00	00	00	39	CC	Stand by for Mode I Bravo.
00	00	00	42	CC	MARK. I Bravo.
00	00	00	43	CDR	Roger. I Bravo.
00	00	01	03	CC	15, Houston. Everything looks perfect down here.
00	00	01	06	CDR	Okay. Looks smooth up here, Gordo.
00	00	01	54	CC	Stand by for Mode I Charlie.
00	00	01	57	CC	MARK. I Charlie now.
00	00	01	58	CDR	Roger. I Charlie.
00	00	02	01	CMP	EDS AUTO to OFF.
00	00	02	03	CC	Roger.
00	00	02	16	CMP	Inboard.
00	00	02	17	CC	Roger. Inboard.

00 00 02 46 CMP Good stage.

00 00 02 47 CC Roger.

00 00 02 55 CC 15, Houston. You have good thrust on the S-II.  
All five are good.

00 00 02 58 CDR Okay.

00 00 03 12 CDR 737.

00 00 03 14 CC Roger.

00 00 03 17 CDR Tower JETT.

00 00 03 18 CC Roger. We confirm the skirt SEP. You're Mode II.

00 00 03 21 CDR Roger. Mode II.

00 00 03 26 CDR Guidance initiate.

00 00 03 28 CC Roger.

00 00 04 01 CC 15, Houston. At 4, the guidance has converged.  
The CMC is GO. Everything looks good.

00 00 04 06 CDR Okay, Gordo. Looks good up here.

00 00 04 59 CC 15, Houston. Five minutes. Everything looks  
nominal. You're GO.

00 00 05 02 CDR Okay, Gordo; thank you. Looks good up here. Got  
a smooth ride so far.

00 00 05 09 CC Roger.

00 00 05 43 CC 15, Houston. Times are nominal. The level sense  
arm will be 8 plus 34, and S-II cut-off at  
9 plus 09. Over.

00 00 05 52 CDR Roger; 8 plus 34 and 9 plus 09.

00 00 05 57 CC And stand by for S-IVB to COI.

00 00 05 59 CC MARK. You have S-IVB to COI now.

00 00 06 01 CDR Roger. S-IVB to COI.

00 00 06 40 CC Stand by for S-IVB to orbit capability.  
00 00 06 46 CC MARK. You have it now.  
00 00 06 48 CDR Roger; S-IVB to orbit.  
00 00 07 40 CDR Inboard.  
00 00 07 41 CC Roger. Inboard.

BERMUDA (REV 1)

00 00 08 12 CC 15, Houston - 15, Houston. Go ahead. Say  
again, 15?  
00 00 08 25 CDR Houston, 15. We didn't call. You got something?  
00 00 08 29 CC You've had PU shift, and the thrust looks good.  
00 00 08 32 CDR Okay.  
00 00 08 40 CC You've had level sense arm now?  
00 00 08 42 CDR Roger.  
00 00 09 11 CC Stand by for Mode IV capability.  
00 00 09 15 CC MARK. You have Mode IV now.  
00 00 09 16 CDR Roger. And a good stage.  
00 00 09 18 CC Roger.  
00 00 09 24 CC 15, Houston. You've had - you have good thrust on  
the S-IVB.  
00 00 09 28 CDR Roger.  
00 00 10 46 CC 15, Houston. Everything's looking perfect.  
Predicted cut-off time, 11 plus 37. Over.  
00 00 10 54 CDR Roger; 11 plus 37.  
00 00 11 36 CDR Okay. Cut-off; 11 plus 34.  
00 00 11 39 CC Roger.

00 00 11 53 CDR Okay, Houston. GIMBAL MOTORS are OFF, and the S-IVB oxidizer is 40, and the fuel's about 31.

00 00 11 59 CC Roger; 40 and 31.

00 00 12 06 CMP Okay, Gordo. We got ourselves in a 93.7 by 88.9; shutdown on a  $V_I$  of plus 25595; H-dot, plus 00008; altitude, plus 00932.

00 00 12 24 CC Roger, Al. Copy.

00 00 12 46 CC 15, Houston. IU shows you in a 92.5 by 91.5; radar confirms that. And the booster is safed.

00 00 12 55 CDR Okay, Gordo; good job. That was a very smooth ride all the way.

00 00 13 01 CC Roger.

00 00 13 28 CC 15, Houston. The booster is configured for orbit. Over.

00 00 13 35 CDR Roger.

00 00 14 46 CC 15, Houston. I have your Z-torquing angle.

00 00 14 53 CMP Okay; go ahead.

00 00 14 55 CC Minus .1 degrees. One-tenth of a degree, minus.

00 00 15 02 CDR Roger. Minus .1.

00 00 15 06 CC That's correct.

CANARY (REV 1)

00 00 17 06 CC Apollo 15, Houston through Canaries. Over.

00 00 17 10 CDR Go ahead, Houston, 15.

00 00 17 12 CC Roger. You're loud and clear.

00 00 17 16 CDR Okay. The S-IVB tank pressures are - about 41 on the oxidizer and about 21 on the fuel.

00 00 17 21 CC Roger; 41 and 21.

00 00 21 23 CC 15, Houston. About 35 seconds to LOS, and we have nothing further for you. We'll see you at Carnarvon, as shown on the checklist, at 52. Over.

00 00 21 34 CDR Okay. Carnarvon at 52.

## CARNARVON (REV 1)

00 00 51 56 CC Apollo 15, Houston through Carnarvon. Over.

00 00 52 00 CDR Roger, Houston, 15. You're loud and clear.

00 00 52 03 CC You're loud and clear also.

00 00 52 06 CDR Okay; the insertion checks are coming along very nicely. We're down through - 21 in the checklist. And the cameras are out, and Al's completed his alinement.

00 00 52 21 CC Roger.

00 00 52 30 CDR And I only got one comment Jim's got for you.

00 00 52 32 CC Go ahead.

00 00 52 34 LMP Houston - Houston, 15. On the H<sub>2</sub> purge, fuel cell 2, I cannot confirm since I had no - no read-out of a flow indication, or a caution and warning associated with that flow.

00 00 52 50 CC Roger.

00 00 52 55 LMP And, if you'd like, I could do it any time, and perhaps you could confirm it.

00 00 53 06 LMP Houston, fif -

00 00 53 07 CC This is Houston. We're unable to help you on confirming that purge down here, Jim.

00 00 53 16 LMP Okay; understand.

00 00 53 36 CMP Gordo, this is Al. I've got some numbers on the P52 for you.

00 00 53 39 CC Okay. Ready to copy.

00 00 53 41 CMP Okay. Used stars 33 and 41. NOUN 05 was plus 000.01. And the torquing angles were minus 00.019, plus 00.021, minus 00.061, and they were torqued out at 50 minutes.

00 00 54 07 CC Roger. Copied. And the torquing angles are minus 00.019, a plus 00.021, and a minus 00.061. Over.

00 00 54 18 CMP That's affirm.

00 00 54 20 CC Thank you.

00 00 55 39 CDR And, Houston, one other comment. Apparently sometime during launch, the RCS B secondary propellant isolation valve closed, and we recycled it and got a gray talkback.

00 00 55 52 CC Roger, Dave.

00 00 57 55 CC Apollo 15, Houston. About 15 seconds to LOS. Estimating United States at 1:30 GET.

00 00 58 06 CDR Roger. 1:30.

END OF TAPE

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STATESIDE PASS (REV 1)

00 01 29 10 CC Apollo 15, Houston. Over.

00 01 29 12 CDR Hello, Houston, 15.

00 01 29 15 CC Would you put the - You're loud and clear, Dave.  
Would you put the IU UP TEL to ACCEPT, please?

00 01 29 20 CDR IU UP TEL, ACCEPT.

00 01 29 22 CC Okay; we're going to update the IU NAV vector based  
on tracking at Carnarvon. We'll have you leave  
that in ACCEPT all the way through the States pass.  
When we get a better track here across the states,  
we'll update it again - before the end. Over.

00 01 29 38 CDR Okay; will do. And we're down through 27 on the  
checklist. The docking probe is out. Looks good.  
And standing by for a sequence arm and a logic  
check when you're ready.

00 01 29 53 CDR Roger. We can do that now.

00 01 30 02 CC Go ahead.

00 01 30 03 CDR Okay. LOGIC 1, on, down. LOGIC 2, on, down.

00 01 30 18 CC Logics are good. You're GO for pyro arm.

00 01 30 21 CDR Okay; and we had one other little one. At about an  
hour, we noticed that the primary and secondary  
propellant isolation valves on QUAD Delta were  
barber pole. We cycled the switch, and they are  
now gray. And the RCS checks okay.

00 01 30 38 CC Roger. I have a TLI plus 90 and lift-off plus 8  
abort pads when you're ready.

00 01 30 52 CDR Can you stand by 1, please, Gordo?

00 01 30 54 CC Okay.

00 01 30 56 CDR Getting a little UV here.



00 01 31 06 LMP Okay, Gordo, I'm ready for the TLI pad.

00 01 31 09 CC Okay. This is the TLI plus 90 abort pad, Jim.

00 01 31 14 LMP Okay.

00 01 31 16 CC TLI plus 90, SPS/G&N; NOUN 47 is 66938; minus 0.52, plus 1.90; GET for ignition is 004:19:56.99; NOUN 81, minus 0425.4, plus four zeroes 1, plus 4921.7; attitude, 180, 166, 002;  $H_A$  is NA,  $H_P$ , plus 0021.0; 4940.1, 6:34, 4920.8. Sextant star is 40, 079.5, 35.9; boresight star, NA; NOUN 61, plus 16.04, minus 030.00; 1099.0, 34492; GET for 05g, 017:43:58; GDC aline stars are Deneb and Vega; 112, 128, 356; no ullage. Go ahead.

USNS VANGUARD (REV 2)

00 01 34 15 CC 15, Houston.

00 01 34 29 CC Apollo 15, Houston. Over.

00 01 34 46 CC Apollo 15, Houston. We're not reading you. Over.

00 01 34 50 CDR Okay, Houston; there is a breakup - breakup in the VHF, and Jim lost some of the first part of the transmission. Could you go through it again?

00 01 34 58 CC Okay, just what do you need?

00 01 35 00 LMP We have NOUN 47 through roll, pitch, and yaw.

00 01 35 04 CC Okay, Jim. NOUN 47 is 66938; minus 0.52, plus 1.90; NOUN 33, 004:19:56.99; NOUN 81, minus 0425.4, plus 0000.1, minus 4921.7 - Correction on DELTA- $V_Z$  is a plus 4921.7; roll, pitch, and yaw are 180, 166, 002. Go ahead.

00 01 36 10 LMP Okay; readback: TLI plus 90, SPS/G&N; 66938; minus 0.52, plus 1.90; 004:19:56.99; minus 0425.4, plus 0000.1, plus 4921.7; 180, 166, 002; NA, plus 0021.0; 4940.1, 6:34, 4920.8; 40, 079.5, 35.9; NA, plus 16.04, minus 030.00; 1099.0, 34492; 017:43:58, Deneb and Vega; 112, 128, 356, and no ullage.

00 01 37 13 CC Okay, Jim, your readback's correct. Lift-off plus 8 pad is 008:00, 6076, minus 175, 027:06. Go ahead.

00 01 37 38 LMP Roger. 008:00, 6076, minus 175, and 027:06.

00 01 37 51 CC Roger. And I have the TLI pad when you're ready for that one.

00 01 38 03 LMP All right. Go ahead. I'm ready for the TLI pad.

00 01 38 07 CC Okay. Time base 6 predict 2:40:23; attitude for TLI, 180, 045, 001; burn time, 5:55; 10401.1, 35599; SEP attitude, 359, 077, 320; extraction attitude, 301, 257, 040. R2 aline, 045.0, 038.0; ORDEAL start, 56:45; YAW, 001; ejection time, 4:16:00. Go ahead.

00 01 39 35 LMP Roger. TLI readback: 2:40:23; 180, 045, 001; 5:55; 10401.1, 35599; 359, 077, 320; 301, 257, 040; 045.0 ... 56:45; 001; and extraction at 4:16:00.

00 01 40 15 CC Okay. A little static on two readbacks. Read back YAW for extraction and R2 aline, please.

00 01 40 24 LMP Roger. 040 and 045.0.

00 01 40 29 CC Okay, readback's correct, Jim.

00 01 41 00 CC 15, Houston. We have a question regarding the primary and secondary isolation valve. Over.

00 01 41 07 CDR Go ahead.

00 01 41 08 CC We're wondering if you happened to just notice them - barber pole at 1 hour, or did you notice them close at 1 hour? Over.

00 01 41 16 CDR No, no. We just noticed that they were closed at an hour. Apparently in the shuffle here, somebody probably bumped the one switch, which would do it.

00 01 41 26 CC Roger. You don't - you can't tie them to any other action or event there then? Is that right?

00 01 41 32 CDR Negative.

00 01 41 33 CC Okay; thank you.

00 01 41 35 CDR Okay.

00 01 42 58 CC 15, Houston. IU UP TEL to BLOCK. We have put in a second IU NAV vector based on stateside data.

00 01 43 08 CDR UP TEL to BLOCK.

00 01 43 26 CC 15, Houston. We'd like POO and ACCEPT.

00 01 43 31 CDR POO and ACCEPT. You've got it.

00 01 45 21 CC 15, Houston. Are you UP TEL to BLOCK? You have a new state vector now.

00 01 45 27 CDR Roger. CCM [sic] going to BLOCK.

00 01 45 31 CC Roger; my mistake. Also have a short update for your TLI checklist ORDEAL angles because of the slight performance difference in the S-IVB. Over.

00 01 45 49 CDR Okay; go ahead, Gordo.

00 01 45 51 CC Okay. On the Launch Checklist, page L/2-30 - bottom of the page. Tell me when you have it.

00 01 46 04 CDR Go ahead, Gordo.

00 01 46 06 CC At 56 minutes, slew FDAI number 1 to pitch equals 17 degrees rather than 16; and, at the top of the next page, ensure FDAI number 1 pitch equal 14 degrees rather than 13. Over.

00 01 46 24 CDR Roger. Copied; 17 degrees instead of 16, and 14 instead of the 13.

00 01 46 36 CC Okay; then on the next page 2-32 at 59:55, change 7 degrees to 8 degrees, ensure FDAI number 1 pitch equal 8 degrees.

00 01 46 49 CDR Copy 8 degrees.

00 01 46 50 CC One more on the cue card for TLI down slightly below the middle, the long cue card that the CDR uses at 54 minutes. The 24 degrees should be changed to 25 degrees. ORDEAL 300/LUNAR, 25 degrees.

00 01 47 09 CDR       Okay, we've got that; 25 degrees.  
00 01 47 15 CC        And then there will be a 1-degree difference on  
                      the rest of the ORDEAL numbers.  
00 01 47 19 CDR       Okay; looks like they all fit.  
00 01 47 22 CC        That's it.  
00 01 48 46 CC        Apollo 15, Houston. We're about to LOS. Nothing  
                      further. We'll see you at Carnarvon at 2:25 GET.  
00 01 48 53 CDR       All right; Roger. 2:25 ...

CARNARVON (REV 2)

00 02 24 31 CC        Apollo 15, Houston through Carnarvon. Over.  
00 02 24 35 CDR       All right, Houston; 15 here 5 by.  
00 02 24 39 CC        You're 5 by also.  
00 02 24 41 CDR       Okay.  
00 02 24 50 CDR       Houston, 15. We're down to the middle of the TLI  
                      PREP, and everything's in order.  
00 02 24 56 CC        Roger.  
00 02 26 06 CC        15, Houston.  
00 02 26 07 CDR       Houston, 15.  
00 02 26 10 CC        We're showing the MANUAL ATTITUDE switches in  
                      RATE - in MIN IMPULSE, and we recommend RATE  
                      COMMAND.  
00 02 26 16 CDR       Roger. RATE COMMAND. And the pyros are armed.  
00 02 26 22 CC        Roger.  
00 02 29 47 CC        Apollo 15, Houston.  
00 02 29 50 CDR       Houston, 15.  
00 02 29 52 CC        You are GO for TLI.

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00 02 29 54 CMP Roger. GO for TLI.  
00 02 30 04 CMP And the S-IVB oxidizer looks like about 36. The  
fuel looks like about nine - nine - 19.  
00 02 30 11 CC Roger.

ARIA 1 (REV 2)

00 02 38 22 CC Apollo 15, this is Houston through ARIA. Over.  
00 02 38 45 CC Apollo 15, this is Houston through ARIA. Over.  
00 02 38 51 CDR Roger, Houston, 15. You're about 1 by 1 through  
ARIA.  
00 02 38 57 CC Roger. You're about 3 by; clear enough to  
understand.  
00 02 39 10 CDR Roger. We have somebody else on the loop with  
us, too.  
00 02 40 30 CDR ... the S-II SEP light?  
00 02 40 33 CC Roger. SEP light.  
00 02 42 06 CDR Hey, Houston. It looks like we have slow REPRESS  
... to about 22 to 23 on the fuel pressure here.  
00 02 42 17 CC Roger, Dave. You're just barely readable.  
Understand you're getting a normal REPRESS.  
We're - It looks good down here.  
00 02 42 26 CDR Okay. Normal REPRESS.

ARIA 2 (REV 2)

00 02 46 08 CC Apollo 15, Houston through ARIA number 2. Over.  
00 02 46 14 CDR This is 15. Say again.  
00 02 46 18 CC 15, Houston. You're way down in the static, but  
I can hear you transmit. Over.

00 02 46 27 CDR Okay. ...  
00 02 48 25 CDR Average g is on.  
00 02 48 28 CC Roger. Average g.  
00 02 48 39 CDR SEP light.  
00 02 48 43 CC Roger. SEP light.

HAWAII (REV 2)

00 02 50 04 CDR We have IGNITION.  
00 02 50 05 CC Roger; ignition.  
00 02 50 17 CC 15, Houston; we're showing good thrust.  
00 02 51 13 CDR Okay. S-IVB pressure is 40 and 30, and we had a little surge at about 1 minute.  
00 02 51 20 CC Roger. That was PU shift and that looks - the thrust looks good.  
00 02 51 26 CDR Okay.  
00 02 52 54 CDR Okay, Houston, 15. And we're about halfway through. Pressures are steady at 40 and 30, and ORDEAL is tracking right on through.  
00 02 53 01 CC Roger, 15. At 3 minutes, it looks completely nominal to us.  
00 02 53 07 CDR Roger.  
00 02 54 56 CDR Okay, Houston. We have about a minute to go. We're tracking 39 and 30 on the pressures and ORDEAL is about 0.  
00 02 55 03 CC 15, Houston; Roger. Looks good here.  
00 02 55 19 CC 15, Houston. We're estimating cut-off about 4 seconds earlier than the pad time.

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00 02 55 25 CDR Roger. Understand; 5 plus 51.  
00 02 55 28 CC That's affirmative.  
00 02 55 55 CDR Okay.  
00 02 55 56 CDR SHUTDOWN, 5 plus 51.  
00 02 55 58 CC Roger.  
00 02 56 12 CDR S-IVB tank pressure is about 32, coming down.  
The oxidizer at about 28, coming down on the fuel.  
00 02 56 21 CC Roger.

NOTE

After the Hawaii pass following TLI, there is continuous acquisition among Goldstone, Madrid, and Honeysuckle.

00 02 57 16 CDR Okay, Gordo. Got the ... for you ...  
00 02 57 22 CC 15, Houston. We're getting a lot of static for some reason. Say again, please.  
00 02 57 27 CDR Roger, Gordo. I've got to cut off residuals when you're ready to copy.  
00 02 57 32 CC Go ahead.  
00 02 57 35 CDR Okay. We cut off on a  $V_I$  of 35614. TFC was plus 02;  $V_G$  was ... 05; DELTA- $V_C$  ... minus ... 4.5 ... H-dot ... and altitude is 167.4.  
00 02 58 07 CC 15, Houston. Most of your readback is blocked by static. Let's wait a little while and try it again.  
00 02 58 14 CDR Okay, Gordo.  
00 02 58 47 CDR And, Houston, we have the S-IVB in ORB RATE.  
00 02 58 51 CC Roger. You're loud and clear now.  
00 02 58 54 CDR Okay.

00 02 59 16 CDR Okay, Houston. I've got the data if you want to copy.

00 02 59 20 CC Okay. Sounds good now. Go ahead again.

00 02 59 24 CDR Okay. DSKY was 35599;  $V_G$  plus 145; and a DELTA- $V_C$ , minus 14.9; TFC, plus .02. And, for your information, the H-dot was 4353 and the H was 167.4 at cut-off.

00 03 00 01 CC Roger. Say again what that figure plus 02 was?

00 03 00 07 CDR Yes. TFC.

00 03 00 12 CC Roger. Okay. Copied all that. And, for your information, the maneuver to the TD&E attitude should start about 1 second earlier than the flight plan; 3:10:53.

00 03 00 26 CDR Roger. 3:10:53.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 03 16 37 CC Apollo 15, Houston.

00 03 16 39 CDR Houston, 15.

00 03 16 41 CC Everything looks good here. You're GO for transposition and docking.

00 03 16 46 CDR Roger. GO for a transposition and docking.

00 03 21 54 CDR Okay, Houston, 15; 30 seconds.

00 03 21 57 CC Roger.

00 03 22 49 CDR Okay, Houston; we got a good SEP.

00 03 22 51 CC Roger.

00 03 22 59 CDR And PRIME PROPELLANT B SECONDARY and Delta PRIME and SECONDARY with barber pole, and they're both in gray, now - reset.

00 03 23 08 CC Roger.

00 03 24 19 CC 15, Houston. Would you give us OMNI Bravo?

00 03 24 23 CDR OMNI Bravo.

00 03 25 08 CDR Okay, Houston. Looks like you've got a good LM in there, and we're rolling now, and the opening rates are stopped, and you should have a TV.

00 03 25 18 CC Roger. We haven't got the picture up here yet. Stand by, and I'll give you a check on that.

00 03 25 22 CDR Okay.

00 03 26 21 CC 15, Houston.

00 03 26 23 CMP Go, Houston.

00 03 26 25 CC Goldstone is receiving the carrier, but we're not getting any signal on the carrier for the TV. Over.

00 03 26 30 CDR Okay; we've got a good picture on the monitor up here.

00 03 27 14 CC 15, Houston; we're getting a picture now, and the LM is coming in the lower right-hand corner of our field of view.

00 03 27 20 CDR Okay.

00 03 28 10 CDR Okay, Houston. It looks like we have a good high-gain antenna. Do you want us to give you the high gain or stay on the OMNI?

00 03 28 17 CC Stand by.

00 03 28 26 CC We'll take the high gain, Dave.

00 03 28 30 CDR Roger. Going HIGH GAIN.

00 03 28 56 CDR Okay, Houston. We're in AUTO and MEDIUM. Looks like we got a good lock.

00 03 28 59 CC Roger; and we're getting a very good picture here. It's - it's over on the right-hand side of the field of view.

00 03 29 34 CC 15, Houston. Request WIDE BEAM width, please.

00 03 29 39 CDR WIDE BEAM.

00 03 31 05 CC 15, Houston. The centering on the picture is good now, and we're getting an excellent quality picture.

00 03 31 11 CDR Very good. We're almost there.

00 03 32 49 CDR Capture.

00 03 32 51 CC Roger.

00 03 33 34 CDR We're retracting.

00 03 33 36 CC Roger.

00 03 33 48 CMP Hard dock, Houston.

00 03 33 50 CC Roger.

00 03 36 07 CDR Okay, Houston, 15.

00 03 36 09 CC Go ahead.

00 03 36 12 CDR Okay; that all went fairly nominally, and the only different thing we've noticed is the SPS THRUST light on the EMS is now on. And we don't know when it came on; somewhere in the process here.

00 03 36 25 CC Roger. Understand the SPS THRUST light is on.

00 03 36 28 CDR And all the switches are off.

00 03 38 23 CC Apollo 15, Houston.

00 03 38 26 CDR Go ahead.

00 03 38 29 CC Stand by 1.

00 03 38 34 CDR Houston, 15.

00 03 38 44 CC 15, Houston. We'd like you to pull both SPS PILOT VALVE circuit breakers on panel 8.

00 03 38 53 CDR Okay; that's being done. They're both open.

00 03 38 59 CC Roger.

00 03 55 06 CC Apollo 15, Houston.

00 03 55 09 CMP Houston, 15. Go ahead.

00 03 55 11 CC At 3:55:54 - about 40 seconds - nonpropulsive vent will be opened on the booster.

00 03 55 21 CDR Roger, Gordo. Understand.

00 04 11 30 CC Apollo 15, Houston. The vent should be complete now.

00 04 11 35 CDR Okay; understand.

00 04 14 25 CMP Houston, 15.

00 04 14 28 CC Go ahead.

00 04 14 30 CMP Roger, Gordo. We're ready to get the pyro arm and logics on now.

00 04 14 34 CC Stand by.

00 04 14 35 CDR Okay, logics coming on; LOGIC 1; LOGIC 2.

00 04 14 47 CC You're GO for pyro arm.

00 04 14 50 CDR Roger.

00 04 17 42 CDR Okay, Houston; we'll SEP at 4:18.

00 04 17 45 CC Roger; stand by.

00 04 18 12 CDR Okay, Houston; we got a good SEP.

00 04 18 14 CC Roger.

00 04 29 41 CDR Okay, Houston; 15. We have the S-IVB in sight, and it looks like it's probably about - oh 7 or 800 feet away.

00 04 29 49 CC Roger.

00 04 30 08 CDR Houston, 15.

00 04 30 10 CC Go ahead, 15.

00 04 30 12 CDR Roger. We have the S-IVB in sight, and it looks like it's 500 feet or so away.

00 04 30 19 CC Roger. We copied the first time. If it's okay with you and looks clear, we'll command the yaw maneuver.

00 04 30 24 CDR Roger. It - it looks like a clean bird out there.

00 04 30 31 CC Roger. We'll be sending the yaw command at 4:31.

00 04 30 40 CDR Roger.

00 04 31 03 CDR Okay. We can see the thruster activity on the S-IVB.

00 04 31 08 CC Roger.

00 04 31 13 CDR It looks like a light mist and a sort of conical shape, maybe - oh, 100 feet long or so.

00 04 31 18 CC Roger.

00 04 31 56 CDR And, Houston, as a sidelight, we can verify that  
the Falcon has his Rover aboard.

00 04 32 03 CC Very good.

00 04 32 55 CDR Houston, 15.

00 04 33 07 CC Go ahead.

00 04 34 00 CC Go ahead, 15.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 04 32 06 CDR As we watch the S-IVB drift away here, how about passing along to Jim Harrington at the Cape congratulations from the crew to the launch team for a superior job.

00 04 32 16 CC Okay. We sure will.

00 04 32 20 CDR Smooth all the way, and right on time.

00 04 32 25 CC Gerry Griffin reports that he's already done that.

00 04 32 27 CDR Good.

00 04 32 28 CC But we'll second it from the crew.

00 04 34 54 CC Apollo 15, Houston. Over.

00 04 34 55 CMP Houston, 15.

00 04 34 57 CC I was thinking about your SPS-THRUST-ON-light problem, and we'd like you to verify the positions of the EMS FUNCTION and MODE switches.

00 04 35 08 CMP Roger. OFF and STANDBY.

00 04 35 14 CC Roger.

00 04 36 11 LMP Houston, this is 15. We're starting to configure for charging battery B.

00 04 36 17 CC Roger.

00 04 38 40 CC Apollo 15, Houston.

00 04 38 42 CDR Houston, 15.

00 04 38 44 CC I think you may have missed a VERB 66 - right there just after LM ejection. We need one now.

00 04 38 51 CDR Roger. In works.

00 04 39 19 CDR And, Houston, 15. The S-IVB looks nice and stable out there. You're GO for your basic maneuver as far as we're concerned.

00 04 39 25 CC Okay; fine. We - were just about to ask you on that.

00 04 39 29 CDR Okay.

00 04 39 31 CC It'll be started at 4:40.

00 04 39 36 CDR Roger; 4:40. And we're just about 90 degrees abeam.

00 04 39 44 CC Roger.

00 04 40 45 CDR Okay, Houston. We see the S-IVB moving very slowly.

00 04 40 49 CC Roger.

00 04 45 17 LMP Houston, this is 15.

00 04 45 19 CC Go ahead, 15.

00 04 45 21 LMP Do you want us to terminate the charge when - when I'm reading 39.5?

00 04 45 29 CC Stand by. Jim, we'll call you, based on integrated amp-hours that we figure out down here.

00 04 45 43 LMP Okay; fine.

00 04 48 07 CDR Houston, 15.

00 04 48 10 CC Go ahead.

00 04 48 12 CDR Okay; we have a LM/CM DELTA-P of plus .2 at the present time.

00 04 48 17 CC Roger, Dave. Plus .2.

00 04 51 30 CC 15, Houston.

00 04 51 33 CMP Houston, 15. Go ahead.

00 04 51 36 CC We need to have you re - reinitialize the HIGH GAIN. We'd like you to set PITCH, minus 30; YAW, plus 98; and go to REACQ. Over.

00 04 51 51 CMP Roger. We copied minus 30 and plus 98.

00 04 51 55 CC Roger.

00 04 52 44 CMP Houston, 15. How do you read?

00 04 52 47 CC Loud and clear.

00 04 52 55 CC 15, Houston. Watch your middle gimbal.

00 04 53 00 CMP Roger.

00 05 00 31 CC 15, Houston.

00 05 00 34 CMP Houston, 15. Go ahead.

00 05 00 36 CC At 5:01:20, we'll be starting a LOX dump through the S-IVB engine. And we have the REFSMMAT when you're ready for it - for the P52.

00 05 00 50 CMP Okay. You want POO and ACCEPT?

00 05 00 55 CC Affirm.

00 05 04 37 CC 15, Houston. The computer's yours. You have a new REFSMMAT, and the trunnion bias has been zeroed.

00 05 04 44 CMP Roger, Gordo. Thank you.

00 05 25 53 CC Apollo 15, Houston. Over.

00 05 25 56 LMP Go ahead, Houston.

00 05 25 58 CC When you get a free moment, we have a reasonably short procedure in a line with checking out the SPS THRUST light. Over.

00 05 26 10 LMP Okay. Stand by.

00 05 26 43 LMP Go ahead, Gordo. We're ready to copy.

00 05 26 45 CC Okay. We see you're starting the P52. This shouldn't interfere, but it - We can wait if you wish.

00 05 26 54 LMP I'm just going to copy the procedure, and we'll do it later.



00 05 26 56 CC Okay. It's - it's the kind of thing we have to watch on the ground as you do it, so it's probably not even worth writing down.

00 05 27 05 LMP Okay. Let's wait then until after P52.

00 05 27 07 CC All right.

00 05 29 13 LMP Houston, 15.

00 05 29 16 CC Go ahead.

00 05 29 18 LMP Okay, Gordo. If you're reading, I've got the gyro torquing angles up, and I'll torque them out at 5:30.

00 05 29 22 CC Okay; we're reading the DSKY. Understand 5:30.

00 05 51 59 CC Apollo 15, Houston. Standing by with a lift-off plus 15 abort pad.

00 05 52 06 LMP Stand by.

00 05 52 40 LMP Okay, Gordo. I'm standing by for the pad.

00 05 52 46 CC Okay. It's GET of ignition of 015:00; DELTA-V<sub>T</sub>, 4926; minus 175; 051:20. Go ahead.

00 05 53 12 LMP Stand by.

00 05 53 55 LMP All right, Gordo, give me that - It's a P37 pad that you have there?

00 05 53 59 CC That's right, Jim. Sorry, I should have used that terminology.

00 05 54 03 LMP Go ahead.

00 05 54 05 CC Okay; 015:00, time of ignition; 4926; longitude is minus 175, and GET for 400K is 051:20. Over.

00 05 54 30 LMP I copied 015:00, 4926, minus 175, 051:20.

00 05 54 41 CC That's correct, Jim.

00 05 55 14 CC Go ahead.

00 05 55 28 CC 15, Houston. When you - when y'all get a chance, we'd like to go with this SPS-THRUST-light check.

00 05 55 37 CMP Okay, Gordo. I'm over in the left couch now; let's go ahead and try it.

00 05 55 44 CC Okay. Stand by; I'll get everybody watching. Okay. First of all, I'd like to be sure that both the PILOT VALVE circuit breakers on panel 8 and both DELTA-V THRUST switches are OFF - both circuit breakers.

00 05 56 04 CMP Okay, Houston. Both PILOT VALVES are open, and the DELTA-V thrust switches are OFF.

00 05 56 10 CC Okay. Now when we do the following steps, we'd like you to watch the SPS THRUST light, and watch it for changes either going out or changes in intensity. We're trying to determine if it's a high-resistance or a low-resistance short, and if it gets brighter, that'll tell us something about this short with any one of these actions.

00 05 56 34 CMP Okay.

00 05 56 35 CC Okay. First item is put the thrust hand controller clockwise, and watch for light.

00 05 56 51 CMP Gordo, do you mean the THC, the translation hand controller?

00 05 56 54 CC Roger. That's what I meant. THC, clockwise.

00 05 56 58 CMP Okay. We'll go clockwise with it. We're clockwise, and no change.

00 05 57 06 CC Okay. Put the THC back to neutral.

00 05 57 09 CMP Roger.

00 05 57 20 CC Okay. SPS THRUST switch, DIRECT ON.

00 05 57 32 CMP Okay. SPS THRUST, DIRECT ON.

00 05 57 37 CC And any change in the light?

00 05 57 39 CMP I didn't see any change. And it's OFF.

00 05 57 46 CC Okay. Back to NORMAL.

00 05 57 47 CMP Roger. Back to NORMAL.

00 05 57 50 CC Okay. We'd like you to do the first part of an EMS DELTA-V check - from page G/2-5 and just the first steps - down to the - don't have to do the bias check, but the first six steps there.

00 05 58 11 CMP Right.

00 05 58 22 CC Idea here is to check for a possible short in the DELTA-V test circuits. It might be causing the light on.

00 05 58 45 CMP Okay, Gordo. That part of the check's been run and shut off at a minus 21.4 in 10 seconds, and the SPS light - the SPS THRUST light got distinctly brighter during the decelerat - or during the acceleration period.

00 05 59 02 CC Roger, Al. Copy. And I'll see if there's anything else they want to do here.

00 05 59 11 CMP Roger.

00 05 59 34 CC Okay, Al. I guess no more questions right now. We'll mull that over a little bit.

00 05 59 39 CMP Okay, Gordo.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 06 16 20 CC Apollo 15, Houston.

00 06 16 24 CDR Houston, 15.

00 06 16 26 CC I've got a short update for your erasable load update as contained in the back of the G&C Checklist. Three num - three addresses to update. Over.

00 06 16 41 CDR Okay; go ahead.

00 06 16 43 CC Turn to page G/9-4.

00 06 16 51 CDR Stand by.

00 06 17 31 CMP Okay, Gordo; go ahead. I got the G&C Checklist out now.

00 06 17 35 CC Okay; on that 9-4, the first one is changing NBD-X, the static drift compensation for the X-gyro. Under load Alfa, the octal ID number 11, which now reads 77332, change that to 00377. Over.

00 06 18 00 CMP Understand. That's Alfa octal ID 11, where it now says 77332, change that to read 00377.

00 06 18 10 CC That's affirmative. And load Bravo, IDs 4 and 5 are changed. This changes T<sub>ephem</sub> to correspond with actual lift-off. And load 4, which is now 30560, change that to 32251. And while you're still writing, change the next one, load - or ID number 5, from 10000 to 26157.

00 06 18 49 CMP Roger; understand. That's column Bravo, IDs 4 and 5, change 4 to 32251, and 5 to 26157.

00 06 19 00 CC That's correct. That's - that takes care of it, Al.

00 06 19 05 CMP Okay.

00 06 43 49 CC 15, Houston. Over.

00 06 43 53 CDR Houston, 15. Go.

00 06 43 55 CC If you're not using the optics, we suggest you zero them; they're - we notice them drifting.

00 06 44 01 CDR Okay; thank you.

00 06 44 21 CDR We've been taking turns looking at the Earth through the telescope. It's a fantastic sight.

00 06 44 28 CC Roger, Dave.

00 06 44 45 CDR As a matter of fact, this sure would be a neat place for a space station out here.

00 06 44 53 CC Roger.

00 07 34 59 CC Apollo 15, this is Houston.

00 07 35 03 CDR Hello, Houston, Apollo 15. Go.

00 07 35 10 CC Hey, the results that we got out of that last test procedure - didn't solve many problems for us. I guess the best we found out was that we don't have a simple problem like a stuck EMS relay. And there's a lot of thinking going on down here, and at the present time, we line up three - three possibilities, depending on where the ground is in the system. And the first one is that it's still a ground that simply turns on the light and affects nothing else. Second possibility, that it's a ground that's going to light the engine early when you put on the DELTA-V THRUST switches. And there's a third possibility, that the - the ground is upstream of the pilot valves, and that we'll bro - we'll blow the PILOT VALVE circuit breakers and lose that bank, if - if we're unlucky. We're busy down here working on a procedure that we could use at midcourse correction 1 to decide which - which of these three possibilities is the right one. And we're talking about getting this all worked out and sent up to you in about 2 hours.

00 07 35 28 CDR Okay; understand. Good luck.

00 07 35 30 CC Righto.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 07 40 51 CDR Houston, this is 15.

00 07 41 01 CC 15, this is Houston.

00 07 41 04 CDR You have down a null bias check. DELTA-V with .9.  
Over.

00 07 41 13 CC Roger. We read DELTA-V, .9.

00 07 52 26 CC 15, this is Houston.

00 07 52 30 CDR Houston, 15.

00 07 52 33 CC We're seeing a low O<sub>2</sub> repress package pressure down  
here. Okay; we'll take that back. We have a  
suspicion that we have a low O<sub>2</sub> repress package,  
and I would like to have an onboard read-out of  
your pressure there.

00 07 52 50 CDR Okay.

00 07 53 03 CDR Houston, it is a little low. We just never finished  
filling it after we pressurized the tunnel.

00 07 53 09 CC Roger.

00 07 53 14 CC They say they'd like to go to fill now and get  
it filled up.

00 07 53 18 CDR Roger. We'll do that.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 09 09 59 CC Apollo 15, this is Houston.

00 09 10 03 LMP Houston, 15. Go.

00 09 10 06 CC Hey, would you ask Al to give us about 3 seconds on the NOUN 49, so we can read them out down here?

00 09 10 13 LMP Oh, very well.

00 09 19 43 CC 15, this is Houston with an update for your procedures for UV photos.

00 09 19 52 CMP Stand by 2.

00 09 19 58 LMP And, Houston, that last NOUN 49 looked like 60 and 16.

00 09 20 05 LMP Houston, we have - -

00 09 20 06 CC We copy.

00 09 20 07 LMP ... NOUN 49 looked like ...

00 09 22 36 CMP Houston, this is 15. Ready on that update concerning the UV photos.

00 09 22 42 CC Roger. On page 3-15 in the Flight Plan, in the left column, about the 17th line down, we have two frames with filter number 2.

00 09 22 58 CMP I found that line.

00 09 23 00 CC Roger. And instead of two frames at 20 seconds, we would like one frame at 20 seconds; and we would like a second frame at 2 seconds.

00 09 23 21 CMP Roger. I copy one at 20 seconds and one at 2 seconds.

00 09 23 31 CC Roger. The reason for that is that they have recently - measured a secondary light leak in that filter, and they need a - two different exposures like this to really separate the two peaks in the filter transmissivity.

Incidentally, this is going to pertain to all the UV photography of the Earth on down the line, but we'll - we'll update it as we come to them.

00 09 24 16 CC And, 15. We have a - perm - a preliminary procedure about to come up to you to see if we can isolate whether this ground and the SPS system is in bank A or bank B. And that'll be coming up in just a few minutes. We - -

00 09 24 34 CMP Okay. I understand.

00 09 24 35 CC And we would like to do that before we start the UV photography.

00 09 24 40 CMP Very well.

00 09 26 38 CC 15, this is Houston. I have the preliminary procedure I spoke about, and we're hoping you might be able to do it while A1 works with the P23.

00 09 26 48 LMP Okay; go ahead.

00 09 26 53 CC You might refer, if you want to see what's going on, to drawing 8.9 down in area E-3. We're playing with the - DELTA-V THRUST switch, and the idea is this. First of all, let's open the - the GROUP 5 circuit breakers on panel 229, both MAIN A and MAIN B. That's a backup to the SPS PILOT VALVES on PANEL 8, which we also want open. Verify that.

00 09 27 25 LMP Okay. GROUP 5, MAIN A and MAIN B on 229. Stand by.

00 09 27 33 LMP Both are open.

00 09 27 35 CC Roger. We've verified GROUP 5, both open; and the SPS PILOT VALVES, both open. Then, we'd like to take the DELTA-V THRUST A switch and try to balance it right in a center position. Tease it back and forth a little bit - to see if you can get any flickering in the SPS THRUST - THRUST-ON light.

00 09 27 58 LMP Okay. Stand by.

00 09 28 05 CC Jim - Let's - let's hold up a little bit before we do that. We don't - We're not all set up down



here to watch that also. So let's - let's read on through the procedure.

00 09 28 15 LMP Okeydoke.

00 09 28 16 CC If the light does flicker, of course, that's going to isolate, in this case, if we were playing with - with the DELTA-V THRUST A switch. That'll isolate the problem into the - to the A bank of valves. If we don't see any flicker, then we'll go ahead and try it with the - with the B bank. Actually, we would like to go ahead and do it with the B bank also. So, stand by.

00 09 28 41 LMP Okay. I understand. Standing by.

00 09 28 55 CC We'd like to have a HIGH GAIN, MEDIUM.

00 09 29 01 LMP HIGH GAIN, MEDIUM.

00 09 30 41 CC 15, this is Houston. We're ready to go ahead. Verify again the GROUP 5 breakers and the SPS PILOT VALVE breakers, and then let's tease that DELTA-V THRUST A switch. Try to balance it in the central position.

00 09 30 56 LMP Okay. Will do. We - we note that trying 8.9 Echo 3 doesn't seem to ... what you're doing.

00 09 31 17 CC Actually, it's area Echo 3 and 4, and it simply shows you the DELTA-V THRUST switches there.

00 09 31 24 LMP Oh, okay. Okay.

00 09 31 27 CC The light has a contact, whether that switch is on or OFF, and we would like to balance it halfway between, so that we don't have a contact.

00 09 31 36 LMP Okay. Here goes DELTA-V A now. Okay A is up and on, and the SPS THRUST light is off.

00 09 32 00 CC Would you confirm that the DELTA-V THRUST A switch is up and the light went out. Is that correct?

00 09 32 06 LMP That's correct. It's still in the up and on position, and when I went to the on position, the light went out.

00 09 32 13 CC Thank you.

00 09 32 17 LMP I'll just leave it there while you think about it.

00 09 32 18 CC Thank you. Read. Stand by.

00 09 34 48 CC 15, this is Houston. We'd like to feel our way ahead here, and we'd like to have you put DELTA-V THRUST - A back to OFF.

00 09 35 01 LMP A is OFF, and the light remains off.

00 09 35 07 CC We copy.

00 09 35 39 CC 15, this is Houston. Our telemetry confirms both of your observations, and we would now like to have you cycle Bravo.

00 09 35 47 LMP Roger. Bravo is up and on; the light is off. Now Bravo is OFF, and the light remains off.

00 09 36 00 CC We copy.

00 09 36 45 CC 15, we'll sit tight and think about that for a while. Thank you.

00 09 36 50 LMP Roger.

00 09 44 21 CC 15, this is Houston. As a final check as to what's happening in that switch, we'd like to have you tap around the DELTA-V THRUST switches a bit. See if any light flickering comes on.

00 09 44 33 LMP Roger. In work. Would you believe, it came on!

00 09 44 44 CC We copy, and we saw it down here. Okay. With the light on now. Let's cycle Bravo on and try to tease it in the middle if it stays on.

00 09 45 02 LMP Okay. Cycling Bravo.

00 09 45 16 LMP Okay. No change at all with the Bravo on, cycling several times through the middle.

00 09 45 20 CC We copy. Okay. Leave Bravo OFF, and let's cycle A again.

00 09 45 31 LMP Roger.

00 09 45 41 LMP Okay. Right in the center of - the contacts with A, right between the two, I can get the light to go out. But now, when I go on up - up and on, the light comes on again. And now, I've come back to the OFF position, and the light's off. So, I think you've isolated your problem.

00 09 45 59 CC Roger.

00 09 48 47 CC 15, this is Houston. We're willing to stop playing with the - with the light problem at the present time. We'd like to verify that both DELTA-V THRUST switches are OFF. And we'd like to have the GROUP 5 circuit breakers both closed, but please keep the PILOT VALVE circuit breakers open.

00 09 49 05 CDR Okay. DELTA-V THRUST verified OFF. PILOT VALVES verified open, and we'll close the GROUP 5.

00 09 49 15 CC Thank you.

00 09 57 17 CDR OMNI Delta, please.

00 09 57 20 CC Roger. OMNI Delta.

00 09 57 48 CC 15, this is Houston.

00 09 57 52 SC ..., 15.

00 09 57 54 CC Let's - summarize our situation with that - with that THRUST ON light. The telemetry we got down here - we actually have two lights which show up in in that area, E-4 and 5 on diagram 8.9 - gave us some rather confusing data that we don't understand yet, but we'll be working on it. But we - we do feel confident enough that there's no need to fire the engine at the present time, and since the midcourse 1 is a correction of 2.8 feet per second, we don't think that we'll be having a midcourse 1. For your information, at the present time, midcourse 2 looks about like 5.0 feet per second.

00 09 58 42 CDR Okay; understand. We'll just hold tight; skip midcourse 1; stand by for 2.

00 09 58 47 CC Roger. And, 15, be advised we'll have a Flight Plan update in the near future.

00 09 59 01 CDR Roger. That was a pretty good S-IVB, wasn't it!

00 09 59 09 CC Roger.

00 09 59 32 CC Hey, and you can tell Al up there that those look like real good P23 markings.

00 09 59 38 CDR Okay. He's glad to hear that.

00 09 59 41 CMP Very good, Karl.

00 10 05 50 CC 15, if you'll give us ACCEPT, we'll send up a new state vector.

00 10 06 04 CC Say again, 15.

00 10 06 11 CMP Okay. You have POO and ACCEPT.

00 10 09 57 CC 15, you can have your computer back.

00 10 10 07 CMP Roger.

00 10 23 52 CC We'd like to have OMNI Bravo, please.

00 10 30 10 LMP Houston, 15.

00 10 30 13 CC 15, this is Houston.

00 10 30 16 LMP Roger, Karl. Would you go back and recheck the attitude - the attitude for the - UV - pictures - pictures of the Moon?

00 10 30 30 CC Stand by. We'll check that. The numbers you have in the DSKY are what we have in the Flight Plan.

00 10 30 41 LMP Houston, 15. As you were on that. Looks like we're all set up.

00 10 30 45 CC Roger.

00 10 35 35 CC 15, this is Houston. Could we bring up the HIGH GAIN with the angles in the Flight Plan?

00 10 35 43 LMP Roger, Houston. Stand by.

00 10 39 31 CC 15, this is Houston. I have a Flight Plan update whenever you can copy it - to be followed by a P27 update and P37 block data.

00 10 39 44 LMP Stand by.

00 10 40 02 LMP Okay, Karl. I'm ... you a Flight Plan.

00 10 40 06 CC Okay. As is obvious, you can delete all of the midcourse activities, beginning there at 11:21, running through the burn status report. And the other activities this evening can be moved up so that you can go to bed as early as 12 hours GET, if you wish. A couple of notes here that we do want you to stay up until 12 hours in order that we can finish a battery charge that's in progress. And, also, that waste water dump; be sure to - to do the water dump before you start PTC.

00 10 40 45 LMP Okay. We understand that.

00 10 40 50 CC And, I'm - I've got a P37 for you - plus 25 hours, if you're ready.

00 10 40 59 LMP Stand by 1.

00 10 41 29 LMP ... I'm ready for the P37 ...hours.

00 10 41 33 CC Roger. 025:00, 4621, minus 175, 075:21; 035:00, 6821, minus 174, 074:51; 045:00, 5605, minus 175, 099:06; 060:00, 5448, minus 175, 123:06. And that's the end.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 10 42 13 CMP Readback. 025:00, 4621, minus 175, 075.21; 035:00, 6821, minus 174, 074:51; 045:00, 56:05, minus 175, 099:06; 060:00, 5448, minus 175, 123:06.

00 10 43 15 CC That's all correct. The next one I have is a P27 update.

00 10 43 22 CMP Stand by.

00 10 43 35 LMP Okay; I'm ready on the P27.

00 10 43 37 CC Roger. It's - the purpose, V71; GET 11:45:00; INDEX 21, 01501, 00001, 71465, 41437, 76654, 45425, 77003, 52553, 72602, 54007, 75455, 55217, 76267, 55324, 00402, 05560, and that's all.

00 10 45 02 LMP Okay. On the P27s; 71, 11:45:00; 21, 01501, 00001, 71465, 41437, 76654, 45425, 77003, 52553, 72602, 54007, 75455, 55217, 76267, 55324, 00402, and 05560.

00 10 45 55 CC That's all correct. Thank you, Jim.

00 11 14 00 CMP Houston - Houston, 15.

00 11 14 04 CC 15, this is Houston.

00 11 14 07 CMP Roger, Karl. We've got the gyro torquing angles for the P52, and we'll torque them out on the minute.

00 11 14 12 CC Roger. We've copied them.

00 11 14 30 LMP And, Houston, this is 15 now. Looking at the OXIDIZER PRESSURE on the SPS, looks like it's a little low; I just wondered what you all are reading down there.

00 11 14 55 CC 15, this is Houston. We're reading a pressure of 168 down here on the SPS OXIDIZER and that's normal at this time. We expect it to be a bit low because of absorption in the helium.

00 11 15 09 LMP Okay; thank you.

00 11 15 34 CC And, 15, this is Houston. When you doff your biomed harnesses, we'd very much like to have you double check those sensors. We've been getting poor readings in respiration from all three of you, and we'd like to have you report any anomalies in - in how they're rigged on you.

00 11 15 57 CDR Roger. We'll do that.

00 11 15 58 CC You could send that down with the evening report.

00 11 16 02 CDR Okay.

00 11 38 11 CC 15, this is Houston. Anytime you have the time to copy down six lines of information, I could give you a general update on the UV filter photography.

00 11 38 27 CMP Okay; stand by 1, Karl.

00 11 38 54 CC And, 15, we'd like to have you verify that the waste-water dump has been terminated.

00 11 39 00 CMP That's a verify.

00 11 39 55 LMP Okay, Karl; I'm ready to copy Flight Plan change relative to the UV.

00 11 40 01 CC Roger. The change is the same as I gave you before. When you're shooting the Earth, two frames with filter 2, at - what was formerly two frames with filter 2, exposure time 20 seconds, in the future, it will be one frame, filter 2 with an exposure time of 20 seconds. And one frame, filter 2, exposure time 2 seconds. And the following is a - places that this occurs in the Flight Plan in the future. First is page 3-38, line 17. I believe we've probably passed that one already. The next one is - Negative, we haven't passed that one yet. The next one is page 3-57, line 16. The third is page 3-167 - both at 123 hours 49 minutes and 123 hours 56 minutes. The next is page 3-352, line 16. The next is page 3-378, line 16, and the final one is page 3-402 parenthesis, it says here, Earth UV, line 16.

00 11 40 44 LMP Roger. I copied all that, Karl.

00 11 40 46 CC Roger.

00 11 44 04 CMP Houston, 15.

00 11 44 07 CC 15, this is Houston. Go ahead.

00 11 44 10 CMP Okay, Karl. Would you check the page for PTC, and let me know what that VERB 49 attitude is? It says, VERB 49 maneuver to PTC, NOUN 20, 090 and 000.

00 11 44 45 CC 15, this is Houston. I understand that you used the present roll. The one you have now, I believe, is 169.6 and, then, the other two numbers give you pitch and yaw.

00 11 44 58 CMP Affirm. Roger, Karl; thank you.

00 11 45 49 CMP And, Houston, 15; we're maneuvering to PTC attitude now.

00 11 45 54 CC Roger, 15. We copy.

00 11 47 16 CC 15, this is Houston. We'd like to have a LM/CM DELTA-P whenever you can check that number for us?

00 11 47 24 CMP Okay, Karl. Stand by 1.

00 11 49 17 LMP Okay, Houston; the DELTA-P is point - plus .4 and we're going to secure the high gain and give you OMNI Bravo.

00 11 49 30 CC Roger, 15; we copy.

00 11 49 36 LMP And, Houston, we're doing an O<sub>2</sub> purge on the fuel cell, presently purging fuel cell 3, and I'm getting a FUEL CELL 3 caution light.

00 11 49 48 CC Roger. We copy.

00 11 50 58 CC 15, this is Houston; we'd like to have OMNI Charlie.

00 11 51 43 CMP Houston, 15. Say again your last.

00 11 51 47 CC Roger. That last comment was to give us OMNI Charlie.



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00 11 51 53 CMP Roger. Charlie.  
00 12 04 54 CC 15, this is Houston.  
00 12 04 57 CDR Houston, 15; go ahead.  
00 12 04 59 CC Your spacecraft rates are low enough now to spin  
up for PTC, but we'd like for you to verify first  
that all of your dumping has been finished.  
00 12 05 17 CDR Karl, we'll hold off for a little bit here and  
finish up the dumping before we go into PTC.  
00 12 05 24 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 12 18 39 CC 15, this is Houston. In connection with the respiration sensor problem, we'd like for you to - go through a special procedure for us before you - you - you doff your biomed harnesses.

00 12 18 59 CDR Okay. Stand by 1, Karl.

00 12 19 25 CDR Okay, Houston; ready to copy special procedure.

00 12 18 29 CC I'm sorry. I didn't - I don't think it needs copying, but we'd like all three of you - when you go into the doffing phase here, we'd like all three of you to pull off the impedance pneumograms. Those are the two respiration sensors back on your kidneys there. Pull them off, and let any - let any trapped air get out, and then reseal them and give us a couple of minutes of read-out down here to see if that improves the situation.

00 12 20 01 CDR Roger. We'll do that.

00 12 20 31 CC 15, this is Houston. We can terminate the battery Bravo charging.

00 12 20 38 CDR Roger.

00 12 29 14 CMP Houston, this is 15. We've terminated the charge on battery B.

00 12 29 21 CC Roger, 15. We copy.

00 13 03 09 CMP Houston, 15.

00 13 03 13 CC 15, this is Houston.

00 13 03 17 CMP Okay, Karlos. Looks like we're getting organized, and we'll go ahead with the PTC now. Do you have any preference on which jets to use?

00 13 03 25 CC Roger. We'd like to have you use the B/D jets.

00 13 03 31 CMP Understand; B/Ds. I guess that would be B-2, D-2, huh?

00 13 03 35 CC Say again, Al.

00 13 03 39 CMP Guess that means you want us to use B-2 and D-2, huh?

00 13 03 43 CC That's affirmative. And we'd like you to - to hold the spinup until we - Okay; we're able to give you a GO for spinup now.

00 13 03 55 CMP Okay; understand the rates are favorable for a spinup DAP.

00 13 03 59 CC That's affirmative.

00 13 08 19 CMP Okay, Karl, this is Apollo 15. If the rates still look good down there, we're ready to go to PTC.

00 13 08 28 CC That's affirmative, Al. Go ahead and spin her up.

00 13 08 35 CMP Okay.

00 13 08 57 CC We'd like to select OMNI Bravo now.

00 13 09 05 CMP Roger, Houston. OMNI Bravo.

00 13 25 40 CC 15, this is Houston. How's the view up there?

00 13 25 47 CMP Houston, 15. It is fantastic, Karl. You ought to be here, man.

00 13 25 55 CC I'm eating my heart out.

00 13 26 07 CDR Karl, I think you said that just to be mean.

00 13 26 23 CC And how does 13 hours of continuous zero g feel?

00 13 26 33 CDR Well, I think everybody is pretty well adjusted, Karl; no problems at all, and we've finished dinner and we're happy.

00 13 26 44 CC Very good.

00 13 37 48 CC 15, this is Houston. On your PTC, when it started out, it looked okay; but we find that it's diverging now, and we're going to have to reinitialize it. We suggest that this time around that we use a - a rate of .375 in NOUN 79. That might help.

00 13 38 11 CDR Okay; .375 in NOUN 79.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

00 13 51 54 CDR Houston, 15.

00 13 51 57 CC 15, this is Houston.

00 13 52 01 CDR Roger, Karl. When the rates look like they're down again, we'll try PTC again.

00 13 52 06 CC Roger. We'd like to have you verify that all the vents are secured before we spin it up again.

00 13 52 18 CDR In work.

00 13 52 28 CC And, 15, in this damping process, we'd like to make sure that all of the jets on two adjacent quads are disabled.

00 13 52 38 CDR And Roger. It's in work.

00 13 53 19 CC And, 15, as a part of trying to figure out what went wrong with that first PTC, we'd like to know whether or not you went into any exercise period after - after we spun it up.

00 13 53 33 CDR That is negative, Karl.

00 13 53 36 CC Roger.

00 13 53 49 CDR And, Houston, the LMP and CDR have recycled their impedance pneumograms. You can give us a word if you see - if you see any improvement in data.

00 13 54 30 CC Dave, we missed that last transmission. Could you say again?

00 13 54 35 CDR Roger. The LMP and CDR have recycled the impedance pneumogram, and we just wondered if you'd seen any improvement in data.

00 13 54 45 CC Okay; he's looking at it now, and he says, yes, it has improved.

00 13 55 45 CC 15, the Surgeon says it's okay for the CDR and the CMP to doff their biomed harnesses now. Thank you.

00 13 55 54 CMP Okay. ...

00 13 55 55 CDR Did that - did that recycling do any good?

00 13 55 58 CC Roger. The recycling cleared up the respiration data we have down here very nicely.

00 13 56 07 CDR Okay, good.

00 14 00 20 CC 15, this is Houston. Everything down here looks good for the spinup.

00 14 00 28 CMP Okay, Karl. We'll spin them up then.

00 14 03 39 CC 15, this is Houston. I'm sorry to tell you that that spinup didn't work very well. We're going to have to reinitialize again.

00 14 04 03 CMP Okay, Houston. We'll try it again.

00 14 04 06 CC And, Al, the - Stand by.

00 14 04 12 CMP Roger, Karl. Hey, Houston, 15.

00 14 04 19 CC Go ahead.

00 14 04 21 CMP Yes, Karl, I think if there was a problem that time, it was because I hesitated just momentarily, thinking I had it FREE, and I ended up in HOLD.

00 14 04 29 CC Thanks; thanks for the information.

00 14 04 34 CMP Okay.

00 14 05 20 CC And, 15, we think that your jet configurations were all okay that time around, but we'd like to confirm that, during damping, you disable all jets on two adjacent quads, and then for the spinup, you use only B-2 and D-2.

00 14 05 38 CMP That's affirm, Houston; that's affirm.

00 14 15 34 CC 15, this is Houston. Everything down here looks GO for the spinup.

00 14 15 42 CDR Okay, Karl. We'll try it once more.

00 14 17 14 CC 15, that looked like a very good start.

00 14 17 19 CMP Okay, Karl.

00 14 25 41 CC 15, this is Houston.

00 14 25 56 CC 15, this is Houston.

00 14 26 00 CDR Houston, 15. Go.

00 14 26 02 CC It looks like we've got it pretty well wrapped up for your rest period. We've got three or four small items to remind you here. Crew status report is outstanding; onboard read-outs, we'd like; and whenever you're ready, we're ready for an E-memory dump.

00 14 26 24 CDR Okay. We're about at that point of the checklist, and we'll give you the whole page at one time. Stand by 1.

00 14 26 30 CC Okay.

00 14 32 44 CDR Okay, Houston, 15. We're ready for the E-memory dump for you, if you're ready.

00 14 32 53 CC Okay, 15. We're ready to go with it.

00 14 32 58 CDR Okay, here it comes.

00 14 33 52 CDR And, Houston, 15. We've got the rest of the pre-sleep checklist if you're ready to copy.

00 14 34 07 CC Roger, 15. We're ready to copy.

00 14 34 12 CDR Okay. Crew status report: everybody's in good shape; no medication today. Onboard read-outs: BAT C, 37.0; PYRO BAT A, 37.2; PYRO BAT B, 37.2; RCS A, 94; B, 92; C, 94; D, 94. And the water has been chlorinated; the H<sub>2</sub> fans have been cycled; the valves are all verified; got your E-memory dump. The cabin is at 5.7; DIRECT O<sub>2</sub> is closed, and I guess we're ready to go to sleep communications configuration.

00 14 35 23 CC Roger, 15. We copy all of that, and the Surgeon has a question about - were there - were there any obvious anomalies in the biomed harness?

00 14 35 34 CDR No, as a matter of fact, we were just discussing that. Al and I both have taken them off, and the sponges are all still quite damp and have their color and they're all sticking very well. I think the system looks real good.

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00 14 35 47 CC Very good. Thank you.

00 14 35 51 CDR Roger.

00 14 36 03 CC 15, this is Houston. I guess we're ready to go to the presleep comm configuration.

00 14 36 12 CDR Roger.

00 14 36 14 CC Good night.

00 14 36 17 CDR Okay; good night.

00 14 36 21 CC Incidentally, 15, your PTC's looking very good.

00 14 36 26 CDR That's good.

00 14 36 46 CDR By the way, Karl, it's about time for you to get some sleep too, isn't it?

00 14 36 50 CC Roger. It's been a long day for all of us.

00 14 36 53 CDR Yes, I think you're a couple - 3 hours ahead of us.

00 14 36 57 CC Not that much.

00 14 39 54 CDR Houston, 15. One more thing here. We note on page 1-24 of the Systems Book in the comm sleep configuration, you've got the S-BAND NORM VOICE - NORM MODE VOICE, OFF. Is that correct?

00 14 40 14 CC 15, this is Houston. The noise was very bad then; are you reading me?

00 14 40 21 CDR Okay, I'm reading you 5 by. Just had a question to verify the sleep configuration of the S-band. Is MODE VOICE to OFF?

00 14 40 32 CC That's affirmative.

00 14 40 33 CDR That gives ... to DOWN VOICE.

00 14 40 35 CC That's affirmative - -

00 14 40 36 CDR Okay.

00 14 40 37 CC That gives us a little cleaner TM.

00 14 40 41 CDR Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 01 27 56 LMP Houston, Apollo 15.

01 01 28 16 CC Hello, Endeavour, this is Houston.

01 01 28 20 LMP Good morning. Joe.

01 01 28 23 CC Good morning, Troops. Has the Sun come up up there?

01 01 28 27 LMP Oh yes, very bright all the way. Ready to give you our status here.

01 01 28 35 CC Roger, Dave. We're standing by.

01 01 28 42 LMP Okay. We all figure we had 8 hours. Dave figures he got his in about three; Alfred, two; and ... about five.

01 01 28 56 CC Endeavour, this is Houston. Stand by on your report. You're broken up at the moment, please.

01 01 30 26 CC Dave, this is Houston again. Go ahead. Our comm is not so noisy now.

01 01 30 35 LMR Joe, this is Jim.

01 01 30 37 CC Roger, Jim. Good morning.

01 01 30 40 LMP Good morning. Would it be okay now?

01 01 30 42 CC Roger. You're loud and clear now.

01 01 30 46 LMP Okay. We figure we all got about 8 hours sleep. The duration of that sleep was different. Dave figures he got it in about three segments; Al, about two; and - I had about five different periods of - of deep sleep. On the consumables update at 25:20; RCS A, 94; B, 94; C, 94; D, 93. On the H<sub>2</sub> tank 1, 95; 2, 93; and 3, 81. O<sub>2</sub> tank 1, 91; 2, 93; and 3, 96. Standing - -

01 01 31 34 CC Roger, Jim. Copy.

01 01 31 35 LMP - - by to charge battery A. And, Joe, I'm standing by to charge battery A.

01 01 31 41 CC Okay, Jim. Could you stand by on that? We'd just as leave you not do it right at the moment.

01 01 31 49 LMP Okay. We'll stand by.

01 01 31 50 CC Roger. And we'll give you the word when we're ready for that.

01 01 31 56 LMP I'll get the radiation report here shortly, and - could you confirm by position that - H<sub>2</sub> FAN should be in?

01 01 32 08 CC Roger, Jim. And, it - the H<sub>2</sub> FAN 3 should be AUTO.

01 01 32 19 LMP Roger. I copy AUTO.

01 01 32 21 CC Roger.

01 01 34 25 CC Jim, this is Houston.

01 01 34 30 LMP Go ahead, Joe.

01 01 34 36 LMP Go ahead, Joe.

01 01 34 37 CC Roger, Jim. Just for your own information here, let me read up to you the CSM consumables that we've generated from the ground.

01 01 34 49 LMP Okay.

01 01 34 54 CC Okay. At GET 25:09, we had RCS total, 90; quad A, 89, 91, 89, 91. H<sub>2</sub> tank 1, 94 percent, 92 percent, 81 percent. O<sub>2</sub> tank 1, 91 percent, 92 percent, 97 percent. So it agrees pretty well with - what you guys are reading.

01 01 35 41 LMP Good. Except for the - the RCS quantity.

01 01 35 45 CC Roger.

01 01 35 53 LMP Okay, Joe. The LM/CM DELTA-P is a plus .7.

01 01 35 58 CC Roger. Copy plus .7.

01 01 37 46 CC Endeavour, this is Houston.

01 01 37 51 LMP Go ahead, Joe.

01 01 37 53 CC Jim. Are all three people still there?

01 01 38 01 LMP All here are busy doing little things.

01 01 38 04 CC Okay, good. I've got some information for you when - you reach a minute - you - you want to listen here, and it concerns our - short - little short problem in the switch.

01 01 38 26 LMP Okay, Joe. We're all listening. Go ahead.

01 01 38 29 CC Roger, guys. We're going to ask you to do a - a test burn on your SPS a little later, in fact, around 28 and 1/2 hours. And - depending upon the results of that, we'll go ahead and do the midcourse, and it will be a normal midcourse if the burn test doesn't really come off. And it'll be a trim midcourse of some kind if - the test, in fact, does give us an SPS burn. And I'll come up to you a little later on in the day with a set of procedures. There - a long list of them, but you'll be able to use your Launch Checklist for most of them. However, the test burn will mean that we're going to change - we're going to update your Flight Plan - with a - a large number of things a little later on. About 10 minutes, I'll be reading that to you. Is it clear so far? Over.

01 01 39 31 CDR Yes. That's fine. Joe. Can you give us a little rundown on what you think the problem is?

01 01 39 37 CC Dave, when we get the better OMNI in a second, I'll start talking about that. We're about to lose the comm.

01 01 39 44 CDR Okay.

01 01 43 41 CC Endeavour, this is Houston.

01 01 43 46 LMP Go ahead, Houston.

01 01 43 48 CC Roger, guys. First of all, Dick Gordon is over in the simulator right now running through this SPS burn procedure, and as soon as he says that's okay, we'll read that procedure up to you; I guess. It's not too complicated. Dave, in regard to your last question, very briefly — and I'm sure you guys have been thinking a bit about this yourselves — we're interested in finding out exactly where in your DELTA-V THRUST A switch the short seems to be. And we're — all of us down here are convinced that it's either in that switch or physically very near that switch. It's important that — that we know where it is, because — I guess the — the worst that it could be — would be a hard short — so-called hard short — upstream of the control PILOT VALVE solenoid on bank A. And that would mean that we would lose the ability to turn bank A on and off as we wanted to. There are many other things it could be; namely, a soft short either upstream or downstream from that PILOT VALVE solenoid. Or I guess it could be a hard short downstream from the solenoid, which — all of these would be annoying to us, but no major problem, really. It - -

01 01 45 17 CDR Okay. We get the general - -

01 01 45 20 CC Go ahead, Dave.

01 01 45 20 CDR We get the general — yes, we get the general gist of that, Joe. Go ahead.

01 01 45 28 CC Okay, Dave. What — what we're going to try to do now is to go — go ahead and do an SPS burn using bank A. And we want that short to be active when we do it. So at some point, we're going to ask you to tap on the panel and try to get the short back for us. We — we show that the light is currently out, and I'm sure you'll confirm that.

01 01 45 52 CDR That — that's verified.

01 01 45 53 CC Roger. Assuming we cannot get the light on again — we think that is unlikely — but, if we can't get it on again, we'll delete this particular test and just go ahead and do a midcourse — normal midcourse 2 burn — and while we scratch our heads on this other thing.

01 01 46 14 CDR Okay.

01 01 46 18 CC Now. Dave. We've got the changes to the Flight Plan here if your recording secretary is standing by to copy it.

01 01 46 30 CDR Okay. Go ahead. I'm ready, Joe.

01 01 46 36 CC Roger, Dave. Are you just going to mark up the Flight Plan as I read it to you?

01 01 46 41 CDR I'd prefer to do it that way.

01 01 46 44 CC Roger. We think that'll be the easiest. And, Jim, are you copying this now?

01 01 46 49 LMP I'm standing by, Joe.

01 01 46 51 CC Roger. Okay. Okay. We're going to start at 25:05, and we've already deleted the charge-BAT-A line. Then moving on to 26:50, add P52 IMU realine, option 3. Moving to 27 - -

01 01 47 30 LMP I copy.

01 01 47 31 CC Okay. Moving to 27:55. Move DELTA-V test and null bias check up to 27:00. In other words, just move that line up. And coming up to 28:00 — a little something for you, Al — we're going to delete the crew exercise period. And at 28:00, add in midcourse column - MCC-Houston column - uplink to CSM, CSM state vector and VERB 66; update to CSM SPS test maneuver pad. And at 28:05, H<sub>2</sub> PURGE LINE HEATERS, on; exit G&N PTC; and maneuver to pad burn attitude. Have you copied so far?

01 01 49 26 LMP Yes, I copied everything to The MCC-H column. Understand the H<sub>2</sub> PURGE LINE HEATER, on; and exit PTC; and maneuver to pad burn attitude at 28:05.

01 01 49 36 CC Roger, Jim. And we're going to lose comm in a minute; I'll be back with you.

01 01 49 42 LMP Okay.

01 01 52 00 CC Okay, Jim; this is Houston. The comm's back again. How do you read me?

01 01 52 06 LMP Loud and clear.

01 01 52 08 CC Okay, I'm ready to continue. And we'll pick up at 28:15, with a sextant star check.

01 01 52 29 LMP Okay.

01 01 52 30 CC Okay; 28:20 I'm - going - going to read to you seven lines of instructions here, and they're all reproduced two pages over in your Flight Plan at 30:30. Your choice as to whether you want to copy them or just look two pages ahead. I'll go ahead and read the lines now.

01 01 52 57 LMP Why don't we just look two pages ahead?

01 01 52 59 CC Okay.

01 01 53 00 LMP Go ahead.

01 01 53 01 CC Okay. We're going - I - I want you to move seven of the lines from 30:30 to 28:20. And those seven lines are: the SM SECTOR 1 SM/AC POWER, on; PAN CAMERA POWER, BOOST; MAP CAMERA IMAGE MOTION, OFF; MAP CAMERA, ON, STANDBY; H<sub>2</sub> and O<sub>2</sub> fuel cell purge; waste water dump; and, at 28:35, H<sub>2</sub> PURGE LINE HEATERS, OFF.

01 01 54 02 LMP Okay, I'll ... the six steps there - -

01 01 54 05 CC Okay.

01 01 54 06 LMP - - at 28:20.

01 01 54 09 CC Roger, Jim. That's right. And the seventh step was at 28:35; you're correct, and that brings us to 28:40, which is SPS burn test. And at 28:41, VERB 66, set CSM state vector into IM state vector.

01 01 54 52 LMP Okay. Copied SPS burn pad, VERB 66.

01 01 54 55 CC Roger. 30:13, delete, and in fact, all the other items from here on out are deletes. And I'll go through them quickly. 30:13, delete battery charge A termination; 30:15, delete H<sub>2</sub> PURGE LINE HEATERS, ON; 30:18, delete exit G&N PTC; 30:23, delete - if SPS MCC required and the references to pan and mapping cameras - the things, in fact, that you moved ahead; 30:35, delete H<sub>2</sub> and O<sub>2</sub> fuel cell purge and waste water dump; and, finally, 30:50, delete H<sub>2</sub> PURGE LINE HEATERS, OFF. Over.

01 01 56 15 LMP Okay. I copied all that, Joe.

01 01 57 14 CC Okay, guys. That's all we've got for you for the moment. Dick walked into the MOCR a few minutes ago. He says that the test burn procedure went okay. We're going to look it over one last time and then read the procedures to you.

01 01 57 29 LMP Okay.

01 02 04 03 CDR Houston, this is 15. We're ready to cycle the film in the - the pan and mapping cameras.

01 02 04 22 CC Endeavour, we're ready when we get the HIGH GAIN going here. And I guess we'll have that ready about 5 minutes.

01 02 04 33 CDR Okay.

01 02 05 05 CC Endeavour, this is Houston with your HIGH GAIN ANTENNA angles; update.

01 02 05 12 LMP All right; go ahead, Joe.

01 02 05 15 CC Roger. For the HIGH GAIN, PITCH, Minus 25; YAW, 90.

01 02 05 26 LMP Okay, minus 25 and 90.

01 02 05 28 CC Roger; and the OMNI, REACQ, NBW.

01 02 05 36 LMP Roger.

01 02 05 41 CC And that's just for your information.

01 02 06 15 CC Jim, if you'll go ahead and set the angles in, we'll give you the cue when we're ready for you to select the high gain.

01 02 06 25 LMP Okay.

01 02 06 26 CC And it looks like it will be about 10 minutes, I guess.

01 02 06 32 LMP Roger.

01 02 08 22 CC Endeavour, this is Houston.

01 02 08 27 LMP Go ahead.

01 02 08 28 CC Roger, guys. Wondered if you were interested in any breakfast-time news up there?

01 02 08 36 LMP Yes, sir; we always are.

01 02 08 39 CC Is it breakfast time?

01 02 08 42 LMP Yes, it's just about.

01 02 08 52 CC Okay, Troops. Let me start with a special message of Godspeed to the crew of Apollo 15 from President Richard Nixon. And I'll quote directly from him, and there are some words in here that are very well expressed, I think. "Apollo 15 is safely on its way to the Moon, and man is on his way to another step across the threshold of the heavens. Man has always viewed the heavens with humility, but he has viewed them as well with curiosity and with courage; and these defied natural law, drawing man beyond gravity, beyond his fears, and into his dreams, and on to his destiny." And we may be losing comm here. Let me stand by for a minute.

01 02 10 48 CC Endeavour, select the HIGH GAIN for us, please.

01 02 10 59 CC Okay, guys; suddenly you're back loud and clear. How do you read, Houston?

01 02 11 11 LMP Okay, we're ...

01 02 11 41 CC Endeavour, this is Houston. How do you read?



01 02 12 04 CC Apollo 15, this is Houston. Over.

01 02 13 02 CC Hello, Endeavour, this is Houston. Over.

01 02 13 07 LMP Go ahead.

01 02 13 08 CC Roger, Jim. Sorry for the inter - interruption there. We had severe noise on our comm momentarily, but it's cleared up now. I'll go ahead with the morning's news and a quote from President Nixon. "The flight of Apollo 15 is the most ambitious exploration yet undertaken in space. Even as it reflects man's restless quest for his future, so it also reenacts another of the deeper rituals of his bones, not only the compulsion of the inner spirit to know where we are going, but the primal need in man's blood to know from what we have come. We hope, by this journey, to know better the origins of Earth, the Moon, and other planets. We hope to understand something more of the mysteries of God's great work. And, in this seeking, we hope to understand more of man himself. To the men of Apollo 15, for all men, I say, Godspeed." End quote. And there's a second message here that was telephoned to Dr. Fletcher yesterday through the State Department. It reads, "Congratulations on flawless launch. Please pass my best wishes for a successful mission to the crew of Apollo 15 and to your entire staff." And that message is signed Spiro T. Agnew. And a third comment about the launch was the launch is called flawless and you three are described as being very businesslike. And Kappy is quoted as saying, quote, "The mission was the most nominal launch we have ever had." Unquote. And I'd like to put in an editor's note here. That's probably technically correct, but it's aesthetically very incorrect. You could track the vehicle for hundreds of miles, literally hundreds of miles through beautiful clear sky, and it was a sensational launch aesthetically. I suspect you - I'm sure you will agree with that. Let's see, we've got an item here on Muhammad Ali-Jimmy Ellis fight here in the Astrodome, and it was declared a technical knockout in favor of Muhammad Ali in the last round - the 12th round. And it says that Ali took control of the fight in the 6th round and signaled the start of the end with an uppercut midway through the final round. And continuing on with the news, if you're still reading. Western Union employees - -

01 02 15 59 CDR Roger, Joe.

01 02 16 00 CC Okay. Western Union Employees have announced agreement on a new contract that will end a nationwide walkout that began June 1. The 17,000 striking workers will go back on the job Wednesday morning. The Lockheed Company lost two Senate vote - votes today in its attempt to avoid bankruptcy by obtaining a \$250,000,000 Government loan guarantee. In sporting news or further sporting news, the Oilers traded Jerry LeVias to the San Diego Chargers in exchange for two linemen, defensive lineman Ron Billingsley and the 300-pound Gene Ferguson. The Oilers will use Ferguson at offensive tackle, it says. And, finally, the Minnesota - Minnesota Vikings lost the services of starting guard Jim Vellone when the doctors revealed that - that an undisclosed ailment would require long-term extensive treatment. And that's the end of the condensed news page I have in front of me this morning.

01 02 17 14 CDR Okay. Thank you very much, Joe, and please express our appreciation to the President and the Vice-President.

01 02 17 21 CC Roger. Sure will.

01 02 17 46 CC Endeavour, Houston. Go to AUTO TRACK for us now, please, and we're going to wait for another REV before we start to cycle those cameras.

01 02 18 00 CDR Okay, Joe. AUTO TRACK.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 02 20 00 CC Endeavour, this is Houston. We'll be coming up on your camera cycling in about 15 minutes. It's for your own planning, and we'll cue you when we're ready for that.

01 02 20 14 LMP Roger. We read, Joe.

01 02 28 44 CC Endeavour, could you select your REACQ mode now for us, please?

01 02 28 51 LMP Okay. Going to REACQ.

01 02 28 53 CC Roger.

01 02 32 18 CC Okay, Endeavour; this is Houston. And we're ready for the camera cycling procedure now.

01 02 32 30 CDR Stand by, Joe.

01 02 32 32 CC Roger.

01 02 35 12 CC 15, this is Houston. If we're going to complete the camera cycling on this rev, I guess we'd better get started on that.

01 02 35 21 CDR Yes, we're in the process, Joe.

01 02 35 23 CC Okay.

01 02 36 40 CMP Houston, 15.

01 02 36 44 CC Go ahead.

01 02 36 48 CMP Okay; if you're reading all this on good telemetry down there, Joe, we'll go ahead and cycle this thing.

01 02 36 56 CC Roger, Al. Go ahead. But stand - stand by. Sorry; stand by.

01 02 37 03 CMP Okay.

01 02 37 05 CC We're not getting high bit rate data yet.

01 02 37 10 CMP Okay; we'll stand by for your cue then, Joe.

01 02 38 03 CC Al, this is Houston. Is your data system switch on?

01 02 38 12 CMP Roger, Joe. That's affirm; it is.

01 02 38 15 CC Roger.

01 02 43 20 CC Apollo 15, Houston.

01 02 43 27 CMP Go ahead, Houston.

01 02 43 28 CC Guys, we're having trouble picking up the proper data so we can monitor the film cycling process here. So we're going to have you stand by on that until our next high gain acquisition, and we'll be back with you. In the meantime, leave all the SIM bay in the present configuration, if you would, please.

01 02 43 50 CMP Roger.

01 02 43 53 CC Okay - -

01 02 43 54 CMP Is there anything we can do to help, Joe?

01 02 43 56 CC Say again, Al.

01 02 43 59 CMP Is there anything we can do to help?

01 02 44 37 CC Al, this is Houston. We don't think there's anything that - that you can do to help us at the moment.

01 02 44 52 CMP Roger, Joe.

01 02 44 54 CC Okay; and in the meantime, we'd like to talk about upcoming SPS burn, and we're going to be reading procedures up to you in a moment, and we think it's the easiest for you to copy these into your CSM Launch Checklist. So you might be looking for that and - and getting that out.

01 02 45 24 CDR Okay, Houston. I wonder if you could hold off for about 10 or 15 minutes, and let us get through the breakfast chores here, and then we can settle down and concentrate.

01 02 45 35 CC That will be fine, Dave. We'll be standing by for your call on that, and there's no hurry.

01 02 45 42 CDR Okay.

01 02 54 01 CC Apollo 15, select HIGH GAIN for us, please.

01 02 54 47 CC Endeavour, this is Houston.

01 02 54 42 CMP Go ahead, Joe.

01 02 54 54 CC Roger. Stop PTC mode for us now, please.

01 02 55 00 CMP Roger. Stand by.

01 02 58 02 CC Apollo 15, Houston.

01 02 58 08 LMP Go ahead, Joe.

01 02 58 10 CC Guys, could you tell us how far down in your cycle film procedure you've proceeded - down to what step?

01 02 58 20 CMP Joe, this is Al. We've got down to the point where we want to get a cue from you to cycle the film.

01 02 58 27 CC Okay, Al; that's fine. We copy that, and we suspected that, but wanted to confirm it.

01 03 01 02 CC Al, this is Houston.

01 03 01 06 CMP Go ahead, Joe.

01 03 01 07 CC Roger, Alfredo. Could you verify two things for us, please, that the MAP CAMERA is in STANDBY and that the PAN CAMERA POWER switch is on; and when you turned it on, did you get the proper talkback indication?

01 03 01 24 CMP The answer is affirmative to both of those, Joe.

01 03 01 29 CC Okay; thank you.

01 03 05 14 CC Al, this is Houston with another request on this film cycle procedure.

01 03 05 20 CMP Okay, Joe; go ahead.

01 03 05 22 CC Roger, Al. Could you cycle the SM/AC POWER switch for us, OFF, and then, on, please.

01 03 05 33 CMP Okay, José; do it.

01 03 05 36 CC Okay; and the problem here, we're seeing all the carriers, but we don't get proper modulation, and so we're just not getting the right data.

01 03 05 55 CMP Okay, Joe; that's been cycled now.

01 03 05 59 CC Okay, Al. Thank you.

01 03 11 05 CC Apollo 15, Houston.

01 03 11 09 CMP Houston, 15; go ahead.

01 03 11 11 CC Roger, guys. The attitude which you're currently holding is a good attitude for your P52, if one of you wants to get started on that. We'll have some words for you on the SIM bay problem in a few minutes, and then we'll want to be talking about the SPS burn coming up pretty shortly here. That is, we want to talk about it shortly; it won't be coming up for a while.

01 03 11 41 CMP Okay, Joe; I'll start doing the P52.

01 03 11 44 CC Okay.

01 03 12 39 CC Okay, Al. This - this is Houston again.

01 03 12 46 CMP Yes, Joe, go ahead.

01 03 12 51 CC Al, your choice here. We suddenly found the missing data. It mysteriously reappeared, and we - we're ready to go ahead with your film cycling procedure. Your choice if you want to do your P52 first or the film cycle first, and we're standing by for either.

01 03 13 07 CMP We're all set up on the - we're all set up on the film cycle, Joe. Why don't we go ahead and do that, and then I'll flip down and do P52.

01 03 13 14 CC Okay, Al; that sounds good to us and we'll be watching.

01 03 16 39 CC Okay, Al; film cycling's complete, and it all looked very good to us. You can proceed on with the powerdown.

01 03 16 48 CMP Okay, Joe. Thank you, sir.

01 03 17 06 LMP Okay; the powerdown of the SIM bay is complete, Joe.

01 03 17 12 CC Okay, Jim.

01 03 23 01 CMP Houston, 15.

01 03 23 04 CC Go ahead, Al.

01 03 23 07 CMP Okay, Joe. I've got gyro torquing angles up, and I'll torque them out on the minute. That'll be at 27 hours and 24 minutes.

01 03 23 16 CC Okay, Al.

01 03 25 10 CC 15, Houston.

01 03 25 14 CDR Go ahead, Joe.

01 03 25 15 CC Guys, we just had indication that your THRUST light came on again for about 10 seconds. Did you notice that?

01 03 25 23 CDR Yes. Roger, Joe. That was the EMS DELTA-V check.

01 03 25 28 CC Okay, Dave. Thank you. And, guys, we - we'd like to ask that you locate your CSM Launch Checklist, because we want to start talking about this SPS burn procedure.

01 03 25 44 CDR Okay, we'll be ready in a couple minutes.

01 03 27 29 CDR Okay, Houston. We've got the Checklist out, and we're ready to listen.

01 03 27 35 CC Okay, Dave. If you would, please, turn to page L/4-14, and we're just going to ask you to copy the procedure onto that page, because it will consist of just a few changes to what's already listed on - on those few pages there.

01 03 27 59 CDR Okay; we've got L/4-14. Go ahead.

01 03 28 05 CDR We've got L/4-14. Go ahead.

01 03 28 09 CC Okay. Unless you'd like an explanation of what's to come, I'll go ahead and read through the steps here and pause from time to time to make sure that you're getting it all, and then we can talk about the details of why it's breaking out like this when we finish it.

01 03 28 27 CDR Okay. Go.

01 03 28 29 CC Roger. I'm going to start there at the line, "If time permits, go to G&N thrusting procedures," et cetera, and right underneath that short paragraph, write in: "Circuit breakers EPS GROUP 5, two, close;" and that's a "Verify."

01 03 28 57 CDR Okay, circuit breakers EPS GROUP 5, two, close. That's the main A and main B, right?

01 03 29 02 CC Yes, sir. And then we'll go on down about four lines to the "Set DELTA-V" and that should read: "Set DELTA-V<sub>C</sub> minus 100."

01 03 29 18 CDR Roger. Set DELTA-V<sub>C</sub> minus 100.

01 03 29 21 CC Roger. Now into the TVC check and prep section. After the first line, which is "Circuit breaker STAB control system, all, close," insert "Circuit breakers SPS pilot valves, two, open" and that's a "Verify."

01 03 29 45 CDR Okay. Circuit - okay; circuit breaker SPS pilot valves, two, open, verify. Below the line it has "CB stability control system, all, close."

01 03 29 59 CC That's correct, Dave. And the next line should read "Circuit breakers SPS, 10, close."

01 03 30 09 CDR Okay, understand. Circuit breakers SPS, 10, closed.

01 03 30 12 CC Roger. Skipping down several lines; DELTA-V CG, LM/CSM.

01 03 30 24 CDR Roger. DELTA-V CG, LM/CSM.



01 03 30 34 CC Okay, Dave. Turn to page 4-15. And your next - -

01 03 30 41 CDR - - 4-15.

01 03 30 42 CC Roger. And your next change is in the TVC check, third line from the bottom of that first group there; delete "Rate, high."

01 03 30 59 CDR Okay; secondary TVC check, third line from the bottom; delete "Rate, high." That's the line right after "Limit cycle, off."

01 03 31 07 CC That's correct. Down into the next group, "DELTA-V THRUST A to NORMAL." You can - -

01 03 31 19 CDR "DELTA-V THRUST A to NORMAL," and delete "B."

01 03 31 23 CC That's affirm, and then insert right after that - immediately after that, the following note. "Get thrust light on by pushing on panel first."

01 03 31 44 CDR Okay. In other words, you want us to try and get the SPS thrust - thrust light on by tapping on the panel some way, so that the light is on with the DELTA-V thrust A switch up to normal. Is that right?

01 03 32 00 CC Dave, that's not quite right. Let me read through it. We want you to get the light on, but we want you to try to first get it on just by pushing, by flexing the panel around the switch in question. And the reason we're doing that, we think - it's - The probable short is contamination in the switch, but there's a small chance that it's some sort of a problem in the wire bundle that will be flexed very slightly when you just push on the panel. So that - the note should read the following, and I'll read it clear through to the end. "Get thrust light on by pushing on panel first. If this doesn't work, rap on panel or cycle the switch until the light comes on. And if the light doesn't come on, we're going to delete the test."

01 03 32 57 CDR Okay. Why don't we try that right now?

01 03 33 03 CC Dave, stand by a second.

01 03 33 07 CDR Okay.

01 03 33 17 CC Dave, let's - let's ask you to stand by on that. We'd prefer to complete reading the procedures to you, and then - we'll worry about this light business. At any rate, you should have inserted the note "Get thrust light on by pushing on panel first. If this doesn't work, rap on panel or cycle the switch and if no light, then delete the test."

01 03 33 45 CDR Okay, understand. Push, rap, cycle, and if no light, delete the test.

01 03 33 50 CC Beautiful. Okay. Now, at about 1 minute to go but definitely after the light is on, proceed on to the next step, which is VERB 37 ENTER, 47 ENTER.

01 03 34 10 CDR Okay. If we get the light on, then we're at 2 minutes, and we'll work for about a minute to try to get the light on. And if we don't get it on by 1 minute, then we'll consider that we cannot get it on, and if we do get it on by 1 minute, we'll call up P47.

01 03 34 29 CC Dave, it's - I guess that the 2-minute mark out to the side of your Checklist there is meaningless in this case, because the test is in no way time critical. We want you to take your own time and work to get the light on, but if it does come on at about 1 minute before the burn, we'll want you to go into PROGRAM 47.

01 03 34 53 CDR Okay, I'm with you. Just to make sure we have P47 running.

01 03 34 57 CC Roger. That's exactly it. Okay. That brings us down to our next change, which is an insert just below the line "EMS mode, normal." And the change is on MSFN cue, "Circuit breaker SPS pilot valve A, closed." And a note that goes with this line, "1-second burn desired. If no ignition, circuit breaker SPS pilot valve A, open, after 3 seconds."

01 03 35 54 CDR Okay, understand. Just before EMS mode, normal, on MSFN cue, CB SPS pilot valve, closed. A desired 1-second burn, which means that if we get a light, we open the circuit breaker after 1 second. If we have no light, you want to leave the circuit breaker closed for 3 seconds, and then open it.

01 03 36 22 CC That - that's - exactly right, Dave. Now I've got some words here from Dick Gordon who's run through the procedure this morning, and he tells me that - that - a good cue to monitor is the SPS PC coming off the peg, and, at the same time, Jim or Al can, or - or - whoever is there, can - watch the ball valve indicators, also, for a cue that the engine is starting to burn.

01 03 37 00 CDR Okay. Stand by 1 now, Joe. Let us regroup here for a minute and make sure that we have no questions up to this point.

01 03 37 06 CC Okay.

01 03 38 58 CDR Okay, Joe. I guess one question we wanted to make sure of here was that the - on the MSFN cue to close the pilot valve, is prior to going to EMS mode, normal? In other words, we'll never get the EMS - -

01 03 39 12 CC Nega - negative.

01 03 39 13 CDR - - Is that correct?

01 03 39 14 CC Dave, that's negative. EMS mode, normal - -

01 03 39 18 CDR Okay.

01 03 39 19 CC And then, on MSFN cue, the SPS pilot valve A, Alfa, close, and let me re - repeat here, Dave, that you may or may - may or may not get a light at this particular point. If you do not get a light, open the circuit breaker after about 3 seconds. If you do get a light, we're interested in - in as short a burn as you can give us, so - and Dick tells me that the reaction time - a good reasonable reaction time would be, in pulling the circuit breaker after you see the PC come off the peg, would give you about 3 to 4 feet per second. And that's a real good number for us as far the midcourse 2 is concerned.

01 03 40 16 CDR Okay. Well, that's why we asked the question, just to make sure. It makes more sense the way you're doing it. So, - I guess we understand that. We can have - Al watching the PC gage, and Jim can watch the ball valves, and if anybody sees something move, why - Al can pull that circuit breaker.

01 03 40 33 CC Okay, Dave. That sounds good. Now a word about the circuit breaker. You might want to cycle it a couple of times - but before we go through this, just to make sure it's not a lot stiffer than what you're used to working with in the simulator. And just get some idea of how it's best to - to position yourself to pull this. It's also not all that critical that it - that it get pulled absolutely immediately, but - you know, what - whatever's comfortable to do. It might make it easier for us on trimming up with your midcourse if we do get a burn.

01 03 41 11 CDR Okay. We'll work that one. Over.

01 03 41 15 CC And, before you - you test that particular circuit breaker, just make sure that the GROUP 5 circuit breakers are open, and we won't be risking anything by testing it. Now finally, after this note, we've got several deletions, and I'll continue on here. Delete "Ullage and thrust, on"; delete "SPS thrust light, on"; delete "DELTA-V thrust, B"; delete "Ullage and thrust, on"; delete "Monitor thrusting PC 95 to 105, EMS counting down."

01 03 42 14 CDR Okay. We got that. Deleting the next seven lines.

01 03 42 23 CC Yes, sir; exactly. Now the next line should read "SPS INJECTION VALVES, two, OPEN."

01 03 42 36 CDR Roger. SPS INJECTION VALVES, two, OPEN.

01 03 42 40 CC Roger. Three lines down, delete "PUGS, balanced."

01 03 42 48 CDR Roger. Delete "PUGS, balanced."

01 03 42 54 CC And then, the next line, after ignition confirmed, circuit breaker SPS pilot valve A - main A, open.

01 03 43 16 CDR Okay. After ignition confirmed, CB SPS pilot valve A - main A, open. That's - just about what you gave us in the notes.

01 03 43 25 CC Roger. Exactly. And then a note - well, let's see. The note is - just a rehash of what we've already told you. The burn should not exceed 1 second if it's possible to avoid it. And then, exit P47 immediately after burn.

01 03 43 55 CDR Okay. Shouldn't exceed 1 second and exit P47 immediately after the burn.

01 03 44 00 CC Roger. And that takes us to page 4-16. The first line - -

01 03 44 06 CDR Page 4-16.

01 03 44 07 CC Roger. The first line, "DELTA-V THRUST A, OFF."

01 03 44 17 CDR DELTA-V THRUST A, OFF.

01 03 44 23 CC Okay, Dave. And that's really the end of the procedures. We have - another note for this page, which is "After test, if SPS light goes out, attempt to get lights back on by your standard procedures, pushing, rapping, cycling, I guess."

01 03 44 49 CDR Okay. After the tests, if the SPS light is out, attempt to get it back on.

01 03 44 57 CC Roger. And that completes the procedures. Maybe a couple of more words about it here. It's also possible that when you push the circuit breaker - to the pilot valve A in, that the light will just go out, in which case, we'd be pretty confident that - the contamination causing the short is just a burn through. In other words, just disappeared and is no longer shorting the switch. The light would go out, and otherwise, nothing else would happen.

01 03 45 35 CDR Okay; understand. If we - if when we push the circuit breaker in, the light goes out, we've burned to the short. Okay.

01 03 45 48 CC And, guys, you might look through those again, and - if you have any questions, please come right back to us with them.

01 03 45 58 CDR Okay. Let us mull it over, and we'll get back with you.

01 03 46 01 CC Okay.

01 03 47 35 CDR Okay, Joe. Why, we have no further questions. We think we can run through that one okay.

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01 03 47 45 CC           Okay, Dave. And we'll have a pad for you in a few minutes.

01 03 47 51 CDR           Okay, and I guess I still have a question as why we don't take a look at that light now with the push, rap, and cycle technique.

01 03 48 04 CC           Let me get a reading on that.

01 03 48 07 CDR           Okay. You know, we've tapped it, cycled it, but we've never pushed that panel just by pushing the panel to see if the light'll come on.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 03 48 44 CC Dave, I guess the main reason is, before you do it, we'd like to get some recorders configured. We're setting the recorders up now so we can monitor the - the problem as you go through it, and then there is no reason you can't try pushing on the panel, provided the PILOT VALVE breakers and the group 5 breakers are pulled.

01 03 49 10 CDR Well, Joe, when you get a - a chance, or when you're set up down there, why - why don't we try that, and at the same time, we could run through our little check to see how the PILOT VALVE MAIN A circuit breaker works, cycling it.

01 03 49 22 CC Okay, Dave, that sounds good.

01 03 49 26 CDR We'll stand by until your call.

01 03 50 30 CC Endeavour, this is Houston requesting POO and ACCEPT, and we'll give you a state vector and some drift terms.

01 03 50 38 CDR You got it, POO and ACCEPT.

01 03 50 40 CC Thank you.

01 03 52 35 CC Endeavour, this is Houston.

01 03 52 40 CDR Houston, Endeavour. Go.

01 03 52 42 CC Roger, Dave. After you verify for us that your pilot valve circuit breakers and group 5 circuit breakers are out, you can go ahead with push, rap, cycle test if you like.

01 03 53 00 CDR Okay. Okay. Group 5 are open and the pilot valves are open, and we'll take a look at it.

01 03 53 51 CDR Okay, Houston. Nothing worked pushing and I'll try rapping.

01 03 53 55 CC Okay, Dave. We agree.

01 03 54 00 CDR Came on with the rap - up just to the top of the switch.

01 03 54 16 CDR Okay; I'll cycle it and see if it goes off.

01 03 54 27 CDR Okay; it flickers as - as I pass through neutral.

01 03 54 33 CC Roger.

01 03 55 08 CDR And now she doesn't want to stay on.

01 03 55 26 CC Dave, as long as you keep those circuit breakers out, there's no reason we can't leave that light on. We need it on for the test anyway.

01 03 55 35 CDR Okay, Joe. I can find a position on the switch where I can turn the light out now - in neutral position on the switch, if you want to look at it. I've cycled the switch a number of times, and I think I've got the spot where the light will go off, and I'll turn it off for a couple of seconds here for you.

01 03 55 51 CC Okay, Dave. Go ahead, and we're watching the drivers at the same time.

01 03 56 01 CMP Okay, Joe. The light's out right now; Dave's holding the switch.

01 03 56 04 CC Roger. We confirm that.

01 03 56 09 CMP Okay; it's coming back on now.

01 03 56 14 CC Roger.

01 03 56 15 CMP Off now.

01 03 56 16 CC Roger.

01 03 56 19 CMP And coming back on.

01 03 56 33 CDR And it seems like it goes off just at the lower portion or near the off portion of the - force range there when you get to neutral. As you go into the neutral position, you have high forces, and right at the beginning of those high forces, it'll go off. And if you hold it in the neutral position, or the - the midposition, where the - the force on the bottom of the switch, holding it so it won't go over center, that's when the light will go off. As soon as you let it go over center and flick up to the top, the light comes back on.



01 03 57 11 CC Roger, Dave; we copy that.

01 03 57 27 CC Dave, let's go ahead and stay in this configuration. If you want to practice with the pilot valve circuit breaker, we emphasize that group 5 circuit breaker definitely should be open.

01 03 57 39 CDR Okay, we'll do that now.

01 03 57 41 CMP And the cir - group 5 are open.

01 03 57 59 CC And, Endeavour, this is Houston with the maneuver pad when you're ready to copy.

01 03 58 14 LMP Okay, Joe; I'm ready to copy.

01 03 58 17 CC Okay, Jim; and it's your computer.

01 03 58 22 LMP Okay.

01 03 58 26 CC Maneuver pad for the SPS test. SPS/SCS; NA; plus 1.24, minus 0.11; 028:40:00.00; NA, NA, NA; roll 061, 018, 020; NA, NA; NA, NA, NA; 11, 216.1, 18.6; NA, NA, NA. NA all the rest of the way. GDC aline, Vega, Deneb; roll aline, 209; 009; 349. Other comments, set up SPS GIMBAL thumbwheels with PITCH trim, YAW trim; HIGH GAIN ANTENNA, PITCH minus 25, YAW 359. Over.

01 04 00 11 CDR Okay. Readback on the SPS test. SPS/SCS; plus 1.24, minus 0.11; 028:40:00.00; 061, 018, 020; 11, 216.1, 18.6. Vega and Deneb. 209; 009; 349. And set the SPS thumbwheels to the PITCH and YAW trim. HIGH GAIN ANTENNA is PITCH minus 25 and YAW 359.

01 04 00 54 CC Roger. Readback correct.

01 04 02 57 CC Endeavour, this is Houston.

01 04 03 04 CMP Houston, 15. Go ahead, Joe.

01 04 03 06 CC Al, just a couple more words here. We're quite interested in subtle changes that may take place in the thrust light. And we'd like for you to think about perhaps playing around with the cabin lighting control there so you can get a good view of the light, and you may or may not want to use the filter in front of the light as you watch it, and I guess the third one of you should be watching the light during the burn test.

01 04 03 42 CMP Okay, Joe. We'll keep a close eye on the light.

01 04 03 46 CC Roger, Al. And you understand, it's not a question of on/off but also if the intensity changes. And - and - -

01 04 03 54 CMP Yes, affirmative, Joe.

01 04 03 55 CC Roger; okay. And, guys, you can go ahead with the waste water dump if you want to now. There's nothing magic about the time we gave you on that.

01 04 04 10 CMP Okay, Joe. Thank you.

01 04 04 11 CC Roger, Al. And - the provision on that is that you be at burn attitude before you dump the water. And after the sextant star check.

01 04 13 50 CC Apollo 15. This is Houston requesting BEAM WIDTH to WIDE.

01 04 13 59 CDR Okay, we're WIDE, Joe.

01 04 25 49 CC 15, you can terminate the waste dump any time.

01 04 25 54 CDR We're doing that now.

01 04 25 57 CC Okay, guys, and just want to reemphasize another point here. This burn is not at all time critical. It has very little effect on - on our midcourse corrections later on or whatever. Just want you to understand that.

01 04 26 14 CDR Okay, Joe. We understand that.

01 04 36 01 CC Okay, Endeavour. This is Houston, and we're showing about 4 minutes to ignition.

01 04 36 08 CDR Okay, and we've got about 5, and we're proceeding through the checklist.

01 04 36 14 CC Sounds good.

01 04 39 53 CDR Houston, 15.

01 04 39 55 CC Go ahead.

01 04 39 58 CDR Okay, Joe. We're all set up and ready to go. We've got about 50 seconds to go. Sorry, Joe, there we are - Yes, we're ready to go now, any time on your cue.

01 04 40 14 CC Okay, guys; go ahead.

01 04 40 19 CDR Okay, Joe. Ready?

01 04 40 35 CDR Mark about 5.3 on the DSKY and about 4.7 on the EMS.

01 04 40 46 CC That sounds beautiful, Troops.

01 04 41 17 CDR And, Houston, the light's still on.

01 04 41 22 CC Roger, Dave. We confirm that.

01 04 43 39 CC Endeavour, this is Houston.

01 04 43 43 CDR Okay; go ahead.

01 04 43 46 CC Roger, guys. When you are comfortably through with the procedure here, we'd like for you to turn the thrust light out for us, please, by pulling the EMS MAIN A and B circuit breakers, two of them, on panel 8.

01 04 44 04 CDR Roger. They're both open; the light is out.

01 04 44 07 CC Okay, Dave, and that - the reason for that is just to conserve that light bulb and a little power, and - that burn was exactly what we wanted to see. We'll proceed with a normal mission.

01 04 44 20 CDR That's nice to hear.

01 04 44 23 CC I'm a smooth talker, aren't I?

01 04 44 27 CDR Well, I'm glad you guys down there can figure all this out.

01 04 44 42 CC And, guys, a further word here. As you're probably already aware, the short is in what we've been calling the downstream side of that driver solenoid, and it means only that it's a little bit annoying to have. We can still turn bank A on and off as we want. We might modify a few procedures a little bit, but we haven't lost that bank.

01 04 45 10 CDR Okay; very good. Thank you, Joe. Let's go to Hadley.

01 04 45 23 CC That's a super idea.

01 04 55 55 CC Hello, Endeavour, this is Houston.

01 04 56 01 CDR Roger, Houston. ...

01 04 56 04 CC Roger, Dave. We're requesting a NARROW BEAM WIDTH, and then we have an attitude we'd like you to maneuver to for - for a DSE dump which we will initiate. Specifically, roll 40, pitch 12, yaw 50. HIGH GAIN, minus 38 and 318. Over.

01 04 56 41 CDR Okay, understand. HIGH GAIN is now in NARROW, maneuver to roll 40, pitch 12, yaw 50. HIGH GAIN is minus 38 and 318.

01 04 56 55 CC Roger, Dave. And after that, we'll need only a roll maneuver to get us into the sextant photo test attitude.

01 04 57 07 CDR Okay; very good.

01 04 59 20 CC Apollo 15, Houston.

01 04 59 25 CDR Houston, 15. Go.

01 04 59 28 CC Roger, Dave. I'm pleased to report that not only did you carry out a successful SPS test burn, but you did a superb midcourse 2 correction at the same time. In fact, you burned it to within a half a foot per second of being exactly what we wanted. Consequently, we're going to omit midcourse 2 and midcourse 3. We'll be looking at a midcourse 4 correction of around 6 feet per second, it looks like now. And, additionally, because of this, we'd like for you to go ahead and secure the mapping camera and the ~~pan~~ pan camera at your convenience per the procedure that's shown at 31 hours and 10 minutes. Over.

01 05 00 23 CDR Okay, Joe. Well, we sort of had that in mind when we ran the burn. And we'll secure the map and pan, and we'll be standing by for midcourse 4.

01 05 00 33 CC Roger, Dave. Al Worden always did have a very fine touch on the circuit breakers.

01 05 00 40 CDR Yes, sir. He's - we call him nimble finger up here.

01 05 00 49 CC Roger. No comment to that one.

01 05 00 55 CDR Okay.

01 05 02 18 CC Endeavour, Houston.

01 05 02 24 CDR Go, Houston; Endeavour.

01 05 02 26 CC Roger. Al, for your benefit, we'd scrubbed the crew exercise period earlier. We'd like to put that back in again, any time between now and the sextant photo test.

01 05 02 41 CDR Okay, Joe. Jim and Al are doing some housekeeping now, and we're going to make sure we get all the exercise periods for you.

01 05 02 51 CC Roger, Dave. I'll rely on you for that.

01 05 02 57 CDR Gee, we might even do a couple extra.

01 05 05 20 CC Endeavour, this is Houston. Please start your battery A charge at your convenience.

01 05 05 27 CDR Okay, start battery A charging.

01 05 05 30 CC Okay, Dave. And we do have one question regarding the burn. On our data down here, we saw the thrust light go off right after the burn for about 7 seconds and wondered if you noticed the same thing up there.

01 05 05 52 CDR Stand by.

01 05 06 11 CDR Houston, the consensus here is that it stayed on, and I guess - we - we might have missed a short period there in getting the engine off and getting out a P47, but Al and I both feel like it stayed on all the way, but I guess we're not a hundred percent sure of that.

01 05 06 29 CC Okay, Dave. We copy. Thank you.

01 05 08 18 CDR Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 05 40 25 CDR Houston, Apollo 15.

01 05 40 30 CC Go ahead, 15.

01 05 40 34 CDR Would you like the P52 at 30 hours, or do you want to bypass that one?

01 05 40 40 CC Say that again, Dave. I didn't copy.

01 05 40 47 CDR Would you like the P52 at 30 hours or would you like to bypass it?

01 05 40 54 CC Dave, that's not required. Go ahead and bypass that, please.

01 05 41 00 CDR Okay; thank you.

01 05 41 30 CC Dave, this is Houston again. While we're talking, could you look back in your time line for us, please, and give us the results of your EMS test. I guess that's a bias reading at around 27 hours.

01 05 41 45 CDR Roger. That was .7.

01 05 41 49 CC Okay; .7. Thank you.

01 05 41 53 CDR And the DELTA-V test was - was okay.

01 05 41 58 CC Roger.

01 05 54 05 CC 15, this is Houston.

01 05 54 14 CMP Houston, 15.

01 05 54 16 CC Roger. Al, I've got a correction to the erasable loads in your G&C Checklist. If you'd fish that out for me, I'll go ahead and read them to you.

01 05 54 31 CDR Okay, Joe. Could you stand by about 5 minutes?

01 05 54 38 CC Roger, Dave. Stand by. No hurry. Just give me the word.

01 05 54 57 LMP Houston, 15. If you could stand by about 5 minutes, why, our trusty CMP could finish up his exercise period and get with you on that.

01 05 55 06 CC Roger. I'll stand by 10 or 15 minutes in that case.

01 05 55 11 LMP Okay.

01 05 55 13 SC Okay.

01 06 01 52 MCC 15, Houston.

01 06 02 00 CDR Houston, 15.

01 06 02 01 MCC Dave, in all that going on with that Flight Plan activity - about 28 hours, we may have missed something. Did you change your lithium hydroxide canister about 28 hours or so?

01 06 02 14 CDR Roger. We got that.

01 06 02 15 MCC Okay.

01 06 02 40 CDR Houston, 15. The canister was changed at about 26:10.

01 06 02 45 MCC Okay, Dave. We're just seeing a little rise in partial pressure CO<sub>2</sub>. That's the - the reason we asked the question. We'll watch it.

01 06 02 55 CDR Roger.

01 06 09 00 CMP Houston, 15.

01 06 09 05 CC Go ahead, 15.

01 06 09 09 CMP Roger, Joe. I'm ready with the erasable update, if you want to go with that.

01 06 09 20 CC Roger, Al. Turn to page 9-4 if you would. And it's - an update only to your column Alfa - octal ID, column alfa. And it's octal ID - -

01 06 09 38 LMP Okay; I got it.

01 06 09 40 CC Roger. Octal ID 11 should read 00634; 12 is 77425; and 13, 77317. Over.

01 06 10 07 CMP Roger, Joe. Understand. Column Alfa, octal ID 11 should read 00634; 12 should be 77405; and 13 should be 77317.

01 06 10 21 CC Al, there's a mistake in your readback for 12. That should be 77425.

01 06 10 30 CMP Roger, Joe; 77425.

01 06 10 34 CC Roger.

01 06 10 42 CC And that's the extent of it. Thank you.

01 06 10 47 CMP Okay, Joe.

01 06 33 21 CC 15, Houston.

01 06 33 25 CMP Houston, 15. Go ahead.

01 06 33 39 CC Roger, guys. We're requesting - that, at your convenience, you roll to the sextant photo attitude, which is a roll of 270 - the same pitch and yaw you're presently in - so that you'll be getting some sunlight on the SIM bay to - to start to warm it up. And during the roll, we'll call out an antenna change to you.

01 06 34 05 CMP Okay, Houston; 15. Understand you want us to roll, with our present pitch and yaw, to a roll of 270.

01 06 34 14 CC That's affirm, Al.

01 06 47 05 CC Apollo 15, select OMNI Charlie, and stow the high gain, please.

01 06 47 11 CMP Roger, Joe. OMNI Charlie, and stow the high gain.

01 06 47 17 CC Roger.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 07 56 22 LMP Houston, this is 15.

01 07 56 26 CC 15, this is Houston. Go ahead.

01 07 56 30 LMP You asked a question on the UV procedures.

01 07 56 37 CC Say again which procedures. You're coming in very weak.

01 07 57 21 CC 15, this is Houston. Standing by for questions on UV procedures.

01 07 57 28 CDR Okay, Karl. Maybe we can get an answer on board. Stand by.

01 07 58 16 LMP Houston, it's 15. I think we have an answer. Thank you.

01 07 58 20 CC Roger.

01 08 14 09 CDR Houston, 15.

01 08 14 12 CC 15, this is Houston. Go ahead.

01 08 14 19 CDR Okay. With the sextant photo test here, we have a call for a PCM cable, and the only ones we have on board will not reach the connectors over by the right-hand girth shelf. Do you have any suggestions on how we can get the DAC connected to the PCM?

01 08 14 38 CC That's a good question. Stand by.

01 08 14 42 CDR Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 08 21 42 CC 15, this is Houston.

01 08 21 46 CDR Houston, 15.

01 08 21 48 CC I guess we have to agree with you that that cable doesn't reach all the way over to 227, and the request down here is that you voice-record shutter opening and shutter closing on the S - on the DSE.

01 08 22 02 CDR Okay. Voice-record shutter opening and shutter closing. We'll do that.

01 08 22 06 CC Thank you.

01 08 22 10 CDR Okay; and meanwhile, we also tried to get it to panel 162 without success. It was too short for that one, too.

01 08 22 16 CC Roger. We copy.

01 08 45 47 CC 15, Houston. We'd like to have OMNI Delta, please.

01 08 45 55 CDR Roger. OMNI Delta.

01 09 05 25 CC 15, this is Houston. We're anxious to know down here if you have checked the LM/CM DELTA-P.

01 09 05 36 CDR Not yet, Karl. We will though.

01 09 13 28 CDR Okay, Houston, 15.

01 09 13 30 CC 15, this is Houston.

01 09 13 34 CDR Okay. The LM/CM DELTA-P is now plus .8, and I guess - there's no need to do the tunnel vent valve, is there, at this stage? Looks to us like we can go ahead and bring the pressure back up - equalize the DELTA-P before we get into the tunnel.

01 09 13 54 CC Stand by.

01 09 14 26 CC 15, this is Houston. We would like to go VENT on the TUNNEL VENT valve, until the DELTA-P is - is greater than 2.7.

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01 09 14 39 CDR Okay. We'll do that.

01 09 15 32 CC Dave, we'd like for you to tell us when the DELTA-P gets to 2.7, and stop there. The basic problem here is, we want to dump the residual atmosphere out of the LM in order to put in good fresh oxygen before we have you climb in. We're sort of up against the time line now - -

01 09 15 49 CDR Okay. That's what we - -

01 09 15 53 CC Righto.

01 09 15 54 CDR Okay. That - that's what we ...

01 09 15 56 CC Good; okay. Don't - don't go below 2.7 DELTA-P there.

01 09 16 02 CDR Roger.

01 09 17 38 CDR Okay, Houston. We're at 2.7 on the DELTA-P on tunnel vent.

01 09 17 42 CC This is Houston. Say again.

01 09 17 47 CDR Roger. We're at 2.7 on the DELTA-P on the tunnel vent.

01 09 18 01 CC 15, this is Houston. The number that we need now, since the - since the cabin went up, is we need a DELTA-P of 3.1. We have to vent the tunnel.

01 09 18 12 CDR Okay. DELTA-P at 3.1 ...

01 09 18 21 CC 15, we'd like OMNI Bravo.

01 09 18 25 CDR Yes; Roger. OMNI Bravo. And what was your last, after you said you wanted 3.1 on the LM tunnel vent?

01 09 18 31 CC Stand by on that one.

01 09 19 05 CC 15, this is Houston. To keep our records straight here, we are anxious for you to bring the tunnel down until we have a DELTA-P of 3.1.

01 09 19 19 CDR Roger, Houston. That's in work, and we're at 2.9.

01 09 20 27 CC 15, this is Houston. There's a couple of readouts we'd like to get, when you have time. First of all, we'd like to get the PRD readouts for all three of you. And we'd also like to have the magazine numbers used for the sextant photography and for the UV photography.

01 09 20 46 CDR Okay. Those are as - magazines are as per Flight Plan, and we'll get you the PRDs when we can get down into our suits. We'll get them before the day is out.

01 09 20 54 CC Okay, Dave. And, incidentally, can you give us any sort of report on that number 5 window?

01 09 21 05 CDR Looks clear.

01 09 21 08 CC We copy. Thank you.

01 09 21 22 CDR Okay, Houston. The DELTA-P is hanging right in at about 2.9 to 3. I'd suggest we press on, huh?

01 09 21 42 CC Stand by on that, Dave.

01 09 23 07 CC 15, this is Houston. Time is not too critical. We'd like to let it vent a little longer. Try to get 3.1. If we don't reach it in about 5 minutes, we'll probably go ahead.

01 09 23 19 CDR Okay; understand.

01 09 29 59 CDR Okay, Houston; 15. We're reading 3.1 now.

01 09 30 10 CC 15, Houston. That's excellent. I guess we can go ahead with pressure - pressurizing the LM.

01 09 30 18 CDR Okay.

01 09 41 26 CC 15, this is Houston. Can you tell us how the pressurization is going?

01 09 41 32 CDR Oh, we're all squared away, and the probe is coming out.

09 09 41 41 CC Roger. And - if you could give us the high-gain angles there, we'd like to get that going.

01 09 41 49 CDR Okay. We'll set them up.

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01 09 42 16 CDR        Okay, Houston. The probe is out, and it worked very smoothly.

01 09 42 21 CC         We copy.

01 09 43 38 CC         15, Houston. We'd like to have NARROW BEAM, please.

01 09 43 50 CDR        Okay, Karl. You got NARROW.

01 09 43 52 CC         Thank you.

01 09 46 22 CC         15, this is Houston. Whenever you have a chance up there, we're interested in seeing some TV.

01 09 46 30 CDR        Roger, Houston. We thought we'd get the tunnel cleared out because, with all that extra gear in the command module, it's sort of tough to find a place to stow everything. And the TV is - right now, sort of in the way. So we'll try and get to you as soon as we can.

01 09 46 44 CC         Okay.

01 09 46 52 CDR        It's a new world in this command module, with all these extra box - boxes and everything.

01 09 48 32 CDR        Houston, this is 15.

01 09 48 37 CC         15, this is Houston. Go ahead.

01 09 48 42 CDR        Roger. We had an AC BUS 2 light and a MAIN BUS B UNDERVOLT. Voltage looks good, and AC BUS 2 looks good. Reading 28.5 volts on MAIN BUS B, and AC BUS 2 looks good. About that time we had a loss of S-band. I don't know whether it was coincidental or not.

01 09 49 05 CC         We copy.

01 09 49 42 CC         15, this is Houston. We saw some of those problems here on the ground, too. And we would like to get back on the high gain, if you would reacquire.

01 09 49 56 CDR        Okay.

01 09 50 46 CDR        Okay, Houston. You should have the high gain now.

01 09 50 52 CC         Roger, 15. Give us NARROW BEAM, please.

01 09 50 54 CDR NARROW.

01 09 51 25 CDR Okay, Houston. The LMP is in the LM.

01 09 51 28 CC Houston copies.

01 09 51 33 CDR And how's your high gain?

01 09 51 36 CC High gain is perfect.

01 09 51 39 CDR Okay.

01 09 52 27 CC 15, this is Houston. Could you give us a description of any actions you took when you had that electrical glitch?

01 09 52 52 CDR Karl, Jim just reset both, and they - everything seems to be okay now. He checked the voltages, and they were fine.

01 09 52 59 CC Thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 09 56 06 CMP Houston, 15.

01 09 56 08 CC 15, this is Houston.

01 09 56 12 CMP Hey, Karl, you getting anything in on the TV?

01 09 56 15 CC Negative, we have no signal yet. Pardon me; something is just now coming down.

01 09 56 23 CMP Okay, fine. I'm over in the LM with them, and they're just going through the checklist.

01 09 56 29 CC Very good.

01 09 58 39 CC 15, this is Houston. We're getting a reasonably good TV signal from you. And, we have about four procedure changes connected with the ASA heater circuit breaker coming up at about 34:30 in your time line, and we'd like your choice as to whether I read it up to you as a block or whether you want us to read it to you step by step when the time comes.

01 09 59 26 CMP Houston, 15. Hey, Karl, how about waiting until Jim and Dave get on comm, and then read up the procedure?

01 09 59 35 CC Roger.

01 09 59 38 CMP If that's satisfactory, let's do it that way.

01 10 04 08 CC 15, this is Houston.

01 10 04 14 CMP Go ahead, Houston; 15.

01 10 04 17 CC 15, when you had the S-band loss back there a few minutes ago, we think the problem was basically on the ground. And, when you lost uplink, it's - it's likely that your high-gain antenna slewed against the limits; and we wonder if there was any circuit-breaker resetting required to get you back up?

01 10 04 39 CMP Okay, Karl, stand by 1, and I'll find out.

01 10 04 54 CMP Negative, Houston. No circuit breakers are reset.

01 10 04 57 CC Very good. And, Al, we're getting a real good picture down here.

01 10 05 07 CMP Okay, Karl.

01 10 09 20 CC 15, the TV picture is beautiful, and we're going to give that cameraman an honorary union card.

01 10 09 38 CMP That cameraman's got too many hands busy to answer you right now, Karl.

01 10 11 28 CMP Houston, 15.

01 10 11 31 CC 15, this is Houston.

01 10 11 34 CMP Okay, give us a time hack, would you, Karl, please? GET.

01 10 11 42 CC Roger. We're counting up to 34 hours 11 minutes and 50 seconds. 4, 3, 2, 1 -

01 10 11 51 CC MARK.

01 10 12 11 CMP Houston, 15.

01 10 12 13 CC 15, go ahead.

01 10 12 16 CMP Roger. If you're ready, Dave and Jim are ready to activate the comm now.

01 10 12 21 CC Roger. Did you get that time hack okay?

01 10 12 25 CMP Yes, sir, sure did. Thank you.

01 10 16 13 CMP Houston, 15.

01 10 16 17 CC 15, go ahead.

01 10 16 21 CMP Roger, Karl. You guys ready to start a comm check now?

01 10 16 34 CC Roger. We're ready down here for a comm check.

01 10 16 38 CMP Okay, coming your way.



01 10 22 37 SC Go ahead.

01 10 23 16 CMP Falcon, this is Endeavour reading you 5 square in DUPLEX B.

01 10 23 24 CC Endeavour, this is Houston. I got your message loud and clear.

01 10 24 45 CMP Houston, Endeavour.

01 10 24 49 CC Endeavour, this is Houston. Go ahead.

01 10 24 52 CMP Roger, Karl. Jim's been calling you on S-band.

01 10 24 58 CC Sorry about that. They're just telling me here that we do have some problems, and we need to stand by for a few more minutes.

01 10 25 07 CMP Okay; understand. Stand by for a few minutes before we try again.

01 10 26 30 CC 15, this is Houston, and we're all set up for the voice check.

01 10 27 17 CC 15, Houston is now configured to go along with you on the voice check.

01 10 27 37 CMP Houston, this is Endeavour. It - apparently Falcon is reading you 5 square, but you're not reading him.

01 10 27 44 CC That's correct, I've had no messages from Falcon.

01 10 27 49 CMP Okay, he has been calling you, Karl.

01 10 28 18 CMP Houston, 15.

01 10 28 21 CC 15, this is Houston.

01 10 28 24 CMP Okay, Karl. What are you receiving? Are you getting any 10 bit rate from the - from the LM - from the Falcon?

01 10 28 31 CC That's affirmative.

01 10 28 34 CMP You are? Okay.

01 10 28 44 CMP Houston, this is Endeavour. Be advised Falcon's going hi bit rate, we'll give you another call.

01 10 28 50 CC Roger.

01 10 29 19 CC Falcon, this is Houston. How do you read?

01 10 29 31 CMP Houston, this is Endeavour again. Apparently Falcon's still reading you, but you're not reading him. How do you pick him up with hi bit rate?

01 10 29 50 CC Endeavour, Houston is getting the hi bit rate data okay, and we'd like to have you hold this present configuration while we think a bit.

01 10 30 00 CMP Okay, Karl.

01 10 31 40 LMP Aren't those pretty?

01 10 31 41 CDR Say again.

01 10 31 42 LMP Aren't those pretty little things?

01 10 31 44 CDR Oh boy. Navy blue yet. Colorful. Too bad they don't work very well.

01 10 31 59 CDR ... had them watch you configure the camera.

01 10 32 02 LMP You do?

01 10 32 03 CDR Yes. That might be embarrassing.

01 10 32 06 LMP Really?

01 10 32 07 CDR Because you might not get it con - Should be back over on the right-hand side. Oh my! You had it last, Al, when you were cleaning up the - screens. I put it in that compartment there, Al, just above the emergency medical kit - compartment above the emergency medicikinal [sic] kit.

01 10 32 31 CC 15, this is Houston. We're reading you on VOX.

01 10 32 36 LMP (Ha, ha) Hot on VOX. - -

01 10 32 39 CDR Okay. DOWN VOICE BACKUP - -

01 10 32 40 LMP Oh, yes, yes, yes, they would - hot mike.

01 10 32 42 CDR Good, I'm glad you're reading us - Houston, finally. Are we coming through now loud and clear, Karl?

01 10 32 56 CC Roger, Falcon. You're coming through loud and clear.

01 10 33 01 LMP Okay. While we're in this position, I guess we ought to go back to LO.

01 10 33 04 CDR We've got - -

01 10 33 06 LMP We ought to go back to LO bit rate.

01 10 33 07 CDR Yes. One little problem we ought to discuss with you before we go on. It seems that somewhere along the way, the outer pane of glass on the tape meter has been shattered. I don't know whether you can get a picture of it on the TV or not; we'll get Al to try and zero in. But about 70 percent of the glass is gone. The inner pane of glass seems to be okay. There's no apparent damage to the tape meter itself. It's sitting on 520 and 482. But, I don't know whether you can see it or not, but I'll trace the area which is missing with my finger here. And it looks like the pieces we found - I found one piece that's almost an inch in size, and there's some smaller ones around. We'll try to pick it up with the tape, and then get the vacuum cleaner later on - to get it all up. So far that's the only obvious discrepancy we've found.

01 10 34 10 CC Roger. Dave, we're reading you loud and clear.

01 10 34 12 CDR - - ... you want to go back? Okay; back to LO bit rate. Let's try that.

01 10 34 19 LMP Yes. Camera's configured, Dave.

01 10 34 21 CDR Okay.

01 10 34 23 LMP Except for the MAG.

01 10 34 34 LMP Okay; we're in LO bit rate. Houston, how do you read Falcon on low bit rate?

01 10 34 46 CC Falcon, Houston is reading you loud and clear on LO bit rate.

01 10 34 51 LMP Roger. We read you the same.

01 10 34 53 CDR Okay; lets go back BIOMED, RIGHT and HI bit rate.

01 10 34 57 LMP Okay. HI and RIGHT. Houston, this is Falcon on HI bit rate, with BIOMED, RIGHT. How do you read?

01 10 35 09 CC Roger, Falcon. We're writing - we're reading you loud and clear.

01 10 35 14 LMP We're reading you the same.

01 10 35 34 LMP Houston, this is Falcon again. BIOMED, RIGHT and LO bit rate.

01 10 35 39 CC Roger, Falcon. We're reading you loud and clear on BIOMED, RIGHT and LO bit rate.

01 10 37 17 CC Endeavour, we're not reading Falcon at the present time, and we've had loss of signal.

01 10 37 27 CMP Houston, Endeavour. Roger; understand. And wonder if you just got that last piece on the TV there. It was a piece of gray tape with some glass on it that came out of the tape meter.

01 10 37 38 CC We're getting a very good picture of it, thank you.

01 10 37 41 CMP Roger.

01 10 37 46 LMP Houston, this is Falcon. How do you read?

01 10 37 48 CC Falcon, this is Houston. Reading you loud and clear. How us?

01 10 37 57 LMP Houston, we caught the first part of your transmission, and then you were cut out.

01 10 38 02 CC Roger. Falcon, this is Houston. How do you read us?

01 10 38 07 LMP Read you loud and clear.

01 10 38 23 LMP Okay, Houston. We're in PCM HIGH. How do you read?

01 10 38 30 CC Roger. Houston is reading you loud and clear. And did I understand PCM HIGH?

01 10 38 37 LMP That's affirm.

01 10 38 51 LMP Houston, this is Falcon. Standing by for a voice and range check.

01 10 39 08 CC Roger, Falcon. We're ready for step 8.

01 10 39 16 LMP Houston, we're configured for step 8.

01 10 39 23 CC Roger, Falcon. We're reading you loud and clear. How us?

01 10 39 28 LMP Loud and clear.

01 10 39 41 LMP ED VOLTAGE reading 37 on both.

01 10 39 46 CC Roger, Falcon. We copy that.

01 10 41 07 CC Falcon, this is Houston.

01 10 41 12 LMP Go ahead Houston, Falcon.

01 10 41 14 CC Roger. We'd like to tell you that the initial problem with and - with the S-band was a ground problem, and it looks as though all of the comm checks are GO. And, we would like to ask if our VHF uplink was okay!

01 10 41 36 CDR Okay, VHF A and B both checked out, with Endeavour, loud and clear. And since we don't have anything other than the sequence camera to check out here, we're going to check that out and then powerdown and take care of the rest of the housekeeping without the power.

01 10 42 01 CC Roger, Falcon.

01 10 42 47 CC Falcon, this is Houston.

01 10 42 51 CDR Go ahead, Houston.

01 10 42 54 CC Be advised that we have - had an excellent TV show here, and that you can secure it, as you like. And I'd like to remind you that we have a - an update to the LM Contingency Checklist that we need to make before you leave - leave the LM.

01 10 43 16 CDR Okay, we'll take that over in the command module, Karl. We'll go ahead and power the LM down now and clean up the housekeeping, and see you on the other side.

01 10 43 30 CC Falcon, stand by. We're interested in the OPS checkout.

01 10 43 36 CDR Roger. We can give you that from the command module.

01 10 43 42 CC Roger.

01 10 43 46 CDR We'll do all the housekeeping. We'll just give you report from Endeavour.

01 10 43 59 CC Falcon, that all sounds good, and only one other mat - matter, and that's the docking index angle as you go back through.

01 10 44 08 CDR Roger. We checked that. It was plus .1.

01 10 44 14 CC We copy.

01 10 44 38 CDR Hey, Houston, correction. That's a minus .1.

01 10 44 43 CC Correction received.

01 10 44 47 CDR It's so close to zero it's hard to tell.

01 10 46 02 CMP Houston, Endeavour.

01 10 46 05 CC Endeavour, this is Houston.

01 10 46 08 CMP Okay, Karl. I'll go ahead and secure the TV now.

01 10 46 12 CC Very good.

01 11 10 36 CMP Houston, 15.

01 11 10 40 CC 15, this is Houston.

01 11 10 43 CMP Okay, Karl. I've got the OPS checkout numbers for you if you want them.

01 11 10 47 CC Very good. Go ahead.

01 11 10 50 CMP Okay. Commander's OPS had a source pressure of 5800, 5800, and a regulated pressure of 3.8. And the LMP's source pressure was 5800, and regulator pressure was 3.85.

01 11 11 13 CC Roger. Houston copies.

01 11 11 17 CMP Roger.

01 11 11 34 CC And, 15, when Jim has a couple of minutes, we'd like to ask a few questions about the high-gain antenna.

01 11 11 45 CMP Okay; he's off the headset right now, Karl. I'll get him as soon as I can.

01 11 11 50 CC Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 12 16 33 CC 15, this is Houston.

01 12 16 39 CMP Hi, Karl. Hey, listen; we're start - going to start up PTC here pretty soon. Do you want to update which RCS jets you want me to use?

01 12 16 59 CC Stand by on that, Al.

01 12 17 09 CMP Okay. I'll go ahead and do the VERB 49 maneuver and start damping rates.

01 12 17 14 CC Negative, Al. We want to stand by in this attitude.

01 12 17 20 CMP Oh, okay.

01 12 17 24 CC We - we are thinking real hard down here about your AC glitch and its possible connection to the loss of comm.

01 12 17 38 CMP Okay.

01 12 17 50 CC Whenever Jim is available, we would be pleased to ask a couple of questions.

01 12 17 58 CMP Roger, Karl. You have to stand by on that. He's finishing up over in the LM right now.

01 12 18 04 CC Okay.

01 12 18 32 CC Al, if you are looking for a job, I could read you up a flyby pad.

01 12 18 42 CMP Okay, Karl. Be a moment.

01 12 20 32 CMP Okay, Houston; this is 15. Go ahead with the pad, Karl.

01 12 20 36 CC Roger. Purpose is flyby, SPS/G&N; 66655; plus 1.24, minus 0.11; 073:30:56.80; plus 0257.2, plus 0230.9, minus 0314.9; 331, 109, 079; NA, plus 0020.8; 0467.6, 1:11, 0463.0; sextant star is 02, 148.5, 26.4; boresight star is NA; latitude, plus 13.32, minus 174.04; 1098.7, 36170; 170:59:57. GDC aline stars, Vega and Deneb; 209; 009; 349. No ullage comments. The burn is SPS docked. Number 2, use



onboard preferred REFSMMAT, because of yaw gimbal angle. Number 3, LM weight is 36220. And that's all.

01 12 23 34 CMP Roger; understand. Purpose is flyby, that's SPS/G&N; and pad's as follows: 66655; plus 1.24, minus 0.11; 073:30:56.80; plus 0257.2, plus 0230.9, minus 0314.9; 331, 109, 079; and the next is NA; and I missed a couple in there. Picking up that sextant star would be 02, 148.5, 26.4; boresight star is NA; latitude is plus 13.32, longitude, minus 174.04; 1098.7, 36170; 170:59:57. Vega and Deneb are set stars; with angles of 209; 009; and 349. No ullage. And the SPS docked burn, use a preferred REFSMMAT because of the yaw gimbal angle, and the LM weight is 33260.

01 12 24 51 CC The LM weight is 36220.

01 12 25 04 CMP Okay, Karl. Understand; 36220.

01 12 25 06 CC That's correct. And down in NOUN 44,  $H_P$  is plus 0020.8; DELTA- $V_T$ , 0467.6, burn time, 1:11, DELTA- $V_C$ , 0463.0.

01 12 25 49 CMP Roger, Karl; understand.  $H_A$  is NA,  $H_P$  is plus 0020.8; DELTA- $V_T$  is 0467.6, with a burn time of 1:11, DELTA- $V_C$ , 0463.0.

01 12 26 08 CC Roger. That's all correct.

01 12 26 13 CMP Okay.

01 12 29 50 LMP Houston, this is - Endeavour.

01 12 30 12 LMP Houston, this is Apollo 15. Over.

01 12 30 16 CC 15, this is Houston. This is Houston; go ahead.

01 12 30 27 LMP Yes, Karl, this is Jim. I'm back in and on comm. As far as that AC and main bus undervolt, I have not much more to add than what I said before. Do you have any other questions?

01 12 30 44 CC Roger. Stand by just about 30 seconds, and we'll come up with a couple.

01 12 30 51 LMP Okay.

01 12 31 32 CC 15, this is Houston.

01 12 31 38 LMP Go ahead, Karl.

01 12 31 41 CC Jim, we've been doing a lot of thinking about that AC glitch down here, and - the coincidence of time - makes us guess that there is a connection with that power loss, but we don't see how. We'd like to start off with a couple of questions. The first one is, when you - reacquired on the high gain antenna, did you possibly notice that the high gain angles were different from what you'd set on the knobs?

01 12 32 13 LMP Yes; as a matter of fact, they were.

01 12 32 16 CC Okay.

01 12 32 20 LMP I - I did nothing up here to reacquire on the - the high gain. It came back automatically.

01 12 32 27 CC Okay; that's interesting information. Were there any talkbacks noted changing state at the time of the glitch?

01 12 32 37 LMP No change that I noticed.

01 12 32 41 CC Okay. Was anyone in the tunnel at the time of the glitch?

01 12 32 50 LMP Say again about the tunnel, Karl.

01 12 32 52 CC Was anyone in the tunnel at the time of the glitch?

01 12 33 04 LMP Stand by.

01 12 34 12 LMP Okay, Karl. Al was in the tunnel, but there were no electrical connections being made at the time.

01 12 34 20 CC Roger. I - I guess a follow up question then — and you've probably answered it — is, was there any unusual activity associated with the tunnel umbilicals?

01 12 34 37 LMP Don't think so - we don't think so, Karl, not at that time.

01 12 34 41 CC Okay. And another question on this line is, what was and what is the position of the LM power 1 main B and 2 main B circuit breakers on panel 5?

01 12 34 54 LMP Stand by.

01 12 35 04 LMP They're both in.

01 12 35 08 CC Roger.

01 12 35 18 CC Okay. If you have some minutes to spare up there, we'd like to go through a cockpit check for open circuit breakers connected with main B and AC 2, on the theory that whatever happened might have blown a circuit breaker that wasn't obvious to you.

01 12 35 37 LMP Okay. I'll - I'll do that now.

01 12 35 40 CC We suggest - that - well, you know, this - figures 3-1 and 3-2 are a good guide to that for the normally open circuit breakers.

01 12 35 53 LMP I'll check all circuit breakers.

01 12 36 22 CC Jim, I've got the diagrams down here, if there's anything I can do to help you.

01 12 36 30 LMP Okay; we'll look around.

01 12 38 23 LMP Karl, this is Jim.

01 12 38 26 CC Go ahead.

01 12 38 30 LMP Roger. On 226, under LIGHTING, NUMERICS/INTEGRAL, LEB AC 2 has been popped, or I believe it's popped. I would think it'd normally be closed now.

01 12 39 06 CC Roger, Jim. We confirm that that is normally closed.

01 12 39 13 LMP Okay; it looks like it might be the problem.

01 12 49 48 CC 15, this is Houston.

01 12 49 56 LMP Go ahead, Karl.

01 12 49 57 CC When you're through checking the circuit breakers, we have a little procedure we'd like to go through here as - as a further check.

01 12 50 08 LMP Okay. Did you want me to continue checking? I figured after I - Stand by.

01 12 50 17 CC Roger, Jim. We - we'd like to have a - a complete check there, and don't - don't reset that circuit breaker, incidentally.

01 12 50 25 LMP I understand.

01 12 51 58 LMP Okay, Karl. I've checked all circuit breakers, and that's the only one that seems to be out of configuration.

01 12 52 04 CC Okay; very good. What we're going to do, Jim, is to drop the up-link and see what happens. And just to clarify the communications glitch that we had, the ground station lost the power amplifier, and we lost up-link to you. There was apparently no loss of down-link. So what we want to do now is to - is to drop the up-link and see if it creates the same glitches that - as you got on the AC bus that time. In view of your circuit breaker being out, we don't think there's a connection, but we'd just like to have this final confirmation. And - -

01 12 52 43 LMP Okay; we're standing by.

01 12 52 44 CC - - to start the procedure here, we'd like to just double check that you - that the dials for the HIGH GAIN ANTENNA are setting at PITCH, minus 30; YAW, 276.

01 12 52 58 LMP Yes, that's correct.

01 12 53 00 CC Roger. And verify that we have - -

01 12 53 02 LMP YAW - YAW is really - -

01 12 53 07 CC Go ahead.

01 12 53 08 LMP Yes, we're in TRACK, AUTO.

01 12 53 10 CC We - we'd like to have AUTO and NARROW.

01 12 53 12 LMP YAW is - -

01 12 53 23 LMP PITCH is minus 30, YAW is 270, and TRACK is AUTO.

01 12 53 44 CC Roger, Jim. And what we're going to do now is to drop up-link for 20 seconds, and you are to read and record the high gain antenna dials and any changes that occur there. Then we'll bring up the up-link; and, at that time, we want you to require - reacquire HIGH GAIN ANTENNA on - on AUTO, NARROW. Okay?

01 12 54 10 LMP Okay. Right now the YAW indicator is reading about 280.

01 12 54 19 CC What does your dial say?

01 12 54 24 LMP The dial is 280. The thumbwheel is 270.

01 12 54 31 CC That's okay. And are you ready for us to drop the up-link?

01 12 54 39 LMP Go ahead. Yes, go ahead.

01 12 54 46 CC Okay. We'll be dropping - dropping the up-link for 20 seconds. Here we go.

01 12 56 07 CC 15, this is Houston. How do you read?

01 12 56 13 CDR This is 15. I read you loud and clear.

01 12 56 16 CC Roger. Did you observe anything special up there?

01 12 56 22 CDR Nothing other than the - the PITCH went to 0, and the YAW decreased just very slightly. And, of course, when you reacquired, it went back to - PITCH went back to 30.

01 12 56 39 CC We copy.

01 12 58 04 CC 15, this is Houston. That's enough troubleshooting, and we're ready to go to PTC now. And we'd like to have you use the A and D quads for damping. And use the B and D quads for spinup. And we'd like to confirm that we are using a spin rate of .375 this time.

01 12 58 35 LMP We copied all that, Karl. A and D for damping,  
B and D for spinup. And .375 for the rate.

01 12 58 43 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 13 10 58 CC 15, this is Houston. Your rates look low enough to go into spinup, if all of your vents have been closed.

01 13 11 08 CDR Okay, Karl. I think we got everything closed, and we'll go ahead and spin her up.

01 13 11 12 CC Very good.

01 13 11 37 CC 15, could you please confirm that you're on OMNI Bravo.

01 13 11 45 CDR That's affirm, Karl. We're on OMNI Bravo.

01 13 11 48 CC Thank you.

01 13 20 07 CC 15, this is Houston. We have a read-out down here that A-1 jet is on - could you confirm that? And if it is on, let's turn it off.

01 13 20 22 CMP Roger, Houston; 15. Your read-out is correct and it's now off. Sorry, Karl, I overlooked that one.

01 13 20 28 CC Thank you.

01 13 23 41 CC 15, this is Houston. Your spinup is looking very good to us, and when you have a couple of minutes to listen, we have a brief status report to send up to you.

01 13 23 56 CDR Okay; go ahead, Houston. We're standing by.

01 13 24 01 CC Okay. In regards to your range rate tape meter - That is normally sealed in a helium atmosphere at 15 psi, and with that outer glass broken, this seal is broken and the meter is now operating in 0 to 5 psi in an oxygen environment. We don't know that this has any effect on it, but Grumman is doing tests to show whether or not it's okay. Concerning the SPS - -

01 13 24 34 CDR ...

Tape 25/2  
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01 13 24 36 CC Yes, go ahead.

01 13 24 40 CDR I was just going to say, it would be interesting to hear what they find out.

01 13 24 44 CC Roger, we'll let you know. Concerning the SPS, we're still reviewing the LOI procedures that we'll use, but it's probable that we'll want to start automatically on bank B and bring on A 5 seconds later, using the circuit breaker, and then turning it off at 6 minutes and finishing up the burn on bank B. It's probable that the other burns, except for TEI, will be done on bank B only. Any comments on that?

01 13 25 23 CDR No, that's just about what we were thinking too, Karl.

01 13 25 27 CC Okay. In the LM, the batteries and the SHe look in perfect shape, and concerning the lighting circuit breaker problem, we're still getting in the data in down here, and we'll review the situation with you tomorrow. We see no problem with the high gain antenna. And other than your - and other than your crew status report and your onboard read-out, that just about wraps up the evening. We'd still like to have your PRD read-outs, and I guess we have a battery charge in progress that will need to be cut off.

01 13 26 16 CDR Okay, Karl; we'll finish up the rest of the items here and bring you up to date on all the read-outs, and - Sorry about the PRDs, but since ... tonight.

01 13 26 33 CC Okay. No problem on that. And I have a - I have the update to the LM Contingency Checklist, and if you want to take it this evening, I can give it to you; otherwise, it can be put off until tomorrow.

01 13 26 58 CDR Okay, stand by.

01 13 27 37 CDR ... notes you have ... Contingency Checklist.

01 13 27 49 CC 15, this is Houston. I heard you trying to come through but we were noisy just then. Hold off just a minute.



01 13 27 58 CDR ... Houston, 15.

01 13 28 01 CC Reading you better now; go ahead.

01 13 28 09 CC 15, this is Houston.

01 13 28 27 CDR Houston, 15.

01 13 28 31 CC 15, this is Houston. I'm reading you loud and clear.

01 13 29 00 CC 15, this is Houston. How do you read me?

01 13 29 07 CDR ... clear.

01 13 29 09 CC Roger. Did I understand that you were ready for the LM Flight Plan - Contingency Checklist update?

01 13 29 19 CDR Yes, I am, Karl.

01 13 29 27 CC Roger. On page 1-1, down under "Power Transfer and RCS Heater Activation."

01 13 29 46 CDR Go ahead.

01 13 29 49 CC At the end of step 2, add the following line:  
"Circuit breaker 16, STABILIZATION/CONTROL, ASA, close."

01 13 30 17 CDR Okay; I copy that.

01 13 30 19 CC Roger. On page 1-7. Under "AGS Activation."

01 13 30 51 CC Okay?

01 13 30 52 CDR I was standing by.

01 13 30 55 CC Add before step 1: "Verify ASA circuit breaker - has been closed for 10 minutes."

01 13 31 20 CDR Roger. Understand before step 1, "Verify ASA circuit breaker's been closed for 10 minutes."

01 13 31 26 CC Roger. The next one is page 2-5.

01 13 31 38 CC And on that circuit breaker configuration, in the second row down, put a black dot under the ASA circuit breaker.

Tape 25/4

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01 13 31 57 CDR Okay; I understand.

01 13 31 58 CC And on page 2-13. Under "AGS Activation and Self Test," add before step 1: "Verify ASA circuit breaker - has been closed for 10 minutes."

01 13 32 30 CDR Okay; I copied all of that.

01 13 32 32 CC Very good. That's all of the update.

01 13 32 37 CDR Okay; thank you, Karl.

01 14 37 15 CC 15, this is Houston. How are you enjoying dinner?

01 14 37 23 CDR It's just fine, Karl.

01 14 37 26 CC Great, glad to hear it. Hey, we'd like to ask a question about that glass breakage in the LM. Did it shatter into little bits or just a few big hunks? How well do you think you got it cleaned up?

01 14 37 42 CDR I think we probably got about - maybe 50, 60 percent of what was broken, and it was broken into - some pieces on the order of three-quarters to an inch and other little - millimeter-type pieces.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

01 14 37 58 CC Okay. I guess that gives us a picture of the situation. We're somewhat concerned about that having drifted into equipment or - yes, into equipment.

01 14 38 06 CDR Okay. Well we looked around and picked up what we could with tape, and we took the vacuum cleaner over and ran it for quite a while to try and pull up what we could.

00 14 38 15 CC Very good.

01 14 38 25 CDR We don't have any idea why it broke. It didn't look like there was anything in the ISA which could have done that to the - just the face of that meter. The ISA had mostly soft equipment. It was pretty well padded.

01 14 38 37 CC Okay.

01 14 53 51 CC 15, this is Houston. We're ready to terminate the charge on BAT A now.

01 14 53 59 CDR Roger. Terminate charge on BAT A.

01 14 54 02 CC And incidentally, we see a - an off-nominal drain on BAT A, and we'd like to verify that the PITCH 1 and the YAW 1 circuit breakers on panel 8 are open. If not, we'd like to open them.

01 14 54 19 CDR Okay. Stand by. Circuit breakers are verified open.

01 14 54 30 CC Thank you. And, let's leave them open.

01 14 54 35 CDR Roger.

01 14 56 15 CC 15, this is - 15, this is Houston. I want to correct a false impression I gave you. We don't see any off-nominal drain on battery A.

01 14 56 27 CDR Alright, Fred. Thank you.

01 15 16 03 CDR Okay; Houston, 15.

01 15 16 10 CC 15, this is Houston. Go ahead.

01 15 16 17 CDR Okay. We have a presleep checklist when you're ready to copy.

01 15 16 34 CC Roger, 15. Go ahead.

01 15 16 40 CDR Okay. Crew status report, everybody's in good shape. No medication today. The onboard readouts: BAT C, 37; PYRO BAT A, 37.2; B, 37.2; RCS A, 90; B, 89; C, 91; and D, 89. The fans are being cycled now. The water has been chlorinated. All the valves are closed. We're getting ready to pump up the cabin. And we'll give you a E-memory dump whenever you are ready.

01 15 17 22 CC Roger, Dave.

01 15 17 28 CDR And one more thing, we've - I've got the PRDs for you.

01 15 17 32 CC Great. Go ahead.

01 15 17 37 CDR Okay. CDR is 23020, the CMP is 5008, and the LMP is 8008,

01 15 17 55 CC Thank you, Dave. And incidentally, if you'd like to get rid of that biomed harness, you can change off now, you know?

01 15 18 08 CDR Oh, that should work, right now.

01 15 23 41 CC 15, this is Houston. We're ready for the E-memory dump.

01 15 23 47 CDR Roger. And here it comes.

01 15 23 54 CC And, Dave, a - we - our telemetry says that the optics power is still on, and I'd like to remind you to turn it off.

01 15 24 04 CDR Hey, I thought we just got that off.

01 15 24 09 CC Sorry about that.

01 15 24 19 CDR Well, Karl, does your telemetry tell you it's on or off now?

01 15 24 25 CC They were just telling me that - hey, it was off about the time that I called you.

01 15 24 31 CDR Oh, okay.

01 15 57 11 CC Endeavour, Houston. Over.

01 15 57 24 CDR Houston, Endeavour. Go ahead.

01 15 57 26 CC Roger. Guys, before you go to sleep, I'd like to have the mode - S-BAND NORMAL MODE - switch VOICE to off, please.

01 15 57 36 CDR S-BAND NORMAL MODE VOICE - switch VOICE to off. Is that it?

01 15 57 41 CC Roger. And, unless you guys have something else, we're going to let you go to sleep now.

01 15 57 47 CDR Okay, Bobby. Thank you.

01 15 57 50 CC See you sometime.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 01 04 11 CC Good morning, Apollo 15; this is Houston. Do you read? Over.

02 01 09 43 CC Good morning, Apollo 15; this is Houston. Are you awake yet? Over.

02 01 09 54 CMP Good morning, Houston; this is 15. Reading you loud and clear there, Joe. Good morning.

02 01 09 59 CC Good morning, Alfredo. It sounds like you had a good night's sleep. We're standing by for crew status.

02 01 10 06 CMP Okay, Joe; we certainly did have a nice sleep, and we think your tracking data must be right. The Moon is getting bigger out the window.

02 01 10 14 CC Roger, Al. At least our direction is right.

02 01 10 20 CMP Appears that way. And, Joe, this is Al. We'll give you a status report here in about 5 minutes, when you're organized.

02 01 10 34 CC That sounds good, Alfredo. And if you like, I'm standing by down here with a PAO Gold Bugle Morning News, if you'd like to hear some.

02 01 11 00 CMP Joe, can you stand by for a minute on that. We wouldn't want our LMP to miss it.

02 01 11 07 CC No, I agree; he should be aware of it. I'll stand by.

02 01 12 14 CMP Joe, Jim's awake here. Ready to listen.

02 01 12 20 CC Roger.

02 01 12 46 CC Okay, Apollo 15. This is your friendly news reporter with the morning news. Apparently the Houston Post reported, yesterday, that the Falcon's checkout went smoothly, and the mission is proceeding on schedule. The inside pages show drawings of how you will deploy the lunar roving vehicle. They didn't tell us anything I think we don't

already know so I won't go into the details of the drawings. In national news - Now, we may be use - losing communications now; I'll stand by a minute.

02 01 13 50 CC

15, are you reading Houston clearly?

02 01 13 55 CMP

Roger, Joe; we're back with you.

02 01 14 00 CC

All right. Moving right along, now, the national news, Secretary of Labor Hodgson has asked the United Transportation Union and the rail industry to put their dispute before a neutral panel for settlement. U.S. Senate will vote today on an amendment to delay a federally guaranteed loan to Lockheed. The vote is expected to be very close. In local news, a Texas Animal Health Commission employee said that he thinks that the Harris County vaccination program against sleeping sickness is almost at an end. I don't know if they're going to institute preflight quarantine on the animals or not. And more than a hundred people were arrested during a raid of the Arlington Country Club in Texas, last night, and gambling equipment was confiscated. Maybe you left town just in time. In sports, yesterday, the Baltimore Orioles increased their lead to four games in the American League East by winning the double header from the Oakland Athletics, 1-0 and 6-4. And the Houston Astros split a twilight double header last night with the Phillies, 8 to 3 and 5 to 1. Muhammad Ali announced that - and I'll stand - all right, Muhammad Ali announced that he will fight Jerry Quarry, September, in the Astrodome and Ali also wants a rematch with Joe Frazier sometime in March, 1972. The Oilers have trimmed their roster to 59 players by placing two of the players, Johnny Peacock and Tom Smiley, on waivers. Four golfers were inducted into the American Golf Hall of Fame last night. They are Julius Boros, Cary Middlecoff, Jock Hutchinson, and the late Walter J. Travis. And we hate to tell you this, but Elizabeth Taylor is a grandmother, at age 39 when her 19-year-old daughter-in-law gave birth to a 6-pound, 2-ounce girl yesterday. And that's all from the Houston MOCR News Center.

02 01 16 31 CMP

Okay, Joe. Thank you very much for the weather and news this morning.



02 01 16 40 CC Okay, Al. And I have a CSM consumables update and a number of other things, when you're ready to listen to them.

02 01 16 55 CMP Okay, Joe; stand by 1.

02 01 16 58 CC Roger.

02 01 19 40 CMP Houston, this is 15. We are ready to copy the consumables updates ...

02 01 19 50 CC Al, stand by. We're not receiving you clearly.

02 01 19 58 CMP Okay. We'll stand by.

02 01 20 02 CC Roger; it's very weak and severe noise in the background, 15. We're standing by for better comm.

02 01 20 12 CMP We understand.

02 01 21 54 CC Al, this is Houston. The noise seems to have quieted down again. Why don't we give it another try?

02 01 22 09 LMP Okay, Joe. Would you like to copy our consumables and then you can pass up S-band.

02 01 22 19 CC Okay.

02 01 22 23 LMP Okay, RCS, 90, 89, 90, and 89. On H<sub>2</sub>, 92, 90, 70. O<sub>2</sub>; 90, 90, and 85.

02 01 22 45 CC Roger, Jim. We copy all that. Let me give you a set of figures here. They agree very closely to what you've read to us. At GET 48 plus 00; the RCS total was 87; and then quad A, 86, 87, 86, 87. H<sub>2</sub> tank, 92, 92, 70. O<sub>2</sub> tank, 90, 92, 85. Over.

02 01 23 34 LMP Okay, I copied all those. As far as sleep, Dave figures 8 hours in two segments; Al was 8 hours for two; and I figure I got 9 hours in about three segments.

02 01 23 55 CC Roger; we copy that. Sounds like that's the most sleep you've had in several months. Out of curiosity, since we're coming up on this eye-flash

experiment, I wonder if any of you has noticed any of the flashes yet?

- 02 01 24 11 LMP Yes, we have noticed them both nights, Joe.
- 02 01 24 15 CC Okay; I guess we'll talk more about that a little later on. I have a number of other things to read up to you, in whatever order you'd like. They include a fairly extensive Flight Plan update, nothing profound but it will require some - certain amount of writing and then a few miscellaneous questions which we'd like to ask you.
- 02 01 24 45 LMP Ok - okay; I guess I can start on the - these Flight Plan bit.
- 02 01 24 54 CC Okay, Jim. And are you the recording secretary this morning?
- 02 01 25 01 LMP Yes.
- 02 01 25 14 CC Okay, Jim. Before we start, did you get the radiation dosimeter readings for us?
- 02 01 25 23 LMP We reported them last night. Do you want them again this morning?
- 02 01 25 29 CC Apparently, we'd like them again the - the - this morning on the schedule.
- 02 01 25 36 LMP Okay; stand by.
- 02 01 27 11 LMP Okay, Joe. I have a radiation report for you.
- 02 01 27 15 CC Go ahead.
- 02 01 27 21 LMP Okay, radiation. On Dave is 23023; Al, 25009; and mine is 08010.
- 02 01 27 44 CC We copy those, Jim; thank you. And normally, I guess, we'd like those in the postsleep period as opposed to presleep, which is when we got them yesterday. I guess it's in the checklist that way
- 02 01 28 00 LMP Okay, we'll - okay, we'll normally do it that way.
- 02 01 28 05 CC Okay; fine, and I'm ready to start with the Flight Plan update. When you're set up to copy up there, I'll start at about 54:50.

02 01 28 20 LMP

Okay, let me get to 54:50.

02 01 28 22 CC

Fine, Jim. And we're coming up on an OMNI switch. When we're on the new antenna, I'll start to read. You might want also your LM Activation Checklist handy because we'll be using it later on.

02 01 28 38 LMP

Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 01 31 44 LMP Houston, how do you read 15?

02 01 31 48 CC Jim, you're loud and clear, and we're ready down here if you are.

02 01 31 53 LMP Okay. I'm at 54:50 on the Flight Plan.

02 01 31 57 CC Okay. Before I start into it step by step, let me just say that it's basically - the - the change is basically moving some of the items around in time, and there's not many changes in procedures involved. The one main thing is we're going to ask you to go into - into the LM a little early, I guess, earlier than you had planned. And we're going to also request that you give us enough - you bring enough of the telemetry on line so we look at the - can look at the LM batteries. And there's no particular reason we want to do this today. Nothing that we suspect is wrong, but rather, apparently, the systems people are interested in a better granularity in data points that they're taking on these batteries. That's the reason for this particular addition. Other than that, I think there's no - nothing at all very - very different about this Flight Plan update, other than a few minor changes. And I'll go ahead and start if you're ready.

02 01 33 11 LMP Okay. I'm ready, Joe. And we understand.

02 01 33 15 CC Okay; 54:50, the step "If LM/CM DELTA-P less than 2.7 psid, LM TUNNEL VENT valve, panel 12, vent until DELTA-P greater than 2.7 psid."

02 01 34 15 LMP Okay. I have "If LM/CM DELTA-P, is less than 2.7 psid, LM TUNNEL VENT valve on panel 12, vent until DELTA-P greater than 2.7 psid."

02 01 34 29 CC That's correct. Now turn one page to 55 plus 15.

02 01 34 48 LMP Okay; I'm there.

02 01 34 51 CC Okay. Insert "Stop PTC at roll 50 degrees. HIGH GAIN ANTENNA angles: PITCH, minus 48; YAW, plus 82."

02 01 35 25 LMP Roger. "At 55:15, stop PTC roll 50 degrees; HIGH GAIN ANTENNA: PITCH, minus 48; YAW, plus 82."

02 01 35 37 CC That's correct. Now, turn back several pages to 3-54, please. And that's the "Cycle Film in Pan and Map Cameras" page - procedures page.

02 01 35 58 LMP Okay; I have it.

02 01 35 59 CC Okay. Down near the bottom, delete the line "SM SECTOR 1, SM/AC POWER, OFF." And add in its place "MAP CAMERA on - that should read "MAP CAMERA on STANDBY/talkback gray." Over.

02 01 36 34 LMP Okay; understand. Delete "SM SECTOR 1, SM/AC POWER, OFF," and add "MAPPING CAMERA on to STANDBY/talkback gray."

02 01 36 46 CC That's correct. Now, turn back to 55 plus 50, and there's a long series of deleted activities that will follow. These - All because we're not going to do a midcourse 3, as you're well aware. And I'll call them out line by line, and they'll carry through for - I guess about a page and a half here. At 55:00.

02 01 37 20 LMP Okay; go ahead.

02 01 37 22 CC Delete "P30 external DELTA-V" and "V49 maneuver to pad burn ATT." Turn the page. Jim, I've apparently made a mistake on that. That should have been 55:50. I think you're at the right - the right place. Continuing on over to 50 - -

02 01 37 50 LMP Yes; I got it.

02 01 37 51 CC Roger. Continuing to 56 plus 00, delete the next seven lines up to the two lines which you should leave in: "O<sub>2</sub> FUEL CELL PURGE" and "WASTE WATER DUMP."

02 01 38 14 LMP Okay; I have that.

02 01 38 16 CC Okay. Continuing - continue deleting the lines below that, down to 57 plus 00.

02 01 38 37 LMP Okay. So the only two actions we have on that page, 56 hours, is the "O<sub>2</sub> FUEL CELL PURGE" and the "WASTE WATER DUMP."

02 01 38 44 CC That's affirm. Now, once again backing up to the time, 55 plus 50. That should read "VERB 49 maneuver to LM checkout attitude," and that attitude is "305, 090, 000. HIGH GAIN angle: PITCH, minus 30; YAW, 276."

02 01 39 54 LMP Okay. "VERB 49 maneuver to LM checkout attitude" at 55:50; the attitude "305, 090, and 000; HIGH GAIN: PITCH, minus 30; and YAW, 276."

02 01 40 11 CC Readback's correct, Jim. I'll stand by until we get another OMNI change.

02 01 40 19 LMP Okay.

02 01 42 48 CC 15, Houston. Our comm's quieted down again, and I'll continue if you're ready.

02 01 42 58 LMP Okay. I'm ready, Joe.

02 01 42 59 CC Roger, Jim. At 56 plus 50, start "CSM Systems Checklist, IVT to LM," and this is an item that's moved up from 57:20, by the way.

02 01 43 34 LMP Okay. At 56:50, start "CSM Checklist, IVT to LM."

02 01 43 43 CC That's correct, and you are to start that checklist from the beginning. And at 57 plus 00, you move the CSM PTC procedures to completion of our LM battery checkout. And I guess that's an item for Al.

02 01 44 21 LMP Okay; understand. We'll move all that there for the PTC until after we complete the battery checkout.

02 01 44 30 CC That's correct, and that should come around 57 plus 50 or perhaps a little later. But, once again, not time critical. We're coming up on 57 plus 30. And, if you'll take out your LM Activation Checklist, page 1-1, please.

02 01 45 11 LMP Okay; I have it.

02 01 45 14 CC Okay. And this is to start at 57 plus 30. Perhaps you should put a mark in your time line, but then on - on the checklist from page 1-1, delete "Comm carrier, CWG connector." Delete step 2. Delete step 5.

02 01 45 54 LMP Okay. On 1-1, I delete "Comm carrier, CWG connector;" step 2; and step 5.

02 01 46 04 CC That's affirm. Do page 1-13. And if you'll turn to that, do 1-13, except in step 2.

02 01 46 34 CC In step 2, delete "VHF B TRANSMITTER, close; VHF A RECEIVER, close; CDR AUDIO, close." And add the instruction "CB 11, ECS CABIN FAN, close."

02 01 47 24 LMP Okay, Joe. On 1-13, under step 2, to delete "VHF B TRANSMITTER, close; "VHF A RECEIVER, close; COMMANDER AUDIO, close." And add "CB 11, ECS CABIN FAN, close."

02 01 47 38 CC That's correct, Jim. Do page 1-14, except in step 5. Delete "VHF A TRANSMITTER, close; VHF B RECEIVER, close;" and delete step 6.

02 01 48 15 LMP Okay. On 1-14, we'll do all that. Under step 5, we'll delete "VHF A TRANSMITTER, close; VHF B RECEIVER, close;" and want to delete step 6.

02 01 48 28 CC Readback's correct, and add step 7. Your comm S-BAND configuration is "PM, SECONDARY, PRIMARY, OFF; PCM, OFF/RESET, OFF, and HI."

02 01 49 03 LMP Okay. The S-BAND configuration is "PM, SECONDARY, PRIMARY, OFF; PCM, OFF/RESET, OFF, and HI."

02 01 49 11 CC That's correct. We'll want you to stay in the configuration for 15 minutes while we take the data. After that time, do page 1-18 and 1-19.

02 01 49 32 LMP Understand to stay in that configuration for 15 minutes, then do 1-18 and 1-19.

02 01 49 38 CC Okay, Jim. Sounding fine. Now, back into your time line. At 57 plus 45, proceed with LM housekeeping. And we've got some words here on the housekeeping. I'll read them to you, and I guess - Copy down whatever you think you haven't done yet.

02 01 50 14 LMP Okay; understand. At 57:45, we're to proceed with LM housekeeping, and go ahead with the - your steps, Joe. I'll note them down.

02 01 50 22 CC Okay. Vacuum cabin fan filter. And as a subgroup under this, you unsnap netting around cabin fan filter.

02 01 50 52 CC Then you vacuum the filter. But do not scrub bristles of the vacuum cleaner over the surface of filter. Then, you remove the remaining particles on cabin fan filter with sticky tape, using care not to dislodge filter material.

02 01 51 39 CC Then, you remove the particles on the inlet screen of the vacuum cleaner with sticky tape; and, finally, replace the netting.

02 01 52 17 CC And, Jim, that's the end of that procedure. Our comm's starting to fade out on us, so we may not be able to copy you. Hopefully, you're copying us clearly still.

02 01 52 29 LMP Yes, we are, Joe. I got that ...

02 01 53 18 CC Okay, Jim. And just an added note on that. As you're well aware, we're interested in cleaning up as many of those fine glass particles as we can, which is primarily the reason for - for this procedure.

02 01 53 36 LMP Yes; we quite agree, Joe.

02 01 53 38 CC Okay. At the time 57 plus 45, the steps "S-BAND AUX, TV to SCIENCE, PAN CAMERA POWER to on," and then in parenthesis, "for 5 minutes/OFF." and finally, "S-BAND AUX, TV to off."



02 01 54 29 LMP Okay, Joe. At 57:45, understand you want the "S-BAND AUX, TV to SCIENCE." Then I missed the information after - after that, and then, finally, the last one was "S-BAND AUX, TV to off."

02 01 54 48 CC Okay, Jim. What we're interested in here is looking at the pan camera temperature. And the center step, the one you missed, reads "PAN CAMERA POWER to on for 5 minutes and then OFF."

02 01 55 18 LMP Okay; understand. "PAN CAMERA POWER to on for 5 minutes and then to OFF."

02 01 55 26 CC That's correct. At 57 plus 50, "CSM proceed with PTC activation."

02 01 55 53 LMP Okay. At 57:50, "CSM proceed with PTC activation."

02 01 56 00 CC Roger. And turning over a page to 60 hours. After the step "S-BAND AUX, TV-off," add "PAN CAMERA SELF TEST to off." And - -

02 01 56 22 LMP Roger, Joe.

02 01 56 33 LMP Joe, do you read me now?

02 01 56 35 CC Okay, Jim. Reading you loud and clear.

02 01 56 40 LMP That last information you gave me on S-BAND AUX, TV. I add that - I added that in at 57:45. Is that correct?

02 01 56 54 CC Jim, no; negative. Turn over the page to 60 hours, 60 plus 00.

02 01 57 08 LMP Okay; I have 60 hours.

02 01 57 22 LMP Okay, Joe. I'm at 60 hours.

02 01 57 24 CC Okay, Jim. This is a new step completely at 60 hours. We did say something at 57:45. I'll come back to that in a minute to make sure that's straightened around. But at 60 hours, after the step in the Flight Plan, S-BAND AUX, TV to off, add two steps. And they are "PAN CAMERA, SELF TEST to off" and "MAP CAMERA, ON to OFF." Over.

02 01 58 10 LMP Okay; understand. Two steps there after "S-BAND AUX, TV-off." "PAN CAMERA, SELF TEST, off" and "PAN [sic] CAMERA, ON to OFF."

02 01 58 23 CC That sounds - that sounds good, Jim.

02 01 58 30 LMP Let's go back to 57:45.

02 01 58 42 CC Okay, Jim. At 57:45, the three steps you added in there should be "S-BAND AUX, TV to SCIENCE; PAN CAMERA POWER, on for 5 minutes and then off; and S-BAND AUX, TV, off."

02 01 59 03 LMP Okay; understand that. I guess I got a little confused there, Joe, when you said turn the page, and you turned several pages to get to 60 hours.

02 01 59 16 CC I think you caught me in that. I guess I did. Sorry.

02 01 59 26 LMP Okay. I'm ready to go on to the next one, Joe.

02 01 59 31 CC Okay, Jim. That completes the Flight Plan update, and you should know by now that you have to take me for what I mean, not for what I say. I do have - -

02 01 59 43 LMP We did.

02 01 59 45 CC Roger. I do have a note, which you can put down in the margin or wherever, and it involves subsequent P23 sightings as required.

02 02 00 05 LMP Okay.

02 02 00 10 CC And the note is "Reduce trunnion to less than 10 degrees before zeroing optics." And then, "Always do optics calibration after optics zero in P23."

02 02 01 02 LMP Okay, Joe. For subsequent P23 sightings, we're to reduce the trunnion to less than 10 degrees before zeroing optics, and always do the optics CAL after the optics zero in P23.

02 02 01 13 CC That's exactly right, Jim. And that is all I have on my Flight Plan update. I guess we've got an afterthought here. I'll get with you in a minute. I do have - some other questions which I'd like to ask, but let - let me give you this addition while you have the Flight Plan there on your lap. And it involves the time 56 plus 20. I'll stand by when you're there.

02 02 01 59 LMP Okay. I'm at 57 - 56:20.

02 02 02 03 CC Okay. The step is "Direct O<sub>2</sub> open until cabin pressure equals 5.7 psia."

02 02 02 31 LMP Okay; understand. At 56:20, "Direct O<sub>2</sub> open until cabin pressure equals 5.7 psia."

02 02 02 37 CC That's correct.

02 02 02 49 CC And, Jim. I'm going to wait until the comm gets a little better before I continue on here. Be a - a minute or so.

02 02 02 58 LMP Okay.

02 02 05 53 CC Apollo 15, Houston.

02 02 06 05 LMP Go ahead, Joe.

02 02 06 07 CC Jim, we've got about three or four small questions for you. Your choice whether you'd like to talk about them now or proceed on with the light-flash experiment.

02 02 06 18 LMP No. We're going to delay that light-flash experiment anyway until we get cleaned up here and have breakfast. So you can ask - ask the questions. We'll be thinking about it while we're cleaning up.

02 02 06 30 CC Okay. That sounds good. Our first one, we noted a very small load change on battery bus A yesterday, several minutes prior to your SPS burn, and we're trying to - to chase down what may have caused this. We suspect that you may have - have closed two circuit breakers that should have been closed and just are curious to know if you did close them, or if when you looked to verify them, they were

already closed. And, the circuit breakers in question are the SPS PITCH 1 and YAW 1 circuit breakers that feed BAT A.

- 02 02 07 22 LMP Okay. We - we closed those per checklist, Joe.
- 02 02 07 27 CC Jim, I understand you closed them per the checklist. By that do you mean that you - when you looked at them, you found them open and closed them?
- 02 02 07 53 LMP Okay. That's firm, Joe. They were open, and we closed them per the checklist.
- 02 02 08 01 CC Okay. The guys in the back room here psyched that out pretty well, I guess. Thank you. That - I guess that was a question mostly of academic interest. Al, the circuit breaker in the lower equipment bay, AC 2, is still out as you're well aware, and it affects a number of EL and DSKY lights and so on, and we'll want to talk to you later on today about this. It should be no problem in any way, but we do want to talk about - discuss ramifications of the - of the various workarounds which this may involve. And, finally, we've been noting during the night some small oscillations in accumulator quantity, and we'd like for you, please, to check your SECONDARY RADIATORS. Verify that's in BYPASS. That's panel 377.
- 02 02 09 11 LMP Okay. We're checking panel 377 now.
- 02 02 09 14 CC Okay.
- 02 02 10 45 LMP Okay, Joe. On that - on that valve on 377. It was in BYPASS, and Dave just cycled it to - cycled it to NORMAL and then back to BYPASS.
- 02 02 11 01 CC Okay, Jim. Thank you. And that's all we have down here for the time being. I've been reading the Apollo 15 Status Report that's put out every 2 hours. What's normally several pages is just a page today. And - with very few words on it, the most prominent one being the word nominal, the meaning of which I'm going to look up as soon as I get off this shift.

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02 02 11 39 LMP

Very good.

02 02 11 51 CC

And, Jim, unless you have any questions, why don't you proceed on with a comfortable breakfast, and we'll be standing by for a callout of when you're ready to continue.

02 02 12 05 LMP

Okay, Joe. Thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 03 23 02 CDR Houston, 15.

02 03 23 11 CC Go ahead, 15. This is Houston.

02 03 23 17 CDR Okay, Houston. We're getting ready to do the light-flash experiment, and we'd like to run the tape recorder so we can get the voice marks on it, if that won't interfere with any of your ...

02 03 23 35 CC Okay, Dave. Stand by. I'll inquire.

02 03 23 42 CDR Okay.

02 03 24 44 MCC TUNNEL VENT valve.

02 03 25 05 CC 15, this is Houston.

02 03 25 12 CDR Houston, 15.

02 03 25 14 CC Roger. In answer to your question on the DSE, we'll handle the DSE from down here when we start the eye-flash experiment. We do have a - a request of you before you start the experiment, though. We don't have the necessary oxygen purity in the LM yet that we think that we're going to need for the surface EVAs several days from now. And - consequently, we want you to start to vent the LM once again. We're going to drain it out and fill it with oxygen again later on today. So, if you would please, turn the TUNNEL VENT valve to the VENT position before we start the eye flash.

02 03 26 01 CDR Okay, Joe. That's in work.

02 03 26 04 CC Okay.

02 03 26 16 CDR Okay, Houston. And we'll take a couple of minutes here and run a hatch-integrity check and make sure it's all fixed up, and we'll be with you in about 5.

02 03 26 23 CC Roger, Dave. Sounds good.

02 03 36 01 CDR Okay, Houston; 15. The TUNNEL VENT ... pretty good, so we can go ahead and start the experiment.

02 03 36 08 CC Okay, Dave. We're stand by. And I could give you a few reminders on the experiment here, if you'd like them.

02 03 36 17 CDR Okay. Go ahead.

02 03 36 18 CC Roger. We're just interested - in primarily a mark from each of the three of you when you notice a - a flash. And then, you might indicate who it is calling it out and then a description, as you see it: position, color, et cetera, et cetera. And - if - any - if another one of you notices one in the meantime during the description, call mark, and that one then takes precedent [sic]. Over.

02 03 36 54 CDR Okay. That's about the way we talked it over, Joe. We're all set. Thank you.

02 03 36 59 CC Roger.

02 03 37 14 CC And, Dave, we'll be standing by for when - -

02 03 37 17 CDR Houston.

02 03 37 18 CC Go ahead.

02 03 37 21 CDR Okay. If you'll start the tape recorder, we'll start.

02 03 37 25 CC Roger, Dave.

02 03 37 31 CDR Okay; Houston, 15. We're starting.

02 03 37 40 CC Roger.

02 03 38 56 CC Dave, this is Houston.

02 03 39 04 CDR Go ahead, Houston.

02 03 39 07 CC Roger, Dave. And, just wanted to make sure you - you understood that we'd also prefer the mark on real time comm, as well.

02 03 39 23 CDR Well, all right.

02 03 43 30 CC 15, this is Houston.

02 03 43 35 CDR ...

02 03 43 39 CC Roger, Dave. Since I haven't heard anything, I'll assume you haven't noticed anything yet. And I'm assuming, also, that you are wearing your eye masks.

02 03 43 52 CDR ..., message, Joe. And the window shades are up, and the cabin is dark.

02 03 43 57 CC Okay. Thank you.

02 03 44 02 CDR And we're concentrating pretty hard.

02 03 46 16 LMP MARK LMP.

02 03 46 22 CC Roger.

02 03 46 33 CMP MARK CMP.

02 03 46 37 CC Roger, Al.

02 03 46 55 CC And, Al, any sensation other than just a flash?

02 03 47 01 CMP Negative, Joe.

02 03 47 02 CC Okay.

02 03 47 16 LMP LMP MARK.

02 03 48 28 CMP MARK CMP.

02 03 48 45 CDR MARK CDR.

02 03 48 49 CC Roger.

02 03 48 08 CDR MARK CDR.

02 03 48 12 CC Roger, Dave. And is it a - just a pinpoint, or a streak, or what?

02 03 48 17 CDR All coming on the DSE, Joe.

02 03 48 20 CC Okay.

02 03 48 25 CDR We can give you that, but it might get confusing.

02 03 48 43 CDR MARK CDR.



02 03 49 04 CDR Houston, so far we've all seen just point sources of light, rather than streaks.

02 03 49 11 CC Okay, Dave. And some of us are a bit - -

02 03 49 13 CMP MARK CMP.

02 03 49 14 CC Roger.

02 03 50 14 CC 15, this is Houston. If you see something significantly different from the point source, we'd like a real-time voice description of it, as well as DSE recorded.

02 03 50 26 CDR Okay, Houston. Fine. It's just that when we're trying to talk back and forth with the time delay, it's going to get confusing on the comm for us to try and record mark CDR.

02 03 50 37 CC Understand, Dave.

02 03 51 35 LMP MARK LMP.

02 03 51 38 CC Roger.

02 03 52 52 LMP MARK LMP. And this one did have a - a streak nature to it. Like it went from 8 o'clock over to - the plus-X position.

02 03 53 07 CC Roger.

02 03 53 30 CMP MARK CMP.

02 03 53 47 CMP MARK CMP.

02 03 54 12 CMP MARK.

02 03 54 59 CMP MARK CMP.

02 03 55 06 CMP MARK.

02 03 55 47 CDR MARK CDR.

02 03 57 37 CDR MARK CDR.

02 03 57 39 CC Roger.

02 03 58 37 LMP MARK LMP.

02 03 58 40	CC	Roger.
02 03 59 14	CDR	MARK CDR.
02 04 00 04	CDR	MARK CDR.
02 04 00 07	CC	Roger.
02 04 00 38	LMP	MARK LMP.
02 04 00 42	CC	Roger, Jim.
02 04 00 45	CMP	MARK CMP.
02 04 00 47	LMP	Right on.
02 04 01 20	LMP	MARK LMP.
02 04 01 22	CC	Roger.
02 04 01 28	CDR	MARK CDR.
02 04 01 40	CDR	MARK CDR.
02 04 01 41	CDR	MARK CDR.
02 04 02 58	CMP	MARK CMP.
02 04 03 11	CDR	MARK CDR.
02 04 03 58	LMP	MARK LMP.
02 04 04 45	CMP	MARK CMP.
02 04 05 11	CMP	MARK CMP.
02 04 06 19	CMP	MARK CMP.
02 04 06 33	CMP	MARK CMP.
02 04 06 49	LMP	MARK LMP.
02 04 07 50	CMP	MARK CMP.
02 04 07 54	CMP	MARK CMP.
02 04 08 05	CMP	MARK CMP.

02 04 08 19 LMP MARK LMP.  
02 04 14 39 CC 15, this is Houston. Are you still with us?  
02 04 14 44 CDR That's for sure. Still here.  
02 04 14 50 CMP MARK CMP.  
02 04 14 54 CMP MARK CMP.  
02 04 18 40 CDR MARK CDR.  
02 04 19 53 CC 15, Houston. Are you still with us?  
02 04 19 58 CDR Roger. ...  
02 04 20 37 CMP MARK CMP.  
02 04 20 47 CC Roger.  
02 04 20 50 CMP MARK CMP.  
02 04 21 01 CMP MARK CMP.  
02 04 21 03 CMP MARK CMP.  
02 04 21 34 LMP MARK LMP.  
02 04 21 44 CDR MARK CDR.  
02 04 22 00 CDR MARK CDR.  
02 04 26 00 CMP MARK CMP.  
02 04 26 01 CDR MARK CDR.  
02 04 27 21 CDR MARK CDR.  
02 04 27 48 CDR MARK CDR.  
02 04 29 00 CMP MARK CMP.  
02 04 29 12 CC Roger, Al. And we're coming up on about 10 minutes remaining.  
02 04 29 20 CMP Roger.  
02 04 29 36 CDR MARK CDR.

02 04 30 02 LMP MARK LMP.

02 04 30 29 CDR MARK CDR.

02 04 30 59 CDR MARK CDR.

02 04 31 53 CDR MARK CDR.

02 04 32 34 CDR MARK CDR.

02 04 32 48 CDR Okay, Houston. We've got 60 minutes up here.  
How's your clock look?

02 04 33 01 CC Dave. We're coming up on 60 minutes here too. And I've - I think that's certainly an adequate period. A couple of quick questions, though. Could you describe for us briefly your positions in the spacecraft during this time?

02 04 33 15 CDR Okay. We've got it - several comments for you, Joe. Let us un - uncouple here, and we'll talk to you for a while about this.

02 04 33 23 CC Roger.

02 04 33 41 CDR Okay. Houston, 15. I guess - we realize the interest behind this and the significance of the thing and - and we'll each try and describe what we saw in the way of the flashes. And I think - because of the randomnum - randomness of the flashes, it was probably better to let us go ahead and work out the events on the DSE. And I think, also, you'll find on the DSE, when you review the tape, that we've come up with a little scheme to give you some quantitative data, which may or not - may not be the best. And if you have any suggestions on future tests or how we can make it a little better for you, we'd be glad to hear that. As to our positions in the spacecraft, we're in our launch - regular and launch positions; I'm in the left, and Al's in the center, and Jim's in the right. Do you still copy?

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTIONS

02 04 34 35 CC Roger, Dave. Loud and clear.

02 04 34 41 CDR Okay, I guess - as far as my impressions, I would say 90 percent of what I'd call a point source of light. And to give you perhaps an analogy, you might picture yourself sitting high in the stands of the - of the Ice Capades with the arena darkened and some single figure on the - on the ice, like Peggy Fleming, doing a nice thing. And you look across at the other side of the - the dark arena and somebody shoots a flashbulb out of their Instamatic or something, and that would be what I'd call a - a typical flash of intensity 5 on a scale 1 to 5, and we tried to sort these out relative to their intensities. And that - that would be my impression of 90 percent of what I saw.

02 04 35 34 CC Roger.

02 04 35 40 CDR Okay, let Al give you his impressions.

02 04 35 46 CMP Okay, Joe. I guess I didn't see the same thing that Dave did - and - talking about the intensity, I guess that's a very subjective thing. But I guess the analogy with the flashbulb ... was very good for the brighter intensities, and it seems like there was - there was one flash maybe that was of ... an intensity in the majority of the ...

02 04 36 07 CC Hey, Al - Stand - Al, stand by. Stand by.

02 04 36 13 CC Al, we're starting to lose you because we're changing our OMNIs now. Could you stand by a second, and I'll give you a call back?

02 04 36 21 CMP Okay, Joe.

02 04 37 45 CC 15, while you're standing by waiting for the OMNI to come around where we can read you more clearly - Dave, that was a very, very nice description of the flashes. Of course, we're very pleased with the - apparently, the intensity values that you put on the - on the DSE. And I think our comm - comm is starting to improve here, Al, so I'll be standing by for your continued description.

02 04 38 17 CMP Okay, Joe. I guess in addition to - to what's been said already, most of the light flashes seem to be of the order of flashcubes or maybe starbursts that you've seen in the summertime. I saw very few streaks or radial paths of light. They all seem to be just point sources of light, and - and I guess that's really about all I've got to add, Joe; I'll - I'll see if Jim's got something.

02 04 38 55 CC Roger.

02 04 38 59 LMP Joe, I just have one comment, ... that's on the tape. And that is, just after the timing ... ended, we were taking - about to take our masks off, I had one - very brilliant streak. ... - -

02 04 39 14 CC Stand by - stand by.

02 04 39 16 LMP - - ... at 9 o'clock - -

02 04 39 18 CC Jim, stand by a second. Our comm's starting to drop out again, and it may be a partial problem with your microphone position. Stand by just a second though, please.

02 04 40 25 CC Okay, Jim. We have comm again. Proceed on.

02 04 40 32 LMP Roger. I wanted to comment on one brilliant streak that I had just after the timing period had ended, and I was about - I was in the process of taking the mask off, and there was a brilliant streak, intensity 5, that went from the 9 o'clock position - through 12 o'clock - and out the 3 o'clock.

02 04 40 55 CC Roger, Jim. We copy that. And could you tell us which eye that one was in?

02 04 41 05 LMP Well, it seemed like it went from the left eye to the right eye.

02 04 41 10 CC Okay; very interesting. Endeavour, the principal investigators on this, Dick Benson and Larry Pinsky, have followed it closely and are quite pleased, I think, with the data you've given us, they'll be looking at the DSE information in detail and may have a - some definite procedure changes to give to you later, based on the information you've given us so far. And I guess as far as we're concerned, we have no more questions.

02 04 41 41 CDR Okay; fine, Joe. We'll be standing by and I - I guess another that - that you've picked up - interesting thing, is that the - the flashes are quite easily located relative to either eye or the position within either eye, which I think we found rather interesting.

02 04 42 00 CC That's remarkable, Dave. Right; thank you.

02 04 42 21 CC 15, when you get squared away there, we'll be looking for - your starting to charge battery B, battery Bravo.

02 04 42 31 CDR Roger. Understand. And I might add one more comment that - in discussing that - that last one, why, Jim didn't quite have that impression of localization within each eye, although Al and I both do.

02 04 42 43 CC Okay.

02 04 43 28 CC Jim, this is Houston again. I have a small addition to your Flight Plan update which I can give you whenever convenient for you.

02 04 43 44 LMP Okay; stand by.

02 04 43 46 CC Roger; whenever convenient, Jim. No hurry on it at all.

02 04 43 59 LMP Battery charge B is in process.

02 04 44 02 CC Roger.

02 04 45 57 LMP Okay, Joe. I'm ready to copy these additional comments you have for the Flight Plan.

02 04 46 03 CC Roger, Jim. The first one is at 53 hours exactly, and it's just a note for your information.

02 04 46 17 LMP All right, go ahead.

02 04 46 19 CC Roger. In the left-hand side of the Flight Plan there, the "Lift-off time (if required)." Note that it is not required in this case so we don't have to worry about that. The - second change - is possibly not a change: at 60 hours, 6 0 hours, I wanted to doublecheck your readback of the addition which I gave to you earlier. And it should read, at 60 hours: "PAN CAMERA SELF TEST, off," and "MAP CAMERA ON, to OFF." Wanted to double-check that last step.

02 04 47 11 LMP Roger. I have both of those, Joe, and they occur after the S-BAND AUX TV, OFF.

02 04 47 17 CC Okay; thank you very much, Jim. The third change is an addition to the LM Activation Checklist changes which I gave you earlier.

02 04 47 33 LMP Is it in the Activation Checklist or is it in the Flight Plan?

02 04 47 36 CC I think you copied it in the LM Activation Checklist on page 1-13.

02 04 47 47 LMP Roger.

02 04 48 11 LMP Okay. I'm on 1-13 of the Activation Checklist.

02 04 48 15 CC Okay, Jim. After the addition on that page which reads, "Circuit breaker 11, ECS CABIN FAN, closed," add: "Circuit breaker 11, EPS: DC BUS VOLT, closed."

02 04 48 43 LMP Okay; copy: "CB 11, EPS: DC BUS VOLT, closed."

02 04 48 48 CC Okay, Jim. That's it from down here for a while.

02 04 57 51 CC 15, Houston.

02 04 57 56 CDR Houston, 15. Go.

02 04 57 58 CC Roger; Dave. The next time one of you floats past the LM/CM DELTA-P gage, could you get a read-out for us, please?

02 04 58 10 CDR Roger; stand by.

02 04 58 12 CC Roger; no hurry.



02 04 58 17 CDR 2.0.

02 04 58 20 CC Copy 2.0. Thank you.

02 04 58 25 CDR Roger.

02 05 01 31 CC Apollo 15, go to POO and ACCEPT, please, for a clock-sync update.

02 05 01 39 CDR Roger. POO and ACCEPT.

02 05 03 25 CC Your computer, Dave.

02 05 03 30 CDR Roger.

02 05 04 09 CC Dave, is that time okay?

02 05 04 16 CDR Roger. We're within about - 1200 to the mission timer.

02 05 04 29 CC Sounds pretty good to me.

02 05 04 59 CC That's the old NOUN 65 trick.

02 05 05 04 CDR Roger. I guess I should have said 12 mini-seconds.

02 05 05 12 CC Yes. Mercy, yes.

02 05 05 18 CDR Yes.

02 05 08 38 CC 15, Houston. Requesting BLOCK on the UP TM.

02 05 08 44 CDR Roger. Thank you.

02 05 56 11 CMP Hello, Houston, 15.

02 05 56 17 CC Hello, 15, this is Houston.

02 05 56 21 CMP Hey, Joe, I just did a DELTA-V and null bias check if you want to copy ...

02 05 56 27 CC Go ahead, Al.

02 05 56 32 CMP Okay, the DELTA-V check was - test was satisfactory. It was a residual minus 21.0 in 10 seconds, and the null bias was .8 feet in 100 seconds.

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02 05 56 51 CC        Okay, Al. We copy. Thank you.

02 05 58 09 CC        And, Al, this is Houston.

02 05 58 13 CMP       Yes, go ahead, Joe.

02 05 58 15 CC        Roger. Will you be starting into your lunch break  
now?

02 05 58 21 CMP       Affirmative.

02 05 58 28 CC        Okay. That sounds like a good idea.

02 05 58 55 CC        15, Houston. If anyone by chance floats past the  
LM/CM DELTA-P gage, we'd like another read-out.

02 05 59 05 CMP       Okay, Joe. We'll get that for you,

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 06 12 28 CC Apollo 15, Houston.

02 06 12 34 CMP Houston, 15. Go ahead, Joe.

02 06 12 36 CC Roger, Al. Would you tell Jim, please, that I've got a - a change Echo to his LM Activation Checklist, when he finishes with lunch and wants to copy it down. No hurry on it, but I don't want to forget it.

02 06 12 52 CMP Okay, Joe. I'll tell him.

02 06 22 49 CC 15, Houston.

02 06 22 56 CDR Houston, 15. Go.

02 06 23 00 CC Roger. The next time somebody goes down into the kitchen to mix up some food, could you read the DELTA-P gage for us, please.

02 06 23 14 CDR Roger. It's 1.9.

02 06 23 24 CC Copy 1.9. Thank you.

02 06 25 22 CC 15, Houston.

02 06 25 28 CDR Houston, 15. Go.

02 06 25 30 CC Roger, Dave. As luck would have it, we lost our comm just as we got the DELTA-P number from you. We copied 1.9. Verify that for us, please. And, also, would you make sure that the valve is still in the VENT position.

02 06 25 49 CDR Roger. I checked that. It's LM TUNNEL VENT and it's, well - 1.9 to 2 - pretty close.

02 06 26 01 CC Okay, Dave. Thank you. Just leave it in that position.

02 06 26 07 CDR Roger.

02 06 27 33 CC 15, this is Houston. We have a further question about the LM TUNNEL VENT valve.

02 06 27 44 CDR Okay; go ahead, Joe.

02 06 27 46 CC Roger, Dave. We should have had a much greater drop in pressure - during the - the time between these two readings. We want to confirm that you went to the DELTA-P position to read the meter this second time. Over.

02 06 28 08 CDR Oh, no. I thought you just wanted the reading in the LM position.

02 06 28 13 CC No, sir. Apparently we have to go over to DELTA-P, get a reading, and then go - return to the VENT position.

02 06 28 22 CDR Yes, that's absolutely correct, Joe. Thank you. We'll do that.

02 06 29 58 CDR Okay. In the LM/CM DELTA-P - it's 2.9, and then back to LM TUNNEL VENT is 3.5.

02 06 30 10 CC Okay, Dave. We copy that. Sounds so much better.

02 06 30 15 CDR Yes, it sure does, doesn't it.

02 07 02 36 LMP Houston, this is 15.

02 07 02 40 CC Roger, 15; go ahead.

02 07 02 45 LMP Joe, I understand you have another change to the Activation Checklist.

02 07 02 49 CC Roger, Jim, I had to change Echo for you. I'm up to change Foxtrot already, if you're ready to copy.

02 07 02 57 LMP I'm ready to copy, Joe.

02 07 03 00 CC Okay. Nothing very profound here. It - it has to do with the LM housekeeping cleaning procedures I read to you at 57 plus 45. And the procedures which I read were basically a cleaning of vacuum cabin fan filter. And it involved unsnapping a netting around the cabin fan filter, running the vacuum cleaner over it, and finally replacing that netting. And we've had second thoughts about that entire procedure down here - mainly, because the

netting is in too cramped an area to get to comfortably - it takes a long time to take the netting off and replace it, and the - the procedure is, actually, not too effective, anyway. So - we want you to delete this entire step, and I have two more to add instead of this particular step at 57 plus 45. Am I clear so far?

- 02 07 04 15 LMP Ah, yes, you're clear so far. Do you still want us to turn the cabin fan on?
- 02 07 04 21 CC Roger, Jim. In fact, the procedure now reads like this. Before you begin the LM Activation Checklist and you're entering the LM, we want you to vacuum all the LM accessible areas such as Velcro, places like that, where dirt and particularly glass particles have accumulated. Then, when you've cleaned it to your satisfaction, tape the vacuum cleaner to the engine cover. Let it run while you're doing the rest of the housekeeping activities. Over.
- 02 07 05 11 LMP Okay; I understand, Joe.
- 02 07 05 13 CC Okay, Jim. And then, finally when you're through with the housekeeping activities, clean the vacuum cleaner inlet screen with sticky tape. We think you'll probably find there are glass particles there which you can remove conveniently with the sticky tape.
- 02 07 05 38 LMP Okay; I copy.
- 02 07 05 42 CC Okay, Jim. That's all I had for you, really.
- 02 07 07 15 LMP Joe, this is 15 again.
- 02 07 07 17 CC Go ahead.
- 02 07 07 20 LMP Roger. Did you confirm that you still want us to turn the cabin fan on?
- 02 07 07 26 CC That's correct. We - we confirm that. We want the cabin fan turned on.
- 02 07 07 36 LMP Okay. And assume if we - if we should see any glass on the cabin fan filter, then I suppose we should try to get down there with tape and clean it off.

02 07 07 50 CC Roger, Jim. That's right. It just - we do not now want you to unsnap the netting around that cabin fan filter, in spite of what we told you earlier. It still might be possible to clean that area with sticky tape - without unsnapping the netting, though.

02 07 08 13 LMP Okay; I understand.

02 07 08 17 CC Basically, - I know you understand. We - we just want as much of the glass in the LM cleaned up as you can find.

02 07 08 39 LMP Okay. I think we cleaned it up pretty well yesterday, but we'll do it again.

02 07 08 33 CC Roger. Just look around. It may not take much at all to take it.

02 07 20 09 CDR Houston. Apol -

02 07 20 23 CC 15, this is Houston.

02 07 20 30 CDR Yes, Houston. Go ahead.

02 07 20 34 CC I was informed that you called, did you call?

02 07 20 35 CDR Roger. We were wondering if you've got the HIGH GAIN angles for us - -

02 07 20 38 CC Stand by.

02 07 20 39 CDR Yes, we called you.

02 07 21 11 CDR Houston, Apollo 15.

02 07 21 18 CC 15, go ahead.

02 07 21 23 CDR Okay. We are ready to cycle the cameras, now, if you've got some HIGH GAIN angles for us.

02 07 21 28 CC Stand by on the HIGH GAIN angles.

02 07 21 47 CC Roger, 15. Your HIGH GAIN angles are PITCH, minus 75; YAW, plus 36.

02 07 21 59 CDR Okay; understand. PITCH, minus 75; and YAW, plus 346 [sic].

02 07 22 06 CC Plus 36. Affirmative.

02 07 22 19 CDR Okay; tell you what, Houston, we'll go back to 50 degrees roll and pick up the UV for you ... up here.

02 07 22 49 CC 15, this is Houston - -

02 07 22 50 CDR And, Houston, 15. Did you copy the P52?

02 07 22 54 CC Roger. We got your torquing angles. Thank you. And they say down here that you don't need to roll at the present time. We'd just as soon save the propellant.

02 07 23 06 CDR Well, we'll pick it up at the 50-degree mark, when we come around.

02 07 23 11 CC Okay; that'll be fine.

02 07 25 00 LMP Okay, Houston. We've got you on the high gain now, and we'll check our circuit breakers, be ready to cycle the cameras when you're ready.

02 07 25 10 CC We copy, 15.

02 07 26 47 CDR Okay, Houston; 15. If you've got telemetry, we'll cycle the film on your cue.

02 07 26 56 CC Roger. Stand by, 15.

02 07 27 01 LMP Roger.

02 07 27 24 CC 15, this is Houston. Before we cycle the cameras, we need to stop PTC. You can either do that immediately - or else go through the - go through the 50-degree roll and use the angles that are in your Flight Plan. That's your choice.

02 07 27 43 CDR Oh, we'll just press on to 50 degrees, and stop there. We thought you could pick it up on the way around.

02 07 27 49 CC That will be fine. Thank you.

02 07 29 12 CDR Houston, Apollo 15.

02 07 29 14 CC 15, this is Houston. Go ahead.

02 07 29 18 CDR Okay. I'm taking a look at our attitude for the UV photos. We see we need a ROLL of 153, and your update today gave us a roll of 050 degrees. And, it seems like we probably ought to stop the roll at 153, and just skip that 050-degree attitude so we can save the maneuver.

02 07 29 48 CC 15. The high gain won't be available to us at the angle 153.

02 07 30 00 CDR Okay.

02 07 30 15 CDR And, Houston, 15. For future reference, I - I guess we are to understand that you cannot do the camera cycling while we're in PTC, even though you have high gain. Is that correct?

02 07 30 57 CC Dave, there are pros and cons to that. We could do it if we finessed it just right. But since it's difficult, and we have to stop rolling anyhow, it's better to stop the roll this time.

02 07 31 12 CDR Well, that - that's true. We were just trying to save you a maneuver. We got to stop the roll and start the roll again to get back to another spot. But, we'll go that way.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 07 38 59 CDR Okay, Houston; Apollo 15. Standing by for the MAP and PAN CAMERA, ON, on your cue.

02 07 39 08 CC Roger, 15. We have a good high gain lock on, and we're GO for the cycling of the cameras.

02 07 39 30 CDR Houston, Apollo 15.

02 07 39 33 CC 15, this is Houston.

02 07 39 37 CDR Roger, Houston. We're standing by for your cue to cycle the map and pan cameras.

02 07 39 42 CC Roger. We are ready to cycle the man and pan - the - the pan and mapping cameras. Go ahead.

02 07 39 52 CDR Okay. The man [sic] and pap [sic] cameras are coming up now.

02 07 43 30 CDR Houston, Apollo 15. That completes the man [sic] and pap [sic] camera operation. And if you're through, we'll secure the high gain and maneuver to the UV attitude.

02 07 43 48 CC Okay. You're GO to maneuver to the UV photo at - attitude.

02 07 43 56 CDR Okay. On the way. Thank you.

02 07 47 03 CC 15, this is Houston.

02 07 47 08 CDR Houston, 15. Go ahead.

02 07 47 11 CC We wonder if you can give us an estimate of how long it takes between removing the Lexan shade and getting the cardboard shade back into the window, when you go into the UV experiment. We need something rough to, say, plus or minus 30 seconds.

02 07 47 32 CDR Karl, this is 15. Looks like you just barely got started when we - when we lost the S-band. How about saying that over again, please.

02 07 47 41 CC Roger. We'd like to have an estimate of how much time it takes between removal of the Lexan shade, and installation of the cardboard shade, when you go into the UV experiment. Something rough to, say, plus or minus 30 seconds.

02 07 48 03 CDR Karl, we've kept the cardboard in the window up to now. We've had no need to put in the Lexan, so we can't give you the ... right now.

02 07 48 13 CC Okay.

02 07 48 17 CDR But we will - the next time we change it, keep it in mind, and we'll give you the ...

02 07 48 22 CC Okay. We'd like to have an estimate on that, when you get a chance.

02 07 57 49 CDR Houston, 15.

02 07 58 11 CDR Hello, Houston; 15.

02 07 58 13 CC 15, this is Houston.

02 07 58 18 CDR Okay, Karl. We're through with the UV photos, and the window number 5 is still clear.

02 07 58 25 CC Thank you very much for the report.

02 07 59 30 CC 15, this is Houston. You can terminate the charge - charging of battery Bravo. And, when you have a moment, we'd like to get a readout on the LM/CM DELTA-P. And, in about 20 seconds, we're going to have a handover and a loss of comm for 1 minute.

02 07 59 49 CDR Okay, Karl. We're terminating battery B charge now.

02 08 08 45 CC 15, we'd like to have OMNI Charlie, please.

02 08 09 13 CC 15, this is Houston. We'd like to have OMNI Charlie, please.

02 08 09 27 CC 15, this is Houston. How do you read?

02 08 13 49 CC 15, this is Houston.

02 08 25 45 CC 15, this is Houston. How do you read?

02 08 25 59 CC 15, this is Houston. Are you reading us?

02 08 26 23 CC 15, this is Houston. How do you read?

02 08 26 28 CDR Yes; Roger, Houston. We're 5 by. Our LM/CM DELTA-P is off-scale high. And I wonder if you're happy with the depressured LM, and may we get on with repressurizing it and go to our housekeeping?

02 08 26 48 CC Roger, 15. You have a GO to proceed.

02 08 26 54 CDR Roger. Thank you.

02 08 27 02 CC And, Al, can you tell us how the - the shade on window 5 - how the hole is being blocked. Do you have the Lexan over it, or do you have the camera in there?

02 08 27 21 CMP Okay. We have the cardboard on it and the metal shade behind that.

02 08 27 31 CC We copy. Thank you.

02 08 27 35 CMP We've been keeping the metal shade on that window to try and keep the temperature in the cabin down a little bit. When the Sun is coming in the windows, it warms things up pretty well.

02 08 27 44 CC Okay. We copy.

02 08 33 21 CC 15, this is Houston. If you would go to a 5-degree med-dead band they say down here we might save a little bit of propellant.

02 08 33 33 CDR Roger.

02 08 45 31 CC 15, this is Houston. If you got a little cry - CRYO PRESS light up there - we see that down here, and that's expected at the moment.

02 08 45 42 CMP Okay. Thank you.

02 09 03 58 CMP Houston, 15.

02 09 04 03 CC Go ahead, 15.

Tape 37/4  
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02 09 04 07 CMP Roger, Houston. Falcon's all set up for data,  
and want to know if you're getting it.

02 09 04 11 CC Roger. We're getting data from Falcon.

02 09 04 17 CMP Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 09 06 15 CMP Houston, 15.

02 09 06 18 CC Go ahead, 15.

02 09 06 22 CMP Okay. If you'll let me know - when you've gotten enough data from Falcon, then I can tell Jim to fire that down.

02 09 06 29 CC Roger, Al. Stand by.

02 09 08 22 CC 15, this is Houston. The batteries in the SHe all look to be in excellent shape, and we're ready to secure the instrumentation. They can go ahead to page 1-18.

02 09 08 34 LMP Roger. Understand, Houston. We go on to 1-18. Thank you, sir.

02 09 08 49 CC 15, Houston. Is it possible to get the ED BAT readings?

02 09 08 56 LMP Stand by 1, Houston.

02 09 09 37 LMP Houston, the ED batteries are reading 37 on both.

02 09 09 42 CC Thank you.

02 09 09 46 LMP Roger.

02 09 26 43 CC 15, this is Houston. Would you please put O<sub>2</sub> HEATERS 1, 2, and 3 all to AUTO?

02 09 26 52 LMP Roger, Karl. O<sub>2</sub> HEATERS 1, 2, and 3, all AUTO.

02 09 26 56 CC Thank you.

02 09 34 42 CMP Houston, 15.

02 09 34 45 CC 15, go ahead.

02 09 34 50 CMP Roger, Karl. Looks like the - the LM checkout's coming along pretty good. We've checked out all the batteries now. When do you want us to start in the PTC?

02 09 35 15 CC Roger, Al. We - we want to get a few minutes, about 5 minutes of SIM bay data there at - it's 15:45 in your Flight Plan, and then we're - then we can go into PTC.

02 09 37 09 CMP Houston, 15.

02 09 37 12 CC Go ahead, Al.

02 09 37 15 CMP Okay, Karl. If you're ready, we'll give you the SIM bay data, now.

02 09 37 19 CC Hang on just 1 or 2 minutes. We're not completely set up down here.

02 09 37 25 CDR Okay.

02 09 40 42 CC Al, we're ready for the SIM bay data.

02 09 40 47 CMP Okay, Karl. Coming your way.

02 09 42 38 CC 15, Houston. We'd like to have you turn O<sub>2</sub> HEATERS 1 and 2 OFF at this time and leave number 3 on AUTO.

02 09 42 48 CMP Okay, Houston. Coming OFF with 1 and 2 and leaving 3 in AUTO.

02 09 42 52 CC Very good.

02 09 44 11 CC 15, this is Houston. We have enough SIM bay data and you can terminate that procedure. And we're ready, then, to go into PTC, and we would like - Alfa and Delta for damping and Bravo and Delta for spinup.

02 09 44 38 CMP Okay, Houston 15. Understand you've got enough SIM bay data so we'll turn it off. Going into PTC and using Alfa and Delta for damping and Bravo and Delta for spinup.

02 09 44 51 CC That's correct.

02 09 56 46 CC 15, this is Houston. How are we coming along on closing up the LM?

02 09 56 53 CMP Houston, 15. We're coming along, taking our time doing it, Karl, while we're getting going on PTC.

02 09 57 00 CC Okay.

02 09 57 01 CMP And we'll be a few more minutes - stabilizing the rates here for the PTC until we get all the dumps done.

02 09 57 10 CC Roger. And be advised that we're prepared to read up a fairly extensive revision to the SPS burns, and we'd like for you guys to - let us know when you're ready to - discuss it and copy it.

02 09 57 28 CMP Okay, Karl. It'll be a while yet.

02 10 12 35 CMP Houston, 15.

02 10 12 38 CC Go ahead, 15.

02 10 12 42 CMP Okay, Karl. How do the rates look to you now?

02 10 12 53 CC Okay. They - Okay, Al; they look good to us, and you can go ahead and spin her up.

02 10 13 00 CMP Okay, Karl.

02 10 15 03 CC 15. We'd like to have OMNI Bravo, please.

02 10 15 10 CMP OMNI Bravo.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 10 53 40 CC Al, this is Houston. Could we have HIGH GAIN, MANUAL and WIDE?

02 10 53 49 LMP Roger. Stand by.

02 10 53 53 CC We don't want to bring it up. We simply want to select MANUAL and WIDE.

02 10 54 00 LMP Okay; you have it.

02 10 54 02 CC Thank you.

02 10 57 11 CMP Houston, Apollo 15.

02 10 57 17 CC 15, this is Houston.

02 10 57 22 CMP Roger. We're all up on the comm and ready to talk about the SPS.

02 10 57 27 CC Roger, Al. Dick Gordon's here and he's been involved in hashing all of this out, and I'd like to have him read it up to you and argue with you about it.

02 10 57 40 CDR I'll do that. Go ahead, Richard.

02 10 57 58 MCC Hello, Dave. No argument; what are you doing way out there?

02 10 58 04 CDR Oh, we're just sort of checking out the old LM - -

02 10 58 07 MCC Okay.

02 10 58 08 CDR - taking a look at the pretty scenery.

02 10 58 09 MCC Okay. Listen, we've been, as you might guess, been talking a great deal about P40 procedures, and we do have some changes to talk to you about and if you've got your G&N Dictionary [sic] handy and page 5-1 where the P40 thrusting goes, I'd like to go ahead and go through it and discuss it with you.

02 10 58 31 CDR Okay, let us pull it out, Dick.



02 10 58 59 CDR Okay. We've got 5-1 out; go.

02 10 59 03 MCC Okay, Dave. Right below the "Verify the SIM powerdown" line there, I'd like for you to insert two lines. "Circuit breakers, SPS PILOT VALVES, two of them, open, and that should be a "Verify."

02 10 59 23 CDR Okay. Should be "SPS PILOT VALVES, two, open; verify."

02 10 59 26 MCC And then the next line would be "Circuit breakers EPS, GROUP 5, two of them, closed; verify."

02 10 59 36 CDR Okay. "CB EPS, GROUP 5, two, closed; verify."

02 10 59 41 MCC Okay. Right there in the same column, underneath "Test caution and warning lamps," insert "EMS FUNCTION, OFF; verify."

02 10 59 54 CDR Okay. Beneath "Test caution and warning lamps," "EMS FUNCTION, OFF; verify."

02 10 59 58 MCC Roger. Then the next line would be "Circuit breakers EMS main A and B, two of them, closed."

02 11 00 31 CDR Okay. "CB EMS A and B, both, closed."

02 11 00 34 MCC Okay, Dave. That'll finish up that page. The next comment's on page 5-2, where it starts in with a TVC check and prep, second line, "Circuit breakers SPS 10, vice 12, close."

02 11 00 52 CDR Okay; understand. "CB SPS 10, vice 12, closed," and those are the two PILOT VALVES?

02 11 00 59 MCC That's affirmative. Okay. Page 5-3 at the 2-minute point - 58 with 2 minutes in parentheses - like for you to scratch the line that says "DELTA-V THRUST A paren B, NORMAL" and substitute "Circuit breaker SPS PILOT VALVES MAIN B, closed."

02 11 01 31 CDR Okay. "CB SPS PILOT VALVE MAIN B, closed," instead of the "DELTA-V THRUST A and B to NORMAL."

02 11 01 40 MCC Okay.

02 11 01 52 MCC We got an OMNI - -

02 11 01 53 CDR Okay. Go ahead; we got it.

02 11 01 54 MCC - Okay; we got an OMNI switch; just hang on. Okay, Dave. The - the next one is on page 5-4 and it's an insert, where you get the flashing 99, below the line that says "PRO at TFI greater than 0 seconds," insert "DELTA-V THRUST A and B, two of them, to NORMAL," and we'll come back and discuss that in a minute.

02 11 04 03 MCC Okay, Dave. Did you get that? DELTA-V THRUST A and B, two of them, to NORMAL right after the PRO at the flashing 99?

02 11 04 12 CDR No, we - we lost you on the comm there, Dick. At minus 2 minutes and we verified we scratched the DELTA-V THRUST A or B, to NORMAL, and substituted CB SPS PILOT VALVE MAIN B, closed. That's the last we heard from you.

02 11 04 25 MCC Okay. On page 5-4, I was just talking about that line where you get the flashing 99, and the line that says "PRO at TFI greater than 0 seconds." Under that line, insert "DELTA-V THRUST A and B, two of them, to NORMAL, and I'm sure we'll want to discuss this in a little bit.

02 11 04 51 CDR Yes, it sounds like it. Okay. After "Auto ignition, PRO at TFI greater than 7 - greater than 0 seconds," insert "DELTA-V THRUST" - Did you mean A or B or do you mean A and B? NORMAL?

02 11 05 05 MCC I mean - I mean at this time A and B, and we'll talk about different burns on this very subject a little later.

02 11 05 13 CDR Okay. A and B, NORMAL.

02 11 05 17 MCC Okay. Down in the next paragraph where it's got the 06 40 and the emergency procedures for the flashing 97 40 for the SPS thrust fail, scratch the line that reads "DELTA-V THRUST B paren A, NORMAL," and insert "Circuit breaker SPS PILOT VALVE MAIN A, closed."

02 11 05 46 CDR Okay. Stand by 1.

02 11 05 48 MCC Okay.

02 11 06 14 CDR Okay. On the flashing 97, scratch "DELTA-V THRUST B paren A, NORMAL," and insert "CB SPS PILOT VALVE B, closed."

02 11 06 25 MCC That was SPS PILOT VALVE MAIN A, closed.

02 11 06 27 CDR That right?

02 11 06 29 MCC That was MAIN A, closed, Dave.

02 11 06 30 CDR Okay. MAIN - Roger. Sorry about that, MAIN A, closed; right.

02 11 06 37 MCC Okay. What we're saying - if you don't get an ignition on B, we want you to go ahead and use A.

02 11 06 43 CDR Okay.

02 11 06 44 MCC Okay. The next change is at 3 seconds. Scratch the line that says "DELTA-V THRUST B paren A, NORMAL," and insert "Circuit breaker SPS PILOT VALVE MAIN A, closed."

02 11 07 06 CDR Okay. At 3 seconds, scratch "DELTA-V THRUST B, A, NORMAL," and insert "CBS - CB SPS PILOT VALVE MAIN A, closed."

02 11 07 18 MCC Okay. In the bottom of the page, this is applicable to LOI only. And at 6 minutes into the burn, we want the line "Circuit breakers SPS PILOT VALVE MAIN A, open."

02 11 07 38 CDR Okay. At 6 minutes into the burn, "SPS PILOT VALVE MAIN A, open."

02 11 07 45 MCC Okay. And then a note there for Jim. At that point, we do - we no longer want any PUGS manipulation for fuel valves.

02 11 07 57 CDR Okay; understand. No PUGS after 6 minutes.

02 11 08 02 MCC Okay. We'll talk about the reason for that in a second. I've got one more line in your P40 checklist, and then we can discuss some things. On page 5-5, it's in the cleanup column there, about halfway - no, almost to the PRO underneath the line that reads "Circuit breakers SPS PITCH 1 and YAW 1, open," insert "Circuit breakers SPS PILOT VALVE MAIN B, open."

02 11 08 33 CDR Okay. Beneath "CB SPS PITCH 1, YAW 1, open," insert "CB SPS PILOT VALVE MAIN B, open."

02 11 08 40 MCC Okay. That cleans up the - the checklist items. Take the easy one first. And the reason we want to - to secure bank A during the LOI burn at 6 minutes is so we can get a handle on the single bank performance, and we anticipate making all of the other burns with the good bank, bank B, with the exception of TEI.

02 11 09 09 CDR Okay; that makes sense.

02 11 09 12 MCC Okay. And I guess the - the other things we might talk about just - just briefly is that the procedures that we just gave to you are for LOI. For midcourse 4 and DOI, we'll use the same procedures, but we'll do it on bank B only, single bank burn; we'll use the good bank. And we won't do anything with the PILOT VALVE for MAIN A or the DELTA-V THRUST A. We'll just go ahead and do these procedures, but not use bank A at all.

02 11 09 54 CDR Okay; understand. We'll use dual bank for LOI and TEI, and all other burns will be on bank B only, with no manipulation of the DELTA-V THRUST A switch.

02 11 10 04 MCC Okay. And after we do our LOI and DOI, we should have some real good visibility into bank B; and for Al's planning, when he's up there by himself for the CIRC and plane change burns, we'll use normal procedures. The old procedures DELTA-V THRUST B, NORMAL, at  $T_{ig}$  minus 2 minutes, with the exception that we will make those burns single bank, and we will not attempt to use bank A.

02 11 10 34 CDR Oh, okay. Well, then, we - we've got three groups and when Al solos, he's going to use single bank B just like he's always done with the circuit breakers with CB SPS PILOT VALVE B in at the beginning of the procedures. Is that right?

02 11 10 51 MCC That's correct. And for TEI, the only change we'll probably make is the procedure we just passed. We'll probably let bank A - we'll probably leave bank A in the burn until we get down to about 5 seconds to go, and the reason for this - if

something happens to the banks then, we're within our RCS capability for midcourses.

02 11 11 16 CDR

Okay. I guess - Okay; we - we can press on here, but we'll probably talk it over with you before each burn anyway, too.

02 11 11 24 CC

Yes, I'm sure we will. And I guess the thing to talk about now is our reasoning, our thought processes on having you proceed at 5 seconds, and then having Al throw on both the DELTA-V THRUST switches right after that. And let me go through it, and let you think about it then. The reason we want to do that now, even though we do have a great deal of confidence in bank B, but the SPS ENGINE THRUST light - we have no visibility into that system as long as that light is on. And, if for some reason, since we do have this suspect system here in A, we don't want to take the chance with B. And when that thing fires off, we want you to be on a good guidance. You won't have to do anything as far as your guidance is concerned. You can continue the burn, and press on even though it - it may have ignited prematurely. It does require procedure change, and I think you and Al think about how you might handle this, and - and come back to us. But those are the reasons we did want to turn either DELTA-V THRUST on earlier than the point where you'll get good G&N-guided burns.

02 11 12 38 CDR

Okay. That sounds like you've been doing some good deep thinking on it all. That fits pretty well, Dick.

02 11 12 46 MCC

Okay, Dave. We'll let you guys think about those - Hang on.

02 11 14 19 MCC

15, Houston.

02 11 14 36 MCC

15, Houston.

02 11 15 38 MCC

15, Houston.

02 11 15 42 CDR

Okay. We got signal strength back, also, Dick. Go ahead.

02 11 15 45 MCC Okay, Dave. I guess we might talk about MCC 4 just a little bit. We haven't really gone into this - -

02 11 15 52 CDR Okay.

02 11 15 53 MCC - - too deeply.

02 11 15 54 MCC We haven't gone into MCC 4 too deeply yet. Right now, it looks like it's a DELTA-V of about oh, 4.2, and our intentions are at this moment to make that single bank burn with bank Bravo. And if something happens there, we're looking at possibly finishing that up with - with RCS. But we're not definite on that, and just wanted you to kind of have a feel for it.

02 11 16 26 CDR Okay; that makes sense. I guess we've got one point here, and looking at the postignition sequence on the LOI burn. In order to monitor start transients and retain Al's capability to take over in case we have a gimbal hardover at start or something like that, perhaps it might be better to push that circuit breaker, the SPS PILOT VALVE MAIN A, closed, as soon as we get ignition. And then that would enable Al to get back over in the THC in case he's got a problem there. How about that?

02 11 17 04 MCC Okay. We did discuss that a little bit down here about that time. We felt that we'd like to have the - the engines stable out - stabilize out to guidance and the engine on bank B before he even goes over and tries to get that PILOT VALVE circuit breaker in. That will give us visibility on - on the DSE dump on how bank B is performing.

02 11 17 30 CDR Okay, then. Why don't we move it down some time past 3 seconds, a little later. How would that fit you?

02 11 17 36 MCC Well, we discussed that one, too, and 5 seconds was used. What would you like?

02 11 17 44 CDR Well, 5 seconds sounds a tad better than 3, and it gives - gives us a chance to get stable in here, and gives Al a chance to take a look at what kind of start transients we've got.

02 11 17 58 MCC      Okay. Dave, I guess our discussion around here - We had proposed 5 at one time, and it was a change to your normal procedures of putting the other bank on, so I guess it's really your choice in this regard; 5 seconds is just as good as 3.

02 11 18 20 CDR      Yes, okay. Well, (laughter) Al made the point that it's all changed anyway, because normally I bring on bank - the second bank in 3 seconds, and he doesn't have to worry about it. He's concentrating on the start transients and everything. So it's a complete change at any rate, and I think it might be a tad better to go to the 5 seconds with Al on the circuit breaker.

02 11 18 43 MCC      Okay; that sounds good to us. Yes, Dave; the point's being made that it can be even longer than that, if you really feel like you need it.

02 11 18 56 CDR      Okay. Well, we'll shoot for 5 seconds and if Al feels uncomfortable about the start transients and wants to hang on to the T-handle, I think that ought to be his option.

02 11 19 05 MCC      I couldn't agree more.

02 11 19 09 CDR      Okay.

02 11 19 10 MCC      Okay. Karl's got some things here, I guess, on the LEB lighting and stuff, and my question to Al is how he wants to handle the timing if he doesn't have that LEE timer for P24s and those good things that he's doing.

02 11 19 32 CDR      He's thinking. Just a minute.

02 11 19 35 MCC      Okay. We don't need an answer now. Karl's got some things on - on that. We can use this as a discussion period, I guess.

02 11 19 44 CDR      Okay.

02 11 19 59 MCC      Dave, I'm going to go get dinner. We'll talk to you later.

02 11 20 05 CDR      Oh, okay. Thanks a lot, Dick; appreciate it.

02 11 20 07 MCC Okay. We'll be looking at you.

02 11 20 11 CDR Good.

02 11 23 39 CDR Houston, 15.

02 11 23 49 CC 15, go ahead.

02 11 23 52 CDR Okay; we're standing by for the rest of the comments you may have on the circuit breaker, et al.

02 11 23 59 CC Roger. We'll be with you in just a couple of minutes.

02 11 33 54 CC 15, this is Houston.

02 11 34 03 CDR Houston, 15; go.

02 11 34 08 CC Just a quick note on the - on the circuit breaker on the illumination, and then a procedure that might clarify a couple of things for us. First of all, there's a - a number of numeric and electroluminescent lights that are out, but we won't go into all of that. The main thing is the panel 122 DSKY down there. The - As far as we can see at the moment, there is some possibility that we still have illumination on your status lights on that DSKY, and if we could go through a small procedure here, we may find out whether or not there will be illumination on this. Stand by.

02 11 35 27 CC 15, this is Houston. Are you reading?

02 11 36 13 CC 15, this is Houston.

02 11 37 58 CC 15, this is Houston.

02 11 38 09 CDR Go ahead, Karl.

02 11 38 11 CC Right. Back to our lighting circuit breaker. Let me emphasize two main points to start with. I guess under no circumstances do we want to close that circuit breaker. And a second - problem is a - a - a second point is that we don't want to change the INTEGRAL LIGHTING, or the NUMERICS lighting rheostats on panel 100. Let's leave them just as they are. And then there's the - there is a possibility due to the fact that there is a very



low amperage shunt going around that circuit breaker, there is a possibility that we do have lights on the DSKY status lights; that is, the UP-LINK ACTIVITY lights, et cetera. And if we can go through a quick procedure here, we'll find out whether or not we do have lights there. Shall we go ahead?

- 02 11 39 14 CDR Okay. Go ahead, Karl; we'll take a look at it.
- 02 11 39 17 CC Okay. First of all, on panel 100, again making sure that we do not change the NUMERICS and INTEGRAL lighting switches, can you tell us the position of those two switches, those two - rheostats?
- 02 11 39 34 CDR Okay. We'll tape them into position they are right now.
- 02 11 40 19 CDR Houston, 15.
- 02 11 40 20 CC Go ahead. 15, this is Houston. Go ahead.
- 02 11 40 43 CDR Okay, Houston. We just did a little checkout for your LEB DSKY, and the KEY RELEASE light doesn't work - for one - does not work.
- 02 11 40 56 CC Roger. I guess you are a couple of steps ahead of us there. Can you tell us the position of - of the NUMERICS knob over on panel 100?
- 02 11 41 09 CDR About 2 o'clock.
- 02 11 41 18 CC Roger. I guess that's - that's one of our weak points. If - if that switch had - if that knob had been over close to full BRIGHT, we had some chance of getting enough energy into those lights to make them work, but in that position, that's probably not possible. And we should leave things as they are.
- 02 11 41 39 CDR Well - well, I - I'm not sure those INTEGRAL lighting rheostats have not been moved since the circuit breaker popped. I guess if you want to, we could run it over to full BRIGHT, or I guess you probably prefer to leave it as it is, and if so, we'll give up on the status lights.
- 02 11 42 08 CC The word at the present time is let's leave them just as they are, Dave.

02 11 42 13 CDR Okay. We'll put a piece of tape across so that we don't accidentally run into them.

02 11 42 20 CC Okay.

02 11 43 05 CC That's all we have on that subject, 15. You probably know as well as we what lights you're missing up there. We could give you a list if you would like.

02 11 43 17 CDR Oh, no. We've got a good handle on it, Karl. Thank you.

02 11 43 21 CC Roger.

02 11 48 02 CC 15, this is Houston.

02 11 48 08 CDR Roger. Go ahead.

02 11 48 10 CC I've got one small comment for you, and then a small update to the Flight Plan. First of all, they've init - they've gone through a fairly thorough test on the range rate meter and how it operates under those pressures and in that pure oxygen atmosphere, and so far as we can see at the present time, there is no problem whatever in its operation, but we'll continue that test. In the Flight Plan at 60 hours on the - on the SIM bay procedure to get some data from the cameras there, I have a small change, if you have the Flight Plan out.

02 11 48 53 CDR Go ahead, Karl.

02 11 48 56 CC Right. That procedure should go in this order. First, the S-BAND AUX, TV to SCIENCE, as is already there. Then the PAN CAMERA POWER, on for 5 minutes, and then off. After the POWER goes off, wait for a MSFN cue because we want to pick up some data in that - in that state as well. After you get a MSFN cue, then we go to the PAN CAMERA, SELF TEST-off, the MAPPING CAMERA, ON switch to OFF, and then the S-BAND AUXILIARY, TV-off, in that order. And we're going to need the HIGH GAIN ANTENNA for this job. And we're going to have a PITCH, minus 30; and a YAW, of 90, and we're going to have to give you cue as to when to start this, so that everything will be lined up right.

02 11 50 05 LMP Okay. We copied all that.

02 11 50 18 LMP Houston, we copied that.

02 11 50 20 CC Roger. And when we come close to the right time, let us know when you're ready to start, and then we'll let you know when we're ready.

02 11 50 35 LMP 15; Roger.

02 11 51 14 LMP Karl, this is 15. We're ready to do that now, or whenever you're ready.

02 11 51 40 LMP Houston, this is 15.

02 11 51 42 CC 15, we copied. And stand by; within 1 or 2 minutes, we'll be able to give you a GO.

02 11 51 52 LMP Roger.

02 11 54 06 CC 15, this is Houston. It looks like we have a 2- to 3-minute wait yet.

02 11 54 13 LMP Roger.

02 11 57 22 CC 15, this is Houston. You're GO to turn on the PAN CAMERA telemetry. We need to bring up the HIGH GAIN ANTENNA first and then turn on the PAN CAMERA telemetry.

02 11 57 36 LMP Roger. We copied.

02 11 59 33 LMP PAN CAMERA POWER is on now.

02 11 59 38 CC We copy.

02 12 01 57 CC 15, this is Houston. We're ready for the PAN CAMERA POWER switch, to off.

02 12 02 06 CDR Oh, very well. PAN CAMERA POWER is coming off.

02 12 02 16 LMP PAN CAMERA POWER is off.

02 12 02 42 CC 15, Houston. You can proceed with the rest of that procedure.

02 12 02 50 CDR Roger. In work.

02 12 03 28 CC 15, Houston. We'd like to have OMNI Bravo.

02 12 05 33 CC 15, this is Houston.

02 12 05 40 CDR Houston, 15. Go.

02 12 05 42 CC At your convenience, give - give us the WIDE BEAM on the HIGH GAIN ANTENNA. And the system down here says that your PTC is excellent. In fact, it's one of the best they've ever seen.

02 12 05 56 CDR Oh, very good. Okay; you want HIGH GAIN, WIDE BEAM, huh?

02 12 06 02 CC That's affirmative.

02 12 06 07 CDR Okay.

02 12 06 08 CC We - we don't want to bring up HIGH GAIN; we just want to select WIDE and MANUAL.

02 12 06 16 CDR Oh, okay. Okay; we - we do that.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 12 34 11 CC 15, this is Houston. How are we set for the bistatic radar frequency check?

02 12 34 29 CDR Well, we're just about ready for it.

02 12 34 33 CC Okay; we're about ready down here, too. Let us know when you're GO.

02 12 34 41 CDR Roger.

02 12 35 10 CDR Okay; we're configured.

02 12 35 21 CDR Houston, this is 15. We're all configured up here.

02 12 35 24 CC Roger. We copy, and stand by. 15, we're turning off the up-link now.

02 12 35 38 CDR Roger.

02 12 43 23 CC 15, this is Houston. How do you read?

02 12 44 07 CC 15, this is Houston. How do you read?

02 12 44 16 CDR Five square, Houston.

02 12 44 19 CC Good; it sounds like we've got our up-link going again. That next bit down there about ground cue, it'll be about 20 minutes before we get - get down to that.

02 12 44 32 CDR Okay. We'll be standing by.

02 13 03 58 CC 15, this is Houston.

02 13 04 05 CDR Houston, 15.

02 13 04 09 CC I guess we've got all the data we need down here. You can go ahead and turn the VHF off.

02 13 04 17 CDR Roger; VHF coming off.

02 13 07 36 CC 15, this is Houston.

02 13 07 43 CDR Houston, 15. GO.

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02 13 07 45 CC Looks like a very quite night tonight. About the only question we've got for you at the present time is your assessment of the glass cleanup. How did it go?

02 13 08 01 CDR Well, we got a - a few more pieces just by looking around over there. Some of the smaller like - oh, I guess the largest piece we found was about a centimeter or so, and the vacuum cleaner picked up a bunch of small chips. I guess - In total, we may have 60 - 70 percent of the portion that broke, and I think we've really picked up all that is practical at this stage.

02 13 08 29 CC Roger. Any special places this stuff seems to collect that you can tell?

02 13 08 39 CDR I think, initially, we've found most of it was - up near the COAS mount and behind the panel on the left side - near - near the forward part of the window. We found several - several larger pieces there and also one large piece just above the data file, which was about an inch long or so. The small pieces seem to have been drifting all about.

02 13 09 07 CC Roger.

02 13 09 25 CC And 15, we didn't forget your state vector. It's just that the one you got on board is very good. We don't need - we feel we don't need an update.

02 13 09 36 CDR Okay.

02 13 09 38 CC Just polishing off a hamburger and french fries down here. What's on the menu up there tonight?

02 13 09 46 CDR Oh, stand by a minute, Karl.

02 13 12 36 CDR Hey, Houston, 15.

02 13 12 40 CC 15, go ahead.

02 13 12 44 CDR Okay, we're just getting ready to do some chlorination here, and we find we've got a leak around the chlorine port - with a cap on it - seems to be leaking water. And you might take a look at that

real quick and see if you can come up with any ideas on the thing. The cap is on, and Jim was just getting ready to take the cap off and noticed a little water; and, in trying to clean it up, it seems like we're accumulating a fair size - fair amount of water right now, right around the cap.

- 02 13 13 13 CC Can you give an - give us an estimate of how many drips per second it is?
- 02 13 13 20 LMP Yes, it's a - it's a pretty good flow right now. Drips per second, it's hard to measure; it's a whole ball of water right around that valve right now.
- 02 13 13 29 CC Roger -
- 02 13 13 37 CDR What we need is a check valve that we can close or get to, to isolate that port, if we could get one.
- 02 13 13 43 CC Dave, I - I had a problem when I chlorinated on launch day. And, when I first took the valve off, I had about what you've got - quite a strong flow. The cap - the cap stops it from flowing when you put it back on, and after I chlorinated, the flow decreased down to a very slow drip, say once a minute.
- 02 13 14 05 CDR This is a big run, Karl, and the cap is on tight, and it - you can almost feel something flowing beneath the cap.
- 02 13 14 14 CC Okay, stand by. Lots of people thinking down here now.
- 02 13 14 17 CDR Okay.
- 02 13 15 25 LMP Houston, 15. It seems to be leaking from behind that panel there, right behind where the waste tank servicing valve is, and the potable tank inlet - and it's accumulating at a pretty good rate.
- 02 13 15 38 CC We copy.

02 13 17 25 CDR Hey, Houston; 15. Got any suggestions yet? We need to isolate this thing pretty quick.

02 13 17 31 CC In - just a minute.

02 13 17 54 CC What was -

02 13 18 08 CC 15, this is Houston. Our recommendation is that on 351, you turn the WATER & GLYCOL TANKS PRESSURE REGULATOR, OFF. On 352, turn the POTABLE TANK INLET, OFF.

02 13 18 27 CDR Okay. POTABLE TANK INLET is now CLOSED, and say again the other one.

02 13 18 34 CC Up on panel 351, WATER & GLYCOL TANKS PRESSURE REGULATOR, OFF.

02 13 18 51 CDR Okay, WATER & GLYCOL TANKS PRESSURE REGULATOR is OFF.

02 13 19 47 CC 15, Houston. That should - that should have taken the pressure off of the potable water tank; is it helping the situation any?

02 13 19 58 CDR No, it's still leaking, Karl; pretty good rate.

02 13 20 07 CC Roger; stand by.

02 13 22 57 CDR Houston, looks like maybe we ought to start dumping out of the waste so we can dump out of the potable tanks. It's still leaking and we've got everything but the check valve between the potable tank and the chlorine nozzle isolated.

02 13 23 26 CC We copy, Dave. No comments yet. Stand by.

02 13 25 39 CC 15, Houston. We note the pressure in your tank coming down. In the meantime, we suspect that the - we suspect that the fitting there on your chlorine injector outlet is loose, and we have - we have a procedure here for tightening it up.

02 13 26 04 CDR Okay; give it, quick.



02 13 26 06 CC Roger. We need tool number 3 and tool number W out of the toolkit.

02 13 26 14 LMP Okay; 3 and W out of the toolkit.

02 13 26 17 CC Right; put - put number 3 in the tool W ratchet, and insert - sert tool 3 in the hex opening in the chlorine injector port.

02 13 26 28 CDR Okay. That's - that looks like where it's probably leaking.

02 13 26 53 CC And, once we have the number 3 tool in the hex opening, it should go in about a quarter of an inch to really engage. It also says "Use caution when inserting the tool because it comes in contact with a rubber diaphragm."

02 13 27 10 CDR Okay.

02 13 27 16 CC We've agreed down here it's a good idea to take the water gun to fill up a food bag or something of that sort.

02 13 27 24 CDR Okay.

02 13 27 30 CC Once you've got tool number 3 well engaged in that injection port, turn it about a quarter turn.

02 13 29 55 CDR Okay, Houston. It looks like that did it.

02 13 29 59 CC Wonderful.

02 13 30 09 CDR Nice to have the quick response you guys have down there.

02 13 30 14 CC Well, you'll never believe it, but after we had the leakage on the morning of the 26th, somebody sat down and wrote up a special procedure, just in case.

02 13 30 25 CDR Well, that was good thinking because we about had a small flood up here.

02 13 31 51 CC 15, Houston. We're looking now at the best procedure for getting the water system operating again. In the meantime, we trust you have your hands full of water up there.

02 13 32 04 CDR Yes. All we have to do now is hang out a few towels to dry, but looks like we're in good shape.

02 13 32 10 CC Very good.

02 13 33 11 CC 15, Houston. We'd like for you to turn the REGULATOR back ON, on panel 351.

02 13 33 18 CDR Okay. REGULATOR coming back ON.

02 13 34 28 CC 15, Houston. Is everything looking all right on the leak now?

02 13 34 34 CDR Yes; it looks okay. That fitting there that we tightened up went somewhere between - 180 - 270 degrees of turn. And that - that was where the water was coming from, and it looks like it's secure now.

02 13 34 48 CC We copy.

02 13 36 37 CMP Hey, Karl, we just ran a little check with our slide rule here, and it was something like 3000 drips per minute.

02 13 36 47 CC Okay; glad to hear that good news. I - I guess up there you don't get drips, do you; that's an interesting fact.

02 13 36 57 CMP Roger.

02 13 37 03 CC Okay, Dave. We're ready to open the INLET valve to the POTABLE WATER TANK.

02 13 37 10 CDR Okay; POTABLE WATER INLET coming OPEN.

02 13 37 15 CC Incidentally, Dick was over at Lurton's and they called up to say, "Hey, it's about time you take a bath up there."

02 13 37 24 CDR Well, we were sort of discussing that a little earlier tonight anyway. And, as a result, well, I guess we all got cleaned up.

02 13 37 33 CC Good enough.

02 13 38 30 CDR And, Houston, with the fitting secure now and everything shipshape, what do you think about proceeding ahead with the chlorination?

02 13 38 48 CC Okay, Dave. Go ahead.

02 13 39 02 CDR Houston, 15.

02 13 39 06 CC 15, this is Houston. The word here is to go ahead.

02 13 39 56 CDR Houston, 15.

02 13 39 58 CC 15, this is Houston. Are - are we in comm now?

02 13 40 06 CDR Roger. We've got you. With everything looking shipshape down here, what do you think about proceeding with the chlorination?

02 13 40 12 CC Okay, Dave. Go ahead.

02 13 40 16 CDR All righty.

02 13 45 06 CC 15, this is Houston. Is Jim doing some exercising now? We're doing a little medical detective work down here.

02 13 45 16 CDR Well, yes, as a matter of fact, he is. He's trying to get one of the compartments open.

02 13 45 20 CC Roger.

02 13 48 03 CC ... with you.

02 13 48 13 CDR Houston, 15. Go ahead.

02 13 48 18 CC 15, this is Houston. Please disregard.

02 13 48 26 CDR Okay, I'll disregard.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 14 14 34 CDR Houston, Apollo 15.

02 14 14 39 CC 15, Go ahead.

02 14 14 44 CDR Okay; we've got the presleep checklist if you're ready to copy.

02 14 14 52 CC Go ahead, Dave.

02 14 14 56 CDR Okay; crew status is good. No medication today. Onboard read-outs: BAT C, 37.0; pyro BAT A, 37.2; B, 37.2; RCS A, 89; B, 86; C, 89; and D, 86. And the H<sub>2</sub> fans have been cycled, and the potable water has been chlorinated, and the vents and switches are all set. The cabin's at 5.7, and I'll give you an E-memory dump any time you're ready.

02 14 15 40 CC We copy; and stand by on memory dump.

02 14 15 46 CDR Okay; you might be interested in another little item. All the meals have been consumed on schedule, and the - the pantry's even had a pretty rigid test so far.

02 14 15 59 CC Excellent.

02 14 16 05 CDR Here, our trusty LMP came up with an interesting analogy relative to the last event. He wondered if the original Endeavour had ever sprung a leak like that.

02 14 16 16 CC Okay; that's a good question. We'll get our historians out to check that one. Hey, what did you do with all that extra water, stick it overboard or drink it or what?

02 14 16 31 CDR Oh, no; we've got a bunch of towels hanging up in the tunnel right now. It looks like somebody's laundry.

02 14 16 45 CC Cy's down here guessing that you hosed some of it overboard.

02 14 16 52 CDR Well, you probably saw the motion of the spacecraft. We were just in that process when you came up with a procedure.

02 14 16 58 CC (Laugh) Okay; fine. The PTC's still looking great.

02 14 17 04 CDR Oh, good.

02 14 17 18 CC Okay, Dave. We're ready for the E-MOD dump.

02 14 17 23 CDR Okay; here it comes.

02 14 20 35 CC 15, Houston. We finished the E-memory dump. The surgeon - the surgeon says that it's - it's your turn in that biomed harness. And, otherwise, we - don't have any - anything more down here. And, we're ready to secure - the - the voice communications any time you like.

02 14 21 05 CDR Okay; very well. By the way, how are the biomed harnesses working out for the surgeons?

02 14 21 15 CC The word is that we're getting good clean data, and they're very happy with it.

02 14 21 21 CDR Okay; very well. See you in the morning.

02 14 21 24 CC Roger, Good night.

END OF TAPE

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APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 22 00 31 CC Apollo 15, Houston. Over.

02 22 00 59 CDR Hello, Houston; Apollo 15.

02 22 01 01 CC Roger. Good morning, Dave. It's time to rise and shine.

02 22 01 06 CDR Okay, Bob. Good morning.

02 22 01 10 CC And we've got the usual quota of checklist changes, Flight Plan updates, et cetera. When you guys are ready, give me a call. Look like you guys had a good night's sleep last night, for you anyway, Dave.

02 22 01 27 CDR Okay. Felt pretty good. We'll get organized and give you a call here in a few minutes.

02 22 01 31 CC Roger.

02 22 26 05 CDR Houston, Apollo 15.

02 22 26 12 CC Roger. Good morning.

02 22 26 17 CDR Good morning. I have a consumables report for you, and sleep report.

02 22 26 22 CC Okay. We're ready to copy.

02 22 26 29 CDR Okay. On the Commander: PRD — 7 and 1/2 hours sleep; CMP: 25012, same sleep; LMP: 08013, same amount of sleep. On the consumables: 70:15; RCS, 90, 87, 84, and 88. On the H<sub>2</sub>; 90, 89, and 60. O<sub>2</sub>; 88, 89, and 65. Over.

02 22 27 24 CC Roger. And, before I read that back, we did not catch the commander's PRD reading.

02 22 27 37 CDR That was 23046.

02 22 27 42 CC Roger. Copy. Understand we have Commander's PRD, 23046; 7 and a half hours sleep for all three crewmen; 25012 for the CMP; and 08013 for the LMP. And we have consumables update, based on our figures from the ground. For 70:00, we have 84 percent

total. And we have 85, 84, 84, and 85. And for H<sub>2</sub>, we have 91, 90, and 60. For O<sub>2</sub>, we have 89, 90, and 73. Over.

02 22 28 39 CDR Roger. I ... I'm ready for any Flight Plan update you might have.

02 22 28 44 CC Okay. First we have Flight Plan update for the day. We'll start out at - Stand by.

02 22 31 21 CC 15, Houston. You back with us again?

02 22 31 31 LMP Roger. We've been here all along, Bob.

02 22 31 33 CC Roger. We had the usual signal break when we went around in PTC there. Let me ask you one question. The EECOMs are interested in getting a verification on the O<sub>2</sub> tank 3 readout, since there's a difference of 8 percent there. And, then after we get that, we'll proceed with this update. It's a very long one, so I guess you might as well - -

02 22 31 53 LMP Okay. Stand by.

02 22 31 54 CC - - drag out your Flight Plan.

02 22 32 10 LMP Okay. We're reading - 74 on board.

02 22 32 15 CC Roger. Understand 74. Okay, Jim. And we'll start this Flight Plan update at 71 hours, so you can tell me when you get there.

02 22 32 29 LMP Okay. I'm there.

02 22 32 30 CC All right. At 71 hours, we want to add the following information. "HIGH GAIN ANTENNA on MSFN cue," and note that we won't stop PTC. We'll have to give you the numbers, depending on where you are - in PTC, as we come around at this point. Second line is "S-BAND AUX TV to SCIENCE, PAN CAMERA MODE to STANDBY." That's a "Verify." "PAN CAMERA POWER, on. PAN CAMERA SELF TEST to HEATERS. MAPPING CAMERA, ON to STANDBY. Then after 5 minutes, PAN CAMERA POWER, OFF, and S-BAND AUX TV, off." Copy?



02 22 34 05 LMP Okay. Here's the readback, Bob. At 71 hours, "HIGH GAIN ANTENNA on MSFN cue, S-BAND AUX TV to SCIENCE, PAN CAMERA MODE to STANDBY." That's a "Verify." "PAN CAMERA POWER, on; PAN CAMERA SELF TEST to HEATERS; MAPPING CAMERA, ON to STANDBY; after 5 minutes, PAN CAMERA, OFF, and S-BAND AUX TV, off."

02 22 34 31 CC Roger. That's good. Okay. Next item at 71:15. This will be a line added in after the "CM/LM pressure equalization decal." And the line says, "PRESS equal valve, close." Over.

02 22 35 02 LMP Roger. At 71:15, "PRESSURE equalization valve, close."

02 22 35 06 CC Roger. And next one is on 73 hours and 15 minutes.

02 22 35 20 LMP Okay. Go.

02 22 35 21 CC Okay. And at 73:15, we will delete the line referring to waste water dump. "Waste water dump" will be deleted.

02 22 35 34 LMP Okay. I copy. Delete the "waste water dump."

02 22 35 37 CC Okay. Next one will be at 81:42, 81:42.

02 22 36 04 LMP Joe.

02 22 36 06 CC Okay. And, in the configuration for the camera there, we're changing that from "CM 4" to "CM 3," on the second line.

02 22 36 21 LMP Okay. "CM 3" is ... to "CM 4."

02 22 36 24 CC Roger. Next one's on 84:24, 84:24.

02 22 36 41 LMP Okay; go.

02 22 36 42 CC Roger. Also, configuration of the camera, and we'll change that one also to "CM 3" instead of "CM 4."

02 22 36 55 LMP I copy.

02 22 36 56 CC Roger. And then over on the other side of the page at 84:40, again terminator photos. The first one, the first line there, 84:40 will now read "EL, on," and the time will be "T-START minus 1:40," 1:40.

02 22 37 22 LMP Okay. I copy.

02 22 37 25 CC And then at 84:42, "EL, off" will now be at "EL, off, parenthesis, T-START."

02 22 37 41 LMP I copy.

02 22 37 42 CC Okay. And we have two general notes. One refers to SIM door JETT, and it's a reminder that we verify that the Lexan shield is mounted in - window 5, with the cardboard shade off, for a photograph of the SIM door JETT. At - this is about 74 hours.

02 22 38 10 LMP Okay. I understand.

02 22 38 11 CC Okay. And second one is with respect to the optics CALs. And I guess we should explain here that - people who are wringing their hands down here about the fact that we looked at a little bit of a bias drift when you guys zeroed the optics the first day, and we sent up some procedures yesterday saying to be careful when you are doing it for P23. And then everybody else got - decided that we ought to be careful when we did it for other things besides P23. And so, we have the following procedures, which are, basically, to avoid trunnion rates for all optics zeroing, so that we don't get any - possible shift on the mirror calibration. And the procedures are twofold. First - I guess you might write them down some place - if the OPTICS power is off, place ZERO switch OFF before turning the optics power on. And then, after the power is on, drive the optics manually to a trunnion of less than 10 degrees before placing the ZERO switch on. Over.

02 22 39 28 LMP Okay, Bob. If OPTICS power off, then OPTICS ZERO switch, ZERO?

02 22 39 39 CC Roger. It really is, if OPTICS power off, place the ZERO switch to OFF before turning the optics power on.

02 22 42 16 CC 15, Houston again.

02 22 42 41 CC 15, Houston.

02 22 42 49 LMP Bob, would you read that procedure again? I want to make sure I have it correct. I have OPTICS power off, then OPTICS ZERO switch, ZERO.

02 22 43 04 CC Okay, Jim. The thing is, if your optics power is off, we - as it will be like this morning, is OFF, we - as it will be like this morning, and the ZERO switch is already on, as it probably is this morning, we want you to place the ZERO switch to OFF before you turn the OPTICS power on, because, otherwise, it will then automatically zero without you having control over it. Do you understand?

02 22 43 28 LMP Okay. We understand.

02 22 43 30 CC Okay. And - the corollary - -

02 22 43 33 LMP Read the - read the rest of it after the OP - -

02 22 43 37 CC Okay. And then after, - Okay; I'll - I'll read it through from the beginning again. If OPTICS power off, place ZERO switch OFF before turning OPTICS power on. Then, drive OPTICS manually to TRUNNION less than 10 DEGREES before placing ZERO switch ON. Over,

02 22 44 14 LMP Okay. That was after the OPTICS power ON. Drive optics until trunnion is less than 10 degrees before ZERO switch ON.

02 22 44 24 CC Roger. And the corollary to that is if the optics power is already ON, then we drive the OPTICS power manually to a trunnion of less than 10 degrees before placing the ZERO switch ON. That's the second part.

02 22 44 42 LMP Okay. We copy.

02 22 44 44 CC Okay. And then I have an update to your Contingency Checklist, page 4-3 which pertains to LOI burn rules, if you can get that out.

02 22 44 58 LMP Stand by.

02 22 44 59 CC Roger.

02 22 46 59 LMP Okay, Bob. I have the Contingency Checklist.

02 22 47 01 CC Okay. I got 4 - page 4-3.

02 22 47 09 LMP Stand by.

02 22 47 20 LMP Okay; I have 4-3.

02 22 47 22 CC Okay. And these changes are basically in the table there. - We'll start out under the heading of "Burntime." And that first one will be change from "00 to 1:36," now, instead of "1:35." So, it'll be 1:36 in the first burn time. The second line will be "1:36 to 1:57." And the third line will be "1:57 to 2:13." And the fourth line will be "2:13 to 3:11." Over.

02 22 48 15 LMP Copy.

02 22 48 17 CC Okay, the next one in the second column, "DELTA-V<sub>M</sub>," the lines will be 0 to, or "0-640, 640-784, 784-900, 900-1313." Over.

02 22 48 55 LMP I copy.

02 22 48 57 CC Okay, and, in the second block, the lower block, under the updates for the times and angles, we have the following readings under the "Update" column. The GET of LOI ignition is "78:31:34.2," the second time is "79:01:34.2," and the angles are "144, 358, and 68." Over.

02 22 49 49 LMP Okay, copied on the update time, "78:31:34.2, 79:01:34.2; 144, 358, and 68."

02 22 50 03 CC Roger. And, be advised, this also changes your little graph over on the side there. Primarily what it does, is to enlarge the mode 130 region by about 10 feet per second on either side and it changes the "LCI plus 30 abort DELTA-V" line by essentially extending it and raising the left-hand corner just a wee bit. We could read up the lines too if you want, but I'm not sure you really need those. Over.

02 22 50 38 LMP Okay; understand.

02 22 50 43 CC We're coming up on another OMNI switch, and we'll be back with you in a minute, Jim.

02 22 50 52 LMP Roger.

02 22 53 17 CC Okay, 15; we're back with you.

02 22 53 33 CC 15, Houston; we're back up.

02 22 53 40 LMP Okay. We read you.

02 22 53 41 CC Okay. Understand you really - didn't feel you needed the complete update to that graph, Jim?

02 22 54 56 CC Jim, this is Houston. Is that a verify on the fact that you don't want the update on the graph? Over.

02 22 55 06 LMP I think we can do it ourselves, Bob.

02 22 55 08 CC Roger. Okay, and that's all the update we have for you at the moment. You might be interested in knowing that that water dump you guys scheduled last night before you went to bed, was at a very opportune time. Your PTC drifted plus or minus 2 and a half degrees all night.

02 22 55 26 CDR Well, very good.

02 22 55 32 CC We'll be up with the news in a while.

02 22 55 39 CDR Okay.

02 23 01 30 CC 15, Houston. We have a PITCH of minus 30 and a YAW of 85 for the HIGH GAIN ANTENNA, and we'll give you a mark when to go.

02 23 01 41 CC Go now.

02 23 01 46 CDR Okay; minus 30 and 85.

02 23 03 28 CC And, 15, we're getting you on HIGH GAIN and receiving -

02 23 03 39 CDR Okay; we understand you're getting the data.

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02 23 03 42 CC That's affirm.

02 23 11 33 LMP Houston, this is 15.

02 23 11 36 CC Roger; go.

02 23 11 40 LMP Roger. We just want to confirm the position of the switches on the MAPPING CAMERA and PAN CAMERA. We have the MAPPING CAMERA on is STANDBY, and the PAN CAMERA POWER, OFF. Is that correct?

02 23 11 54 CC Roger. If you finished, that's the correct position.

02 23 12 02 LMP Okay.

02 23 13 45 CC 15. We'll take OMNI Delta at this time, please.

02 23 13 52 LMP Roger; OMNI Delta.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

02 23 13 45 CC And, 15, we'll take OMNI Delta at this time, please.

02 23 13 52 CDR Roger. OMNI Delta.

02 23 19 51 CC And, 15, we'd like WIDE and MANUAL on HIGH GAIN, please.

02 23 19 58 CDR Roger.

02 23 24 00 CC Apollo 15, this is Houston. Select OMNI Bravo, please.

02 23 24 08 LMP OMNI Bravo.

02 23 34 25 CC Apollo 15, Houston.

02 23 34 31 LMP Go ahead, Joe.

02 23 34 39 LMP Go ahead, Joe.

02 23 34 40 CC Stand by, Jim. I'll wait until the comm's a little better.

02 23 39 01 CC Hello, 15; this is Houston.

02 23 39 08 LMP Go ahead, Joe.

02 23 39 10 CC Good morning, Jim. This is your friendly news reporter on duty now. And I wondered if you'd be interested in something from the local newspapers?

02 23 39 21 LMP Oh, yes. We certainly would.

02 23 39 26 CC Roger. This is from the MOCR Gold Bugle and Taglich Zeitung News. The Administration effort to rescue Lockheed Aircraft cleared a major hurdle in the Senate yesterday when an amendment to deny favored status was rejected 60 to 35. Houston unemployment rose to 4.1 percent in June, an increase of a full percentage point from May, which is the highest in 6 years. And this morning's Post reports that the checkout of Falcon went on with a few words from Worden and virtually nothing from the other astronauts. However, I think that's

incorrect, and I enjoyed talking to you very much yesterday. In sporting news, Houston dumped Philadelphia, 6 to 3, and is now in fourth place, 10 games behind the Giants. And an interesting note from the North. Bart Starr underwent surgery yesterday for a bicep tendon transplant and will be out of action for at least 12 weeks. And that's all from the Daily Zeitung this morning.

02 23 40 54 CDR Thank you, Joe. Enjoyed it.

02 23 40 58 CC Roger, Dave. Good morning.

02 23 41 05 CDR Morning.

02 23 41 29 CC Al, this is Houston. And we're standing by for your null bias EMS check if you've gotten to that yet.

02 23 41 43 LMP Roger. The DELTA-V test was good, and the null bias was 1.0.

02 23 41 52 CC Roger. Copy.

02 23 49 16 CC 15, this is Houston.

02 23 49 22 LMP Go ahead, Joe.

02 23 49 25 CC Roger, Jim. Just wanted to tell you to expect all your updates on time except the pad; and we're going to delay the pad to 72 plus 50 because of very good tracking data we'll be getting in those last few extra minutes there.

02 23 49 48 LMP Okay; understand. Expect the pad about 72:50.

02 23 49 52 CC Roger.

03 00 04 21 CMP Hello, Houston; 15.

03 00 04 45 CMP Hello, Houston; 15.

03 00 04 48 CC Go ahead, 15. This is Houston. We hear you now.

03 00 04 54 CMP Morning, José. Say, listen; on this - on the door jettison photography, we've got about 50 percent left on MAG A, and we thought we would go ahead and use that.



03 00 05 13 CC Good morning, Alfredo. We copied you, but I'm not sure that I understand your question.

03 00 05 23 CMP Okay, Joe. No, it's not a question. Just wanted to let you know, on the 16-millimeter photography for the SIM door JETT, the Flight Plan called out MAG - stand by 1. Yes; it called out MAG Echo, and we're going to use MAG Alfa instead. We got about 50 percent left on it. Just letting you know.

03 00 05 48 CC Okay, Al. Thank you. And, by the way, is that the maneuver where the SIM bay door jettisons the spacecraft?

03 00 06 00 CMP It has been variously known as that kind of a maneuver, yes.

03 00 06 04 CC Roger. I'm looking forward to that.

03 00 22 13 CC Apollo 15, Houston.

03 00 22 18 CMP Houston, 15. Go ahead.

03 00 22 21 CC Roger, 15. I have a maneuver pad PC plus 2, when you're ready to copy.

03 00 22 31 CMP Okay, Joe; stand by 1.

03 00 22 34 CC Roger.

03 00 23 21 CMP Okay, Joe. I'm ready; go ahead.

03 00 23 24 CC Roger. PC plus 2, SPS/G&N; 66313; plus 1.23, minus 0.12; 080:29:13.47; plus 3189.4, minus 2437.0, minus 1356.5; 175, 079, 332; all other is NA; ullage, none; other, burn equals SPS docked. Over.

03 00 24 42 CMP Roger, Joe; copy. Plane change plus 2 SPS/G&N; 66313, plus 1.23, minus 0.12; 080:29:13.47; plus 3189.4, minus 2437.0, minus 1356.5; 175, 079, 332; no ullage; and that burn equals SPS docked.

03 00 25 14 CC Readback's correct, Al. Thank you.

03 00 25 19 CMP Roger.

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03 00 38 44 CC Apollo 15, this is Houston. We need P00 and ACCEPT to give you a state vector and a target load, and we'll up-link when we get the next OMNI.

03 00 39 02 CMP Okay, Joe. You have it.

03 00 39 05 CC Roger; thank you.

03 00 42 38 CC Apollo 15, this is Houston with the maneuver pad midcourse 4, when you're ready.

03 00 42 49 CMP Okay. Stand by 1, Joe.

03 00 42 53 CC Roger; standing by.

03 00 43 45 LMP Okay, Joe. I'm ready to copy the midcourse 4 pad.

03 00 43 50 CC Roger, Jim. Midcourse 4, SPS/G&N; 66531; plus 1.23, minus 0.12; 073:31:14.02; plus 0001.9, minus 0003.6, plus 0003.5; 038, 240, 331 - 15, hold off the P52; we're commanding, and go to P00 and ACCEPT, please.

03 00 44 53 CDR Yes. Roger, Joe.

END OF TAPE

## APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 00 45 01 LMP Okay. We - we're back in POO and ACCEPT. I forgot, there's no up-link activity light in the LEB.

03 00 45 11 CC Roger, 15. I'll continue with the pad. H<sub>A</sub> is NA, NA; 0005.4, 0:01, 0003.2; 23, 106.1, 17.6. The rest is NA. GDC aline, Vega, Deneb; roll aline, 209; 009; 349; ullage, none. Other: LM weight, 36256; SIM-door-JETT attitude is nominal. Single bank Bravo burn. HIGH GAIN: PITCH, 21; YAW, 243. Over.

03 00 46 36 LMP Okay, Joe. Readback for midcourse 4, SPS/G&N; 66531; plus 1.23, minus 0.12; 073:31:14.02; plus 0001.9, minus 0003.6, plus 0003.5; 038, 240, 331; 0005.4, 0:01, 0003.2; 23, 106.1, 17.6. Vega and Deneb; 209; 009; 349. No ullage. LM weight, 36256; SIM door JETT, attitude nominal. Single bank burn on Bravo. HIGH GAIN: PITCH, 21; YAW, 243.

03 00 47 34 CC Roger, Jim. Sounds good, and it's your computer.

03 00 47 41 LMP Roger.

03 00 52 55 CDR Okay, Houston. Gimbal angles are up. We'll torque them on in a minute.

03 00 53 00 CC Roger, 15.

03 00 54 13 CDR Houston, 15. Did you get the gyro torquing angles?

03 00 54 17 CC Roger, Dave. We got them. Thank you.

03 00 54 22 CDR Okay.

03 01 12 29 CC Apollo 15, Houston. Requesting the high gain, when convenient.

03 01 12 38 CDR Roger, Joe.

03 01 16 27 CC Apollo 15, Houston. Just a reminder to load the DAP and then go on back.

03 01 16 39 CDR Roger, Joe.

03 01 32 26 CDR Okay, Houston. 15 with the burn status report.

03 01 32 30 CC Go ahead, Dave. This is Houston.

03 01 32 35 CDR Okay. I guess you could see it was a nice smooth burn. On time. Burn time was a second. DELTA-V<sup>gx</sup> at the end of the burn was .2; there was no trim; residuals were plus .2, minus .1, plus .1; DELTA-V<sub>c</sub> was a minus 2.3.

03 01 32 56 CC Roger, Dave. We copy. And we think you're bragging, but you have a reason to. Beautiful burn.

03 01 33 06 CDR It's all this nice machinery up here, Joe.

03 01 52 37 CDR Okay; Houston, 15.

03 01 52 41 CC Roger. Go ahead.

03 01 52 46 CDR Okay. Suit pressure integrity check is okay. The flow was about .3 or .4. And we're proceeding into the setup for the SIM bay door jettison, and we'll give you a call when we get everything ready, before we blow it.

03 01 53 03 CC Roger, Dave, Sounds good.

03 01 54 45 LMP Houston, this is 15. We're ready to turn PAN CAMERA POWER on, if you are.

03 01 54 54 CC Roger, Jim. Go ahead.

03 01 54 58 LMP Okay. It's coming on now.

03 01 57 14 CC 15, Houston.

03 01 57 21 LMP Go ahead, Houston.

03 01 57 23 CC Jim, we're not sure that the cameras are running properly. We want you to check the two SEB circuit breakers on panel 5, in, and confirm for us that you got the right talkback when you turned them on.

03 01 57 39 LMP The two circuit breakers on panel 5 are in. Stand by.

03 01 58 00 LMP Joe, there's no talkback called out here on the PAN CAMERA POWER on.

03 01 58 20 CC Roger. We copy. And, Jim, apparently, when you turn the power on, you should get about 2 seconds of barber pole, and then back to gray. It may very well have happened, and you just didn't notice it.

03 01 58 44 LMP Okay. Stand by.

03 01 59 19 LMP Houston, this is 15. Do you want us to turn the PAN CAMERA POWER on again and check that talkback a little more carefully?

03 01 59 41 CC Jim, that sounds like a good - -

03 01 59 43 LMP Houston, 15.

03 01 59 44 CC - - idea to us. Would you turn the PAN CAMERA POWER OFF, wait 30 seconds, and then go back on, watching the barber - the - the barber pole indication, please.

03 01 59 56 LMP Okay. That's in work.

03 02 01 12 LMP Houston, this is 15.

03 02 01 15 CC Roger. Go ahead.

03 02 01 19 LMP Roger. We have the SM/AC POWER OFF, down on 180 [sic], per the P40 checklist. Should we put that power on?

03 02 01 28 CC Jim, that's affirmative. That power should be on, and that's probably our problem. Thank you.

03 02 01 35 LMP Okay.

03 02 02 03 CDR Okay, Houston. The SM/AC POWER is on, and the PAN CAMERAS are coming back to POWER at this time.

03 02 02 12 CC Roger.

03 02 02 16 CDR And we got a barber pole for 2 seconds.

03 02 02 24 CC Roger. As advertised. Thank you, Dave.

03 02 02 30 CDR Okay. I guess that's a spot in the cleanup of the P40 that didn't get carried over to the Flight Plan.

03 02 02 37 CC We concur.

03 02 03 08 CC 15, verify MAP CAMERA, STANDBY, please.

03 02 03 17 CDR Stand by. Okay; MAPPING CAMERA going STANDBY.

03 02 03 23 CC Roger.

03 02 03 29 CDR The - the MAPPING CAMERA is in STANDBY now, but it required a - a change.

03 02 04 00 CDR Okay; Houston, 15. I - do you want the MAPPING CAMERA in STANDBY for the door JETT?

03 02 04 06 CC That's affirmative, 15. MAP CAMERA, STANDBY.

03 02 04 13 CDR Okay.

03 02 04 41 LMP Houston, would you like the SM sector AC POWER OFF for the SIM door jettison?

03 02 04 48 CC That's right, Jim. Per the checklist, the first one in step 4.

03 02 04 56 LMP Okay. We just wanted to confirm it.

03 02 04 59 CC Roger. Sounds like a good idea. I think we have a bug or two in this procedure.

03 02 05 23 CC Apollo 15, Houston.

03 02 05 31 CDR Go ahead, Houston.

03 02 05 34 CC Roger, Dave. We're ready for PAN CAMERA POWER to BOOST. On your step 2 there, you are GO for SIM door jettison. And we want you to watch the FUEL CELL REACTANT valves after the jettison, per the checklist - just a reminder of that. Over.

03 02 05 58 CDR Okay; understand. And we are in boost, and we'll give you a mark when we blow the door.

03 02 06 07 CC Roger. And we will be standing by for a description.

03 02 06 12 CDR Roger.

03 02 06 43 LMP Okay, Houston; 15. SIM door JETT. - 3, 2, 1 -

03 02 06 48 LMP MARK.

03 02 06 52 CDR Felt a little shudder, but not too much.

03 02 08 17 CDR Okay, Houston. We have negative visual on the SIM door as of yet. And the fuel cells looked okay. The RCS Bravo primary talkback went to barber pole, and it's reset. And otherwise, no reaction in here.

03 02 08 34 CC Roger, Dave. We copy. And we assume you didn't notice any debris of any kind either.

03 02 08 47 CDR Nothing in particular, Joe, and Jim's got a visual now.

03 02 09 18 CDR Okay, Houston. Jim's got it out his window, and he's taking pictures, and he says it's slowly tumbling.

03 02 09 26 CC Roger.

03 02 09 51 CC And, 15, just out of interest, we saw a good healthy jolt in our Doppler data down here during JETT time.

03 02 10 02 CDR Gee, that's very interesting because I would say that the jolt in here was very minor.

03 02 10 29 CDR Houston, 15. I guess the consensus would say that the - the shock was about one-tenth of the other pyros we've seen up to this point.

03 02 10 42 CC Roger, Dave. We copy. Can you still see the world's largest lens cap out the window?

03 02 10 56 CDR We'll check.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 02 34 47 CC 15, this is Houston.

03 02 34 53 CMP Houston, 15. Go ahead.

03 02 34 57 CC Roger. We've looked ahead in - several hours in our Flight Plan, and we have - see no further inconsistencies between the checklist and the Flight Plan like the small problem we just had with the power. So, just wanted to advise you of - of this, and just follow the Flight Plan as usual. Over.

03 02 35 22 CMP Okay, Joe; we'll follow the cookbook. Thank you.

03 02 35 25 CC Roger, Al.

03 02 49 47 CC Apollo 15, this is Houston.

03 02 49 52 CMP Houston, 15. Go.

03 02 49 55 CC Roger. I've got a preliminary maneuver pad for LOI when you're ready.

03 02 50 02 CDR Okay; stand by 1.

03 02 50 14 LMP Okay; stand by 1.

03 02 51 26 CC And, Apollo 15, if you'll give us POO and ACCEPT, please, we'll give you a preliminary state vector, target lead, and a REFSMMAT.

03 02 51 37 LMP Okay; you've got POO and ACCEPT.

03 02 51 39 CC Roger.

03 02 51 40 LMP And I'm ready to copy the preliminary pad, Joe.

03 02 51 44 CC Roger, Jim. Just out of curiosity, has the SIM bay door long since disappeared from view?

03 02 51 52 LMP Yes, I looked for it a few minutes ago and couldn't see it any longer.



03 02 51 56 CC Okay, thank you. And I'll go ahead with the maneuver pad. LOI, SPS/G&N; 66244; plus 1.21, minus 0.12; 078:31:34.48; minus 2894.5, minus 0766.4, minus 0112.3; roll, pitch, and yaw, all zips; 0169.5, plus 0058.3; 2996.4, 6:40, 2990.2; 25, 267.1, 228; the rest is NA. GDC aline, Vega - Deneb on zero degrees mark. Roll aline, 264; 090; 349. No ullage. LM weight, 36258. Over.

03 02 54 06 LMP Roger, Joe. Readback for LOI: SPS/G&N; 66244; plus 1.21, minus 0.12; 078:31:34.48, minus 2894.5, minus 0766.4, minus 0112.3. All zips for roll, pitch, and yaw. 0169.5, plus 0058.3; 2996.4, 6:40, 2990.2; 25, 267.1, 228. Vega and Deneb on the zero mark. 264; 090; and 349. No ullage. LM weight, 36258.

03 02 55 08 CC That sounds good, Jim. Thank you.

03 02 56 51 CC Apollo 15, your computer.

03 02 56 56 CDR Roger. Thank you.

03 03 15 19 CDR Houston, 15. The first P52 is complete, and I trust you got the torquing angle.

03 03 15 31 CC Roger. Dave - We copied.

03 03 15 37 CDR Okay, and processing the second one.

03 03 15 41 CC Dave, did you copy? We got the torquing angle. Thank you.

03 03 15 48 CDR Okay, and the second P52 is in work.

03 03 15 53 CC Roger.

03 03 19 15 CDR Okay, Houston; 15. The second P52 torqued out at 75:19.

03 03 19 24 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 04 08 41 CMP Houston, 15.

03 04 08 59 CC Go ahead, 15.

03 04 09 04 CMP Roger, Joe. DELTA-V test, null bias check. The null bias is 1 foot per second per 100 seconds.

03 04 09 16 CC Okay, Al. We copy. Thank you.

03 04 09 22 CMP Roger.

03 04 09 24 CC And, Al, you'll be interested to know that the SIM bay data we're getting so far looks very good.

03 04 09 33 CMP Okay, Joe. And you'll be interested to know that there's a very thin crescent Moon in front of us.

03 04 09 42 CC Roger. We've been suspecting that all along.

03 04 09 53 CMP And it may be thin, but it's big.

03 04 40 50 CMP Houston, this is 15. The - pre-LOI SECONDARY GLYCOL loop check looked good.

03 04 40 54 LMP Did you turn it?

03 04 41 00 CC 15, we concur.

03 04 41 15 CC And, 15, I have a TEI-4 pad for you any time that you have time to copy it.

03 04 41 24 CMP Okay; stand by 1.

03 04 42 46 CMP Okay, Karl. I'm ready to copy the TEI-4 pad.

03 04 42 48 CC Roger. TEI-4, SPS/G&N; 40015; plus 0.59, plus 1.21; 087:12:40.06; plus 3121.1, minus 2074.0, minus 0643.0; 182, 057, 329; the rest is NA. Ullage, 4 jets, 12 seconds, and this assumes burn undocked; and no DOI; and the roll, pitch, and yaw angles assume landing site REFSSMMAT. And that's all.

03 04 44 39 LMP - - 6; plus 3121.1, minus 2074.0, minus 0643.0; 182, 057, 329; 4 jets, 12 seconds, assumes burn undocked; and no DOI; landing site REFSSMMAT.

03 04 45 01 CC Roger, Jim. The part I got was correct, but we had a loss of comm for the first part. Would you read the - about the first 10 back to me again?

03 04 45 15 LMP Roger. TEI-4, SPS/G&N; 40015.

03 04 45 49 LMP Houston, this is 15. Did you get all the readback?

03 04 45 52 CC 15, this is Houston. We're having a comm problem down here on the ground and I need to check still your NOUN 48 and your NOUN 33.

03 04 46 04 LMP Okay. NOUN 48, plus 0.59, plus 1.21; 087:12:40.06.

03 04 46 14 CC That's all correct, Jim.

03 04 52 16 CDR Houston, 15.

03 04 52 18 CC 15, go ahead.

03 04 52 23 CDR Roger. The LM/CM DELTA-P is .5.

03 04 52 27 CC We copy.

03 05 02 18 CDR Houston, Apollo 15.

03 05 02 21 CC 15, go ahead.

03 05 02 26 CDR Roger, Karl. All the systems checks are complete, and everything looks good.

03 05 02 32 CC Very good.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 05 24 31 CDR Houston, Apollo 15.

03 05 24 37 CC 15, go ahead.

03 05 24 56 CC 15, this is Houston. Go ahead.

03 05 24 57 CDR Houston, Apollo 15.

03 05 25 05 CC 15, this is Houston. Go ahead.

03 05 25 11 CDR Okay, we've just made a little mission-rules review up here, and I have one question for you - relative to the circuit breaker on bank A procedure at 6 minutes. Our interpretation of the mission rules says that, if we have a bank B ball valve close prematurely, then we would leave that circuit breaker closed until shutdown, and close - or - or until 10 seconds prior to shutdown, using that as our good bank rather than closing it in 6 minutes. And this is in reference to the cue card - at the bottom where it discusses one ball valve closing prematurely.

03 05 26 06 CC Stand by.

03 05 26 11 CDR Okay.

03 05 26 46 CDR Houston, 15. I'll just repeat it once here, maybe in simpler terms. If bank B closes prematurely, then we'll leave the PILOT VALVE on A closed until 10 seconds prior to cut-off, instead of at 6 minutes.

03 05 27 05 CC Roger. We copy.

03 05 27 28 CC 15, Houston. We copy your question, and we concur.

03 05 27 35 CDR Okay, thank you. Everything else I think we have squared away.

03 05 27 41 CC Roger. Milt says we owed you a review before every burn. Are you interested in a quick runthrough of what happens at LOI?

03 05 27 53 CDR Sure, why not. Let's do it.

03 05 27 56 CC Okay. As I have it here, starting at T minus 2 - T minus 2 minutes, we close the MAIN B PILOT VALVE circuit breaker. At T minus 5 seconds, we PRO. Then, the DELTA-V THRUST A and B switches both go to NORMAL. At T plus 5 seconds, we close the MAIN A PILOT VALVE circuit breaker; and, at T plus 6 minutes, assuming nominal burns, we open the MAIN A PILOT VALVE circuit breaker; and, after that, we avoid PUGS manipulation. And a reminder here is - don't forget to turn on the DSE because we're vitally interested in that single-engine burn performance.

03 05 28 53 CDR Okay, Houston; we're right with you. We've just gone through that, and - we understand it. Thank you.

03 05 28 58 CC Very good.

03 05 30 37 CC 15, this is Houston. If you'll give us ACCEPT, we'll send up a new state vector.

03 05 30 46 LMP Roger; you got it. POO and ACCEPT.

03 05 30 54 CC Okay; and I have an LOI pad for you whenever you're ready to copy.

03 05 31 01 CDR Okay, Karl; I'm ready to copy.

03 05 31 04 CC Okay. LOI, SPS/G&N; 66244; plus 1.21, minus 0.12; 078:31:45.91; minus 2897.5, minus 0776.4, minus 0044.1; all zips for roll, all zips for pitch, all zips for yaw; 0169.6, plus 0058.4; 3000.1, 6:41, 2993.9; 25, 267.1, 22.8; the rest is NA. Set stars are Vega and Deneb; 264; 090; 349. No ullage. LM weight, 36258. Single-bank burn time is 6 plus 52; and just a reminder that, if bank B doesn't burn, we are expecting you to go into lunar orbit on bank A.

03 05 33 10 LMP Okay, Karl. LOI pad readback: SPS/G&N; 66244; plus 1.21, minus 0.12; 078:31:45.91; minus 2897.5, minus 0776.4, minus 0044.1; all zeros for roll, pitch, and yaw; 0169.6, plus 0058.4; 3000.1, 6:41, 2993.9; 25, 267.1, 22.8. Vega, Deneb; 264; 090; 349. No ullage. LM weight, 36258. Single-bank time, 6 plus 52.

03 05 34 09 CC That's all correct. And it's your computer now, 15.

03 05 34 23 LMP Roger. And we also understood that, if bank A doesn't light, we'll take it on in with bank - I mean, if bank B doesn't light, we'll take it on in with bank A. We don't ...

03 05 34 31 CC Roger.

03 05 40 41 CC 15, this is Houston. I have a map update when you have time to copy.

03 05 40 52 LMP Okay. Stand by 1, please.

03 05 49 14 LMP Houston, 15. I'm ready to copy the map update.

03 05 49 19 CC Roger, 15. I have four times for you, beginning with LOS. 78:23:31, 78:33:27, 78:55:03, 78:46:44. That's all.

03 05 49 49 LMP Copied. 78:23:31, 78:33:27, 78:55:03, 78:46:44.

03 05 50 00 CC That's correct.

03 06 03 47 CC 15, this is Houston. Everything is looking in good shape down here, and you have a GO for LOI.

03 06 03 59 CDR Roger. Houston, 15. Understand. GO for LOI.

03 06 04 03 CC And a note here from EECOM that, due to destratification in your oxygen tanks, you may get a cryo pressure light; don't worry about it. That's during the burn.

03 06 04 17 CDR Okay. Roger. Understand the cryo pressure.

03 06 20 35 CC 15, this is Houston.

03 06 20 41 CDR Houston, 15. Go.

03 06 20 44 CC Gentlemen, everything looks perfect down here, and - all we can say is, "Have a good burn."

03 06 20 53 CDR Okay, thank you. We'll see you on the other side.

03 06 20 56 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 06 32 -- BEGIN LUNAR REV 1

03 06 56 19 CC 15, this is Houston. How do you read?

03 06 56 25 CDR Hello, Houston. The Endeavour's on station with cargo, and what a fantastic sight.

03 06 56 30 CC Beautiful news. Romantic, isn't it?

03 06 56 36 CDR Oh, this is really profound; I'll tell you, fantastic!

03 06 56 49 CDR And we've got a burn status report for you.

03 06 56 52 CC Okay. We're ready to copy whenever you're ready to give it.

03 06 56 58 CDR Okay. I think our trusty pilot has a first for you on this one. Burn time was 6 plus 38, ignition was on time; the residuals were 0, 0, and 0; DELTA-V<sub>C</sub>, minus 4.8; the fuel, 33.25, the oxidizer, 33.3.

03 06 57 31 CC That's a beautiful job up there.

03 06 57 37 CDR And it was a very smooth burn all the way, Karl. There was not a ripple. I guess the only little thing we might comment on was that we had a little PUGS operation after 6 minutes.

03 06 57 50 CC Okay; we copy.

03 06 58 22 CDR And, Houston, after our first few minutes of looking here, I don't think we'll have any trouble at all finding new things for you for 6 days.

03 06 58 30 CC Good enough.

03 06 58 40 CC 15, Houston. We'd like to know the position of the PU VALVE and also the UNBALANCE meter reading.

03 06 58 57 CMP The FLOW VALVE is in DECREASE right now. The UNBALANCE is reading about - 25, and I put it in the INCREASE position for about 10 seconds after 6 min - after 6 minutes.

03 06 59 16 CC           Okay, Jim. We copy.

03 07 13 31 CC           15, Houston.

03 07 13 35 CDR          Houston, 15.

03 07 13 37 CC           We've just got through with the playback, and we've got excellent burn data down here. And, if you'll give us ACCEPT, we'll send up a REFSMMAT.

03 07 13 47 CDR          Okay; you've got POO and ACCEPT.

03 07 13 52 CC           Thank you.

03 07 13 57 CDR          And, Houston. We're over Mare Crisium at the present time, and the sights are really striking. I guess some of the interesting things we've noted is the variation in albedo from white to dark gray with many variations of gray in between. And many times, this albedo change appears without any significant change in topography, other than perhaps a - a mountain ridge or a chain or a wrinkle ridge or something, but there are many vari - variations in the albedo all over the surface. I guess our general consensus is, it's gray. We haven't noticed any brown yet.

03 07 14 49 CC           Excellent. If I'm not mistaken, this is probably the first time men have been over Crisium.

03 07 14 59 CDR          I guess that's probably right.

03 07 15 09 CDR          We have everything from the very old subdued craters that are almost completely washed out to the very bright fresh ones which have interior walls of almost pure white.

03 07 15 24 CC           We're lapping it up down here. Keep talking if you feel like it.

03 07 15 37 CDR          Another interesting fact that - that we've all noticed is that it - it looks like a great desert across which we've had a number of dust storms. And, in many places, you can see the - the tracks or the swirls across the surface which looks like a - a great dust storm has been blowing across the surface - primarily indicated by the albedo change. But all over Crisium, you can see the streaks,



which obviously are from impact at some point or another, but the impression we get is that the results of a dust storm.

- 03 07 16 12 CC Very interesting; 15, the computer's yours.
- 03 07 16 27 CDR Say again.
- 03 07 16 29 CC The computer's yours.
- 03 07 16 32 CDR Okay.
- 03 07 16 44 CMP Karl, this is Al. I'd have to say pretty much what Dave's been saying. Might be interested to know that we're coming up over Pierce right now, and just about to hit the west rim of Mare Crisium, and kind of looking forward to taking a look at Proclus as we get up a little bit closer here. There are a couple of craters just to the north - northeast corner, and we'll pinpoint those a little better for you later. A very, very small crater that looks like it's had some dark material slide down into the crater, the eastern wall of the inside of the crater has some very dark material in it, and at - at this Sun angle, it doesn't appear that it's shadow.
- 03 07 17 32 CC Okay; we copy.
- 03 07 17 39 CDR And, you know, as we look at all this after the many months we've been studying the Moon and learning all the technical features and names and everything, why - when you get it all at once, it's just absolutely overwhelming. There are so many different things down there and such a great variety of landforms and stratigraphy and albedo, that's it's hard for the mental computer to sort it all out and give it back to you. I hope over the next few days, we can sort of get our minds organized and get a little more precise on what we're seeing. But I'll tell you, this is absolutely mind-boggling up here.
- 03 07 18 15 CC Gentlemen, I can well imagine that a foreign planet must be a weird thing to see.
- 02 07 18 25 CDR Roger. And we've got Proclus in view right now.

03 07 18 28 CC Excellent. Tell us about it if you have a chance.

03 07 18 37 CDR Well, the - the rays extending from Proclus are very light in color for about - they are very light color for about - oh, 240 to 260 degrees around, and then there's a region of dark mare or albedo. And our - our orientation presently with the spacecraft is such that we have - we're having a tough time figuring out north and south; and, once we get on an orbit track, we'll be able to give you direction a little bit better. But the inner walls of Proclus are very light in color, almost white. The outer walls - the outer ring has a somewhat light gray appearance, and the difference in the - the rays is really between a light and a dark gray, as distinguished from the inner walls which are quite white. The - the walls exhibit some debris on the upper slopes, maybe the upper 30 percent. I can see, on one side of the - the crater, some large blocks. On another side, I can see what appears to be a large slump block or a large slumping of the wall that goes about half way down and takes about - oh, 15 degrees of the rim of the crater with it. The floor is very irregular and rough, almost constant gray - medium gray color, somewhat darker than the light gray on the outside rays and somewhat lighter than the dark gray on the - the surface, which does not seem to be covered with a ray pattern. There are a few ridges on the floor, arcuous ridges, and some domes which are quite prominent. And I'm sure when Al comes back over here later on and has a chance to study it carefully, he can give you a - a good accurate picture.

03 07 20 55 CC Beautiful.

03 07 21 36 CC 15, we would like to have TRACK to AUTO on the HIGH GAIN. And, for your information, the Saturn IVB impact is going to take place in just a few minutes. It's going to be a - in a - -

03 07 21 51 CDR Okay; very good. I wish we were in a - -

03 07 21 54 CC Right. It's 2 minutes 40 seconds, but it's going to be out of your visual range, somewhere around the center area of the Moon.

03 07 22 07 CDR

Roger. It's too bad we won't get to see it. We'd already taken a look at the map to see if we'd have a chance, but I guess we'll miss that one.

03 07 23 11 CDR

Houston, 15. We're coming up to Serenitatis, and it really looks like an ocean. The landforms, as we approach, are very rugged, very highly cratered, rounded, and we get to the shoreline and we see a few wrinkle ridges that have smoothed out. And we can see, on the far side on the horizon, the mountains which pick up again on the western side of Serenitatis.

03 07 23 43 CC

Roger, 15.

03 07 23 46 CMP

Okay, Karl. We're coming up over Serenitatis now. We're almost over Le Monnier at the present time, and we can see the Littrow area just out in front of us. And it is, in fact, about three different shades. You can see the - in the upland area, and particularly what looks like down in the valleys, a darker color, and it does look like it's a light powdering- or dusting-over of the entire area. And then, as you get out further into Mare Serenitatis, there's another layering which is a little bit lighter in color. And then, out at the last edge of the wrinkle ridge, out beyond that is the last layer, and the rest of Serenitatis looks fairly - fairly light in color. So I'd say that the - the - the central - central part of Serenitatis is light, out beyond the first wrinkle ridge is a darker layering, and we're not up close enough to see what it is yet, and then as you get up into the highlands around Le Monnier and Littrow area itself, there's what - what appears to be a - a light dusting of dark material, and it certainly looks volcanic from here. Off to - to the left of that to the south, we can pick up Sulpicius Gallus pretty clearly right now.

03 07 25 08 CC

Roger, Al. Sounds like you're seeing a marvelous amount of detail up there.

03 07 25 18 CMP

Well, after - after the king's training, it's almost like I've been here before.

03 07 25 23 CC You can't help yourself, can you?

03 07 25 28 CDR And, Karl, we're approaching the Apennine Mountains, and that is indeed a spectacular view.

03 07 25 34 CC Roger - -

03 07 25 35 CMP Sure is, Karl. No question about those mountains being there and where we're at with them.

03 07 25 41 CC They stand up on your horizon, do they?

03 07 25 52 CMP Yes; tremendous relief as we approach the mountain, Karl.

03 07 25 58 CC Roger. And, for your information, gentlemen, we're getting a good seismic signal from the impact of the Saturn IVB.

03 07 26 50 CC 15, this is Houston. There is no update required on your T - on your TEI-4 pad.

03 07 26 59 CDR Okay, Houston; understand. Houston, as we cross out of Serenitatis into the Apennines, why, it's just - unreal. You know, those are very poor descriptive terms, but the - the mountains jut up out of the ocean here in great relief. I'm sure the guys who've been here before can probably sit down over a cup of coffee and tell you. But the relief is really pervasive.

03 07 27 35 CC You're the first man to fly over this mountain range, Dave. I guess pretty soon you're going to be over the - over the landing site, aren't you?

03 07 27 48 CDR Roger. But I'm afraid it'll be dark today.

03 07 27 51 CC That's right.

03 07 27 57 CMP Karl, this is Al again. Looking down into the Sulpicius Gallus area, looking at some of the wrinkle ridges and some of the rilles - the arcuate rilles down there, I can make out some distinct color patterns that seem to run parallel to the arcuate rilles - and along the wrinkle ridges, and there is a very subtle darker color, again almost as if it was - some kind of cinder fallout along the ridges and along some of the rilles.

03 07 28 38 CC Roger, Al.

03 07 29 00 CDR And, Houston, we're coming up here on the terminator and the area I guess we call Crackled Hills really looks like crackled hills. If you distinguish between the mountains, which are very prominent and smooth, the surface between the first small mountain range and the - what is now the terminator, is relatively flat with a very rough texture - very irregular, lower, crackled hills.

03 07 29 35 CC We copy, Dave.

03 07 29 47 CDR Jim's - Jim calls it a gun-metal gray, and that's a very good term, I think, for the color that we're seeing now. And as we approach the terminator, of course, the relief stands out even more. The shadows are getting much longer, and the peaks of the mountains, as they're silhouetted against the - the Crackled Hills, seem to have a - a diffuse shadow at the top. The - the shadow, as it goes from the base of the mountain to its peak, is very sharp. And around the top of the mountain, it becomes more diffuse, not - not quite as sharp and begins to blend in with the - the surface on which it's being cast.

03 07 30 41 CC Roger, Dave. Sounds very interesting.

03 07 32 34 CDR Houston, we're trying to get oriented here so we can perhaps pick out some of the features near the landing site. There's quite a bit of shadow now, but we have Aristillus and Autolycus very clearly. And with a low Sun angle, the surface between those two large craters and the rim of Imbrium - the eastern rim of Imbrium is very rough, quite a bit of debris, and it looks like it probably came out of the two craters. I believe we can see Hadley C, just barely on the shadows.

03 07 33 21 CC Roger, 15. We copy that. Did I understand that the rim of Autolycus is standing up in the sunlight?

03 07 33 31 CDR Yes, that's true. Aristillus and Autolycus both have their eastern rims exposed to the sunlight, and we get a pretty good look at the elevation on

the rim. And Autolycus, to its northeastern side, seems to have a - a saddle or somewhat depressed rim, and as you come around to the west - the eastern side of Aristillus, it seems to be relatively level or horizontal, with a few subtle saddles and depressions. Autolycus appears to have a - a relatively horizontal or - or even rim all the way around, and we can see sunlight on the northwestern side of Autolycus on the rim, just barely a tick of it.

- 03 07 34 28 CC Roger. It sounds like a fantastic view.
- 03 07 34 35 CMP It really is.
- 03 07 34 42 MCC You guys have enough to keep you busy for a few days then?
- 03 07 34 48 CDR Hey, Dick, we got enough to keep us busy for months and months and months, as you well know.
- 03 07 35 05 CDR The outer rims of Aristillus and Autolycus seem to be quite heavily cratered and rough; and Aristillus, on its east-northeastern side, seems to have a couple of benches on the outer rim as it goes down to the surface, and their - the shadows are - are exposed quite well.
- 03 07 35 34 MCC Roger, Dave.
- 03 07 36 11 CDR Houston, just north of Conon, there's a - a great depression in the mountains - a low part of the mountains. In the - The western side of the mountains is exposed to the sunlight, and this reflects back into the shadow part of the mountains which - the base - basin just north of Conon there is really shadowed by the eastern mountain range; but the reflectivity back from the - the mountains exposed to the sunlight illuminates the - the shadowed area to where we can pick out craters and ridges and various other topographic features. It's - it's really quite interesting. As a matter of fact, just to the - the inner walls or the inner basin of Conon itself is illuminated by its own reflectivity on its western wall.
- 03 07 37 14 CC Roger. That sounds like a fascinating illumination. Do - do you have any inclination that you're

going to be able to see the dark side of the Moon with earthlight on it?

- 03 07 37 30 CDR Well, we can just barely see subtle features now, I think. We can see the horizon quite clearly.
- 03 07 37 43 CC Roger. When you get dark-adapted, it may be that things will come through pretty well.
- 03 07 37 51 CDR Roger.
- 03 07 48 27 CC 15, this is Houston.
- 03 07 48 32 LMP Roger. Houston, 15; go.
- 03 07 48 35 CC Jim, the people down here would appreciate it if you could give them something of a description of the operation of the PU VALVE during the LOI burn.
- 03 07 48 51 LMP Roger, Karl. There was no operation of the - the PU VALVE at all until crossover. And then at crossover, it required a - a DECREASE, and then at about - about 5 minutes and a half into the burn, it started to increase, and I went to the - the INCREASE position at that time. All the operation of the PUGS manual operation occurred after crossover.
- 03 07 49 26 CC Okay; we copy.
- 03 07 49 40 LMP And, as I mentioned, about 5 and a half, I went to - 5 and a half minutes, I went - went to neutral and then the - it looked like the UNBALANCE was going to go - it was rapidly departing the zero region, and that was about the time we went through 6 minutes, and I put it into minimum at that time - into the DECREASE position.
- 03 07 50 19 CC Okay, Jim. That answered our next question.
- 03 07 50 58 CC And, 15, the people down here were very much turned on by your description of the swirls on the floor of Crisium. We trust you got some good photography of that; and, if you didn't, they'd very much appreciate having some next time around.

03 07 51 16 LMP      Okay. We were discussing our photography, and we're going to try and stay as close to the pre-planned photos as we can and not overextend ourselves into what's already planned for the 6 days. But we will use our spare - spare film judiciously for the kind of things you hear us talk about that you'd like pictures of.

03 07 51 37 CC      Sounds very good.

03 08 01 32 CC      15, this is Houston. Joe just came up from below to tell us that Farouk and company are ecstatic about what you've told them so far and that all of the SIM bay experiments are looking to be in excellent shape.

03 08 01 50 CDR      Okay. Thank you, Karl. That's good news.

03 08 04 05 CC      15. We have your torquing angles.

03 08 04 12 CDR      Roger. Torqued on the minute.

03 08 16 07 CC      15, this is Houston.

03 08 16 13 CDR      Houston, Apollo 15; go.

03 08 16 17 CC      Just to firm up our interest in those swirls on the floor of Crisium, the words we'd like to send up is that it'd be nice to get a three-photo convergent stereo sequence on it, and if you'd like settings, we recommend - -

03 08 16 33 CDR      Okay; three photo ...

03 08 16 38 CC      Roger. And if you'd like settings, we recommend f/8 at 1/250th with a 250-millimeter lens.

03 08 17 00 CDR      Okay, Houston; understand. Swirls on Crisium, three-photo convergent stereo, f/8, 1/250th, with a 250.

03 08 17 09 CC      Roger. And now, you wanted us to remind you about your helmet and gloves when you take shots of Ingenuity this time around.

03 08 17 24 CDR      Okay; we'll tell him.



03 08 17 31 CC

And, otherwise, we have nothing more down here.  
Everything's looking in great shape, and have  
fun on the back side.

03 08 17 42 CDR

Okay. Thank you, Karl. We will.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 08 43 -- BEGIN LUNAR REV 2

03 09 11 31 CC 15, this is Houston.

03 09 11 39 CDR Roger, Houston. Looks like we're getting locked up now.

03 09 11 42 CC Roger. That looks better now.

03 09 15 15 CDR Okay, Houston, 15.

03 09 15 19 CC Go ahead, 15.

03 09 15 28 CDR Okay, Karl; while I got a minute here waiting on Crisium to show up, I'll give you a rundown on what we've done so far.

03 09 15 36 CC Go ahead.

03 09 15 41 CDR Okay; we got the strips of photos of the Sea of Ingenuity - or Ingenii - and took a look at the light-colored swirls in the bottom of the mare. I couldn't tell - No elevation associated with those light-colored swirls, and they're very distinct when you look at them at this angle. Also - looked at the - at the area just adjacent to Ingenii; there is a very definite valley that cuts through the edge of the wall there, and with what looks like a rille in the bottom, what's been described as Vallis Alpha Reed [?] - I guess it is kind of unique; it's the only one we've seen on the back side so far. We took some pictures of the rim deposits and then took a couple of shots going on out to Dumbbell. After that, we got set up for a Keyhole, took some convergent stereo on Keyhole, and got a couple of shots of The Bright One, along with some - some general pictures to show the ejecta pattern, although I'm afraid that ejecta pattern on The Bright One is not going to show up too well. It's - it's very bright but it's - it's also such a large area that it's kind of indistinct as to definition. And then - took a couple of what I hope will be convergent stereos of the - of the rooster tail along by Saenger. And then got on to Ibn Yunus/Al-Biruni/Goddard complex and took some convergent stereo of

the swirls to the - to the west of Ibn Yunus and to the north and west of Goddard. And now we're looking for the ones in Mare Crisium.

03 09 17 32 CC Roger. Sounds like you did it up brown.

03 09 17 39 CDR Well, it does look - sometimes brown, sometimes gray, Karl. But we'll see when we get back.

03 09 17 47 CC Hey, let's keep those colors straight, fellows.

03 09 19 18 CC 15, we can take HIGH GAIN to AUTO now.

03 09 21 17 CC 15, we need to go back to REACQ - on the HIGH GAIN.

03 09 21 28 CDR Roger. REACQ.

03 09 22 46 CDR Houston, 15.

03 09 22 49 CC 15, go ahead.

03 09 22 54 CDR Okay, Karl. Just a couple of general observations on Crisium while we're coming up on it. Proclus coming up from the east is really spectacular, you can very distinctly see the - the difference in the - in the color of the albedo in the excluded zone of Proclus, and as you're coming up across Crisium with Proclus ahead, you can see the ray pattern very distinct - extending out across Crisium - and follow the ray patterns almost as far as you like. And the excluded zone in the - in the ray pattern is just very distinct at this point.

03 09 23 34 CC Excellent.

03 09 24 03 CDR And, Houston, from this angle looking at Proclus, about a crater diameter out to maybe a diameter and a half or so, you can see many small bright fresh craters, which appear to be in the general direction of a ray, like part of the ejecta blanket.

03 09 24 25 CC Roger. Dave, you mean to say that these small bright craters seem to be clearly related to the ejecta blanket. Is that correct?

03 09 24 36 CDR That's the impression I get. They occur within a diameter to a diameter and a half of Proclus, and - they're about the same brightness as the inner walls of Proclus and they're small - just small craters. I don't see any - Yes, I do see one which you might call a loop, which would suggest secondaries. They just seem to lie in the general direction of the rays of the ejecta from Proclus.

03 09 25 10 CC We copy.

03 09 25 16 LMP They're sort of localized to one area which is - probably - yes, on the - on the western side of Proclus, northwest side.

03 09 25 32 CC We copy that.

03 09 25 58 CC Do you - do these small, bright craters have more or less a uniform size or do they come in varied sizes?

03 09 26 10 LMP I'd say - Karl, this is Jim - I'd say they're various sizes.

03 09 26 17 CC Okay.

03 09 26 22 LMP It is - I - I guess it depends, Karl, on - what do you mean by sizes, there are various sizes within a certain sorting. They - they seem to be fairly well sorted within one range, but within that range, there is a distribution. And they're all much, much smaller than Proclus.

03 09 26 44 CC Okay, we copy.

03 09 28 03 CC 15, this is Houston. If you'll give us ACCEPT, we'll send up a - a state vector and a target load.

03 09 28 15 CMP Roger. You have it.

03 09 28 18 CC And, 15, we don't require a PIPA bias check at this time. And I have a terminator photo pad when you're ready to copy.

03 09 28 29 CMP Okay, stand by 1.

03 09 28 52 CMP And I'm ready for the terminator photo pad, Karl.

03 09 28 56 CC Roger. The T-start is 81:44:10, and there's a note here that the PCM cable may not reach to window 3. And if it doesn't, go ahead and run on the intervalometer alone. And this pertains to all future photography in window 3.

03 09 29 21 CMP Roger. We understand.

03 09 29 43 CC 15, we'd like to go to AUTO again, and go directly from REACQ to AUTO without a pause.

03 09 29 52 CDR You're in AUTO.

03 09 30 07 CC The high gain looks good this time; thank you.

03 09 30 13 CDR Roger.

03 09 30 46 CC 15, Houston. When you can copy, I have both a DOI pad and a TEI-5.

03 09 30 59 CDR Stand by 1, Karl.

03 09 31 08 CDR Okay, I'm ready to copy the pads.

03 09 31 14 CC Roger. DOI. SPS/G&N; 39800; plus 1.68, minus 0.55; 082:39:48.29; minus 0208.4, minus 0048.0, plus 0002.0; 000, 283, 347; 0058.4, plus 0009.2; 0213.9, 0:24.5, DELTA-V<sub>C</sub> is 0208.4; 33, 144.2, 35.7; the rest is NA. Set stars, Vega and Deneb; 288, 340, 346; ullage is four quads, 15 seconds - 15 seconds.

03 09 33 02 CC And the computer is yours.

03 09 33 09 CDR Okay, Karl, if you're ready, here's the readback for the DOI pad. SPS/G&N; 39800; plus 1.68, minus 0.55; 082:39:48.29; minus 0208.4, minus 0048.0, plus 0002.0; 000, 283, 347; 0058.4, plus 0009.2; 0213.9, 0:24.5, 0208.4; 33, 144.2, 35.7; Vega and Deneb; 288, 340, 346; four quads, 15 seconds.

03 09 34 06 CC That's all correct. And the next is a TEI-5 pad.

03 09 34 17 CDR All right, go ahead.

03 09 34 19 CC TEI-5, SPS/G&N; 38206; plus 0.58, plus 1.01; 088:25:47.09; plus 2864.3, minus 1227.7, minus 0317.0; 180, 091, 338; the rest is NA. Set stars, Vega and Deneb; 288; 340; 346. Four jets, 12 seconds. This - Comments are that the burn is undocked, and it assumes DOI.

03 09 35 36 CDR Okay. TEI-5 readback: SPS/G&N; 38206; plus 0.58, plus 1.01; 088:25:47.09; plus 2864.3, minus 1227.7, minus 0317.0; 180, 091, 338; Vega and Deneb; 288; 340; 346. Four jet, 12 seconds. Undocked and assumes DOI.

03 09 36 16 CC That's all correct.

03 09 37 17 CDR Houston, Apollo 15.

03 09 37 23 CC 15, go ahead.

03 09 37 29 CDR Okay, as a quick review here, DOI is a single-bank burn on B, with nominal procedures, with the exception of having the A PILOT VALVE open.

03 09 37 48 CC That's affirmative, and if we have no ignition, we'll postpone the burn a rev.

03 09 37 55 CDR Roger; understand.

03 09 41 00 CC 15, this is Houston. We're showing a low voltage on the battery relay bus down here. We think it's just a matter of instrumentation, but there's a couple of procedures we'd like to run through here to check it out.

03 09 41 27 CDR Go ahead, Karl.

03 09 41 29 CC Okay; first of all, we'd like to read - have an onboard read-out of the battery relay bus voltage, which is B-5 on the test meter.

03 09 41 43 LMP Okay. That's 5-B.

03 09 41 47 CC Roger.

03 09 41 50 LMP It's reading 2.4 - No, I'm sorry, 1.4 - 1.5.

03 09 42 08 CC Roger that reading.

03 09 42 09 LMP Okay; Dave moved the - Stand by. Dave wiggled the selector to the right - That's on B and the position that backs the B position and now we're reading 3.5.

03 09 42 29 CC Roger. And we just recovered our read-out of - We got a good voltage reading down here now.

03 09 42 37 LMP Good.

03 09 42 55 CC Okay; thank you. We'll think on that for a while and everything looks - everything looks fairly normal.

03 09 43 04 LMP Roger.

03 09 44 34 CC 15, we have only one more question on that problem. And can you tell us what position you were in before you went to 5-B on the test meter?

03 09 44 45 LMP B was selected, Karl, but Dave moved the selector out of - just barely out of B and back into the B position to obtain the higher reading.

03 09 44 55 CC Roger. And what about the numerical side; was it in 5?

03 09 45 01 LMP Yes, it was.

03 09 45 06 CC We copy. Thank you.

03 09 47 39 CC 15, this is Houston. And I have a map update for REV 3.

03 09 47 59 CDR Stand by 1, Karl.

03 09 48 23 CDR Okay; go with the map update for REV 3.

03 09 48 28 CC Roger. LOS: 82:28:16; 180 is 82:48:42; AOS is 83:14:54.

03 09 48 56 CDR Okay, understand. LOS: 82:28:16; 180 degrees, 82:48:42; AOS, 83:14:54.

03 09 49 07 CC Roger. And while you're on that page, I have information for the landmark J-1 observation.

03 09 49 16 CDR Okay; go ahead.

03 09 49 18 CC T HOR is 8 - 83:39:33; TCA minus 20, 83:41:25.

03 09 49 39 CDR Okay, understand. T horizon at 83:39:33; TCA minus 20, 83:41:25.

03 09 49 49 CC That's correct.

03 09 55 20 CC 15, this is Houston.

03 09 55 26 CMP Houston, 15. Go ahead.

03 09 55 29 CC It's our understanding that we'd agreed that you'd send down magazine numbers and final frame numbers on each path on this photography, and if you're in agreement with that, we'd like to have the magazine and frame number on the orbital photography and also on the terminator photography.

03 09 55 55 CMP That - that's all in an agreement that I've got with Spencer, Karl. I think right now, we're too busy to do that, and after we get the landing out of the way, we'll go back and recap all the film and start from scratch.

03 09 56 07 CC Very good.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 10 07 48 CC 15, this is Houston.

03 10 07 53 CDR Houston, 15.

03 10 07 55 CC One more comment on the battery relay bus voltage. From all indications, it is indeed an instrumentation problem, but we have one more question and that is to confirm that the MAIN A - MAIN BUS A and MAIN BUS B FUEL CELL talkbacks are normal and - and have been normal during this period.

03 10 08 22 CDR Yes, that's affirmative, Karl. They have been normal.

03 10 08 27 CC Thank you. And, at the present time, all the systems, otherwise, are looking fine, and you're GO for DOI.

03 10 08 37 CDR Okay; understand. GO for DOI.

03 10 16 31 CC 15, this is Houston. We'd like to verify, over on panel 226, that the O<sub>2</sub> TANK 50-WATT HEATER circuit breakers, 1 MAIN B and 2 MAIN A are open. And, if they're not open, let's open them.

03 10 16 50 LMP Stand by.

03 10 17 03 LMP Okay. The two circuit breakers that are open are O<sub>2</sub> TANK HEATERS, 50 WATTS, 1 MAIN B, and 2 MAIN A.

03 10 17 12 CC Roger. I understand they have been open. Is that correct?

03 10 17 19 LMP That's correct.

03 10 17 22 CC Okay. The reason we ask is that the temperatures weren't quite as we expected. Thank you.

03 10 17 41 CC Apollo 15. OMNI - OMNI-Delta please, and we'll go to Charlie a little bit later.

03 10 17 52 LMP Roger. OMNI Delta.

03 10 25 58 CC 15, this is Houston. As you go around the corner, we'd like to verify that all systems are in good shape. And that the data you have in the Flight Plan for bail-out burn all stand as recorded. The no-burn AOS, you may be interested in, is 83:11:14.

03 10 26 29 CMP Roger; understand. And we ran all the systems checks up here, and everything looked good, and I copied the AOS time.

03 10 26 36 CC Excellent.

03 10 49 -- BEGIN LUNAR REV 3

03 11 15 33 CC Fif - 15, this is Houston.

03 11 15 41 CDR Hello, Houston, Apollo 15. The Falcon is on its perch.

03 11 15 46 CC Good to hear you coming around that corner. How do things look?

03 11 15 53 CDR Okay. Burn status report. Burn was on time. Burn time was about 24.0 - about half a second shorter than predicted; there was no trim; residuals were plus .6, plus .0, minus .1; DELTA-V<sub>C</sub>, minus 4.4; fuel 29 - 29.25; and the oxidizer was 29.55; Unbalance, 100 increase.

03 11 16 34 CC Thank you, Dave. We copy all that.

03 11 16 41 CDR And I'll tell you, it's really spectacular, when you can see the central peak of Tsiolkovsky coming up over the horizon before you see the rim.

03 11 16 51 CC Hey, that's an interesting astrophysical observation.

03 11 17 59 CDR And, Houston, 15. The G&N had us in a 58.4 by 10.0.

03 11 18 08 CC We copy, 15.

03 11 21 14 CDR Houston, 15. We're in an attitude now in which we cannot see the surface. But our initial impressions after the burn, when we could see the surface, is that we were rolling in on a high-angle pass.

03 11 21 29 CC We copy, 15.

03 11 21 42 CDR And, Al just added, we were.

03 11 21 45 CC True enough. True enough.

03 11 22 20 CC 15, this is Houston. You're STAY in the DOI orbit, and we have an orbit for you of 58.8 by 9.5.

03 11 22 31 CDR Very good, Houston. 58.8 - 9.5 and we're STAY. Thank you.

03 11 23 56 CC 15. You have a GO to proceed to the landmark observation attitude.

03 11 24 06 CDR Roger, Houston. Thank you.

03 11 24 08 CC And would you please give us AUTO on the HIGH GAIN?

03 11 24 13 CDR AUTO.

03 11 29 54 CDR Okay, Houston; 15. We've got a little bit of visual - visibility now, and we're down in Crisium.

03 11 30 03 CC Roger, 15.

03 11 30 16 CDR And it looks like we have enough altitude to get up over the western rim.

03 11 30 20 CC You know, I sure hope so.

03 11 30 34 CDR But it sure looks like we're looking up at some of those fellows out there.

03 11 30 38 CC That must be sort of exciting, skimming along down there over the waves.

03 11 30 46 CDR That's a mild word for it.

03 11 30 55 CC Hey, can you see anything more about those sw - swirls? Anything interesting?

03 11 31 02 CDR No, we're too close. And right now I've just finally picked out the rim of Proclus, and we're just about level, altitude wise, with the - the

rim of Proclus. I can not see down into it. I can see just a tad of the southern wall. I guess we're just north of it. I can see some large blocks on the outer walls.

03 11 31 24 CC

Roger.

03 11 31 28 CDR

But I'd say we're definitely at an altitude even with the top of the rim of Proclus.

03 11 36 10 LMP

Okay, Houston. We're coming up on the edge of Serenitatis now and I can look out and see a rille that runs parallel with the eastern edge. We're taking some pictures.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 11 36 20 CC Roger. I suspect that's Littrow Rille.

03 11 36 45 CC And after Littrow Rille, you should be coming up on Le Monnier. Do you have much chance of seeing down at that angle?

03 11 36 56 CDR I doubt it, Karl. At this attitude for the landmark tracking, the windows are almost out of it. Jim's got some visibility out window 5.

03 11 38 15 LMP Karl, we just passed the wrinkled ridges about a quarter of the way across Serenitatis, and the - there is definitely a topographic high in the middle of the wrinkled portion.

03 11 38 34 CC Roger, 15. We copy.

03 11 38 46 CC Are those ridges smooth, or do they show signs of lots of cracks in them?

03 11 38 54 LMP I was impressed with the smoothness of the - the raised portion.

03 11 39 02 CC Roger.

03 11 39 34 LMP Okay. I'm taking several pictures of the wrinkled ridges that run roughly north and south in Serenitatis.

03 11 39 45 CC Excellent, Jim.

03 11 39 49 LMP In the one we just passed over, there were some vertical fractures, definite vertical relief, in the smooth portion of the raised wrinkled ridge. The fractures were also running north and south.

03 11 40 07 CC Roger, Jim. We copy.

03 11 40 43 LMP Roger. It's a spectacular view as we glide across the Sea of Serenity, and I'm taking a picture now of a sinuous rille out to the north.

03 11 40 55 CC Roger, Jim.

03 11 42 10 LMP Okay. We're approaching the mountains now on the western side of Serenitatis. At this point, there's a wrinkled ridge running to the - the northwest.

03 11 42 30 CMP Karl, this is Al.

03 11 42 32 CC Go ahead, Al.

03 11 42 36 CMP Okay, Karl. I just finished the observation on J-1, and everything looked fine from my standpoint. Could track it very smoothly. And in fact, I took a couple of marks on it, if anyone's interested.

03 11 42 51 CC Very good, and we have them down here.

03 11 42 56 CMP Okay.

03 11 43 07 CC We were sitting down here wondering how you were ever going to find that little bugger. No trouble, huh?

03 11 43 18 CMP Not that much trouble, Karl.

03 11 43 20 CC Very good.

03 11 43 21 CMP Seemed like there was plenty of time waiting on it.

03 11 44 25 CC 15, does it look like you're going to clear the mountain range ahead?

03 11 44 33 LMP Karl, we've all got our eyes closed. We're pulling our feet up.

03 11 44 44 CC Open your eyes. That's like going to the Grand Canyon and not looking.

03 11 47 15 CC 15, this is Houston. I have the camera photo pad.

03 11 47 23 CDR Okay, stand by. We're just noticing the cabin temp here, and also that the outlet temp is up to about - the glycol about - outlet temp's up to about 70.

03 11 47 47 CC We copy, and EECOM says that's normal, and they're on the way down now.

03 11 47 55 CDR Okay, fine. Thank you.

03 11 47 56 LMP And, Karl, I'm ready to copy the map camera pad.

03 11 48 01 CC Roger. They're in the Flight Plan at 84:32 and 84:39. Mapping camera: T-start, 84:42:23; T-stop, 84:54:14. The pan camera times are the same as the mapping cameras times, and we would like to change a shutter speed at 84:24. Instead of 125th, we want 1/250th at 84:24.

03 11 48 45 LMP Okay. Understand 84:24. We'll change it to f 250 [sic] rather than 125; and on the map pad, it's 84:42:23 and 84:54:14, and the pan camera pad's the same.

03 11 49 00 CC That's all correct.

03 11 55 08 CC 15, we have your torquing angles.

03 12 15 32 LMP Houston, 15.

03 12 15 35 CC Go ahead, 15.

03 12 15 38 CMP Okay, Karl. Got a few numbers for you on the extension times. We started the whole thing off at 84:06:30. And got the covers open, the MAPPING CAMERA EXTENDED, and the extension was about 3 minutes instead of 4. Then we DEPLOYED the GAMMA RAY and the MASS SPEC BOOMS for barber pole plus 2 seconds. The GAMMA RAY turned barber pole after 6 seconds, and the MASS SPEC turned barber pole immediately. And I was suspicious of the MASS SPEC, so we tried them again and got the same results. Turned the X-RAY, ON at 84:15:10 and LASER ALTIMETER, ON at 84:15:30.

03 12 16 25 CC Roger, Al. We copy.

03 12 18 25 CC 15, this is Houston. Would you verify that the X-RAY is ON?

03 12 18 36 CMP 15, Roger. That's verified.

03 12 18 40 CC Thank you.

03 12 19 10 CC We have not.

03 12 20 20 CC 15, this is Houston. All systems are looking good down here, and until we tell you otherwise, all the AOSs are as in your Flight Plan.

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03 12 20 35 CDR Roger.  
03 12 20 36 LMP We're ready to go. (Laughter)  
03 12 20 38 CDR We both like to hear that.  
03 12 20 42 CC Roger.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 12 43 -- BEGIN LUNAR REV 4

03 13 10 26 CC 15, this is Houston.

03 13 10 33 CDR Hello, Houston; 5 by.

03 13 10 37 CC Roger. Like to remind you to configure the DSE as per the Flight Plan.

03 13 10 48 CDR Roger.

03 13 13 45 CDR Houston, 15.

03 13 13 47 CC Go ahead, 15.

03 13 13 51 CDR Okay. When we get down to the presleep checklist here in about 50 minutes or so, I wonder if you might give us your best guess on the probability of a DOI trim tomorrow.

03 13 14 04 CC Okay. We'll work on that information.

03 13 14 11 CDR Okay. Appreciate it.

03 13 14 35 CC Dave, we can give you a pretty good guess at that now. It seems to be unlikely that we're going to need a DOI trim. I've got a couple of trajectory numbers here if you'd like to copy them.

03 13 14 50 CDR Yes, it'd be interesting. Go ahead.

03 13 14 54 CC Our tracking data tells us that your current orbit is 58.2 by 9.1. And, tomorrow morning at wakeup time, it'll be 58.6 by 8.7.

03 13 15 14 CDR Okay; that looks pretty fair. How about the - the out-of-plane of the cross track?

03 13 15 21 CC Stand by.

03 13 16 03 CC Dave, your out-of-plane data looks like about 2/10ths of a mile at PDI time.

03 13 16 13 CDR Okay; that sounds pretty good. Thank you.

03 13 16 49 CC 15, we'd like HIGH GAIN to AUTO, please.

03 13 16 55 CDR Roger. HIGH GAIN to AUTO.

03 13 17 48 CC Dave, thinking about trajectories, you probably noted the out-of-plane part of the DOI. They're telling me here that you burned a perfect LOI, but the state vector they gave you was slightly in error. So they got rid of - they - they made corrections for that during DOI, so that we're standing pretty close to perfect now.

03 13 18 13 CDR Okay. I got to admit we did have some question about that but figured you all had it in hand, as you usually do.

03 13 18 21 CC Roger. Between a perfect crew in orbit up there and a perfect crew down here, we're doing pretty good so far. Knock on wood.

03 13 18 33 CDR Yes. We got a few miles to cover though.

03 13 20 36 LMP Houston, 15.

03 13 20 40 CC Go ahead, 15.

03 13 20 44 CMP Okay, Karl. Guess I should bring you up to date on a couple of things here. Everything went as planned on the - on the terminator photos. The pan camera and the mapping camera pass started on time and stopped on time. Turn - Got the mass spec boom deployed and gamma ray boom deployed; the mass spec deployed in 2 minutes 20 seconds, and the gamma ray deployed in 2 minutes 28 seconds. Got the ION SOURCE, ON, and the LOGIC POWER, OFF, at 85:05. And that brings you up to date.

03 13 21 26 CC Beautiful, Al. Sounds like all of that nice equipment is working real nice for us.

03 13 21 34 CMP Sure does, Karl. We're interested in what kind of data you're getting down there on it.

03 13 21 45 CC OSO's two-word summary of it is that we're getting beautiful data. Incidentally, Al, if - if you'd like sometime, let us have, say - 12 to 24 hours operation, would you like to have a summary sometime tomorrow on some of the details?

03 13 22 10 CMP Yes, indeed, Karl; sure would.

03 13 22 12 CC Okay; we'll get one together.

03 13 22 14 CMP Yes, listen. Skip it tomorrow; and, maybe day after tomorrow, we'll get a summary on that. I'll be kind of interested in how goes it myself.

03 13 22 24 CC Very good.

03 13 25 20 CMP Houston, 15.

03 13 25 23 CC Go ahead, 15.

03 13 25 28 CMP Roger, Karl. For your information, you can see both of the - both of the booms at full extension out of window 5.

03 13 25 37 CC Hey, we're glad to hear that.

03 13 25 42 CMP Yes; they sure look pretty sitting out there.

03 13 25 46 CC Roger.

03 13 34 20 CC 15, this is Houston. We'd like to have you hold off on putting the MASS SPEC EXPERIMENT switch to STANDBY, and we'd like to have the DISCRIMINATOR, LOW.

03 13 34 38 CMP Roger, Karl. We'll hold off until you - cue us, and going DISCRIMINATOR, LOW, now.

03 13 34 44 CC Thank you, Al.

03 13 35 47 CC 15, this is Houston. If you'll give us ACCEPT, we'll send up a new state vector.

03 13 35 57 LMP Roger, Houston. You've got it.

03 13 36 01 CC And, - and if you've finished with dinner up there and somebody can copy, I have a TEI-12 pad.

03 13 36 12 LMP Okay. Stand by a minute, Karl.

03 13 37 05 CDR Houston, we're making a low pass over the Apennine, and they're really something.

03 13 37 12 CC Roger. Do they look like any terrestrial mountains you've ever seen?

03 13 37 28 CDR No.

03 13 37 36 CC How about the slopes? Are they generally steeper than you expect, or shallower than you expect on something like the Tetons?

03 13 37 52 CDR Say again, Karl. I'm sorry; we were discussing the rille at that time - Hadley, that is.

03 13 37 56 CC Roger. I - I was just trying to get a better feel for how the mountains look. Are there - are they more - more craggy and rougher than something like the Tetons, or do they give you some other appearance?

03 13 38 12 CDR No. As a matter of fact, from this altitude, even though we're low, they appear to be smooth and rounded. There aren't any jagged peaks that we can see. And even though they're cratered and rough in texture on a small scale, they really don't look anything like the Alps or the San Juans or any of the other familiar ranges we know.

03 13 38 38 CC Roger. Is there anything that looks like bare rock on them?

03 13 38 48 CDR I think we can see some boulders, but there are no apparent jagged peaks that we can tell or that we can see from this - this particular altitude yet, although some of the - the shadows look fairly sharp.

03 13 39 02 CC Roger.

03 13 39 05 CDR And, Karl, speaking of shadows, there seems to be enough light being reflected off the sides of the mountains around to supply some light down on the landing site. And the rille is quite distinctive as we pass right over it.

03 13 39 20 CC Beautiful. That must be an eerie sight in a half-light.

03 13 39 27 IMP Well, it was, sort of.

03 13 39 33 CC And, 15. You can have your computer back.

03 13 39 38 CDR Roger.

03 13 43 21 CC 15, this is Houston.

03 13 44 09 CC 15, this is Houston. How do you read?

03 13 44 14 CMP Loud and clear, Houston.

03 13 44 16 CC Roger. We've finished picking up data on the mass spectrometer. Leave the discriminator as it is, and we're ready to go to put the EXPERIMENT in STANDBY now.

03 13 44 38 CMP Understand; you're ready to put the MASS SPEC in STANDBY.

03 13 44 41 CC Roger. And then you can start to put the blunt end forward, anytime you care to.

03 13 44 49 CMP Roger; we're maneuvering now.

03 13 46 42 CC 15, this is Houston. Dave, the Surgeon would like to have a special reading of the PDR from you tonight. Your reading last night was not in agreement with the other two crewmembers, and they'd like to get another data point on you.

03 13 47 05 CDR Okay. We copy, Karl. We'll give you all three readings.

03 13 47 09 CC Roger. They'll accept them gladly.

03 13 48 28 CC 15, this is Houston. Whenever you can copy, I have the TEI-12 pad.

03 13 48 37 CMP Stand by, Karl.

03 13 49 04 CMP Okay, Karl. I'm ready to copy TEI-12.

03 13 49 09 CC Roger. TEI-12, SPS/G&N; 38110; plus 0.58, plus 1.00; 101:36:08.38; plus 2845.0, minus 0380.2, minus 0063.8; 180, 107, 354; the rest is NA; 4-jet ullage for 12 seconds. And this assumes the burn undocked and no circular burn, and the GET of landing is 196 hours at MPL.

03 13 50 22 CMP Okay. TEI-12 readback: SPS/G&N; 38110; plus 0.58, plus 1.00; 101:36:08.38; plus 2845.0, minus 0380.2, minus 0063.8; 180, 107, 354; 4 jets for 12 seconds. Undocked, no circular burn. Assumes landing at 196 GET at the MPL.

03 13 50 58 CC That's all correct.

03 13 51 31 CC 15, we need the mode switch in AUTO, please.

03 13 51 48 CMP Houston, 15. What mode switch you talking about, Karl?

03 13 51 57 CC That's the CMC MODE switch. I guess we need to get into AUTO before we can execute this maneuver.

03 13 52 05 CDR That's affirmative. And I'll go into AUTO as soon as I complete the 40 degrees of roll.

03 13 52 10 CC Roger.

03 13 55 07 CC 15, Houston. On the MASS SPECTROMETER operations down there at 59 minutes, we'd like to have you keep the DISCRIMINATOR, LOW, as it is now. And, as the ION SOURCE goes ON, we would like to have you pause in the OFF position until you get our cue.

03 13 55 30 CMP Roger; understand. You wanted the DISCRIMINATOR left in LOW, and you wanted us to pause in the OFF on the ION SOURCE on your cue.

03 13 55 37 CC Roger. And I - I - think you know that we'd probably - that we - we don't want to go into those operations until we have got into the correct attitude.

03 13 58 09 CC 15, this is Houston.

03 13 58 14 CDR Houston, 15; go ahead.

03 13 58 17 CC A couple of special notes on the hardware. First of all, on - on the SYSTEMS TEST meter - we don't fully understand why that switch did funny things for us, and we have some back in - the fairly extensive tests going on down here still trying to understand it. And we suggest that you leave the meter in the 5-B position until we do get some handle on what happened there.

03 13 58 46 CMP Okay, Karl. We copy that.

03 13 58 48 CC Okay. And I just heard the word that, if you really need it, go ahead and use it, but if don't have a strong reason for moving it, leave it as it is. And on - We - we're observing the radiator temperature - occasionally cycling above 80 degrees. This is out of limits, and we don't really have a good solution for this at the present time. We could think about turning on the evaporator, but that would foul up the mass spectrometer, and we'd rather not do that. The only things that it's - that the high temperature would be bothering are the IMU PIPAs, and we have - we - Since the temperature is cycling up and down, cools off on the back side of the Moon, we - on the dark side of the Moon, we - we think there's no - no imminent danger to that system. So, our feeling on that is to leave the system as it is.

03 13 58 52 CDR Okay. We understand.

03 14 00 58 CMP Houston, this is 15 with some onboard read-outs for you and PRDs.

03 14 01 04 CC Go ahead, 15.

03 14 01 11 CMP Roger. BAT C is 37; pyros A and B are both 37.5; RCS, 83, 82, 82, and 83. The PRD readings, 23072, 25014, and 08016.

03 14 01 56 CC Roger, 15. We copy all that.

03 14 02 41 LMP Roger. Houston, this is 15. The ION SOURCE is OFF, and we're standing by for your word.

03 14 02 52 CC We copy, 15. Stand by.

03 14 04 14 CC 15, this is Houston. Let's continue standing by on that ION SOURCE switch. We'd like to get all the way into attitude before we go into the ON position.

03 14 04 27 LMP Roger.

03 14 07 57 CC 15, this is Houston. We're ready for the E-memory dump.

03 14 08 05 LMP Okay, Karl. Coming at you.

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03 14 08 13 CC And, 15, we're ready now for the ION SOURCE switch,  
ON.

03 14 08 20 LMP ION SOURCE going ON.

03 14 10 29 LMP Houston, 15. We're going to configure communica-  
tions for sleep.

03 14 10 50 CC

after LOS?

03 14 10 58 LMP Okay.

03 14 11 18 CC Okay, 15. Our last worry seems to be cleared up  
down here. We've got nothing more to bother you  
with, and all we can do is wish you a good night's  
sleep.

03 14 11 30 LMP Thank you, Karl. Good night.

03 14 11 32 CC Good night.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 14 36 --	BEGIN LUNAR REV 5
03 16 30 --	BEGIN LUNAR REV 6
03 18 24 --	BEGIN LUNAR REV 7
03 20 17 --	BEGIN LUNAR REV 8

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 21 31 32 CC Apollo 15, Houston.

03 21 32 06 LMP Houston, 15.

03 21 32 07 CC Good morning, Jim. We're waking up you [sic] a little early to tell you a few things before you go around the corner because you only have 4 minutes in the old Flight Plan. So, if you guys are awake and ready to listen, I'll give you a few words.

03 21 32 23 LMP Okay, Bob. Go ahead.

03 21 32 25 CC Okay. At the moment - Okay, one short one. We'd like you to go HIGH GAIN antenna to AUTO so we don't lose you just before you go around the corner there. Okay - -

03 21 32 49 LMP We're in AUTO.

03 21 32 50 CC - - And at the moment, 15, you're sitting in a 58.8 by 7.6 orbit; and, at PDI, we're extrapolating you to approximately 33,000 feet. This is with a plus or minus 9000 feet on top of it, due primarily to the uncertainty of the RLS. Because of this, we're pretty well decided we're going to do DOI trim, but we're holding a decision on that until after we get the data for this pass, which we'll process, of course, while you're behind the Moon. We're talking about something like a 6-foot-per-second burn and probably targeting for 50,000 feet at PDI. As far as the rest of the spacecraft, all your systems look good. No problems at all during the night. We do have a pan camera problem, which may or may not be serious. We're going to look at it later on today after CIRC, and we'll be coming up with a procedure for A1 for that later on in the day. A short item. We'd like a - during your eat periods if you have the time, also would like you to give us a gain step — on the gamma ray — up to 1. And we'd like to get a medication report, too, this morning. We apparently missed that last night. Over.

03 21 34 28 LMP Okay. Copied all that. And no medication.

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03 21 34 35 CC Copy. And we have a consumable update for you as of 93:30. RCS total was 75, quad Alfa, 76; Bravo, 75; Charlie, 74; Delta, 77; hydrogen 2, tank 1, 84; 2, 81; and 3, 54; oxygen 2, tank 1, 82; tank 2, 86; tank 3, 68. Over.

03 21 35 32 LMP Okay. Got the consumables update.

03 21 35 34 CC Roger.

03 21 44 41 CC And, Apollo 15; Houston. You're looking good going around the horn. Systems all look good. At your convenience, while you're down the SIM bay area there, we'd like also the MASS SPEC DISCRIMINATOR to HIGH. Over.

03 21 44 58 LMP Okay; understand. MASS SPEC DISCRIMINATOR to HIGH.

03 21 45 01 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

03 22 11 -- BEGIN LUNAR REV 9

03 22 37 28 CC Apollo 15, Houston.

03 22 38 01 CC Apollo 15, Houston. Over.

03 22 38 19 CC Apollo 15, Houston. Over.

03 22 38 48 CDR Houston, Apollo 15. You're 5 by.

03 22 38 50 CC Roger. You're 5 by also. And we got three more Flight Plan updates due you, if you're ready.

03 22 39 04 CDR Okay. Go ahead.

03 22 39 05 CC Okay. First one I'd like to mention is 95:02 - 95:02. And it reads, in addition to those two lines on the O<sub>2</sub> HEATERS at the top of the page, we want to add a third line that ~~Says~~ "CB O<sub>2</sub> TANK 100-WATT HEATERS, 3 MAIN B, open. Panel 226." Over.

03 22 39 48 CDR Okay; understand. "CB O<sub>2</sub> TANK 100-WATT HEATERS, 3 MAIN B, open."

03 22 39 53 CC Roger. And after you guys give us the PRD read-outs, we'd like to exchange the CMP and CDR PRDs because, Dave, yours appears to be malfunctioning, and they'd like to have two working ones on the surface. Do you copy?

03 22 40 16 CDR Okay; understand. Exchange CMP and CDR PRDs.

03 22 40 21 CC Okay. And the next update's for the LM Activation Checklist. And while you're going - getting that, I'll give you a little update on our expectations for the DOI burn.

03 22 40 38 CDR Okay. Stand by.

03 22 41 04 CDR Okay. Go ahead, Bob.

03 22 41 05 CC Okay. The update to the Activation Checklist is on page 2-6.

03 22 41 26 CDR Okay; 2-6. Go.

03 22 41 28 CC Okay. We'll delete the third line of step 2. And we'll add a step 5, which reads "(1) LMP's SUIT ISOL valve to SUIT FLOW; Commander's SUIT ISOL valve to SUIT FLOW, for 15 seconds. And then SUIT DISCONNECT, for both." And then (2) is "SUIT GAS DIVERTER, PUSH-CABIN." What we're doing here, Dave, is basically making sure that we're blowing any glass particles that might have settled in through the little holes into the inlet hoses. Going to blow those out. Over.

03 22 42 26 CDR Okay; understand. Step 2, scratch the third line. Step 5, "LMP and CDR SUIT ISOLATION to SUIT FLOW for 15 seconds. And then SUIT DISCONNECT, for both." And then "SUIT GAS DIVERTER, PUSH-CABIN." And that sounds like a pretty good idea.

03 22 42 41 CC Okay. And, I'll give you a few clues as to what's liable to be coming up for the DOI trim burn. Currently, we're showing a 5.87 perilune on REV 14, which is 35,000 feet plus or minus 9000 with that RLS uncertainty. And, what's being proposed now is not an SPS burn, because it will be very short, but an RCS burn of 20 seconds which is 3.2 foot per second, which would raise us to 50,000 feet. Will cost us about 27 pounds of gas, and we're looking at a  $T_{ig}$  time of 95:56, which you will note is 20 minutes early - earlier than in the Flight Plan, which means we're going to have to compress some of that stuff together. Over.

03 22 43 35 CDR Okay. Understand 95:56. And looking over the Flight Plan, it looks like, had we gone on the original DOI trim, we had about 40 minutes of SIM data there. Maybe we can just scratch that.

03 22 44 06 CC Roger, Dave. We're just going to have to trim that SIM stuff off a little bit early, because we don't have the time right here.

03 22 44 15 CDR Okay. I guess what I'm thinking is, it takes us a lot of time to go through that. Turn it on and turn it off. And, of course, we could always use time, but we'll get it.

03 22 45 23 CC Dave, we don't show you turned anything on this morning; it's just a long protracted business of turning it off. And I guess, that was - used to be starting after the TV pass. And I guess that- what we're saying right now is it looks like we're going to start turning that off during or before the TV pass.

03 22 45 44 CDR Okay. You're right, Bob. We'll do that; that looks good.

03 22 45 47 CC Okay, and we'll be getting you a real pad coming up some time soon.

03 22 45 55 CDR Okay; we'll be standing by.

03 22 46 28 CC And, Dave, if practicable, we'd prefer to have it turned off before or after the TV, because then we can watch it being turned off. Otherwise, we can't see it during the TV. But you can certainly turn part of it off before and part after.

03 22 46 48 CDR Okay; understand. We - we'll do it some time other than the during the TV.

03 22 46 54 CC Correct.

03 22 48 08 CC Okay, Dave. And we got a few updates here for the time after the TV pass, if you're ready to copy. Some other stuff that we are moving up because of this.

03 22 48 27 CDR Okay; ready to copy. Go ahead.

03 22 48 30 CC Okay. At 95:28, we will schedule a "P52 option 3."

03 22 48 47 CDR Okay. "P52 option 3."

03 22 48 49 CC Okay. At 9 - -

03 22 48 50 CDR At 95:28.

03 22 48 51 CC Roger. At 95:33, we'll delete the "P00 at pitch, 033."

03 22 49 05 CDR Okay; delete "P00 at pitch, 033" at 95:33.

03 22 49 09 CC Roger. At 95:35, we will delete "P52 option 3," and that's the one we've moved up by 7 minutes.

03 22 49 20 CDR Roger. Go ahead.

03 22 49 21 CC Roger. And at 95:43, we will delete the "P52 option 1," because we will be staying on landing site REFSMMAT.

03 22 49 33 CDR Okay; very good. Go ahead.

03 22 49 35 CC And at 95:30, we're going to start - we're going to move the activities that start around 95:47 to 95:55. So it will be moved up to 95:30.

03 22 49 55 CDR Okay. Do you want - Okay, I got it. Fine.

03 22 49 59 CC That's that little box there. And the time to show on the Flight Plan anyway is 95:56 for the DOI trim.

03 22 50 12 CDR Roger; 95:56.

03 22 51 06 CDR Houston, 15. Is that all you have?

03 22 51 08 CC Roger. Sorry, Dave. That's the end - for now.

03 22 51 15 CDR Okay.

03 22 51 25 CMP Houston, 15.

03 22 51 27 CC Go.

03 22 51 31 CMP Okay, Bob. We've got the TV turned on if you want to catch it down there.

03 22 51 36 CC Roger. We'll do our best.

03 22 52 50 CDR Okay; Houston, 15. We're coming up on the edge of Crisium, and we've got a good picture up here.

03 22 52 55 CC Roger. Don't see anything down here yet, but we're anticipating.

03 22 53 52 CC 15, can we verify that you're in transmit on the TV switch, please?

03 22 54 07 CDR Okay; that was the problem. We've got it.

03 22 54 09 CC Thank you.

03 22 55 34 CC Okay, 15. We got it now. Couple of big holes in the ground out there.

03 22 55 42 CDR Roger.

03 22 55 46 CMP That's right, Bob.

03 22 56 31 CMP Okay; Houston, 15. If you want to orient yourself on the TV there, Bob, we just came over Macrobius-A, and the small crater that you just saw - we just went by, is Romer-J. We're coming up on - on Romer-K here in a moment, which means that very shortly, we'll be coming up over the Littrow Rille - Rima Littrow.

03 22 56 57 CC Roger. We've got our little charts out here.

03 22 57 04 CMP Okay.

03 22 57 21 CMP Yes. It looks like Romer-J we're just coming up on now. In fact, we'll pan down into it.

03 22 57 31 CC Beautiful shot.

03 22 58 55 CMP Okay, Bob. You can see we're up over one of the Littrow rilles now. You can see the rille cutting diagonally there from about - 6 o'clock to 2 o'clock across the picture, and you can see some of the wrinkled ridges. In fact, there's a beautiful wrinkled ridge right below us right now.

03 22 59 12 CC Roger. I believe you. I see it.

03 22 59 14 CMP I'll pan up along the wrinkled ridges so you can see. And they're a very, very distinctive thing. Now we're out over Mare Serenitatis. You can see some of the Littrow rilles in the background there, some of the graben-type rilles, and some of the wrinkled ridges down on the - on the far - or on the - on the close corner here.

03 22 59 50 CMP Yes, we should be coming up on the inner ridge system here in a moment, and we - we'll try and pan down along the - the inner ridge.



- 03 23 00 12 CMP Yes. That looks like the inner ridge system there, and if your picture's like mine, you should be picking it up pretty well.
- 03 23 00 35 CMP Those ridges in places look like they could be nothing more than a - than a - than a flow that stopped there - flow front. In other places, they look like - like a - like it's buckled material underneath, folded to - to give it some elevation.
- 03 23 00 51 CC Roger.
- 03 23 01 23 CC And that was a good one, Al. And if someone who's not just looking out the window, will give us P00 and ACCEPT, we'll send you up a - not P00, just ACCEPT. Pardon me. We'll give you state vectors and a target, while we're taking a view.
- 03 23 02 08 CMP Bob, I'm going to pan forward a little bit, and you can see the beginnings of the Apennine Front showing up on the far side of Serenitatis.
- 03 23 02 15 CC Roger. We see that.
- 03 23 02 24 CMP And off on the left there, that's the - the Haemus Mountains around south of the Apennines.
- 03 23 02 41 CMP See how - when you're coming up at low altitude on these mountains, how - how striking they are in the distance? It's really hard to miss any from such a long ways away.
- 03 23 02 52 CC I hope you can miss them.
- 03 23 03 02 CMP I guess that's up to you guys.
- 03 23 03 04 CC Roger. Speaking of that, the burn attitude's going to be  $10^4$  degrees, so you might keep that in mind when you get down here. You're getting kind of close to it now, or - beginning to get close to it.
- 03 23 03 18 CMP Okay.
- 03 23 03 51 CMP There's a very interesting little fissure just below us here, Bob. It looks like there might be a little flow coming out of it, but it's - it's almost an arrowhead-shaped affair. And, it certainly doesn't have any features like any - any

impact. It's very sharp and distinct and makes a very distinct arrowhead. And here we come up on the ridges on the west side of Serenitatis, just at the foothills of the Hadley Apennines. And you can see, there is - there is some relief as we look back to the south there, there is some very distinct relief in - in - in the shore of Serenitatis, with some wrinkle ridges that follow the contour. And some - what look like fairly distinct arcuate rilles that also follow the contour. I think that when we get up very close here, you can see - In - in the field of view there right now, is a lineament that looks like it might be some sort of a collapsed lava tube, and you can also see down in here the - the mare material looks like it's pooling in the - in the foothills of the mountains; and in some places, you can even see what appears to be a frozen shoreline, so to speak.

03 23 05 07 CC Beautiful, beautiful.

03 23 05 24 CC Roger. We can take black now, too.

03 23 05 27 CMP Okay. Okay, Bob. I'm going to take the TV out of this window and get it located in window 3, so we can all have a good look at the landing site.

03 23 05 40 CC Okay.

03 23 06 01 CMP Sorry about that; we're just a little bit late, but you can see the edge of the rille there as we go beyond it. And you can see the blocky features inside the rille. And now we're out across the plain on the other side. That was very fast.

03 23 06 16 CC That was a quickie.

03 23 06 44 CMP Okay. In the field of view right now, Bob, is beginnings of Bradley Rille, and you can see it cutting back off to the southwest there.

03 23 06 53 CC Roger. Looks kind of like our rille.

03 23 06 58 CMP Yes. It does, doesn't it?

03 23 09 22 CMP Okay, Bob. I guess that about does it. We're at the terminator, and we'll pick up the attitude now.

03 23 09 27 CC Okay. And, righto.

03 23 12 51 CC And, Apollo 15, Houston. We've got a DOI trim pad for Jim when he's ready to copy.

03 23 13 26 LMP Morning, Bob. I'm ready to copy.

03 23 13 29 CC Roger, Jim. The P30 pad. Purpose, DOI trim, RCS/G&N; 38264; NOUN 48 is NA; 095:56:42.50; plus 0003.1, last two NOUN 88s [sic] are 0; 180, 104, 359; NOUN 44 is 0059.4, plus 0009.6; 0003.1, 0:20, 0003.1; 30, 192.8, 11.1; rest of the pad is NA. GDC aline stars are Vega and Deneb; roll, pitch, and yaw are 288; 340; 346. It's a four-jet RCS burn, and we do not want to trim any retrograde residual. So any extra burn you get in that direction, we will not trim. Over.

03 23 15 21 LMP Okay, Bob. DOI trim pad readback. RCS/G&N; 38264;095:56:42.50; plus 0003.1, 0 and 0 for Y and Z; 180, 104, 359; 0059.4, plus 0009.6; 0003.1, 0:20, 003.1; 30, 192.8, 11.1. Vega and Deneb; 288; 340; 346. Four-jet RCS, no trim of any retrograde residual.

03 23 16 10 CC Roger. Copy. Correct, and one last comment; we will not be passing you up a TET-9 - TEI-19 pad at this time.

03 23 16 23 LMP Understand.

03 23 16 26 CC And that should take care of all little squares in that MSFN update box at 28 - at 95:25.

03 23 16 41 LMP Repeat the last one, Bob.

03 23 16 44 CC Roger. I was just telling you that fills - that takes care of all squares there at the MSFN update at 95:25. We've taken care of all those in one way or another this morning.

03 23 16 55 LMP Roger.

03 23 16 58 CDR Roger.

03 23 24 45 CC And, 15, people down here are recommending that you terminate your roll at this attitude to help your P52 before you press on to the burn attitude.

03 23 24 58 CMP Hey, very good, Bob. Thank you. We will.

03 23 26 21 CMP Houston, this is 15 with some retraction times for you.

03 23 26 24 CC Okay. Go ahead.

03 23 26 28 CMP On the MASS SPEC, it was on the MASS SPEC, it was 02:33. On GAMMA RAY, 03:09.

03 23 26 37 CC Copy, thank you.

03 23 26 47 CMP It was 2 minutes 33 seconds, 3 minutes and 9 seconds.

03 23 26 58 CC Say again, 15. Was that 233 seconds, and 3 minutes and 9 seconds?

03 23 27 08 CMP No; 2 minutes and 33 seconds, 3 minutes and 9 seconds.

03 23 27 12 CC Roger. We have that; thank you.

03 23 28 17 LMP Houston, 15.

03 23 28 19 CC Go ahead.

03 23 28 24 LMP Okay, Bob. I'm setting looking right at the surface with the optics in this attitude. Give me a good roll angle to go to.

03 23 28 30 CC Okay; stand by.

03 23 29 19 CC Stand by. We're talking about it, guys.

03 23 29 25 LMP Okay, Bob.

03 23 30 13 CC Roger, 15. Now that we told you to stop, why don't you press on to the burn roll of 180.

03 23 30 24 CDR Okay; thanks a lot.

03 23 30 27 CC (laughter) For what? And now, if you lose HIGH GAIN by going to the burn attitude before you go around the corner, it will be OMNI Delta in the burn attitude.

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03 23 30 40 CDR Roger. OMNI Delta.

03 23 34 17 CC And, Apollo 15, we'd like TRACK AUTO as you go around the corner here. It'll help us keep you on data for a couple of minutes there at the end. And we got a couple of stars for you, if you want to take any more advice. And that's a 25 and 26.

03 23 34 39 CDR Okay; 25 and 26. And you've got AUTO.

03 23 34 43 CC Thank you.

03 23 37 45 CC And, Apollo 15, you're 5 minutes from LOS, looking good, and GO for the burn for DOI trim.

03 23 37 55 CDR Okay; understand. GO for DOI trim. See you on the other side.

03 23 37 58 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 00 04 -- BEGIN LUNAR REV 10

04 00 30 07 CC Apollo 15, Houston. Standing by.

04 00 30 13 CDR Roger, Houston; 15 here. We had a good burn and have a burn report for you.

04 00 30 18 CC Roger. Ready to copy.

04 00 30 23 CDR Okay; on time - burn time was about 18 or 19 seconds. The residuals were minus .1, plus .2, plus .2, DELTA-V<sub>C</sub> was plus .8, and the G&N has a 59.4 by 10.3.

04 00 30 46 CC And copy, Dave.

04 00 31 03 CC And, 15, I have a landing site observation pad for you when ready.

04 00 31 10 CDR Roger. Go ahead.

04 00 31 13 CC T-horizon: 96:57:10. Stand by.

04 00 31 46 CC Hey, 15, you still with us?

04 00 31 50 CDR Roger. We're there, and T-horizon: 96:57:10. Standing by for TCA minus 20.

04 00 31 56 CC Roger. It's at 96:59:17.

04 00 32 08 CDR 96:59:17.

04 00 32 11 CC Looks good.

04 00 32 24 CC 15, Houston. We have an up-link for you, state vector, and a REFSMMAT, if you'll give us POO and ACCEPT.

04 00 32 35 CDR POO and ACCEPT.

04 00 32 59 CC And, 15, Houston. I have a couple of words for Al on the systems test meter if he can listen.

04 00 33 09 CDR Sorry, he - he's busy right now. What do you need? I'll tell him later.

04 00 33 13 CC Hey, it - we'll get it to him later. It's simply that the systems test meter is okay to use for the LM checkout on the LM current.

04 00 33 25 CDR Okay; thank you.

04 00 34 44 CDR Houston, 15. We're equalizing pressure now, and the DELTA-P was 1.0 before we started.

04 00 34 52 CC We copy.

04 00 35 24 CC 15, the computer's yours.

04 00 35 29 CDR Roger.

04 00 48 26 CC 15, Houston.

04 00 48 32 CMP Houston, 15. Go ahead.

04 00 48 35 CC Al, we didn't get your last torquing angles and torquing time. Could you read them down to us, please?

04 00 48 43 CMP Okay, Ed - Just a minute.

04 00 48 46 CC If you're busy, we'll get them later.

04 00 48 51 CMP I'll give them to you now; anything for you. Okay; we used stars 25 and 26. NOUN 05 was four balls 1, torquing angles were plus 00022, minus 00032, plus 00038, and they were torqued out at 95:43:00.

04 00 49 19 CC Roger; copy. And, as long as we have you on the loop, your REFSMMAT 00 time is 104:41:43.00.

04 00 49 39 CMP I'm sorry, Ed. I didn't get that. Would you say that again, please?

04 00 49 42 CC Roger, Al. 104:41:43.00.

04 00 49 54 CMP Understand. The REFSMMAT time is good for 104:41:43.00.

04 00 50 01 CC Good readback.

04 00 56 16 CC 15, Houston. One minute until T-horizon.

04 00 56 22 CMP Roger, ED.

04 01 01 43 CDR Houston, Apollo 15.

04 01 01 48 CC Go ahead, 15.

04 01 01 53 CDR Okay; looks like FAO owes us one, I had no trouble picking up Index Crater at all. The surface looks generally smooth. I saw no big boulders. I saw more craters than we're normally used to seeing, but I think that's because of the resolution of the photography. I can see a - a fair amount of boulders in the bottom of the rille. Most of the surface seems to be pretty subdued and rounded. I did see some debris around some of the fresher craters. And, of course, I don't know exactly what size, but if we're looking at 3-foot resolution on this, I'd - I'd say I didn't see anything larger than - I guess, at the most, maybe 15 feet or so, but that's - that was a unique rock. The - the area, in general, looks pretty good. I don't think we'll have any problem picking it up, and I don't think Al will have any problem at all identifying Index Crater.

04 01 03 03 CC Okay, Dave. We copy. Thanks a lot.

04 01 03 09 CDR Roger.

04 01 10 34 CC Apollo 15, Houston. If there's someone available to copy a TEI-19 pad, I'll give it to you.

04 01 10 43 CDR Okay; hold for about 5, will you please, Ed?

04 01 10 47 CC Will do.

04 01 13 48 CDR Okay, Houston; go - go ahead with the TEI pad.

04 01 13 54 CC Roger, 15. TEI-19: SPS/G&N; 38009; plus 06.1, plus 10.5; 115:27:55.59; plus 2845.1, minus 0831.7, minus 0219.7; 180, 102, 346. The rest NA. Ullage, four jet, 12 seconds; and some notes. One is, burn is undocked; two, assume CIRC; three, longitude at Tig is 166.0 west; and the fourth note is, the attitude's based on landing-site REFSMMAT.



04 01 15 24 CDR Okay, readback. TEI-19: SPS/G&N; 38009; plus 06.1, plus 10.5; 115:27:55.59; plus 2845.1, minus 0831.7, minus 0219.7; 180, 102, 346; four jet, 12 seconds; burn undocked; assume CIRC; longitude 166.0 west at T<sub>ig</sub>, and landing site REFSMMAT.

04 01 16 00 CC That's affirm; and we have a few centiseconds update for your CMC clock, whenever you're ready.

04 01 16 11 CDR Okay, you want POO and ACCEPT?

04 01 16 13 CC That's affirm.

04 01 16 16 CDR You got it.

04 01 17 51 CC Computer's yours, 15.

04 01 23 23 CC Falcon - rather, Apollo 15, Houston. OMNI Charlie, please.

04 01 23 35 CMP Houston, 15. Go ahead.

04 01 23 38 CC OMNI Charlie, please, Al.

04 01 23 43 CMP Okay, OMNI Charlie.

04 01 23 51 CC I haven't had a chance to say good morning, Al, so good morning.

04 01 23 58 CMP Good morning, Edgar.

04 01 29 23 CC Apollo 15, Houston.

04 01 29 28 CMP Houston, 15. Go ahead.

04 01 29 30 CC Roger. We need to redo the REFSMMAT update that we gave you a little while ago. Could we have POO and ACCEPT, please?

04 01 29 41 CMP Okay, Ed. You caught me just in time, doing a P52.

04 01 29 43 CC Roger - -

04 01 29 44 CMP I'll go back in ...

04 01 29 45 CC - - what - what we were hoping to do.

04 01 29 50 CMP Okay; you got it now.

04 01 29 51 CC Roger. Here it comes.

04 01 30 05 CC The story here, Al, is that, apparently, the block update changed some registers in the REFS - REFSMMAT and screwed it up a bit.

04 01 30 16 CMP Roger.

04 01 31 46 CC 15, Houston. The computer's yours. And, Al, before you do 50 - 52, be advised you can use the systems test meter on the back side for any of the normal LM checkout functions; on the front side, we'll watch it for you. And go ahead and leave the test meter in whatever position you're - you're testing with. You understand?

04 01 32 12 CMP Roger, Ed. Understand.

04 01 32 13 CC Okay; proceed with your P52.

04 01 32 18 CMP Okay; thank you.

04 01 35 32 CC Apollo 15, Houston. Thirty seconds to LOS.

04 01 35 38 CMP Roger, Ed.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 01 58 -- BEGIN LUNAR REV 11

04 02 25 35 CDR Okay, Al. VERB 066 - VERB 06 NOUN 65; I'll give you a mark.

04 02 25 46 CDR 3, 2, 1 -

04 02 25 48 CDR MARK. Okay; 25:45.62.

04 02 26 01 CC Apollo 15, Houston; standing by.

04 02 26 10 CDR Roger, Houston. This is Falcon, ...

04 02 26 13 CC Okay, Falcon; reading you. We have a lot of noise on the loop - maybe it'll go away in a moment.

02 04 26 22 CDR Yes, I hope so.

04 02 26 51 CDR Okay, Endeavour, shut her down ... if you're ready.

04 02 26 59 CMP On your mark.

04 02 27 00 CDR 3, 2, 1 -

04 02 27 02 CDR MARK.

04 02 27 03 CMP Okay. 98:26:59.60.

04 02 27 09 CDR Okay, ...

04 02 27 12 CMP Okay.

04 02 27 41 CC Endeavour, Houston. Do you read?

04 02 27 46 CMP Hello, Endeavour - Houston, this is Endeavour. Loud and clear.

04 02 27 50 CC Okay, Al. We read you through the static. Let us have NARROW on the HIGH GAIN, please.

04 02 28 01 CMP Okay, you got it. NARROW and REACQ.

04 02 28 09 CDR And, Houston, this is Falcon. We're going to configure for secondary S-band transmitter and receiver.

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04 02 28 21 CC Okay, Falcon. Press on with secondary S-band.

04 02 29 06 CDR Houston, this is Falcon. How do you read?

04 02 29 15 CC Endeavour, Houston. Verify on your last P52, you used option 1.

04 02 29 25 CMP Houston, Endeavour. Go ahead.

04 02 29 28 CC Roger, Al. Verify that on your last P52, you used option 1.

04 02 29 39 CMP I think that's a negative, Ed; I used option 3. Stand by 1 and I'll check.

04 02 29 45 CC Roger. We're standing by.

04 02 29 46 CDR Houston, how do you read Falcon?

04 02 29 49 CC Falcon, Houston. You're coming through; we have a lot of static on the line and they're trying to clear it up now. You're way down in the mud.

04 02 29 59 CDR Okay. I can give you my time with that - ... time - 97:54:55.

04 02 30 19 CMP Houston, Endeavour.

04 02 30 22 CC Go ahead, Endeavour.

04 02 30 26 CMP Okay, Ed. I did do that on an option 3.

04 02 30 30 CC Okay. We'll have some words for you, and we're ready to up-link to you, Endeavour, if you'll give us - POO and ACCEPT.

04 02 30 39 CMP Okay, you got POO and ACCEPT.

04 02 30 41 CC Falcon, Houston. Your S-band check is okay. You can press on, and I'll have your updates for you in a little while.

04 02 30 51 CDR Roger.

04 02 31 04 CC And, Apollo 15; Houston. I'm going to hold off reading you any pads at the moment until we can clear up our comm on the ground.

04 02 31 15 CDR Roger.

04 02 31 28 CC Falcon, Houston. Bring up your steerable, please. See if that helps our comm.

04 02 31 35 CDR In work.

04 02 33 10 LMP Houston, this is Falcon. We're locked up on the - the high gain. How do you read?

04 02 33 14 CC Okay, Jim. Reading you loud and clear now; that seemed to have improved our comm. And I'm - I'm ready to start with the pads. I'll start with the CSM first, Al - whenever you're ready.

04 02 33 30 CDR Okay; he's working right now. Are you ready for an E-memory dump on the Falcon?

04 02 33 35 CC Stand by.

04 02 34 06 CC Falcon, Houston. We're ready for E-MOD dump.

04 02 34 13 CDR Okay; stand by.

04 02 34 22 CC En - Endeavour, Houston. The computer's yours.

04 02 34 29 CMP Roger, Houston.

04 02 34 55 CC And, Endeavour; Houston. We will stay with the REFSMMAT you have.

04 02 35 03 CMP Okay, Ed. Thank you.

04 02 35 59 CC Falcon, Houston. Give us POO and DATA. I have an up-link for you.

04 02 36 06 CDR Roger. POO and DATA.

04 02 36 09 CC And I'm ready to give the pads, Falcon, whenever you want them.

04 02 36 17 LMP Okay, Al; I'm checking it.

04 02 36 18 CDR Go ahead, Ed.

04 02 36 21 CC All right, your LM DAP data first. CSM weight, 37679; LM weight, 36630. Your GDA drive angles on board are good.

04 02 36 46 CDR Okay; copy. CSM weight is 37679; LM weight, 36630.

04 02 36 54 CC That's affirm. AGS abort constants. 224 - -

04 02 37 02 CDR Go ahead.

04 02 37 03 CC - - Plus 60442; 225, plus 29365; 226, plus 60449; 305, minus 01659; 662, minus 55021; 673, minus 32306.

04 02 37 41 CDR Okay; readback on the AGS abort constants. 60442, 29365, 60449, 01659, 55021, and 32306.

04 02 37 59 CC Affirm. The first three are plus, the last three are negative.

04 02 38 05 CDR That's affirm. Houston, Falcon.

04 02 38 11 CC Go ahead, Falcon.

04 02 38 15 CDR Okay. Everything is in order up to this point as far as the checkout goes, with the exception of the - LGC. When we pushed in the LGC circuit breaker, we got a program light - with a 400 and R-1. A VERB 5 NOUN 9 gave us - gave us an 1105, which seems to be of little consequence; just thought you might like to know.

04 02 38 41 CC We copy, Dave.

04 02 39 56 CC Falcon, Houston. The computer's yours.

04 02 40 01 CDR Roger.

04 02 41 04 CC And, Endeavour; Houston. Are you about ready for your pads?

04 02 41 14 CMP Roger, Ed. Stand by 1.

04 02 41 43 CMP Okay, Houston. Endeavour's ready to copy.

04 02 41 45 CC Okay. Falcon, the first one's a SEP time, if you would like that one, too.

04 02 41 56 CDR Houston, Falcon. Go ahead; we'll stand by.

04 02 41 59 CC Okay. SEP: GET 100:13:56.00 - the pitch angle of 108.

04 02 42 18 CMP Understand, Ed. That's a GET of 100:13:56.00.  
And that's a pitch angle of 108.

04 02 42 29 CC That's affirm, Al. Okay, the next one is CSM DAP  
data.

04 02 42 42 CMP Okay; go.

04 02 42 43 CC Roger. CSM weight, 37679; pitch, 0.49; yaw, 1.04.

04 02 43 02 CMP Understand. The DAP data is weight, 37679; pitch  
trim is 0.49; and yaw trim is 1.04. And do you  
have some signs on those?

04 02 43 14 CC It's a good readback, and say again your last?

04 02 43 21 CMP Roger, Ed. I need a sign on the pitch and yaw  
trims.

04 02 43 24 CC All right - Let me check that.

04 02 43 29 CMP Okay.

04 02 43 39 CC Affirm, Al, they're both positive.

04 02 43 47 CMP Understand; they're both plus.

04 02 43 49 CC Okay; your P24 is next.

04 02 43 55 CMP Okay; go ahead.

04 02 43 57 CC  $T_1$ , 100:46:29;  $T_2$ , 47:07; TCA, 47:37;  $T_3$ , 47:59;  
roll, pitch, and yaw are 008, 296, 000; north,  
3 nautical miles. NOUN 89, longitude over 2,  
plus 2.149. Latitude and altitude are nominal.

04 02 44 58 CMP Roger, Ed - Ed - Understand. P24 landmark track-  
ing pad:  $T_1$  at 100:46:29;  $T_2$  47:07; TCA, 47:37;  
 $T_3$ , 47:59. It's a roll of 008; pitch, 296 yaw, 000.  
Expected north at 3 nautical miles. And understand  
the longitude over 2 is plus 02.149, and latitude  
and altitude are as in the Flight Plan.

04 02 45 32 CC Good readback, Al.

04 02 45 39 CDR And, Houston, this is Falcon. ED batteries both reading 37 volts.

04 02 45 46 CC We copy that, Falcon; thank you.

04 02 45 52 CDR Okay, Endeavour; Falcon. We're ready for a docked IMU coarse aline, if you are.

04 02 45 59 CMP Okay, Falcon. Stand by 1.

04 02 46 00 CDR Okay; give us a call when you're in MIN DEADBAND ATTITUDE hold.

04 02 46 04 CMP Roger.

04 02 46 21 CMP Okay, Dave; we're there.

04 02 46 23 CDR Okay; if you could read us your gimbal angles, please.

04 02 46 33 CMP Okay;  $R_1$  is plus 00124,  $R_2$  is plus 10166,  $R_3$  is plus 00537.

04 02 46 47 CDR Plus 00124, 10166, 00537.

04 02 46 54 CMP Roger.

04 02 50 45 CC Falcon - -

04 02 50 46 CDR Houston, Falcon. We got about 9 minutes until sunset here.

04 02 50 51 CC Okay, Dave. And we have a clock update for you of about 66 centiseconds if you'll give us POO and DATA, please.

04 02 51 01 CDR Okay; POO and DATA. You got it.

04 02 51 09 CDR And, Houston; Falcon. We'd like to do the RCS pressurization now since we're a tad ahead, if - you're ready to take that?

04 02 51 18 CC Okay; we're ready, Falcon; go ahead.

04 02 51 23 CDR Okay.



04 02 51 48 CC And, Endeavour, Houston. When you get a moment, we'll take your read-outs from the last P52.

04 02 51 58 CMP Okay, Ed.

04 02 52 03 CC Falcon, the computer is yours.

04 02 52 08 CDR Roger.

04 02 53 09 CDR Houston, Falcon. A slight pause here while we take a look at the landing site; we're going right over it.

04 02 53 16 CC Okay. Roger.

04 02 53 31 CDR Okay; a few interesting differences there. Index is much more subtle than we've seen on the simulator. And earthlight is much sharper with a much deeper shadow.

04 02 53 43 CC Copy, Dave.

04 02 54 03 CMP Houston, Endeavour. Here are the P52 numbers.

04 02 54 07 CC Say again, Endeavour.

04 02 54 11 CMP Roger; I got the P52 numbers for you.

04 02 54 13 CC Ready to copy, Al.

04 02 54 18 CMP Okay, Ed. Stars 41 and 42; NOUN 05 was plus four balls 1. Gyro torquing angles were minus 00.010; minus 00.009, minus 00.025. And they were torqued out at 97:39 even.

04 02 54 17 CC Copied that, Al. And could you give us your LM power switchover time, please?

04 02 54 58 CMP Roger. That was at 97:35.

04 02 55 03 CC We copy that. And what was the result of the VHF check; does it work okay?

04 02 55 11 CMP That was satisfactory both ways - far as I know.

04 02 55 14 CC Thank you.

04 02 55 18 CDR Roger, Houston. It was good both ways.

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04 02 55 28 CDR Hey, Endeavour; Falcon. Did you copy that on the difference between earthlight and Index?

04 02 55 33 CMP Roger.

04 02 55 34 CDR Okay.

04 02 55 41 CDR And, Houston, the RCS looks good up here on the Falcon.

04 02 55 45 CC And it looks good down here, Dave.

04 02 55 50 CDR Okay. We'll pick up the alinement now and get back to you later on with the RCS checkout.

04 02 55 55 CC Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 03 10 39 CDR Houston, Falcon. That P57 up here docked works pretty well.

04 03 11 22 CDR Houston, Falcon. Do you have the torquing angles?

04 03 11 24 CC That's affirmative.

04 03 11 29 CDR Okay; we'll torque them at 1130.

04 03 11 34 CC Roger. Observe the five balls there.

04 03 11 47 CDR Yes; a couple of interesting things, we have reflection off the command module apparently from earthlight. And it's sort of tough to track the star with the command module dead-banding, but seems like if you get the star in the crosshairs, why, the optics take care of it for you.

04 03 12 03 CC Copy.

04 03 12 23 CC And, Falcon; Houston. Will you verify the CAL roll for us, please?

04 03 12 34 CDR Roger. Minus .1.

04 03 12 37 CC We copy, Dave.

04 03 13 11 CDR Okay, Endeavour; Falcon. Mid - min dead band no longer required.

04 03 13 15 CMP Okay.

04 03 13 22 CDR Okay, Houston; Falcon. We're ready for the RCS checkout, if you are.

04 03 13 28 CC We're ready to go, Falcon.

04 03 13 32 CDR Roger.

04 03 14 25 CDR Okay, Houston; Falcon. You have your HIGH BIT RATE?

04 03 14 32 CC That's affirm, Dave.

04 03 14 37 CDR Okay. And, Endeavour. We need you in a wide DEAD BAND ATTITUDE hold.

04 03 14 44 CMP Okay; wide DEAD BAND ATTITUDE hold.

04 03 14 47 CC Roger.

04 03 17 30 CDR Endeavour, Falcon. Do you have any jet fires going on over there?

04 03 17 38 CMP I haven't detected any, Dave.

04 03 17 41 CDR Okay.

04 03 17 45 CMP You want me to go FREE now?

04 03 17 46 CDR Roger. Go FREE, please.

04 03 18 10 CDR Okay, Endeavour. We'll be firing a direct ...

04 03 18 16 CMP Okay.

04 03 20 47 CDR Okay, Endeavour. Hot-fire check is complete. Everything looks good. You can go back to wide DEAD BAND ATTITUDE hold.

04 03 20 52 CMP Okay. And I'm going to turn the roll jets off and put the hatch in, if you don't mind.

04 03 20 57 CDR Oh, good.

04 03 21 07 CC And, Falcon; Houston.

04 03 21 08 CDR And, Houston; Falcon. How did it look down there?

04 03 21 10 CC I was just going to tell you, Dave, hot-fire check looked good here.

04 03 21 16 CDR Okay. They're nice and positive, aren't they?

04 03 21 20 CC That's affirm.

04 03 21 47 CDR Endeavour, Falcon. Could you verify RCS thruster, B-3, off, and the TRANSPONDER, OFF, please?

04 03 21 54 CMP I'll verify both those.

04 03 21 56 CDR Thank you.

04 03 22 38 CMP And, Falcon; Endeavour. I'm cocking the latches now.

04 03 22 41 CDR Okay.

04 03 29 18 CC Okay, Apollo 15; Houston. You're GO for undocking. You're 45 seconds from LOS, and we observed your rendezvous radar test. Falcon, also, we have not seen you reset the DAP.

04 03 29 35 CDR Okay, understand. I'll get the DAP reset, and the tape meter looks like it works fine.

04 03 29 40 CC Very good, Dave. Glad to hear it.

04 03 52 -- BEGIN LUNAR REV 12

04 04 18 13 CC Endeavour, Houston. Standing by for a SEP report.

04 04 18 21 CDR Okay, Houston; this is the Falcon. We didn't get a SEP, and Al's been checking the umbilicals down on the probe.

04 04 18 33 CC Okay. We didn't read that, except no SEP.

04 04 18 54 CDR Okay, Houston; Falcon. We got no SEP, and Al's going back into the tunnel to check the umbilicals now. And I guess we'll stand by for your recommendation.

04 04 19 07 CC Okay, Falcon. We have copied. And we'll have some words in a minute.

04 04 19 13 CDR Okay. There was not even any motion on the probe.

04 04 19 23 CC Roger. We copy.

04 04 19 48 CC Falcon, Houston. We have no probe temp, which indicates the umbilical is probably not well connected.

04 04 19 58 CDR Okay. Well, that's just what he's checking. Thank you.

04 04 20 47 CC And, 15; Houston. Be advised that we have plenty of time here on the SEP, up to 40 minutes or so. Procedures will be to get vertical or get - now get vertical on the orb rate ball and standard SEP procedures.

04 04 21 06 CDR Okay, fine. We can handle that.

04 04 21 41 CDR Hey, Al, I hope you made sure the EXTEND/RELEASE switch was OFF when you went in there.

04 04 21 50 CMP Roger.

04 04 21 51 CDR Okay.

04 04 22 59 CC Apollo 15, Houston. We're seeing the telemetry on the probe now. I presume that may have been our problem.

04 04 23 09 CDR Okay; very good.

04 04 23 18 CMP Okay, David. I'm venting you down now.

04 04 23 20 CDR Okay; good show.

04 04 23 27 CMP And that probe was loose in the - the umbilical was loose in Victor [?].

04 04 23 31 CDR Okay, I'm glad you found something.

04 04 23 41 CDR Go ahead and take your time. And when you get all squared away, give us about 5 minutes or so, and we'll be all set.

04 04 23 45 CMP Okay.

04 04 23 49 CC And there's plenty of time to get a good hatch-integrity check, 15, and do the procedure leisurely.

04 04 23 59 CMP Okay, Ed. That's in work now.

04 04 25 10 LMP Houston, Falcon. In the meantime, I can give you the gimbal angles under VERB 06 NOUN 20.

04 04 25 24 CC This is Houston; go ahead.

04 04 25 30 LMP Okay. The GET was 100:08:56; and the CSM, 35975, 10818, 35995. The LM, 30009, 28836, zip zip zip 4.

04 04 26 01 CC We copy.

04 04 27 04 CC And, Endeavour; Houston. Reminder: We want the SEP in a local vertical attitude.

04 04 27 14 CMP Roger; understand. Local vertical.

04 04 27 28 CDR Houston, Falcon. You know, we've - You might run out of an attitude and a time, and it might save a little gas.

04 04 27 53 CC Okay. In 2 minutes, we have an angle of 55.7. We're working on one for 5 minutes later.

04 04 27 59 MCC Go ahead.

04 04 28 03 CDR Well, it's going to take a fairly sizable maneuver, and it takes a little while to maneuver 2/10ths of degree per second.

04 04 28 08 CC Roger; understand. We're getting another one for you for 5 minutes from now.

04 04 28 23 CDR Better make it 10.

04 04 28 27 CC Yes; we'll have one for every 5 minutes, Dave.

04 04 28 33 CDR Okay.

04 04 28 51 CC And 15; Houston. We're not going to be able to make the P24 this pass, we don't believe. So don't worry about it.

04 04 29 08 CDR Roger.

04 04 30 04 CC Endeavour, Houston. Let's head for a - an inertial pitch gimbal angle of 30 degrees. And we may have to touch that up, but that's approximate.

04 04 30 24 CMP Okay, Houston; Endeavour. Going towards 30 degrees pitch.

04 04 30 30 CC That's affirm, Al.

04 04 30 51 CC And, Endeavour; Houston. That angle is good for 100 hours and 38 minutes, and it's not very critical. We'll use it anytime around there.

04 04 31 08 CMP Yes. Roger, Houston.

04 04 36 11 CMP Okay, Falcon; this is Endeavour. And I'm all set up again. The tunnel's centered in and pressure's good.

04 04 36 17 CDR Okay, very good. Give me a minute.

04 04 36 19 CMP Okay. And I'll stop the maneuver at local vertical.

04 04 36 26 CDR Okay. Have you - Are you in ATTITUDE hold now?

04 04 36 29 CMP Negative. Will be in just about another 10 degrees.

04 04 36 35 CDR Okay.

04 04 36 44 CC Okay. As you get all set, I need about 1 minute to get P47 up.

04 04 36 47 CMP Okay.

04 04 37 23 CMP Okay, Dave. About a minute and a half.

04 04 37 28 CDR Okay; a minute and a half until you get to your attitude?

04 04 37 21 CMP Until we're ready to SEP.

04 04 37 32 CDR Okay; good.

04 04 38 13 CMP Okay; let's GO on 1 minute.

04 04 38 16 CDR Okay; you got P47 running. You can GO anytime you want to.

04 04 38 18 CMP Okay; I've got P47 running also.

04 04 39 02 CMP Ten seconds.

04 04 39 03 CDR Roger.

04 04 39 20 CDR Okay; we're on the capture latches.

04 04 39 22 CMP Good. ...

04 04 39 37 LMP-LM And you're on your own.

04 04 39 43 CDR-LM Okay; good clean SEP.

04 04 40 22 CC Endeavour, Houston. Be advised your current attitude is a good one for your P52, if you'd like to hold it.

04 04 40 31 CMP Okay, Ed; if you think we can't get there for the P24s.

04 04 40 37 CC Negative. You've only got 6 minutes. They say, "No way."



04 04 40 43 CMP Okay. We'll hold this.

04 04 40 47 LMP-LM Okay. Falcon's going to yaw left.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 04 42 00 CMP And you got four good-looking gear.

04 04 42 30 CMP And, Falcon, Endeavour. Looks like you got one radar there that's - rotating away from me.

04 04 43 39 CC Falcon, Houston. LO bit rate, AFT OMNI, please.

04 04 43 58 CC Endeavour - -

04 04 43 59 CDR-LM Roger. We're LO bit rate and AFT.

04 04 44 02 CC Roger. Thank you.

04 04 45 02 CC Falcon, Houston. Give us on the steerable - PITCH, 155; YAW, minus 50.

04 04 47 38 CC Okay, Falcon. We're reading you well now. Give us HI bit rate, please.

04 04 47 48 LMP-LM Roger. HI bit rate.

04 04 47 53 CDR-LM And, Houston, we're ready to go with the DPS throttle check whenever you are.

04 04 47 56 CC Okay; we're ready. Let's go.

04 04 48 01 CDR-LM Okay.

04 04 48 07 CC Endeavour, Houston. Give us POO and ACCEPT; we have an up-link for you.

04 04 48 14 CMP Okay. POO and ACCEPT.

04 04 48 18 CMP Got it?

04 04 48 21 CC Roger, Al.

04 04 48 40 CDR-LM Minimum is 11; soft stop, 52; max, 100.

04 04 48 52 CC Copy.

04 04 49 11 CDR-LM LMP is 11; soft stop, 51; max, 100.

04 04 49 22 CC Copy.

04 04 51 19 CC And, Falcon, Houston. We didn't see the throttle actuator move on that test. Check your DECA POWER circuit breaker, please.

04 04 51 30 CC Endeavour, the computer's yours.

04 04 51 31 CDR-LM ... open.

04 04 51 37 CMP Endeavour, Roger.

04 04 51 40 CC And say again, Dave.

04 04 51 41 CDR-LM Okay. We'll run it again real quickly, Ed.

04 04 51 43 CC Okay. Was the circuit breaker out?

04 04 51 44 CDR-LM ... take at it - take a look at it again with the - Yes. Roger. The circuit breaker is out.

04 04 51 54 CC Very good.

04 04 52 00 CDR-LM Okay. Do you want to look at the test again?

04 04 52 03 CC That's affirmative, Falcon. Let's have it again, please.

04 04 52 08 CDR-LM Roger-D.

04 04 52 30 CDR-LM Okay, Ed. CDR's at min, 11; soft stop, 51; max, 101.

04 04 52 41 CC We copy. And it looks good this time.

04 04 52 49 CDR-LM Okay. And the circuit breaker is still in.

04 04 52 52 CC Roger. Roger. And we're ready to give you an up-link, if you'll give us POO and DATA, please.

04 04 52 58 CDR-LM Stand by. Let's run the LMP check here.

04 04 53 14 CC And it looked good here, Falcon.

04 04 53 19 CDR-LM Okay. Thank you.

04 04 53 31 CC And, Falcon, Houston. Do you know if the circuit breaker was out, or did it pop? Can you verify what - either?

04 04 53 41 CDR-LM No, I can't verify either. We checked them over before undocking and - I can't tell you whether it popped or it was open.

04 04 53 49 CC Okay; we understand. Thank you.

04 04 53 53 CDR-LM Roger.

04 04 54 08 CDR-LM Okay, Houston. We'll take the up-link anytime you want to give it to us.

04 04 54 12 CC Okay. Here she comes.

04 04 55 26 CDR-LM Okay; Endeavour, Falcon. We're going to run the radar checkout now.

04 04 55 36 CC And, Falcon, the computer's yours.

04 04 55 50 CDR-LM Roger.

04 04 55 56 CDR-LM Falcon, Endeavour. I mean Endeavour, Falcon.

04 04 56 11 CDR-LM Okay; Houston, Falcon here. Would you give the Endeavour a call. Tell him we're going to run the radar checkout now, please. We seem to have lost contact.

04 04 56 18 CC Roger. Endeavour, Houston. Falcon is calling, and he's ready for the rendezvous radar check.

04 04 56 41 CC Endeavour, Houston. Do you copy?

04 04 57 04 CC Endeavour, Houston.

04 04 57 30 CC Endeavour, Houston. Do you read?

04 04 58 04 CC Endeavour, Houston. Over.

04 04 58 14 CDR-LM Endeavour, Falcon.

04 04 58 29 CDR-LM Endeavour, Falcon. SIMPLEX A and B. How do you read?

04 04 58 35 CMP I read 5 square, Falcon.

04 04 58 37 CDR-LM Okay. Well, we lost you there somewhere along the way. We need to check out the radar and Houston seems to not be able to get a hold of you either.

04 04 58 44 CMP Okay. I'm in.

04 04 58 46 CC We're reading you now, Al.

04 04 58 48 CMP Okay, Ed - -

04 04 58 49 CDR-LM I was - -

04 04 58 50 CMP Okay, Ed; I was off for a couple of minutes reconfiguring inside here.

04 04 58 55 CC Roger.

04 04 58 56 CDR-LM Okay, Al. If you'll go back to SIMPLEX A, then we'll give you the voice ranging, and we'll check out the radar.

04 04 59 06 CMP Okay. I'm SIMPLEX A.

04 04 59 10 CDR-LM Okay. Voice ranging coming up. We're going to check the radar.

04 05 00 47 CDR-LM Endeavour, Falcon. You got your TRANSPONDER on?

04 05 00 50 CMP Roger. Trans - TRANSPONDER is on.

04 05 01 07 CMP Say again, Falcon.

04 05 01 44 CDR-LM Okay, Endeavour; Falcon. Can you give us your range, please?

04 05 01 48 CMP Okay, Falcon. Stand by 1.

04 05 02 01 CDR-LM Endeavour, Falcon.

04 05 02 06 CMP Hello, Falcon. This is Endeavour. How do you read now?

04 05 02 08 CDR-LM Yes, 5 by. Can you give us your range, please?

04 05 02 10 CMP Okay. Stand by 1.

04 05 02 33 CMP Okay; .4, Dave.

04 05 02 38 CDR-LM Okay; .4. We're looking at .78.

04 05 02 41 CMP Roger. Let me reset.

04 05 02 44 CDR-LM Okay. Reset.

04 05 03 03 CMP I have you at .41 now.

04 05 03 06 CDR-LM Okay. Maybe we're just in too close. We're looking at .79 mile. We'll press on.

04 05 03 11 CMP Roger.

04 05 03 48 CC Endeavour, Houston. We're going to recommend you skip your P52. Guido's satisfied with your alignment, and we are ready with your CIRC burn - CIRC pad any time.

04 05 04 08 CMP Roger, Houston; Endeavour. Stand by 1.

04 05 04 16 CC Endeavour, Houston. Did you say standing by?

04 05 04 18 MCC Yes.

04 05 04 24 CMP Yes. Houston, Endeavour's ready to copy.

04 05 04 27 CC Okay, Al. We'd like for you to go ahead and start going to the burn attitude. I'll give you the roll, pitch, and yaw, and you can get that in, and I - then I will give you the rest of the pad.

04 05 04 45 CMP Roger, Houston. Go ahead.

04 05 04 46 CC Roger. 000, 107, 358.

04 05 05 01 CMP Roger; understand. 000, 107, 358. I'll put that in and be right back with you.

04 05 05 07 CC Roger.

04 05 05 25 CMP Okay, Houston; Endeavour. We're maneuvering. Go ahead with the rest of the pad.

04 05 05 30 CC Okay. CIRC: SPS/G&N; 37679; plus 0.49, plus 1.04; GET is 101:38:58.19; plus 0068.3, minus four zeros 1, minus four zeros 7; 000, 107, 358; 0064.9, plus 0054.3; 0068.3, 0:04, 0057.2; sextant star 10, 171.3, 40.0. The rest NA. GDC aline, Vega, Deneb; 288, 340, 346. Ullage four jet, 14 seconds.

04 05 07 15 CMP Roger, Houston. Understand. P30 pad, CIRC burn, SPS/G&N; 37679; plus 0.49, plus 1.04; 101:38:58.19; plus 0068.3, minus 0000.1, minus 0000.7; 000, 107, 358; 0064.9, plus 0054.3; 0068.3, 0:04, 0057.2; 10, 171.3, 40.0. Vega, Deneb, set stars; 288, 340, 346. Four jet, 14 seconds.

04 05 08 08 CC That's a good readback, Al, and I have an erasable change for you.

04 05 08 19 CMP Okay. Go ahead.

04 05 08 21 CC VERB 21 NOUN 01. Address 1765 and ENTER 01605.

04 05 08 40 CMP Understand VERB 21 NOUN 1 ENTER, 1765 ENTER, 01605 ENTER.

04 05 08 46 CC That's affirmative, and that's - a short burn constant change, Al.

04 05 08 53 CMP Roger.

04 05 09 10 CC And, Al. Be advised that your sextant star will - will be occulted at 101:16 - 7 minutes from now. And a gentle reminder, this is a single-bank, bank B burn.

04 05 09 23 CMP Roger.

04 05 09 28 CC Okay. PDI<sub>0</sub> pad, when both vehicles are ready.

04 05 09 41 LMP-LM Falcon's ready.

04 05 09 48 CC Roger, Falcon. And did you get the CIRC GTI [sic]?

04 05 09 55 LMP-LM Affirmative, Ed.

04 05 09 56 CC Okay. And, Endeavour, you're ready for a PDI<sub>0</sub> pad?

04 05 10 03 CMP Endeavour's ready.

04 05 10 06 CC Okay. PDI<sub>0</sub>. Alfa: 102:39:35.35; Bravo: plus 0100.0, plus all zeros, plus 0001.8; 0138.3, plus 0009.0, 0100.1; 0:34; 000, 273; 0159.6; plus 0100.0, plus all zeros, plus 0002.4; Cocoa: 103:40:24.00; Delta: 105:22:30.00. Readback.

04 05 11 26 LMP-LM Okay. Houston, this is Falcon with the PDI<sub>0</sub> read-  
back. 102:39:35.35; plus 0100.0 plus all zips,  
plus 0001.8; 0138.3, plus 0009.0, 0100.1; 0:34;  
000, 273; 0159.6; plus 0100.0, plus all zips,  
plus 0002.4; 103:40:24.00, 105:22:30.00. Over.

04 05 12 15 CC Good readback, Falcon. And, Al, did you copy?

04 05 12 21 CMP Endeavour copied.

04 05 12 23 CC Roger, Roger.

04 05 15 54 LMP-LM Okay, Houston. We'll talk in a minute.

04 05 16 01 CC And, Falcon, Houston. We copy. Thank you.

04 05 20 18 CC And, Endeavour, Houston. Your go for CIRC as soon  
as you get your short-burn constant ...

04 05 20 28 CMP Okay, Ed.

04 05 20 55 CC And we observed it here. Endeavour.

04 05 21 00 CDR Okay.

04 05 21 06 CC And, Falcon, Houston. AGS K vector.

04 05 21 14 LMP-LM Go ahead, Houston. Ready to copy.

04 05 21 17 CC Roger. 100, 000, and 00006.

04 05 21 31 LMP-LM Roger. 100, 00, 0006.

04 05 21 40 CC I think we needed 00006.

04 05 21 47 LMP-LM Okay; understand. Four zeros 6.

04 05 21 50 CC That's affirmative.

04 05 22 39 CC The Apollo 15, Houston. We're about 1 minute from  
LOS. We seem to be caught up, and everything is  
looking good from here.

04 05 22 51 LMP-LM Falcon, Roger. Thank you.

04 05 22 53 CMP And Endeavour Roger. Thank you.



04 05 45 —

BEGIN LUNAR REV 13

04 06 12 24 CC

Endeavour, Houston. Standing by for your burn status.

04 06 12 44 CC

Endeavour, Houston. Standing by for burn status.

04 06 12 51 CMP

Hello, Houston. Endeavour. Roger. Stand by 1.

04 06 12 55 CC

Roger. Roger, Al.

04 06 13 00 CMP

Okay, Houston. The burn got off on time. Burn time, 4 seconds;  $V_{gx}$ , minus 0000.9; and I trimmed that to 0 at - roll of 0, pitch of 107, and yaw of 358.  $V_{gx}$  was plus all zero's,  $V_{gy}$  was plus all zero's,  $V_{gz}$  was minus 0000.5. DELTA- $V_c$  was minus 11.2; fuel was 29.25; oxidizer, 29.15; and unbalance meter was decreased 50. And I've got me in a 65.2 by 54.8.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 06 13 44 CC Okay, Al. We got everything except the item after the burn time.

04 06 13 54 CMP Roger. The  $V_{gx}$  at shutdown was minus .9, 0.9.

04 06 14 03 CC Okay. We copy.

04 06 14 19 CC And, Al, I'm ready to give you a P24 pad, when you're ready to copy.

04 06 14 45 CMP Okay, Ed. Go ahead.

04 06 14 47 CC Roger. 15-1; T-1, 102:37:27; T-2, 42:17; TCA, 43:57; T-3, 44:45. The attitude is nominal, and you'll be off track 3 miles to the north.

04 06 15 21 CMP Roger. I understand; 24 landmark tracking pad, tracking 15-1; T-1, 102:37:27; 42:17; 43:57; 44:45. Nominal attitude is off track north 3 miles.

04 06 15 42 CC Good readback.

04 06 15 46 CMP Roger.

04 06 15 54 LMP-LM Ed, I have some AGS CAL numbers for you.

04 06 15 57 CC Okay, Falcon. Ready to copy.

04 06 16 02 LMP-LM Roger. The initial values: plus 02, minus 04, plus 03, plus 02, plus 90, minus 07. CAL values: plus 02, minus 04, plus 02, plus 21, plus 81, and minus 15.

04 06 16 26 CC Copied all of them. Those numbers look good, Falcon.

04 06 16 36 LMP-LM And, Houston; Falcon. We're ready to go with the DPS.

04 06 16 41 CDR-LM Okay. And we're ready to go with the DPS pressure checkout any time you are.

04 06 16 44 CC Okay. We're ready. Press on.

04 06 16 49 CDR-LM Roger.

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04 06 16 54 CC Endeavour, Houston. Give us NARROW please on your HIGH GAIN.

04 06 17 02 CMP Roger.

04 06 18 26 CDR-LM Okay, Houston; Falcon. We've done the descent start. The ambient pressure is down to 450, but the manifold pressure hasn't moved.

04 06 18 39 CC Stand by. Okay, Falcon. We believe you turned your PQM OFF and - that's your PQGS OFF and - probably your problem - your hed - HELIUM MONITOR. I think you got it inadvertently. And, Endeavour, we'll take POO and ACCEPT.

04 06 19 23 CMP Roger. You got it.

04 06 19 27 CC And, Falcon - -

04 06 19 28 LMP-LM Oh, yes, Ed. Thank you.

04 06 19 30 CC Roger. DPS looks good from down here.

04 06 19 36 CDR-LM Okay.

04 06 20 05 CC And, Falcon; Houston. A couple of items. Dave, do you have a warm feel for the LPD CAL?

04 06 20 14 CDR-LM Roger, Ed. It was right on.

04 06 20 16 CC Good enough. And we'd like for you to take your PROPELLANT TEMP/PRESS MONITOR to ASCENT and give us an OX tank read-out, please.

04 06 20 28 CDR-LM Oxidizer is 100.

04 06 20 31 CC We copy. Thank you. And, Dave, be advised, there will be no gyro bias updates - or gyro drift updates.

04 06 20 44 CDR-LM Okay; very good.

04 06 21 07 CDR-LM Houston, Falcon going into landing radar checkout now.

04 06 21 13 CC Roger, Roger, Falcon.

04 06 21 50 CDR-LM ALTITUDE TRANSMITTER is 3.6. VELOCITY TRANSMITTER, 3.8.

04 06 22 16 CC Okay, Endeavour; Houston. Computer is yours, and you can start your maneuver.

04 06 22 35 CC Endeavour, Houston. The computer is yours. You can start your maneuver.

04 06 22 43 CMP Roger, Houston; Endeavour. Thank you.

04 06 22 53 CC Endeavour, Houston. We're recommending a half of a degree per second for your maneuver. You've got quite a ways to go.

04 06 23 02 CMP Roger, Ed.

04 06 23 10 CDR-LM And, Houston; Falcon. The landing radar looks good up here.

04 06 23 14 CC Roger. It looks good here.

04 06 23 25 CDR-LM Roger.

04 06 24 48 CC Falcon, Houston. If you'll let us have POO and DATA, we have an up-link for you.

04 06 24 55 CDR-LM Roger.

04 06 24 58 CC And I have pads for Endeavour and Falcon, when you're both ready.

04 06 25 11 CDR-LM The Falcon's ready.

04 06 25 14 CMP Endeavour's ready.

04 06 25 17 CC Okay. Here we go. With Echo, 104:42:30.00; Foxtrot, plus 0108.2, plus all zeros, minus 0050.0; 0144.9, plus 0008.6, 0119.2; 0:36, 000, 270; 0282.5; plus 0108.5, plus all zeros, minus 0049.3; Golf, 107:37:30.00; Hotel, 109:18:45.00. Read back.

04 06 26 31 LMP-LM Okay. Falcon with the readback on no PDI plus 12. 104:42:30.00; plus 0108.2, plus all zips, minus 0050.0; 0144.9, plus 0008.6, 0119.2; 0:36, 000, 270; 0282.5; plus 0108.5, plus all zips, minus 0049.3; 107:37:30.00; and 109:18:45.00.

04 06 27 20 CC Okay. You got cut out there. Your AGS DELTA-V<sub>Z</sub>, confirm a negative and Hotel, 109:18:45.00.

04 06 27 36 LMP-LM That's confirmed, Ed.

04 06 27 38 CC Okay. Endeavour, give us OMNI Charlie, please.

04 06 27 48 CMP Endeavour on OMNI Charlie.

04 06 27 50 CC Roger. And did you get the readbacks, Al?

04 06 27 55 CMP The Endeavour copied them - copied the pads. Roger.

04 06 27 58 CC Okay. Here we go with India PDI pad: 104:30:10.94;  
11:03, plus 0002.9; 002, 110, 310; plus 56922;  
Juliett: 109:18:45.00; Kilo: 107:27:30.00; Lima:  
104:50:49.67; Meco 109:18:45.00; T-2 is at PDI  
plus 20:39; Nectar: 106:41:20.05. Read back.

04 06 29 18 LMP-LM Okay. Falcon, with the readback. PDI-1: 104:30:10.94;  
11:03 plus 0002.9; 002, 110, 310; plus 56922; Juliett:  
109:18:45.00; Kilo: 107:27:30.00; Lima: 104:50:49:67;  
109:18:45.00; T2 at PDI plus 23:39; and Nan is  
106:41:20.05.

04 06 30 05 CC Okay. The T-2 time is at 20.39.

04 06 30 16 LMP-LM Roger. 20:39.

04 06 30 19 CC Let's try it again - 20.39.

04 06 30 25 LMP-LM 20:39; thank you, Ed.

04 06 30 26 CC Good readback. Falcon, computer's yours.

04 06 34 24 CMP Houston, Endeavour.

04 06 34 27 CC Go ahead, Endeavour.

04 06 34 32 CMP Roger, Ed. Just checking over this P24 pad again.  
And you didn't update the longitude over 2 on this one.  
Did you want to do that?

04 06 34 41 CC Stand by. Negative, Al. Go with the one in the  
Flight Plan.

04 06 34 46 CMP - - and low altitude. Okay.

04 06 36 14 CC Falcon, Houston. Over.

04 06 36 19 CDR-LM Houston, Falcon. Go.

04 06 36 21 CC Roger. Check your CO<sub>2</sub> SENSOR circuit breaker.  
We're showing off-scale low.

04 06 36 29 CDR-LM Okay.

04 06 36 32 LMP-LM Circuit breaker's closed, Ed.

04 06 36 34 CC Roger.

04 06 36 52 CC Endeavour, stand by for T-1 minus 30 seconds.

04 06 36 57 CC MARK.

04 06 36 59 CMP Roger.

04 06 41 19 CC MARK. One minute; T-2 minus 1.

04 06 41 24 CMP Roger.

04 06 41 45 CC Stand by for 30 seconds.

04 06 41 47 CC MARK.

04 06 42 04 CC Ten seconds.

04 06 42 07 CC MARK.

04 06 44 54 CMP Okay, Houston. It's out of sight.

04 06 44 56 CC Roger, Endeavour. How did you feel about them, Al?

04 06 45 03 CMP Oh, I felt good about them, Ed. Right on.

04 06 45 05 CC Very good. Thank you.

04 06 45 08 CMP No question about the landmark. And every mark I had the - the crater centered, Crater Index.

04 06 45 17 CC Very, very good. Thank you. And I have an update to the PDI abort pad, when Endeavour and Falcon are ready.

04 06 45 37 CDR-LM The Falcon's ready.

04 06 45 46 CMP Endeavour's ready.

04 06 45 47 CC Okay. It's item Kilo. Should be 107:20:30.00.

04 06 46 02 LMP-LM Okay. Falcon copied Kilo as 107:20:30.00.

04 06 46 07 CC Good readback.

04 06 46 08 CMP Endeavour copies.

04 06 50 51 CC Endeavour, Houston. OMNI Delta.

04 06 56 44 CC Falcon, Houston.

04 06 56 50 LMP-LM All right. Go ahead, Ed.

04 06 56 51 CC Let's see if you can reach Endeavour and ask him to bring the HIGH GAIN up to Flight Plan angles, please, minus 69 and 114.

04 06 57 05 LMP-LM Roger. Endeavour, this is Falcon. How do you read?  
Roger. Houston would like you to bring up the HIGH GAIN to a minus 69 and a 114.

04 06 59 24 CDR-LM Houston, Falcon. Do you have the torquing angles?

04 06 59 26 CC That's affirmative. We have two of them, Falcon.

04 06 59 33 CDR-LM Roger. Torque to 30.

04 06 59 36 CC Copy.

04 06 59 41 CMP Houston, Endeavour is up on HIGH GAIN.

04 06 59 44 CC Roger, Endeavour.

04 07 00 12 CC And, Endeavour, we copy your NOUN 93s.

04 07 00 17 CMP Okay, Ed. And I'll ... in a minute.

04 07 07 23 CC Endeavour, Houston. Recommending monitor 92, NOUN 92.

04 07 07 32 CMP Roger.

04 07 09 38 CDR-LM Okay, Houston; Falcon. How's the P63 look?

04 07 09 42 CC Okay, Dave. It looks very good. Time's okay. And be advised, both Endeavour and Falcon, that the P24 looked good. There will be an update, but we feel very confident about it.

04 07 10 00 CDR-LM Okay, Falcon here. Very good.

04 07 10 04 CC And, Falcon, we'd like to see a VERB 47 down to the AGS, please. And be advised that your platform, both gyros and PIPAs, are good shape. No updates to them.

04 07 10 19 CDR-LM Very good.

04 07 10 26 CDR-LM Houston, Falcon. While that's running through there, we're going back through our notes, checking over the activation. And one thing we missed there was, just before undocking, we ran the suit pressure integrity check, and the first time around, we got a greater than 3/10ths decrease in 1 minute. So we cycled through both regulators, did that test, and came back and ran the suit integrity check again, and it was just fine. It was about 1/10th in a minute.

04 07 11 38 CC Okay, Falcon. We copy that. Thank you.

04 07 11 44 CDR-LM Okay.

04 07 12 56 CC Falcon, Houston.

04 07 13 01 CDR-LM Houston, Falcon. Go.

04 07 13 03 CC Roger, Dave. Talk about reviewing notes, we did so, also, and we found one we'd like to pass to you before LOS.

04 07 13 12 CDR-LM Okay.

04 07 13 14 CC Dave, we - we're working out a procedure down here that we SIMed, and it's in the event of a low thrusting DPS during PDI. We're prepared to call to you - an RCS thrust augmentation for 1 minute, at about 1 minute or a minute and a half into the burn. And recommending doing it on the LMPs TTCA, if we have to do it at all. What do you think?

04 07 13 47 CDR-LM That's fine. We'll try that if we need it.

04 07 13 50 CC Okay. The procedures are very simple. We'll call it to you as we've measured your thrust.

04 07 13 57 CDR-LM Okay. And I guess you'll call "on" and call "off" with the TTCA, is that correct?



04 07 14 03 CC We can. That'll just be a 1-minute - a 1-minute burst.

04 07 14 11 CDR-LM Okay, fine. And by the way, when we went by PD - PDI-0 we took a couple of hacks at the altitude. It showed 10 miles even.

04 07 14 20 CC Very good.

04 07 15 53 CC Falcon, Houston. You're about a minute and 40 seconds from LOS. We'd like to see a 400 plus 30,000 before LOS.

04 07 16 06 CDR-LM Roger. In work.

04 07 17 19 CC Falcon, Houston. LOS in 30 seconds.

04 07 17 24 CDR-LM Roger, Houston; Falcon. All set.

04 07 17 40 CMP OMNI Delta ...

04 07 17 47 CMP Endeavour; Roger.

04 07 21 30 CC Endeavour, Houston.

04 07 21 36 CMP Houston, Endeavour. Go ahead.

04 07 21 37 CC Roger, Al. You're a minute from LOS. We recommend, on the next pass, check your S-BAND SQUELCH SWITCH OFF.

04 07 21 50 CMP Roger. Roger. (Laughing)

04 07 21 52 CC Thank you.

04 07 21 53 CMP ..., was I?

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 07 43 -- BEGIN LUNAR REV 14

04 08 06 00 CC Falcon, Houston.

04 08 06 05 CDR-LM Houston, Falcon. Go.

04 08 06 08 CC Roger, Falcon. We're ready for your ASCENT BAT ontime and your ED BAT report.

04 08 06 18 CDR-LM Roger; Ed. The ASCENT BATS were on at 103:50:45, and I'll check the ED BATs now.

04 08 06 53 CDR-LM And, Houston, this is Falcon. Ed batteries both check at 37 volts.

04 08 06 57 CC Copy; 37 volts. And I have an update to your PDI pad.

04 08 07 06 CDR-LM Roger. Go ahead.

04 08 07 08 CC And, Falcon, give us POO and DATA, and we'll give you an up-link.

04 08 07 20 CDR-LM POO and DATA. Go ahead with the pad.

04 08 07 22 CC Roger. India 104:30:08.54; NOUN 61 crossrange, plus 000.33 and your DEDA's 231 entry, plus 569.43.

04 08 07 57 LMP-LM Ed, if you read ... uplink, we can not read you.

04 08 08 36 CC Falcon, Houston. How do you read now?

04 08 08 42 LMP-LM Read you loud and clear, Ed. I'm ready for that update now.

04 08 08 45 CC Roger. India 104:30:08.54; NOUN 61 crossrange, plus 0003.3; DEDA 231, plus 56943.

04 08 09 14 LMP-LM Roger. 104:30:08.54; crossrange, plus 0003.3; DEDA 231, plus 56943.

04 08 09 26 CC Readback is correct, and be advised that crossrange number means you're going from south to north. You'll probably see some roll during the PDI.

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04 08 09 39 LMP-LM Roger.

04 08 11 42 CC Endeavour, Houston. Standing by.

04 08 12 04 CC Falcon, Houston. Computer's yours.

04 08 12 09 CDR Roger. Thank you

04 08 12 13 CC Endeavour, Houston.

04 08 12 50 CC Endeavour, Houston.

04 08 13 11 CC Endeavour, Houston. How do you read?

04 08 13 19 CC Endeavour, Houston. You're on the scan limit. Go to REACQ when you're at the angles.

04 08 14 41 CC Endeavour, Houston. How do you read?

04 08 14 46 CMP Houston, Endeavour. Loud and clear.

04 08 14 48 CC Roger, Endeavour. I have an update for the PDI pad, India.

04 08 15 03 CMP Okay, Houston. Go ahead.

04 08 15 05 CC It's 104:30:08.54, A1.

04 08 15 17 CMP Understand. PDI is 104:30:08.54.

04 08 15 23 CC Good readback.

04 08 16 32 CC Endeavour, Houston. We're ready for AUTO on the HIGH GAIN please.

04 08 16 41 CMP Roger. AUTO.

04 08 18 42 CC Falcon, Houston.

04 08 18 47 LMP-LM Houston, Falcon. Go.

04 08 18 49 CC Roger. We did not see the 231 load go in. Could you verify that, please?

04 08 19 02 LMP-LM In work.

04 08 19 10 LMP LM There's the readout. I didn't put the 231 in.  
You want that also, Ed?

04 08 19 15 CC That is affirmative, Falcon.

04 08 19 46 CC Okay, Falcon. Thank you.

04 08 20 37 CDR-LM Hey, Houston, Falcon on VOX. How do you read?

04 08 20 40 CC Loud and clear, Dave.

04 08 20 44 CDR-LM Okay.

04 08 20 47 CDR-LM \*\*\* off.

04 08 21 19 LMP-LM Okay. PROPELLANT QUANTITY MONITORS, DESCENT 1.

04 08 21 21 CDR-LM \*\*\*

04 08 21 23 CDR-LM Okay; you ready for the DPS configuration card?

04 08 21 26 CDR-LM Roger.

04 08 21 27 LMP LM Okay; CBs on 11. DECA GIMBAL AC, closed.

04 08 21 31 CDR-LM DECA GIMBAL AC is closed.

04 08 21 33 LMP-LM \*\*\* Command OVERRIDE logic is closed. ATT CONTROL  
circuit breakers, all closed, except AEA, open.

04 08 21 39 CDR-LM Roger, verified.

04 08 21 41 LMP-LM RATE SCALE, 25 DEGREES PER SECOND.

04 08 21 43 CDR-LM 25.

04 08 21 44 LMP-LM \*\*\* AUTO CDR.

04 08 21 45 CDR-LM AUTO CDR.

04 08 21 46 LMP-LM ATTITUDE TRANSLATION, 4 JETs.

04 08 21 47 CDR-LM 4 JETs.

04 08 21 48 LMP-LM BALANCE COUPLE, ON.

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04 08 21 49 CDR-LM ON.  
04 08 21 50 LMP-LM ENGINE GIMBAL, ENABLE.  
04 08 21 51 CDR-LM ENABLE.  
04 08 21 52 LMP-LM COMMAND OVERRIDE, OFF.  
04 08 21 53 CDR-LM OFF.  
04 08 21 54 LMP-LM Abort, abort stage, RESET.  
04 08 21 55 CDR-LM RESET.  
04 08 21 56 LMP-LM DEAD BAND, MIN.  
04 08 21 57 CDR-LM MIN.  
04 08 21 58 LMP-LM \*\*\* control, 3, to MODE CONTROL.  
04 08 21 59 CDR-LM MODE CONTROL.  
04 08 22 00 LMP-LM PGNS, AGS to AUTO.  
04 08 22 01 CDR-LM AUTO, AUTO.  
04 08 22 02 LMP-LM Stop pushbutton, both reset.  
04 08 22 03 CDR-LM Both reset.  
04 08 22 05 LMP-LM Okay. The throttle, your's to MIN and mine to soft stop.  
04 08 22 09 CDR-LM Soft stop. And you're - you're clipping a little bit on the first part, Jim.  
04 08 22 17 LMP-LM Okay.  
04 08 22 29 LMP-LM We're down here where I can take VERB 40, NOUN 20.  
04 08 22 32 CDR-LM Okay. \*\*\* you.  
04 08 23 06 LMP-LM \*\*\* on.  
04 08 23 07 CDR-LM Say again.  
04 08 23 08 LMP-LM \*\*\* steering is in.

04 08 23 10 CDR-LM Okay.

04 08 23 18 LMP-LM Stand by for 5 minutes.

04 08 25 11 LMP-LM Five minutes.

04 08 25 12 CDR-LM Okay. \*\*\*

04 08 25 13 LMP-LM \*\*\* breaker is in. \*\*\* transmitter.

04 08 25 18 CDR-LM Attitude transmitter is 3.7; velocity's 3.8.

04 08 25 23 LMP-LM Stand by for 4 minutes for \*\*\*

04 08 25 36 LMP-LM Reading me any better, now?

04 08 25 37 CDR-LM Yes.

04 08 26 09 CDR-LM Okay. GO for the final trim.

04 08 26 11 CC And, Falcon, you are GO for PDI.

04 08 26 19 CDR-LM Roger. GO for PDI.

04 08 26 38 LMP-LM \*\*\*

04 08 26 43 CDR-LM Okay. Endeavour, how do you read the Falcon?

04 08 26 45 CMP Falcon, Endeavour. Reading you loud and clear there, Dave.

04 08 27 08 CDR-LM Endeavour, Falcon. If you're reading, we're not reading you.

04 08 27 13 CMP Falcon, Endeavour. How do you read now?

04 08 27 22 CC Falcon, Endeavour is reading you loud and clear.

04 08 27 27 CDR-LM Okay; fine. Thank you.

04 08 27 40 LMP-LM Stand by for 1 minute.

04 08 27 41 CDR-LM Okay.

04 08 27 51 LMP-LM \*\*\* oxidizer - They're low, aren't they?

04 08 28 00 CDR-LM Yes.

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04 08 28 02 LMP-LM \*\*\* cycle the cir\*\*\*

04 08 28 04 CDR-LM No. Thats all right. \*\*\* accurate later on.

04 08 28 14 LMP-LM Houston, we're reading 87 and 85 on the FUEL QUANTITY.

04 08 28 19 CC Roger. Roger. It'll come up here in a moment. It looks good to us, Jim.

04 08 28 35 LMP-LM Okay.

04 08 29 09 CC MARK. One minute.

04 08 29 13 CDR-LM Okay. MASTER ARM is ON; I have two lights.

04 08 29 38 CDR-LM AVERAGE G. ARMED the DESCENT. We have guidance. Stand by for ullage.

04 08 29 49 LMP-LM Standing by for ullage.

04 08 30 03 LMP-LM Ullage.

04 08 30 05 CDR-LM GO for the PRO. \*\*\*

04 08 30 12 CDR-LM Auto ignition. Eleven percent; the OVERRIDE is ON.

04 08 30 37 CDR-LM Throttle up.

04 08 30 43 LMP-LM Okay. MASTER ARM, OFF.

04 08 30 44 CDR-LM Okay. MASTER ARM is coming OFF. Lights are OFF. Looks stable.

04 08 30 52 LMP-LM H-dot's looking a little higher than normal.

04 08 30 56 CDR-LM Okay. We're a little higher than normal.

04 08 31 11 CDR-LM One minute.

04 08 31 13 LMP-LM H-dot's about 20 high.

04 08 31 16 CDR-LM Okay.

04 08 31 18 LMP-LM Fuel is a little low; oxidizer is a little high.

04 08 31 25 CC Falcon, Houston. A 169, minus 02800.

04 08 31 37 CDR-LM Roger, minus 2 - minus 02800. Standing by for the ENTER.

04 08 31 43 CC You're GO for ENTER.

04 08 31 46 CDR-LM GO for ENTER.

04 08 32 07 CC Falcon, Houston. You're GO at 2 minutes.

04 08 32 13 CDR-LM Roger, GO at 2. PGNS and AGS compare.

04 08 32 18 LMP-LM H-dot's a little high. We're about 2 percent low on fuel.

04 08 32 23 CDR-LM Okay.

04 08 32 24 LMP-LM At 1.

04 08 32 41 CC Fal - -

04 08 32 42 LMP-LM 3 ... good - -

04 08 32 43 CC Falcon, Houston. We're - -

04 08 32 44 LMP-LM H-dot's 4 high.

04 08 32 47 CC Falcon, Houston. We're happy with your fuel.

04 08 32 53 CDR-LM Okay; that's nice to hear.

04 08 33 09 CDR-LM Okay; 3 minutes showing to zero.

04 08 33 13 LMP-LM Altitude is good. H-dot's right on, Dave.

04 08 33 16 CDR-LM Good.

04 08 33 17 LMP-LM Still reading 2-percent low, but Houston's happy with it.

04 08 33 21 CC Falcon, Houston. You're GO at 3.

04 08 33 25 CDR-LM Roger, GO at 3.



04 08 33 29 CDR-LM Altitude light is out. We have a 3400 DELTA-H. Velocity light is out. DELTA-H looks good up here, Houston. What do you think?

04 08 33 45 CC Falcon, Houston. We agree with DELTA-H. ACCEPT.

04 08 33 52 CDR-LM Roger. ACCEPTING. It's going in.

04 08 33 58 LMP-LM And, Houston, ED batteries check.

04 08 34 01 CC Copy.

04 08 34 12 LMP-LM 4 minutes. Altitude is 2000 high.

04 08 34 15 CDR-LM Okay.

04 08 34 16 LMP-LM About 3 low. Fuel and oxidizer looking good. \*\*\* in 1 percent.

04 08 34 21 CDR-LM Okay. PGNS and AGS look good.

04 08 34 42 LMP-LM \*\*\* 30. Altitude's 4000 high, H-dot's right on. Fuel and oxidizer good.

04 08 34 48 CDR-LM Okay.

04 08 34 50 LMP-LM DELTA-H is 2000.

04 08 35 11 LMP-LM \*\*\* 5 minutes. Altitude, 4000 high. H-dot, about 9 high.

04 08 35 18 CDR-LM Okay.

04 08 35 19 CC Falcon, Houston. You're GO at 5, and your fuel quantity looks good here.

04 08 35 25 CDR-LM Okay; understand. GO at 5.

04 08 35 42 LMP-LM Altitude - altitude is 3000 high. H-dot, 10 high. Fuel and oxidizer, good.

04 08 35 50 CDR-LM Okay.

04 08 36 13 LMP-LM Altitude, 2000 high. H-dot, 6 high.

04 08 36 16 CDR-LM Okay. It's coming in.

04 08 36 17 LMP-LM Oxidizer, good.

04 08 36 19 CDR-LM And the DELTA-H is looking pretty good.

04 08 36 26 CC Falcon, Houston. You're GO at 6.

04 08 36 31 CDR-LM Roger. GO at 6.

04 08 36 34 CDR-LM 30 K.

04 08 36 43 LMP-LM Altitude, a thousand high. H-dot, about 4 high.

04 08 36 50 CDR-LM Okay. X-axis override in out.

04 08 36 56 CC Falcon, Houston. Throttle down 7 plus 23.

04 08 37 03 CDR-LM Roger. 7 plus 23.

04 08 37 12 LMP-LM Seven minutes. A thousand high. H-dot just about on. Oxidizer's running just about 1 percent low.

04 08 37 33 LMP-LM Throttle down.

04 08 37 34 CDR-LM Throttle down. 7 plus 22.

04 08 37 43 LMP-LM \*\*\* 30. \*\*\*

04 08 37 46 CDR-LM Okay.

04 08 37 47 LMP-LM Oxidizer, good.

04 08 37 48 CDR-LM Okay.

04 08 37 49 LMP-LM Check \*\*\* manual.

04 08 37 55 CDR-LM No flags. Looks good.

04 08 38 08 CC Falcon, Houston. DESCENT 1.

04 08 38 14 CDR-LM Roger. DESCENT 1, and looks like P64 at 923.

04 08 38 19 CC Roger.

04 08 38 38 LMP-LM \*\*\*

04 08 38 41 CDR-LM MARK.

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04 08 38 44 LMP-LM Good.

04 08 39 17 CC Falcon, Houston. We expect you may be a little south of the site, maybe - -

04 08 39 18 LMP-LM Okay. Coming up on 8000.

04 08 39 19 CC - - 3000 feet.

04 08 39 24 CDR-LM Okay.

04 08 39 32 LMP-LM 7000 feet.

04 08 39 35 LMP-LM P64

04 08 39 36 CDR-LM Okay.

04 08 39 37 LMP-LM \*\*\* LPD.

04 08 39 40 CDR-LM LPD. Coming right.

04 08 39 45 LMP-LM 40

04 08 39 47 LMP-LM 5000 feet. 39. 39. 38. 39.

04 08 39 56 LMP-LM 4000 feet. 40. 41. 45. 47. 52.

04 08 40 06 LMP-LM 3000 feet. 52. 52. 51. 50. 47. 47.

04 08 40 21 LMP-LM 2000 feet. 42.

04 08 40 26 CDR-LM Okay. I got a good spot.

04 08 40 28 LMP-LM Good. 42. 43.

04 08 40 31 LMP-LM 800 feet.

04 08 40 32 CC Falcon, Houston. You're GO for landing.

04 08 40 33 LMP-LM 44. 45.

04 08 40 36 CDR-LM Roger. GO for landing.

04 08 40 39 LMP-LM 44. 45.

04 08 40 43 LMP-LM 1000 feet. 45.

04 08 40 47 LMP-LM 900. 45.  
04 08 40 49 LMP-LM 800. 45.  
04 08 40 53 LMP-LM 700. 46.  
04 08 40 58 LMP-LM 600. 48.  
04 08 41 02 LMP-LM 500. 49. Minus 17. Minus 15.  
04 08 41 08 LMP-LM 400 and minus 14. \*\*\* P66?  
04 08 41 13 CDR-LM Okay.  
04 08 41 15 LMP-LM 300 feet. Minus 11. Minus 11.  
04 08 41 22 LMP-LM 250. Minus 11; 9 percent fuel.  
04 08 41 28 LMP-LM 200. Minus 11.  
04 08 41 31 LMP-LM 150. Minus 7, minus 6.  
04 08 41 36 LMP-LM 120 feet. Minus 6.  
04 08 41 39 CDR-LM Okay. I've got \*\*\*  
04 08 41 40 LMP-LM Minus 5; 100 feet at 5; 9-percent fuel; minus 5.  
04 08 41 46 LMP-LM 80 at 5. Minus 3.  
04 08 41 51 LMP-LM 60 at 3.  
04 08 41 54 LMP-LM 50 at 3. Crosspointers look good.  
04 08 41 58 LMP-LM 40 at 3.  
04 08 42 02 LMP-LM 30; 3.  
04 08 42 05 LMP-LM 25; 2; 7-percent fuel.  
04 08 42 12 LMP-LM 20 at 1.  
04 08 42 14 LMP-LM 15 at 1. Minus 1, minus 1; 6-percent fuel.  
04 08 42 22 LMP-LM 10 feet. Minus 1.

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04 08 42 27 LMP-LM 8 feet. Minus 1.  
04 08 42 29 LMP-LM CONTACT.  
04 08 42 34 LMP-LM Man!  
04 08 42 36 CDR-LM Okay, Houston. The Falcon is on the plain at Hadley.  
04 08 42 40 CC Roger. Roger, Falcon.  
04 08 42 48 LMP-LM No denying that. We had contact.  
04 08 43 08 CDR-LM Okay. ECS looks good.  
04 08 43 14 LMP-LM Okay.  
04 08 43 16 CDR-LM \*\*\* open. \*\*\* looks steady. Did you get the LANDING RADAR open?  
04 08 43 23 LMP-LM Yes.  
04 08 43 24 CDR-LM Okay.  
04 08 43 31 CDR-LM Standing by for T-1.  
04 08 43 32 LMP-LM Roger.  
04 08 43 35 CC Standby.  
04 08 43 40 CDR-LM Okay. Looks good on board.  
04 08 43 46 CC Falcon, Houston. You're STAY T-1.  
04 08 43 51 CDR-LM Roger; stay for T-1.  
04 08 43 55 LMP-LM Okay.  
04 08 43 57 CDR-LM Okay. Let's get on with the little checklist.  
04 08 45 01 CDR-LM Yes.  
04 08 45 02 CC Falcon, we have a NOUN 43s.  
04 08 45 07 CDR-LM Okay.  
04 08 45 21 CDR-LM Is that the pad for P12, Jim?

04 08 46 38 CDR-LM See the little elevation in front of us there?  
04 08 46 40 LMP-LM ...  
04 08 46 43 CDR-LM No, not out across the rille.  
04 08 46 44 LMP-LM No, I mean ...  
04 08 46 46 CDR-LM Oh, hard to tell.  
04 08 47 15 CDR-LM No, we're not there. We're not too far from Salyut. I did find that, - I think.  
04 08 47 25 CDR-LM One foot per second too.  
04 08 48 33 CDR-LM Roger.  
04 08 48 38 CC Falcon, Houston. You're stay for T-2.  
04 08 48 44 CDR-LM Okay. Stay for T-2.  
04 08 49 20 CC Endeavour, Houston. Are you still with us?  
04 08 49 26 CMP Roger, Houston. Endeavour standing by.  
04 08 49 29 CC Roger. Your buddies are on the ground, and we'll be along with you in a little while.  
04 08 49 35 CMP Roger, Ed. I listened to most of it. Could pick them up VHF all the way down, and, in fact, I just now lost contact with them.  
04 08 49 44 CC Roger.  
04 08 49 47 CMP I had a beautiful view of the landing site going over, but I couldn't see anything.  
04 08 49 52 CC We copy Al.  
04 08 57 55 CC Falcon, Houston.  
04 08 58 00 CDR-LM Houston, Falcon. Go.  
04 08 58 01 CC Roger. On page 1-2 where you get to - to setting your S-BAND to SLEW, I've got some new angles for you because of your attitude.

04 08 58 12 CDR-LM Okay.

04 08 58 13 CC It's a minus 71 - -

04 08 58 14 CDR-LM Go ahead.

04 08 58 15 CC - - and a minus 58. Sorry, plus 71 and minus 58.

04 08 58 22 CDR-LM Copied - Okay; a plus 71 and a minus 58.

04 08 58 29 CC That's affirm.

04 08 58 32 CDR-LM Okay, Ed - Okay, Ed. We'll give you a little quick summary here before we get on with it. The general terrain looks exactly like what you had on 14. And many of the craters that we use for ID were completely washed out with no shadows, and I - that's probably because the topo data - data just wasn't that good. And I think we're setting a little off in attitude, but we're in fairly good shape. And, when we get around to the SEVA, we'll try and pin down the location exactly. I had a little bit of dust at 150 and completely obscured at 50 feet. It was IFR from then on down. And the rest of it, you can probably see it as well as we could.

04 08 59 18 CC Okay, Dave. We copy. Thank you.

04 08 59 23 CDR-LM Roger.

04 08 59 40 CC Falcon, Houston. Do you have an estimate of your landing site?

04 08 59 50 LMP-LM There's a long pause there, Ed.

04 08 59 53 CC Roger.

04 08 59 59 CDR-LM I think - as best I could find, I think we're fairly close to Salyut. But I guess the best thing to do is to press on and get to - the SEVA where we can take a look around. It's very hummocky, and, as you know, in this kind of terrain, you can hardly see over your eyebrows. There's very little to tell us exactly where we are in our local position.

04 09 00 24 CC Completely understand, Dave.

04 09 00 29 CDR-LM Okay, thank you. You can probably explain it to the folks back there better than I could.

04 09 00 35 CC Dick wants to know where Falcon Crater is, if you can see it?

04 09 00 42 CDR-LM I think we're in it.

04 09 00 45 CC That's what we figured.

04 09 00 50 CC Endeavour, Houston.

04 09 00 56 CMP Houston, Endeavour. Go ahead.

04 09 00 57 CC Roger. I have your camera pads for you.

04 09 01 04 CMP Okay, stand by 1.

04 09 01 59 CMP Okay, Houston; Endeavour. Go ahead.

04 09 02 02 CC Roger, Endeavour. REV 15 map camera; pad T-start, 105:52:58; T-stop, 106:17:57. And your camera pa -

04 09 02 32 CMP Roger. Houston - -

04 09 02 33 CC - - pan camera pad is the same.

04 09 02 37 CMP Okay, Houston. Understand mapping camera and pan camera pads are the same. T-start, 105:52:58 and T-stop 106:17:57.

04 09 02 47 CC That's correct. Your REV 16 camera - map camera pad. Endeavour, Houston, give us P00 and ACCEPT, and we'll up-link while we're talking here.

04 09 03 08 CMP Okay. You've got ACCEPT, and I'm in a middle of a maneuver right now.

04 09 03 12 CC Okay. Leave it in P20.

04 09 03 18 CMP Okay.

04 09 03 21 CC And your T-start 106 - -

04 09 03 22 CMP ... rev 16?



Tape 68/16  
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04 09 03 24 CC Roger. T-start, 106:56:51; T-stop, 108:55:19.

04 09 03 39 CMP Understand. T-start, 106:56:51. T-stop, 108:55:19.

04 09 03 52 CC That's a good readback, Al.

04 09 05 03 CC Endeavour, Houston. If you'll give is an ENTER, we can go ahead with the load.

04 09 05 11 CMP Okay.

04 09 05 27 LMP-LM Houston, are you copying the AGS CAL values?

04 09 05 34 CC That's affirm, Falcon.

04 09 06 47 CC Endeavour, Houston. The computer's yours.

04 09 06 52 CMP Roger; Houston.

04 09 07 08 CC Endeavour and Falcon, Houston. Could I talk with - a minute.

04 09 07 20 CMP Houston, this is Endeavour. Go ahead.

04 09 07 26 CC And Falcon, Houston.

04 09 07 33 CDR-LM Go ahead, Houston, Hadley Base here.

04 09 07 36 CC Okay, crew. The President sends his regards through Doctor Fletcher, and I read: "The President sends his congratulations to the entire ground team and the Apollo 15 crew on a successful landing and sends his best wishes for the rest of the mission."

04 09 08 00 CDR-LM Roger; Houston. Thank you. Our appreciation - -

04 09 08 02 CMP Houston, this is Endeavour. Thank you very much.

04 09 08 03 CDR-LM - - to the President, and I'd like to thank you too for the support we've had.

04 09 08 07 CC Roger. Roger.

04 09 08 16 CDR-LM And, Houston, the Hadley Base here. Tell those geologists in the back room to get ready because we've really got something for them.

04 09 08 24 CC Which group of guys in the back room?

04 09 10 56 CMP Okay Ed. If you've got the gyro torquing angles, I'll torque them on the minute.

04 09 11 05 CC Roger. We copy.

04 09 11 13 CMP Okay, Houston; Endeavour. I'll wait until the even minute to torque them out.

04 09 11 18 CC Roger. On the even minute.

04 09 11 26 CC Falcon, Houston. Stand by on your stars, and let us give you some new ones.

04 09 11 33 CDR-LM Okay. Standing by.

04 09 11 36 CC Okay. The first pair, we will have star 3 in detent 3; star 12 in detent 6; second pair - -

04 09 11 48 CDR-LM 3 in detent 3 and 12 in detent 6.

04 09 11 52 CC That's affirm. Second pair will have star 61, that's Epsilon Orionis, in detent 6; and NOUN 88, plus .10975, plus .99373, minus .02127. Star 122, Schedar, is your second. It's in detent 3, NOUN 88, plus .54566, plus .09353, plus .83277. And if you're questioning, there weren't any other noun star pairs available, apparently.

04 09 12 59 LMP-LM Okay, Ed. I understand. For the first P57, it's 3 in detent 3 and 12 in detent 6. And then for the second pair, it's star 61 in detent 6, and the NOUN 88 values are plus .10975, plus .99373, minus .02127. And in star 122, in detent 3, plus .54566, plus 09353, and plus .83277.

04 09 13 38 CC That's a good readback, Jim.

04 09 14 01 CC Falcon, Houston. Your vent's complete. You can terminate.

04 09 14 08 CDR-LM Roger. Thank you.

04 09 19 38 CC Endeavour, Houston. 1 minute until LOS. You're looking good from here.

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04 09 20 03 CC Endeavour, Houston. 30 seconds to LOS. Do you  
read?

04 09 20 09 CMP Houston, Endeavour. Roger.

04 09 20 13 CC And you look good from the ground, Al. We'll  
see you on the other side.

04 09 20 18 CMP Okay, Ed.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 09 22 11 CC Falcon, we copy your NOUN 93.

04 09 22 17 CDR-LM Okay; we'll torque them at 22:30.

04 09 22 21 CC Stand by 1.

04 09 22 25 CDR-LM Standing by.

04 09 22 31 CC Okay; proceed with your torquing.

04 09 22 36 CDR-LM Underway.

04 09 22 48 CDR-LM Okay, Houston. Standing by on an RLS.

04 09 22 54 CC Stand by 1.

04 09 22 58 CDR-LM Okay.

04 09 23 04 CC Okay; let's reject those, Dave.

04 09 23 09 CDR-LM All right, reject.

04 09 25 53 CC Falcon, Houston. When the NOUN 88 comes up again, hold it, please.

04 09 26 00 CDR-LM Okay, Houston. I didn't copy the name of the star, but how about Castor or Pollux or Betelgeuse or somebody like that?

04 09 26 13 CC Okay; stand by. We'll tell you which one it is; we think it's in the middle of the belt, Dave.

04 09 26 17 CDR-LM Which one, Jim?

04 09 26 22 LMP-LM Alni Lam - Alni Lam.

04 09 26 23 CDR-LM Yes, we got that.

04 09 26 24 LMP-LM Middle star.

04 09 26 25 CC Roger; it's the middle star.

04 09 26 30 CDR-LM Sure, old Aludiman!

04 09 26 33 CC You're right.

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04 09 26 43 CDR-LM It's nice to see friends.

04 09 26 56 CDR-LM Okay, Houston. We can use this one, but we don't have the NOUN 88 for it.

04 09 27 03 CC Yes, you do - That's what we gave you, Dave.

04 09 27 09 CDR-LM Okay; we'll try it again.

04 09 27 31 CDR-LM Houston, why don't you read us the NOUN 88s again then, please?

04 09 27 34 CC Roger. Plus .10975.

04 09 27 43 CDR-LM Go.

04 09 27 45 CC Plus .99373.

04 09 27 56 CDR-LM Go.

04 09 27 57 CC Minus .02127.

04 09 28 05 CDR-LM Okay; that's exactly what we just loaded. We'll see where it takes us.

04 09 28 10 CC We're seeing it on the last register; we're seeing a minus 02124.

04 09 28 22 CDR-LM Sure, that's just a round-off.

04 09 28 25 CC Yes, you're probably right.

04 09 28 30 CDR-LM And - let's take a look at the NOUN 79, and that's not even close.

04 09 28 36 CC Okay.

04 09 28 46 CC Dave, we specified it for detent 6, and the computer's giving you detent 5.

04 09 28 54 CDR-LM I should have noticed that, Ed; I'm sorry.

04 09 29 15 CC Okay, Dave - the spiral should be about 330 and the cursor about 148, if that helps.

04 09 29 25 CDR-LM Right on.

04 09 34 10 CC Falcon, Houston.

04 09 34 14 CDR-LM Go.

04 09 34 15 CC If you'd like some help being coached on to this next star, it's in Cassiopeiae, and we're suggesting detent 3; be a spiral of 181, a cursor of 23, and it should be just to the left of Navi - the bright star to the left of Navi.

04 09 34 39 CDR-LM Okay.

04 09 34 41 CC And we'll give you the NOUN 88 ...

04 09 34 42 CDR-LM ... Roger.

04 09 34 44 CC That's affirm.

04 09 34 47 CDR-LM Okay.

04 09 34 57 CDR-LM Okay; we'll cycle back, Ed.

04 09 35 49 CC Okay, Falcon; Houston. Observed your cycle back. We're going to have to rerun that first star again.

04 09 35 58 CDR-LM Yes; Roger, Ed. The reason I did that was because we need to stick an erasable load in here on the NOUN 79.

04 09 37 25 CDR-LM Okay, Houston. It doesn't look like the program is running exactly light - right.

04 09 37 31 CC What seems to be the problem, Dave - it looks good from here.

04 09 37 39 CDR-LM Okay, we'll try; but we - we're in a loop here where it won't accept detent 6, I believe, but we'll press on.

04 09 37 48 CC It's always going to give the first one it computes, Dave. Change it to 6 and go ahead.

04 09 41 15 CC Okay, Dave, you ready for your second NOUN 69 - NOUN 88s?

04 09 41 21 CDR-LM Well, I think we've got them on board if that's what you read us.

04 09 41 24 CC Roger. You're going great; keep going.

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04 09 42 17 CDR-LM Okay, Ed; I have Schedar.

04 09 42 19 CC Very good, Dave.

04 09 45 40 CDR-LM Okay, Houston; the torquing angles are up.

04 09 45 44 CC Roger. Stand by.

04 09 46 06 CC Okay, PRO.

04 09 46 11 CDR-LM Okay; they're in. And how about the RLS? Do you want to take it?

04 09 46 23 CC Negative, Falcon.

04 09 46 27 CDR-LM Roger on the negative.

04 09 46 32 CC Okay, Falcon; Houston. We need to reset - redesignate the rendezvous radar - to 180, 270 00 for thermal protection.

04 09 46 49 CDR-LM 180 and 270.

04 09 46 53 CC That's affirm.

04 09 47 17 CC And, Falcon; Houston. As soon as you get the radar parked, we're ready for the E-MOD dump.

04 09 47 25 CDR-LM Roger.

04 09 49 27 CDR-LM Okay, Houston; here comes your E-MOD dump.

04 09 49 30 CC Roger; ready.

04 09 49 47 CDR-LM And, Houston, we'll be standing by for your STAY/NO STAY.

04 09 49 54 CC And Roger; you have a STAY.

04 09 49 59 CDR-LM Got a STAY; thank you.

04 09 50 49 CC And, Falcon; Houston. We're going to delete the 10-minute delay - so you can go right into POC and power down.

04 09 51 00 CDR-LM Roger.

04 09 52 19 CDR-LM And, Houston; 15. ED batteries both check at 37.

04 09 52 24 CC Roger; Roger. ED BATs.

04 09 55 45 CC And, Falcon; Houston. We're having changeover down here; didn't get a chance to say real good job on that descent.

04 09 55 57 CDR-LM Okay; thank you, Ed. And appreciate all your help, too. The comm was super today, and everybody back there was right on top of it all the way. We sure - sure appreciate that help.

04 09 56 07 CC And looked real good from here, Dave. We'll see you on lift-off.

04 09 56 13 CDR-LM Okay, thanks Ed-o.

04 09 57 01 CC Hello, Falcon; this is Houston.

04 09 57 06 CDR-LM Hello there, Houston; how are you?

04 09 57 10 CC Super down here, Dave and Jim. From what I heard, it was not only a good landing, it was a great landing. And it sounds like you didn't even bend anything.

04 09 57 22 CDR-LM Well, I hope not, Joe. But we're sure in a fine place here. We can see St. George; it looks like it's right over a little rise. I'm sure it's much farther than that. We can see Bennett Hill. We see something off at our - like - 1 o'clock that's a pretty good elevation — we're not too sure of that — but we'll give you some more detail - detail later on.

04 09 57 44 CC Roger. We're standing by.

04 09 58 55 CC Falcon, Houston.

04 09 59 00 CDR-LM Go, Houston.

04 09 59 02 CC Dave, we've got some vital questions down here. First, did you see the rille on the way down?

04 09 59 12 CDR-LM Sure, Joe - easy.



04 09 59 16 CC Roger. And did you read the VHF call from Endeavour right shortly before the landing?

04 09 59 26 CDR-LM Negative.

04 09 59 31 CC Roger.

04 09 59 35 CDR-LM Why? Did he have something to say?

04 09 59 39 CC I'm sure he did, Dave, but we're wondering if you ever heard him call you on VHF - It sounds like we're going to have to do a VHF comm check.

04 09 59 51 CDR-LM No, we tried that comm check 3 minutes prior to PDI and we didn't get - we got no response, and Houston verified that the Endeavour could hear us, but we did not hear him.

04 10 00 05 CC Roger. We copy. And we have REV's 16 through 20 lift-off times when you're ready.

04 10 00 13 CDR-LM Okay; give us 5 minutes to clean up the cockpit here.

04 10 00 23 CC Roger, Dave. We're standing by. And be advised the backroom's doing slow rolls just from your first description there.

04 10 00 39 CDR-LM Okay, we've got a lot more coming. Stand by.

04 10 04 05 LMP-LM Okay, Joe; this is Jim. I'm standing by to copy some lift-off data.

04 10 04 13 CC Roger, Jim. Lift-off time for T-16, 108:39:45; T-17, 110:38:00; T-18, 112:36:13; T-19, 114:34:26; and T-20, 116:32:39. Over.

04 10 04 59 LMP-LM Okay; the readback, Joe. 108:39:45; 110:38:00; 112:36:13; 114:34:26; 116:32:39. Over.

04 10 05 16 CC Roger, Jim. Readback's correct. Sounds good.

04 10 11 05 CDR-LM Houston, Falcon.

04 10 11 08 CC Go ahead.

04 10 11 14 CDR-LM Say, I think we need a couple of words on the PLSS stowed on the cabin floor. We've got the two pins out on the side and can't seem to get it up. Do you have any good words on that?

04 10 11 27 CC Stand by, Dave.

04 10 11 31 CDR-LM Okay.

04 10 12 47 CC Falcon, this is Houston.

04 10 12 53 CDR-LM Go ahead.

04 10 12 54 CC Roger; Dave. We suggest you try first holding the bracket at the front in place while you push the PLSS aft and jiggle it.

04 10 13 09 CDR-LM Okay.

04 10 16 16 CC Falcon, Houston. Any luck with the PLSS?

04 10 16 23 CDR-LM Roger; sorry. Yes. We got it up; that worked fine.

04 10 16 44 CC And, Dave, we thought the transmission time between Earth and Moon was unusually long there.

04 10 16 53 CDR-LM It sort of was.

04 10 23 19 CC Hadley Base, this is Houston.

04 10 23 33 CDR-LM Go ahead there, Joe; this is Hadley Base.

04 10 23 37 CC Dave and Jim, while you're working there, thought you'd be interested in the report that the SIM bay is giving us some remarkable data. It seems to be working beautifully.

04 10 23 51 CDR-LM Good; we're - hope we compete with it.

04 10 32 24 CDR-LM Okay, Houston; Hadley base on VOX. How do you read?

04 10 32 28 CC Okay, Dave; you're loud and clear.

04 10 32 33 CDR-LM Okay, we're configured; and let's ...

04 10 32 37 LMP-LM Joe, how do you read me?

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04 10 32 39 CC Five by, Jim; sounds great.

04 10 32 44 CDR-LM Okay - Okay, we're configured; we're down to helmet and glove donning, and \*\*\*

04 10 33 11 CDR-LM Okay; red to red and blue to \*\*\* Position mikes; don the helmets.

04 10 33 23 LMP-LM I keep sliding to your side for some reason.

04 10 33 28 CDR-LM You're attracted to me.

04 10 33 31 LMP-LM While in the LM - while I was in the LM, it was the other way around; I was sliding to the right.

04 10 33 45 LMP-LM Okay, don the helmets and don the LEVAs.

04 10 33 53 LMP-LM Pictures first as per usu\*\*\*

04 10 33 59 CC Roger, Dave and Jim; we copy. And just as a reminder, we're starting to bite into the sleep period a little - a little bit.

04 10 34 08 CDR-LM Okay; understand.

04 10 34 20 CDR-LM Okay; your helmet's locked. And did you do \*\*\*

04 10 34 48 CDR-LM Okay, \*\*\* locked.

04 10 35 32 CDR-LM \*\*\* today, aren't they?

04 10 35 33 LMP-LM \*\*\* are.

04 10 35 50 LMP-LM Okay.

04 10 35 51 CDR-LM Okay; verify the following: helmet and visors alined and adjusted. Yours are. Let me check O<sub>2</sub>.  
Okay; red ones, lock, lock; blue, lock, lock; the gas connectors both in a lock, lock.

04 10 36 05 LMP-LM Let me check yours. Okay; yours are okay.

04 10 36 13 CDR-LM Okay; PGA diverter valves to horizontal?

04 10 36 15 LMP-LM That's verified.

04 10 36 16 CDR-LM Okay, don EV gloves?

04 10 37 05 LMP-LM Okay, my gloves are on.

04 10 37 06 CDR-LM All right. My gloves are on. Let me check yours.  
Okay, locked and locked. Check mine.

04 10 37 16 LMP-LM Okay, you're locked.

04 10 37 18 CDR-LM Okay.

04 10 37 19 LMP-LM PLSS integrity check. Okay, if you'll read to me.

04 10 37 23 CDR-LM Okay. SUIT GAS DIVERTER, PULL-EGRESS; verify?

04 10 37 27 LMP-LM Verified.

04 10 37 28 CDR-LM CABIN GAS RETURN, EGRESS; verify?

04 10 37 30 LMP-LM Verified.

04 10 37 31 CDR-LM SUIT CIRCUIT RELIEF, CLOSE?

04 10 37 32 LMP-LM CLOSE.

04 10 37 33 CDR-LM PRESS REG A to EGRESS?

04 10 37 35 LMP-LM A to EGRESS.

04 10 37 36 CDR-LM PRESS REG B, DIRECT O<sub>2</sub>?

04 10 37 38 LMP-LM DIRECT O<sub>2</sub>.

04 10 37 40 CDR-LM Okay, monitor cuff gage to 3.7 to 4.0.

04 10 37 43 LMP-LM Okay.

04 10 37 46 CDR-LM Okay, cabin pressure's coming up. \*\*\* suit  
pressure's coming up - in the cabin.

04 10 37 53 LMP-LM We might as well turn the urine line heater off.

04 10 37 56 CDR-LM Yes. We're it for now.

04 10 38 32 CDR-LM Okay, mine's off on the peg on the cuff gage.

04 10 38 35 LMP-LM You want mine? Want to pick it up at 3.7?

04 10 38 41 CDR-LM Yes.

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04 10 38 49 LMP-LM Okay, there's 3.5.

04 10 38 51 CDR-LM Right.

04 10 38 53 LMP-LM 3.6, 3.65. Okay. I'm EGRESS. Reading 3.6.

04 10 39 03 CDR-LM Okay. One minute.

04 10 39 06 LMP-LM Okay. You hack the time?

04 10 39 11 CDR-LM Yes.

04 10 39 54 CC Dave and Jim, while you're timing that minute out, be advised that En - Endeavour is passing overhead. Al's got you in sight, and I suspect there are two big cameras that'll be brought to bear on you a little later on.

04 10 40 11 CDR-LM Okay, very good. I'll bet Al can tell you where we are better than we can.

04 10 40 15 CC Al says you're - -

04 10 40 16 LMP-LM Okay, Joe; that's a minute, and - -

04 10 40 17 CC - - just north of Index.

04 10 40 18 LMP-LM - - I've got - -

04 10 40 24 CDR-LM North of Index, huh?

04 10 40 28 LMP-LM Okay, I'm reading 3.4.

04 10 40 31 CDR-LM Okay.

04 10 40 33 LMP-LM Okay. I'm reading 3.4. That's 2/10ths in a minute.

04 10 40 40 CDR-LM Okay, SUIT CIRCUIT RELIEF to AUTO.

04 10 40 43 LMP-LM CIRCUIT RELIEF going AUTO.

04 10 40 50 CDR-LM Suit circuit pressure should go down to 4.8.

04 10 41 15 CC And, Falcon, you are GO for depress.

04 10 41 20 CDR-LM Roger; understand GO for depress.

04 10 41 27 CDR-LM Okay, we're down almost to 5 on the gage.

04 10 41 32 LMP-LM Okay.

04 10 41 33 CDR-LM CB(16) ECS: CABIN REPRESS, open.

04 10 41 36 LMP-LM CABIN REPRESS coming open. Open!

04 10 41 42 CDR-LM Okay, overhead or forward dump valve OPEN, then AUTO, at 3 and a half.

04 10 41 51 LMP-LM Going OPEN.

04 10 41 53 CDR-LM I'll call you at 3.5.

04 10 41 54 LMP-LM Okay.

04 10 41 56 CDR-LM 4.5, 4.0.

04 10 42 01 CDR-LM MARK; 3.5.

04 10 42 02 LMP-LM Okay, back to AUTO.

04 10 42 06 CDR-LM Verify cabin pressure 3.5, LM suit circuit lockup at 4.3. Okay, the LM suit circ\*\*\* about 4.5.

04 10 42 22 LMP-LM And it's \*\*\* ... \*\*\*

04 10 42 33 CDR-LM Locked up?

04 10 42 35 LMP-LM Yes, it looks like it's locked up.

04 10 42 36 CDR-LM Say again?

04 10 42 37 LMP-LM Yes.

04 10 42 38 CDR-LM Okay, overhead - I mean, forward dump valve to OPEN and verify LM suit circuit 3 \*\*\*

04 10 42 44 LMP-LM Okay, I'm going OPEN.

04 10 43 00 CDR-LM Okay, coming off the peg.

04 10 43 09 LMP-LM Ready to turn the card?

04 10 43 11 CDR-LM Yes. Hold it.

04 10 43 32 LMP-LM I'll hold it if you'll push it on there.

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04 10 43 34 CDR-LM Okay. Okay, hatch opening.

04 10 43 41 LMP-LM Okay.

04 10 43 42 CDR-LM Partially open the over - head hatch.

04 10 43 47 LMP-LM Okay, I'll read to you.

04 10 43 48 CDR-LM Okay, go.

04 10 43 51 LMP-LM Partially open the overhead hatch.

04 10 44 02 CDR-LM Okay.

04 10 44 06 LMP-LM Open, Dave?

04 10 44 08 CDR-LM Yes. I guess. Yes, \*\*\* Okay, it's partially open.

04 10 44 12 LMP-LM Okay, I'm going to go AUTO on the dump valve here.

04 10 44 15 CDR-LM Okay.

04 10 44 17 LMP-LM Okay, I'm AUTO on the forward dump valve.

04 10 44 19 CDR-LM Okay.

04 10 44 20 LMP-LM Okay. Overhead hatch: full open and latched.

04 10 44 22 CDR-LM Okay, coming full open.

04 10 44 29 CDR-LM Move over some, Jim?

04 10 44 33 CC Dave and Jim, Houston.

04 10 44 37 CDR/  
LMP-LM Go ahead.

04 10 44 38 CC Roger. Endeavour places you very near November Crater, very close to November Crater.

04 10 44 47 CDR-LM Okay. A little short, huh?

04 10 44 54 CC A little short and a little north.

04 10 44 55 LMP-LM Okay, Dave, you got the hatch open?

04 10 45 01 CDR-LM Okay. \*\*\* hatch. Forgot about the LCG \*\*\* ISA.

04 10 45 28 LMP-LM Push them out of the way?  
04 10 45 29 CDR-LM Yes. All right, give me a little -  
04 10 45 35 LMP-LM What do you want me to do?  
04 10 45 36 CDR-LM Nothing.  
04 10 45 37 LMP-LM Okay. Okay, are you sitting up there now?  
04 10 45 46 CDR-LM Yes, just stand by.  
04 10 46 35 CDR-LM Okay. Okay, overhead hatch is open and latched.  
04 10 46 45 CC Roger.  
04 10 46 46 LMP-LM Okay. Sit on the engine cover, facing forward,  
unlock the drogue, and rotate counterclockwise to  
release.  
04 10 46 52 CDR-LM Okay.  
04 10 46 58 LMP-LM I'll block the sun from - impinging on the instru-  
ment panel.  
04 10 47 03 CC Well done, Jim.  
04 10 47 11 CDR-LM Shadow device.  
04 10 47 24 CDR-LM Okay, Jim. Drogue's coming out.  
04 10 47 28 LMP-LM \*\*\* helmet. Yes.  
04 10 47 31 CDR-LM You're breaking up again.  
04 10 47 32 LMP-LM Roger.  
04 10 47 34 CDR-LM Watch you don't - Wait, wait.  
04 10 47 36 LMP-LM Utility lights. Yes. Oh, boy.  
04 10 47 37 CDR-LM Okay, you got it?  
04 10 47 39 LMP-LM I've got it.  
04 10 47 52 LMP-LM Okay.  
04 10 48 01 CDR-LM Give me the next step.



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04 10 48 13 CDR-LM Go ahead, Jim; read the next step.

04 10 48 15 LMP-LM I know. Just a -

04 10 48 16 CDR-LM Oh.

04 10 48 27 LMP-LM Okay, stand on the engine cover.

04 10 48 32 CDR-LM Oh, okay. Why not?

04 10 48 34 LMP-LM Get to work.

04 10 48 35 CDR-LM Very easy.

04 10 48 37 LMP-LM MASTER ALARM.

04 10 48 38 CDR-LM Check. Turn up the - the ANUN/NUM lights there.

04 10 48 48 LMP-LM Anything.

04 10 48 51 CDR-SEVA Oh boy, what a view.

04 10 48 56 LMP-LM Okay, there's nothing to go along with that MASTER ALARM.

04 10 48 59 CDR-SEVA Okay - -

04 10 49 00 CC Falcon, select separator number 2, please.

04 10 49 08 LMP-LM That's water separator 2?

04 10 49 10 CC Roger, water separator 2, Jim.

04 10 49 13 LMP-LM Okay, can you - Okay; stand by, Joe.

04 10 49 19 CC Roger.

04 10 49 31 LMP-LM Stay there, Dave; I'm going to give them SEP 2.

04 10 49 33 CDR-SEVA Okay, go ahead.

04 10 49 42 LMP-LM Okay, I have SEP 2 selected, Joe.

04 10 49 47 CDR-SEVA Did we reset the MASTER ALARM, Jim?

04 10 49 49 LMP-LM Yes.

04 10 49 50 CDR-SEVA Okay.

04 10 49 52 CC Roger, Jim. We think you - you may be pinching hoses back there somehow.

04 10 50 01 CDR-SEVA No, they all look clear, Joe.

04 10 50 05 LMP-LM Okay, Dave, you ready for me to hand you the map?

04 10 50 07 CDR-SEVA Yes, I can see Pluton and Icarus - and Chain, Slide, ... St. George, Window, Spur - beautiful!

04 10 50 28 LMP-LM Fantastic.

04 10 50 29 CDR-SEVA Okay, let's get a good fix; hand me the compass there.

04 10 50 45 CDR-SEVA Okay, \*\*\*

04 10 50 48 LMP-LM Want the map?

04 10 50 50 CDR-SEVA Just the Sun compass first. Let's get a take - on our position.

04 10 51 07 LMP-LM And, actually, at this Sun angle, Joe, there's no direct sunlight coming into the cabin.

04 10 51 10 CC Roger, Jim; understand.

04 10 51 25 CDR-SEVA Okay, hand me the - the big overlay map, Jim.

04 10 51 28 LMP-LM Okay.

04 10 51 38 LMP-LM Let me know when you're ready for the camera.

04 10 51 41 CDR-SEVA Okay.

04 10 51 42 CC And, Falcon; Houston. It looks like water separator 2's holding up fine.

04 10 51 49 LMP-LM Okay. Good, Joe.

04 10 52 11 CDR-SEVA Okay, Joe, our bearing to Icarus is 338.

04 10 52 18 CC Copy.

04 10 52 42 CC And, Dave, be advised we're going to be hustling you along here. We think we know pretty well where you are, so maybe we shouldn't spend too much time just on location.

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04 10 52 53 CDR-SEVA Okay. Another quick one: Bennett Peak is 255.

04 10 53 04 CC Roger.

04 10 53 11 LMP-LM Hey, Dave, and the first camera works with the 60-millimeter lens.

04 10 53 14 CDR-SEVA Okay.

04 10 53 15 CC Roger, Dave; maybe one more bearing.

04 10 53 20 CDR-SEVA Okay, coming up. Make Hadley Delta at about 182.

04 10 53 27 CC Roger.

04 10 53 29 CDR-SEVA Here you go, Jim.

04 10 53 33 CC And, Dave, a bearing on a close feature if you can identify it, please.

04 10 53 39 CDR-SEVA No, I can't right now, Joe.

04 10 53 42 CC Roger.

04 10 53 43 CDR-SEVA I'll get on with the photography here.

04 10 53 45 CC Roger; we agree.

04 10 53 54 LMP-LM Okay, you want 22 frames in this - in the stereo pan, Dave.

04 10 53 59 CDR-SEVA Right.

04 10 54 03 CC And, Dave, while - while you're firing them off there, does the trafficability look pretty good?

04 10 54 12 CDR-SEVA Yes, it sure does, Joe. It'll be - The largest fragment I can see right now on the surface is probably about 6 to 8 inches; however, inside the walls of Pluton, there are some pretty big chunks.

04 10 54 33 CC Roger. We'll worry about those when we start driving in Pluton.

04 10 54 38 LMP-LM Can you see the edge of the rille up - Dave, can you see the edge of the rille?

04 10 54 45 CDR-SEVA No.

04 10 54 51 CC And, Dave, while you're swinging around there, do you know if you can see November yet or not?

04 10 55 01 CDR-SEVA I - I don't, Joe. I - I better try and get some photos here and then start thinking - -

04 10 55 06 CC Roger.

04 10 55 07 CDR-SEVA - - about looking around.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 09 42 -- BEGIN LUNAR REV 15

04 10 07 40 CC Endeavour, this is Houston. Over.

04 10 07 47 CMP Hello, Houston. Hello, Houston. This is Endeavour.

04 10 07 54 CC Roger. Had a CAP COMM shift here, Al, and you're coming up on a change from - to MONO on the PAN CAMERA. I'll let you get that in about - -

04 10 08 06 CMP Say again, Houston.

04 10 08 07 CC - - 20 seconds. Endeavour, Houston. In 15 seconds, you need to change the PAN CAMERA to MONO. Just a reminder.

04 10 08 18 CMP Okay.

04 10 08 48 CC And, Al, when you're ready, I have a P24 pad, the LM visual, and also a couple of changes to the Flight Plan. Over.

04 10 08 59 CMP Okay. I'm all set up and ready to copy.

04 10 09 02 CC Okay. P24 landmark track pad, LM visual. T-1 is 106:33:59; T-2 is 106:38:06; TCA is 106:40:29; T-3, 106:40:57; you're off track 3 nautical miles north. And one note on that, use OMNI Charlie. Over.

04 10 09 50 CMP Roger. Copy. P24 pad. T-1, starting with the times, T-1, 106:33:59; 38:06; 40:29; 40:57; off track north 3 miles, and use OMNI Charlie.

04 10 10 06 CC Okay; readback's correct. And change at 106:45.  
Let me know when you're there.

04 10 10 27 CMP You say you have a change at 106:45?

04 10 10 30 CC That's affirmative, Al. Change where it says  
"GAMMA RAY: GAINSTEP, SHIELD OFF." Change that  
to read "GAMMA RAY: GAINSTEP, increase one step."  
Over.

04 10 10 49 CMP Understand, Gordo. It says "GAMMA RAY: GAINSTEP,  
increase one step" at that time.

04 10 10 53 CC That's affirmative. Then at 106:56, delete the  
"GAINSTEP, SHIELD" on remark there, and the reason  
is to adjust the spectrum. Over.

04 10 11 10 CMP Roger; understand. You want that whole line de-  
leted at - at 106:56, then.

04 10 11 16 CC That's affirmative, Al.

04 10 14 39 CC Endeavour, Houston. Reminder, PAN CAMERA, STEREO,  
at 14:58.

04 10 14 46 CMP Roger.

04 10 17 37 CC Endeavour, Houston; 20 seconds to your camera  
T-stop time.

04 10 17 45 CMP Roger, Gordo.

04 10 19 13 CC Endeavour, Houston. We're ver - we verify that  
the lens is tucked in. You're clear to turn the  
PAN CAMERA, off.

04 10 19 22 CMP Roger.

04 10 26 38 CC Endeavour, Houston. If you read, OMNI Charlie.

04 10 31 58 CC Endeavour, Houston. Endeavour, Houston. Give us  
OMNI Charlie, if you read.

04 10 35 00 CC Endeavour, Houston. If you read, go OMNI Charlie.

04 10 35 09 CMP Hello, Houston; Endeavour. On OMNI Charlie now.

04 10 35 14 CC Okay, Al. Loud and clear, and you're just about  
to T-1. I guessed you just passed it.

04 10 35 21 CMP Okay, Gordo. And I've been reading you right along.

04 10 35 25 CC Okay.

04 10 35 48 CC Endeavour, Houston. We're getting kind of a weak signal. Would you go to best OMNI?

04 10 35 56 CMP Roger, Gordo. Going best.

04 10 36 14 CMP Okay, Houston; Endeavour. Looks like OMNI Charlie's it.

04 10 36 18 CC Roger. Understand you're on OMNI Charlie.

04 10 36 35 CC Endeavour, Houston. We can't get a - a data with you. We'd like you to put the DSE to LOW BIT RATE, RECORD, FORWARD, and COMMAND RESET.

04 10 36 53 CMP Okay. Understand you want LOW BIT RATE, RECORD, FORWARD, and RESET.

04 10 36 58 CC That's affirmative, Al.

04 10 37 08 CMP Okay, Gordo. You got it.

04 10 37 10 CC Roger. I think we're getting a little better comm now.

04 10 38 04 CC Endeavour, Houston. Your T-2 now.

04 10 38 10 CMP Roger. I have the landing site in view.

04 10 38 13 CC Roger. Very good.

04 10 39 29 CMP Okay. And, Houston; Endeavour. I've got the LM.

04 10 39 34 CC Roger, Al.

04 10 39 39 CMP I'll give you the coordinates in a minute.

04 10 39 41 CC Okay.

04 10 39 43 CMP But he's almost directly north of Index.

04 10 39 46 CC Roger. Understand.

04 10 40 28 CC Endeavour, Houston. Your TCA now.

04 10 40 34 CMP Roger.

04 10 40 48 CMP Okay. He's about halfway between Index and the next crater off toward the North Complex. He's sitting right by a very small crater. And, as soon as I lose them here, I'll give you the coordinates, but he's quite plain down there.

04 10 41 05 CC Roger, Al.

04 10 42 22 CMP Houston, Endeavour.

04 10 42 24 CC Go ahead, Al, Houston.

04 10 42 28 CMP Okay, Gordo. If you look at the grid map, 1 to 250; that's HR 25-11, he's on BR, .5, 75.5.

04 10 42 49 CC Okay; copy. Baker Romeo, .5 and 75.5?

04 10 42 58 CMP That's affirm.

04 10 42 59 CC Okay; thank you.

04 10 48 02 CC Endeavour, Houston. Give us OMNI Bravo, please.

04 10 48 11 CMP Okay. You've got OMNI Bravo.

04 10 48 13 CC Okay, Al.

04 10 50 22 CMP Houston, Endeavour. The - the GAMMA RAY BOOM is out and took 2:30; 2 minutes and 30 seconds, fixed in.

04 10 50 31 CC Roger; 2 minutes and 30 seconds, Al.

04 10 50 53 CC Endeavour, Houston. One other thing, if you don't have it already, we'd like to have the S-BAND SQUELCH, OFF, so you'll realize loss of signal. Over.

04 10 51 06 CMP Roger, Gordo. I've got it OFF now.

04 10 51 09 CC Roger.

04 10 52 22 CC Endeavour, Houston; 30 seconds now to T-start for  
the MAPPING CAMERA.

04 10 56 31 CMP Roger, Gordo. I'm all set for it.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 10 55 20 CDR-SEVA I think probably we owe you the photos first.

04 10 55 23 CC Roger. We agree.

04 10 55 29 LMP-LM When you're finished with that, Dave, I've got the 500 handy.

04 10 55 32 CDR-SEVA Okay.

04 10 55 42 CDR-SEVA Okay, Jim. Here's the 80 [sic].

04 10 55 48 LMP-LM Okay. I've got it.

04 10 55 49 CDR-SEVA Okay. 500, now.

04 10 55 51 LMP-LM Got it.

04 10 56 25 CDR-SEVA Okay, Joe. I'm taking a picture now of that bright, fresh crater just to the south of the famous St. George. And now over to ... window, I believe.

04 10 56 44 CC Roger. And, Dave, we're coming up on 15 minutes SEVA.

04 10 56 54 CDR-SEVA Okay.

04 10 57 23 LMP-LM ... finished with the 500, Dave, I have the other camera.

04 10 57 25 CDR-SEVA Okay. Try not to shoot my foot there.

04 10 57 47 CDR-SEVA Looking back into the Sun is almost useless. ... blots everything out.

04 10 57 57 CC Roger, Dave. Any sign of the big mountain back there?

04 10 58 02 CDR-SEVA Yes. You can see - Big Rock Mountain back there.

04 10 58 07 CC Roger. Copy Big Rock Mountain.

04 10 58 22 CDR-SEVA Okay. Here, I'll give you this one back, Jim.

- 04 10 58 26 LMP-LM Okay.
- 04 10 58 27 CDR-SEVA I think we'll get a chance to get a lot more of those. Okay. Got it?
- 04 11 00 03 CDR-SEVA Okay, Joe. We've got all the photos. Here you go, Jim.
- 04 11 00 07 LMP-LM Okay. I got it.
- 04 11 00 09 CDR-SEVA Okay. And let me start - by 12:00 o'clock, Joe, and I'll go around real quick on the far distant horizon. Apparently, across the rille, I can see - just about our 1 o'clock, now - a very large mountain, which I'd have to call Hill 305.
- 04 11 00 31 CC Roger.
- 04 11 00 32 CDR-SEVA And - all of the - all of the features around here are very smooth. The tops of the mountains are rounded off. There are no sharp jagged peaks or no large boulders apparent anywhere. The whole surface of - the area appears to be smooth, with the largest fragments I can see are in the walls of Pluton. There are no boulders at all on St. George, Hill 305, Bennett, or, as far as I can tell, looking back up at Hadley. Hadley's sort of in the shadow. It's a gently rolling terrain completely around - 360 degrees - hummocky, much like you saw on 14. The pitch line across the rille, from Hill 305 around to 1 o'clock, seems to be - slightly lighter in albedo, with some white marks from craters, recent craters, apparently. Bennett Hill also has - a lighter-colored albedo. One face of it, that facing the Sun, now is almost completely white. As I come around to my 2 o'clock, the horizon is really the Northern Complex. I can see, as I mentioned before, Chain, Icarus, and Pluton are very rounded, subdued craters. It looks like the southern rim of Pluton is on the same level as our location here. The northern rim is

somewhat higher. I'd say — dist - distances are difficult — but maybe 50 meters higher. I can see the scarp on the other side of the north rim of Pluton. All of it very flat, smooth, and gently rolling. Inside walls of Pluton are - fairly well covered with debris, fragments up to, I'd estimate, maybe, oh, 2 to 3 meters, irregular, no layering, just sort of scattered around, and maybe the walls have 5 percent fragments. As I look on around - to the north, Mount Hadley itself is in the shadow, although I can see that the ridge line on the top of Mount Hadley - it too is smooth. I see no jagged peaks of any sort. The hill I would call number 22 on your map - far distance - also looks smooth and rounded; no prominent features. I'll skip the distant field around to my 6 o'clock, because it's all in the shadow. And looking into the Sun, of course, obliterates almost everything. As I look on down to my - 7 o'clock, I guess I see Index Crater here, the near field. But, back up on Hadley to the east of Hadley Delta, why, again I can see a smooth surface. However, I can see lineaments. I'll take a picture for you. There's some very interesting - take - Silver Pass [sic] and look at 13 on your map. I can't tell whether it's 13 or 16, right now, because of the Sun. But there appear to be lineaments or lineations running - dipping through the northeast, parallel. And they appear to be, maybe, 3 percent to 4 percent of the total elevation of the mountain, almost uniform. I can't tell whether it's structure or internal stratigraphy or what. But there are definite linear features there, dipping to the - to the northeast, at about - oh, I'd say 30 degrees. And, as I look up to Hadley Delta itself, I can see what appears to be a sweep of linear features that curve around from the western side of Hadley Delta on down to the Spur down there. And they seem to be dipping to the - to the east at about 20 degrees. These are much thinner - lineations on the mountain than I saw before. These probably are less than 1 percent of the total elevation of the mountain. The craters on the side of Hadley Delta are rather few. Around Window and Spur, those that you see on your maps are the only ones I can see, and there appear

to be, oh, about a dozen of them in that particular area. I might associate those with a secondary cluster, if I took a guess at it. I see nothing that indicates any flow down - or a landslide down Hadley Delta, only some subtle changes in topography. There's one bright fresh crater right next to St. George on the eastern side with almost white albedo, and it's got an ejecta blanket about a crater diameter away. How are you copying so far?

04 11 05 54 CC

Superb description, Dave. Got every single word. Beautiful. And we'll ask you to hustle on around and give us something on the near field, plus a comment on ALSEP deployment possibilities. Superb communication, though. Beautiful.

04 11 06 11 CDR-SEVA

Okay. Coming on around to St. George, it again is a very subtle old crater, but in this case, I can see some lineaments running - dipping to the west at about 20 degrees, parallel to the rim of the crater. These two are very small, less than a percent, and continuous ... \*\*\* parallel. The rim of the crater is very subdued and smooth. Coming around - I'll just take a quick look at the near field for you here. It's about generally the same. The crater density is, I'd say, quite higher - somewhat higher than I expected. Sizes are mostly less than about 15 meters. The only large crater that I see is what I believe to be Index back here, about the 8 o'clock, and it has a very subtle rim, almost no shadow in the bottom of it. I think that's one of the things that was deceiving on the descent. There are very few deep dark craters in the area. The distribution of fragments appears to be less than \*\*\*2 percent. On the surface, they vary from a \*\*\* centimeter in size up to, maybe, 3 or 4 inches. Most of them appear to be angular. I see some white ones. I can give you some more of that out of the - out of the window. Trafficability looks pretty good. It's hummocky; I think we'll have to keep track of our position, but I think we can manipulate the Rover fairly well in a straight line. And I - I can see the base of the front. As near as I can tell - as a matter of fact, I think I see where the front

runs into the level ground, where we get that 5-degree inflection. I see no boulders over there whatsoever. Looks like we'll be able to get around pretty good.

- 04 11 08 00 CC Roger, Dave. We copy.
- 04 11 08 05 CDR-SEVA And as far as ALSEP deployment (laughing), unfortunately, looking straight ahead in zero phase - it's blocked out somewhat, but if there's continuity of the surface that I see in our general position, I don't think we'll have any trouble taking the ALSEP out 300 or so and placing it. I just noticed a couple of items on the far side of the rille on the - on the flat horizon ... west there. Looks like a couple of very large boulders on the horizon; just unique, two of them. They're quite bright and - and quite sharp. I cannot see Hadley Sea at all, as we thought we might be able to. Bennett peak is about all I can see in inspection of Head Valley.
- 04 11 08 51 CC Roger, Dave. Is that down towards Head Valley?
- 04 11 08 53 CDR-SEVA Trafficability up - right. Down - yes, that's correct. And the trafficability up to the Northern Complex looks the same. I see no large boulders. The slopes go up maybe 5 \*\*\* 10 degrees at the most. And beyond that, all the terrain looks pretty - pretty smooth. I can see some young, fresh craters in our vicinity, which are sort of interesting in that there's some very small debris - in the crater itself and on the rim, and it's somewhat lighter gray than the general surface, the debris being on the order of, oh, centimeters or so, but quite young and fresh. And I see a - at 8 or 9 - or 3 o'clock, a very deep crater, old crater, smooth. But I can't even see the bottom, and it can't be more than, oh, 60, 70 meters away. I think that's one of them I was avoiding on the way in. That very mel - well may be November.
- 04 11 10 05 CC Roger, Dave. And how far away do you think that might be. It sounds very exciting.
- 04 11 10 15 CDR-SEVA Joe, distances are very deceiving. I'd guess maybe 60, 70 meters. There's another somewhat deeper

one just to the north of that. It - it looks to me, and Jim has the same impression looking out the window, that we're much closer to Pluton and - and St. George, and all that stuff, than we expected to be.

- 04 11 10 40 CC Roger, Dave. We think it just may look closer to you. Sounds like we're in business, old friend.
- 04 11 10 49 CDR-LM Yes, it - it just looks closer, I'm sure, but we are indeed in business. And I think, once we get through here and I hop back down, why, we can talk over more of what I've been seeing up there.
- 04 11 11 03 CC Roger, Dave. You're coming up on 30 minutes into this SEVA, and we don't have any more questions. You've answered everyone beautifully. Outstanding.
- 04 11 11 17 CDR-SEVA Okay, Joe. I'll take another quick look around. See if anything - looks unique. There's just so much out there, I could talk to you for hours. Do you have any specific questions before we clo - call it quits?
- 04 11 11 34 CC Dave, we're - we're hoping you will be talking to us for hours about it. We don't have any specific questions right now. We'll think about it and talk to you again, once you button up. Maybe one last look for an ALSEP deployment position. And we've copied that you've gotten both sets of pictures for us.
- 04 11 11 55 CDR-SEVA That's correct, Joe. I - I limited myself somewhat on the - the 500s, because I think we'll get a chance to take a lot more of those. But I did get the pans for you.
- 04 11 12 07 CC Roger, Dave. We're quite - -
- 04 11 12 09 MCC Have the ...
- 04 11 12 10 CC - - satisfied and would - would like for you to climb back in now, please.
- 04 11 12 15 CDR-SEVA Okay. Coming down.

04 11 12 18 CC Just out of curiosity, could you see any sign of - of the South secondary Cluster?

04 11 12 32 CDR-SEVA There's a gentle rise, just to our south and - I don't see anything that's really prominent, as far as elevation. I think the elevations on the - the models we've been working with were somewhat exaggerated, because I just don't see that much detail looking up towards Hadley Delta.

04 11 12 55 CC Roger, Dave. We agree. Sounds like it may well be hidden behind a shallow ridge there.

04 11 13 04 CDR-SEVA Well, we'll just have to go look for it. Hey, Jim. You want to hand the drogue?

04 11 13 19 CDR-SEVA I tell you, Joe, this 1/6g is really great.

04 11 13 50 CDR-SEVA Okay. The drogue is in.

04 11 14 11 CDR-SEVA \*\*\* the drogue is locked. You want to verify that, Jim?

04 11 14 17 LMP-LM I can't see as well as you can, Dave.

04 11 14 19 CDR-SEVA Okay. It's locked.

04 11 14 20 LMP-LM Okay.

04 11 14 21 CDR-SEVA I'm coming down. Okay. We'll close the hatch.

04 11 13 45 CDR-LM Okay. Hatch is closed. Hatch is locked. Okay. Both dump valves are AUTO. That's verified.

04 11 13 51 LMP-LM AUTO and locked.

04 11 13 52 CDR-LM Okay. CABIN REPRESS going to AUTO.

04 11 13 57 LMP-LM It's AUTO. It's verified.

04 11 13 58 CDR-LM That's verified. It's dark in here. Oh. Okay, I'm going to push CABIN REPRESS circuit breaker, if I can turn around here.

04 11 15 05 LMP-LM Okay.

04 11 15 09 CDR-LM Okay. CABIN REPRESS circuit breaker going in now.

04 11 15 14 LMP-LM ...

04 11 15 15 CC Roger.

04 11 15 16 LMP-LM VENT ...

04 11 15 17 CDR-LM VENT. Cabin's at .5, 1.0.

04 11 15 52 LMP-LM Okay, Dave. We can go CABIN - on the REGs.

04 11 15 58 CDR-LM Okay. PRESS REG A and B to CABIN. Okay. I'm going CABIN on both REGs.

04 11 16 07 LMP-LM Okay. Okay. You going to read to me?

04 11 16 17 CDR-LM Yes. CABIN warning light off. Verify cabin pressure stable at 4.6 to 5. We're at 4.6.

04 11 16 23 CDR/  
LMP-LM Stable.

04 11 16 26 LMP-LM Time to take off gloves.

04 11 16 27 CDR-LM Alright. Let's doff gloves. Stow on comm panel.

04 11 16 51 CDR-LM Okay. Doff helmets and - with visors and stow in the helmet bag.

04 11 16 54 LMP-LM Okay.

04 11 17 15 CDR-LM Okay. Verify safety on dump valve.

04 11 17 19 LMP-LM Okay. \*\*\*

04 11 17 20 CDR-LM The head is on. Okay. Hoses, red to blue and blue to red.

04 11 17 27 LMP-LM Going to ICS/PTT.

04 11 17 30 CMP-LM Hi, Joe. Okay, Houston. Hadley Base here. We'll get the cabin cleaned up a little bit, and you might want to jot down some questions. And as we



eat, we can maybe discuss some with you.

04 11 17 52 CC Roger, Dave. We'll do that and be standing by.

04 11 20 31 CDR-LM Houston, Hadley Base here. What do you think the problem with - our H<sub>2</sub> - our H<sub>2</sub>O SEP is?

04 11 20 41 CC Stand by, Dave.

04 11 20 45 CDR-LM Okay.

04 11 22 14 CC Hadley Base, Houston.

04 11 22 21 CDR-LM Go ahead, Houston. Hadley here.

04 11 22 23 CC Roger, troops. While you're getting squared away there, regarding your question, Dave, on the SEP 1 unit, we think that you had some residual condensation in your hoses. And when you stood up, it ran down into the separator and water-logged it, causing it to go off the line. It'll drain - be draining, and we think the next time we try it out, it'll be okay. Over.

04 11 22 51 CDR-LM Okay. I understand. But, we haven't seen any water around lately, but there has been quite a bit of moisture on the windows. There was when we powered up; we had to bring the heaters on for a while to get the windows cleared.

04 11 23 06 CC Roger, Dave. Understand. We think the water was condensed in the suit hoses.

04 11 23 14 CDR-LM Okay. I understand.

04 11 24 24 LMP-LM I think I know where we are too. If I can just look at that map.

04 11 25 03 CDR-LM Be sure I get that all the way up.

04 11 25 05 LMP-LM Yes.

04 11 25 06 CDR-LM Okay.

04 11 25 07 LMP-LM Okay. Are you ready to do a little urine transfer?

04 11 25 09 CDR-LM Go ahead. You first.

04 11 25 17 CC And, Hadley Base. Be advised, you're still on VOX.

04 11 25 25 CDR-LM How about that. Are you still VOX?

04 11 25 29 LMP-LM No.

04 11 25 31 CDR-LM DOWN VOICE BACKUP?

04 11 25 32 LMP-LM I bet we are. I bet we're on hot mike.

04 11 25 33 CDR-LM Yes.

04 11 25 36 CC Dave and Jim, you're on hot mike now. But the medics are enjoying your comments.

04 11 25 42 LMP-LM Yes, I guess we are. I bet they are. Almost everybody else is too. (Laughing) What did we say, Joe?

04 11 25 54 CDR-LM Let's see. We need the circuit breaker in too for the - -

04 11 25 56 LMP-LM Say again.

04 11 25 57 CC You're clean.

04 11 25 58 CDR-LM Urine transfer.

04 11 26 00 LMP-LM Wait.

04 11 26 01 CDR-LM Hey, did you get the - the comm? Are we off? Are we -

04 11 26 07 LMP-LM ... DOWN VOICE BACKUP.

04 11 26 09 CDR-LM DOWN VOICE BACKUP. We're on hot mike.

04 11 26 12 LMP-LM Apparently, but, are we in DOWN VOICE BACKUP now?

04 11 26 14 CDR-LM Good. Turn it OFF.

04 11 28 26 CC Falcon, this is Houston.

04 11 28 34 LMP-LM Go ahead, Joe.

04 11 28 36 CC Roger, Jim. We have a question that may bear on this minor water problem. We're wondering if you

can tell, or have a feel, for whether you're in a crater, or the slope of the spacecraft is, perhaps, caused by just a gentle slope of the terrain there. Any feel for that?

- 04 11 28 58 LMP-LM I'll have to ask Dave.
- 04 11 29 27 CDR-LM Houston, Hadley.
- 04 11 29 29 CC Go ahead.
- 04 11 29 35 CDR-LM I guess to answer your question, we're not really in a big crater anywhere. I - I think there are possibly - one gear may be in one of these small craters. And as you might have heard Jim and I discussing, there's a rather high crater density and I guess my references to traffic - trafficability were really to boulders, because that's what I was really most concerned with on driving the Ro - Rover. There is a fairly high crater density around. And, as I mentioned, they range up to probably 10 - 8, 10 meters or so. And in our local area - Let me give you a - a rough count of the, oh, 8- to 10-meter ones. I guess one every 15 to 20 meters. So there's a - a fair number of medium craters. Nothing sharp, no boulders, and it may be that one footprint is in one of these craters that range on down to maybe 2 meters or 1 meter. And then there's a sharp break in craters down to probably a foot or so. But it - it's almost like 14, as I remember their pictures, quite a variety of crater sizes, up to some certain limits. I don't see anything on the 25-meter scale that we hoped to expose the bedrock in our immediate vicinity, although I can see some fresh ones - maybe some rims out through the window here at 10 or 11 o'clock. But I can't really account for our attitude right now. We'll just have to get out and take a look.
- 04 11 31 19 CC Roger, Dave. Copied all that loud and clear. I phrased my other question poorly. Apparently, the thermal people were worried that if you were sitting in - right in the bowl of a - of a fairly deep crater, there would be a certain focusing effect of the sunlight, and it may require more water to keep the spacecraft cool later on. That's a good

answer we have from you. Will have some more questions for you later on when you're comfortable and into your eat period, if you're in - interested in - in talking at that time. And we'll be standing by.

- 04 11 31 57 CDR-LM Okay, Joe. I - there's so much here, I could talk to you forever. But, there - there's a large - I can see now, we were in zero phase — and without taking a close look out the front window, I couldn't tell you — but, as I was coming down trying to select a spot to land, I was trying to avoid these 8- to 10-meter craters. And we have one out of our 4 o'clock - I guess about 3 or 4 o'clock that I discussed before. There is one directly in front of us almost - the rim is almost on the shadow of the radar antenna right now, and it appears to be an 8- to 10-meter one. And there's one over to our 10 o'clock. They're just all over, and it was sort of hard to find a spot that was really level.
- 04 11 32 41 CC Roger. We copy. And, Dave. Earlier you talked about, specifically, a very bright crater, I think, fairly near by. Could you estimate for us the size, distance, and azimuth of that bright crater?
- 04 11 33 03 CDR-LM Stand by. I can tell you're still looking for our position.
- 04 11 33 14 CC No, that's not necessarily true. We think we're pretty well squared away on your position. This probably would cinch it down, though.
- 04 11 33 25 CDR-LM Okay. As we're unsuiting here, let me think that one over. I think we can cinch it down too.
- 04 11 33 32 CC Roger.
- 04 11 33 36 CDR-LM But, before we go, I got to tell you about a - a rock that's right out at 12 o'clock, right - almost at the radar antenna shadow, and it's going to be gone pretty soon. There's a - a dark, black, angular fragment which is on the order of probably - I'd say 6 to 8 inches across. It's got some light-colored apparent dust on it. It's

unique on the surface. All the other fragments appear to be white. And this one really looks like a jewel. You can think about that for awhile.

- 04 11 34 12 CC Roger. We copy. And it wouldn't surprise me at all if there wasn't some thought given to that rock. And, Dave and Jim, when you're comfortable, we'll call up our best guess as to your position and let you think about that for awhile.
- 04 11 34 36 CDR-LM Okay.
- 04 11 34 39 CC And you'll be very pleased to hear that your landing was not recorded on either of our seismometers on the Moon.
- 04 11 34 49 CDR-LM Well, that's nice to know. You can tell the Program Manager that we certainly didn't buckle his engine bell for him.
- 04 11 34 57 CC Roger.
- 04 11 35 07 CC And, Jim, I just have to ask you, did you notice if the contact light came on or not?
- 04 11 35 19 LMP-LM You didn't hear me.
- 04 11 35 28 CDR-LM Joe, I think Jim might simply qualify what he thought was - what our landing velocity might have been.
- 04 11 35 36 CC Roger. I'd say he was dividing everything by 10. And, Dave, be advised the program - -
- 04 11 35 44 LMP-LM No, I don't think so. I think we're - -
- 04 11 35 48 CC Okay, Dave. Be advised the Program Manager says he'll wait until tomorrow until he decides about that engine bell.
- 04 11 35 59 CDR-LM Okay. Well just tell him that I'll guarantee that it wasn't running when we touched down.
- 04 11 38 30 CC Hadley Base, this is Houston. When you have the ECS configured properly, we'd like to run a separator number 1 check, please. And we'll ask you to go back to separator number 1.
- 04 11 38 44 LMP-LM We understand, Joe.

04 11 38 46 CC Roger. We'll be standing by.

04 11 39 09 CC And, Jim. This is Houston. We would like a mark when you go to separator number 1.

04 11 39 19 LMP-LM Okay. It'll be a little while, Joe.

04 11 39 21 CC Roger. No hurry. We'll just know when to be watching.

04 11 39 27 LMP-LM Roger.

04 11 49 44 CDR-LM Okay, Houston. Hadley for comm check on the light weights.

04 11 49 50 CC Roger, Hadley Base. Copy you 5 by.

04 11 49 56 CDR-LM Okay. One suit and helmet stowed.

04 11 49 59 CC Roger, Dave. And, Jim, standing by for your call.

04 11 55 42 CDR-LM Okay, Houston. Hadley here. If you want to give us the consumables update, we'll take it.

04 11 55 48 CC Roger, Dave. Got them right here. And if you're ready to copy, here they come.

04 11 55 56 CC The LM consumables - -

04 11 55 57 LMP-LM We're ready to copy.

04 11 55 58 CC - - RCS Alfa, 85.0; Bravo, 85.5; O<sub>2</sub> descent number 1 85; number 2, 83.5; O<sub>2</sub> ascent number 1, 99; number 2, 99; H<sub>2</sub>O descent number 1, 79; number 2, 80; H<sub>2</sub>O ascent number 1, 100 percent; ascent number 2, 100 percent; AMP-hours descent, 1705; ascent, 572. Over.

04 11 56 50 LMP-LM Okay. Copied all that. Look - that looks pretty close to nominal.

04 11 56 54 CC Not half bad.

04 11 58 39 CDR-LM Okay, Houston; Hadley. We're in the ECS sleep configuration now, if you want to run your water SEP check.

04 11 58 45 CC Roger, Dave. We're standing by for a mark.

04 11 59 05 LMP-LM Okay. Stand by, Joe.

04 11 59 18 LMP-LM 2, 1 -

04 11 59 20 LMP-LM MARK.

04 11 59 21 CC Roger.

04 12 07 24 CC Hello, Falcon. This is Houston. Just for your own information, the water separator number 1 looks good. But we'll be keeping a further eye on it here. A little later on, Gordo's going to read up a procedure that involves the VHF communications check.

04 12 07 43 CDR-LM Okay. I understand. Thank you.

04 12 07 54 CC And, Dave and Jim, we've got some positions, when you get in a comfortable position, maybe have something to eat, but have your maps out. I'll read them up to you.

04 12 08 08 CDR-LM Okay. Give us about 5 minutes.

04 12 08 10 CC Roger, Dave. No hurry at all.

04 12 13 17 CC Falcon, Houston. If you're not busy, I'll give you some switch positions to get set up for the VHF comm check.

04 12 13 28 CDR-LM How much time do we have, Gordo?

04 12 13 31 CC Plenty of time. Probably - about 15 minutes before he comes over the horizon.

04 12 13 41 CDR-LM Okay. Give us about 5 to finish fixing dinner here. It takes a while.

04 12 13 47 CC Okay.

04 12 16 46 CDR-LM Okay, Houston. Hadley Base here. Go ahead with your switch settings.

04 12 16 53 CC Okay, Falcon. This is Houston. You can go ahead and throw these switches as I call them. We'd like the VHF A TRANSMITTER to VOICE, and the VHF A RECEIVER ON. That's a verify. Over.

04 12 17 16 CDR-LM Roger. That's a verify on both.

04 12 17 19 CC Okay. And the VHF A SQUELCH, we'd like you to adjust it. Suggest so you can hear a little noise. And VHF ANTENNA, AFT. Over.

04 12 17 32 CDR-LM SQUELCH with a little noise, and an - ANTENNA, AFT.

04 12 17 35 CC Okay, the LMP. We suggest he makes a check. Put his AUDIO panel, VHF A T/R to T/R. And we're going to have Al initiate the check. He - He's kind of busy as he passes over, so he's going to initiate the check at a slack moment, and that'll be sometime between 108:32 and 108:44.

04 12 18 03 CDR-LM Okay. A couple of points. We don't have any mission timer, and we'll be standing by. And I'll have to do it, because we have one lightweight headset that - that would - that failed right when we picked it up after lift-off when we first unstowed it. We brought it down so Al could have a good one.

04 12 18 22 CC Oh, okay. Fine. We think we know what the problem was. We think it's just an error in procedures at - back before PDI. And before the comm check you were in VOICE/RANGE, according to the Timeline Book, and that would block your transmitter. And that's probably what's wrong. We really don't suspect any hardware problem.

04 12 19 03 CDR-LM Okay. We just talked it over, Gordo. After the radar check, we went from VOICE/RANGE back to VOICE on the VHF A.

04 12 19 17 CC Yes, we realize that. But we think that the comm check was before that - that you got back and that you just never did have another call after you got back to VOICE. The blocking - that was my mistake a minute ago - the block was due to the blocking of your receiver while in ranging. Over.

04 12 19 42 CDR-LM Okay. Well, we're set up now, and Jim's got his comm helmet on. So we'll be standing by for Al's call.

04 12 19 48 CC Okay. Good enough.

04 12 19 56 CDR-LM And, Houston. Hadley Base, here. Anytime you want to discuss the landing and our position, why, I guess we've got supper cooked, and we're ready.



04 12 20 06 CC Roger. Under - understand that supper is cooked or being eaten?

04 12 20 15 CDR-LM Yes, if you like cold tomato soup.

04 12 20 23 CC Oh, mercy, yes. Delicious. Dave, I guess the first thing that we might start with, is our estimated position of your landing sight. And we've got two inputs on that. Al, when he passed over, got what seemed like a pretty accurate hack on where you've landed, and he calls it out as Bravo, Romeo 2 - Correction. Disregard. Bravo Romeo 5 75 5. And in the back room, the best guess from the back room is Bravo Romeo 2 75 2. In both cases, it's very near November Crater. It's just a question of on which side of November are you now sitting. So a tally ho on November Crater will tell us, I guess, exactly. As it is, we think we know where you are to within about 100 - 100 yards. Over.

04 12 21 28 CDR-LM Okay. I tried to find November Crater out there, Joe. And, I could see a fresh one to the north of ... rim, but no bright ejecta, as you see on the map there. But I guess I probably agree with you, and I might run through what I saw from pitchover, on down, and that might help you out a little bit. It was quite a surprise.

04 12 21 52 CC Roger, Dave. We're standing by. And - and by the way, your comm is absolutely crystal clear. It's just beautiful.

04 12 22 04 CDR-LM Great. So is yours. Well, anyway, I got the 3000-south call, which was a good call. And as we came down prior to P64, I could see the rille to the south, and I couldn't see it up over the nose. And I got the distinct im - impression, as I looked at Hadley Delta, coming into P64, that we were going to be way long. And, I guess - you know, I've never shot one of these landings before, and I got fooled a little bit there. And at pitchover, we were definitely quite a ways south, and I never saw Index Crater all the way down. I saw what I thought was Salyut, and the one north of Salyut, which I sort of picked as a landmark to zero in on. I gave about four clicks right and then about two more right, as I remember, to get us back up to the north. And because we were south, I lost the - the four craters in a row that lead into Index. But I believe the topo

relief is somewhat exaggerated in that our - our maps and models show good shadow at Index. And, as good a crater as that is from orbit — it was very easy to pick up in orbit — I never did locate it on the descent during the visibility phase. But I - I was able to see earthlight, and that substantiated your call of being 3000 short. Now, after I got over a - a roll to come back up north with the LPDs, and Salyut — what I thought was Salyut — I redesignated short to bring us back to what looked like a reasonably smooth area. And then I just picked out a spot in between the holes down here, and I - put it down. And I guess I - I sort of have to agree with you that we're probably somewhere around November. And - let me think a little bit and see if I can remember seeing something that looked like November.

04 12 24 42 CC

Roger, Dave. We copy that.

04 12 24 46 CC

Dave. While you're thinking there, let me repeat a question I asked earlier. You described a bright - a very bright crater in one of your first descriptions. And we were - we're still looking for the azimuth, approximate distance, and size of that bright crater.

04 12 25 09 CDR-LM

Well, the brightest crater I've seen is the one that was right on the rim, halfway up St. George, and it's almost white. And - is that the one you're thinking about?

04 12 25 25 CC

Stand by, Dave. I think there - I think there was another one. I'll - I'll get back with you on that in a minute. It was one that was a lot closer to you. And I've got another question now on the board in front of me here. We - we think you're near the edge of Aristillus - Aristarchus ray. And, I wonder if you can recall anything about the local albedo changes. Over.

04 12 26 02 CDR-LM

No, Joe, I didn't see a thing. And, it's just all the same (laughing), north and south, east or west in our current position.

04 12 26 23 CC

Roger, Dave. Copy that. And sorry on that crater call. That was my fault - Arist - the Aristillus - Autolycus ray.

04 12 26 34 CDR-LM

Okay.

04 12 26 35 CC As you, I'm sure, understood.

04 12 26 49 CC Dave, while you're sipping your - cold tomato soup there, was the black rock that you called out to us on a crater rim?

04 12 27 04 CDR-LM Yes, it is, Joe. It sure is. And it's a typical crater to see. It's quite a subtle crater, but it's out - well, LM shadow being like 30, maybe 28 meters now. It's probably about 40 meters away, the rim of the crater. And that black rock is sitting right on the rim.

04 12 27 25 CC Roger.

04 12 27 40 CDR-LM Hey, Joe. Jim's just pointed out another black one now that must be 300 meters out. And it's so dark that it looks like a shadow. It's just coal black, and it looks like it might be about the same size.

04 12 27 58 CC Roger, Dave. Incredible. While you're peeking out there, do you have any further observations on the abundance, size, and distribution of the frags in the nearby field of view?

04 12 28 17 CDR-LM Yes. That's what we found here. Yes. I'd say that, in the - in the near field, the surface is covered by - probably less than 1 percent of fragmental debris. And, of that debris, I'd say 70 percent of it is on the order of an inch to 2 inches, or less. And maybe the other 30 percent seems to be in a range of maybe 4 or 5 inches, something like that; no large frags anywhere. They mostly - -

04 12 28 54 CC Dave. Let me interrupt a second. Verify - -

04 12 28 56 CDR-LM - - colors.

04 12 28 57 CC - - your SLEW, please.

04 12 29 03 CDR-LM That's verify.

04 12 29 05 CC Thank you. Continue.

04 12 29 11 CDR-LM Okay. Most the fragments are light colored, except for the two that we - we mentioned to you. In fact, they all look - they look white. I can see some that are just stark white and some that are a lighter gray.

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04 12 29 33 CC Roger, Dave. You might comment on the relative abundance. And, just for your information, you're coming up on a sleep period in about a half an hour, I guess.

04 12 29 48 CDR-LM Okay. Understand, Joe. So -

04 12 30 28 CC And, Falcon. We had - -

04 12 30 29 MCC ...

04 12 30 30 CC - - Roger. Go ahead. We've had a site handover. It's complete now.

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

04 10 57 44 CC Endeavour, Houston. When you have a minute, I have another pan camera pad.

04 10 57 54 CMP Okay; I'm ready. Go ahead.

04 10 57 56 CC Okay. This one goes at 108:10.

04 10 58 01 CMP Roger.

04 10 58 02 CC Okay. T-start is 108:15:27, and T-stop is 108:43:15. Over.

04 10 58 19 CMP Understand. T-start is 108:15:27; T-stop is 108:43:15.

04 10 58 29 CC Roger. The last seconds on the T-stop are 43:15. Is that what you've got?

04 10 58 39 CMP That's correct, Gordo; 15, 43:15.

04 10 58 42 CC Okay. For your information, the LM troops are in the middle of the SEVA now, and Dave is standing up in the hatch and taking the panoramic pictures.

04 10 58 54 CMP Oh, very good.

04 11 01 43 CC Endeavour, Houston. Go ahead.

04 11 01 54 CMP Houston, Endeavour didn't call.

04 11 02 12 CC Endeavour, Houston. Over.

04 11 02 17 CMP Houst - Houston, Endeavour. Go ahead.

04 11 02 20 CC We'd like you to bring up the HIGH GAIN. Use PITCH of minus 38 and YAW, 186. Over.

04 11 02 30 CMP Roger. Understand minus 38, 186.

04 11 03 04 CMP Okay, Houston; Endeavour. You've got the HIGH GAIN now.

04 11 03 09 CC Okay, Al. Thank you.

04 11 08 09 CC Endeavour, Houston. Would you give us AUTO on the HIGH GAIN?

04 11 08 17 CMP Roger, Houston. AUTO on the HIGH GAIN.

04 11 08 19 CC Thank you, Al.

04 11 09 37 CC Endeavour, Houston. Over.

04 11 13 41 CC Endeavour, this is Houston. Over.

04 11 13 47 CMP Houston, Endeavour. Go ahead.

04 11 13 49 CC Okay. The SEVA's over; they're calling them back in to button up the LM, for your information. Also, we're contemplating another VHF comm check on the next rev. It will occur around 108:32, at the time you come over the LM horizon, and probably interfere with your photo of the Caucasus Mountains. We'll have more procedures after AOS. Over.

04 11 14 17 CMP Okay, Gordo. Sounds fine.

04 11 18 14 CC Endeavour, Houston. We're about to LOS, so see you next time around.

04 11 18 22 CMP Okay, Gordo. See you on the other side.

04 11 18 26 CC Roger.

04 11 40 -- BEGIN LUNAR REV 16

04 12 07 52 CC Endeavour, this is Houston. Over.

04 12 07 58 CMP Hello, Houston; Endeavor.

04 12 08 01 CC Okay, Endeavour - -

04 12 08 03 CMP Hello, Houston; Endeavour.

04 12 08 05 CC Roger, Endeavour; this is Houston. We're going to run the comm check coming up here, but we'd like to go ahead and get the - the procedures here in the Flight Plan as we go, and I'll give you a hack before the pan camera start time. The pan camera status, by the way, it's running about 70 percent okay; getting about 70 percent good pictures, and we're going to use nominal procedures. Over.

04 12 08 31 CMP Okay, Gordo. Understand.

04 12 08 37 CC Also, Al, your orbit's looking good. It's performing - or behaving - as the FIDO's expected. Over.

04 12 08 48 CMP Roger. Understand.

04 12 08 57 CC When you have a free moment, Al, let me know, and I'll give you the switch positions to get set up for the comm check.

04 12 09 07 CMP Okay, Gordo. Stand by just 1, please.

04 12 09 45 CMP Okay, Houston; Endeavour. Go ahead.

04 12 09 48 CC Okay, Al. You can go ahead and throw these switches as I call them out to you. Put VHF AM A to SIMPLEX and the VHF ANTENNA to RIGHT. Over.

04 12 10 05 CMP Okay. Understand VHF A, SIMPLEX, and ANTENNA, RIGHT.

04 12 10 09 CC Okay. And then check on whatever audio panel you're using, probably 9, that VHF AM T/R is at T/R.

04 12 10 21 CMP Roger. That's verified.

04 12 10 23 CC Okay. That's all there is until about 108:32, which time I'll call you. And then any time in about a 12-minute band there, you can initiate a VHF comm check when it doesn't interfere with the photo target there.

04 12 10 41 CMP Okay.

04 12 10 42 CC I'll give you a hack when you're within range of the LM.

04 12 10 48 CMP Roger.

04 12 11 32 CC Endeavour, Houston. Reminder: about - slightly less than 4 minutes now to T-start for the pan camera.

04 12 11 42 CMP Roger, Houston.

04 12 13 30 CMP Houston, Endeavour.

04 12 13 52 CC Endeavour, Houston. Did you call?

04 12 13 57 CMP Roger, Houston. Just reporting that the GAMMA RAY BOOM RETRACT time was 3 plus 07.

04 12 14 04 CC Roger; 3 plus 07.

04 12 15 11 CC Endeavour, Houston. Don't bother to acknowledge; 15 seconds to pan camera T-start.

04 12 23 43 CC Endeavour, Houston. Would you verify that the MAPPING CAMERA IMAGE MOTION switch was to INCREASE? Over.

04 12 23 55 CMP Houston, Endeavour. That's verified.

04 12 24 01 CC Okay. You got it a couple of minutes ago, is that right?

04 12 24 08 CMP Yes, that's right, Gordo. At 21.

04 12 24 11 CC Okay, fine. It looked funny on the data here. I'll check.

04 12 30 38 CMP Houston, Endeavour.

04 12 30 41 CC Endeavour, Houston. Go ahead.

04 12 30 46 CMP Okay, Houston. Gordo, I'm just coming up over Le Monnier now. Heading towards Serenitatis, and finished that photo strip from Peirce to Le Monnier. You might tell the king that the strip looks pretty good. I got some convergent stereo on Romer on the way over. And right now, I'm directly above one of the Littrow ridges, and it's - it - it has quite

distinct relief. I'm really surprised at the amount of relief that the ridge has from here, and I won't take a picture of it, because we got a couple yesterday. But it's really quite distinct. And I can look out to the north and look at Posidonium. And there's a very - along the - the narrow portion of what looks like the - the lakebed part of the fill in the mare floor, it looks very similar to what you'd see on a lakeshore. Very distinctive color, light color on the bank, and a darker color in the mare floor, and what looks like some very positive relief, almost as if there was a lava flow that came out around the edge of the slab that was tilted and flowed down into the low spot of the floor.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 12 30 36 CDR-LM Okay, we heard that. Gee, I'm just looking down right in front of the LM here to try and get your relative abundance, and I was about ready to say that maybe, of these inch frags, there might be five or six in a square meter. And I see what appears to be a round glassy ball. It's shiny, it casts a rounded shadow, and it looks about the size - oh, maybe an - an inch or so.

04 12 31 08 CC Roger.

04 12 31 11 CDR-LM I can see some lineaments on the surface which appear to be from the descent engine. They radiate away from our position here. We'll take a closer look at those later.

04 12 31 22 CC Roger, Dave. And, for the benefit of our fine Flight Director, maybe the name of that should be called an Aggie.

04 12 31 42 CDR-LM Okay, Joe. We'll call that one our first Aggie.

04 12 31 46 CC And, Dave, the question on the bright crater, you described it as the one near the LM with lighter gray debris in it. And I'm - I'm sitting here wondering if maybe that was No - -

04 12 32 01 CDR-LM Roger.

04 12 32 02 CC - - November Crater itself.

04 12 32 06 CDR-LM Okay; there was one in that fresh debris. Light colored around the rim. Although it was - did not have a particularly raised rim. It was a - a level rim, but there was a - a fair amount of debris around the rim. And that was out about, my 2 o'clock, I guess. Maybe you'd call that November. I guess what I was looking for, relative to November, was the bright ejecta blanket, which I don't really see.

04 12 32 34 CC Roger. We agree. It does look bright on our map here. Stand by for a call from Al if you could, guys.

04 12 32 45 CDR-LM Roger.

04 12 33 07 CC Falcon, would you give Endeavour a call? He's been calling you. Evidently you don't read. Try it in the reverse.

04 12 33 15 CDR-LM Hello, Endeavour. This is the Falcon. How do you read?

04 12 33 28 CC Falcon and Endeavour, this is Houston. Evidently neither of you are reading each other. We'll stand by until you get overhead and give it another try. I'll give you a cue. Over.

04 12 33 43 CDR-LM Falcon. Roger.

04 12 33 49 CC And, Falcon; this is Houston. We're suggesting that you proceed on with the PLSS charge, and we'll be saying goodnight to you shortly. You're coming up on your sleep period shortly.

04 12 34 04 CDR-LM Okay. And did that Sun compass do you any good, Joe?

04 12 34 12 CC Dave, those - those readings converge pretty well. They just don't decide between the about 100-meter error we think we have in the two possible landing sites. But you're very close to being exactly right on.

04 12 34 30 CDR-LM Okay, fine.

04 12 35 04 CDR-LM Hello, Endeavour; this is Falcon. You're loud and clear. How us? - Hey, it was super, just super. And we got the greatest place on the Moon down here. Yes, that's what they tell me. Say, can you see Index very well up there?

04 12 36 14 CC And, Falcon, this is Houston. In a few minutes, while you're stowing the ETB, we'd like for you to pick up the magazine and frame counts on the magazine from your two cameras, please.

04 12 38 14 CDR-LM Well, we'll do the little things and you do the big things.

04 12 38 18 CMP Yes, sirree. Maybe we can get together and compare notes.

04 12 38 25 CDR-LM Okay, we're about ready to power down for the night, and everything's in good shape down here. Everything is running well. And all we got to do is get a little sleep and get out after it.

04 12 38 36 CMP Okay, David. See you in the morning.

04 12 38 38 CDR-LM Okay. Have a nice night.

04 12 38 42 LMP-LM Good night, Al.

04 12 38 44 CMP Good night, James. I'm keeping your sleeping bag warm for you, Jim.

04 12 38 51 LMP-LM Take care of everything up there.

04 12 38 54 CMP Certainly.

04 12 40 07 CMP Houston, Endeavour.

04 12 41 03 CMP Hello, Houston; Endeavour.

04 12 41 08 CDR-LM Hey, Houston; Falcon. Endeavour's calling you.

04 12 41 11 CC Thank you, Dave. We're hearing him.

04 12 41 20 CMP What is it? Shift change, Joe?

04 12 41 22 CC Al, no, it's not. I think maybe - we may be on split S-band, and you're transmitting to me instead of Gordo. What can I do for you?

04 12 41 37 CMP Well, I didn't - I didn't change my frequency, Joe. Say listen, I had a photo pass - -

04 12 41 51 CC Alfredo, are you still reading me?

04 12 42 09 CDR-LM Say, Houston; Falcon. By the way, the VHF is crystal clear up here. Our comm is working great. Soon as you guys get it squared away on the ground, I guess we'll all be tied together.

04 12 42 19 CC Roger, Dave. We - we read the conversation. We'll be standing by for a report of a successful PLSS charge and interested in getting you guys in the sack as quickly as possible. Also, when you load up the ETB, we'll be standing by for frame counts from your cameras.

04 12 42 40 CDR-LM Wilco.

04 12 44 27 LMP-LM Okay, Joe. I have some frame numbers - frame counts for you.

04 12 44 32 CC Roger, Jim. Standing by.

04 12 44 38 LMP-LM Roger. Mag L is reading 33. Mag K is reading 66. And MAG Metro is reading 20.

04 12 44 57 CC Roger, Jim. Thank you. Sounds like we got some beautiful shots already.

04 12 45 07 LMP-LM Beautiful scenery.

04 12 45 11 CC It sounds it.

04 12 52 37 CC Hello, Hadley Base; this is Houston. Regarding the water separator number 1: Just to give you a warm feeling, it's - it's working perfectly now. It looks as though we just had a temporary - temporarily there, some water run down from the hoses and waterlogged it, but it's working perfectly now. Over.

04 12 53 02 CDR-LM Okay, Houston. Thank you for passing it on.

04 12 59 36 CDR-LM Houston, Hadley.

04 12 59 39 CC Go ahead, Dave.

04 12 59 45 CDR-LM I'd like to confirm that, on the LMP camera for EVA-1, we use MAG Lima. Is that correct?

04 12 59 53 CC That's correct, Dave. MAG Lima on the LMP camera. And we copied all the frame counts.

04 13 00 02 CDR-LM Okay; thank you.

04 13 00 33 CC And, Dave, this is Houston. Did you copy from me that your water separator number 1 looks good again?

04 13 00 43 CDR-LM Roger; I thought we called you back on that, Joe. We got it. Thank you.

04 13 08 08 CDR-LM Okay, Houston. Hadley Base has two charged PLSSs.

04 13 08 16 CC Go ahead, Dave.

04 13 08 20 CDR-LM Roger. We have two charged PLSSs.

04 13 08 23 CC Roger; that sounds good.

04 13 08 52 CC And, Dave and Jim; this is Houston. If you two are interested, I could probably arrange for a geology lecture here to put you asleep - to put you to sleep.

04 13 09 10 CDR-LM Perhaps, Joe - I'm afraid that might - that'd keep us awake.

04 13 09 14 CC Roger. I agree. That was an outstanding job of describing your surroundings. By the way, guys, I'm really - all of us are looking forward to tomorrow.

04 13 09 27 CDR-LM Well, thank you, Joe. I hope we get wound up and get out there and get close to some of this. It's really fascinating.

04 13 13 14 CC Hadley Base, this is Houston. Requesting telemetry switch. LO bit - bit rate. Please.

04 13 13 26 CDR-LM Roger. LO bit rate.

04 13 19 37 CC Hello, Hadley Base. This is Houston.

04 13 19 43 CDR-LM Go ahead, Houston.

04 13 19 47 CC Roger, Dave. We're not going to ask exactly for a mark when you ingress the hammocks. And, by the way, I think the space program is the any - only place where a person can ingress a hammock, but we would like a status report on the two of you

when you get comfortable. And, a final thing, you might be interested, the score of the All Star game at about halftime is the Baltimore Colts 14, College All Stars 7. And we'll be standing by for your status report. Over.

- 04 13 20 27 CDR-LM Okay. That sounds like a pretty good game.
- 04 13 28 10 CC Hadley Base, this is Houston.
- 04 13 28 17 CDR-LM Go, Houston.
- 04 13 28 18 CC Dave, before you get too well settled there, I forgot to indicate that the Surgeon is requesting a - a radiation device read-out to be included in your crew status report there.
- 04 13 28 34 CDR-LM All right. We'll look into that, Joe. We'll get it.
- 04 13 28 38 CC Okay. Fine, Dave. I was afraid you would get in a position where you couldn't reach those devices.
- 04 13 28 48 CDR-LM Oh, no, we weren't thinking of passing the Surgeon. We just have a - a number of unscheduled housekeeping chores that we've got to get squared away here, if we are going to settle down for 3 days.
- 04 13 29 00 CC Roger. Understand. And we're in no hurry. I do want you to get a good night's rest though.
- 04 13 29 10 CDR-LM Roger.
- 04 13 29 34 CC And, Dave, this is Houston. It sounds like you'll be able to carry out a very good experiment with your portable Leaning Tower of Pisa there.
- 04 13 29 50 CDR-LM Well, I'll tell you. It really doesn't seem to be leaning that much. We haven't noticed any - well, we can see it's still a little tilted here, but it's no real problem.
- 04 13 29 59 CC Roger.
- 04 13 30 06 CDR-LM In fact, what, about 10 degrees at the most?

04 13 30 20 CDR-LM Okay. On the PRD, if you're ready to copy.

04 13 30 25 CC Roger; go ahead.

04 13 30 30 CDR-LM Okay; CDR is 25011. The LMP, 08020.

04 13 30 39 CC Roger, Dave. Thank you.

04 13 36 16 CC Dave, this is Houston.

04 13 36 23 CDR-LM Go ahead.

04 13 36 25 CC Roger. Apologize for the question. But are your radiation meters tucked away yet?

04 13 36 35 CDR-LM They sure are.

04 13 36 37 CC Okay, thank you.

04 13 36 41 CDR-LM Roger.

04 13 43 39 CC Hello, Hadley Base; this is Houston. Over.

04 13 43 46 CDR-LM Go ahead, Joe.

04 13 43 50 CC Roger - -

04 13 43 51 CDR-LM What can I do for you?

04 13 43 52 CC Roger, Dave. We've got two goodnight questions for you here. The first, we're trying to unravel some water-pressure data, and we just needed to know if you charged the PLSSs, using your checklist or using the decal instructions on the PLSSs. Over.

04 13 44 16 CDR-LM No, we used the checklist. We used the checklist for the water ...

04 13 44 22 CC Roger; understand you used the checklist and charged it with water for the specified 5 minutes then. Over.

04 13 44 35 CDR-LM Yes, that's correct.

04 13 44 37 CC Okay; copy that. And, Dave, we've got a major discrepancy in your radiation dosimeter reading. It's either gone belly-up on us or we miscopied the number which you read. We'll have to ask you to read it again, please.

04 13 45 00 CDR-LM You know that we switched them?

04 13 45 05 CC Say again, Falcon.

04 13 45 10 CDR-LM You know that CDR and CMP's PRD's were interchanged.

04 13 45 16 CC That's affirm, Dave; and the last reading we got from Al was considerably higher than the one we got from you. The device is either broken or you're being un-irradiated, which seems unreasonable. Over.

04 13 45 38 CDR-LM Well, all I can do is look in this very tiny window and look at these very tiny numbers and they say 2501 - I guess I can give you a seven on that one.

04 13 45 53 CC Roger. Everybody's happy. Thank you, Dave. And we have no questions from Houston. We'll say a pleasant good night to the two of you and look forward to tomorrow. Over.

04 13 46 08 CDR-LM Okay, Joe. I guess we don't have any alarm clock, so if somebody'll give us the word, we'll be standing by.

04 13 46 13 CC I wouldn't be at all surprised. You're liable to get the word from down here. And it's been an out-standing day.

04 13 46 27 CDR-LM Yes, we've enjoyed it.

04 13 57 42 CDR-LM Houston, Hadley Base. We're all tucked in. We'll see you in the morning.

04 13 58 06 CC Falcon, Houston. Did you call?

04 13 58 12 CDR-LM Roger. I just let you know that we're all tucked in - in the hammocks, and we'll see you in the morning.

04 13 58 19 CC Roger, Dave. Good night and don't fall out.

04 13 58 26 CDR-LM No way, Bob, no way. There's no place to go if I did.

04 13 58 36 CC Copy.



SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 12 32 13 CC Okay, Al. Very interesting. Change the subject, we're now - should be - within line of sight of the LM, so stand by while I get a quick check and see if they can take a comm check.

04 12 32 29 CMP Okay; fine.

04 12 32 40 CC Al, go ahead with it and see if you can raise them.

04 12 32 45 CMP Okay. Hey, Falcon; this is Endeavour. How do you read?

04 12 32 55 CMP Hello, Falcon; this is Endeavour.

04 12 33 11 CMP Hello, Falcon; Endeavour.

04 12 33 28 CC Falcon and Endeavour, this is Houston. Evidently, neither of you are reading each other. We'll stand by until you get overhead and give it another try. I'll give you a cue. Over.

04 12 33 42 CMP Okay, Gordo. I'll keep trying here a couple of times. Falcon, Endeavour. How do you read?

04 12 33 53 CMP Hey, I hear you trying to call. Go ahead.

04 12 34 32 CMP Hey, Falcon; Endeavour. How do you read?

04 12 34 39 CMP Hello, Falcon; this is Endeavour. I read you.

04 12 35 01 CMP Hello, Falcon; Endeavour.

04 12 35 06 CMP Hey, you're coming in 5 square, David. How'd it go?

04 12 35 13 CMP Hey, that sounds neat. I think I got you on the - on the last pass, too.

04 12 35 22 CMP Yes, sir. I could see Index just as clear as a bell.

04 12 35 32 CDR-LM ... Falcon to go with it?

04 12 35 33 CMP I went right down the line, Matthew, Mark, Luke, and Index.

04 12 35 38 CDR-LM Roger.

04 12 35 47 CMP How do you read now, Dave?

04 12 35 50 CDR-LM All broken. How us?

04 12 35 51 CMP Okay, let me try another antenna.

04 12 35 53 CDR-LM Okay.

04 12 35 57 CMP Okay; how do you read now?

04 12 35 58 CDR-LM Okay; that's a lot better.

04 12 36 00 CMP Okay.

04 12 36 01 CDR-LM I've got a question for you here - -

04 12 36 02 CMP Gee! That sure is a pretty sight down there, pal - -

04 12 36 03 CDR-LM - - Can you see Index at altitude now? Could you see any shadows to identify it?

04 12 36 09 CDR-LM Say again, Dave.

04 12 36 12 CDR-LM Could you identify Index Crater as you go over the landing site, now?

04 12 36 17 CMP Yes, I can do that with the naked eye right now. I'm just coming up on you now, and I can see Index from here.

04 12 36 29 CDR-LM Hey, Houston; Falcon. Stand by.

04 12 36 41 CDR-LM Okay, Endeavour; Falcon. I guess you're over the hill, because we don't read you now.

04 12 36 45 CMP Hey, negative, negative. I'm just coming up on you.

04 12 36 47 CDR-LM Oh, okay. You're broken a little bit. As you go by, see if you see any shadows in Index. I never saw it on the way in.

04 12 36 56 CMP Hey, listen. I've got Index with - just looking out the side hatch window, right now. Those four craters ending in Index are just as clear as a bell right now.

04 12 37 18 CDR-LM Okay. Do you see us sort of relative to Index?

04 12 37 22 CMP Well, I did, yes. I can't see you now, but on the last pass I picked you up, and you're just to the north and a little bit west of Index.

04 12 37 31 CDR-LM Okay, I think that's about right. Yes.

04 12 37 34 CMP Yes. Did you get the coordinates off the map?

04 12 37 37 CDR-LM Yes, we got the ones you passed to Houston, and we also got the ones in the back room, and I guess we're discussing ... several kind of numbers now within 100 meters or so of where we really are. So, I think we're pretty well located.

04 12 37 53 CMP Well, I'm right over you right now, pal, looking down.

04 12 38 02 CMP I hope the view is as fantastic down there as it is up here.

04 12 38 06 CDR-LM I'm telling you, it really is!

04 12 39 24 CC Endeavour, Houston.

04 12 39 46 CC Endeavour, Houston.

04 12 40 00 CC Endeavour, Houston. If you're reading, put the pan camera on MONO and also add - -

04 12 40 06 CT Houston COMM TECH, Goldstone COMM TECH.

04 12 40 20 CT Houston COMM TECH, Goldstone COMM TECH, net 2.

04 12 40 28 CT Houston COMM TECH, Goldstone COMM TECH, net 2.

04 12 41 04 CC Endeavour, Houston. Go ahead.

04 12 41 17 CC Endeavour, this is Houston. Go ahead. Over.

04 12 41 41 CMP Had a photo pass just coming up on the landing site that time. It was photo target 25, Caucasus Mountains, which I skipped to do the VHF voice check.

04 12 43 00 CC Endeavour, this is Houston. Over.

04 12 43 06 CMP Hello, Houston; Endeavour.

04 12 43 08 CC Okay, you've been loud and clear. We've been balled up on a site configuration problem here, but I think we're back with it, and we have one question. You're by T-stop for the pan camera now, we wondered if you went to MONO on the pan camera at 3 minutes and 20 seconds before T-stop. Over.

04 12 43 29 CMP Negative, Gordo. I got tied up in that VHF check.

04 12 43 33 CC Roger.

04 12 43 36 CMP Want me to go MONO now?

04 12 43 42 CC Go STANDBY now, Al. We're past the T-stop time.

04 12 43 50 CMP Okay, Gordo. Sorry about that. We're in STANDBY now.

04 12 43 53 CC No problem. It was our fault for the comm problem. We - we heard the comm checks and it sounded good. You're clear to go back to normal configuration on the VHF whenever you get a chance.

04 12 44 09 CMP Okay.

04 12 44 52 CC Endeavour, Houston. We'd like the GAMMA RAY GAIN STEP switch one step up. Over.

04 12 45 02 CMP Roger. GAMMA RAY GAIN STEP, one step up, now.

04 12 45 06 CC Okay, Al. Thank you.

04 12 45 10 CMP Okay, and if you want to let me know on the pan camera power, whether the lens is in or not.

04 12 45 15 CC Okay. The lens is tucked in - -

04 12 45 16 CMP Yes, just keep waiting.

04 12 45 17 CC - - and you're cleared to turn it on.

04 12 45 23 CMP Okay, and the GAMMA RAY BOOM is going out now.

04 12 45 33 CC Okay.

04 12 45 36 CMP MARK. Barber pole.

04 12 45 41 CMP And the MASS SPEC BOOM is going out.

04 12 45 43 CC Roger.

04 12 45 44 CMP MARK. Barber pole.

04 12 45 47 CC Roger.

04 12 46 36 CC Endeavor. Houston. Would you give us AUTO on the HIGH GAIN, please?

04 12 46 48 CMP Roger. AUTO on the HIGH GAIN.

04 12 46 37 CC Endeavour, this is Houston. Thirty seconds to T-stop on the mapping camera. Over.

04 12 54 56 CMP Okay, Gordo. Thank you. Got you.

04 12 58 24 CC Endeavour, Houston. I have the TEI-26 pad for you. Over.

04 12 58 42 CMP Okay, Houston. Stand by just 1.

04 12 58 44 CC Okay; standing by 1.

04 12 59 13 CMP Okay, Gordon. I'm ready to copy.

04 12 59 16 CC Okay. TEI-26: SPS/G&N; NOUN 47 is 37354; plus 0.60, plus 0.97; T<sub>ig</sub> is 129:22:25.54; NOUN 81 is plus 3031.2, minus 1327.1, minus 0308.7; attitude is 180, 092, 339; ullage is four jets for 12 seconds. And other remarks: Lambda at T<sub>ig</sub> equals plus 172.93. Go ahead.

04 13 00 34 CMP Okay. TEI-26: SPS/G&N; 37354; plus 0.60, plus 0.97; 129:22:25.54; plus 3031.2, minus 1327.1, minus 0308.7; 180, 092, 339. That's four jets for 12 seconds and Lambda at T<sub>ig</sub> is plus 172.93.

04 13 01 05 CC Okay, Al. Your reading back is correct, and another comment. I think earlier we led you to believe that you shouldn't use the systems test meter. We retract that. We think the system - systems text - test meter is okay, and use it anytime you feel the desire to. Over.

04 13 01 24 CMP Oh, okay. Fine. Thank you.

04 13 01 27 CC And we're still missing the deploy time on the booms there back earlier. If you've got them written down and you want to get on, just give them to us anytime you have time.

04 13 01 43 CMP Okay. I'll - Let me dig for them. Gordo, on these boom deploy times and retract times, I don't have all of those times each time I do it, precisely, because sometimes it happens that I'm off busy doing something else, and I - you know, I miss the barber pole, so I - I don't have all of them.

04 13 02 08 CC Okay. I'm sure it's not a matter of life or death.

04 13 07 10 CMP Houston, Endeavour.

04 13 07 12 CC Go - go, Al.

04 13 07 17 CMP Okay. Did you get the gyro torquing angles on that P52, Gordo?

04 13 07 21 CC That's affirmative. We got them.

04 13 07 26 CMP Okay. I torqued them out at 109:07.

04 13 07 31 CC Roger; 109:07; and, for your information, there's 1 minute now until all those items on the SIM bay there is coming up.

04 13 07 41 CMP Okay.

04 13 10 54 CC Endeavour, Houston. Over.

04 13 11 00 CMP Houston, Endeavour. Go ahead.

04 13 11 02 CC A couple of requests - for you here. We would, first of all, like the MASS SPECTROMETER DISCRIMINATOR switch to LOW. Over.

04 13 11 17 CMP Okay. The MASS SPEC DISCRIMINATOR's in LOW.

04 13 11 20 CC And we're ready for an E-MOD, and we'd also like to ask you for a crew status report. Over.

04 13 11 31 CMP Okay. The E-MOD's coming your way, and stand by a minute and I'll give you all the status.

04 13 11 37 CC Okay.

04 13 11 47 CMP I guess just - if you want just crew status report - doing just fine. I don't know what else I can say.

04 13 12 00 CC Can you give us how much sleep you got last night, and also your PRD read-out?

04 13 12 10 CMP Okay. I've got apparently a bad PRD, so I haven't been keeping track, but I will if you want. But I've got Dave's PRD. And, let's see, I guess you didn't get a status report this morning. I got - I think all three of us got 7 and a half hours of sleep last night, and I got mine all in one segment. And I've taken no medication today.

04 13 12 32 CC Okay, Al. Fine. That - that was the problem; we didn't get this morning's report. One other quicky. If you'll comment if we're throwing too many reminders up from the ground here or not enough. We're just trying to get a feel for whether we're harassing you or helping you - on the timing callouts.

04 13 12 53 CMP Gordo, I think - Yes, yes. I think if you don't expect me to answer, it's a great help to me, because I do find that I'm trying to be three places at once in here; and, if I'm doing a P52, I can't be over working the - the SIM bay at the same time. So the reminder is good. I can always break into a P52 to go turn something off, but bearing in mind that I don't have a mission timer in - in the lower equipment bay, it's a little difficult for me to keep track of the time sometimes, so I do appreciate it.

04 13 13 27 CC Okay. We'll keep them coming. If they, at any time, become too much, just shut us up.

04 13 13 35 CMP Okay, Gordo. Appreciate it. Thank you, sir.

04 13 15 13 CC Endeavour, Houston. We got about 2 minutes until LOS. We still need the onboard readings, but if they were all nominal, just say so, and we'll get them some time later. And that's about all we have for you until tomorrow morning. Over.

04 13 15 33 CMP Okay. Onboard read-outs: BAT C was 37; PYRO BAT A was 37; PYRO BAT B, 37; RCS Alfa was 73; Bravo, 71; Charlie, 72; and Delta, 73.

04 13 15 48 CC Okay. We copy all that.

04 13 16 34 CC Endeavour, Houston. One last thing. The INCO's running behind on his DSE rewind; if it's not rewound when you LOS, you'll have to do those - perform all those verifies yourself. Over.

04 13 16 49 CMP Okay, Gordo. Will do it.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 13 38 --

BEGIN LUNAR REV 17

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 15 36 -- BEGIN LUNAR REV 18

04 16 06 11 CC Endeavour, Houston. Over.

04 16 06 37 CC Endeavour, Houston. Over.

04 16 06 59 CC Endeavour, Houston. Over.

04 16 07 37 CMP Houston, Endeavour.

04 16 07 41 CC Roger, Al. Sorry to wake you up again, but we need REACQUIRE and NARROW with angles of PITCH, plus 25; YAW, 185. Over.

04 16 08 39 CMP Okay, Houston. You've got REAC, NARROW; PITCH, plus 25; and a YAW of minus 185. How do you read?

04 16 08 47 CC Roger. Read you much better now, Al. Sorry about that. Good night, again.

04 16 08 53 CMP That's okay. I wasn't asleep yet. I was waiting for you to call.

04 16 08 58 CC Oh, okay. Anything else you want to tell us?

04 16 09 10 CMP No. I was just wondering what you wanted setting on the - on the HIGH GAIN is all.

04 16 09 17 CC Okay.

04 16 09 52 CC Okay, Al. And one other thing you might do before you go to bed is MASS SPEC DISCRIMINATOR to LOW.

04 16 10 04 CMP Ok - okay, Bob; understand. MASS SPEC DISCRIMINATOR to LOW.

04 16 10 09 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 17 34 --

BEGIN LUNAR REV 19

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 19 30 39 CC Falcon, Houston. Over.

04 19 30 54 CDR-LM Hello, Houston. This is Falcon. Go.

04 19 31 01 CC Roger. Morning, Dave. Waking you up an hour early because we've got a little problem on board we need addressed. When you get a moment to get something to write it down, let me talk to you about it in detail. The problem we're looking at is a leak in descent O<sub>2</sub>, and we're trying to determine whether we got a small cabin leak or a leak in the oxygen system itself. Over.

04 19 31 28 CDR-LM Okay. Understand, Bob.

04 19 32 -- BEGIN LUNAR REV 20

04 19 35 53 CC Falcon, Houston. Are you ready to copy?

04 19 36 02 CDR-LM Stand by, Houston.

04 19 36 45 LMP-LM Houston, this is Hadley. We're ready to copy.

04 19 36 48 CC Okay, Hadley. First thing we'd like is HI bit rate. That will allow us to look at some extra parameters, particularly temperature, to see how much of this fall is due to temperature effects, which we haven't experienced before. So, if you're standing right there, why don't you flip that on while I read you the rest of the pad, Jim.

04 19 37 09 LMP-LM Okay. We're HI bit rate.

04 19 37 11 CC Roger. Thank you. Next step is DESCENT O<sub>2</sub> to CLOSE. And why don't you do that now, because the step following that is for the ground to monitor the descent O<sub>2</sub> tank pressure and the cabin pressure, and we're going to look and see if the leak, which we've seen so far as a drop in the tank pressure, is due to a cabin leak or to a leak in the system itself. Copy?

04 19 37 45 LMP-LM Okay. I copy. DESCENT O<sub>2</sub> is CLOSED.

04 19 37 51 CC Roger. Stand by.

04 19 38 10 CC Okay, Hadley. We'll be watching that. Then, you might copy down the following steps to be performed, depending upon our analysis of what we're watching right now. One, if leak stops, upper and forward hatch valves, close. And ensure that the urine QD is capped. Over.

04 19 38 52 LMP-LM Stand by 1.

04 19 39 17 LMP-LM Houston, this is 15. We were just looking at the urine transfer device, and that valve was in the OPEN position, although the device wasn't capped.

04 19 39 31 CC Roger. Copy and understand that the receptacle or transfer device was attached to the hose ... all night.

04 19 39 42 LMP-LM That's affirm.

04 19 39 43 CC Roger. Stand by.

04 19 40 24 CC Okay, Jim. We'd like you to leave it in the configuration you found it in for a few minutes, because that will allow us to verify that that's where the leak was. Over.

04 19 40 37 LMP-LM Okay. I'm going to open the valve again.

04 19 40 40 CC Roger. Thank you. I'll tell you, that's good news if that's what it is, man.

04 19 40 46 LMP-LM Understand on your first - Okay, on that first step that you read, it said, if leak stops, to close both dump valves.

04 19 40 57 CC Roger. That's affirm. In other words, if we see that the leak has stopped here on the ground, we will then ask you to close both dump valves and also verifying the urine QD; and, if the leak in the cabin - now, if the cabin is completely isolated - continues to hold, we will then ask you to open the hatch valves one at a time to verify that the hatch valves are not going to leak or which hatch valve is leaking in the open position. Some of that will be - not indicated, if indeed it is the urine QD that's capped. Do you copy, Jim?

04 19 41 44 LMP-LM Okay. Yes. We understand.

04 19 41 48 CC Roger. And we'd like to verify right now just quickly that the DESCENT O<sub>2</sub> is CLOSED; that the urine receptacle is back in its original configuration. Over.

04 19 42 02 LMP-LM That's verified.

04 19 42 03 CC Roger. Let's just stand by here for a couple of minutes and we'll see how - what the ground has to tell us.

04 19 42 13 LMP-LM Roger.

04 19 42 30 LMP-LM Bob, as long as we're talking about consumables, what are you showing down there for water? Because we are reading - oh, about 60 percent on descent 1 and 2 now.

04 19 43 13 CC Stand by, Jim. We'd better read our decals down here, too.

04 19 43 25 LMP-LM Bob, you did copy my question about the water quantity?

04 19 43 29 CC Roger, Jim. And we're having to read our decals down here, too. It will take us a minute. We'll be right back with you.

04 19 43 38 LMP-LM Understand.

04 19 46 52 CC Jim, we have an answer for you on your water gauge problem. The 60 that you're seeing indeed corresponds to a true 70 percent which, indeed, is the number that we were expecting to see. Over.

04 19 47 09 LMP-LM Okay. Fine, Bob. Thank you.

04 19 48 54 CC And, Hadley Base; Houston. Over.

04 19 49 01 LMP-LM Go ahead, Bob.

04 19 49 02 CC Roger. It looks like your descent tanks are holding up very nicely; your cabin is falling slightly, as you may have noticed already on your - your meters. We would like you to take the

urine receptacle off the hose and then put the QD cap on after you remove the urine receptacle. Over - And then we'll - After you have done this, we will watch the cabin for a little bit longer to see that it stops also. Over.

04 19 49 29 LMP-LM Okay. That's in work.

04 19 49 48 LMP-LM Okay. The urine receptacle is off, but the - the other QD is - installed.

04 19 49 54 CC Roger. We're standby to watch what comes off down - down here on the ground.

04 19 50 42 CC And, Jim, we'll be sitting here in this configuration about 5 minutes to watch the cabin again.

04 19 50 51 LMP-LM Roger.

04 19 50 55 CC It looked like you were getting pretty good sleep there for a while, Jim.

04 19 51 04 LMP-LM Say again, Bob.

04 19 51 05 CC Roger. It looked like you were getting a pretty good sleep there.

04 19 51 11 LMP-LM Yes, sir. That's the best sleep I've had on the flight.

04 19 51 13 CC Roger. How was Dave doing?

04 19 51 24 CDR-LM Just fine, Bob. I was - way down in sleep when you gave us a call.

04 19 51 29 CC Sorry about that, Dave.

04 19 51 34 CDR-LM Oh, no. That's okay. Let's get the problem squared away.

04 19 51 38 CC Yes, I figured we lost a little bit of sleep down here on the ground tonight. I couldn't even fall asleep at my console.

04 19 51 47 LMP-LM That is amazing.

04 19 55 53 LMP-LM Houston, this is Hadley. If you're not too busy, I could copy the lift-off data from P21 and P27.

04 19 56 11 CC Roger, Jim. If you are ready to copy then, T-21 is 188:30:48 - negative. That should be a 118. I guess you gathered that. T-22 is 120:29:00; T-23 is 122:27:10; T-24, 124:25:21; T-25, 126:23:32; T-26, 128:21:44; T-27, 130:19:54. Over.

04 19 58 32 LMP-LM Okay, Bob. I'll give you a quick readback on that - on these. 118:30:48; 120:29:00; 122:27:10; 124:25:21; 126:23:32; 128:21:44; and 130:19:54.

04 19 58 58 CC Roger. Good readback, Jim.

04 19 59 08 LMP-LM And, if you have the consumables update, I'll take that, too.

04 19 59 30 CC Roger, Jim. We're ahead of ourselves there.

04 19 59 36 LMP-LM Okay. Not - no rush.

04 20 00 38 CC And, Falcon; Houston. Over. We believe that we are very strongly convinced, finally, down here, that that indeed solves the problem. You can go back to DESCENT O<sub>2</sub>, OPEN. And we'd like to suggest that the procedure, when using that particular device from now on, will be to remove the resepricle [sic] when you're finished and cap it in - as we've just done. Over.

04 20 02 11 CDR-LM That's good news, Bob. We'll do that. And, gee, the sleeping up here is really good up here; and, if y'all ever see another little problem like that, why, we'd be only too happy to roll over and take care of it. I think, as a matter of fact, we'd even sleep better if we knew that you wouldn't mind waking us.

04 20 02 31 CC Roger. You can sleep better because now you know I can wake you up anyway. The thing didn't drop out of your ear, apparently, Dave.

04 20 02 39 CDR-LM Oh, no. I made sure of that.

04 20 02 42 CC And you guys have about 22 minutes left, if you want to go back to sleep again.

04 20 02 50 CDR-LM Well, I tell you, we probably could. We were just talking - talking it over, and both of us slept just as well here as we do at home.



- 04 20 03 04 CC Well, frankly, Dave, it's your guys option. If you want to lie down and take a little morning snooze while the rest of us keep working down here, that's your option. I'm not sure that we want to - we weren't talking about starting the EVA early. I think that was kind of agreed upon before - we start on time, wasn't it?
- 04 20 03 23 CDR-LM Yes, that's right. We don't want to start the EVA early. We'll stick to the time line. But I think we'll take advantage of the extra little bit of time here to keep getting organized. It takes a little while to settle down and get a system here for living to be efficient, and I think we can make good use of the time.
- 04 20 03 41 CC Okay; you're the boss.
- 04 20 03 50 CDR-LM Well, we both feel pretty well rested at this point. And we'll just mush along here at a nice easy pace and, hopefully, be all ready by the time it's time to go out.
- 04 20 04 02 CC Okay; and when you're ready, you can give me call, when you're ready for some updates, particularly concerning EVA planning, and I'll have a few good words to pass you then, when you're con - when it's convenient.
- 04 20 04 18 CDR-LM Okay. We'll get breakfast cooking here, and give you a call.
- 04 20 04 22 CC Roger.
- 04 20 11 21 CDR-LM Houston; Hadley Base. We've got another little question here on your questioning last night during the PLSS recharge of the water. You seem to have had some question as to whether we ran 5 minutes or not, and I wonder if you had any indication we got less than a full charge on the PLSS.
- 04 20 11 39 CC Okay, Dave. Stand by. I'll check -
- 04 20 13 32 CC And, Falcon; Houston. I guess last night the question came down to whether we could read it well enough down here on the ground. To the best of our ability down here to read this, you got a

full charge, but apparently that's plus or minus about a pound. But our readings down here, for what they're worth, say you got a good charge. Over.

04 20 13 57 CDR-LM Okay. Understand. We felt like we did by looking at the sight gages, although on the first PLSS, there were still a few little bubbles running through when we reached the MAX time, by looking at the sight gage. And on the second PLSS, it was clear, oh, within 4 or 5 seconds.

04 20 14 17 CC Copy.

04 20 19 13 CC Hadley Base, Houston. Over.

04 20 19 19 CDR-LM Go ahead.

04 20 19 20 CC Roger, Dave. It looks like we can tell you that, at the present time, our extrapolations indicate we'll have sufficient oxygen for a completely nominal mission, including the PLSS recharge on EVA-3. This PLSS recharge - having high enough pressure for the PLSS recharge - was our hardest constraint, and it looks like we meet it, although rather closely. Over.

04 20 19 49 CDR-LM Okay. Well, we'll breathe slowly and save as much as we can.

04 20 19 54 CC Copy.

04 20 21 23 CDR-LM Houston, Hadley. We've got another question for you, since we're sitting here eating and looking around. Did you all, by chance, get any figures on our descent rate at touchdown? We're just taking a look out here, and it looks like we may have stroked a gear some; and, as near as we can recall, we were coming down about a foot per second when we got the contact, and we just wondered if you had any data on that yet.

04 20 22 14 CC Stand by, Dave. We're getting that.

04 20 22 20 CDR-LM Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 20 23 10 CC Okay, Dave. We have an answer for you; which is that we were showing .7 feet per second up to touchdown. And then at touchdown, it appears that, at the same point we got the roll and pitch, that we picked up to something like 3.7 feet per second at that point. Over.

04 20 23 32 LMP-LM So we went from .7 to 3.7 from contact to touchdown. Is that right?

04 20 23 54 CC Dave, we're having to look at these based upon times - We don't see the contact light, and we don't really know when touchdown occurred, but we're looking at things like the times. You were coming down at .7 there, all the way to the very end; and, then, at the same that we see the pitchup and the rollover, we see an increase suddenly to 3.7. Over.

04 20 24 21 CDR-LM Oh, I see. Think we might have stuck our rear paw [sic] in a crater back there somewhere, huh?

04 20 24 29 CC What say again, Dave?

04 20 24 35 CDR-LM Looks like we might have stuck the rear pad in a crater back there somewhere, huh?

04 20 24 40 CC Either that, or you touched down on something and fell through.

04 20 24 50 CDR-LM That's an interesting thought.

04 20 25 06 CDR-LM Well, that says the landing radar is pretty good data then.

04 20 26 11 CDR-LM Okay, Houston. Hadley Base, here. We're ready to talk over the EVA plan with you, if you'd like.

04 20 26 23 CC Roger, Dave. We're ready to. First of all, we'll talk about the changes in the traverse plan, which are very minimal. But for your planning, we're now showing a LM location on the grid map in the coordinates of Bravo Romeo 3 and 75.5. Over.

04 20 26 54 LMP-LM Okay, Bob. We're going to have to get in the ETB and pull the maps out. Just a second.

04 20 26 59 CC Roger. I'll wait then.

04 20 27 52 LMP-LM Bob, will you give me the coordinates again?

04 20 27 55 CC Roger. Bravo Romeo 3, 75.5. Over.

04 20 28 07 LMP-LM Roger. Copy. Bravo Romeo 3, 75.5.

04 20 28 12 CC Roger. And that's over there near - near November. Okay. That's to write down. The rest of this, for a while anyway, is kind of just advisory. This new location adds approximately 0.6 kilometers to the EVA-1 traverse and, therefore, about 6 minutes driving time. However, that's only provisionary, of course, and our indications of a beautiful flat plain out there may mean that we'll make up some of that time just in being able to drive faster than we were perhaps anticipating. If this is not the case - -

04 20 28 53 LMP-LM There, you have it.

04 20 29 00 CC Go ahead.

04 20 29 02 CDR-LM Before you get too far into that broad, flat plain out there, I hope we made it clear that there is a fairly good population of craters, which we're going to probably have to drive around. Even though there are no boulders, we're still going to have somewhat of a wander factor in avoiding the 3- to 4-meter craters.

04 20 29 24 CC Okay. We realize that, Dave; and, in order to keep the EVA total time to the maximum of 7 hours, this 6 minutes of it has already been deleted from the activities of the LM at the end of the traverse. So that's where we've taken up the slack at the present time. And then beyond that, no further changes have been made to the EVA-1 time line. Over.

04 20 29 51 CDR-LM Okay. Very good.

04 20 29 56 CC      Okay. Extra activities we'd like for you to include. We'd like the big glass ball that you saw in the vicinity of the LM - could be picked up, hopefully, with the contingency sample, if it's convenient; if not, it should be retrieved as part of the LRV preparation before the EVA traverse. The geology people, for obvious reasons, are rather interested in the large black rocks you described on the SEVA at 40 meters and 300 meters. And we'd like to pick those up before you leave sometime. And I guess a little note here, which sounds like motherhood to me - "collected samples should be taken at the crew's convenience at the end of the EVA." As far as the Rover is concerned, in our new position - -

04 20 30 49 CDR-LM    Okay.

04 20 30 59 CDR-LM    Bob, give us a couple of minutes here for each of those comments, so we can come back at you.

04 20 31 02 CC      Roger. Waiting.

04 20 31 09 CDR-LM    Okay. We were just discussing the frags around the LM, and we can see a number of interesting rocks out here. And we thought it might be better to wait until we get back to the LM to pick them up and make sure we didn't disturb the surface around it, although we can pick them up fairly quickly in the beginning. I guess it's your choice. If you want to spend the time in the beginning or wait until we get back.

04 20 31 36 CC      Roger, Dave. My first flip comment there was the comment before you leave the Moon. The second comment on the "selected samples should be taken at the crew's convenience at the end of the EVA" was apparently intended by the geologists to mean selected samples of these black rocks and other interesting frags. Over.

04 20 31 57 CDR-LM    Okay. Well, do you specifically want us to pick up the glass ball and the black rocks before we start the EVA-1?

04 20 32 07 CC      Stand by, Dave.

04 20 32 24 CC Okay, Dave. You will put the glass ball at a higher priority. Apparently, because they're worried if the glass ball might get lost once the area gets mussed up a little bit, whereas the black rocks will probably still be there. Over.

04 20 32 42 CDR-LM Okay. Understand. And I guess our understanding of the contingency sample is that it's supposed to be typical of the surface around, rather than an exotic.

04 20 33 12 CC I guess that's basically true. I guess that's basically true, Dave; however, they would like this little glass ball. You could also put it separately in a bag before you leave with the Rover, or I guess they really wouldn't mind, if they know particularly what it is, if it was part of the sample - contingency sample.

04 20 33 34 CDR-LM Okay. We'll take care of that.

04 20 33 39 CC Okay. Let me talk to you about Rover status. The additional distance - this 0.6 - will - and your new position - will not affect the electrical power profile. It's really a very small and almost trivial distance. And, secondly, the LM slope, the 9 degrees by 9 degrees, is within the angles for which the deployment is specified, which is 15 degrees, and also within the angles for which it's been tested. And I guess a couple of days ago they did test 15 degrees of pitch and 5 degrees of roll at Marshall, and 14 degrees of pitch and 14 degrees of roll. And, right now, we will, in real time, have the mockup at Marshall positioned corresponding to our pitchup of 9 and roll of 6 degrees. Over.

04 20 34 37 CDR-LM Okay. That's nice to hear, and it sounds like those fellows are planning ahead as usual.

04 20 34 44 CC Hope so. And as far as checklist changes - we have none. As far as TV plan updates - we have none.

04 20 34 57 CDR-LM Okay. Understand.

04 20 35 03 CC And, sometime, Dave, the medics would like a status report, postsleep.

04 20 35 17 CDR-LM Okay. Stand by.

04 20 35 44 CC And, when you're ready, Falcon, we've got some consumables for you.

04 20 35 51 CDR-LM Okay. On the crew status, I guess we both got about 5 hours sleep, based on the time we went to bed and the time we got up; no medication; and we're in good shape. And I guess you can go ahead with the consumables.

04 20 36 11 CC Roger. And how about a PDR or PRD — or whatever they are — read-out.

04 20 36 20 CDR-LM Okay. I'll tell you, it would help us out if we could do that once a day. You know they're stowed down in the suit pocket, and we've got to do some digging to get them. We'll give them to you twice a day if you really need them, but it takes a little time.

04 20 36 36 CC Roger, Dave. I think they're only called out for once a day, we agree; and somehow, I guess, trans-earth - or translunar, we got in the habit of getting them from you at the time when we didn't really need them, like at sleep. We got them from you at sleep last night; it's just that the checklist calls out then - calls them out for right now; but you're right, it is only a requirement once a day, and we did get them last night.

04 20 37 08 CDR-LM Okay. Our crew status report has them in the evening before bed. Do you want them then, or do you want them in the morning?

04 20 37 15 CC Say again, Dave. When does your crew status report have them?

04 20 37 23 CDR-LM Prior to the rest periods.

04 20 37 26 CC Okay; the Flight Plan shows it in the postsleep.

04 20 37 35 CC We'd like one this morning - -

04 20 37 36 CDR-LM Well, make a decision.

04 20 37 37 CC Roger. We'd like one this morning before the EVA, and the surgeons promise they'll look at it today.

04 20 37 47 CDR-LM That's encouraging.

04 20 37 50 LMP-LM Okay, Bob, I'm ready to copy the consumables.

04 20 37 53 CC Okay. This is for GET of 116:40. RCS A, 85; B, 85; O<sub>2</sub> descent 1, 78.5; tank 2, 78; O<sub>2</sub> ascent 1, 99; tank 2, 99; H<sub>2</sub>O descent 1, 58; tank 2, 58. H<sub>2</sub>O ascent 1, 100 percent; tank 2, 100 percent. Descent amp-hours, 15:38; ascent amp-hours, 5:72. Over.

04 20 39 01 LMP-LM Okay; I copy, Bob.

04 20 39 33 LMP-LM Bob, I've been looking at the descent water. It looks like we're off about 12 percent. Is that any concern down there?

04 20 39 42 CC Roger, Jim. We didn't just suddenly lose that. That was TELMU's understanding of how we wanted the consumables updated. We're having a discussion about that right now. That was meant to be what your reading on board should be. I guess, saying that if you're reading 58 percent, you're in good shape. Whereas, there's a separate figure, which is a figure down here, which I guess is something like the 70 percent that I gave you a few minutes ago. That seems to be a - -

04 20 40 18 LMP-LM Okay; understand - -

04 20 40 19 CC - - That seems to be a question of how TELMU interprets what the consumables update should be. We may change that around and let you know later.

04 20 40 35 LMP-LM Roger. We copy.

04 20 42 08 CC Okay, Hadley; this is Houston. The actual on-board figures, not the gage figures that you'll read, but the actual onboard figures for water, are, descent 1, 70.7 and tank 2, 68.5. Over.

04 20 42 33 LMP-LM Roger. Copy that. Thank you.

04 21 22 36 CDR-LM Houston, Hadley Base.

04 21 22 53 CC Falcon, this is Houston. Over.



04 21 23 00 CDR-LM Morning, Joe. We're about due to wake the computer up for a little while; and, if you're ready, we'll bring it out of its sleep period for a minute and then put it back to sleep if you want to take a look at it.

04 21 23 22 CC Roger, Dave; that sounds good to us. We'll be watching.

04 21 23 28 CDR-LM Okay.

04 21 24 33 CDR-LM Okay, Houston. It looks like it's still with us.

04 21 24 37 CC Roger, Dave. That's good news.

04 21 30 -- BEGIN LUNAR REV 21

04 21 36 52 CDR-LM Houston, Hadley Base.

04 21 36 56 CC Go ahead, Hadley. This is Houston.

04 21 37 01 CDR-LM Okay. As we get started on the suiting here, I wanted to make sure the biomed data was coming through clean to you, so we don't have any problems once we get the suits on.

04 21 37 28 CC Falcon, Houston. Apparently, Jim's data is not clean, and we're not getting your data at all, Dave. Other than that, it looks beautiful.

04 21 37 41 CDR-LM Well, I guess I don't mean right now, because you shouldn't be getting any data right now. What I mean, are the signals acceptable for computation of PLSS data or, perhaps, if they're not, you can give us a suggestion so, before we get going here, we - we're sure that you've got good data.

04 21 38 09 CC Stand by.

04 21 38 15 CDR-LM As a matter of fact, while the good surgeons are trying - thinking that one out, we're going - Jim's going to plug in to the suit now, and you can check it out.

04 21 38 27 CC Roger, Dave. That sounds good, and we'll be watching.

04 21 38 46 CDR-LM Okay. You should be receiving it, and we'd appreciate a call as soon as you can verify it's good.

04 21 38 57 CC Dave, it looks real good to us.

04 21 39 03 CDR-LM Okay, thank you. And I'll let you take a look at mine as soon as I get to the suit part.

04 21 39 07 CC Roger.

04 21 43 52 CC Jim, this is Houston. Verify for us, please, that your biomed data is unplugged now.

04 21 44 02 CDR-LM Well, he's off the headset, Joe, but - yes, it's unplugged. We're getting him into the suit.

04 21 44 07 CC Roger. Thank you.

04 21 44 16 CDR-LM What we'll do is get all hooked up to the suit, and then let you check it out, and then climb into the suit, just to make sure.

04 21 44 23 CC Sounds good, Dave. We'll be standing by.

04 21 47 34 LMP-LM Joe, how do you read? I'm back on comm.

04 21 47 43 CC Roger, Jim. Loud and clear.

04 21 47 47 LMP-LM You're the same.

04 21 50 54 LMP-LM And, Joe, looking at a battery management change at about 118:05, should we do it on that time?

04 21 51 09 CC Stand by, Jim. I'll be right back with you.

04 21 51 16 LMP-LM Okay.

04 21 51 28 CC Falcon, regarding your question on battery management, we would like you to do it per the checklist on the time listed there, please.

04 21 51 40 LMP-LM Okay; understand.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 22 04 14 LMP-LM Houston, this is Hadley Base. Will you check the Commander's biomed?

04 22 04 22 CC Roger, Jim. Dave's EKG data looks clean as a whistle.

04 22 04 29 LMP-LM Very good. He's going to complete the suit - suiting-up.

04 22 04 32 CC Roger.

04 22 04 37 LMP-LM And I'll get to the batteries shortly.

04 22 04 40 CC Roger.

04 22 09 58 LMP-LM Okay, Joe. I'm going to press on with the battery management now.

04 22 10 01 CC Roger, Jim.

04 22 10 12 LMP-LM And both ED batteries check at 37.

04 22 10 15 CC Roger.

04 22 13 14 LMP-LM Okay. Battery management complete.

04 22 13 17 CC Roger, Jim. Thank you.

04 22 35 49 CDR-LM Hello, Houston; Hadley Base.

04 22 35 53 CC Hello, Hadley; this is Houston.

04 22 35 59 CDR-LM Okay. We're down to the point of PLSS donning and with our mission timer turned off here to save the power. How about giving us a hack on - when we depress relative to the time now so we can keep track?

04 22 36 18 CC Roger, Dave. We're starting the clock right now.

04 22 36 26 CDR-LM Yes, but give us a hack on the time at which we should depress relative to your time there in Houston.

04 22 36 34 CC Roger, Dave. Understand, and we'll be right back with you.

04 22 36 41 CDR-LM Okay, we're looking at about 10 minutes after 7:00 right now.

04 22 38 15 CC Hadley Base, this is Houston.

04 22 38 21 CDR-LM Go ahead, Houston.

04 22 38 22 CC Roger, Dave. We're looking toward the cabin depress at about 8:00 o'clock Houston time.

04 22 38 31 CDR-LM Okay; fine. Thank you.

04 22 38 43 CC And, Dave and Jim, there's nothing ba - magic about that number. That's just our - our first calculation. Any time around there would be beautiful.

04 22 38 56 CDR-LM Okay. Well, that's all we wanted; just to have a rough cut on it.

04 23 05 46 CDR-LM Okay, Houston; Hadley Base. We're ready to go into a PLSS comm check, if you're ready.

04 23 05 56 CC Roger, Dave. We read you about 3 by. Stand by until I get a go-ahead from INCO here.

04 23 06 07 CDR-LM Okay.

04 23 06 17 CC Okay, Dave. We're go on the FM and high power. We've got it down here.

04 23 06 25 CDR-LM Okay. We'll be talking to you.

04 23 07 44 CDR-LM VOX - MAX. VHF to T/R; B to RECEIVE. Okay. CB(16) COMM: SE AUDIO, open, and you connect to the - PLSS comm.

04 23 08 40 CDR-LM A CB(16) COMM: SE AUDIO, close. PLSS PT ... MAINTAIN right, verify. A PLSS mode, A, wheel counterclockwise.

04 23 08 54 LMP-LM ... mode A. And wheel is full counterclockwise.

04 23 08 58 CDR-LM Okay. Tone-on, vent flag P, PRESS flag O, O<sub>2</sub> momentary.

04 23 09 03 LMP-LM Okay; they're on.

04 23 09 05 CDR-LM Okay. PLSS O<sub>2</sub> pressure grage [sic] gate opens at 85.

04 23 09 09 LMP-LM Verified.

04 23 09 10 CDR-LM Okay. You've made your comm check with me.  
Jim, ...

04 23 09 13 LMP-LM Houston, how do you read the LMP?

04 23 09 16 CC Jim, you're loud and clear. There's a squeal in  
the background.

04 23 09 23 LMP-LM Roger. I have that squeal, also.

04 23 09 31 CC Jim, stand by; we'll - -

04 23 09 33 LMP-LM I'll ... down a little bit in a few minutes.

04 23 09 35 CC Roger. And, Jim, stand by. We're thinking about  
that tone a minute here - about the squeal in the  
background.

04 23 09 44 LMP-LM Okay. I'm standing by.

04 23 10 16 CC Jim, this is Houston. Could you turn your volume  
down a little bit for us, please? And that's vol-  
ume on the wheel.

04 23 10 30 LMP-LM Okay. The volume's down now.

04 23 10 31 CC That's - -

04 23 10 32 LMP-LM Okay. It's down about three quarters of the way.  
How do you read now?

04 23 10 34 CC Jim, that's beautiful. The squeal's gone and  
you're 5 by. And we're ready to go to the next  
step.

04 23 10 41 LMP-LM I changed the ...

04 23 10 42 CC Roger. We're ready to go to the next step.

04 23 10 46 CDR-LM Okay. CB(11) COMM: CDR AUDIO, open.

04 23 12 08 CDR-LM Okay. I have a tone-on, vent flag plee - P [sic], and pressure flag 0. O<sub>2</sub> pressure gage is reading about 94 percent. And, how do you read me, Jim?

04 23 12 22 LMP-LM I read you loud and clear.

04 23 12 24 CDR-LM Okay. You need to make a comm check with Houston then.

04 23 12 27 LMP-LM Houston, how do you read the LMP?

04 23 12 29 CC Jim, you're 5 by. And, Dave, you're 5 by. Sounds beautiful.

04 23 12 34 LMP-LM You're the same. ... he can't ... me. Understand.

04 23 12 41 CDR-LM Okay. PLSS mode LMP to - Now you won't be able to hear Houston.

04 23 12 45 LMP-LM Yes.

04 23 12 46 CDR-LM PLSS mode, LMP to B and CDR to A.

04 23 12 50 LMP-LM ... on B.

04 23 12 52 CDR-LM Okay. I'm in A; how do you read?

04 23 12 56 LMP-LM I read you loud and clear, Dave.

04 23 12 58 CDR-LM Okay; I read you loud and clear. Houston, how do you read the CDR?

04 23 13 01 CC Dave, you're 5 by, and Jim's 5 by.

04 23 13 07 CDR-LM Okay. PLSS - PLSS mode, both, to AR, tone-on.

04 23 13 13 LMP-LM AM, AR.

04 23 13 16 CDR-LM AM, AR, and you're loud and clear to me. How me to you?

04 23 13 19 LMP-LM Same.

04 23 13 21 CDR-LM Okay, Houston. How do you read the CDR?

04 23 13 24 CC Dave, you're loud and clear.

04 23 13 30 CDR-LM Okay. And we need a TM check with you, and O<sub>2</sub> quantity on the CDR is 94, and give them yours, Jim.

04 23 13 37 LMP-LM I'm reading about 92.

04 23 13 41 CC Roger. We copy. And, Falcon, the data looks good. We have the TM check.

04 23 13 48 CDR-LM Okay. CB(16) ECS: LCG PUMP, op - closed. Okay. Understand, a good TM check. Good.

04 23 13 57 LMP-LM Okay. LCG PUMP going closed, now.

04 23 14 02 CDR-LM Okay. I hear the pump.

04 23 14 04 CDR-LM Okay. LCG cold as required. I feel it already. It feels good.

04 23 14 09 LMP-LM Yes. It sure does, doesn't it?

04 23 14 12 CDR-LM Okay. CB(16) ECS: CABIN REPRESS, close; verify.

04 23 14 15 LMP-LM Verified.

04 23 14 16 CDR-LM SUIT FAN DELTA-P, open.

04 23 14 17 LMP-LM Open.

04 23 14 19 CDR-LM SUIT FAN 2, open.

04 23 14 20 LMP-LM Open.

04 23 14 21 CDR-LM SUIT FAN, select number 2, and I'll get that. ECS caution, H<sub>2</sub>O SEP COMPONENT lights on.

04 23 14 33 CDR-LM Okay. I've got a PRESS flag 0 and a vent flag P.

04 23 14 41 LMP-LM Same here.

04 23 14 42 CDR-LM Okay. That's good. Okay. ECS caution lights are out. Okay. SUIT GAS DIVERTER, PULL - EGRESS; verify.

04 23 14 55 LMP-LM That's verified.

04 23 14 56 CDR-LM Okay. CABIN GAS RETURN to EGRESS; verify.

04 23 14 59 LMP-LM That is verified.

04 23 15 01 CDR-LM SUIT CIRCUIT RELIEF, AUTO; verify.

04 23 15 02 LMP-LM That's verified.

04 23 15 04 CDR-LM A OPS CONNECT. SUIT ISOLATION to SUIT DISCONNECT.  
And disconnect the LM O<sub>2</sub> hoses and secure about  
the PGA.

04 23 15 18 LMP-LM ...

04 23 15 20 CDR-LM Stand by. We've got a MASTER ALARM. We'll see what  
it is.

04 23 15 25 LMP-LM I think it was just the second one on the fan.

04 23 15 30 CDR-LM ECS TX to C. Water SEP. ...

04 23 15 36 CC Guys, it looks okay. It's a water SEP light.

04 23 15 41 LMP-LM Yes. Read those next steps there, Dave, I didn't -  
one at a time.

04 23 15 46 CDR-LM Yes; okay. Connect the OPS O<sub>2</sub> hose to PGA, blue  
to blue.

04 23 15 54 LMP-LM Okay. ... I might have to turn around and let  
you do that.

04 23 15 59 CDR-LM Yes. I get it; there.

04 23 16 05 LMP-LM In fact - hey, why don't you turn around?

04 23 16 06 CDR-LM Yes.

04 23 16 07 LMP-LM And time them.

04 23 16 14 CDR-LM Hey, that's pretty good cooling isn't it?

04 23 16 15 LMP-LM Beautiful.

04 23 16 18 CDR-LM You had enough?

04 23 16 20 LMP-LM (Laughing) You ought to turn the stuff up. We'll  
need it; we ought to cool down as much as we can.

04 23 16 22 CDR-LM Yes. ... Am I hooked?



04 23 16 32 LMP-LM Yes. Here, let me get it. You are hooked on the handle for the PLSS. Can you get down a little bit? Okay. See if we can put that ... out. Yes. You had hooked the PLSS harness on the handle.

04 23 16 48 CDR-LM Okay. (Laughing) Okay.

04 23 16 49 LMP-LM OPS O<sub>2</sub>. Go through it here; I'll just hook you. I'll have to go to suit disconnect. Yes, I'll get it. Okay. Your suit disconnect.

04 23 17 18 CDR-LM Okay, it's locked and lock, locked.

04 23 17 20 LMP-LM Okay; we take the O<sub>2</sub> hoses off. Okay; secure above the PGA. Look there.

04 23 17 32 CDR-LM Okay.

04 23 17 33 LMP-LM Okay; connect OPS. You already did that. Retrieve the purge valve.

04 23 17 39 CDR-LM Okay.

04 23 17 46 LMP-LM ... It's closed and it's in LO position.

04 23 17 51 CDR-LM Lock pin in. Okay. Purge valve in PGA, red to red.

04 23 17 59 LMP-LM Mine look about right?

04 23 18 01 CDR-LM Yes, looks okay.

04 23 18 16 CDR-LM Okay; purge valve is in, lock, locked.

04 23 18 20 LMP-LM Okay. PGA diverter valve on vertical. Dave, you repeat the OPS connect.

04 23 18 28 CDR-LM Okay.

04 23 18 29 LMP-LM Okay. You go to SUIT ISOLATION; go to SUIT DISCONNECT.

04 23 18 32 CDR-LM Okay. SUIT ISOL, DISCONNECT.

04 23 18 35 LMP-LM I'll disconnect your O<sub>2</sub> hoses.

04 23 18 50 LMP-LM Okay. We'll secure those above the PGA, here.

04 23 18 57 LMP-LM Okay. I'll connect the OPS O<sub>2</sub> hose. Okay. ...

04 23 19 14 LMP-LM Connected and locked. Okay. Okay. Retrieve the purge valve. Verify close, lock pin, in, and LO.

04 23 19 28 CDR-LM Okay. It's LO, locked in there, and now it's closed.

04 23 19 40 LMP-LM Okay; it's in.

04 23 19 42 CDR-LM Okay.

04 23 19 47 LMP-LM And locked. In, and it's locked.

04 23 19 54 CDR-LM Okay. Now, PGA diverter valve, vertical.

04 23 20 01 LMP-LM Vertical.

04 23 20 02 CDR-LM Okay; take a drink. Take a drink, and - I think I've had about enough of the LCG, huh?

04 23 20 09 LMP-LM Now let's - -

04 23 20 19 LMP-LM Yes, let me get it. That thing is caught on the nut.

04 23 20 21 CDR-LM Yes.

04 23 20 22 LMP-LM I don't know why they have that little hook - Oh, it's a safety wire.

04 23 20 54 CDR-LM Here you go.

04 23 20 55 LMP-LM Yes. Yes.

04 23 21 15 LMP-LM Okay; I'll get it. Okay; it's stowed.

04 23 21 24 CDR-LM Okay; descent water going closed.

04 23 21 31 LMP-LM Okay.

04 23 21 32 CDR-LM Ready for helmet and glove donning.

04 23 21 34 LMP-LM Okay.

04 23 21 36 CDR-LM Position mikes.

04 23 21 38 LMP-LM Yes, Dick's got them today.

04 23 21 43 CDR-LM Okay; PLSS fans, on.

04 23 21 45 LMP-LM Okay; yes, yes.

04 23 21 46 CDR-LM PLSS fan to on.

04 23 21 47 LMP-LM PLSS fan, on. Vent flag, clear. Clear.

04 23 21 54 CDR-LM Okay; mine's clear.

04 23 21 55 LMP-LM Don helmets with LEVAs.

04 23 21 56 LMP-LM Check drink bag position.

04 23 21 58 CDR-LM Okay.

04 23 22 03 LMP-LM Okay. Let me get them. How's that look?

04 23 22 14 CDR-LM Okay.

04 23 22 20 LMP-LM (Laughter) Get the drink valves. And lunch.  
Okay.

04 23 22 34 CDR-LM Go ahead and line it up.

04 23 22 35 LMP-LM Yes, you line it up.

04 23 22 41 CDR-LM You can line it up right there.

04 23 22 44 LMP-LM Okay.

04 23 23 00 LMP-LM Yes, it's the sound.

04 23 23 02 CDR-LM Click and lock. Get your flaps back here.

04 23 23 15 CDR-LM I've got a high-frequency tone on the comm. Do  
you?

04 23 23 20 LMP-LM I have - I guess I - I do.

04 23 23 24 CDR-LM Way way in the background.

04 23 23 25 LMP-LM Yes. Yes, pretty low. Okay; you're all buttoned  
up.

04 23 23 34 CDR-LM Okay.

04 23 23 37 LMP-LM Let's get your - strap.

04 23 23 38 CDR-LM Strap here.

04 23 23 39 LMP-LM Okay, 1; there's 2.

04 23 23 47 CDR-LM Okay.

04 23 23 48 LMP-LM There's 3. That's yours.

04 23 24 06 LMP-LM I'll line it up for you.

04 23 24 08 CDR-LM Hold it there. Let me get your - keep - keep coming down. I'll push this in. Okay.

04 23 24 12 LMP-LM Okay; you're clear of the suit. Okay; it's lined up if you can zip me down all the way.

04 23 24 22 CDR-LM Okay; it's locked.

04 23 24 23 LMP-LM Okay; LEVA's not locked though.

04 23 24 41 CDR-LM Have to rotate your helmet after I get the LEVA locked.

04 23 24 43 LMP-LM Okay.

04 23 24 48 CDR-LM Okay.

04 23 24 49 LMP-LM Still lined up?

04 23 24 50 CDR-LM Yes, it's okay.

04 23 24 52 LMP-LM Ear flap first?

04 23 25 11 LMP-LM Okay.

04 23 25 13 CDR-LM Okay; let me get your straps with the tool harness.

04 23 25 16 LMP-LM Here.

04 23 25 23 CDR-LM Right one. Then my left one.

04 23 25 31 LMP-LM Okay. LCG, cold, as required.

04 23 25 35 CDR-LM It sure is.

04 23 25 36 LMP-LM Okay; I'll go around and - -

04 23 25 38 CDR-LM Okay.

04 23 25 39 LMP-LM - - fill it.

04 23 25 48 LMP-LM Okay; LCG PUMP coming open.

04 23 25 50 CDR-LM Okay.

04 23 25 54 LMP-LM Okay; next.

04 23 25 59 CDR-LM Okay; CB(16) ECS: LCG PUMP is open, and disconnect the LM water hose, and connect the PLSS water hose.

04 23 26 05 LMP-LM Okay; in work.

04 23 26 22 LMP-LM Okay; mine's connected, Dave.

04 23 26 25 CDR-LM Okay; mine's connected.

04 23 26 27 CDR-LM Okay. Stow LM hoses.

04 23 26 33 LMP-LM That's in work.

04 23 26 34 CDR-LM Okay; I'll put mine up here on the - on the handhold. Out of your way. ... looks good.

04 23 27 08 LMP-LM Okay; mine are stowed.

04 23 27 10 CDR-LM Okay; good.

04 23 27 14 LMP-LM Okay; mine are stowed.

04 23 27 18 CDR-LM Verify the following.

04 23 27 20 LMP-LM Okay. Don't turn around.

04 23 27 22 CDR-LM Okay.

04 23 27 30 LMP-LM Where are we getting any flow from, I wonder?

04 23 27 33 CDR-LM Aft.

04 23 27 34 LMP-LM Oh, yes. Just straight to the cabin; that's right.

04 23 27 38 CDR-LM Okay, Ver - Helmet and visor alined and adjusted.

04 23 27 41 LMP-LM I am. Verify.

04 23 27 43 LMP-LM Okay. O<sub>2</sub> connectors; three of them, lock.

04 23 27 46 CDR-LM Okay; and I'll put your bootees on.  
04 23 27 49 LMP-LM Yes.  
04 23 27 57 CDR-LM Okay; they're all three locked.  
04 23 27 59 LMP-IM Okay; purge valves, one, locked.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 22 48 16 CC Alfredo, Houston is calling. How are you doing up there?  
04 22 48 25 CMP Good morning, Houston; this is Endeavour. Doing - doing fine. Reading you loud and clear.  
04 22 48 32 CC Glad to hear from you, Endeavour. We'd like to have ACCEPT, when you have a chance to reach up that direction.  
04 22 48 43 CMP Okay. You've got it.  
04 22 48 54 CC Roger. And down on panel 230, MASS SPECTROMETER, MULTIPLIER, HIGH, at your convenience.  
04 22 49 07 CMP Okay. DISCRIMINATOR's in HIGH.  
04 22 49 11 CC Thank you. And, I've got that batch of updates there, whenever you can copy.  
04 22 49 20 CMP Okay. I'll wake up first.  
04 22 49 23 CC Go ahead; enjoy it.  
04 22 49 41 CC Al, on that MASS SPECTROGRAPH, we want the MULTIPLIER, HIGH, and the DISCRIMINATOR, LOW.  
04 22 49 54 CMP Okay; understand. MULTIPLIER, HIGH, and DISCRIMINATOR, LOW.  
04 22 50 00 CC That's that's the right way, yes.  
04 22 50 16 CC And, if you can reach up to panel 3 there, we'd like HIGH GAIN, AUTO, at your convenience.

04 22 50 27 CMP Okay; you have it.

04 22 50 42 CC And, Al, the computer is yours at anytime.

04 22 54 56 CMP Okay, Houston; this is Endeavour. I'm ready to copy some updates there, Karl.

04 22 55 26 CMP Hello, Houston; Endeavour.

04 22 55 29 CC Endeavour, this is Houston. The first thing we'd like get through to you are the mapping camera photopads over on the next page at 119:30.

04 22 55 42 CMP Okay, Karl. Go ahead.

04 22 55 44 CC "Start: 119:34:33; stop: 121:33:02." And a note to that is that the - the - the extend/retract times on the mapping camera seem to be getting longer with time, and, until further notice, we'd like for you to record and send down the DELTA-T on each extend and retract.

04 22 56 19 CMP Okay; understand. Yes, those times do seem to be getting longer, and I'll record the DELTA-T and tell you what they are.

04 22 56 27 CC Roger. And, over there at 119:20, on the mass spectrometer boom retract, it says "record the retract time DELTA T." Instead of "in barber pole," we want all of these in the future "from switch on to gray." That corresponds to what we can monitor here on the ground, and we - we need to - we need to calibrate - comparison of your data and ours. I'm sorry; that's not what we monitor, but this is - this is - this is - -

04 22 57 02 CMP Roger. Instead you want that "switch on to gray."

04 22 57 05 CC Right. That compares with our test calibration data, that's what I should say. And while I'm reading up - -

04 22 57 13 CMP Okay.

04 22 57 14 CC - - while I'm reading up to you, I'd also like to get something in on the ECS radiators, the outlet temperature is running high 10 to 15 degrees,

primary radiator outlet temperature. And we'd like for you to verify, first of all, that FLOW CONTROL on the ECS RADIATORS is AUTO and POWER. Is that the way they're setting?

- 04 22 57 40 CMP That's verified. AUTO and POWER.
- 04 22 57 43 CC Okay. And three circuit breakers over on panel 5, ECS RADIATORS, CONTROLLER, AC 1 and AC 2, should be closed, and, also, CONTROLLER HEATERS, MAIN A should be closed. All three closed.
- 04 22 58 04 CMP Yes, that's verified. They're all closed.
- 04 22 58 06 CC Okay; thank you. You got a status report to send down to us?
- 04 22 58 17 CMP Okay. Got about 5 and a half to 6 hours sleep in two segments. My PRD is reading 23105, but I'm not sure that's any good. And no medication, and standing by for consumables update, the rest of it.
- 04 22 58 37 CC Roger. Consumables update. Are you ready?
- 04 22 58 44 CMP Roger. Go ahead.
- 04 22 58 46 CC The time is 118:00; RCS total is 60 - is 63; quad A, 63; 64; 61; 64; H<sub>2</sub> tank 1, 76.9; 75.6; 51.9; O<sub>2</sub> tank 1, 79.3; 87 - 82.5; 61.7.
- 04 22 59 31 CMP Roger on the consumables.
- 04 23 03 20 CC Al, if you can listen while you work, I got a couple of short goodies for you before you go round the corner. First of all, the experimenters on the SIM bay are as happy as can be. I think on the gamma ray experiment, they say on that first-rev data, they have enough to justify the whole flight; they're so happy with it. I have a more complete science report for you, which I will send up on the next rev. And just bringing you up to date on the news, the egress down on the surface will be beginning on schedule in just about 1 hour.
- 04 23 04 00 CMP Hey, that all sounds real good, Karl. And, as you can see I'm right in the middle of a P52 here. I'll have the second star and the gyro torquing angles in just a second.



04 23 04 10 CC Roger.

04 23 04 50 CMP And if you've got those torquing angles, I'll get them on the minute.

04 23 05 01 CC We don't have any CMC data at the present time. You'll have to read them down to us, Al.

04 23 05 08 CMP Okay, Karl. I'll read them to you. P52: the stars were 01 and 36; the torquing angles were minus three balls 28; minus three balls 58; plus three balls 12; and they were torqued out at 119:05, on the minute.

04 23 05 33 CC We copy all of that. Loud and clear. Thank you.

04 23 05 52 CC And as you go around the corner, Al, all your systems are looking good.

04 23 05 59 CMP Roger, Karl. Thank you. See you the other side.

04 23 06 02 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

04 23 27 57 LMP-LM Okay. They're all three locked.  
04 23 27 59 CDR-LM Okay. Purge valves, one, locked.  
04 23 28 02 LMP-LM Locked.  
04 23 28 03 CDR-LM H<sub>2</sub>O connector, locked.  
04 23 28 04 LMP-LM Okay. It's locked.  
04 23 28 06 CDR-LM Comm connector, locked.  
04 23 28 07 LMP-LM Locked.  
04 23 28 08 CDR-LM PGA diverter valve to vertical.  
04 23 28 10 LMP-LM Vertical.  
04 23 28 11 CDR-LM Okay. You read to me.  
04 23 28 12 LMP-LM Okay. Helmet and visor, alined and adjusted.  
04 23 28 15 CDR-LM Okay. It's verified.  
04 23 28 17 LMP-LM O<sub>2</sub> connectors, three locked.  
04 23 28 19 CDR-LM Okay. One, two, the bootee down, three, and the bootee's down.  
04 23 28 28 LMP-LM Okay. Purge valves, one, locked.  
04 23 28 30 CDR-LM Purge valves on and locked.  
04 23 28 32 LMP-LM Okay; water connectors, one, locked.  
04 23 28 34 CDR-LM Locked.  
04 23 28 35 LMP-LM Comm connectors -  
04 23 28 37 CDR-LM On and locked.  
04 23 28 38 LMP-LM PGA diverter valve, vertical.  
04 23 28 40 CDR-LM Diverter valve is vertical.

04 23 28 41 LMP-LM Okay. Verify EVA circuit breaker configuration.

04 23 28 45 CDR-LM Okay.

04 23 29 05 CDR-LM Okay. Mine are verified.

04 23 29 08 LMP-LM Stand by. I'll check mine.

04 23 29 11 CDR-LM Okay.

04 23 29 18 LMP-LM Okay. Mine are verified.

04 23 29 20 CDR-LM Okay. Don EV gloves.

04 23 29 23 LMP-LM Okay; in work.

04 23 30 51 CDR-LM Got yours on yet?

04 23 30 52 LMP-LM Yes, yes. Okay.

04 23 30 53 CDR-LM I'm waiting for you.

04 23 30 54 LMP-LM Okay; just a second.

04 23 31 26 CDR-LM Don't - don't bump me for just a second.  
... again. Yes. You'll have to turn around and  
give me a hand here.

04 23 31 37 LMP-LM Okay.

04 23 31 50 CDR-LM Just hold the glove.

04 23 31 51 LMP-LM Wait; you're not in engage position.

04 23 31 52 CDR-LM Yes, I know, but -

04 23 31 54 LMP-LM Okay.

04 23 31 55 CDR-LM I can't even get -

04 23 31 59 LMP-LM Here, let me do it.

04 23 32 08 CDR-LM Okay.

04 23 32 13 LMP-LM Okay; push.

04 23 32 18 CDR-LM Okay?

04 23 32 19 LMP-LM Okay; good. Okay. You verify mine; I'll verify yours.

04 23 32 25 CDR-LM Okay. Locked and locked.

04 23 32 28 LMP-LM And you're locked.

04 23 32 30 CDR-LM Okay.

04 23 32 42 LMP-LM Pull up our cuff.

04 23 32 44 CDR-LM Good work.

04 23 32 45 LMP-LM Yes.

04 23 32 49 CDR-LM Okay. The PGA biting, PLSS O<sub>2</sub>, ON/OFF. No, it's not. PLSS DIVERTER valve to MIN, verify.

04 23 33 08 LMP-LM That's verified.

04 23 33 10 CDR-LM Okay; that's - mine's verified. PLSS pump to on, right.

04 23 33 14 LMP-LM Okay, my pump's going on now.

04 23 33 16 CDR-LM Mine's on. PRESS REG A and B to EGRESS.

04 23 33 19 LMP-LM A and B to EGRESS.

04 23 33 21 CDR-LM Okay. Now, we run through the pressure integrity check. Okay, PLSS O<sub>2</sub> to ON.

04 23 33 28 LMP-LM Okay.

04 23 33 39 LMP-LM O<sub>2</sub> is ON.

04 23 33 45 LMP-LM My pressure's coming up.

04 23 33 50 CDR-LM Okay. My O<sub>2</sub> is ON. My pressure's coming up.

04 23 33 56 CDR-LM Okay. Got a press flag.

04 23 34 07 LMP-LM Okay.

04 23 34 33 LMP-LM Okay. My pressure's off the peg; the cuff gage.

04 23 34 38 CDR-LM Okay. And mine's off the peg.

04 23 34 55 LMP-LM My pressure flag's clear, about 3.2.

04 23 35 18 CDR-LM Okay, I'm stabilized about 3.8, and the O<sub>2</sub> flag is clear.

04 23 35 24 LMP-LM Good enough?

04 23 35 26 CDR-LM Okay. Now we got to do that tricky little maneuver with the PLSS O<sub>2</sub>.

04 23 35 31 LMP-LM Coming OFF.

04 23 35 32 CDR-LM Okay. Coming OFF now.

04 23 35 34 LMP-LM Okay; mine's OFF.

04 23 35 35 CDR-LM Okay; mine's OFF.

04 23 35 36 CDR-LM MARK. A minute, Houston.

04 23 35 39 CC Roger.

04 23 36 10 CDR-LM Man, you can really tell the pump's running, can't you?

04 23 36 12 LMP-LM Yes. Sounds like an airplane: wa-wahn. Just like its takeoff.

04 23 36 17 CDR-LM Yes.

04 23 36 33 LMP-LM It should be about a minute, Dave, right there. I'm free at 3.7.

04 23 36 36 CDR-LM Yes.

04 23 36 37 LMP-LM They'll give us a mark.

04 23 36 39 CC That's good.

04 23 36 43 CDR-LM Okay, it's a min, and I'm reading 3.7. Okay; PLSS O<sub>2</sub>, ON.

04 23 36 49 LMP-LM O<sub>2</sub> coming on.

04 23 36 50 CDR-LM Okay. Verify the - Okay. I got a tone and verify the O<sub>2</sub> flag is clear.

04 23 36 59 CDR-LM Okay, Houston. I guess here at Hadley Base, we're standing by for a GO for the DEPRESS.

04 23 37 06 CC Roger, Falcon. You're GO for DEPRESS. Let's take a look at Hadley.

04 23 37 14 CDR-LM Good show. Okay, Jim. You ready with the circuit breakers?

04 23 37 17 LMP-LM Yes.

04 23 37 18 CDR-LM CB(16), ECS CABIN REPRESS, open.

04 23 37 20 LMP-LM CABIN REPRESS, open.

04 23 37 24 CDR-LM CB(16), COMM, TV, closed.

04 23 37 26 LMP-LM COMM, TV, closed.

04 23 37 29 CDR-LM Okay, CABIN REPRESS valve to CLOSE.

04 23 37 31 LMP-LM CABIN REPRESS, CLOSE.

04 23 37 35 CDR-LM Okay, and you can come around to the dump valve.

04 23 37 37 LMP-LM Okay.

04 23 37 44 CDR-LM Okay, I got a tone.

04 23 37 45 LMP-LM So - so - -

04 23 37 46 CDR-LM Do you have a tone?

04 23 37 47 LMP-LM So do I.

04 23 37 48 CDR-LM Yes. Gone.

04 23 37 50 LMP-LM There you go.

04 23 37 51 CDR-LM Can you get around all right?

04 23 37 52 LMP-LM Yes.

04 23 37 53 CDR-LM See if I can get out of your way a little bit.

04 23 37 54 LMP-LM Oh, is that what's blocking me?

04 23 37 55 CDR-LM Yes. Move back in the corner.

04 23 37 57 CMP-LM Okay.

04 23 37 58 CDR-LM Let me get turned around here a little bit. Okay, now I'm a little bit more out of the way for you.

04 23 38 13 LMP-LM Okay. I'm ready to go down.

04 23 38 15 CDR-LM Okay.

04 23 38 18 LMP-LM I'm at the dump valve.

04 23 38 19 CDR-LM Okay; let me get a hold of the cabin pressure, here.

04 23 38 21 LMP-LM Okay.

04 23 38 22 CDR-LM OPEN and then AUTO at 3 and a half. Okay?

04 23 38 24 LMP-LM Three and - OPEN?

04 23 38 25 CDR-LM Okay, we're down to 4 and a half. 4.

04 23 38 33 CDR-LM MARK. 3.5.

04 23 38 34 LMP-LM Back to AUTO.

04 23 38 38 CDR-LM Okay. Verify cuff gage has not dropped below 4.6. I'm looking at 5.1.

04 23 38 44 LMP-LM Okay. Same here.

04 23 38 46 CDR-LM Roger. Okay. Verify cabin at 3.5, and it is at 3.5. IM suit circuit lockup at 4.3 and it's at about 4.5. Okay; PGA greater at 4.6 and decaying. And that's a verify on mine. And something about the clock here. And - got it. Okay; overhead or forward dump valve to OPEN.

04 23 39 12 LMP-LM Okay. I'm going OPEN.

04 23 39 13 CDR-LM Okay. Verify tone on, water flag A at about 1.2 to 1.7. Okay; we're down to 2.5. 2.0.

04 23 39 28 LMP-LM Gee, I can see condensation in here.

04 23 39 32 CDR-LM Say you can?

04 23 39 33 LMP-LM Yes, a little - little fog. Ah!

04 23 39 36 CDR-LM Okay; 1.5.

04 23 39 37 LMP-LM Okay, I've got a water, tone.

04 23 39 40 CDR-LM Okay. And I have a water and a tone. Okay; down to 1.0.

04 23 39 54 CDR-LM Okay. When it gets all the way down, I'll partially open the forward hatch so you can come back up.

04 23 39 58 LMP-LM Okay; I'll just leave the dump valve in OPEN. Okay.

04 23 40 03 CDR-LM Now if you could slide back over to the right a tad there.

04 23 40 05 LMP-LM Yes.

04 23 40 17 LMP-LM The jettison bag sure fills up in \*\*\*

04 23 40 19 CDR-LM I need that right there, old buddy.

04 23 40 22 LMP-LM Yes, I've got to swing around so I can get your antenna too. Whenever you're - can move over to the left. I want to swing around to the left.

04 23 40 31 CDR-LM Okay. Let me get the jettison bag out of the way.

04 23 40 32 LMP-LM Okay. The world's biggest jettison bag.

04 23 40 43 CDR-LM Okay. Okay; hold off. Better get the cabin down to - so I can open it partial here.

04 23 41 10 LMP-LM Get down there okay?

04 23 41 11 CDR-LM Yes. Okay; it's open.

04 23 41 19 CC Roger, Dave. And we've got that mark.

04 23 41 20 CDR-LM ... we're blowing moisture, but we're -

04 23 41 24 LMP-LM It's blowing ice crystals out the front hatch. It's really beautiful. You should see the trajectory on them. (Laughter)

04 23 41 29 CDR-LM I can't keep it open because of - of the pressure.



04 23 41 34 CC I bet they're flat, aren't they, Jim? The trajectories.

04 23 41 36 CDR-LM Can you hold it open, Jim? Hold it open there.

04 23 41 40 LMP-LM Very flat, Joe.

04 23 41 45 CDR-LM Oh, man. Whup! Hold it.

04 23 41 48 LMP-LM Go again.

04 23 41 49 CDR-LM ... Come on back over to where you were. Want that closed.

04 23 41 53 LMP-LM What't that on our - getting caught on our feet? Is that that Velcro? Strap?

04 23 42 01 CDR-LM Let me get back in my corner, here.

04 23 42 03 LMP-LM Yes, you really have to.

04 23 42 04 CDR-LM More room. Let me turn around to the right.

04 23 42 17 CDR-LM Can't keep it open. There. Okay.

04 23 42 45 LMP-LM Listen, maybe I - Can you hold it open?

04 23 42 48 CDR-LM Yes, I got it open. But - I wish I had a mirror.

04 23 43 04 CDR-LM I feel like I'm caught on something.

04 23 43 06 LMP-LM I think it's the Velcro straps on the floor.

04 23 43 08 CDR-LM Ouch, my back.

04 23 43 12 LMP-LM Okay. I can't tell.

04 23 43 18 CDR-LM Okay. PLSS primary water, open. Ready to do that?

04 23 43 25 LMP-LM Yes. Let's see. Can't get around to it.

04 23 43 33 CDR-LM Yes, I'm - I'm going to have to move the - Can you look around and - -

04 23 43 37 LMP-LM Let me turn around here.

04 23 43 38 CDR-LM - - ... Yes.

04 23 43 40 LMP-LM See what might be -

04 23 43 51 LMP-LM Feel like I'm caught.

04 23 44 06 LMP-LM I'm hung up on something.

04 23 44 07 CDR-LM Yes.

04 23 44 09 LMP-LM You see what I'm hung on ...?

04 23 44 10 CDR-LM No. ...

04 23 44 11 LMP-LM Okay; I'm swinging around now. Let me check you.  
Shoot.

04 23 44 21 CDR-LM See anything hung?

04 23 44 22 LMP-LM Oh, I think - it's your hoses. Here.

04 23 44 25 CDR-LM The hoses?

04 23 44 27 LMP-LM Okay. Oh, I think - that strap. I think the hoses  
were - Watch out; let me adjust that strap.

04 23 44 36 CDR-LM Okay.

04 23 44 37 LMP-LM Your right side. It was hung up on these ho -  
hoses. Stand by.

04 23 44 45 CDR-LM Okay.

04 23 44 46 LMP-LM Did you get your water on?

04 23 44 48 CDR-LM No, I never got it. Let me get it now. There,  
I've got it on.

04 23 45 01 LMP-LM See if I can get around and get mine.

04 23 45 06 CDR-LM You know, one thing we never did was to tie this  
jettison bag up.

04 23 45 27 CDR-LM Get it all right?

04 23 45 39 CDR-LM Don't work too hard.

04 23 45 40 LMP-LM Yes, I'm thinking about it.

04 23 46 03 CDR-LM It on?

04 23 46 05 LMP-LM Yes, it's on. The only question is whether it's on completely all the way. I think it is. I'll know as soon as the cooling comes in.

04 23 46 30 CDR-LM If I could get this jettison bag out of the way.

04 23 46 41 CDR-LM That passed us over. Put this on the engine cover?

04 23 46 48 LMP-LM I'll try.

04 23 46 54 CDR-LM Get it?

04 23 46 56 CC Jim, this - -

04 23 46 57 LMP-LM ...

04 23 46 58 CC - - is Houston. Your water looks good to us.

04 23 46 59 LMP-LM Okay.

04 23 47 00 CDR-LM Here. Let me just hold it. - -

04 23 47 02 LMP-LM Oh, good. Thank you, Joe. I'll just hold it here, Dave, until you've moved down.

04 23 47 06 CDR-LM Okay.

04 23 47 07 LMP-LM Before you get out, let me get that - your antenna.

04 23 47 10 CDR-LM Yes. But, you can get that as I get through the door.

04 23 47 12 LMP-LM Yes.

04 23 47 24 CDR-LM I can start ... here. There.

04 23 47 41 CDR-LM Don't know how we missed that. ...

04 23 47 52 LMP-LM Okay; my water flag's clear. ... cooling. MIN cooling. You might want to go to INTERMEDIATE.

04 23 48 00 CDR-LM Yes.

04 23 48 29 LMP-LM Did you go to INTERMEDIATE?

04 23 48 30 CDR-LM Yes.

04 23 48 31 LMP-LM ...

04 23 48 33 CDR-LM - flag clear yet.

04 23 48 35 CC Dave, it should clear in a minute.

04 23 48 37 CDR-LM ... It just - yes, it just went.

04 23 49 11 CDR-LM See what's next on the agenda here.

04 23 49 16 LMP-LM SEP light's on.

04 23 49 19 CDR-LM Lower EV visor. Okay. Yes, I'm beginning to get a little bit now. Get your visor?

04 23 49 29 LMP-LM I'll get it. Thought I'd do it down at the door so I don't scratch it - -

04 23 49 36 CDR-LM Okay.

04 23 49 37 LMP-LM - - around in here.

04 23 49 40 CDR-LM Hey, Houston. By the way, you got TV picture down there.

04 23 49 45 CC Not yet, Dave. We're working on it.

04 23 49 54 CDR-LM Say again.

04 23 50 16 CC Dave, this is Houston. Is the MESA deployed?

04 23 50 22 CDR-LM (Laughter) That might have something to do with it, huh, Joe. Not yet. Okay. I'm ready.

04 23 50 31 LMP-LM Okay. Hey! Can you move back a tad?

04 23 50 39 CDR-LM Yes.

04 23 50 45 CDR-LM ... Here we go.

04 23 50 53 CC Dave, this is Houston. Jim's feed water pressure is a little high. We wonder if you can - are in a position to - to see water coming from his sublimator. Over.

04 23 51 06 CDR-LM Ha! I'm sure not, Joe. Not really - -

04 23 51 08 LMP-LM Look, let's check it out when we get out, Joe.

04 23 51 12 CC Roger.

04 23 51 22 LMP-LM Okay. Down a little further, Dave.

04 23 51 24 CDR-LM Yes.

04 23 51 25 LMP-LM The back of the PLSS is just hitting the DSKY desk.

04 23 51 28 CDR-LM Yes, I - I was caught on the jettison bag. How's that?

04 23 51 34 LMP-LM You're clear on the - clearing it now. Over a little to your - little to your left. Down a little more; a little to your left.

04 23 51 43 CDR-LM Okay. How's that?

04 23 51 45 LMP-LM Good. Okay. Let me get the antenna. Hold right there.

04 23 52 01 LMP-LM Okay. Your antenna's deployed.

04 23 52 02 CDR-LM Okay.

04 23 52 07 CDR-EVA Ease out here. Okay.

04 23 52 22 CDR-EVA Okay. Let's try the MESA. Down it comes. MESA's down.

04 23 52 36 LMP-LM Okay, Dave. I'm going to put the jet bag in the hatch.

04 23 52 39 CDR-EVA Okay.

04 23 52 45 CC Okay, Dave; and superb television picture down here.

04 23 52 49 CDR-EVA Oh, that's encouraging.

04 23 52 55 LMP-LM Here's the JET bag, Dave.

04 23 52 57 CDR-EVA I've got it.

04 23 53 00 LMP-LM And I'll pass you the LEC.

04 23 53 02 CDR-EVA Okay. Let's see; I certainly don't want to hit that neat little round rock down there.

04 23 53 17 CDR-EVA Well, the JET bag got pretty dirty.

04 23 53 38 CC Jim, Houston. Requesting INTERMEDIATE cooling.

04 23 53 47 LMP-LM Stand by, Joe.

04 23 54 03 CDR-EVA Get it okay, Jim?

04 23 54 09 LMP-LM Yes. This should be your portion.

04 23 54 12 CDR-EVA Say again. Yes. Okay.

04 23 54 25 CDR-EVA Let's see here. \*\*\* tied up with string.

04 23 54 41 LMP-LM You tied it too tight.

04 23 54 42 CDR-EVA Oh, yes. Okay. Okay.

04 23 54 54 CDR-EVA Going down on the Rover's side. Okay; it's down. Okay. Ease on down the ladder here.

04 23 55 42 CC Dave, an extraordinary television picture here.

04 23 55 45 CDR-EVA Okay - -

04 23 55 50 CDR-EVA Okay, Houston. As I stand out here in the wonders of the unknown at Hadley, I sort of realize there's a fundamental truth to our nature. Man must explore. And this is exploration at - at its greatest.

04 23 56 24 CDR-EVA Well, I see why we're in a tilt. We've got - (laughter) that's very interesting. There's so man- - so much hummocky ground around here, we're on a slope of probably about 10 degrees. And the left-rear foot pad is probably about 2 feet lower than the right-rear foot pad. And the left-front's a little low too. But the LM looks like it's in good shape. Tell the Program Manager I guess I've got his engine bell. (Laughter) It's a little rise right under the center of the IM. The rear leg's in a crater and - and the rim of the crater is right underneath the engine bell.

04 23 57 32 CC Roger, Dave. Jim got the message. - -

04 23 57 33 CDR-EVA Okay. Okay. Sorry about that Jim, but IFR landings, you know.

04 23 57 55 CDR-EVA Okay. ETB. Jim, you can transfer the ETB. I think you'll find the stability is pretty good.

04 23 58 05 LMP-LM Okay.

04 23 58 24 LMP-LM Stand by, Dave. Let me -

04 23 58 25 CDR-EVA Okay. Give me a ~~work~~<sup>Word</sup>, anytime.

04 23 58 34 LMP-LM Okay, Dave, it's - Ready? Over the rail here.

04 23 58 40 CDR-EVA All righty. Down she comes.

04 23 58 59 CDR-EVA Rather interesting sight, Houston. I can look straight up and see our good Earth back there.

04 23 59 08 CC Roger.

04 23 59 28 CDR-EVA Okay. ETB is on the ladder hook, and we'll pick the old MESA up here.

04 23 59 32 CC Roger, Dave. And Jim, the diverter valve is yours; whatever position you'd like. And did something else come out with the ETB?

04 23 59 45 LMP-LM The - the wrapping on the package for the LEC.

04 23 59 51 CC Roger.

05 00 00 00 LMP-LM Okay, Dave. I'm going to come on out.

05 00 00 02 CDR-EVA Come on out. It's nice.

05 00 00 31 CDR-EVA One of the interesting things, Jim, is the momentum you generate. Get going and - Easy to get going, but - but you get all that momentum going there, why, it takes a bit to stop. That looks like a reasonable place for the MESA.

05 00 01 08 CDR-EVA Okay. ...

05 00 01 22 CDR-EVA I think maybe a little higher.

05 00 01 33 LMP-LM Hey, Dave, can you tell what I'm hung up on here.

05 00 01 35 CDR-EVA Okay; let me come over. Just a second. Stay right there.

05 00 01 52 CDR-EVA Yes. Coming up to take a look. Stand by. Okay, come left, Jim.

05 00 02 12 LMP-LM Left?

05 00 02 13 CDR-EVA Okay; now, you just back out. Head down. You're coming. Ease out. That a boy. Okay. Okay; you're clear.

05 00 02 26 LMP-EVA Okay. I'm closing the hatch. Oh, and it's dirty.

05 00 02 47 CDR-EVA And, Jim, I'm going to put a big circle around this glass ball, so we don't mess it up. It's pretty neat.

05 00 02 56 LMP-EVA You want me to take it in the contingency sample?

05 00 02 58 CDR-EVA Yes, wish we had - Oh, - We ought to document it. We won't lose it.

05 00 03 04 LMP-EVA Boy, that front pad is really close, isn't it?

05 00 03 09 CDR-EVA Yes.

05 00 03 10 LMP-EVA Okay; why don't you get my antenna.

05 00 03 11 CDR-EVA Get your visor, Jim. Let me get your antenna.

05 00 03 20 CDR-EVA I'll open this snap here. Tear that little fellow. Okay. Your antenna's up.

05 00 03 29 LMP-EVA Your boots are black already.

05 00 03 30 CDR-EVA Yes, and so are yours.

05 00 03 31 LMP-EVA What did we decide? I'll get this glass ball here on the - -

05 00 03 34 CDR-EVA No, why don't you save it. Let's document it. It's - -

05 00 03 37 LMP-EVA Okay.

05 00 03 38 CDR-EVA - - I've got a circle around.

05 00 03 39 LMP-EVA Okay. I'm going to move out and get the contingency sample.



05 00 03 42 CC Roger, Jim.

05 00 03 47 LMP-EVA How do the PLSSs look now, Joe? Oh, boy. It's beautiful out here. Reminds me of Sun Valley.

05 00 03 59 CC Roger, Jim.

05 00 04 45 LMP-EVA I think I can get a - a rock here. It's about 2 inches subrounded in the contingency sample, along with the soil.

05 00 04 53 CC Roger, Jim; we copy that. And did Dave get your EV visor down?

05 00 05 00 LMP-EVA Yes, he did.

05 00 05 04 CC Outstanding.

05 00 05 10 CDR-EVA You might note for the next time around that, in addition to the Velcro and the MESA blankets, they have all the tape. It really makes it tough. If we need tape, I guess we ought to learn how to do it all with tape on there.

05 00 05 43 LMP-EVA Okay, I have the contingency sample. I'm taking it back to the ladder.

05 00 05 46 CC Roger, Jim.

05 00 06 02 LMP-EVA No wonder we slipped, Dave. Boy, that's really soft dirt there around the - the front footpads.

05 00 06 07 CDR-EVA Sure is, isn't it?

05 00 06 08 LMP-EVA Like about 6 inches deep of soft material.

05 00 06 13 CC And that's also like Sun Valley, Jim.

05 00 06 18 LMP-EVA (Laughter) Yes, powder. Hey, don't move back; I've got the tripod over here.

05 00 06 27 CDR-EVA Okay.

05 00 06 28 CC That makes for easy trench digging.

05 00 06 35 LMP-EVA Always thinking, huh, Joe?

05 00 06 38 CC Looking ahead.

05 00 06 43 CDR-EVA Okay, TV's coming off to go to the tripod.

05 00 06 46 LMP-EVA There it is; don't step on it.

05 00 06 49 CDR-EVA I won't. Let me get this out of your way first, Jim.

05 00 06 52 LMP-EVA Yes.

05 00 07 06 CDR-EVA But, look at that little glass ball ... around.

05 00 07 07 LMP-EVA Hey, I got to do my FAM now.

05 00 07 08 CDR-EVA Yes..

05 00 07 43 LMP-EVA The crater here that I'm standing by, Joe, it's about a meter in diameter. And then, there's a smaller crater right in the center of it, and that one has fragments around it that - that have glass exposed on them, where the - the larger crater does not have any glass exposed. Just the smaller crater within the large one.

05 00 07 44 CC Roger, Jim. Copy. And careful with the Sun, Dave.

05 00 07 52 CDR-EVA Yes, sir. Well, when I turn this thing back and point it at you at 12 o'clock, it's going to be looking right into the Sun, so you'd better think about that. Matter of fact, I think a little discretion here might put it over about 10:30 or 11:00.

05 00 08 12 CC Roger, Dave. That sounds good.

05 00 08 17 CDR-EVA I'll tell you, looking even that way, with that Sun angle - Oop - Why, by golly, it's pretty bright. Joe, I'm going to swing the camera around towards the ground. And now it's pointing back at the LM, but down. I want you to take a look as I move it up slowly. Make sure that we're okay on what you see. Okay?

05 00 08 50 CC Dave, we read all that. We're getting a beautiful picture now. We're going to try to wind up with the tripod in the shade, if that's possible, looking back towards the LM.

05 00 09 03 CDR-EVA Yes that - that's possible. We'll do that.

05 00 09 16 CC Outstanding.

05 00 09 20 CDR-EVA Okay. Managed to set it right in a crater.

05 00 09 32 LMP-EVA Okay, MAG C is going on the 16 millimeter.

05 00 09 37 CC MAG Charlie?

05 00 09 41 LMP-EVA Charlie.

05 00 09 45 CDR-EVA Okay, Joe. That ought to do it for your TV, I hope.

05 00 09 49 CC Dave, we're happy. It looks good.

05 00 09 56 CDR-EVA Okay. Okay. You want - you want - you like it like that or do you want to go to the settings in the checklist?

05 00 10 04 CC Stand by, Dave. Stand by.

05 00 10 08 CDR-EVA Okay.

05 00 10 37 LMP-EVA Dave, I have the camera all configured for those pictures.

05 00 10 40 CDR-EVA Good. Okay, Houston, I'll give you about 10 more seconds.

05 00 10 49 CC Roger, Dave. Very slightly more to the right so we can watch the Rover come down. Looks good. Looks good.

05 00 10 57 CDR-EVA How's that? Okay, you want to - you want to leave those settings at f/8 instead of f/11.

05 00 11 09 CC It's okay, Dave. Beautiful. Okay.

05 00 11 13 CDR-EVA Okay.

05 00 11 22 CDR-EVA Okay, Jim. Let's take a look at our Rover friend here. Watch that TV cable. Man, that's really a -

05 00 11 28 LMP-EVA Yes, I'm going to - let me see if I can get it under the pad so I don't trip on it. Okay.

05 00 11 37 CDR-EVA Okay, the outriggers look okay.

05 00 11 45 LMP-EVA Okay, I'm going to go up the platform.

05 00 11 48 CDR-EVA Okay. Don't pull it yet.

05 00 11 50 LMP-EVA No.

05 00 11 56 CDR-EVA Aha! One walking hinge was loose. It's reset.

05 00 12 04 LMP-EVA How about this one over here, Dave? Did you check this one?

05 00 12 05 CDR-EVA Yes. I'm going to get it.

05 00 12 06 LMP-EVA Yes, because I think it's loose - -

05 00 12 07 CDR-EVA Yes, it's loose, too.

05 00 12 08 LMP-EVA Yes.

05 00 12 10 CDR-EVA Both walking hinges were open, Joe.

05 00 12 12 CC Roger. Copy.

05 00 12 17 CDR-EVA And they're locked. Chassis looks generally parallel. And - take a look at the pins.

05 00 12 28 LMP-EVA Contingency samples on the platform, Joe.

05 00 12 31 CC Roger.

05 00 12 39 CDR-EVA Yes, I think they're - How does the - how do the pins look up there, Jim? Can you - see those?

05 00 12 47 LMP-EVA Pins look okay up here, Dave.

05 00 12 49 CDR-EVA Okay. Glad we learned about those -

05 00 12 57 LMP-EVA Walking hinges.

05 00 12 58 CDR-EVA - walking hinges. A surprise.

05 00 13 07 CC And, Dave, the LRV tools should come down with that strap.

05 00 13 14 CDR-EVA Yes. I got it.

05 00 13 30 CDR-EVA Okay, I guess we -

05 00 13 33 LMP-EVA Let's just lay it in there.

05 00 13 34 CDR-EVA Yes. And I'll stick it right down here in case we need it. Okay.

05 00 13 45 LMP-EVA Whenever you're ready.

05 00 13 47 CDR-EVA Get the right tape up.

05 00 13 48 LMP-EVA Okay.

05 00 14 08 CDR-EVA Okay, Jim, go ahead.

05 00 14 09 LMP-EVA Okay, here it comes. Released.

05 00 14 16 CDR-EVA It's released.

05 00 14 17 LMP-EVA Okay. Coming down.

05 00 14 19 CDR-EVA Now, to come down, don't disturb our little glass ball. The Rover's going to come down into a slight tilt to the left. But I think we'll be okay.

05 00 14 44 LMP-EVA I want to get the camera, too, Dave.

05 00 14 45 CDR-EVA Yes.

05 00 14 46 LMP-EVA Start taking this out.

05 00 14 49 CDR-EVA I'll just start it. It takes a while to unwind. Walking on all these slopes makes it sort of sporty, doesn't it?

05 00 14 57 LMP-EVA Yes.

05 00 15 10 CDR-EVA You're hooked up on the LEC, Jim.

05 00 15 12 LMP-EVA \*\*\* the TV.

05 00 15 16 CDR-EVA Oh, yes. Don't knock the TV over. Get in trouble.

05 00 15 21 LMP-EVA \*\*\* whether I move it or not?

05 00 15 23 CDR-EVA No, you didn't move it. Looks okay I think. TV still look okay to you, Joe?

05 00 15 28 CC TV's fine.

05 00 15 30 CDR-EVA Okay, you're on the TV, Jim.

05 00 15 32 LMP-EVA Yes, I see that. \*\*\* ...

05 00 15 35 CDR-EVA Okay, why don't you just go around?

05 00 15 38 LMP-EVA Let's go.

05 00 15 40 CDR-EVA You're on the TV with your left foot. Your left foot's on the TV. Now you're still on it, Jim. Don't keep coming in - There you go. Now you're out. Okay.

05 00 15 57 LMP-EVA I've got to get around that -

05 00 15 58 CDR-EVA Okay.

05 00 15 59 LMP-EVA You would put that circle right there.

05 00 16 01 CDR-EVA Oh, yes. Too bad.

05 00 16 03 LMP-EVA Let me get around here.

05 00 16 05 CDR-EVA Okay. Ready? Here we go. Okay.

05 00 16 20 CDR-EVA Oh! Oh! That a boy. A little more. Little more. Looks like you're going to have to do the bulk of the work today. More. Keep it taut. Atta boy. Okay, we're coming up here, 45, up to about - easy, Jim, easy. Oop (laughter). Okay. Here, let me help you. Take it easy - take it easy. Give me your hand. Okay, come on up. Up we go. Come on. Easy.

05 00 16 59 LMP-EVA ...

05 00 17 00 CDR-EVA Okay, just pull - just stand there a little easy, forget the pictures. Just pull real easy right there. Okay. Just go easy now.

05 00 17 10 LMP-EVA Go ahead.

05 00 17 19 CC Pretty sporty there, Jim.

05 00 17 27 CDR-EVA Okay.

05 00 17 40 CDR-EVA Okay, we're - Oh, shoot. The walking hinge again.

05 00 17 42 LMP-EVA Did it come loose?

05 00 17 44 CDR-EVA Yes. Let's see, Houston, the walking hinges are unlocked again. Is that right?

05 00 17 53 CC They're supposed to be unlocked now, Dave.

05 00 17 56 LMP-EVA At that point?

05 00 17 58 CDR-EVA Okay. Okay. Once - once you see those things unlocked up there in the stowed position, it doesn't give you too good a feeling. Looks like she's coming down okay. ...

05 00 18 31 CDR-EVA Okay, can you pull it out a little bit, Jim?

05 00 18 34 LMP-EVA How's that?

05 00 18 36 CDR-EVA That looks good. Okay, that's good. Outrigger cables are - Well, the one over there's not. Okay, outrigger cables are loose.

05 00 18 48 CC Roger.

05 00 19 02 LMP-EVA Watch - watch the - the rope and watch the glass ball.

05 00 19 06 CDR-EVA Roger. I got it.

05 00 19 18 CDR-EVA Okay, outrigger cable is loose, and off. Okay.

05 00 19 36 CDR-EVA Okay, let's come down with the left tape.

05 00 19 49 CDR-EVA Easy does it. It's coming okay.

05 00 19 51 LMP-EVA Okay.

05 00 20 16 CDR-EVA Okay. It looks like it's loose to me.

05 00 20 19 LMP-EVA Okay, that's good.

05 00 20 22 CDR-EVA Okay. Let you go put the - come on over and we'll ... (Laughter) Man, this thing's nice and light.

05 00 20 38 CDR-EVA Check. Get the old hinge pins - Oop! Out. ...

05 00 21 01 CDR-EVA Let's see. Okay. Hinge pin out. I'm going to get you the tool. Maybe you can reach it, Jim, - Maybe I can reach it. Hey, Jim.

05 00 21 21 LMP-EVA Yes.

05 00 21 22 CDR-EVA Need you to get this hinge pin over here.

05 00 21 23 LMP-EVA Okay.

05 00 21 25 CDR-EVA Wait. Let me get the - Oh, shoot. Did you - See my hinge pin on my side?

05 00 21 34 LMP-EVA Yes. It looks like it's almost all the way in.

05 00 21 37 CDR-EVA Yes, but not quite. How about putting the tip of the tool on it and pushing it. There you go.

05 00 21 46 LMP-EVA Okay.

05 00 21 48 CDR-EVA Now, let's - let's line this up a little straighter. Let's pull the - the rear end back towards me.

05 00 21 54 LMP-EVA Okay.

05 00 21 55 CDR-EVA There. Okay.

05 00 22 01 LMP-EVA Okay, chassis hinge pins are good on my side.

05 00 22 05 CDR-EVA Okay.

05 00 22 14 CDR-EVA Now if I could get the telescoping rods off.

05 00 22 30 CDR-EVA Okay, let's - Jim. Hold on a minute there. Let's - I'm not sure the telescoping rods are disconnected. Let's pick it up and move it back and turn it around. Okay?

05 00 22 40 LMP-EVA Okay, turn it what, your way?

05 00 22 42 CDR-EVA No, your way.

05 00 22 43 LMP-EVA Okay. (Laughter). Wait a minute. Not disconnected. Let me - Put it down right there. And maybe take it forward a little bit, huh?



05 00 22 56 CDR-EVA Well, the pin's out. The rods. The whole saddle up here is still on. Both pins are out. See what I mean?

05 00 23 09 LMP-EVA I think we can maybe lift the front end up, can't we?

05 00 23 13 CDR-EVA Try.

05 00 23 18 LMP-EVA Let me get in there and lift it up. Maybe - Here. Let me pull it this -

05 00 23 23 CDR-EVA Wait a minute. Let's - let me twist it this way to give you a little more room. Okay. See that saddle. Oh, you'll never get in there with the PLSS, Jim.

05 00 23 37 LMP-EVA Am I too tight?

05 00 23 38 CDR-EVA Yes. Forget it.

05 00 23 39 CC Jim - -

05 00 23 40 CDR-EVA Hey, Houston -

05 00 23 41 CC - - verify you pulled the saddle pin, please.

05 00 23 42 CDR-EVA Any suggestions?

05 00 23 46 LMP-EVA Yes, the saddle pin has been pulled. I've got to somehow -

05 00 23 55 CDR-EVA Okay. Joe, the situation is that both pins are out of the saddle, and it still seems to be connected to the frame of the LRV.

05 00 24 13 CC Roger. We copy, and we're working it.

05 00 24 18 CDR-EVA Okay.

05 00 24 19 LMP-EVA Let's finish setting up the Rover, huh?

05 00 24 21 CDR-EVA Yes.

05 00 24 44 CDR-EVA I remember a guy who once said "dirt dirt" and it is [sic] ever! Pshew!

05 00 25 07 CC Dave and Jim, pull the Rover as far out as you can away from the LM, and then pull on the front end, if you could.

05 00 25 16 CDR-EVA Okay. Standby.

05 00 25 18 CC And, by that, we mean lift up on the front end.

05 00 25 20 CDR-EVA What's that - You mean pull up?

05 00 25 23 LMP-EVA Yes. Lift up on the front end. Yes. We copy, Joe.

05 00 25 29 CDR-EVA Get this down here, so I don't ...

05 00 25 56 CDR-EVA Okay, let's try that, Jim. Okay?

05 00 25 58 LMP-EVA Okay, pull it out as back - far as we can?

05 00 26 01 CDR-EVA Yes.

05 00 26 02 LMP-EVA Back as far as we can? Okay, I'm ready.

05 00 26 18 LMP-EVA That's about as far back as we are going to be able to get it, Dave.

05 00 26 19 CDR-EVA Yes.

05 00 26 20 LMP-EVA If you want to hold it there, I'll get in front of it - -

05 00 26 23 CDR-EVA Okay.

05 00 26 24 LMP-EVA - - and try to lift it up.

05 00 26 25 CDR-EVA Okay, I'm holding it.

05 00 26 26 LMP-EVA Okay. Yes, if I can clear this -

05 00 26 35 CDR-EVA Now, your PLSS is hung up, Jim. ...

05 00 26 42 LMP-LM It's coming. - -

05 00 26 43 CDR-EVA Okay.

05 00 26 44 LMP-EVA - - there we go.

05 00 26 45 CDR-EVA Good show. Okay, let's turn it - -

05 00 26 47 LMP-EVA Okay, Joe, it's off.

05 00 26 48 CC Outstanding.

05 00 26 49 CDR-EVA Let's turn it around now, Jim.

05 00 26 50 LMP-EVA Okay. Okay, I've got my grip here, Dave. We'll turn it -

05 00 27 02 CDR-EVA Yes, my way. Come to your left; don't - don't walk back - just swing left.

05 00 27 08 LMP-EVA Okay.

05 00 27 09 CMP-EVA That a boy.

05 00 27 15 LMP-EVA We want to get a downhill run here.

05 00 27 17 CDR-EVA Yes, back up a little bit now. Just back up a little bit. Go in reverse. You. That's good, right there.

05 00 27 34 LMP-EVA Okay.

05 00 27 35 CDR-EVA Watch. Put your ball behind you.

05 00 27 37 LMP-EVA (Laughter) I've been watching that all morning. I just about fell on it.

05 00 27 41 CDR-EVA I noticed. Have you got your side of the console unlocked?

05 00 27 51 LMP-EVA Yes, it's unlocked.

05 00 28 00 CDR-EVA Lock it.

05 00 28 01 LMP-EVA Okay. Okay, my side is locked.

05 00 28 05 CDR-EVA And my side is locked.

05 00 28 59 LMP-EVA This side looks okay, Dave.

05 00 29 01 CDR-EVA Okay. Man, they've really done it with the velcro.

05 00 29 11 LMP-EVA Yes, you almost have to pull against the sheer force of that to get it - to get the seat up. I had to really - really tug at it.

05 00 29 20 CDR-EVA Yes, man!

05 00 29 35 CDR-EVA It's awfully bouncy too, isn't it. Okay. Get your seat belt out later, I reckon.

05 00 29 48 LMP-EVA ..., I might as well get it now.

05 00 30 35 LMP-EVA Give a holler when you're ready to drive, Dave, I'll come out and take pictures.

05 00 30 37 CDR-EVA Okay? ... fenders. You've got a fender, Jim. Get your fenders?

05 00 30 51 LMP-EVA No, I haven't.

05 00 30 52 CDR-EVA Go ahead. I'll get them.

05 00 31 07 CDR-EVA Boy, is this dirt soft! Man!

05 00 31 15 LMP-EVA Like soft powdered snow.

05 00 31 16 CDR-EVA Really is.

05 00 31 17 LMP-EVA It's a little different - different -

05 00 31 33 CDR-EVA Okay, looks like the brake's on, reverse is down, so I'll see if I can't hop in it.

05 00 31 47 CDR-EVA That's a reasonable fit.

05 00 31 52 CC Okay, Dave. And buckle up for safety here.

05 00 31 57 CDR-EVA Oh, yes. Okay, safety belt's on.

05 00 32 12 CDR-EVA Oh, you sit up a lot higher than in one g, but that makes sense, does it? Okay, hand controller is locked. Brakes on, reverse is down. Circuit breakers all except the AUX and the NAV are coming.

05 00 32 33 CDR-EVA Okay, I get readings on bus B.

05 00 32 50 CDR-EVA All the switches are off, by the way. Okay, switches are all closed. Okay, Houston, are you ready to copy some numbers?

05 00 33 01 CC Go.

05 00 33 03 CDR-EVA Okay. Amp-hours, 105 and 105. Amps, of course, are at zero. The - Okay, volts: on number 1 I've got about 82, and number 2 is reading zero. Hmm. Uh! Okay and on the battery temperature, I'm reading 68 - about 78 and 80. And the motor temps are off scale low, of course.

05 00 33 49 CC Roger. Copy.

05 00 33 51 CDR-EVA And the only discrepancy so - and the only discrepancy so far - I don't have any volts on number 2.

05 00 34 03 CDR-EVA PWM SELECT is BOTH; DRIVE ENABLE, 2 in forward: PM - PWM 1, reverse; PWM 2. And Houston, I'll stand by for any comments you might have on that readout.

05 00 34 24 CC Roger, Dave. I know you've rechecked your circuit breakers there.

05 00 34 30 CDR-EVA That's correct. The circuit breakers are all in.

05 00 34 35 LMP-EVA Dave, just let me know before you drive.

05 00 34 36 CDR-EVA Yes.

05 00 34 43 CC Dave, we're standing by for you to drive away and monitor the AMPS - the AMPS on battery 2, please.

05 00 34 53 CDR-EVA Okay, will do. Okay, 15 VOLT DC is going to SECONDARY. STEERING: FORWARD, BUS A; and REAR to BUS D. Power, forward to DRIVE POWER, forward to BUS A - BUS A.

05 00 35 12 CC Roger, Dave - -

05 00 35 13 CDR-EVA And to BUS D.

05 00 35 14 CC - - and if battery 2 is out on us, we'll have no rear steering or no rear drive. Just be advised.

05 00 35 22 CDR-EVA Okay, got a detent; we're moving.

05 00 35 31 CC Extraordinary.

05 00 35 40 CDR-EVA Hey, Jim, you can probably tell me if I've got any rear steering.

05 00 35 45 LMP-EVA Yes, you have rear steering.

05 00 35 46 CDR-EVA Okay.

05 00 35 48 CC Do you have - -

05 00 35 49 CDR-EVA But I don't have any front steering.

05 00 35 50 CC - - Amps on BAT 2, Dave?

05 00 35 51 CDR-EVA - - Joe, you sure about that battery bit? Negative. But I don't have any front steering, Joe.

05 00 36 00 LMP-EVA Got just rear steering, Dave.

05 00 36 01 CDR-EVA Yes.

05 00 36 20 CC And, Dave, while you're rolling there, requesting FORWARD STEERING to BUS C, BUS Charlie.

05 00 36 29 CDR-EVA Okay. STEERING, FORWARD to BUS Charlie. Still no forward steering, Joe.

05 00 36 38 CC Roger.

05 00 36 40 LMP-EVA Okay, got another suggestion? Roger.

05 00 36 50 CC Cycle that forward steering circuit breaker, please.

05 00 36 57 CDR-EVA Okay.

05 00 37 10 CDR-EVA Okay, I go to BUS Charlie and the circuit breaker is cycled. No forward steering, Joe.

05 00 37 22 CC Roger, Dave. Press on.

05 00 37 25 CDR-EVA Okay. That's a good idea. Here, Jim, I'm going to bring her around here and let's get on with it.

05 00 37 33 LMP-EVA Okay.

05 00 37 47 CDR-EVA Boy, you're going to have a great time with all these hills and mounds around.

05 00 37 56 CDR-EVA Okay, you think you can handle it there?

05 00 37 58 LMP-EVA Yes, that's good.

05 00 38 00 CDR-EVA Okay, brake's on. DRIVE POWER, 4 coming OFF. OFF on the steering. OFF on a 15 VOLT DC. Okay, temps look about the same, Houston.

05 00 38 30 CDR-EVA Jim, soon as you get that dust brush out, I want to brush off so we don't get the old Rover too dirty.

05 00 38 38 LMP-EVA Okay.

05 00 38 49 CDR-EVA You know. As I look back behind us. It almost looks like we landed in a - Another, oh, 10 meters aft and we'd have been in Surveyor Crater.

05 00 39 40 CC And, Dave and Jim, you're both off the TV camera now. We're standing by for description of your progress.

05 00 39 45 CDR-EVA We'll be back on occasionally as we get to the MESA. Back with you now?

05 00 39 55 CC Don't worry about it, Dave. We see you starting to come into view now. - -

05 00 39 56 CDR-EVA Here. I tell you what I'm going to do, Joe, - I'm going to move the TV camera because it'll save us time if we don't have to tell you what we're doing.

05 00 40 07 CC Okay, fine. Don't - Nev- -

05 00 40 20 CC Roger, Dave. Perfect.

05 00 40 44 LMP-EVA I have the 16 millimeter on the Rover.

05 00 40 48 CC Roger.

05 00 40 49 LMP-EVA And the Commander's 70 millimeter's over there.

05 00 41 27 CDR-EVA This is really tricky working on this slope in this soft material.

05 00 41 30 LMP-EVA It sure is.

05 00 41 34 CC We copy, Dave and Jim, and we're standing by for an EMU status check. - -

05 00 41 37 LMP-EVA Let me know when you're finished - -

05 00 41 49 CDR-EVA Okay, I'm reading 38 on my gage. Flags are clear, and I'm reading 75 percent.

05 00 41 57 CC Roger.

05 00 41 58 LMP-EVA Okay, I'm reading 385, flags are clear, and I'm reading 75 percent.

05 00 42 29 LMP-EVA Trying to - like walk up out of a crater each time. Uh! Boy!

05 00 42 31 CDR-EVA Can you make it?

05 00 42 33 LMP-EVA Yes, I'll make it. I don't know how it's going to work when I get that geology pallet. Might need a little help there. ... Okay, I have a flag - I have a tone, rather.

05 00 42 48 CDR-EVA I got one. I guess I heard yours.

05 00 42 50 LMP-EVA Roger.

05 00 42 54 CDR-EVA Got any flags, Jim.

05 00 42 59 LMP-EVA I can't quite see it. No, I don't have any flags.

05 00 43 04 CC We concur, Jim. No flags.

05 00 43 10 LMP-EVA Are you finished at the MESA for a little bit, Dave?

05 00 43 12 CDR-EVA Oh, no. This - -

05 00 43 16 LMP-EVA Okay, I'm going to -

05 00 43 20 CDR-EVA - - beauty is really tight.

05 00 43 43 CC And, Dave, this is Houston. Be advised Jim's got a flap hanging from the lower right-hand corner of his PLSS which perhaps you could button up the next time you're close to him.

05 00 43 52 CDR-EVA Yes, okay. It's his water flap.

05 00 44 00 LMP-EVA Yes, I can see that in the shadow.



05 00 44 01 CDR-EVA Yes, we're going to have to do some cleaning of him and get that dirt off so we got - ... thermal problems. Take this out.

05 00 44 16 LMP-EVA Hey, I've got a tone again. I guess that stuff just -

05 00 44 26 CDR-EVA What, Jim? Flags are clear.

05 00 44 35 CDR-EVA His TCU was wedged in very tightly.

05 00 44 40 CC Jim, all our numbers on you look good down here.

05 00 44 45 LMP-EVA Okay. I keep getting a tone.

05 00 45 27 CC And, Jim, this is Houston requesting an EMU MAL number 5 procedure when you get to a convenient break point, over.

05 00 45 38 LMP-EVA Okay, EMU number 5.

05 00 46 07 CDR-EVA Need some help with that.

05 00 46 09 LMP-EVA I think I'll get it, Dave.

05 00 46 11 CDR-EVA Okay, I'm going to come button your flap here.

05 00 46 22 LMP-EVA I'd better take a break and find out what's causing the tone.

05 00 46 24 CDR-EVA Yes, I think you'd better. Why don't you just go through EMU number 5, and I'm just going to close your flap here. Matter of fact -

05 00 46 45 LMP-EVA I don't have any flags at all.

05 00 46 52 CDR-EVA Stand still a minute so I can get this flap, Jim.

05 00 46 55 LMP-EVA Check my diverter - -

05 00 46 56 CC And, Jim, if you want, I'll step you through this procedure.

05 00 46 57 LMP-EVA - - valve back there for me, Dave, while you're there.

05 00 46 59 CDR-EVA Okay. Diverter valve is in INTERMEDIATE.

05 00 47 15 LMP-EVA Okay, Joe, I'm looking at EMU number 5.

05 00 47 22 CC Roger. Use the step that's greater than 3.4 - -

05 00 47 23 LMP-EVA ... do you want me to cycle the MODE SELECT switch?

05 00 47 25 CC - - and after tone off, cycle MODE SELECT switch to A and then to AR. No tone.

05 00 47 36 LMP-EVA Okay.

05 00 47 37 CC No vent or O<sub>2</sub> fail.

05 00 48 05 LMP-EVA Okay, I'm getting a P in the vent window.

05 00 48 20 CC Say again, Jim.

05 00 48 25 LMP-EVA I have a P in the vent window.

05 00 48 28 CC Roger.

05 00 48 29 LMP-EVA I'll cycle the fan.

05 00 48 37 CC Roger. Copy you're cycling your fan.

05 00 48 44 LMP-EVA Yes. Fan's back on. I have good flow, Joe, -

05 00 49 07 CC Roger.

05 00 49 08 LMP-EVA But I have a P in the vent window.

05 00 49 09 CC Roger. Copy.

05 00 49 14 LMP-EVA Keep a watch on it. I'm going to press on slowly.

05 00 49 19 CC Roger. We agree.

05 00 49 29 CC And, Jim, we think we just have a flag and tone problem. All your numbers look clean as can be down here.

05 00 49 39 LMP-EVA Well, that's encouraging. Dave, do you want me to - Are you finished with the this pallet that's here at the MESA.

05 00 49 52 CDR-EVA Oh, yes, you can dump it. I had to take the pallet out to get the TCU off.

05 00 50 05 CC And, Dave, you're setting a new outdoor record with each toss there.

05 00 50 07 CDR-EVA That's pretty neat. At least we won't clutter up the immediate vicinity.

05 00 50 28 LMP-EVA Joe, I have a tone again, but I won't even bother telling you cause it's -

05 00 50 32 CC Roger, Jim, that's true. - -

05 00 50 33 LMP-EVA ... hopeless.

05 00 50 34 CC - - We can tell when you get a tone down here. We hear it as well.

05 00 50 39 LMP-EVA Okay.

05 00 50 41 CDR-EVA So do I, Jim.

05 00 50 44 LMP-EVA Disturbs you too, doesn't it?

05 00 50 45 CDR-EVA Yes. Sure does.

05 00 51 13 CDR-EVA (Laughter)

05 00 51 21 LMP-EVA Yes.

05 00 51 28 CDR-EVA That tape for the MESA blankets is something again.

05 00 52 09 LMP-EVA Hardly deployed, already?

05 00 52 17 LMP-EVA You can tell, Joe, I have the GEO pallet on the back end of the Rover. I don't know whether it's locked on there properly yet.

05 00 52 24 CC Roger, Jim.

05 00 53 30 LMP-EVA Well, it looks like the pallet is secured to the Rover.

05 00 53 34 CC Roger.

05 00 53 49 LMP-EVA And taking a hand rails off.

05 00 54 16 CDR-EVA Okay, Joe, I'm going to put the TV on the Rover now, if you're ready, and so far the LCRU is on,

locked, cable's connected, the high gain antenna bootee is on. I'll get the antenna as soon as we get the TV on.

05 00 54 38 CC Roger, Dave. Have at it.

05 00 55 03 CDR-EVA I'll tell you, that Rover is a pretty picture out there.

05 00 56 05 LMP-EVA Sure is. I hope \*\* pictures turned out.

05 00 56 15 LMP-EVA Okay, SRC-1 is going to the table, Joe.

05 00 56 18 CC Roger, Jim.

05 00 56 36 CC Okay, Dave, and we lost the picture.

05 00 56 41 CDR-EVA Okay, I'll have it back for you in a jiffy here.

05 00 56 53 LMP-EVA Okay, I'm closing the control sample, and -

05 00 56 58 CC Roger.

05 00 56 59 LMP-EVA - SRC.

05 00 57 12 LMP-EVA And ... bag 1 going -

05 00 57 20 CC Okay.

05 00 57 21 LMP-EVA \*\*\*hand tool carrier.

05 00 57 47 CDR-EVA There goes the old TV. Trouble getting it to fit today.

05 00 58 03 CDR-EVA And the TV handle is down in the side so you get your \*\*\* ...

05 00 58 18 LMP-EVA And I'm configuring the GEO pallet now, Joe.

05 00 58 21 CC Okay, Jim.

05 00 58 40 CDR-EVA The TV cable is connected.

05 00 58 43 CC Roger.

05 00 58 47 CDR-EVA Okay, L - LCRU's circuit breaker is closed. And the LCRU POWER is going to INTERNAL. CTV POWER switch to ON - with the antenna coming up.

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

04 23 28 -- BEGIN LUNAR REV 22

04 23 54 58 CMP Allo, Terre. Salute de l'Endeavour.

04 23 55 10 CC Endeavour, this is Houston. How are things going up there?

04 23 55 17 CMP Roger, Karl. Going okay, I think we might have a problem also with the MASS SPEC boom. Let me give you some times here. The mapping camera retracted in 4 minutes and 30 seconds. The gamma ray retracted in 2 minutes and 30 seconds. I'm sorry, the mapping camera extended in 4 minutes and 30 seconds, the gamma ray retracted in 2 minutes and 30 seconds. And the MASS SPEC I let retract for about 4 minutes, didn't get a gray, went to deploy for a few seconds, back to retract a few seconds, and it finally went gray and retract. So I don't really have a good accumulative time on - on how long it was in barber pole.

04 23 56 04 CC We copy.

04 23 57 21 CC Al, you may be interested to know that Dave is walking around on the lunar surface now.

04 23 57 32 CMP Very good, very good.

04 23 57 34 CC And I have a mapping camera pad, and a - -

04 23 57 37 CMP I knew it was coming.

04 23 57 39 CC - - and a Flight Plan update for you when you have a chance to copy.

04 23 57 45 CMP Okay. You caught me right in the middle of breakfast. Stand - stand off on that for a while.

04 23 57 49 CC No rush, no rush.

04 23 59 08 CC Al, this is Houston. Why don't you go ahead and eat, and let me read up the science summary to you.

04 23 59 15 CMP Hey, good idea, Karl. Go ahead.

04 23 59 21 CC Okay, here we go. In general, all orbital science experiments are working very well, and we have some very happy principal investigators. The X-ray PI reports count rates higher than expected, which gives good facial resolution. Real-time data shows a signature of magnesium, aluminum, and silicone, so far. And appear to be differences cropping up between the mare and the highlands. The mass spectrometer PI reports good operation with many peaks appearing, and so far they've clearly identified neon and argon. Gamma ray is happy, with improved data since separation of the LM - and spectral features are appearing in the data. The alpha particle experiment reports seeing a radon peak over Procellarum - and possibility of some other peaks over other areas of the Moon. I'll let you know about - more about that later. The photo team tells us - the photo team tells us that the mapping camera is working well - and the laser is going great. The pan camera appears to be getting about 80 percent of its frames in good - in good quality despite the V over H sensor problem. And in general, they say, "Keep up the good work. It's looking great."

05 00 00 55 CMP Okay. What's the matter with the V over H on the - on the pan camera? You indicated yesterday, I guess, that there was a problem with it, but nobody ever explained what the problem was.

05 00 01 17 CC Roger, Al. I'm not sure that it's well understood - it - it's - all we can say is that its operation is erratic; sometimes it manages to get the - the motion compensation right, and sometimes it doesn't quite make it. That's the problem we're working on down here trying to understand - -

05 00 01 36 CMP I understand.

05 00 01 37 CC - - in greater detail.

05 00 01 41 CMP Yes, okay.

05 00 02 24 CC Endeavour, let's have HIGH GAIN ANTENNA, AUTO, please.

05 00 02 31 CMP A going AUTO.

05 00 02 57 CMP Karl, if you've got a paper and pencil there while I'm - while I'm finishing up breakfast here, let me run down some cameras - magazines with you. I just - took inventory of all the MAGs last night. And, thought I might just read through the list for you, and -

05 00 03 18 CC Okay. Hold on a second -

05 00 03 21 CMP - You might see what is left on the MAG now.

05 00 03 24 CC Hold on a second, and I'll copy those. But there's a Flight Plan change in just a few minutes I'd like to get to you. The mapping camera image motion, which is scheduled at 120:10, we'd like to have at 120:16.

05 00 03 45 CMP Okay, understand. You want to slip that down to 120:16.

05 00 03 49 CC That's correct.

05 00 03 51 CMP Mapping camera image motion increase.

05 00 03 54 CC That's affirmative, Al. And go ahead with your read-down.

05 00 04 02 CMP Okay. As promised to Spencer, the MAGs are as follows. First, the 16-millimeter stuff; MAG A's been used 100 percent; MAG B's been used 100 percent; C and D haven't been used; E's been used about 4 percent; F is still full; G is full; H has been used 25 percent; I is full; J, K, and L are full. Okay, on the Hasselblad, I'll call out the number of frames used. Okay. MAG M, Metro 100 - 1, 5, 3 are the frames used; and Nectar is 42; O is 39; and P and Q are 0; R is 20, and F is 40. And no 35-millimeter film has been used.

05 00 09 15 CC That came through loud and clear, Al.

05 00 09 21 CMP Okay.

05 00 11 05 CMP Houston, Endeavour.

05 00 11 08 CC Endeavour, this is Houston. Go ahead.

05 00 11 14 CMP Okay. Just thought I'd orient you a little bit as to where I am, Karl. At the present time, I am directly over Picard, and I'm coming up on Proclus, here, very shortly. And from this particular angle, looking at Proclus, the fan pattern out of Proclus is really magnificent. It covers about, oh, I'd say, about 240 degrees of arc, and you can see the ray pattern way, way out into Crisium; way out into - into the highlands, both north, east, and south of Proclus. And, the excluded zone is very well defined. It's very clear where - where the exclusion is. And I'll give you a little better description when we get up closer to it.

05 00 12 04 CC That sounds fantastic, Al. Do you think you're going to solve the secret of that excluded zone?

05 00 12 13 CMP You never know.

05 00 12 40 CC Al, could you please confirm that your H<sub>2</sub> FANS are OFF?

05 00 12 50 CMP Negative, Karl. They're ON. Sorry about that.

05 00 12 55 CC Okay. We'd like to have them OFF, Al.

05 00 13 00 CMP Okay, they're OFF.

05 00 13 22 CC And, they've just been deploying the TV camera on the lunar surface, and we had some of our first looks at Hadley Delta and St. George, and what do you know, it looks just like all the pictures they've been drawing for us.

05 00 13 36 CMP Hey, super. It sure looks the same from up here.

05 00 14 01 CC Endeavour, 15. Could we please have OPTICS ZERO?

05 00 14 09 CMP Roger. OPTICS ZERO.

05 00 14 52 CC And we've got 10 seconds for changing image motion on the mapping camera, Al.

05 00 15 00 CMP Roger.



05 00 16 30 CC Al, there's no rush on it, but I'm waiting for your cue before I send up Flight Plan update.

05 00 16 40 CMP Okay, Karl. I'll be ready in a minute.

05 00 20 21 CC Endeavour, this is Houston. Rover has just hit the ground. You don't see it down below you, do you?

05 00 20 34 CMP I'm not quite there yet, Karl, but I'll look when I go over.

05 00 20 37 CC Roger.

05 00 21 50 CC Endeavour, we'd like to have PAN CAMERA POWER, OFF.

05 00 22 02 CMP Okay, all turned off now.

05 00 22 05 CC Thank you.

05 00 28 26 CC Endeavour, the first part of that Flight Plan update is to delete the gamma - gamma ray boom deploy at 120:33. We want to be sure to get that one. Delete "gamma ray boom, deploy."

05 00 28 43 CMP Okay, Karl. I'll delete it.

05 00 31 01 CMP Okay, Karl. Looks like I'm set for business for the day now. And, go ahead with your Flight Plan update.

05 00 31 09 CC Okay, Al. First of all, on the gamma ray boom, the reason for that, is the fact that we're getting a little gain change every time that we deploy and retract it. It's not serious, but we'd like to sort of leave it as it is until we study the problem a little longer. You've already deleted the extension at 120:33. We also, then, will delete the retraction at 121:27.

05 00 31 46 CMP Okay. 121:27. Roger.

05 00 31 51 CC And while you're on that page, the mapping camera photo -

05 00 31 55 CMP ...

05 00 31 56 CC Roger. And while you're on that page the mapping camera photo pad is as follows. Start, 121:39:34; 122:32:43. Would you like to read that back?

05 00 32 14 CMP Okay. 121:39:34, and T-stop is 122:32:43.

05 00 32 20 CC That's correct. And just on the same page again. The attitude - the attitude there at 121:37, instead of reading a roll angle of "000," should be "142." That's for the P20 option 5.

05 00 32 45 CMP Okay, understand. Roll angle of 142.

05 00 32 49 CC That's correct. The next correction is all the way up at 125 hours and 44 minutes.

05 00 33 07 CMP Okay, go ahead.

05 00 33 08 CC And, this is one of those general things. On reporting the DELTA-P, it should be from switch ON to talkback gray.

05 00 33 23 CMP Okay.

05 00 33 25 CC And, we have exactly the same thing at 129 hours and 20 minutes.

05 00 33 42 CMP What was that again? What time was that?

05 00 33 45 CC At 129:20, the same thing, the switch - the DELTA-P that you read back to us is switch ON to talkback gray. And really, I suppose, we should make this a generality - that we don't have to put it in the Flight Plan every time.

05 00 34 04 CMP Roger. I'd agree to that.

05 00 34 06 CC Incidentally, I have a question in that connection - says verify that times previous to 118 hours were from switch ON, beginning time. Do you recollect that?

05 00 34 26 CMP Karl, the way we time it on board here, is you have to hit the switch, and then look at the mission timer. Now, the - the gamma ray is taking about 6 seconds to go from switch ON to barber pole, the mass spec was going on immediately to

barber pole, so it didn't make any difference in the case of the mass spec. And in the gamma ray, the most it could be off is 6 seconds.

05 00 34 54 CC Right. And, - I guess on the gamma ray when you reported the time - do you recall which it was that you were giving us, switch ON or talkback barber pole?

05 00 35 06 CMP Talkback barber pole.

05 00 35 08 CC Okay, fine. That's the way the instructions were, originally.

05 00 35 18 CC We have a comm change. It's simply an error in our Flight Plan at 128:10.

05 00 35 35 CC And, at 128 -

05 00 35 36 CMP Okay, go ahead.

05 00 35 37 CC - at 128:10, the first step in that configuration is "VHF AM A, SIMPLEX." The second step is to change "VHF AM B," delete "DUPLEX," and make that "OFF."

05 00 36 06 CMP Okay. Understand you want SIMPLEX A in, B - and B, OFF.

05 00 36 10 CC That's correct, and at 149 hours and 37 minutes, we do the same thing.

05 00 36 30 CMP Okay, gotcha.

05 00 36 32 CC And at 149:37, we also want to add "mode VOX."

05 00 36 54 CMP Okay. Understand, "mode VOX."

05 00 36 56 CC Roger. And, I think the last item to come up is again the comm change at 169 hours and 20 minutes - that we put "A, SIMPLEX" and "B, OFF."

05 00 37 44 CMP Okay, Roger. Got those.

05 00 37 46 CC Okay. That takes care of our current Flight Plan updates.

05 00 37 52 CMP Roger.

05 00 44 44 CC Incidentally, Al, we'd like to have the gamma ray gain - gainstep go through its usual procedures here, even though we don't have the boom ex - extended.

05 00 44 56 CMP Okay, Karl.

05 00 53 52 CC Al, we'd like to have the GAMMA RAY GAINSTEP back to the center position, please.

05 00 54 47 CC Endeavour, this is Houston. The down-link doesn't seem to be coming through very good; could you give me a comm check?

05 00 55 06 CMP Hello, Houston; Endeavour. How do you read?

05 00 55 09 CC Roger. That's loud and clear, thank you.

05 00 55 14 CMP Okay. I'm back on VOX now, Karl.

05 00 55 17 CC Okay, good.

05 00 58 03 CC Endeavour, this is Houston. Surface activities are coming along swimmingly at the present time. The - the Rover has already been driven - made one circle around the LM so far, and they're about ready to take off on traverse number 1.

05 00 58 23 CMP Oh, very good. Got the Rover going, huh?

05 00 58 26 CC Roger. - -

05 00 58 27 CMP - - good.

05 00 58 28 CC That's good news. And a time reminder here. Over at 21:03 is the time to configure the DSE, as you go around the corner.

05 00 58 42 CMP Okay, Karl. 21:03.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 00 59 16 LMP-EVA Okay; LCRU is going PML/NARROW BAND.

05 00 59 21 CC Roger.

05 00 59 34 CDR-EVA Okay. Okay; I've got readings for you here, Houston, if I can get down to it.

05 00 59 40 CC Okay, Dave.

05 00 59 41 CDR-EVA The AGC - AGC is 2.7. Radiator temperature 1.6, and the power is 2.9.

05 01 00 02 CC Copy.

05 01 00 07 CDR-EVA Okay. I'm now going - You got a good check on the narrow band, Joe?

05 01 00 16 CC Stand by, Dave.

05 01 00 22 CDR-EVA Okay.

05 01 00 25 CC And we're going to NARROW BAND.

05 01 00 30 CDR-EVA Hey, give me a call when you want to go to TV REMOTE and I'll do it.

05 01 01 08 LMP-EVA How are you coming?

05 01 01 10 CDR-EVA Fair. Boy, that ... - -

05 01 01 11 CC Okay, Dave. How do you read Houston?

05 01 01 17 CDR-EVA Houston. I read you loud and clear.

05 01 01 31 CC Okay, Dave. TV REMOTE, please.

05 01 01 38 CDR-EVA Okay; going to TV REMOTE.

05 01 02 12 CC Ok - Okay, Dave. And continue on, please.

05 01 02 19 CDR-EVA Okay. LCRU blankets are 100-percent open; connector covers are closed; the dish is deployed. See if I can find the Earth.

05 01 02 45 CDR-EVA There she is. Okay; pointing right at you, Houston.

05 01 02 59 CC Okay, Dave. Thank you.

05 01 03 04 CDR-EVA Okay; she's all yours.

05 01 03 09 CC Roger. No TV yet, but we're looking.

05 01 03 12 LMP-EVA Got your favorite little gadget - -

05 01 03 15 CDR-EVA Okay.

05 01 03 16 LMP-EVA - - got your favorite gadget stowed back here, Dave.

05 01 03 18 CDR-EVA Oh, good.

05 01 03 53 CC Okay, Jim. And, we assume, in the meantime, you're pressing on here.

05 01 04 00 LMP-EVA Oh, yes. We're pressing on.

05 01 04 26 CC Dave, we want you to verify the CTV switch, ON, please. And that the high gain's pointed in TV REMOTE.

05 01 04 40 CDR-EVA Okay, Joe; stand by. I'll go look.

05 01 04 51 CDR-EVA Okay, we are in TV REMOTE; high gain is looking right at that - very pretty blue ball up there - at least half of the ball. I did turn the CTV, ON, I will - It's a spring-loaded switch; I'll do it again.

05 01 05 07 CC Roger.

05 01 05 08 CDR-EVA And, it's spring loaded to neutral. It moves - I think - - Maybe that's just Jim wiggling the rear end.

05 01 05 20 LMP-EVA Wasn't me.

05 01 05 30 CC Presto, change-o; there's the TV.

05 01 05 36 CDR-EVA Oh, beautiful, I'm glad to hear that. Okay; your general direction right now, it's pointed to the southwest. You can probably look down and see the LMS shadow. And, the Sun is at about 7:30 to you now, so, you don't get in that kind of trouble.

05 01 05 57 CC Roger - Roger, Dave. We copy and hustle on, please.

05 01 06 03 CDR-EVA Yes, sir.

05 01 06 11 CDR-EVA Okay. In the seat pan on the CDR side: MAG E, MAG \*\*\* - MAG Oboe, MAG Kilo; the LRV map holder is out and - get it stowed here in a minute.

05 01 06 45 CC Roger.

05 01 06 46 LMP-EVA ... A.

05 01 06 48 CDR-EVA MAG Lima is on the LR - LMP's camera.

05 01 07 05 CDR-EVA 500 with MAG Metro - is in the seat pan and tucked away.

05 01 07 23 CC Roger.

05 01 07 27 LMP-EVA And, Joe, in bag 2, I have the core stems and caps. I put bag 2 under the - under my seat.

05 01 07 34 CC Okay, Jim. Sounds good.

05 01 07 45 CC And, the TV scenery for us is breathtaking.

05 01 07 51 CDR-EVA Good. Can't be half as breathtaking as the real thing though, Joe; I'll tell you. Wish we had time just to stand here and look.

05 01 08 07 CDR-EVA I'll tell you, you might take a look at the old LM. She sure does a good job - landing in this kind of terrain.

05 01 08 46 CDR-EVA The BSLSS is on.

05 01 08 52 LMP-EVA Bag number 4 is on the right of the tool carrier.

05 01 09 00 CC Roger, Jim.

05 01 09 09 CDR-EVA The unstable base sure makes a difference, doesn't it, Jim?

05 01 09 12 LMP-EVA Sure does.

05 01 09 54 LMP-EVA Okay. And, the sample bags are on the \*\*\*dividual - seats, Joe. I'm going to get the rake.

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05 01 10 04 CC Roger.

05 01 10 12 CDR-EVA Have to rake a lot of this, wouldn't you?

05 01 10 17 LMP-EVA Yes, that rake may be a good thing - because it doesn't look like we're going to have any - piles of chips around.

05 01 10 58 LMP-EVA Okay; maps are in.

05 01 11 20 CDR-EVA Okay; maps are on - and your sample-bag holder is on your camera, Jim.

05 01 11 42 CDR-EVA And, I'll put the Sun compass a - overlay map in my seat pan.

05 01 12 22 LMP-EVA Okay; I'm securing the handtool kit - -

05 01 12 25 CC Roger.

05 01 12 26 LMP-EVA - - area here for driving.

05 01 12 27 CDR-EVA Good. Hey, get the - Jim, before you go back, get the dust brush out - -

05 01 12 32 LMP-EVA Yes.

05 01 12 33 CDR-EVA - - and, I want to get you dusted off.

05 01 12 34 LMP-EVA Yes, I don't want to take all that dirt into the LM.

05 01 12 44 LMP-EVA Boy, is it dirty.

05 01 13 13 LMP-EVA Where are you on your time line, Dave?

05 01 13 15 CDR-EVA Anytime you want to ingress, I'm ready for you.

05 01 13 17 LMP-EVA Okay, you brush me off; I'll go in.

05 01 13 20 CDR-EVA Okay.

05 01 13 43 CDR-EVA Really are dirty.

05 01 13 46 LMP-EVA I want you to get my antenna, too, before I go in.

05 01 13 56 LMP-EVA My harness is still secure, isn't it?



05 01 13 58 CDR-EVA Yes, harness is fine, except for the dirt.

05 01 14 05 CC And, Dave, this might be a good time to button up the corner of Jim's PLSS there.

05 01 14 12 CDR-EVA It's all buttoned; I got that a little while ago, Joe.

05 01 14 15 CC Roger. Sorry, missed it. And, for your thinking, we're down about 25 minutes, but no problem.

05 01 14 24 CDR-EVA Okay; I guess we expected that.

05 01 14 26 CC Roger.

05 01 14 27 CDR-EVA Hold the brush a minute and stand there. It did come off.

05 01 14 38 LMP-EVA Okay; give me the brush. Try and get as much as we can.

05 01 14 46 CDR-LM \*\*\* it'll help if you kick your feet when you go in, because a lot of the stuff will come off.

05 01 14 51 LMP-EVA Yes.

05 01 14 56 CDR-EVA Can you bend over a tad?

05 01 15 02 LMP-EVA How's that?

05 01 15 03 CDR-EVA Yes, that's good. Okay; I think I got the - the major portion of it, Jim.

05 01 15 09 LMP-EVA Okay, you want to stow my antenna?

05 01 15 11 CDR-EVA Yes - Oh, let me get your front here.

05 01 15 21 LMP-EVA \*\*\* work on a slope is another game, isn't it?

05 01 15 39 CDR-EVA Okay. It's stowed.

05 01 15 41 LMP-EVA You'll stow the brush while I get in?

05 01 15 43 CDR-EVA Yes, I'll get the brush.

05 01 15 44 LMP-EVA Okay.

05 01 15 45 CDR-EVA Be careful.

05 01 15 46 LMP-EVA Yes.

05 01 15 49 CC And, Dave, this is Houston. While you're stowing the brush there, just thinking ahead; we've got a couple of checks to carry out on the Rover before you drive off from the site.

05 01 16 01 CDR-EVA Yes, that's good, Joe. Go ahead.

05 01 16 04 CC Roger. We'll want you to look at the front wheel steering decoupling lanyard for us, and then after that, physically try to turn the front wheels for us.

05 01 16 17 CDR-EVA Okay.

05 01 16 22 LMP-EVA Why would anybody put a snap there?

05 01 16 49 LMP-EVA Gee, watching me flounder around out here.

05 01 16 52 CDR-EVA Okay; the decoupling lanyard is taped down, Joe. I guess ... - -

05 01 16 57 CC Roger. That's good, Dave, fine. You might physically try to turn the front wheel; if you think now is a good time.

05 01 17 12 CDR-EVA I don't get much out of turning the front wheels.

05 01 17 15 CC Okay; I think we're in business. We'll want 15 volts to PRIMARY and FORWARD STEERING to BUS A when you start off.

05 01 17 26 CDR-EVA What makes you think we're in business? What did I do?

05 01 17 32 CC We - Dave, we can get this later, when you're ready to go.

05 01 17 38 CDR-EVA Okay.

05 01 17 49 LMP-EVA Okay; I got a trench.

05 01 17 50 CDR-EVA How you doing, Jim?

05 01 17 52 LMP-EVA Gee, I'm - hung up. Something's - -

05 01 17 57 CDR-EVA Go easy - go easy. Stand by; let me come up there and watch you. Take it easy.

05 01 18 26 CDR-EVA Okay; come -

05 01 18 28 LMP-EVA Yes.

05 01 18 30 CDR-EVA Problem - Okay; come left - left - left, your shoulders to the left. Turn your hips to the right. Push down.

05 01 18 44 LMP-EVA Okay.

05 01 18 45 CDR-EVA You okay? PLSS is catching on the - There you go, a little more - a little pushup there - put your stomach down. Okay, get your - your right shoulder down - right shoulder down. Okay; now go forward. That a boy; there you go. Okay. Little more.

05 01 19 30 CDR-EVA That was some - looks like travono [?] under there.

05 01 19 33 LMP-LM Okay; I'm in.

05 01 19 36 CDR-EVA There's a real hooker there. I don't ever remember seeing that in the 1/6g training.

05 01 20 00 CDR-EVA Okay, Jim. Take a little break up there, and let me pass you the EL - the pallet, okay?

05 01 20 07 LMP-LM Okay; let me get the ETB up.

05 01 20 27 CDR-EVA Hold a minute.

05 01 20 30 LMP-LM I'm ready, okay.

05 01 20 31 CDR-EVA Hold on.

05 01 20 33 LMP-LM Not doing a thing, except shutting it up.

05 01 20 36 CDR-EVA Okay.

05 01 20 51 CDR-EVA Okay; now, I'm ready anytime you are.

05 01 20 54 LMP-LM Okay; I'm ready.

05 01 20 55 CDR-EVA Okay; go ahead.

05 01 21 11 CDR-EVA Hey, Jim.

05 01 21 12 LMP-LM My, it's heavy.

05 01 21 13 CDR-EVA Yes. It is. There you got it - Keep coming.  
Coming. That a boy, right over the step now -  
Little more - There you go, it's over the step.

05 01 21 44 CDR-EVA You know, I tell you there's a lot better way to  
get that up.

05 01 21 47 LMP-LM I hope so.

05 01 21 48 CDR-EVA Yes. Next time I'll carry it up the ladder to you.  
There you go, babe.

05 01 21 53 LMP-LM Okay.

05 01 21 56 CDR-EVA Yes, next time I'll just bring it up the ladder.

05 01 22 11 CDR-EVA You're doing that - Anything else I can do on the  
Rover here, Joe?

05 01 22 21 CC Negative, Dave. Just press on, and we'll give you  
some more words when you're ready to drive off.

05 01 22 29 CDR-EVA Okay.

05 01 23 08 CDR-EVA Got the pallet disconnected, Jim?

05 01 23 10 LMP-LM Say again, Dave?

05 01 23 12 CDR-EVA Is the pallet disconnected?

05 01 23 14 LMP-LM Yes - Oh, no; stand by.

05 01 23 16 CDR-EVA Disconnect to the LEC, and let me pull it back down.

05 01 23 19 LMP-LM Yes. Just a minute.

05 01 23 32 LMP-LM Okay, Dave; it's disconnected.

05 01 23 35 CDR-EVA Okay.

05 01 24 03 CDR-EVA Okay; I'm going out to the - get the NAV initialized.

05 01 24 07 LMP-LM Okay.

05 01 24 13 CC Okay, Dave. This is Houston with a Rover procedure for you, as you get on. We want the 15 VOLT to PRIMARY and FORWARD STEERING to BUS Alfa.

05 01 24 28 CDR-EVA Okay, Joe. First, let me - stow the high gain and give you PML/WB.

05 01 24 34 CC Roger.

05 01 24 35 CDR-EVA So I'm going to turn you off.

05 01 24 37 CC Okay.

05 01 24 48 CDR-EVA Okay, Joe. Give me a comm check on PML/WB.

05 01 24 52 CC Okay, Dave. We're reading you 5 by on PML/WB.

05 01 24 59 CDR-EVA Okay, \*\*\* stowed.

05 01 25 13 LMP-LM Joe, how do you read me in the LM?

05 01 25 15 CC Jim, you're 5 by.

05 01 25 20 LMP-LM Good. Okay; I have the pallet unloaded on the MESA. Reconfigure the COMM circuit breakers.

05 01 25 29 CC Roger.

05 01 25 31 CDR-EVA Switches? Okay, Joe. Give me a call on those switches again.

05 01 25 39 CC Okay, Dave. 15 VOLTS to PRIMARY, FORWARD STEERING to BUS Alfa.

05 01 25 48 CDR-EVA PRIMARY, BUS Alfa. ... DRIVE POWER is OFF - -

05 01 25 50 CC Roger. Now, we want you to rock the hand controller full left and right - and watch the ammeter while you do that on the batteries. And look for small deflections in those ammeter readings.

05 01 26 08 CDR-EVA Okay.

05 01 26 15 LMP-LM Joe.

05 01 26 16 CDR-EVA See, the only switches I have on now are 15 VOLT DC PRIME and STEERING FORWARD BUS A.

05 01 26 22 CC That's correct, Dave.

05 01 26 34 CDR-EVA There - I - I can't perceive anything, Joe.

05 01 26 40 CC Okay, Dave. That's all we need. Press on - as always.

05 01 26 46 CDR-EVA Okay. What does that tell us?

05 01 26 50 LMP-LM Okay, Joe. Under COMM, TV is coming open.

05 01 26 54 CC Okay.

05 01 27 01 LMP-LM MODULATE going to PM. POWER AMPLIFIER, OFF. PCM going low.

05 01 27 32 CC Okay, Dave; while you're getting configured there, we think both your batteries are okay. There is something wrong with the forward steering and we'd like the FORWARD STEERING switch to OFF. We still have good rear steering.

05 01 27 47 CDR-EVA \*\*\* FORWARD STEERING is OFF, Joe.

05 01 28 39 CDR-EVA Okay, Joe. I'm in a nice smooth area now. Do you want to point any particular direction, or will you take this one? Oh, wait; I'll get it. Wait; I know where I'm going. (Laughter)

05 01 29 00 CDR-EVA Tried to find a good smooth area with all the qualifications around here.

05 01 29 28 CDR-EVA Okay, Joe. I'm at the NAV initialization site here.

05 01 29 32 CC Roger, Dave. We're standing by.

05 01 29 37 CDR-EVA Okay. Okay, NAV circuit breakers going closed. It's driving. SYSTEM RESET. Let her run 3 minutes here. Okay. LRV systems, if you want them. What does - the read-outs on the LRV again, Joe, or are you happy with what you got?

05 01 30 08 CC Dave, give us your AMP-HOURS again, please.

05 01 30 18 CDR-EVA Okay; AMP-HOURS, 105 on number 1 and - I'm sorry, 110 on number 1 and 115 on number 2.

05 01 30 27 CC Roger.

05 01 30 32 CDR-EVA Okay, and attitudes, if you're ready to copy.

05 01 30 35 CC Go.

05 01 30 39 CDR-EVA ROLL is 1 LEFT. PITCH is 0. Heading is 240. I'm in SYSTEM RESET, and we're driving down to zero. And the SUN SHADOW DEVICE is at zero.

05 01 31 03 CC Okay, Dave.

05 01 31 15 CC And, Dave, you're going to be close to 279 on your heading, and I'll fine tune that in a minute.

05 01 31 25 CDR-EVA Okay; well, I'll stand by; I'm still - the SYSTEM RESET's still driving.

05 01 31 30 CC Roger.

05 01 31 38 CC And, Jim, we'd like for you to take a breather here for a minute, while Dave's getting the NAV realigned.

05 01 31 46 LMP-EVA Okay. All I do is tidy the blanket.

05 01 31 55 CDR-EVA Hey, Jim, try some of that fruit stick, it's really good.

05 01 32 01 LMP-EVA Forgotten about it.

05 01 32 02 CDR-EVA Boy, I just had a couple of bites; it's really good.

05 01 32 05 LMP-LM Full of quick energy.

05 01 32 06 CDR-EVA No water.

05 01 32 11 CC And, Dave, the fine tune heading is 279.

05 01 32 19 CDR-EVA 279, Roger.

05 01 33 32 LMP-EVA Okay, the MESA blankets are tidied, Joe.

05 01 33 36 CC Okay, Jim. Sounds good.

05 01 33 57 CDR-EVA Okay, Joe. We're sitting on 279 - SYSTEM RESET is OFF.

05 01 34 12 CDR-EVA The SSD is stowed. And I'll - see.

05 01 34 27 LMP-EVA That's good, Dave.

05 01 34 28 CDR-EVA That good there?

05 01 34 29 LMP-EVA Can you come and join me?

05 01 34 30 CDR-EVA Yes, I'm right behind you.

05 01 34 31 LMP-EVA Oh, you are?

05 01 34 32 CDR-EVA Yes, I'm ready.

05 01 34 33 LMP-EVA Good show.

05 01 34 34 CDR-EVA Let's go - -

05 01 34 35 LMP-EVA I'm ready to configure you.

05 01 34 36 CDR-EVA Good.

05 01 34 37 LMP-EVA Or you configure me.

05 01 34 38 CDR-EVA Okay, let me get the switches off here - so we don't have anybody drive off with it while we're gone.

05 01 34 50 CDR-EVA Okay.

05 01 34 52 LMP-EVA I put up my antenna so I can read you a little better.

05 01 34 54 CDR-EVA Yes, that's a good idea. Okay, your antenna's up.

05 01 35 13 LMP-EVA My - flap never got fixed.

05 01 35 26 CDR-EVA Okay. The hammer's on the LMP.

05 01 35 37 CDR-EVA The hammer's on the LMP. Got some core tube caps for me?

05 01 35 40 LMP-EVA Yes. Here you go.



05 01 35 49 CDR-EVA Okay. Oh, ... - Core tube caps didn't fit. Pitch it up, Jim.

05 01 36 16 LMP-EVA Okay.

05 01 36 17 CDR-EVA \*\*\* kind of to your right and I'll put it on.

05 01 37 11 CDR-EVA Okay; bag number 4 is on the LMP. Okay. Get me, ole buddy.

05 01 37 25 CC Okay, Dave and Jim. As a reminder before you climb on the Rover, you may want to go to MIN cooling; it may get chilly while you're riding.

05 01 37 36 CDR-EVA Okay.

05 01 38 08 LMP-EVA Are your bags secured? Okay.

05 01 38 19 CDR-EVA How do the PLSSs look to you down there, Joe?

05 01 38 23 CC They're looking smooth as silk down here.

05 01 38 24 LMP-EVA Here's your tongs, Dave.

05 01 38 27 CDR-EVA Okay.

05 01 39 00 CC And, Jim, if convenient now, you might give us an EMU status check.

05 01 39 07 LMP-EVA Okay; I'm reading 385, all flags are clear, and - looks like 65 percent.

05 01 39 16 CC Roger.

05 01 39 19 CDR-EVA Okay, Joe, and I'm reading 65 percent, all flags clear, and 3.85.

05 01 39 25 CC Roger, Dave. Let's do a little geology.

05 01 39 31 CDR-EVA That a boy.

05 01 39 40 CDR-EVA Okay, Mr. Navigator. By the way, little arrows - on the heading indicator - on the LRV NAV system worked good.

05 01 39 59 CC Okay, we copy.

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05 01 40 12 CDR-EVA Okay, this thing's really bouncy when you get on.

05 01 40 18 CDR-EVA Easy, easy, easy, Jim - easy.

05 01 40 20 LMP-EVA Huh?

05 01 40 24 CDR-EVA The foot's hooked on the tool there. That-a-boy.

05 01 40 35 LMP-EVA You really sit high.

05 01 40 36 CDR-EVA Yes, you do.

05 01 40 37 LMP-EVA It's almost like standing up. In fact, I can't -

05 01 40 52 LMP-EVA Down to the maps, let's see.

05 01 40 57 CDR-EVA Huh? Can you get to the maps?

05 01 40 59 LMP-EVA Get my safety belt.

05 01 41 00 CDR-EVA Yes. Be careful you don't hit our jackrabbit switches there.

05 01 41 29 CDR-EVA There's something wrong with my safety belt. I'll get off and fix it.

05 01 41 34 LMP-EVA As long as you're getting off, will you adjust mine?

05 01 41 36 CDR-EVA Sure.

05 01 41 38 CDR-EVA How did it get down there?

05 01 41 43 LMP-EVA I'll look at the maps.

05 01 41 47 CC Okay, Dave. And, we're standing by for a mark as you leave.

05 01 41 53 CDR-EVA Yes. Okay, Joe. I got my trusty seat belt hooked under a Cannon plug that - a new surprise.

05 01 42 18 LMP-EVA I think it's too short, Dave, it - for - -

05 01 42 19 CDR-EVA Yes, sure is.

05 01 42 24 LMP-EVA Don't waste time on it; I'll just hang on.

05 01 42 26 CDR-EVA No, start out right. At least you're narrow. Got too far to go.

05 01 43 03 CDR-EVA Okay. You're hooked.

05 01 43 08 LMP-EVA Sort of.

05 01 43 09 CDR-EVA Can you get it off?

05 01 43 11 LMP-EVA ... get if off.

05 01 43 19 CDR-EVA I think - once we get a - a couple of tries at getting on and getting of, why, be able to do pretty good.

05 01 43 51 CDR-EVA Okay, got mine.

05 01 43 55 LMP-EVA Okay, I'm supposed to give a few readings here.

05 01 44 00 CC Go ahead, Jim.

05 01 44 01 LMP-EVA Are you ready to copy some readings, Joe?

05 01 44 03 CC Roger.

05 01 44 04 LMP-EVA Okay. 250, 000 - Well, all zeros there. AMP-HOURS 090, 092, 80, 85; and FORWARD MOTOR TEMPS are lower limit - in the REAR, lower limit.

05 01 44 31 CC Roger, Jim. Thank you.

05 01 44 32 LMP-EVA Off-scale low.

05 01 44 35 CDR-EVA Okay, Jim, here we go.

05 01 44 37 LMP-EVA Okay, Dave. We want - a heading of 203.

05 01 44 44 CDR-EVA Okay, 203.

05 01 44 45 LMP-EVA Checkpoint 1.

05 01 44 49 CDR-EVA Going to miss that double Ackerman, I can see that now.

05 01 44 55 LMP-EVA Okay, we're moving forward, Joe.

05 01 44 57 CC Roger.

05 01 45 02 CDR-EVA Whew! Hang on.

05 01 45 06 LMP-EVA And we're coming around left.

05 01 45 16 LMP-EVA Heading directly south right now to miss some craters off to our right - very subdued craters.

05 01 45 24 CDR-EVA Okay, I'm going to take a little zig zag here - -

05 01 45 26 LMP-EVA On the right is - -

05 01 45 28 CDR-EVA Hang on. Get a feel for this thing.

05 01 45 31 LMP-EVA Nine kilometers an hour, Joe.

05 01 45 33 CDR-EVA Hold - hold the geology; let's get the Rover squared away first. Okay; 8 kilometers up a little rise. Okay, turning back.

05 01 45 55 CDR-EVA 203, huh? Okay.

05 01 45 57 LMP-EVA 203 for - 2 miles.

05 01 46 05 CDR-EVA Okay. That's a nice young fresh one.

05 01 46 10 CC Dave and Jim, Houston.

05 01 46 11 LMP-EVA Speed's varying between 8 - 8 and 10.

05 01 46 15 CDR-EVA Go ahead, Houston.

05 01 46 16 CC Roger. Our TV pan suggests, you can go straight for St. George Crater, and you'll find Elbow okay. And we're suggesting you omit Checkpoint 1 - Rhysling Crater should be a good landmark along the way, and head 208. Over.

05 01 46 36 CDR-EVA Okay. 208, Joe.

05 01 46 39 LMP-EVA Okay, we're doing 10 kilometers, now. Now we're heading uphill; when we head uphill, it drops down to about 8.

05 01 46 47 CDR-EVA No dust, Joe, no dust at all.

05 01 46 49 CC Yes, sir. Sounds great. And, Jimmy, we're standing by for AMP read-out.

05 01 46 57 LMP-EVA About 9 kilometers, now.

05 01 47 01 LMP-EVA Okay, AMP read-out is 15 - looks like 15 on 1, I can't quite see 2.

05 01 47 18 CDR-EVA Okay, I guess - Could this be Rhysling right here, Jim?

05 01 47 21 LMP-EVA Probably is - this large depression off to our left?

05 01 47 24 CDR-EVA Yes. Man, I can see I'm going to have to keep my eye on the road.

05 01 47 35 CDR-EVA Boy, this is - it's really rolling hills, Joe. Just like 14. Up and down we go. Oh, and this must be earthlight, huh? Could that be? Boy, look at that; we're going to have to do some fancy maneuvering here.

05 01 47 55 LMP-EVA There's an elongate depression here before you get to Rhysling. I don't think we're to Rhysling yet - Rhysling ought to be about 1.4. We've only gone - see .4.

05 01 48 06 CC Roger, Jim - -

05 01 48 07 LMP-EVA Okay.

05 01 48 08 CC - - We think you're short of Rhysling now.

05 01 48 13 LMP-EVA Do you think that's probably Rhysling out about 11:00 o'clock to us, Dave?

05 01 48 17 CDR-EVA Okay.

05 01 48 18 LMP-EVA Out about - maybe 1 kilometer.

05 01 48 21 CDR-EVA Yes. Okay, Joe, the Rover handles quite well. We're moving at, I guess, an average of about 8 kilometers an hour. It's got very low damping compared to the one-g Rover, but the stability is about the same. It negotiates small craters quite well, although there's a lot of roll. It feels like we need the seat belts, doesn't it, Jim?

05 01 48 49 LMP-EVA Yes, really do.

05 01 48 54 CDR-EVA The steering is quite responsive even with only the rear steering. It does - does quite well. There doesn't seem to be too much slip. I can maneuver pretty well with the thing. If I need to make a turn sharply, why, it responds quite well. There's - there's no accumulation of dirt in the wire wheels.

05 01 49 24 CC Just like in the owner's manual, Dave.

05 01 49 26 CDR-EVA Okay, we're heading right - Yes, man. Okay, I've got it on the wall here for a minute - and we're up to 12.

05 01 49 41 LMP-EVA As we head upslope, it drops off.

05 01 49 43 CDR-EVA Yes.

05 01 49 44 LMP-EVA Or, are you deliberately slowing down?

05 01 49 46 CDR-EVA Yes, I slowed down in order to get my - my feeling here before we start sprinting.

05 01 49 50 LMP-EVA Oh.

05 01 49 51 CDR-EVA Look at this little fresh one - little fresh - Boy, look at that! Miles of very angular frags all over the thing.

05 01 49 58 LMP-EVA Yes, we passed several of those.

05 01 50 02 CDR-EVA Okay; I'm going to cut down to the south here, Jim.

05 01 50 05 LMP-EVA Yes, that'd probably be best - because I think that's probably - Let's see, range .7 - That's still not Rhysling. Shouldn't be.

05 01 50 14 CDR-EVA Whoa! Hang on.

05 01 50 21 LMP-EVA And we have a - a large subdued one at our 1 o'clock position, I'd estimate 50 kilometers wide -

05 01 50 35 CC Roger, Jim.

05 01 50 36 LMP-EVA .8.

05 01 50 39 CDR-EVA Okay, how we doing on the heading, Jimmer?

05 01 50 47 LMP-EVA Okay, if we're heading right for Elbow -

05 01 50 54 CDR-EVA Pick a spot here, okay. You really have to pick your way.

05 01 51 02 LMP-EVA Yes.

05 01 51 09 LMP-EVA You're only about half way - to Checkpoint 1. We shouldn't - What I thought was Rhysling was probably not Rhysling; Rhysling is a larger crater, and it's out at about 1. - should be about 1.4 - from the LM.

05 01 51 32 CC That's affirmative, Jim. Right on.

05 01 51 34 LMP-EVA Okay.

05 01 51 39 LMP-EVA Whoa.

05 01 51 41 CDR-EVA Hang on.

05 01 51 42 LMP-EVA Bucking bronco.

05 01 51 43 CDR-EVA Yes, man. You back off on the power, it keeps right on going.

05 01 52 00 CDR-EVA The zero-phase riding is pretty tough, Joe. We're going to have to make sure we keep at an angle. Once I look into zero-phase, it all looks flat. There's a nice little round 1-meter crater with very angular frags all over the bottom and the rims, and glass in the very center. About a meter across.

05 01 52 27 CC Roger, Dave. And, Jim, as you come up on the rille, you may want to turn your 16-millimeter camera on.

05 01 52 37 LMP-EVA Yes, when we get to the rille, we will, Joe. Can't see the rille at all from here. Still looking for Rhysling.

05 01 52 45 CC Roger.

05 01 52 49 LMP-EVA 1.1 -

05 01 52 54 CDR-EVA Okay, right now our bearing is 039 for 1.1.

05 01 53 03 CC Roger.

05 01 53 04 CDR-EVA Okay. (Laughter) ... clicks.

05 01 53 24 CDR-EVA Hey, Jim, give me - Well, I just have to drive around these craters; that's all there is to it.

05 01 53 28 LMP-EVA Yes. We have a large subdued one on our right about - 60 meters wide with several small ones in the center. By small, I mean about 10 meters in diameter.

05 01 53 47 CC Roger, Jim.

05 01 53 50 LMP-EVA Boy, it really - really bounces, doesn't it?

05 01 53 54 CDR-EVA Well, I think - there's sort of a - The rear end breaks out at about 10 to 12 clicks.

05 01 54 04 CC Roger, Dave. It sounds like it's - like steering a boat, with the rear steering and the rolling motion.

05 01 54 05 CDR-EVA And, gosh, every ... - -

05 01 54 12 CDR-EVA Yes, that's right. It sure is. Hey, here's a good fresh one right there - -

05 01 54 15 LMP-EVA Yes, I was looking at that one at 1 o'clock to us right now. Very fresh angular block of lighter albedo material on the south rim.

05 01 54 24 CDR-EVA Okay, let's - -

05 01 54 25 LMP-EVA We kick up a little dust when we go through these craters.

05 01 54 28 CDR-EVA Yes.

05 01 54 29 LMP-EVA Seems like when we get to the bottom, and I can see the trajectory of the fragments coming from the - It looks like - Yes, they're coming from the front wheels and coming up kind of around my arm and then forward.

05 01 54 39 CDR-EVA Yes, but it's not dusty. I mean, there's - -



05 01 54 41 LMP-EVA No - no, looks - it looks like millimeter-type particles.

05 01 54 44 CDR-EVA Yes. Hang on.

05 01 54 51 LMP-EVA Okay, let's see, the distance 1.3. Okay, I think there's a large one coming up about 12:30 or 1:00 o'clock that could be Rhysling.

05 01 55 04 CDR-EVA Okay.

05 01 55 08 CC Jim, that sounds good or it could be the large one to the northwest of Rhysling. Rhysling may be coming up on your left now.

05 01 55 20 LMP-EVA Well, there's a large one over there, too, Joe, I -

05 01 55 23 CC Roger. But your heading is beautiful. Continue on.

05 01 55 29 CDR-EVA Okay.

05 01 55 30 LMP-EVA Our heading's about - averaging about 200 - 210.

05 01 55 44 CDR-EVA (Laughter) Man, this is really a rocking-rolling ride, isn't it?

05 01 55 48 LMP-EVA Never been on a ride like this before.

05 01 55 50 CDR-EVA Boy, oh, boy! I'm glad they've got this great suspension system on this thing. Boy.

05 01 56 08 CDR-EVA Okay, here's a big one right here on our left, Jim.

05 01 56 09 LMP-EVA Yes, but it's not - I don't think it's big enough to be Rhysling.

05 01 56 12 CDR-EVA No, I don't think it is either. We got a ridge up here in front of us, we'll - -

05 01 56 16 LMP-EVA What did I say, Joe, about 1.6 - 1.7, for Rhysling?

05 01 56 24 CC It's about 1.4, 1.5, Jim.

05 01 56 26 CDR-EVA Get on top of it.

05 01 56 30 LMP-EVA That could be Rhysling, Dave; we'll find out when we get up on top of this ridge.

05 01 56 34 CDR-EVA Yes. By the way, Houston, your comm is crys -  
crystal clear for us up here.

05 01 56 46 CC So is your's, Dave. Maybe we ought to take this  
gear to Flagstaff next time.

05 01 56 53 CDR-EVA Yes.

05 01 56 54 LMP-EVA Off in the west now, I can see Bennett Ridge.

05 01 56 57 CDR-EVA Oh, yes. I've seen it all the way. You can see  
just the peak of it all - almost all - all the time.

05 01 57 06 CC And Rover, this is Houston. Your range to Rhysling  
is about 1.7; so you may be short of that still.

05 01 57 14 LMP-EVA It just came up 1.7, and our relative bearing's  
036.

05 01 57 19 CDR-EVA And we're coming up on the right - -

05 01 57 21 LMP-EVA Hey, you can see the rille - there's the rille.

05 01 57 22 CDR-EVA There's the rille.

05 01 57 23 LMP-EVA Yes. We're looking down in it - down and across  
the rille, we can see craters on the far side of  
the rille.

05 01 57 32 CC Roger. Like advertised.

05 01 57 33 LMP-EVA A lot of blocks. You ought to turn the camera on.

05 01 57 40 CDR-EVA Yes. Now we're getting into the blocky stuff -  
about 1 foot, quite angular, irregular surface.

05 01 57 55 LMP-EVA We're right at the - the edge of the rille, I  
bet you.

05 01 57 57 CDR-EVA Yes, sir. We're on the edge of the rille, you'd  
better believe it. I think we're heading right - -

05 01 58 01 LMP-EVA I don't see Elbow though. Oh, yes, I see Elbow.  
Dave, we have to stay up on the high part of the  
rille, here.

05 01 58 08 CDR-EVA Yes. See, Elbow is not as prominent as we thought, but there's a definite crater there.

05 01 58 13 LMP-EVA I see Elbow.

05 01 58 15 CDR-EVA Yes, it - subtle though - subdued.

05 01 58 17 LMP-EVA ... turn on the camera.

05 01 58 18 CDR-EVA Hey, look there's a big block on the edge of the rille there that must be 10 meters. There are lots of outcrops. But, on the far side, I don't see anything that would suggest really layering. There's a lot of debris, big angular blocks all the way down, but nothing that you'd really call - exact layers.

05 01 58 41 CC Roger. We copy.

05 01 58 43 CDR-EVA Let me get us back up on it - back up on the ridge, it's smoother.

05 01 58 47 LMP-EVA Yes, I think that heading was - we were on a heading of a little too far west. We're getting back up on the higher part of the rille rim. At this point, I'd estimate the slope is probably - what? About 3 degrees?

05 01 59 03 CDR-EVA Yes, there's a definite branch or rim that runs along the rille, maybe 70 - 80 meters from this - the inflection point that drops down into the rille, don't you think, Jim?

05 01 59 15 LMP-EVA Yes. And, we might as well - we're heading right toward - we'll head toward the east side of - of Elbow.

05 01 59 24 CDR-EVA Yes, we're in good shape. We can see Elbow, and we can see the front all the way down to the Spur. And, there's not a big block on it.

05 01 59 37 CC Keep talking, keep talking. Beautiful description.

05 01 59 40 CDR-EVA Hang on.

05 01 59 42 LMP-EVA I see one large block, up about a quarter of the way up the front, Dave.

05 01 59 48 CDR-EVA Okay, hang on there.

05 01 59 49 LMP-EVA Yes.

05 01 59 51 CDR-EVA There's a big one partially buried. Oh, there's some beautiful geology out here. Spectacular!

05 02 00 01 CDR-EVA Oops, watch that. Hold on.

05 02 00 10 LMP-EVA Looking up at the - at the front now, Joe, I sure see the linear patterns that Dave commented on before. With the dip and everything.

05 02 00 18 CDR-EVA Whew, whoopee!

05 02 00 19 LMP-EVA Boy, that was a - good stroke.

05 02 00 21 CDR-EVA It's a good stroke, all right.

05 02 00 24 LMP-EVA And, I sure get the impression that - Almost looks like a slump feature, but we'll take some good pictures of that, because you see the same lineal - linear-type pattern in the - the east side of the rille. And note the linear pattern there is parallel. Almost like layering in the rille. And, then as you look upslope - up the front, that layering takes that - that dip to the northeast that Dave had mentioned earlier.

05 02 01 02 CC Roger, Jim. And can - can you actually see the east side of the rille, towards the south there?

05 02 01 09 LMP-EVA Oh, yes. I can see, looking directly south - I can see that - that exposure - the exposure that faces northwest. I can look down and I can see - I think I can see Hadley C down there.

05 02 01 23 CC Remarkable.

05 02 01 24 LMP-EVA Yes, I think I can see the south rim of Hadley C.

05 02 01 38 LMP-EVA Okay, let's see - Well, we can see Elbow. But anyway, when we get there - -

05 02 01 43 CDR-EVA Hang on - got one coming.

05 02 01 45 LMP-EVA Okay.

05 02 01 47 CDR-EVA Oh, my.

05 02 01 50 LMP-EVA It should be 2.7, so we got another .7 to go.

05 02 01 55 CDR-EVA Okay, we're doing all right.

05 02 02 00 LMP-EVA Speed's been generally about 10 clicks.

05 02 02 02 CDR-EVA Yes - but it takes attention paying.

05 02 02 11 LMP-EVA Yes. And again looking at the - looking to the south along that - the edge of the rille that faces to the northwest, I can see several large blocks that have rolled downslope. Very large blocks that are about three-quarters of the way down the - slope - into the rille. That's just at the base of St. George.

05 02 02 32 CC Roger, Jim. Copy.

05 02 02 40 LMP-EVA And - we're heading - heading about 165 - right now. Tried to stay on the fairly level and smooth part of the Rille rim. But looking over to the - the edge of the rille at this point, I see a - a large concentration of large boulders - large rocks. And I'd estimate the size - They're angular, and - they're all of the same color and texture as - as far as I can tell from here. See that ...? Well, you'd better watch the road, Dave.

05 02 03 22 CDR-EVA Yes. No, I see what you're seeing there, but - you - you keep talking; let me drive.

05 02 03 28 LMP-EVA It's the first good concentration of large rocks that I've seen. Very similar to the large rocks that - that 14 saw up at the top of Cone.

05 02 03 42 CC Roger, Jim, we copy. And your range should be coming up on 3.1, at Station 1.

05 02 03 51 CDR-EVA Okay, relative - Right now, Joe, our bearing is 18 and range is 2.3.

05 02 03 57 CC Roger.

05 02 04 08 LMP-EVA Okay; now, Joe, I can - see the - the bottom of the valley - Head Valley that leads down toward

Hadley C. I can see the - the bottom of the rille - it's very smooth. I see two very large boulders that are right on the surface - there, on the top of the very smooth portion, of the bottom of the rille. And the one to the - the southeast, I can see the track of where it's rolled downslope.

- 05 02 04 53 CC Roger, Jim. Copy. And is the bottom V-shaped or fairly flat?
- 05 02 04 59 LMP-EVA I'd say it's flat. I'd est - Well, it's hard to estimate. I'd - I'd estimate maybe - oh, 200 meters wide of the flat - flat area in the bottom. Oh, and I can see what we thought was Bridge Crater. And - it definitely would not have been a place to cross Hadley Rille. It's just a depression in the west wall of the rille. And I - Boy, at this vantage point, there's sure a lot more blocks exposed on the - on the far side of the rille. I'm contrasting now the rille to the southeast - -
- 05 02 05 47 CDR-EVA Oop, hang on, Jim.
- 05 02 05 48 LMP-EVA Okay - and the rille to the - side of the rille to the northwest.
- 05 02 05 52 CC Roger, Jim. Copy all that, loud and clear. And Dave, is the front wheels - are the front wheels wandering off of straight ahead as you drive along there?
- 05 02 06 04 CDR-EVA No, they're okay, Joe, it's just - There are a lot of craters and it's just sporty driving; I've just got to keep my eye on the road every second.
- 05 02 06 12 CC Roger. We understand that - -
- 05 02 06 13 LMP-EVA By golly, it's a real test for the Rover.
- 05 02 06 14 CC - - just want to get some info - engineering information here. Apparently, your front wheels are tracking straight ahead, is that correct?
- 05 02 06 23 CDR-EVA That's correct. And, of course, when we turn, they dig in, and it makes the rear end break out. But it's okay; we can handle it.

05 02 06 31 CC Knew you could.

05 02 06 33 CDR-EVA I might add to Jim's comment, that the near - the near side of the rille wall is smooth without any outcrops, there by St. George, and the far side has got all sorts of debris. It almost looks like we could drive down in on this side, doesn't it?

05 02 06 48 CC Stand by on that, Dave.

05 02 06 49 LMP-EVA I'm sure we could drive down; I don't think we could drive back out.

05 02 07 00 LMP-EVA Oh, now - I can turn around and look to the north-west - where the rille trends to the north. Now, let me concentrate on Elbow for the moment.

05 02 07 11 CDR-EVA Yes, let's get to Elbow.

05 02 07 20 CDR-EVA (Laughter) Hang on.

05 02 07 26 LMP-EVA Okay, our range - the range estimate must have been off for Elbow. Our map says 2.7, Joe said 3.2, I guess. You confirm that, Joe?

05 02 07 36 CC Our estimate, Jim, was 3.1 from your landing site.

05 02 07 43 LMP-EVA I see, that's right.

05 02 07 44 CDR-EVA That's the difference.

05 02 07 45 LMP-EVA Yes.

05 02 07 51 CDR-EVA (Laughter) Well, this is really a sporty driving course. Man, oh, man, what a Grand Prix this is!

05 02 08 04 CDR-EVA There's old Elbow.

05 02 08 07 LMP-EVA Is it?

05 02 08 08 CDR-EVA There's a real fresh one down here.

05 02 08 10 LMP-EVA No, Elbow's larger than that.

05 02 08 12 CDR-EVA Yes, but there's - Hey, there's a nice fresh one then.

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05 02 08 14 LMP-EVA Yes, but you want to go a little farther east.  
See, that's Elbow out at 11:30.

05 02 08 19 CDR-EVA Oh, yes. Roger. Gosh, that's a long way away.

05 02 08 22 LMP-EVA Yes.

05 02 08 23 CDR-EVA Distances are very deceiving. \*\*\* like we've been  
driving for an hour. Are you sure that's Elbow,  
Jim?

05 02 08 34 LMP-EVA Yes. Yes, you want to go farther east, Dave.

05 02 08 38 CDR-EVA Okay. Down this little crater - back up.

05 02 08 51 LMP-EVA You have Elbow out at our 1 o'clock position.

05 02 08 53 CDR-EVA Shoot, this is Elbow right here, I believe, my  
friend.

05 02 08 56 LMP-EVA Yes, this is Elbow right here.

05 02 08 57 CDR-EVA Yes.

05 02 08 58 LMP-EVA Yes, this large one.

05 02 08 59 CDR-EVA The one we were just trending in to.

05 02 09 00 LMP-EVA Yes.

05 02 09 01 CDR-EVA Yes, that's some big fellow, isn't it?

05 02 09 03 LMP-EVA Yes, it sure is. I don't know - -

05 02 09 08 CDR-EVA Take a look up here, and we'll see how she looks.

05 02 09 10 LMP-EVA Maybe you can - you know, angle up hill here?

05 02 09 12 CDR-EVA Yes, like this? How are we doing on time there,  
Houston?

05 02 09 18 CC Like gang busters, Dave and Jim. Continue on, and  
we'll give you the exact number in a minute.

05 02 09 27 CDR-EVA Okay. Do we - do we want to stop at Elbow, or  
press on?



05 02 09 32 CC Stop. Follow the Checklist, just as planned.

05 02 09 37 CDR-EVA Just as planned, okay. Okay, let's go right up on the ridge line there, I see some debris. Maybe we can get some - a fresh one in the rim. Be looking down-Sun. Oh, look at this baby climb the hill.

05 02 09 53 LMP-EVA Yes, climbing at about 8 clicks.

05 02 09 55 CDR-EVA Yes, man.

05 02 10 00 CC Jim, can you get an AMP reading for us as you climb?

05 02 10 01 LMP-EVA Okay, Elbow's - out there.

05 02 10 07 LMP-EVA Yes, reading - Oh, it's just about - it's 10 on BAT 1, Joe.

05 02 10 15 CC Roger.

05 02 10 21 LMP-EVA We got a good slope here about, - I'd say 10 degrees; we're going up right now.

05 02 10 27 CDR-EVA Amen.

05 02 10 29 LMP-EVA I felt it.

05 02 10 32 CDR-EVA Did you feel that?

05 02 10 33 LMP-EVA Okay, now we're up on the high part, and we're on the - we're on the east rim - east rim of Elbow.

05 02 10 41 CC Stupendous.

05 02 10 46 CDR-EVA Okay, this ought to give the folks back home something to look at right here. Okay, we're at our first stop. Okay. Power this beauty down.

05 02 11 06 LMP-EVA And, Joe, here's some readings for you.

05 02 11 08 CC Roger.

05 02 11 11 LMP-EVA 185, 011, 045, 032, 105, 112 - 085, 087 - and - Gee, I'm reading the lower limit on the MOTOR TEMPs, both FORWARD and REAR. Don't look like that front gage is operating.

05 02 11 45 CC Maybe they're still cool.

05 02 11 51 CDR-EVA Let's hope so. Okay, Joe, Ill give you FM/TV here.

05 02 11 58 CC Roger.

05 02 12 27 CDR-EVA Okay, Joe. High gain's pointed. And we've got a fair good - a fair amount of dust on the Rover. Very light, thin -

05 02 12 52 CC And, Dave and Jim. We gained 20 minutes back. We're making money hand over fist on your driving.

05 02 13 02 CDR-EVA Okay, I see the camera coming up.

05 02 13 09 LMP-EVA Never got that Velcro on the gnomon bag fixed.

05 02 13 15 CDR-EVA Hey, Joe. Give me a comm check on the FM/TV.

05 02 13 18 CC Okay, Dave. Comm check on FM/TV and is the 16-millimeter off?

05 02 13 35 CDR-EVA How do you read me, Jim?

05 02 13 36 LMP-EVA Loud and clear, Dave.

05 02 13 37 CDR-EVA Are you reading Houston?

05 02 13 38 LMP-EVA No.

05 02 13 41 LMP-EVA Okay, I'm taking a pan.

05 02 13 43 CDR-EVA Okay. Okay, Houston. How do you read on ...?

05 02 13 59 CC Dave and Jim, we lost comm temporarily here. Stand by.

05 02 14 09 CDR-EVA Houston, how do you read?

05 02 14 11 CC Dave, you're very broken and garbled. Stand - stand by 1. We're working.

05 02 14 20 CDR-EVA Now we lost comm with them, Jim.

05 02 14 22 CC Okay, you're loud and clear now, Dave.

05 02 14 23 CDR-EVA Why don't we - do a quick sample here, and then press on?

05 02 14 28 LMP-EVA Yes.

05 02 14 31 CDR-EVA Yes, I'd like to get the comm back. Did you get your pan?

05 02 14 35 LMP-EVA Got the pan.

05 02 14 36 CC Okay, we've got the comm. You're loud and clear, now.

05 02 14 37 LMP-EVA Why don't we do a quick sample?

05 02 14 39 CDR-EVA Yes.

05 02 14 40 LMP-EVA We want a radial - a radial sample.

05 02 14 41 CDR-EVA Yes, okay. I'll go back to FM/TV, and let them \*\*\*

05 02 14 50 LMP-EVA Okay. A quick radial sample here.

05 02 14 52 CDR-EVA Yes. Let me find you one. Here, Jimmer. Right over here's one. I kick dust all over them so easy. How about that one right there? Think we can get that in the bag?

05 02 15 16 LMP-EVA Yes.

05 02 15 20 CC Okay. And, Dave and Jim; this is Houston, with a voice check.

05 02 15 25 LMP-EVA Watch the shadow.

05 02 15 36 CDR-EVA Okay.

05 02 15 46 CDR-EVA Got me a bag?

05 02 15 47 LMP-EVA Yes.

05 02 15 52 CC Okay, Dave and Jim; Houston with a comm check. Do you read? Over.

05 02 15 56 LMP-EVA Number 156.

05 02 15 58 CC Roger. - -

05 02 15 59 CDR-EVA Okay.

05 02 16 00 CC - - Copy 156.

05 02 16 04 CDR-EVA Boy!

05 02 16 05 LMP-EVA It's very friable.

05 02 16 07 CDR-EVA Looks like a breccia all right, quite friable. But, I see a lot of sparklies in there. No glass. Sub-angular, with lots of dust on it.

05 02 16 20 CC Roger, Dave. - -

05 02 16 21 CDR-EVA Did they hear?

05 02 16 22 LMP-EVA I suppose they did.

05 02 16 23 CC - - Copy loud and clear. Continue on. And, this is Houston with the comm check.

05 02 16 28 CDR-EVA Hey, that's a lot better, Joe. I thought we'd lost you there for a minute.

05 02 16 31 CC We're hearing every word loud and clear.

05 02 16 36 CDR-EVA Okay, I guess it was in your configuration down there. Okay, we'll hop up here and get another one.

05 02 16 59 CDR-EVA Okay, here's one about the same size. You're a little too big. Take this one right here, Jimmer. Oh, I see a large chunk in there.

05 02 17 16 LMP-EVA Get a little - get a little soil on this one, huh?

05 02 17 17 CDR-EVA Yes, man.

05 02 17 33 CDR-EVA Got it?

05 02 17 34 LMP-EVA Yes, I got the down-Sun.

05 02 17 36 CDR-EVA Okay.

05 02 17 37 LMP-EVA Get the location shot here.

05 02 17 38 CDR-EVA Okay, Joe. These are buried about - an inch or so. The one I have is subangular; it's covered with dust, but beneath the dust - by golly it's a - It's quite friable and - I see olivine. Look at this, Jim. In the sunlight, would you call that olivine? And,

there is a big lath in there. Look at the big lath about a centimeter long and a millimeter wide.

05 02 18 14 LMP-EVA Yes.

05 02 18 15 CDR-EVA Plage.

05 02 18 16 LMP-EVA Yes, let me put this in your bag.

05 02 18 17 CDR-EVA It's a light gray - millimeter-size grains, with - like 2 miller - millimeter-size phenocryst in it. Gosh. That one is really something. Look at that - look at that ... there.

05 02 18 30 CC Roger; that's very critical, Dave. We copy you loud and clear. We need a bag number for that.

05 02 18 38 CDR-EVA Bag number 157.

05 02 18 40 CC Roger.

05 02 18 41 CDR-EVA Let me get you another one. My goodness! Let's get another one out of here.

05 02 18 45 LMP-EVA Okay.

05 02 18 55 CDR-EVA That one's really buried.

05 02 18 56 LMP-EVA A little too big to go in there.

05 02 18 58 CDR-EVA Yes. There's a little one. Okay, let me just stick it in.

05 02 19 08 LMP-EVA Going to put any ... in there?

05 02 19 10 CDR-EVA Yes, give me the bag. I'll fill it up, too. Dig a little light trench in there, and we'll - I got - I got a feeling that Dr. Schmitt's going to win his bet. Not that part, get another part. Not where we picked the rock up, right - right in front of it. Okay, that's good. Just - hit the - spot, too.

05 02 19 37 CDR-EVA Whoo, boy.

05 02 19 38 LMP-EVA Okay; a little bit more.

05 02 19 39 CDR-EVA Okay, you - you just try it again. Get another one and just pour real smooth, and I'll catch.

05 02 19 49 LMP-LM Okay.

05 02 19 50 CDR-LM That a boy. That a boy. Good show. Okay. That ought to be enough for them to take a look at. Okay, 157. Oh! Oh! Good catch.

05 02 20 15 LMP-EVA Got it?

05 02 20 16 CDR-EVA Yes. Okay, I got it.

05 02 20 25 CDR-EVA ... I'm going to get the picture. Get the picture. Okay, let's hop on out and get one more. Yes, it's pretty sparse out here. Gosh, we're only - not very far at all. I'm not sure that the ones out here aren't thrown up from ...

05 02 20 42 LMP-EVA I don't know that this is representative too much of Elbow.

05 02 20 46 CDR-EVA I don't think so, either. But, let's pick up a couple - one more anyway, since we're out here. I see a little one. Got to be careful not to kick the dust all over them when you get there. Jim, I see sort of a miniature raindrop here, it looks like.

05 02 21 10 LMP-EVA Yes, just behind you is one of those fresh craters, too, with a lot of glass in it.

05 02 21 13 CDR-EVA Is it really?

05 02 21 14 LMP-EVA Yes, right behind you.

05 02 21 15 CDR-EVA Okay, let's pick up these, get the - -

05 02 21 17 LMP-EVA Okay.

05 02 21 18 CDR-EVA - - radial done.

05 02 21 28 CDR-EVA My yoyo doesn't cut it out here. My yoyo's broken. ... my yoyo.

05 02 21 35 LMP-EVA I've got so much dust on my camera, I can hardly see the set - camera setting.

05 02 21 39 CDR-EVA Okay, got a bag?

05 02 21 40 LMP-EVA Yes.

05 02 21 53 CDR-EVA Okay, Joe. I've got a - another subangular fragment here. Rough surface texture. And, knock a little dust off of it, and it looks like a very fine-grained, gray - rather solid frag. I don't see any significant pits or any significant-size crystals in there. It might just be because the surface covering; but just a smooth, fairly hard rock.

05 02 22 27 CC Roger, Dave. Copy.

05 02 22 28 CDR-EVA So far, I haven't seen any pits - pits on any of these. And, most of them are about 1/5th buried. Okay, here's another one that's got - Oh, on - on the underneath side of that - I hope I don't lose these tongs - On the underneath side of this frag, Joe, I can see some soil that is caked on the bottom, about 1 millimeter thick, and maybe down in the place from which I got it, we could sample. Why don't we get it - I'll take a picture and you can scoop that. And there's another one that has a large - -

05 02 23 03 CC Okay, Dave. We copy. Good description. We'd like a bag number from that, and like for you to move out at your next opportunity, please.

05 02 23 12 CDR-EVA Okay, 158.

05 02 23 14 LMP-EVA Okay, Dave.

05 02 23 15 CDR-EVA Got that sample scooped up?

05 02 23 17 LMP-EVA Yes.

05 02 23 18 CDR-EVA Skip that. I only got one hand now, with that broken yoyo.

05 02 23 26 CDR-EVA Wait, wait; let me get a picture. Whoa, whoa. Got it. Okay.

- 05 02 23 41 CDR-EVA Okay. Good boy. Good shot. Okay; if your yoyo's working, can you roll the bag up?
- 05 02 23 48 LMP-EVA Yes.
- 05 02 23 51 CDR-EVA I'm going to have to hold on to these tongs now. Maybe it's a good idea we have two tongs after all.
- 05 02 23 56 LMP-EVA Yes, if it's that fragile, I'm wondering about - isn't mine. Maybe you can use mine.
- 05 02 24 03 CDR-EVA No, that's all right.
- 05 02 24 04 LMP-EVA I - I can go better without it - just as well without it. Okay, I'll put this in your bag.
- 05 02 24 09 CDR-EVA Yes.
- 05 02 24 10 LMP-EVA Going to go back to Rover?
- 05 02 24 11 CDR-EVA Yes. Okay, Joe. You want us to press on up to St. George?
- 05 02 24 14 CC That's affirmative, guys. Move on.
- 05 02 24 17 LMP-EVA Okay, Dave.
- 05 02 24 19 CDR-EVA Okay. We're on the way. Oh, boy, is this traveling!
- 05 02 24 32 CDR-EVA It's a great sport, I'll tell you.
- 05 02 24 35 LMP-EVA The sandpile was never like this.
- 05 02 24 37 CDR-EVA Yes, man. I wish we could just sit down and play with the rocks for a while. Look at these things! They're shiny, sparkly! Look at all these babies here; gosh! Man!
- 05 02 24 54 LMP-EVA Come on, Dave. There'll be lot of them, let's get back.
- 05 02 24 57 CDR-EVA Can't resist it. Go find something neat in St. George.
- 05 02 25 30 LMP-EVA So you put my belt out all the way, huh?



05 02 25 33 CDR-EVA Yes.

05 02 25 35 LMP-EVA Well, I ought to be able to get it.

05 02 25 48 LMP-EVA Listen, I'll tell you.

05 02 25 49 CDR-EVA Want me to attach it for you?

05 02 25 52 LMP-EVA Yes, try it.

05 02 25 54 CDR-EVA Okay. You need to lean forward some - up and forward. Okay, I'll get the TV. Okay, Joe. Going PML/WB.

05 02 26 09 CC Roger, Dave.

05 02 26 25 CDR-EVA Did you get it on, Jimmer? Huh? Let me get it for you.

05 02 26 37 LMP-EVA I just can't get my arm up for it.

05 02 26 39 CDR-EVA Let me get it. Here go. You're hooked.

05 02 26 50 CC Jim, could we - -

05 02 26 51 CDR-EVA Okay. ... pick up one of those crumbly ones?

05 02 26 52 CC - - have a heading reading as you climb on there?

05 02 26 56 LMP-EVA Yes, heading's 1 - 185, Joe.

05 02 27 00 CC And sounds steady as a rock. Thank you.

05 02 27 05 CDR-EVA Oh, my. I just kicked up a hole here, at the rim of this little crater. Seems to be all white, much lighter albedo.

05 02 27 15 LMP-EVA Golly, Dave.

05 02 27 29 CDR-EVA Hold my seatbelt, Jim, and I can hop in quicker.

05 02 27 32 LMP-EVA Okay.

05 02 27 33 CDR-EVA No. That's right.

05 02 27 34 LMP-EVA Here.

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05 02 27 35 CDR-EVA Okay.

05 02 27 40 CC Okay, Dave and Jim. Standing by for a mark as you roll.

05 02 27 46 LMP-EVA Okay, stand by.

05 02 27 52 CDR-EVA Okay, Joe. The time consumer here is the seatbelt operation. Because we definitely need them, and in 1/6g, we don't compress the suits enough to - be able to squish down and get the seatbelt locked without a certain amount of effort.

05 02 28 15 CC Roger. We understand.

05 02 28 17 CDR-EVA I'll tell you, it's a good seatbelt design - it's a great seatbelt design. Okay, let's check the DRIVE ENABLE. They're all on. DRIVE POWER is on. STEERING FORWARD to BUS A. 15 VOLTS DC. Ready to go, Jimmy?

05 02 28 34 LMP-EVA Ready.

05 02 28 35 CDR-EVA Okay.

05 02 28 36 CDR-EVA MARK. ... roll.

05 02 28 37 CC Dave, we want STEERING FORWARD, OFF.

05 02 28 42 LMP-EVA Oh, yes, yes, yes, yes, yes. Okay.

05 02 28 47 CC And, Dave and Jim. As you - as you drive away there, I was a little hasty on my time call. Mickey's big hand was actually over his head, and we're running about 30 minutes down now, but we're still looking good.

05 02 29 02 CDR-EVA Okay.

05 02 29 05 LMP-EVA Okay, we're moving - moving out again at about 7 - 8 clicks. Heading 180.

05 02 29 14 CDR-EVA Let's head up to - -

05 02 29 15 LMP-EVA We want about a 225.

05 02 29 18 CDR-EVA Yes.

05 02 29 19 LMP-EVA If we can just find -

05 02 29 33 LMP-EVA As we drive along, there's several craters 3 to 5 meters in diameter. There's one out at - a rather large one out at 1 o'clock to us now. We have a heading of 215. It looks fairly recent - there are a lot of angular blocks on the rim of it.

05 02 30 04 CC Jim, let me interrupt 1 second here. Can you confirm that your DAC is stopped?

05 02 30 14 LMP-EVA That what is stopped?

05 02 30 16 CC The 16-millimeter camera.

05 02 30 20 LMP-EVA Yes, it is stopped.

05 02 30 21 CC Thank you.

05 02 30 24 LMP-EVA Okay, Joe. We're -

05 02 30 25 CDR-EVA Careful. Here, let me. Boy, that's a nice fresh one. There's the - there's the answer to - Gosh. Bump! Sure hate to go by that one. Okay.

05 02 30 42 LMP-EVA Okay, if we don't find a better crater, that might be a better one to come by. You know?

05 02 30 45 CDR-EVA Yes.

05 02 30 46 LMP-EVA Don't find a fresher one?

05 02 30 47 CDR-EVA Yes, that's the freshest we've seen. It's a great one.

05 02 30 52 CC Approximate size, Dave.

05 02 30 53 LMP-EVA Oh, I see a - oh, there's a - another fresh one over there at about - 11 o'clock.

05 02 30 58 CDR-EVA Okay, it's about 20 - 25 meters across, and it looked like it excavated the bedrock; it had a very blocky ejecta blanket and blocky rims, and the ejecta blanket was about halfway out. Blocks on the order of about a foot and a half - at the largest. And some angular, some quadangular.

05 02 31 16 LMP-EVA Bet there's glass in the bottom of that one.  
05 02 31 17 CDR-EVA Yes, there sure is.  
05 02 31 19 LMP-EVA Yes, we're starting a slight upslope now.  
05 02 31 22 CC Roger.  
05 02 31 26 LMP-EVA As we approach the Front. And what a beautiful view looking up that slope.  
05 02 31 31 CDR-EVA Isn't that, and you can see the lineaments come down cutting across there can't you? Going from - Let's see; it's got to be northeast or southwest, huh? Okay, let's pick a - let's just head up the slope here.  
05 02 31 51 LMP-EVA It would be great if we could get up to that rather large - large mountain - I think that's too far away, Dave.  
05 02 31 57 CDR-EVA I do, too. Man, this is - this's getting - Ho, ho, ho - look at these here. Deep, subdued, but - -

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 01 04 47 CC Al, this is Houston. As spacecraft Endeavour swings majestically around the eastern limb of the Moon, all systems are GO.  
05 01 04 58 CMP Hey, I'm supposed to say that.  
05 01 05 00 CC Oh, okay.  
05 01 05 06 CMP See you on the other side, Karl.  
05 01 05 08 CC Righto, see you then.  
05 01 22 -- BEGIN LUNAR REV 23  
05 01 53 20 CC Endeavour, this is Houston. How do you read?  
05 01 55 32 CC Endeavour, this is Houston. How do you read? And, we seem to have a small comm problem. Please stand by.

05 01 55 51 CMP Houston, Endeavour is standing by. I'm reading you 5 square.

05 01 55 55 CC Roger. And, I'm reading you loud and clear, with a good bit of noise over the top of you.

05 01 56 04 CMP Roger.

05 02 02 10 CC Endeavour, this is Houston. We'd like you to go ahead and try acquisition of the high gain antenna with the angles in the Flight Plan.

05 02 02 25 CMP Roger, Houston. Stand by for 1 minute.

05 02 05 55 CC Endeavour, this is Houston. The information we have on your attitude indicates that you're a little bit off for those forward obliques. And, we'd like to see your NOUN 78, if possible.

05 02 06 09 CMP Okay. They were as per Flight Plan. In fact, Karl, I wanted to mention that to you. When I loaded NOUN 78 with plus 126.30 and plus 045.77, the computer came up with an angle, or an attitude of 149, 089, and 344.

05 02 06 41 CC We copy.

05 02 06 54 CMP Guess you better run that one through the mill down there again.

05 02 06 56 CC We're chewing on it.

05 02 07 51 CC Al, you may be interested to know that the Rover has crossed quite a bit of territory, now. And, they're on the edge of the rille, having a good look into it.

05 02 08 03 CMP Very good. The things seems to be working okay.

05 02 08 07 CC Roger. They'll be at Elbow corn - Crater in just a couple of minutes.

05 02 09 50 CC Endeavour, you can give us AUTO on the HIGH GAIN. And, Al, Vance is sitting beside me here. He's been downstairs talking to the PIs about the pan camera, and has some good words for you.

05 02 10 13 CMP Okay. Go ahead, Vance.

05 02 10 15 MCC Hey, morning, Al. Hey, first of all, Isi said to tell you that your - -

05 02 10 20 CMP Good morning, Vance. Hey, I'm - I'm looking at our favorite crater right now.

05 02 10 24 MCC Is that right? It couldn't be King Crater?

05 02 10 29 CMP Yes, sir. I'm right over Proclus, now. Proclus.

05 02 10 33 MCC Okay. Very good. Hey, Isi has a message for you.

05 02 10 43 CMP Very good, how's Isi?

05 02 10 44 MCC He's good. He says to tell you that you make a dandy spectrographer - for X-rays, that is. He's getting a lot of data in. I guess, actually, a little more activity than they expected, and they seemed real pleased about that.

05 02 11 04 CMP That's good. That ought to keep Pete and Jack busy.

05 02 11 07 MCC Getting into the pan camera. I don't know how much has been explained to you. It's - it's taking pictures - about 80 percent of them are good. And, the problems in the V over H sensor, which I'll try to explain here, briefly. The V over H sensor is drifting, which means that, occasionally, it drifts down to the - to the place where it thinks that - you're out of the 45- to 80-mile limit. Whenever it does that, why, it - the camera is commanded back to a nominal 60 setting. As it turns out, it drifts enough that it - it's out of this band most of the time. And that's actually good because you're at 60 miles, so it's - it's going back to the 60-mile limit, probably to give you 80 percent of the time good pictures. The fault - We're not quite sure where it is - ; people are working on that. It's probably either in the sensor or up-stream just a little ways in the electronics.

05 02 12 26 CMP Roger, Vance. I understand.

05 02 12 30 MCC And, other than that, Al, I haven't got much to report. The data seems to be coming in on all the experiments, and it's looking pretty good.

05 02 12 44 CMP Yes, I noticed just - some - some problems with getting the booms in and out, Vance; but, outside of that, everything seems to be okay. The mapping camera is taking about 4 and a half minutes to retract now. And, I had a little trouble getting the MASS SPEC in the last time, and I ran it out and in a couple of times, before it finally came all the way in.

05 02 13 04 MCC Roger. AUTO on HIGH GAIN.

05 02 13 11 CMP Roger. AUTO.

05 02 13 18 MCC And, Al. The next time you extend and retract the boom, they'd like a - a hack on it - and on the mapping camera, too, because, - Stand by. I'm sorry, they'd like hack - a time hack when you start extending the map - mapping camera and when it gets out, because they're looking at the current signatures and that sort of thing on it.

05 02 13 50 CMP Okay. They want to help me keep time, do they?

05 02 14 04 MCC We're just looking at the real-time electrical, both signatures, when this - this thing is working - extending and retracting, Al. And, we'd like to have a hack so we will know when you - when we can start looking.

05 02 14 21 CMP Okay, I understand, them then. You - you're watching the - the voltage levels or power levels in the motor that drives the extend - release.

05 02 14 31 MCC That's affirmative.

05 02 14 36 CMP Okay.

05 02 14 37 MCC Okay. Back to Karl.

05 02 14 42 CMP Okay, Vance.

05 02 17 54 CMP Houston, Endeavour.

- 05 02 17 58 CC Endeavour, go ahead.
- 05 02 18 04 CMP Okay, Karl. This may be the wrong attitude for what we want, but it's such good viewing attitude that - let me make a couple observations while we're here.
- 05 02 18 12 CC Great. We're listening.
- 05 02 18 17 CMP Okay. I'm right directly over Littrow at the present time. And, I can see all the way around - to the Apennine Front - encompassing all of Serenitatis between here and there - except to the north over by Posidonius. So, I got a very good view of Sulpicius Gallus - and that sort of extends off my 10 - 11, to 12 o'clock position. And the observation I wanted to make, in particular, was - the - the distinct way that the - that the rilles do follow the - the old mare basin. And, the fact that the second color band that we discussed in Littrow - seems to be continuous right on across the - the basin into Tranquillitatis and on around - almost a shelf - a continental shelf - appearance - on into the Sulpicius Gallus. And, that seems to be that second color band that we noticed in Littrow. There is a darker color - coloring - in the uplands in Littrow and closer to the - to the front or closer to the basin of - of Scarp. But the second band seems to go all the way around Sulpicius Gallus. And, then - as you follow Sulpicius Gallus on around a little bit more to the west, that color banding is still there. I can see a distinct boundary between it and the - and the Serenitatis Basin itself - inner basin - but it turned into little more brownish color from the gray color that we saw before.
- 05 02 20 08 CC Roger, Al. You're coming through loud and clear.
- 05 02 22 27 CMP Houston, Endeavour. Karl, I've got Hadley Rille in sight now in Front. Have a very commanding view of the whole countryside.
- 05 02 22 39 CC Beautiful. Any chance of spotting Rover tracks down there, do you think?



- 05 02 22 52 CMP Well, I got the binocular out and I'll let you know.
- 05 02 26 37 CC Al, while you're getting a beautiful view from up above, we just got a - some beautiful pan shots of Hadley's Rille and saw all sorts of blocks and bedrock sticking out of the rim of it.
- 05 02 26 53 CMP Roger, Karl. I can vouch for the rocks and the blocks in the bedrock in the rille. I can see it from here with a binocular. I didn't have much luck picking up the Rover. I think I got a - I think I got a look at the - at the IM again through the binocular - but I wasn't real sure.
- 05 02 27 10 CC Very good.
- 05 02 27 25 CC You must be just about over the area south of Archimedes, there, with all those sinuous and - and linear rilles. That's pretty choppy country, isn't it?
- 05 02 27 39 CMP Yes, that's affirmative. And that's right where I'm at now, just south of Archimedes and this - hummocky, hilly terrain south of Archimedes is, in fact, quite full of - of rilles, although they're very subdued rilles. They - they don't have much definition to them, even in this low Sun angle. But, they're combinations of linear rilles, which seem to run northwest, southeast and sinuous rilles, which have no particular direction. And then, I noticed a couple of rilles have - in fact - I'm looking at one right now. In this, we see a small crater pair just to the left of Archimedes and a real light feature running to the east out of it. And that rille feature has a - a series - a whole succession of - of craters run - running right down the rille.
- 05 02 28 38 CC Right down the rille. Any - any sort of blankets around these craters? Does it look like volcanic chain there coming out of the rille?
- 05 02 28 54 CMP Well, it certainly looks like a volcanic chain. Let me check and see if I can see any rims to them.

05 02 29 10 CMP No, I don't see any rim - rim deposits associated with them. In fact, the - the craters that I'm looking at are irregular in shape, elongate in direction of the rille, and they look distinctly like collapsed features in a lava tube.

05 02 29 30 CC Very interesting.

05 02 29 39 CMP They didn't seem to have any particular shape, except that they were elongate in the direction of the rille and I didn't notice any particular any - any buildup around the - the mountain. In fact, in this particular Sun angle, which is rather low, I didn't really see much elevation around them. So, I assume that they're depressional, kind of collapsed features, rather than buildup features of positive relief.

05 02 30 06 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 02 32 07 LMP-EVA Deep, but there's not much fresh ejecta around them.

05 02 32 10 CDR-EVA No. Man, steep slopes, that must be 30 degrees on the side. And a little old crater that couldn't be more than 10 meters across. We're heading for St. George, I think, huh?

05 02 32 23 LMP-EVA Yes. Now, there are some blocks now that look like they're a foot - angular blocks. They're - seem like they're on the surface, Dave. Look over there at 11:30 - 10 - 11 - 11:30.

05 02 32 40 CDR-EVA Yes, they are. Most of them have been buried at this time, and those seem like they're right on the - -

05 02 32 43 LMP-EVA Yes, they're right on the surface for some reason.

05 02 32 46 CDR-EVA Oh, that antenna fell down. Hey, Joe, we're going uphill pretty good. We're just ... - -

05 02 32 56 CC Roger, Dave. Copy. Your updated range at station 2 is about 3.9 clicks. And if you'll park down-Sun, we'll give you a NAV update when you're going back on.

05 02 33 10 CDR-EVA All righty.

05 02 33 12 LMP-EVA Hey, we're reading 3.8 right now - -

05 02 33 13 CC Must be getting close.

05 02 33 14 LMP-EVA - - ... 4.4; okay.

05 02 33 15 CDR-EVA ...

05 02 33 16 LMP-EVA That light - the light-colored one out there?

05 02 33 18 CDR-EVA Yes, sir.

05 02 33 19 LMP-EVA That'd be a good one. But it looks awful rough up there, doesn't it?

05 02 33 24 CDR-EVA Yes, and it - -

05 02 33 25 LMP-EVA Probably farther away, Dave, than we could go.

05 02 33 27 CDR-EVA Yes, we'll - we'll just keep mushing along here.

05 02 33 30 LMP-EVA There's a large block - looks like about a 5-footer out at 1 o'clock - angular block.

05 02 33 35 CDR-EVA Yes, you're right. Why don't we go there? It's - We're - you can tell we're going uphill.

05 02 33 43 LMP-EVA Yes, speed's dropped down to 7 clicks.

05 02 33 49 CDR-EVA Yes, if we just go straight over to that big one - -

05 02 33 51 LMP-EVA Yes, that's what we'll do - -

05 02 33 53 CC Sounds good to us. Any place that looks good to the two of you.

05 02 33 56 LMP-EVA - - ... to a big boulder.

05 02 33 57 CDR-EVA Well, it looks fairly straight - -

05 02 33 58 LMP-EVA Okay; we're going to a big block here, Joe. It's one we just can't afford to miss. What it is to look at a big block; we're going to look at a big block.

05 02 34 09 CDR-EVA It's the only big block I see anywhere.

05 02 34 11 LMP-EVA Yes.

05 02 34 12 CDR-EVA Hey, we could get to that fresh one, Jim - Jim. Hang on - hang on, digging in.

05 02 34 30 LMP-EVA Okay. Boy, this'll give them a view. Oh my.

05 02 34 33 CDR-EVA Yes, look there.

05 02 34 34 LMP-EVA What a view back into the rille.

05 02 34 35 CDR-EVA Ohhh, there's almost a view right into that crater.

05 02 34 40 LMP-EVA Glad you stopped short of it.

05 02 34 41 CDR-EVA (Laughter)

05 02 34 42 LMP-EVA - - Let's just stop here.

05 02 34 43 CDR-EVA Huh?

05 02 34 44 LMP-EVA Let's stop here?

05 02 34 45 CDR-EVA I got to go down-Sun just a minute. I want to back up just a tad. Okay; as far as we can -

05 02 34 55 CC And, Jim, as you look back, can you see the Rover tracks?

05 02 35 02 LMP-EVA Oh, stand by - -

05 02 35 04 CDR-EVA Yes, we could, Joe. I saw them when we stopped at the last stop.

05 02 35 08 CC Okay; good. Sounds like the old Hansel and Gretel trick will work.

05 02 35 16 CDR-EVA (Laughter) Yes, man.

05 02 35 20 LMP-EVA Okay.

05 02 35 21 CDR-EVA Move here, Jim; you can get off. You can try and get off.

05 02 35 27 LMP-EVA Made it.

05 02 35 29 CDR-EVA Okay, Joe; I'm going to give you the NAV updates, soon as Jim gets off.

05 02 35 33 CC Roger.

05 02 35 35 LMP-EVA I was going to give them some - Oh, you give it to him.

05 02 35 37 CDR-EVA I'll give it to him.

05 02 35 38 LMP-EVA Good.

05 02 35 39 CDR-EVA Let me go get the TV - -

05 02 35 40 LMP-EVA Okay, Joe. If you're ready to copy, here we go: 280, 017, 055, 039, 105, 110, 090, 090.

05 02 36 18 LMP-EVA Oh, me. You having trouble, too?

05 02 36 22 CDR-EVA Yes, man. Moving.

05 02 36 27 LMP-EVA And MOTOR TEMPS are both off scale, low.

05 02 36 30 CDR-EVA Oh, look back there, Jim! Look at that. Oh, look at that! Isn't that something? We're up on a slope, Joe, and we're looking back down into the valley and - -

05 02 36 39 LMP-EVA That's beautiful.

05 02 36 40 CDR-EVA - - That is spectacular!

05 02 36 48 LMP-EVA Get the antenna pointed here.

05 02 36 51 CC Okay, Jim. And could you give us a frame count - -

05 02 36 53 LMP-EVA ... I'm taking a pan.

05 02 36 54 CC - - when you finish your pan; and, Dave, we'd like one from you.

05 02 36 59 CDR-EVA Yes, sir.

05 02 37 02 CC And if you're still ne - near the Rover, we missed the HEADING and BEARING.

05 02 37 07 CDR-EVA Oh, I'll get you that, Joe.

05 02 37 09 LMP-EVA I'll do it, Dave. Okay. The HEADING - is 270; and the BEARING, 0.17.

05 02 37 27 CC Roger. And if the Rover's fairly level, we'll give you a NAV update - later on.

05 02 37 35 CDR-EVA Give - give him the readings to the Rover. Jim, give him the readings on the Rover.

05 02 37 39 LMP-EVA Okay.

05 02 37 49 LMP-EVA (Sneeze)

05 02 38 01 LMP-EVA Okay. The shadow is reading - 1 to the right. PITCH is 0.

05 02 38 25 LMP-EVA And ROLL is 8 degrees, right.

05 02 38 28 CC Okay, Jim; sounds good.

05 02 38 33 LMP-EVA Okay. Going to FM/TV.

05 02 38 34 CC Roger.

05 02 38 41 LMP-EVA Man, you all ought to have a great view this time.

05 02 38 44 CDR-EVA Okay, Jim; let's go sample this rock - -

05 02 38 46 CC Can hardly wait.

05 02 38 47 LMP-EVA Let me take a pan here, Dave.

05 02 38 48 CDR-EVA Okay; get your pan.

05 02 38 50 LMP-EVA This is unreal. The most beautiful thing I've ever seen.

05 02 39 21 CDR-EVA Yes, we're walking uphill, too!

05 02 39 23 LMP-EVA Is that ever uphill!

05 02 39 26 CDR-EVA There is one boulder! Very angular, very rough surface texture. Looks like it's partially - Well, it's got glass on one side of it with lots of bubbles, and they're about a centimeter across. And one corner of it has got all this glass covering on it; seems like there's a linear fracture through one side. It almost looks like that might be a contact; it is, within the rock. It looks like we have a - maybe a breccia on top of a - a crystalline rock. It's sort of covered with glass; I can't really tell, but I can see a - a definite linear feature through one side of it which is about a fifth, and the glass covers both sides of what I guess I'm calling a contact. And there's also, parallel to that contact, one surface, which is quite flat, only for about 8 inches or so. Looks like it's been chipped off. The boulder itself is on the order of about a meter across and maybe a - Gee, it looks like a half meter thick or so. It's got a fillet up one side, and the Earth side is in a shadow. I can't really tell whether - It doesn't look like it's filled. It's got a fillet on the down-slope side, and - the upslope side is - is open and free. As a matter of fact, it looks like it's almost excavated beneath it.

05 02 41 04 LMP-EVA It looks fairly recent, doesn't it, Dave?

05 02 41 07 CDR-EVA Yes, it sure does. It sure does, and I can see underneath the upslope side; whereas, on the down-slope side, it's piled up. Boy, that is really something.

05 02 41 17 LMP-EVA Hey, let's get some good pictures of that before we disturb it too much.

05 02 41 25 CC Roger, Dave and Jim - -

05 02 41 26 LMP-EVA Do you want a sample ...

05 02 41 28 CC - - See you crystal clear, and we've got a beautiful tally-ho on you and boulder on the TV. And it probably is fresh; probably - -

05 02 41 34 CDR-EVA Okay.

05 02 41 35 CC - - not older than 3 and a half billion years.

05 02 41 41 CDR-EVA Can you imagine that, Joe? Here sits this rock, and it's been here since before creatures roamed the sea in our little Earth.

05 02 41 54 CC Well said, Dave - -

05 02 41 55 CDR-EVA Hey, Jim.

05 02 41 56 LMP-EVA Yes.

05 02 41 57 CC - - well said.

05 02 41 58 CDR-EVA We ought to check the dust on the lens of these cameras.

05 02 42 04 CDR-EVA Man, this has just got to be impressive.

05 02 42 13 LMP-EVA Go up topside here and photo the other side of it.

05 02 42 26 CDR-EVA You get the down-Sun?

05 02 42 27 LMP-EVA Yes.

05 02 42 28 CDR-EVA Okay. Now, I think to not disturb things too much, let's try the fillet first. I'll get you a bag. And then we'll corner the rock.



05 02 42 48 LMP-EVA I'm stepping on a piece of glass, right by the  
tongs. I'll remember that.

05 02 42 52 CDR-EVA Watch your boot.

05 02 42 54 LMP-EVA Yes. See if I can get a bag out. Okay; 180.

05 02 43 01 CC Roger.

05 02 43 02 LMP-EVA For the fillet material. I'll get the fillet right  
here.

05 02 43 06 CDR-EVA Wait, wait. Before you do, let me poke a picture  
at it. Okay; go ahead.

05 02 43 14 LMP-EVA Little beads of glass in there in some places.

05 02 43 17 CDR-EVA Oh, I'm sorry, Jim.

05 02 43 20 LMP-EVA Ohhhhh. Got it.

05 02 43 24 CDR/LMP (Laughter)  
-EVA

05 02 43 26 CDR-EVA You know when you lean over downhill what happens?

05 02 43 33 LMP-EVA Get some more?

05 02 43 34 CDR-EVA Yes. Get some more.

05 02 43 49 CDR-EVA Okay. Now, let's get some typical soil, couple  
of feet away.

05 02 43 57 LMP-EVA Okay.

05 02 44 00 CDR-EVA Hey, you know what we're going to do when we get  
through with this thing, Joe? We're going to roll  
it over, and we're going to sample the soil beneath.

05 02 44 07 LMP-EVA Yes, I'll take it right out here by the gnomon.

05 02 44 09 CDR-EVA Yes; good idea. It hasn't been disturbed.

05 02 44 14 LMP-EVA Okay.

05 02 44 15 CC That a boy, Dave. That might fill a square for  
the football-size rock.

05 02 44 21 CDR-EVA (Laughter) Sure would.

05 02 44 25 LMP-EVA Okay. Get another one, if you can.

05 02 44 30 CDR-EVA Yes, you can't see with my shadow there very good, can you? Okay?

05 02 44 34 LMP-EVA Got it? That a boy.

05 02 44 37 CDR-EVA Okay; hang on to this one for a second.

05 02 44 41 LMP-EVA Okay; I got it.

05 02 44 42 CDR-EVA Okay; 181.

05 02 44 45 CC Roger; 181. And we have a view of the rille that is absolutely unearthy.

05 02 44 53 LMP-EVA Yes. Didn't we tell you?

05 02 44 54 CDR-EVA Give me your other bag, Jim; I'll put it in.

05 02 44 56 LMP-EVA Glad you can enjoy it with us. Yes, sir, Joe. Tell me this isn't worth doing, boy.

05 02 45 08 CDR-EVA Okay. Now we got the fillet, we got the soil; now we need to sample the rock.

05 02 45 13 LMP-EVA Yes.

05 02 45 14 CDR-EVA Let me get - Give me your hammer.

05 02 45 19 LMP-EVA Okay. I got it. Look at the vesicles in that rock.

05 02 45 22 CDR-EVA Those are glass bubbles.

05 02 45 24 LMP-EVA Glass bubbles; yes.

05 02 45 26 CDR-EVA Okay. Hey, listen; I want to get a closeup of that - that contact. Hold on to this a second, okay? Let me get my trusty tongs. As a matter of fact, if you'll pull the bag out, Jim, I'm going to get a quick selected sample here.

05 02 45 42 LMP-EVA Okay.

05 02 45 46 CDR-EVA I've got a little piece of glass right there. I can get up the hill to it. Think I can put that in there? See that beauty? Oh, I'll hold the hammer. Okay; don't want to drop that one. But not - Put in some soil.

05 02 46 26 LMP-EVA Huh? Here? Yes, I'll - -

05 02 46 28 CDR-EVA Grab some soil right there with the tongs; it'll stay. It seems to be fairly cohesive here. Look at that.

05 02 46 37 LMP-EVA You can even dig a trench. Got my big chance.

05 02 46 41 CC And, Dave and Jim, you might want to get some material from the top and under the upslope edge of the boulder.

05 02 46 50 CDR-EVA All right; we'll do that - We'll get it from under - Well, I'm going to roll the boulder over, and - I might even roll the boulder down the rille, Joe. I - I got a feeling here - We ought to do that.

05 02 47 03 LMP-EVA Okay. Let's see - we got those. Now, let's - let me get a closeup. Hold the hammer.

05 02 47 10 CDR-EVA Is my lens too dirty to use?

05 02 47 13 LMP-EVA I don't see any dust on it at all, Dave.

05 02 47 15 CDR-EVA Okay - -

05 02 47 16 LMP-EVA Looks good.

05 02 47 17 CDR-EVA - - ... The top is - -

05 02 47 18 LMP-EVA Yes. I know. The top of mine is covered with dust too.

05 02 47 21 CDR-EVA Okay; we'll take Gary's little formula here. See if we can't get a picture of that contact. Nice close picture for him.

05 02 47 34 CDR-EVA Right there. ... 10. Okay. I go on the other side. Doesn't that look like a contact to you, Jim?

05 02 47 47 LMP-EVA Yes. It does.

05 02 47 52 CDR-EVA Okay; right exactly there. Okay; I think that'll do it. Now your hammer. If we can't get - Oh, let me take a couple of after pictures before - -

05 02 48 10 LMP-EVA Do you want me to hold one of those?

05 02 48 12 CDR-EVA Yes. (Laughter)

05 02 48 17 LMP-EVA Seal the sample in your bag.

05 02 48 19 CDR-EVA Yes; good idea.

05 02 48 26 LMP-EVA Okay.

05 02 48 29 CDR-EVA After there, for the fillet. And after there, for the material around. Okay. Let's try the old hammer.

05 02 48 45 CDR-EVA Give me a couple of bags here, old buddy.

05 02 48 48 LMP-EVA Got them. Stand by.

05 02 49 01 CDR-EVA (Laughter) Man.

05 02 49 04 LMP-EVA Is that a good one?

05 02 49 05 CDR-EVA No.

05 02 49 06 LMP-EVA Pull hard.

05 02 49 07 CDR-EVA Oh, is that hard!

05 02 49 09 LMP-EVA Don't underrate it.

05 02 49 10 CDR-EVA Wowiee.

05 02 49 18 CDR-EVA Oh, oh.

05 02 49 19 LMP-EVA Hey, you're knocking off ... some fragments.

05 02 49 21 CDR-EVA Yes.

05 02 49 23 LMP-EVA Probably the best you're going to be able to do.

05 02 49 24 CDR-EVA After all that instruction I got - -

05 02 49 28 LMP-EVA Dave, I - I think, up on top here, if you hit it,  
it will break.

05 02 49 32 CDR-EVA Right here?

05 02 49 33 LMP-EVA Yes, right there. Yes. Yes, it's coming loose.

05 02 49 38 CDR-EVA Yes. There it is. I got it. Oh - oops. That's  
it, right there.

05 02 49 52 LMP-EVA Boy, that rock is really - ready to roll.

05 02 49 54 CDR-EVA There it is.

05 02 49 55 LMP-EVA Yes, good show.

05 02 49 57 CDR-EVA There's one - Let's get one down here -

05 02 50 00 LMP-EVA Yes, it is.

05 02 50 01 CDR-EVA Boy, you ought to see the down-Sun, down - Oh, look  
at underneath the rock! We got to roll it over and  
get some of that too. Underneath the rock is, looks  
like, either glass bubbles or vesicles; I can't tell  
which because it's in the shadow.

05 02 50 31 LMP-EVA Open it, Dave. Got your eye on it?

05 02 50 32 CDR-EVA Yes, I got it. Let me get one more.

05 02 50 36 LMP-EVA Watch it; I'll go up and get this one. Dark black,  
very fine grain basalt. By golly!

05 02 50 51 CDR-EVA You got your eye on that one?

05 02 50 52 LMP-EVA Yes.

05 02 50 53 CDR-EVA Well, are you going to pick it up or - -

05 02 50 56 LMP-EVA Yes, I'll get it. Here, let me get the tongs, and  
let's get those two. I was hoping I could get a  
larger frag here.

05 02 51 07 LMP-EVA What can I do? Whew. It's a hard one.

05 02 51 13 CDR-EVA Okay. Did you get it?

05 02 51 14 LMP-EVA Yes.

05 02 51 15 CDR-EVA Okay; that's - -

05 02 51 17 LMP-EVA How about the other one? I can get the other one, too, if you want.

05 02 51 19 CDR-EVA Yes; where is it?

05 02 51 20 LMP-EVA Huh? Both of them, you mean?

05 02 51 22 CDR-EVA Yes. Yes, but don't put them both in the same bag. Let's separate the bags. Here, give me that bag. I'll fold the bag up, and you get the other - here - Yes, I can - -

05 02 51 31 CC And, Dave, need a number off that bag.

05 02 51 33 CDR-EVA - - 160, Joe, is the ... for the - Yes, 160 is for the rock that's on the - or the chip off the corner uphill. I hope that makes some sense to you, but when you get the pictures back and it's the one that doesn't appear to have any phenos in it. It just looked like a fine-grained basalt, nonvesicular. Now the other one that Jim - Are you getting it? Here, let me hold the bag for you.

05 02 52 05 LMP-EVA How about doing a dumbbell - dumbbell fragment there beside it? You didn't knock that off, did you?

05 02 52 15 CDR-EVA The dumbbell frag beside it?

05 02 52 17 LMP-EVA Yes, hold the bag here. I'll show you what I mean.

05 02 52 18 CDR-EVA Okay. No, I think that fell off, Jim. That looks like the same kind of stuff.

05 02 52 26 LMP-EVA This one right here?

05 02 52 27 CDR-EVA Yes, it fell off when I hit, I guess.

05 02 52 28 LMP-EVA But I didn't see it fall off, though.

05 02 52 31 CDR-EVA I didn't either, but I don't think - -

05 02 52 32 LMP-EVA It looks like a different type of rock.

05 02 52 33 CDR-EVA It sure does. I'm sure it was there when we started.

05 02 52 38 LMP-EVA Okay; let me just look at that one.

05 02 52 40 CC Okay. Dave and Jim, we'd like you to finish this sampling and - -

05 02 52 43 LMP-EVA Got a lot of glass.

05 02 52 44 CC - - press on with your comprehensive sample, please.

05 02 52 49 CDR-EVA Okay.

05 02 52 51 LMP-EVA Lots of glass on it, but can't tell the inside too well.

05 02 53 05 LMP-EVA Okay; what number is that?

05 02 53 10 CDR-EVA 161.

05 02 53 11 CC Roger.

05 02 53 12 CDR-EVA Frag on the top of the rock.

05 02 53 14 CC Roger; copy.

05 02 53 19 CDR-EVA Okay. Let me put the hammer back.

05 02 53 27 LMP-EVA If you want, I'll go over and get the - We'll probably going to need the rake for the comprehensive - -

05 02 53 32 CDR-EVA Yes, why don't you go get the rake and let me - Let's see - I want to roll the rock over - -

05 02 53 39 CC Okay, Jim. If you walk back there, could you see - -

05 02 53 41 LMP-EVA I'll get the rake.

05 02 53 42 CC - - if we have a TV cable hung up on the LCRU someplace? We are having trouble commanding the - -

05 02 53 48 LMP-EVA Okay. Stand by.

05 02 53 49 CC - - direction of the TV.

05 02 53 50 CDR-EVA Yes, you do. I think the wire from the high-gain antenna has got your cable to the TV.

05 02 53 57 LMP-EVA Yes, I'll get it.

05 02 54 05 CC Roger. Could you give that unmanned vehicle a little help, please?

05 02 54 12 LMP-EVA Okay. Done.

05 02 54 35 CDR-EVA Okay; roll it over.

05 02 54 41 LMP-EVA Okay; get in there.

05 02 54 44 CDR-EVA Oh, me. It looks like a breccia.

05 02 54 47 LMP-EVA It sure is. The top layer is a breccia. You can see it. There, that baby's over.

05 02 55 08 LMP-EVA Those are my tongs. Do you want me to bring the other tongs?

05 02 55 13 CDR-EVA No, I can get them.

05 02 55 19 LMP-EVA (Laughter) I'm going to get them with the scoop.

05 02 55 23 CDR-EVA Yes.

05 02 55 27 LMP-EVA A couple of pictures, and we'll get some of that material underneath the rock.

05 02 55 50 CDR-EVA Oh, there's a great big glass bubble on that rock.

05 02 55 54 CC And, Dave, we're - -

05 02 55 57 LMP-EVA Okay.

05 02 55 58 CC - - getting a local vertical off the gnomon now.

05 02 56 01 CDR-EVA (Laughter) Hit her, Jim.

05 02 56 05 LMP-EVA Okay, I can - -

05 02 56 06 CDR-EVA Oh, no, no. Let me - let me pick it up again.

05 02 56 12 CC As soon as you finish this sample, we'd like for you to start on the comprehensive, and we need frame counts.



05 02 56 19 CDR-EVA Yes, we're starting. Jim, get a scoop of that underneath. Let me go around to the other side and get a picture.

05 02 56 30 LMP-EVA The underneath portion there?

05 02 56 31 CDR-EVA Yes.

05 02 56 32 LMP-EVA Okay.

05 02 56 48 CDR-EVA Okay; I got the pictures.

05 02 56 53 LMP-EVA The bag?

05 02 56 54 CDR-EVA Okay, let me get it; 182.

05 02 56 58 LMP-EVA Looks like pristine material, all right.

05 02 57 02 CC Roger.

05 02 57 06 LMP-EVA Okay; get me another one.

05 02 57 11 CDR-EVA You know, I can't get down to you.

05 02 57 12 LMP-EVA Give me another scoop, if you can. Just kicked a little in there, but that's all right. Gee - Good shot. Good shot. Okay; we're in business.

05 02 57 25 CDR-EVA Yes, why don't you - -

05 02 57 28 LMP-EVA Meantime, I'm going to configure here for a comprehensive.

05 02 57 32 CDR-EVA Yes.

05 02 58 15 LMP-EVA Dave, did you want to pick the site here?

05 02 58 17 CDR-EVA Yes, let me get the - the gnomon out here, and I'll - -

05 02 58 20 LMP-EVA Okay. Don't knock my scoop over.

05 02 58 21 CDR-EVA No. (Laughter)

05 02 58 23 LMP-EVA That's a good place to put it.

05 02 58 25 CDR-EVA On the bottom of the rock, Joe, it seems to be gray where there's no surface alteration, but there is

a surface covering. And in one portion, there's some glass and almost looks like slickenside across the glass, and it's about - 4 inches by 4 inches. And then there's - Oh my, one whole corner of that thing that's loaded with glass. That's just an unreal rock - -

- 05 02 58 49 CC Roger.
- 05 02 58 50 CDR-EVA - - Looks like a nice fresh place.
- 05 02 58 52 LMP-EVA Not but - here - right out here. Look good? Smooth?
- 05 02 59 02 CDR-EVA Think you ought to be able to do some raking there. Good rake?
- 05 02 59 16 LMP-EVA Okay; I have a fissure, cross-Sun.
- 05 02 59 24 CDR-EVA Now a down-Sun?
- 05 02 59 26 LMP-EVA Okay.
- 05 02 59 53 LMP-EVA Okay; I'm going to start to rake, Dave.
- 05 02 59 55 CDR-EVA Okay. Have at it.
- 05 03 00 17 CDR-EVA Okay. There's one swath - about a meter long.
- 05 03 00 20 LMP-EVA Help me take this - clip off. I can hold that. Okay.
- 05 03 00 31 CDR-EVA Anything at all?
- 05 03 00 33 LMP-EVA \*\*\* to dig deeper - -
- 05 03 00 35 CDR-EVA If you can. You've got two little frags - Well, that's better than nothing. Got a bag? It's number 186.
- 05 03 00 53 CC Roger.
- 05 03 00 55 CDR-EVA If I can get over there without falling down. Okay? Give another - -
- 05 03 01 01 LMP-EVA Try another couple swaths here - -

05 03 01 03 CDR-EVA - - Yes, just keep going across in that direction. That'll work. We're bound to get something.

05 03 01 09 CDR-EVA Joe, the soil is dark gray, and it's fine grain, and I haven't seen any difference in granularity between the LM and our position at all. It all looks about the same. It's fairly cohesive with very few fragments in it. Jim's getting about three or four with each scoopful - well, two or three.

05 03 01 36 CC Roger.

05 03 01 37 LMP-EVA I think our - Take one more swath here.

05 03 01 56 CDR-EVA Man, we are really up high. Rolling smooth hills as far as you can see. And on the - near side of the rille as we go down to - or up to the north, why, there seems to be quite a bit of debris, whereas in our present position near St. George, there is very little. It might be covered just with a downslope - -

05 03 02 25 LMP-EVA Yes.

05 03 02 26 CDR-EVA - - movement.

05 03 02 27 LMP-EVA Okay.

05 03 02 32 CC And, Dave, - -

05 03 02 33 CDR-EVA ... that's it.

05 03 02 34 CC - - We're hearing every word.

05 03 02 35 CDR-EVA Well, we don't have much for all that raking.

05 03 02 37 LMP-EVA Okay; why don't - Do you want another swath?

05 03 02 39 CDR-EVA Yes, let's take one more. That's about, I think, all we can do then. There's just not that much in there. Boots go in about an inch or so when you press on them. Packs it down nice and smooth. Guess you can see the dust jumping up as we walk. At the bottom of the rille over by, I would guess somewhere near the Twins - -

05 03 03 08 LMP-EVA Not a thing, Dave.

05 03 03 09 CDR-EVA - - Okay - -

05 03 03 10 LMP-EVA Let me take one more.

05 03 03 12 CDR-EVA Near the Twins I can see sever - several very large boulders. Very angular, and I guess when I say large, they must be 10 meters across. They're sort of unique in the bottom of the rille. In that particular area, the other ones look like they're half the size anyway. And there does seem to be quite a bit of debris up there along where the Twins are, up on the rim.

05 03 03 37 LMP-EVA Okay, Dave. That one was a little more fruitful - -

05 03 03 39 CDR-EVA Okay.

05 03 03 40 LMP-EVA - - Looks like about five or six.

05 03 03 41 CDR-EVA Okay; let's call it quits there - -

05 03 03 42 LMP-EVA Yes.

05 03 03 43 CDR-EVA - - and get some soil?

05 03 03 48 LMP-EVA Okay.

05 03 03 50 CC Dave and Jim, we're happy - -

05 03 03 52 LMP-EVA Yes. Okay to me - -

05 03 03 53 CC - - with this comprehensive sample.

05 03 03 56 CDR-EVA Okay. We'll press on to - We got documented samples. You want - We'll pick up a double core.

05 03 04 03 CC Right on.

05 03 04 04 LMP-EVA Do you want soil with that comprehensive?

05 03 04 06 CC Roger. One bag soil with the comprehensive, and then double core.

05 03 04 13 CDR-EVA Okay. Let me picture this here where my big foot went.

05 03 04 28 CDR-EVA Okay; I got it, Jim. You can get your soil.

05 03 04 32 CC And, Dave, could we get a bag number for the frag?

05 03 04 34 CDR-EVA Okay; 187.

05 03 04 37 CC Thank you.

05 03 04 38 LMP-EVA It must be 186. I've got 187 for the soil.

05 03 04 41 CC Roger. Agreed.

05 03 04 42 CDR-EVA Get another one.

05 03 04 48 LMP-EVA Okay.

05 03 04 50 CDR-EVA Good show. Here's a bag; here's a bag. Okay. If you can hold on to this little one, I'll roll up the big one.

05 03 04 57 LMP-EVA Okay.

05 03 04 59 CDR-EVA Okay; the next thing on the agenda is a double core.

05 03 05 02 LMP-EVA Yes. Okay; I'm going to go over and configure for it.

05 03 05 06 CDR-EVA Okay. Hey, Joe, we've got a crater that looks sort of fresh up here, oh, a hundred meters or so, looks like, with a fairly fresh rim. Would you like a double core on the rim of that, or would you like us just to pull it right here?

05 03 05 22 CC Stand by.

05 03 05 28 CDR-EVA There's a change in albedo on the rim; it's much lighter.

05 03 05 31 CC Roger, Dave. Drive the core right down through the rim.

05 03 05 37 CDR-EVA I thought you might say that. Okay. Take some of this stuff back, and we'll have to walk up there. But that won't take too long.

05 03 05 47 CC You were just checking up on us.

05 03 05 59 CDR-EVA Okay, Jim. You got everything you need? And I'll just come up there with you.

05 03 06 02 LMP-EVA Yes. Come on up here, and I'll get the cores up.

05 03 06 03 CDR-EVA Okay. Here we go. Head up to the crater. Think we can get there without any trouble?

05 03 06 09 LMP-EVA This one right here, you mean?

05 03 06 11 CDR-EVA No, I was thinking of Bright One. The - -

05 03 06 14 LMP-EVA That'll probably take a good 5 minutes to get up there.

05 03 06 16 CDR-EVA Yes, you're right. I guess - Well, we'd be pushing it.

05 03 06 22 LMP-EVA Yes.

05 03 06 23 CDR-EVA Joe, I guess we'd take 5 minutes to get up there. What do you think?

05 03 06 27 CC Negative. Drive the core where else you think might be convenient.

05 03 06 34 CDR-EVA Oh, we've got a good place here. We've got a fairly deep crater; it must be about 10 meters across, and a meter and a half or so deep, and we'll pick the rim of that - There's a fresh impact crater in - in the rim anyway, which looks like it pulled out some - -

05 03 06 54 LMP-EVA Let me get it.

05 03 06 55 CDR-EVA Is that a good enough place for you, Jim, right here?

05 03 06 56 LMP-EVA Sure is, Dave.

05 03 06 58 CDR-EVA Okay.

05 03 06 59 LMP-EVA I wouldn't want to go up much farther on this slope. It's too hard to get up.

05 03 07 01 CDR-EVA It sure is, isn't it?

05 03 07 02 LMP-EVA You're right ... kicking too much.

05 03 07 05 LMP-EVA Whew. Whew. Well.

05 03 07 24 CDR-EVA Okay. Let's give it a double core here. Bet we get a deep double core. Hey, Jim.

05 03 07 32 LMP-EVA Huh?

05 03 07 33 CDR-EVA Oh, you - here let me - Why don't you turn around this way?

05 03 07 37 LMP-EVA Here, I'll - I was just going to grab the cores. I was going to take a location shot.

05 03 07 39 CDR-EVA Oh, okay.

05 03 07 43 CDR-EVA I think you'll get location.

05 03 07 45 LMP-EVA Hold that for me while I get the cores out. Okay?

05 03 08 04 LMP-EVA Okay, Dave. If you'll hold - -

05 03 08 06 CDR-EVA Okay.

05 03 08 07 LMP-EVA - - the lower one while I get the upper one in.

05 03 08 08 CDR-EVA Roger.

05 03 08 11 LMP-EVA Extension handle.

05 03 08 20 CDR-EVA Hey, Joe, the boulder we just sampled is the only one of its size anywhere to be seen. There's a fairly fresh crater up a little ways, maybe another half a kilometer or so, but - -

05 03 08 33 LMP-EVA ... ring off, will you, Dave? We've got to screw that off.

05 03 08 39 LMP-EVA Save that part.

05 03 08 40 CDR-EVA (Laughter) Yes. They might want that, huh?

05 03 08 54 CDR-EVA Okay; here's your hammer in your left hand, Jim. There you go. Get over here, and we'll get some photography of this.

05 03 09 05 LMP-EVA Oh!

05 03 09 07 CDR-EVA Get on the other side, yes.

05 03 09 09 LMP-EVA Do you - you push it in from the uphill side?

05 03 09 11 CDR-EVA Yes.

05 03 09 15 CC And, Dave and Jim, as you're getting a double core for us there, we'll be wanting to leave the station in about 10 to 15 minutes. We'd like only the big camera photograph following this. I think we're in good shape on everything else.

05 03 09 32 CDR-EVA Okay, Joe. Is that as far as you can push it, Jim?

05 03 09 35 LMP-EVA That's as far as I can push it. I got the picture; go ahead.

05 03 09 39 CDR-EVA Okay. It's a - We've got one full core, second core is going in about 2 inches per hammer stroke.

05 03 09 45 CC Roger.

05 03 09 46 CDR-EVA And we've got almost a second core. Got another couple of inches to go, Jim. Doing good.

05 03 09 55 CC Jim, you're an iron man.

05 03 09 57 CDR-EVA Don't smash your finger.

05 03 10 00 LMP-EVA Ought to bomb this.

05 03 10 03 CDR-EVA Okay; that's good, men. All the way in. Good show.

05 03 10 07 LMP-EVA Okay. Let me come up to the hill there. I got the picture.

05 03 10 13 CDR-EVA Okay. Pull it out very gently. Nice. Nice. Easy does it. That's nice. Coming out very clean. Looks clean. Hold it steady. Got a good one. Okay. Come on over this way a little. Cap for it. Oh, it looks like we have some dings on the cap. Okay.

05 03 10 51 LMP-EVA Give me the cap. I'll put it on, Dave.

05 03 10 52 CDR-EVA Okay. Good idea.



05 03 11 03 CDR-EVA Okay. Break it and I got the oth - Oh, you're going to ram it first. Roger on her. Let me put your hammer away.

05 03 11 18 CDR-EVA Okay.

05 03 11 19 LMP-EVA Rammer out.

05 03 11 21 CDR-EVA Okay; why don't you just hold it? Okay. Okay. Does it feel pretty hard?

05 03 11 32 LMP-EVA Yes.

05 03 11 35 CDR-EVA Okay. Rammer went in about 6 inches.

05 03 11 42 LMP-EVA Okay. Here, hold this and I'll break the ... I'll try to break it.

05 03 11 54 CDR-EVA That a boy. Easy does it.

05 03 12 01 CC And, Dave, we're standing by for a number on the core.

05 03 12 06 CDR-EVA Yes, the top one is 03, Joe.

05 03 12 14 CC Roger.

05 03 12 15 LMP-EVA Oh.

05 03 12 16 CDR-EVA Don't lose the core!

05 03 12 17 LMP-EVA Move the core. Here's your cap back. Can you get it, Dave?

05 03 12 21 CDR-EVA Yes, I'll get another one. Don't sweat the caps; we got beaucoup caps.

05 03 12 27 LMP-EVA Okay.

05 03 12 36 CDR-EVA Okay, I'll let you - God bless it! Don't lose the core!

05 03 12 44 LMP-EVA You can hold this one, and I'll put the cap on the bottom one.

05 03 12 49 CDR-EVA They're new caps. You know, they're a lot harder to get on.

05 03 12 54 LMP-EVA ... those before. Give Joe the numbers on - -

05 03 13 01 CDR-EVA Yes. I gave him the top one. I can't see the two at - The bottom's too dirty.

05 03 13 07 LMP-EVA Rub it off when you get going there.

05 03 13 09 CC No problem on the bottom one, Dave. We know that.

05 03 13 18 LMP-EVA Okay, Dave. Let me give you this.

05 03 13 22 CDR-EVA Okay.

05 03 13 23 LMP-EVA I'll put this in your pack. I've got to ram it.

05 03 13 28 CDR-EVA None of that.

05 03 13 30 LMP-EVA Got all sorts of little goodies to do. Okay; turn right so I can get the rammer.

05 03 13 42 CDR-EVA Okay; it's rammed. Okay.

05 03 13 45 LMP-EVA Hey, the - <sup>pack</sup> the core - You can put the one that you got in my ~~back~~. Okay. Now try and recover those caps?

05 03 13 53 CC Yes, Jim. If you could with the tongs, we'd like it back.

05 03 13 59 LMP-EVA Yes. I'll try.

05 03 14 01 CDR-EVA Yes. Those new caps, Joe, with the metal band on them will sure stay on a lot better - -

05 03 14 05 LMP-EVA Okay; another one - Yes, hold the core.

05 03 14 09 CDR-EVA Okay.

05 03 14 11 CDR-EVA Can't even see them in ... --

05 03 14 12 CC Roger. Understand.

05 03 14 14 LMP-EVA They're right here, Dave.

05 03 14 16 CDR-EVA Damn.

05 03 14 17 LMP-EVA Right under here. I can see the edge of it.

05 03 14 20 CDR-EVA Do I need the tongs?

05 03 14 22 LMP-EVA Yes, I'll go get them. Just a minute. Bow down.

05 03 14 32 CDR-EVA Oh, I dig in pretty deep.

05 03 14 36 CC And, Jim, we'd like a stereo pan with your 70-millimeter camera. Maybe now is a good time to get it. Or wherever you think is just - -

05 03 14 47 CDR-EVA Okay. Look at his hands - look at his hands, Joe. You figure he could take a picture? (Laughter)

05 03 14 54 LMP-EVA Okay, partner. Where are they?

05 03 14 57 CDR-EVA Right in here.

05 03 15 01 LMP-EVA Oh, yes. Here, hold this. I'll put it on.

05 03 15 07 CDR-EVA Okay.

05 03 15 09 LMP-EVA Okay. I've got it.

05 03 15 23 LMP-EVA Okay. What numb ... - oh - -

05 03 15 25 CDR-EVA Did you get the number of the other one?

05 03 15 27 LMP-EVA What number is that one?

05 03 15 29 CDR-EVA This is 3.

05 03 15 30 LMP-EVA Okay.

05 03 15 31 CC Roger.

05 03 15 32 LMP-EVA Know what the other one was?

05 03 15 33 CDR-EVA I can call Joe when we up - unload that.

05 03 15 36 LMP-EVA Okay.

05 03 15 37 CDR-EVA I can look it up - -

05 03 15 38 CC We can take it later, Jim. That's good.

05 03 15 40 LMP-EVA It's the middle one in that - that - Dave's sample bag.

05 03 15 45 Roger. That's good enough.

05 03 15 47 LMP-EVA Okay. Hold this and let me put the core tube cap back.

05 03 16 03 CDR-EVA Okay. Why don't you get your stereo pan, and I'll get the big camera out. I can get ... back.

05 03 16 17 LMP-EVA Boy, I just hope there's not any dust on the lens.

05 03 16 20 CDR-EVA Didn't look bad, Jim. I just looked at it.

05 03 16 21 LMP-EVA Okay.

05 03 16 25 CDR-EVA Don't forget the rake and that other sample on the boulder.

05 03 16 28 LMP-EVA Yes.

05 03 16 34 CC And, Dave, we see you're carrying the ignition - the ignition key there for the Rover.

05 03 16 41 CDR-EVA (Laughter) That's right; that little blue thing?

05 03 16 51 LMP-EVA Hey, that gnomon is pretty dirty, unfortunately, Joe. Just no way to keep that color chart clean with all this dust.

05 03 16 59 CC Roger.

05 03 17 12 LMP-EVA Going to have a little moving base on that pass.

05 03 17 15 CC Roger, Jim - -

05 03 17 16 LMP-EVA I was trying to get us a few still ones.

05 03 17 17 CC - - no problem.

05 03 17 19 LMP-EVA You know, a burnt picture isn't much good.

05 03 17 37 LMP-EVA Okay.

05 03 17 43 CDR-EVA Take off the lens - cap.

05 03 17 47 LMP-EVA ...

05 03 17 57 CDR-EVA Five hundred. Okay. Okay, Joe, I'm going to give you - Looks like I got some pretty good contrast looking

up to the northwest. I'll give you the far side of the rille - the vertical and the horizontal. And I'll use a - let's see - -

05 03 18 20 CC Sounds good, Dave. And we'd like about 2 minutes' worth of pictures and then think about leaving.

05 03 18 27 CDR-EVA Okay. How's a 250th and a 8th look to you.

05 03 18 38 CC Sounds good.

05 03 18 43 CDR-EVA Okay.

05 03 19 35 CDR-EVA Okay; the first horizontal strip, Joe, is on the upper layer - not layer - upper region - of the far side. I can't really see our A, B, C, D that we thought we might see.

05 03 19 50 CC Roger.

05 03 20 06 CDR-EVA Okay. And then about one-third of the way down - and there's a nice, big, very interesting outcrop over there, which looks like vertical jointing in a big block, with a horizontal layer on the top; the block must be, oh, 2 percent of the rille height and it must be about the - oh, twice that across, with the layer maybe one-quarter of the height of the block, and I got a 500 of that. I'll also take you a 500 vertical in the same area.

05 03 20 51 CC Roger, Dave. And we're interested in your climbing aboard now and start back towards the LM. We're going to eliminate station 3.

05 03 21 01 CDR-EVA Okay.

05 03 21 18 LMP-EVA The camera count on Dave's camera is 54, Joe.

05 03 21 21 CC Thank you, Jim. Good call.

05 03 21 27 LMP-EVA And the camera count on the 500 is 61.

05 03 21 31 CC Roger.

05 03 21 35 LMP-EVA Maybe you can see mine, Dave.

05 03 21 37 CDR-EVA Yes, I'll look.

05 03 21 40 LMP-EVA When you come over to strap me in - -

05 03 21 41 CDR-EVA Yes.

05 03 21 42 LMP-EVA - - maybe you can put these - -

05 03 21 43 CDR-EVA I'll check.

05 03 21 44 LMP-EVA - - put these samples in - -

05 03 21 45 CDR-EVA I will.

05 03 21 46 LMP-EVA - - my bag.

05 03 21 48 CDR-EVA I'll do that. Okay.

05 03 22 01 CDR-EVA Tidy the Rover up. Ready for another little drive.

05 03 22 15 CDR-EVA Did you get your rake?

05 03 22 16 LMP-EVA Yes.

05 03 22 17 CDR-EVA Okay; hop on.

05 03 22 28 CDR-EVA (Laughter) Up a little bit. That a boy. Now you're in. That's a good position.

05 03 22 34 LMP-EVA Okay; let me get the MAGs in your bag.

05 03 22 41 LMP-EVA ... Okay. Cover's closed. Belt.

05 03 22 57 CC And, Jim, while you're climbing in there, what's your heading?

05 03 23 03 LMP-EVA Heading 270 - 280, Joe.

05 03 23 08 CC Roger. It's rock steady.

05 03 23 13 CDR-EVA Okay; 115 on Jim's camera.

05 03 23 22 CC Roger, Dave. Thank you.

05 03 23 23 LMP-EVA And we got to roll that ... - -

05 03 23 24 CC And we suggest you just follow your navigation system home.

05 03 23 31 CDR-EVA That's a good idea. I was going to say we might try that just to see how she works.

05 03 23 35 CC That's exactly our thinking.

05 03 23 36 CDR-EVA Could be a problem finding home.

05 03 23 48 CDR-EVA Oh, I caught that seatbelt - There's a cannon plug right down there on the floor.

05 03 23 53 LMP-EVA Here let me - -

05 03 23 54 CDR-EVA No, you can't do a thing. I have to get off - and unhook it from this cannon plug down here.

05 03 24 01 LMP-EVA Hand the seatbelt to me. I'll hand it to you when you get off.

05 03 24 03 CDR-EVA Okay. ... - -

05 03 24 04 CC And, Dave, you're turning our TV off now, I guess.

05 03 24 14 CC Dave, this is Houston - -

05 03 24 15 LMP-EVA Okay, now keep holding it there.

05 03 24 16 CDR-EVA Yes.

05 03 24 17 CC - - We assume you're going to turn our TV off shortly.

05 03 24 19 CDR-EVA Yes, sir. Yes, sir. Thank you, Joe.

05 03 24 46 LMP-EVA Okay, Joe; you're going PML/WB.

05 03 24 51 CC Roger.

05 03 24 53 LMP-EVA Quite a little dust on that ... surface, isn't there?

05 03 24 57 CDR-EVA Yes.

05 03 25 16 LMP-EVA Okay, buddy, and there you go.

05 03 25 36 LMP-EVA Okay; strapped in.

05 03 25 45 CDR-EVA PRIMARY; STEERING to BUS Delta on the rear, and nothing on the front, DRIVE POWER is ON. DRIVE

ENABLEs are both squared away. Sun shadow device is stowed. And we're ready to go. Are you all strapped in?

- 05 03 25 58 LMP-EVA All strapped in. You did it.
- 05 03 26 02 CDR-EVA Okay; here we go; rolling again. Okay; we'll try getting home on the NAV system here. Oh, look at that big fresh one in the side of the rim. ... that - that stereo pan, so we're right up - -
- 05 03 26 20 LMP-EVA Got to make a - ... go downslope too much.
- 05 03 26 24 CDR-EVA I'm not. I'm going slow. I'll cut back over here.
- 05 03 26 28 LMP-EVA Yes. Easy does it.
- 05 03 26 40 CDR-EVA Looks like it takes us right back the way we came, doesn't it?
- 05 03 26 45 LMP-EVA Yes, that's the ... Well, we're going to have to go to the right to go around Elbow.
- 05 03 26 50 CDR-EVA Oh, yes; I suggested that we could go to the left, but I guess we don't want to do that.
- 05 03 26 53 LMP-EVA I don't think we'd better try it, Dave.
- 05 03 26 55 CDR-EVA (Laughter) That's a neat place down into the rille though, isn't it?
- 05 03 27 01 LMP-EVA See the way it comes back?
- 05 03 27 02 CC Roger, Dave and Jim.
- 05 03 27 03 CDR-EVA ... down into the rille, Joe, ... would like - -
- 05 03 27 04 CC - - we'd rather that you don't take that option.
- 05 03 27 07 CDR-EVA (Laughter) Okay. And if anybody ever comes back, Joe, and wants to go down into the rille, have them come talk to us, because there's a good place to do it here.
- 05 03 27 16 CC Roger. We'll suggest that.
- 05 03 27 23 CDR-EVA Okay; we're moving at about 5 clicks. And the slope - I'd guess about 6 - 6 or 7 degrees on going cross-slope.



05 03 27 34 LMP-EVA Whooeel

05 03 27 35 CDR-EVA I'm going to go down this way.

05 03 27 37 LMP-EVA Yes, we better go down to - -

05 03 27 38 CDR-EVA Yes.

05 03 27 39 LMP-EVA - - a slope that's not quite as steep. I didn't realize we'd gone up so high.

05 03 27 43 CDR-EVA Oh, looking back, man, we - we really climbed it. Okay; we're moving downslope now.

05 03 27 57 CDR-EVA Come back up here.

05 03 28 04 LMP-EVA Yes, we know our tracks are to the right of us.

05 03 28 07 CDR-EVA Yes, we're in good shape. Heading right toward Mount Hadley.

05 03 28 13 CC Roger, Dave - -

05 03 28 15 CDR-EVA What a checkpoint.

05 03 28 16 LMP-EVA Yes. ...

05 03 28 17 CC - - any idea of whether you can see the LM or not?

05 03 28 21 CDR-EVA Well, Joe. I took a look when we were up there, and I couldn't see it.

05 03 28 25 CC Roger. Sounds reasonable. And if you cross over Rover tracks, Dave, we'd like a depth estimation of them, please.

05 03 28 39 CDR-EVA (Laughter) Okay. I hope we do, Joe.

05 03 28 45 LMP-EVA Hang on. Yo, oh, hang on!

05 03 28 47 CC Oh, mercy, yes (laughter).

05 03 28 49 CDR/LMP- (Laughter).  
EVA

05 03 28 55 LMP-EVA Better go easy downhill, huh?

05 03 28 57 CDR-EVA I - I'd say so (laughter).

05 03 28 59 CC It's uphill from here on in.

05 03 29 00 CDR-EVA ... though, is it?

05 03 29 06 CDR-EVA (Laughter) That's what you think, Joe. There's a hill we have to climb here. You just - you can't go fast downhill in this thing, because if you try and turn with the front wheels locked up like that, they - they dig in and the rear end breaks away, and around to go; and we just did a 180.

05 03 29 28 CC Dave - -

05 03 29 29 CDR-EVA Strictly up ... skiing.

05 03 29 30 CC Tell Jim it must be that powdered material on the slope there.

05 03 29 36 CDR-EVA (Laughter) Yes. Yes. We just did a christy. Okay; we're down - It's fairly level now and we're going to start upslope but we're on - just about on the south rim of Elbow.

05 03 29 54 CC Roger.

05 03 30 00 LMP-EVA (Laughter) What a ride.

05 03 30 05 CC Jim, that's probably the first christy - -

05 03 30 06 CDR-EVA If we get back up here - -

05 03 30 07 CC - - you've ever managed.

05 03 30 08 CDR-EVA - - Rover'll be able to make it.

05 03 30 12 LMP-EVA (Laughter) Just sitting still, huh?

05 03 30 20 CDR-EVA Okay; now we're going.

05 03 30 24 LMP-EVA Yes, now we're up to 9 clicks; you have to swing to the right here, Dave, whenever you can.

05 03 30 31 CDR-EVA Yes.

05 03 30 33 LMP-EVA We want to get up on the ridge line here.

05 03 30 34 CDR-EVA Yes.

05 03 30 35 LMP-EVA And also stay away from up - Sun - that - -

05 03 30 37 CDR-EVA Yes.

05 03 30 44 LMP-EVA There now - we're - Now we're cooking.

05 03 30 47 CDR-EVA Up-Sun isn't too bad though, you know? There's a lot more definition than straight down-Sun. I don't think we'll have any trouble driving up-Sun, because the craters seem to show up pretty well. Have you noticed here on Elbow, it seems like there's a very subtle bench on the southern side?

05 03 31 03 LMP-EVA Yes, I kind of got the idea there were several subtle benches in the downslope - a - particularly on that - on the eastern wall.

05 03 31 13 CDR-EVA Yes.

05 03 31 14 LMP-EVA On the wall.

05 03 31 15 CDR-EVA Oh, there's a big boulder. We just crossed over a buried rounded boulder. Must've been a meter and a half across, with - Of course, it's all gray - -

05 03 31 24 LMP-EVA Gets pretty rough up ahead, Dave.

05 03 31 25 CDR-EVA Yeah, man. No kidding. Lots of debris. There! Some Rover tracks. How about that? Yes, here they are. Somebody else has been here.

05 03 31 40 LMP-EVA Somebody else has been here.

05 03 31 41 CDR-EVA Yes, you know they really don't sink in very far.

05 03 31 43 LMP-EVA No, they don't.

05 03 31 44 CDR-EVA I'd say less than a half an inch, if that, but they're here.

05 03 31 47 LMP-EVA They're here.

05 03 31 49 CC Roger.

05 03 31 50 LMP-EVA Maybe you can find a smoother way home. (Laughter)

05 03 31 53 CDR-EVA I'm going to do the NAV system here, once we get squared away and get out of the hole. Incidentally, Joe, I don't think we saw any indication of flows or a slide or anything coming off of Hadley Delta there. I - I didn't see anything that looked like a change in granularity or - any subtle - scarps of any sort. Did you notice any, Jim?

05 03 32 19 LMP-EVA No. ... - -

05 03 32 20 CC Roger. Dave, that's exactly the picture we built from your verbal description there and that's the reason - one of the reasons we're going to omit station 3. We think that there probably is not at least a sharp debris flow down the side.

05 03 32 37 CDR-EVA Yes, okay. I think that's a good decision. I don't think we're going to find much more over there than we've already found.

05 03 32 42 LMP-EVA You know, looking out to the east now, Dave, I see some little very subtle ridges. I think they're ridges rather than craters. And it's probably - Well, it's out toward the secondary crater cluster.

05 03 32 56 CDR-EVA Yes.

05 03 32 57 CC ... cluster, Jim, sounds reasonable.

05 03 33 04 CDR-EVA Okay, bearing 11 for a 3.3 kilometers. We'll see you on that - -

05 03 33 09 CC Right on.

05 03 33 15 CDR-EVA Hey, here's some footprints, Jim.

05 03 33 16 LMP-EVA Ha, how about that.

05 03 33 18 CDR-EVA Hey, see that white albedo I kicked up over there?

05 03 33 20 LMP-EVA Yes.

05 03 33 21 CDR-EVA Gosh, I sure wish we had more time to sample.

05 03 33 25 LMP-EVA I think I see the - I see something reflecting over there. I think that's the IM.

05 03 33 29 CDR-EVA Sure is. See the reflection?

05 03 33 30 LMP-EVA See the reflection of it at 12 o'clock?

05 03 33 35 CDR-EVA Yes. Yes.

05 03 33 36 LMP-EVA Yes, we see it, Joe.

05 03 33 39 CDR-EVA Sure do. And we're heading right straight for it on a bearing of 11 degrees (laughter), except for the wanders through the craters.

05 03 33 52 CDR-EVA Boy, I'll tell you, Joe, this is a super way to travel; nice and cool - uphill without any strain. This is great.

05 03 34 00 CC Yes, sir.

05 03 34 10 CDR-EVA And it's easy to drive; no problem at all. Just have to be careful because of the locked front wheels, but other than that, very responsive. I can put the throttle right up to the stop or at some intermediate position, and take my hand off - and rest my hand; if I want to go left or right, I just put a little pressure until I get the angle I want and then let it off and we recenter on the steering. It's - really neat, even with the locked front wheels.

05 03 34 44 CC Sounds mighty smooth, Dave. And we're still working on your front wheel problem. We may have them back before you know it.

05 03 34 53 CDR-EVA Okay; I'd like to try it that way, too.

05 03 34 56 LMP-EVA Looking over to the east, Dave, I see a very large crater, and it could very well be - -

05 03 35 01 CDR-EVA Could it be Dune?

05 03 35 03 LMP-EVA No, it's probably too close to be Dune.

05 03 35 05 CDR-EVA Yes.

05 03 35 06 LMP-EVA Maybe it's Fifty-four.

05 03 35 08 CDR-EVA Yes, it could be.

05 03 35 09 LMP-EVA I think it's Fifty-four. .

05 03 35 10 CDR-EVA You see it?

05 03 35 11 LMP-EVA Yes.

05 03 35 12 CDR-EVA Good for you! Fifty-four's on the Moon.

05 03 35 16 CC All right.

05 03 35 23 CDR-EVA Hey, look at this rock right on the sur - Hey, you know, see that one on the surface there?

05 03 35 27 LMP-EVA No.

05 03 35 28 CDR-EVA I'll bet you - I wouldn't be surprised if it didn't come from that crater. Too bad we can't stop. There's a rock that was sort of rounded, but had a rough surface texture to it, about a half a meter in size, and it was about 10 meters downstream from a nice fresh crater that had a lot of angular debris in the bottom and the walls.

05 03 35 54 CDR-EVA There are a lot of little craters around here - little being less than a meter - which are very rough, have a lot of debris - right up to the rim and over the top side of the rim, and no ejecta blanket to speak of, but the whole inside of the wall - take a half a meter crater and it's filled with angular, gray, fragmental debris on the order of inch size - or less, very uniformly distributed, fairly well sorted. Like - maybe they came - maybe the debris is from one of our Aristillus or Autolytus friends. And there's a lot of it, so I think we'll have a chance to get it later on.

05 03 36 53 CDR-EVA They're rather shallow craters, too. Let's say that they're only about - oh - 1 to 6. Hang on, Jim.

05 03 37 07 LMP-EVA Yes, look at - There's a large flat rock over at 1 o'clock.

05 03 37 11 CDR-EVA Yes.

05 03 37 12 LMP-EVA That's several large rocks there.

05 03 37 13 CDR-EVA Yes.

05 03 37 14 LMP-EVA Must be 5 feet in diameter.

05 03 37 16 CDR-EVA Right.

05 03 37 18 LMP-EVA Concentration in this one area - and then there's a large one down in the pit of that subdued crater.

05 03 37 26 CDR-EVA How we doing on time there, Houston?

05 03 37 32 CC Stand by.

05 03 37 36 CDR-EVA Ooh, look at that - ooh, oh! Look at that one. It had - It almost looked like pahoehoe, didn't it?

05 03 37 43 LMP-EVA Yes.

05 03 37 44 CDR-EVA Did you see that one? Oh, my! How we doing on time, Joe?

05 03 37 46 CC Dave, you'll be about 20 minutes down from the original plan when you get back to the LM.

05 03 37 57 CDR-EVA Okay.

05 03 37 58 CC We're not in bad shape at all. It's looking real fine.

05 03 38 04 CDR-EVA Okay.

05 03 38 06 CC And we may be in better shape when you arrive there.

05 03 38 11 CDR-EVA Okay; we'll see how we do. Oops! Hang on, buddy.

05 03 38 18 LMP-EVA Yes.

05 03 38 19 CDR-EVA Every once in a while, when one of the steering wheels comes off the ground - due to bumping in a crater, and we get a side force, why, the rear end will break out, because we've lost our directional control.

05 03 38 33 LMP-EVA Dave, could you comment on the - the horizontal bedding in - in Hadley - looking out the foot of Hadley, that spur that comes out - -

05 03 38 40 CDR-EVA No, no.

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05 03 38 41 LMP-EVA - - out northwest.

05 03 38 42 CDR-EVA The lineations across there?

05 03 38 44 LMP-EVA Yes. The horizontal.

05 03 38 46 CDR-EVA Yes. There are two or three of them right at the base.

05 03 38 47 LMP-EVA Yes.

05 03 38 48 CDR-EVA I didn't see those yesterday. It was all in the shadow.

05 03 38 50 LMP-EVA Yes. Joe, there's definitely a horizontal - a horizontal pattern in the spur of Hadley.

05 03 39 00 CDR-EVA Oh! Hang on.

05 03 39 06 LMP-EVA Just at the base.

05 03 39 07 CC Roger.

05 03 39 08 CDR-EVA Oh shoot, it really gets bumpy.

05 03 39 09 LMP-EVA And then as you go up above that - and, again, that's - maybe only 10, 15 percent of that particular exposure of the spur, then there's a definitely linear pattern that looks like it dips 30 degrees to the west. How come we stopped?

05 03 39 32 CDR-EVA I got to put my seatbelt on.

05 03 39 42 CC Dave, stand by for mark when you start. Help us on our speed calculations.

05 03 39 49 CDR-EVA Yes, I'm sorry about that, Joe, but I'm pretty unstable without that seatbelt and there's a lot of feedback into the controller.

05 03 39 55 CC Yes, sir; buckle up there.

05 03 39 56 CDR-EVA Okay -

05 03 39 57 CDR-EVA MARK.

05 03 40 05 LMP-EVA Anytime we stop, Joe, I'll let you know (laughter).



05 03 40 08 CDR-EVA (Laughter) I was going to tell you, but your descriptions were so neat.

05 03 40 14 LMP-EVA Well, it's nice to be able to see the LM.

05 03 40 17 CDR-EVA Yes. That bearing is right on.

05 03 40 18 LMP-EVA There's home.

05 03 40 23 CC Okay, Jim, and keep talking; the description's beautiful.

05 03 40 26 CDR-EVA ...

05 03 40 41 LMP-EVA We can see several craters on Hadley. Hard to estimate what the size of them is, but the ones that I can resolve seem to be a - seem to be a fairly uniform size, as I can resolve from this distance.

05 03 41 03 CC Roger; understand.

05 03 41 10 CDR-EVA Oh, there's a rough area ahead.

05 03 41 34 CDR-EVA I'd like to see Rhysling on the way in.

05 03 41 36 LMP-EVA Yes.

05 03 41 37 CC Dave, are you moving again?

05 03 41 41 CDR-EVA Yes. We're moving.

05 03 41 42 CC Okay.

05 03 41 43 CDR-EVA We gave you a mark when we started, Joe. That stop was - was maybe 15 seconds.

05 03 41 47 CC Roger; okay. Thank you.

05 03 41 53 CDR-EVA And we're moving about 10 clicks.

05 03 41 56 CDR-EVA Now this large one ahead, it could be - No, we're not close enough yet to be Rhysling. ... this boulder here, Jim.

05 03 42 07 LMP-EVA I'll try to do it. ...

05 03 42 11 CDR-EVA Okay; we're coming out across either an elongate crater, or two that are kind of joined up - running east-west, kind of a doublet, and we're going across the bridge between them.

05 03 42 25 LMP-EVA And it must be, maybe 30 meters across on each one of them with no debris and they're smooth on the bottom.

05 03 42 33 CC Roger, Dave and Jim. And we've got them on the map.

05 03 42 38 LMP-EVA Hey, great!

05 03 42 41 CDR-EVA Oh, there's some vesicular basalt right there, boy. Oh, man! Hey, how about it, let's - just hold on 1 second, we've got to have - -

05 03 42 50 LMP-EVA Okay; we're stopping.

05 03 42 52 CDR-EVA Let me get my seatbelt.

05 03 42 56 CC Roger; mark that you stopped.

05 03 42 57 CDR-EVA ... keeps coming off.

05 03 42 59 LMP-EVA Why don't you hand me your seatbelt?

05 03 43 01 CDR-EVA Just a minute.

05 03 43 02 LMP-EVA Then get off.

05 03 43 08 CDR-EVA If I can find it. There it is. If you'll hang on to it here for a second.

05 03 43 19 LMP-EVA Okay, I've got it.

05 03 43 41 CC And are you moving again?

05 03 43 45 LMP-EVA No, we're stopped here, Joe. I'll let you know when we move.

05 03 43 48 CC Roger.

05 03 44 14 LMP-EVA You know, Joe, these small fresh craters that we've commented on - whatever caused them, must crea - must create or indurate the soil into the

rocks - creates its own - own rocks, because there's just a concentration of rocks around the very fresh ones. And the small I'm talking about may be a foot to 3 feet diameter.

05 03 44 49 CC Roger, Jim. Sounds very possible.

05 03 44 50 LMP-EVA - - And create the ... of breccia.

05 03 44 55 CDR-EVA Okay, ready to hand me my - -

05 03 44 58 LMP-EVA Yes. Get it?

05 03 45 01 CDR-EVA Yes.

05 03 45 14 CDR-EVA Okay.

05 03 45 21 LMP-EVA Shoot, Dave. I think I dropped the map. I did.

05 03 45 23 CDR-EVA Did you?

05 03 45 24 LMP-EVA Yes.

05 03 45 25 CDR-EVA Where's the 1 to 25 for EVA-1?

05 03 45 26 LMP-EVA Right there by you?

05 03 45 27 CDR-EVA Yes.

05 03 45 28 LMP-EVA Oh, here.

05 03 45 29 CDR-EVA Hold my seatbelt. ...

05 03 46 00 LMP-EVA Go.

05 03 46 04 CDR-EVA Dirty, dirty.

05 03 46 07 LMP-EVA Yes, the map's so dirty you can hardly - hardly see it.

05 03 46 15 CDR-EVA Let me tighten this thing up a little bit better.

05 03 46 16 LMP-EVA You got to tighten it up?

05 03 46 17 CDR-EVA Yes. It keeps coming off. Make a lot better time ...

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05 03 46 25 CDR-EVA Okay, hold it.

05 03 46 26 LMP-EVA Maybe should trade seatbelts.

05 03 46 27 CDR-EVA No; hold it for me.

05 03 47 05 CDR-EVA There. Okay. Okay, Houston.

05 03 47 08 CDR-EVA MARK. We're go - moving.

05 03 47 09 CC Roger.

05 03 47 10 CC Mark.

05 03 47 47 CDR-EVA There's a pretty fresh one right up ahead, Jim. Looks like about 10 meters across, and it's got up to 6-inch frags around the rim - maybe 15, 20 percent of the rims has frags in it but nothing - no significant ejecta blanket, which I think is typical of all these around here. That one looks like it's maybe a meter and a half deep. Yes, we can't get in it, and I bet it has glass in it, too.

05 03 48 18 LMP-EVA You know, you can almost tell the ones that are going to have glass - -

05 03 48 19 CDR-EVA Yes - -

05 03 48 20 LMP-EVA - - by looking at them before you get there.

05 03 48 21 CDR-EVA That's right, you sure can.

05 03 48 22 LMP-EVA Yes. Hey, we were up to about 11 or 12 clicks on that last burst.

05 03 48 29 CC Roger, Jim; I'm standing by for amps readings.

05 03 48 32 LMP-EVA Roger. At any particular speed, Joe?

05 03 48 40 CC Give us anything.

05 03 48 44 LMP-EVA Okay, right now we're going at 10 clicks, and I'm reading about 10 amps.

05 03 48 50 CC Roger; sounds consistent.

05 03 48 58 LMP-EVA Still no reading on the motor temps.

05 03 49 05 CC Must be that smooth driver.

05 03 49 13 LMP-EVA Okay, we're 1.7 so we - Rhysling is - should be near Rhysling.

05 03 49 21 CDR-EVA Yes.

05 03 49 22 LMP-EVA In fact, we ought to be - Rhysling ought to be off to our right.

05 03 49 26 CDR-EVA Hey, there's a pretty sharp one right there. It's - not that - not big enough though.

05 03 49 31 LMP-EVA No.

05 03 49 35 LMP-EVA Do you agree, Houston? We're reading 013 to the LM, and we're at 1.6. We ought to be able to see Rhysling.

05 03 49 45 CC We agree, Jim. It should be about a 125-meter crater.

05 03 49 52 LMP-EVA Okay. We're cutting at 12 now.

05 03 49 57 CDR-EVA Gee, I don't see it, do you?

05 03 49 59 LMP-EVA No, there's - there's one over here at 2 o'clock that - that's fairly deep and might - -

05 03 50 06 CDR-EVA It's deep, but it's not near that big. It's only - -

05 03 50 07 LMP-EVA It's not that large, no.

05 03 50 09 CDR-EVA - - like - 10, 15 meters across.

05 03 50 12 LMP-EVA Haven't really seen any large enough that - that we'd call Rhysling, Joe.

05 03 50 22 CC Okay, Jim, it may just be - -

05 03 50 23 CDR-EVA We see the old LM.

05 03 50 24 CC - - hidden by the undulations.

05 03 50 29 LMP-EVA Yes, it could be. And there are those.

05 03 50 41 LMP-EVA Yes. Occasionally as we drop down in these - You know, I kind of get the impression, Dave, we're go - it's almost like - Well, they're depressions and then there's the rises, and they're generally perpendicular to our direction of travel.

05 03 50 57 CDR-EVA Yes? Now that you mention it, you're right. Sure does seem that way, doesn't it? We're just going up and down the - Ha - Now watch your frequency. Whoop; watch out; hang on. On that one. Hang on the next one. Oh, ho.

05 03 51 16 LMP-EVA Like just small valleys that are trending upslope, Joe. And - we go down low enough so that we can't see the LM anymore. Won't see him until we get on top of the next rise. They're very gentle valleys. And they're about - would you say - 60, 70 meters across?

05 03 51 41 CDR-EVA Yes.

05 03 51 54 LMP-EVA And, you know, the terrain, looking from the east here - the - is just a general rise to the east. It looks like, oh, 2 - 2 or 3 percent. Notice that, Dave?

05 03 52 06 CDR-EVA Yes, up to - -

05 03 52 07 LMP-EVA Right to the - -

05 03 52 08 CDR-EVA ...

05 03 52 09 LMP-EVA - - the base of the Apennines.

05 03 52 10 CDR-EVA Yes. And it's - -

05 03 52 11 LMP-EVA Right up to - the Swan Range there.

05 03 52 14 CDR-EVA Yes.

05 03 52 18 LMP-EVA Now when we go out on EVA-2, why, it'll be uphill going out, and probably downhill all the way back.

05 03 52 25 CDR-EVA That's nice. Whoop! There's a shocker. Boy, what a great suspension system this thing has (laughter).

- 05 03 52 33 LMP-EVA It'll be a tremendous view back to the LM when we get out to the last station on EVA-2.
- 05 03 52 56 LMP-EVA And rather than this being the plains, as such, I get the idea it's the - kind of a base of a very gentle talus slope.
- 05 03 53 08 CDR-EVA Yes, that's - that's right. We're not on a flat plain; it looks like it slopes down from the - the Swan Range over there into the rille, and then when you get to the rille rim, there's another slight break-down to a sharp break. The slight break goes, maybe, 50, 60 meters, and then you drop off steep into the rille. It doesn't look like we're in a - a basin so much, although if I look to the left, Jim, I can see a rise - up to the - the rille.
- 05 03 53 36 LMP-EVA Well, there might be a rise, you know, there at the - at the rille.
- 05 03 53 39 CDR-EVA Yes.
- 05 03 53 41 LMP-EVA Yes. Rise at the rille. But you're definitely right, we're traveling on a slope to the left right now.
- 05 03 53 48 CDR-EVA And, boy, you really get that impression if you, you know, look east, look up-Sun.
- 05 03 53 52 LMP-EVA Yes, you sure do.
- 05 03 53 59 CDR-EVA I can't believe we came over those mountains.
- 05 03 54 05 LMP-EVA We did.
- 05 03 54 07 CDR-EVA It's just a beautiful little valley.
- 05 03 54 11 LMP-EVA Yes, those are pretty big mountains to fly over, aren't they? Here's a nice, subtle crater with a - with a - about 70 meters across, with a sharp, 15-meter one on the rim, which scattered debris out. But no big ejecta blanket, no rays.
- 05 03 54 33 CDR-EVA We can't see the LM now. And we're traveling at about 12 clicks.

05 03 55 20 CDR-EVA Let's see, 018 degrees for .7, so right over the next rise, we should see homeplate.

05 03 55 34 CDR-EVA And I think I see, on the surface here, lineaments that are trending about - northwest-southeast, Jim. Do you get that feeling? Morton's [?] little lineaments. Look - look as we go across here and if you think about them, if you look down there.

05 03 56 04 LMP-EVA Not convinced, Dave.

05 03 56 05 CDR-EVA Not convinced, huh?

05 03 56 07 LMP-EVA Look right ahead of us here where we're driving I see lineaments that are parallel with our direction of - -

05 03 56 11 CDR-EVA Yes?

05 03 56 12 LMP-EVA - - motion.

05 03 56 13 CDR-EVA That's right. I see those, too.

05 03 56 14 LMP-EVA Ohhhh! Ohhh!

05 03 56 15 CDR-EVA Hang on.

05 03 56 16 LMP-EVA Ohhh, brother!

05 03 56 17 MS-EVA (Laughter)

05 03 56 18 CDR-EVA There's the LM.

05 03 56 19 LMP-EVA Yes.

05 03 56 20 CDR-EVA Came up over the rise, Joe, and right - right when we got over the rise, there was a great big crater in our path. But we missed it.

05 03 56 30 CC Got some bad news and some good news.

05 03 56 35 CDR-EVA (Laughter) Yeah, man. But it's the only game in town.

05 03 56 44 CC Don't you know.

05 03 56 52 CDR-EVA Oh, Joe, wish we could stop and pick up hundreds of rocks; there's so many. There's a little one



sitting on the rim of a crater that's on a pedestal. It's a - looks like a smooth, gray rock, subangular, and it was sitting up on a pedestal it looks like. Right on the very rim of the crater, and it was the only frag near the crater.

05 03 57 17 CDR-EVA (Laughter) Hey, there's the old Falcon.

05 03 57 20 CC Dave, that sounds like a - -

05 03 57 21 CDR-EVA Sitting down there in that hole.

05 03 57 23 CC - - ... to me.

05 03 57 25 LMP-EVA The Falcon?

05 03 57 27 CDR-EVA Yes. (Laughter)

05 03 57 32 LMP-EVA Hey, look at the - Would you think that the albedo's - oop! - changed there where we landed?

05 03 57 38 CDR-EVA Sure had; it's lighter colored.

05 03 57 40 LMP-EVA Sure is. Is this fellow Index over here to the right, Dave?

05 03 57 43 CDR-EVA Yes, uh-huh. Yes.

05 03 57 47 CDR-EVA Not very distinct, is it? That's Index. Our position is - like we're - I guess we're a little - just a little east then - ,

05 03 58 04 LMP-EVA Yes.

05 03 58 05 CDR-EVA - - of our planned - -

05 03 58 06 LMP-EVA I think they've got our - -

05 03 58 07 CDR-EVA - - landing site.

05 03 58 08 LMP-EVA - - I think that the position they have picked out is pretty good.

05 03 58 11 CDR-EVA It's close, but I - It looks like it might be a little south.

05 03 58 14 LMP-EVA Yes. Hey, Joe - -

05 03 58 15 CDR-EVA Hey, we're - we're - Our NAV system's starting to wander now. We got a range of .2 and a bearing of 34 and we're heading about 015 into the LM, and it's just almost in front of us so - I think it's done very well though.

05 03 58 37 CDR-EVA Hey, do you know I think I almost landed in a crater, Jim. Look at the one on the right there.

05 03 58 42 LMP-EVA Yes.

05 03 58 47 CDR-EVA If I'd have just gone down another - -

05 03 58 49 LMP-EVA Yes. I have that on the map.

05 03 58 51 CDR-EVA Do you really?

05 03 58 52 LMP-EVA It's right - you know, it's just west - looks like it's just west, northwest of Index.

05 03 58 57 CDR-EVA Yes.

05 03 59 04 CDR-EVA Okay; come back here, and we want to park it - across - at - towards the ALSEP side. Okay, swing around. Yes, I landed right in a little bench there, huh? No wonder.

05 03 59 18 LMP-EVA Just on the - the northwest rim of that crater.

05 03 59 21 CDR-EVA Yes. Yes. I was hoping - I - I - I think I saw that big crater - I was hoping by keeping like a foot per second forward all the way in, and it'd keep us out of something like that.

05 03 59 35 CDR-EVA Joe, we're back at the LM, by the way.

05 03 59 39 CC Okay, Dave; good news. Thank you.

05 03 59 50 CDR-EVA I'll park out here a little ways, Jim.

05 03 59 55 LMP-EVA There's a lot of glass fragments around here.

05 03 59 57 CDR-EVA Yes.

05 03 59 58 LMP-EVA More than I've seen any other - -

05 04 00 02 CDR-EVA Yes. If that's Index over there and this is the one that's northwest of Index - gee, that puts us a - You know what? That puts us really at - position D - yes, let's see that'd be a 7 - 755 and Baker Queen. Yes, and, you know, I can see why now, I thought that was Salyut, because Index is so subtle, and there's another one that is just to the north of Salyut, which I was going to call the landing site. Okay, we're parked.

05 04 00 46 CC Okay, Dave and Jim.

05 04 00 48 CDR-EVA Let me get off.

05 04 00 49 CC You're certainly very close there, and we can sort out the details of that later. Dave, when you turn on the TV, could you police the TV cables for us again? We think that we may be hung up again. And we need a status check on your - from both of your EMUs, please.

05 04 01 08 CDR-EVA Okay, Jim. Would you do all that?

05 04 01 10 LMP-EVA Okay; here are the Rover readings; 315, 059, 103, 001, 100, 107, 95, and 95, and motor temps are both lower limit.

05 04 01 36 CC Roger. And that lower limit's okay.

05 04 01 38 LMP-EVA And, Joe, my EMU flag - -

05 04 01 41 CDR-EVA Careful, Jim, come on. Go easy, babe.

05 04 02 03 CDR-EVA Okay, everything nice and easy now, huh? Let me get your - let me look at your camera.

05 04 02 12 CDR-EVA ... dust brush out this. Hop off of that thing with the grace of a ballerina.

05 04 02 32 CDR-EVA Get the brush on your - RCU.

05 04 02 37 CC Okay, and while you're brushing it, Dave, we need a PLSS check.

05 04 02 42 CDR-EVA Yes. Roger. I got - flags are clear. I've got 40 percent and 3.85.

05 04 02 48 CC Sounds good.

05 04 02 49 CDR-EVA Turn around here, Jim, let me get your - -

05 04 02 50 LMP-EVA Okay, I'm - I'm 385; my pressure flags are clear, and I'm reading 45 percent.

05 04 03 01 CC Okay.

05 04 03 16 CDR-EVA Give me your camera so when you take those pictures it's not - ...

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 02 32 18 CC Okay, Al. The mapping camera comes off in about 30 seconds.

05 02 32 26 CMP Okay, Karl.

05 02 42 53 CC Al, whenever you're ready, I've got a couple of photo pads for you.

05 02 43 06 CMP Okay, Karl. I've got all the camera setups for the solar corona. And they're all checked out and ready to go, so I'll stand by for your pad.

05 02 43 14 CC Beautiful. Over on the next page at 123 hours and 16 minutes, solar corona. The time is 123:16:50. And down there at 123:50, the UV photo pad, 123:49:49.

05 02 43 42 CMP Okay, Karl. Understand. The solar corona pad is 123:16:50, and the UV is 123:49:49.

05 02 43 54 CC That's correct.

05 02 46 32 CMP Houston, Endeavour.

05 02 46 35 CC Endeavour, go ahead.

05 02 46 40 CMP Roger. If you are ready down there, I'll go ahead and retract the mapping camera now. If you want to watch the data.

05 02 46 59 CC Stand by a second.

05 02 47 04 CMP Okay; I'm waiting.

05 02 47 18 CC Okay. You're GO to retract the mapping camera, and give it the mark.

05 02 47 26 CMP Okay. On my mark.

05 02 47 28 CMP MARK.

05 02 51 21 CMP Okay, Houston -

05 02 51 22 CMP MARK.

05 02 51 23 CMP Talkback is gray.

05 02 56 58 CC Al, this is Houston. I hate to start bothering you right when business is getting heavy here, but we find that waste water is accumulating faster than we'd anticipated, and in order to avoid a waste-water dump before we planned it, we'd like to have you fill up a water bag. Looking at your - looking at your current schedule, we recommend you start that right away and get it done.

05 02 57 31 CMP Roger, Houston.

05 02 57 33 CC And, Al, that is on page C/2-28, for waste water.

05 02 57 55 CMP Roger, Karl. Thank you.

05 02 58 04 CC They say it will take about 8 minutes to fill a bag.

05 02 59 50 CMP Houston, Endeavour.

05 02 59 53 CC Go ahead, Endeavour.

05 02 59 58 CMP Okay, Karl. Say again the page number, please.

05 03 00 00 CC The page number is C/2-28, and the bag is down in the - in the L-shaped bag, they tell me.

05 03 00 14 CMP Roger. I've got the bag out.

05 03 00 20 CC And before you go around the corner, I should tell you that the configure DSE should be done at 123:10.

05 03 00 32 CC And a reminder that that is a low bit rate command  
this time.

05 03 00 35 CMP Roger.

05 03 03 16 CC Okay, Al. We have - 1 minute to LOS. All systems  
are looking good, and enjoy that solar corona.

05 03 03 28 CMP Roger. Thank you.

05 03 25 -- BEGIN LUNAR REV 24

05 03 54 46 CC Endeavour, this is Houston. How do you read?

05 03 55 07 CC Endeavour, this is Houston. How do you read?

05 03 55 15 CMP Hello, Houston; Endeavour. Did you call?

05 03 55 25 CC Roger, Endeavour. We copy you. A bit noisy yet.  
On the second set of UV photos at T-start  
plus 7 minutes, a number that we have for you is  
56 minutes and 49 seconds, if you haven't already  
computed it.

05 03 55 46 CMP Roger.

05 04 03 18 CC Endeavour, we'd like to have OMNI Alfa.

05 04 03 25 CMP Roger. OMNI Alfa.

05 04 03 56 CMP And, Houston, Endeavour.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 04 03 59 CC And, Dave, are you off the Rover at - the front of the Rover, now?

05 04 04 05 CDR-EVA Yes, stand by, Joe. I'm going to get your cables; and you're hung up, all right.

05 04 04 09 CC Okay, thank you. And, Jim, as you unload the gear from the PLSSs, we'd like for you to put the spare core tube, core tube cap, and SESC in bag 2 as you put bag 2 on the handtool carrier.

05 04 04 28 LMP-EVA Okay, talk me through when I get around to that.

05 04 04 31 CC Sure will.

05 04 04 40 CDR-EVA Yes. Oh, well, I parked the Rover wrong, but that's right. It'll work - this way.

05 04 04 53 CDR-EVA Joe, do you want to reset on the NAV system? Or do you want to go ahead and pull a circuit breaker on that?

05 04 05 06 CC Pull the circuit breaker, Dave.

05 04 05 10 CDR-EVA Okay, going to TV REMOTE.

05 04 05 56 CDR-EVA Hey, - Houston, with the attitude of the Rover, I'm having a tough time finding the Earth in the - in the field of view because of the Sun shining in my eyes. This is only going to be a short stop. Do you think you can do without it here?

05 04 06 15 CC We can certainly do without it, Dave. Yes, no problems.

05 04 06 24 LMP-EVA - - on the ALSEP.

05 04 06 27 CC Roger; and, Jim, perhaps you could get bag 2 on the right-hand side of the handtool carrier.

05 04 06 44 LMP-EVA Okay, I'll be there pretty ...

05 04 06 49 CDR-EVA ... a little dirt?

05 04 06 51 LMP-EVA Oh, boy. ...

05 04 07 22 LMP-EVA ... What are you going to use for UHT?

05 04 07 27 CDR-EVA Oh, boy, I don't know.

05 04 07 29 LMP-EVA You don't use the UHT that much.

05 04 07 30 CDR-EVA No; I'll think of something.

05 04 07 31 LMP-EVA Let's take that back into the LM, and maybe we can repair it.

05 04 07 34 CDR-EVA Yes.

05 04 07 52 CDR-EVA Okay.

05 04 07 53 LMP-EVA Tell you what. ...

05 04 07 56 CDR-EVA Yes, you want to open the gate? Okay. Here's a hammer.

05 04 08 03 LMP-EVA Okay.

05 04 08 06 CDR-EVA And the rammer.

05 04 08 10 LMP-EVA Okay.

05 04 08 14 CDR-EVA And the core tube caps.

05 04 08 17 LMP-EVA Okay. Got them.

05 04 08 19 CDR-EVA Got them? Okay. Your Velcro is tidied.

05 04 08 33 CDR-EVA \*\*\* another PLSS flap open. If you'd just bend over right there, I can get the bag up.

05 04 08 43 LMP-EVA Okay.

05 04 08 51 CDR-EVA Here's a bag; want to hang onto it?

05 04 08 53 LMP-EVA Okay.

05 04 08 59 CDR-EVA Okay, \*\*\* another Velcro. Okay, you're tidied.

05 04 09 11 LMP-EVA Okay, I have bag 4 here, and I'll hang it temporarily on the right side, Joe.

05 04 09 17 CC Put it under the seat, Jim, and get bag 2 - -



05 04 09 19 LMP-EVA ...

05 04 09 20 CC - - on the right side.

05 04 09 25 LMP-EVA Yes, I'll be doing that. Bend over, Dave.

05 04 09 30 CDR-EVA Okay.

05 04 09 40 LMP-EVA \*\*\* tidy up. Okay. Okay.

05 04 10 01 CDR-EVA Hey, we want to put bag 4 under your seat.

05 04 10 03 LMP-EVA Yes, I know it.

05 04 10 05 CDR-EVA Okay, I'll do it.

05 04 10 12 LMP-EVA I put bag 2 there.

05 04 10 14 CDR-EVA Yes.

05 04 10 16 LMP-EVA That's mine, I'll get it.

05 04 10 22 CDR-EVA Get it. You want to go ahead and -

05 04 10 26 LMP-EVA Okay. Okay. I'm going over and open the SEQ bay doors.

05 04 10 32 CDR-EVA Okay.

05 04 10 45 CC And, Jim, once again, we want to transfer the core tube, its cap, and SESC into bag number 2.

05 04 10 55 CDR-EVA Well - that didn't get done, Jun - Joe. We'll - I'll pick it up - remind me after I get the - LR cubed on the Rover, Joe; I'll do that.

05 04 11 08 CC Okay. Fine, Dave; no problem.

05 04 11 14 CDR-EVA Okay. The ALSEP's in a good place to get off.  
... - -

05 04 11 18 LMP-EVA Yes. You got a good attitude there. Yes, man.

05 04 11 20 CDR-EVA Well, I was thinking of ALSEP.

05 04 11 22 LMP-EVA Okay, the doors are coming open. Okay.

05 04 11 31 CDR-EVA The doors are open.

05 04 11 32 LMP-EVA Doors are opened. Boy, it's going to be hard to keep the dust off the ALSEP.

05 04 11 36 CDR-EVA Yes, boy. You're not kidding.

05 04 11 57 LMP-EVA Yo, ho, ho, ho. Out it came. Go ahead, Dave.

05 04 12 03 CDR-EVA Okay.

05 04 12 06 CDR-EVA (Laughter) Yes. Easy. You clear?

05 04 12 13 CDR-EVA Let me get out of your way. Okay. Here is a nice spot up here to set them down. Try it.

05 04 12 22 LMP-EVA You're hung up.

05 04 12 23 CDR-EVA Yes, sure am.

05 04 12 24 LMP-EVA Pull that pin there.

05 04 12 26 CDR-EVA Pulled it. Okay.

05 04 13 16 CDR-EVA Okay, give me one of those - if you can get them apart.

05 04 13 28 LMP-EVA \*\*\* seen them wedged in there like that before.

05 04 13 31 CDR-EVA \*\*\* lot of surprises; got to expect surprises. Here, maybe if I hold the fitting - rotate it.

05 04 13 51 LMP-EVA Can't.

05 04 13 52 CDR-EVA I've never seen it wedged in there like that either. There. Whew. I got one.

05 04 14 01 LMP-EVA You got one?

05 04 14 03 CDR-EVA Okay. ...

05 04 14 19 LMP-EVA Straps do come handy for something, huh?

05 04 14 21 CDR-EVA Looks like it might work. Okay.

05 04 14 32 LMP-EVA Got it.

05 04 14 45 CDR-EVA Okay, my package is a lot closer than normal, Jim, so watch out when you back up. I want to move it over.

05 04 14 52 LMP-EVA Okay.

05 04 15 05 CDR-EVA Okay, bar's on.

05 04 15 10 LMP-EVA Okay.

05 04 15 23 LMP-EVA Okay, Joe. I'm going over to tip - the fuel cask.

05 04 15 34 CC Roger.

05 04 15 38 CDR-EVA I'm going up to the pallet to get the - no - drill. Drill first.

05 04 15 44 CC Roger.

05 04 16 13 CDR-EVA Okay, drill's out of the MESA.

05 04 16 38 CDR-EVA Okay, Joe, I'm in a good position to handle that core tube business, now, if you want to run through it.

05 04 16 44 CC Okay, Dave, fine. Just want to empty - all the loose gear - the extra gear, core tube and its cap, and SESC into bag number 2.

05 04 17 10 CDR-EVA Okay. The core tube - and its caps into bag number 2. What loose gear? What are you talking about? Used core tubes or new core tubes?

05 04 17 25 CC The new ones, Dave, the unused ones. And the SESC that was on your collection bag and the core tubes that were in your collection bag.

05 04 17 36 CDR-EVA Okay, the unused core tube now goes into bag number 2.

05 04 17 41 CC That's affirm.

05 04 17 46 CDR-EVA And the SESC that's on my pack comes out of its pocket and it goes into bag number 2.

05 04 17 51 CC Right on.

05 04 17 56 CDR-EVA Okay.

05 04 18 13 CDR-EVA Okay, the other number on that core tube is 01, by the way.

05 04 18 17 CC Roger, Dave. Thank you.

05 04 19 13 CDR-EVA Okay, Joe. I'm going for the LR cubed now.

05 04 19 16 CC Okay, Dave, and super clean.

05 04 19 21 CDR-EVA Super clean; yes, man. We'll do our level best.

05 04 20 09 LMP-EVA Okay, the RTG is - fueled, Joe.

05 04 20 12 CC Roger, Jim. Thank you.

05 04 20 15 LMP-EVA Ahh!

05 04 20 38 CDR-EVA Okay, the LR cubed is out.

05 04 21 01 CDR-EVA (Whew) The LR cubed is on the pallet.

05 04 21 29 CC And, Dave - Jim, just a reminder on those SEQ bay doors if you're getting ready to leave that area.

05 04 21 39 LMP-EVA I was going - just in the process of closing them.

05 04 21 42 CDR-EVA He's not going to forget that, Joe.

05 04 21 49 LMP-EVA Booms are out a little farther than normal.

05 04 21 57 LMP-EVA Got to keep my LM cool.

05 04 22 00 CDR-EVA Yes.

05 04 22 08 CDR-EVA Okay, Jim, your seatbelt is going to have to get readjusted - because I'm going - I want to make sure I get the LR cubed tied down good here.

05 04 22 21 LMP-EVA Okay. The SEQ bay doors are closed, Joe.

05 04 22 31 CDR-EVA Okay. LR cubed and the drill are down on the Rover. Yes, we'll go out and find ourselves an ALSEP site, I hope.

05 04 22 44 CDR-EVA Y'all set, Jim?

05 04 22 46 LMP-EVA Yes, Dave.

05 04 22 47 CDR-EVA Okay, go slow.

05 04 22 49 LMP-EVA Don't worry. I can't go fast carrying this.

05 04 22 51 CDR-EVA Yes, don't drop it.

05 04 23 15 CC Dave, this is Houston. When you climb on the Rover, I'd like a mark on that, and then I'd like to update you with some further EVA planning that's going on down here as you drive out to the ALSEP site.

05 04 23 32 CDR-EVA Okay, Joe. Stand by.

05 04 23 42 LMP-EVA I'm heading out, Dave.

05 04 23 43 CDR-EVA Okay.

05 04 23 50 CDR-EVA Okay. Okay, Joe, on the Rover, and heading to the ALSEP site. Ready -

05 04 24 05 CDR-EVA MARK.

05 04 24 07 CC Okay, Dave. As you're moving out there, I guess I've got some good news and some bad news for you. Your O<sub>2</sub> usage rate has - been considerably higher than we've been planning on. It may cut the EV - EVA a little short. We want you to be aware of this right now, and we're watching it real close, and we'll advise you in real time. No problem otherwise. It - it is good to note, though, that if you can do as little unnecessary moving around as possible, we may be able to run the EVA - EVA out to the full 7 hours. Over.

05 04 24 44 CDR-EVA Okay. Understand, Joe. ... You know, Joe, a little moving around with the drill is - That's sort of hard.

05 04 25 03 CC We know.

05 04 25 12 LMP-EVA That go for me too, Joe?

05 04 25 16 CC Jim, you're a little low, but not - -

05 04 25 16 CDR-EVA Not too far ...

05 04 25 18 LMP-EVA I'm ...

05 04 25 20 CC - - as low as Dave at the moment. You're in good shape. You're probably trying to get out of Station 8 already.

05 04 25 27 CDR-EVA (Laughter) Let's find a spot out here, Jim. There's just no place that's really nice and smooth. And the zero phase sure doesn't help anything. I think I've got - This is probably as good as we're going to do. Right about here.

05 04 25 58 CDR-EVA Jim, I'm going to turn right here and head north.

05 04 26 01 LMP-EVA Okay.

05 04 26 02 CDR-EVA That'll be pointing at you.

05 04 26 03 LMP-EVA Okay.

05 04 26 04 CDR-EVA Pointing at the central station.

05 04 26 07 LMP-EVA \*\*\* show.

05 04 26 10 CDR-EVA And it's gently rolling, but I think we're all right. Take it easy. No hurry. Let's see. I shouldn't have turned OFF that NAV. I could have pointed north if I'd have had the NAV. Okay, Jim. Walk up another 10 meters, and then come over towards me - a little bit.

05 04 26 43 LMP-EVA Okay.

05 04 26 51 CDR-EVA Okay. Right - right there looks like a good spot. Yes, that's good.

05 04 26 58 CC And, Dave, you can put the - your shadow off the Rover at about 9:30. It should work.

05 04 27 06 CDR-EVA Okay, Joe.

05 04 27 34 CDR-EVA I can't steer.

05 04 27 55 CC And, Jim, you might want to take a short breather after carrying that heavy package.

05 04 28 02 LMP-EVA I'll go slow, Joe.

05 04 28 20 LMP-EVA I have the power package positioned.

05 04 28 23 CDR-EVA Okay. Okay, Joe. I'm parked, and I'm a little - I'm going to be looking up-Sun. I can't seem to get it. Sure need that steerage.

05 04 29 04 CDR-EVA Okay. Right there.

05 04 29 47 CDR-EVA Okay. Got so much dust on these checklists, and you can't turn them.

05 04 29 55 LMP-EVA Can't read them either.

05 04 29 58 CDR-EVA That's a point. Okay, Joe. Do you need any read-outs from the LRV?

05 04 30 10 CC Negative, Dave. And we'll be standing by for TV.

05 04 30 16 CDR-EVA ... you clipped, Joe; I didn't hear it.

05 04 30 18 CC Roger. Negative on the read-outs and standing by for TV.

05 04 30 25 CDR-EVA Roger. It's coming up. Don't think I'd come all the way out here and not let you guys see the ALSEP deployment.

05 04 30 32 CC Wouldn't miss it for the world.

05 04 30 37 LMP-EVA Okay, Joe. On the shorting switch, I'm reading about .8.

05 04 30 42 CC Roger.

05 04 30 54 CDR-EVA Joe, I might make a comment that - very difficult to find the Earth in the field of view with this sight glass, even with the extension out of the thing. It's just almost too dim. Having a tough time.

05 04 31 09 CC Okay, Dave. Thank you. Important information.

05 04 31 16 CDR-EVA Okay. Going TV REMOTE now.

05 04 31 23 LMP-EVA Okay. RTG cable is connected.

05 04 31 26 CC Thank you.

05 04 32 29 CC And, Dave and Jim, we have - -

05 04 32 30 CDR-EVA Okay. LR cubed is off.

05 04 32 31 CC - - a beautiful TV picture again.

05 04 32 35 CDR-EVA Good.

05 04 32 45 CDR-EVA \*\*\* to set it, so it won't fall over. There.  
Hey, Jim, when you pick up the LR cubed be careful  
you don't knock her over.

05 04 33 04 LMP-EVA ...

05 04 33 05 CDR-EVA ... because that's - -

05 04 33 06 LMP-EVA ...

05 04 33 28 CDR-EVA Okay. Drill's off.

05 04 33 52 CDR-EVA Hey, Jim, you make quite an albedo.

05 04 33 56 LMP-EVA Just what you've said to me.

05 04 34 03 CDR-EVA Do you want something?

05 04 34 04 LMP-EVA No. Don't want to get in your way here.

05 04 34 11 CDR-EVA Let me get this thing out of your way, and if -  
two nuts. You need a little break anyway; you're  
working hard.

05 04 34 28 CDR-EVA (Laughter) Boyd bolts really spring when they  
spring.

05 04 35 38 CDR-EVA Man, things really go - go when you throw them!

05 04 36 04 CDR-EVA Okay. Heat flow's connected.

05 04 36 07 CC Roger. We got it.

05 04 36 32 CDR-EVA Find me a couple of good spots out here. The  
probe is in. Looks like about this direction  
will be best.

05 04 36 53 LMP-EVA Okay. The legs on the SIDE are deployed, Joe;  
sitting it down.

05 04 37 02 CC Roger, Jim.

05 04 37 50 LMP-EVA Okay. And I'm moving over to connect the SIDE  
cable to the central station.

05 04 38 01 CC Very fine.



05 04 38 43 LMP-EVA Got any more slack in that cable, Dave?

05 04 38 45 CDR-EVA Yes, I'll put some more in it. I've got a Boyd bolt problem.

05 04 39 07 CDR-EVA Gummit.

05 04 39 21 CDR-EVA Down, down. Stuck Boyd bolt, Joe. Never get those things apart without that though.

05 04 40 22 CDR-EVA There we go.

05 04 40 24 CC Beautiful.

05 04 40 25 LMP-EVA Hook on SIDE cable not locking down very well.

05 04 41 00 CC Dave, did the bolt come free?

05 04 41 05 CDR-EVA Yes, I got it.

05 04 41 37 CC Jim, have you gotten that connection yet?

05 04 41 43 LMP-EVA Not very positive, I'm afraid, Joe. Try it again.

05 04 41 52 CC Say again, please.

05 04 41 53 CDR-EVA Pull it off.

05 04 41 56 LMP-EVA That pulls right off. I ought to work on it.

05 04 42 00 CC Jim, just make sure that the ears are pulled back before you plug it in.

05 04 42 14 LMP-EVA Back.

05 04 42 36 CDR-EVA Okay; 30 degrees north, 42 degrees to the Sun. That's - -

05 04 42 49 LMP-EVA Ah, I got it, Joe. Got it. Ooh.

05 04 42 55 CC Outstanding.

05 04 44 07 CDR-EVA Okay. The central station is tipped down, Joe.

05 04 44 11 CC Thank you, Jim.

05 04 45 06 LMP-EVA Okay. I'm taking the PSE stool out.

05 04 45 10 CC Roger, Jim.

05 04 45 50 LMP-EVA It might take a little time to level things, today.

05 04 45 52 CDR-EVA Yes.

05 04 46 19 CDR-EVA Well, my gosh. Things just aren't working too good. There.

05 04 47 10 CDR-EVA Hey, Joe. The heat flow is leveled, and the shadow is - right between 2 and 3 on the index.

05 04 47 21 CC Sounds good. Thank you.

05 04 47 53 CDR-EVA Now I'll give you a demonstration here, Joe. Got the TV on this - pallet here.

05 04 48 01 CC Roger. Right on.

05 04 48 02 CDR-EVA Here it goes.

05 04 48 13 CDR-EVA Beautiful. But I lost my balance.

05 04 48 15 CC Spectacular demonstration.

05 04 48 20 CDR-EVA Yes, oh well. Enough of that.

05 04 48 27 LMP-EVA Lovely.

05 04 48 49 CDR-EVA Another demonstration.

05 04 49 38 CDR-EVA Hey, Joe. I'm picking up the drill now.

05 04 49 40 CC Roger, Dave.

05 04 49 45 CDR-EVA It works.

05 04 49 46 CC Beautiful. And, for goodness sakes, hang on to it there. Don't throw it.

05 04 49 53 CDR-EVA Yeah, man. You better believe.

05 04 49 57 CC What was that a demonstration of, by the way?

05 04 50 02 CDR-EVA I'm not sure I know.

05 04 50 04 CC It started out to be of gravity and it wound up being of centrifugal force, I think.

05 04 50 13 CDR-EVA Yes, I think you're right. Oh well.

05 04 51 06 LMP-EVA Okay, Joe. The PSE is leveled, and the shadow is reading - 091.

05 04 51 13 CC Roger.

05 04 52 36 CDR-EVA Okay, Joe. Drill on the rack. Going to the first probe. But the - one on the right stayed, because the rammer was packed in the one on the right, today.

05 04 52 56 CC Roger, Dave.

05 04 53 10 CDR-EVA Check south, huh, Joe?

05 04 53 14 CC Check south.

05 04 53 21 CDR-EVA Okay. I'm in a - I'm in a shallow depression here, Joe. And there's no way of getting around it. There's just nothing really flat. There's a little rim here - a little slight rise. Further to the north, maybe ... would like it up there.

05 04 53 56 CC Dave, drill it there.

05 04 54 00 CDR-EVA Okay.

05 04 54 01 CC Right where you stand.

05 04 54 03 CDR-EVA Thank you. Just - just checking. You know. Right.

05 04 54 11 LMP-EVA Sometimes those guys have some ... good ideas.

05 04 54 45 LMP-EVA Okay, Joe. On the solar wind, it's alined; the door is open.

05 04 54 55 CC Thank you, Jim.

05 04 55 01 LMP-EVA Going for the LSM.

05 04 55 05 CC Right-o.

05 04 55 46 CDR-EVA Okay. First two. Down we go. Huh, it takes a little bit of force. \*\*\* matter of fact, it's getting a little stiffer. In fact, it's getting a lot stiffer. \*\*\* stuff down there.

05 04 56 43 CC Jim, you'll get your feedwater tone shortly.

05 04 56 49 LMP-EVA Okay, I did. Time to go to AUX-WATER, huh?

05 04 56 56 CC It's about that time.

05 04 57 00 LMP-EVA Dave, can I disturb you to get my AUX-WATER?

05 04 57 03 CDR-EVA Be glad to, Jim. Here.

05 04 57 24 CDR-EVA Oh, wait a minute. Okay. Your AUX-WATER is ON.

05 04 57 31 LMP-EVA Thank you.

05 04 58 02 LMP-EVA Okay. I'm taking the LSM out, Joe.

05 04 58 06 CC Okay, Jim. And MIN DIVERTER on your PLSS, please.

05 04 58 15 LMP-EVA That's for startup?

05 04 58 16 CC That's affirmative.

05 04 58 23 LMP-EVA Okay. MIN, although I understood it could start up on any position. Bet you're trying to make me sweat a little.

05 04 59 13 CDR-EVA Joe, can you see the drill?

05 04 59 15 CC Yes, sir. We sure can.

05 04 59 22 CDR-EVA Now I'll give you a better angle. That's all I got.

05 04 59 31 CC We agree, Dave.

05 04 59 37 CDR-EVA There are about three probes in, Joe. And, my goodness, I think that looks like about the end of it.

05 04 59 53 CC Something to argue with, Dave.

05 05 00 00 CDR-EVA I guess the next question is do we dig a little trench and lay them in the trench, or do we just put three in?

05 05 00 33 CC Dave, this is Houston. We agree that, if you've hit bottom there and think there's no way you'll

go any deeper, just press on and put the probes  
in this hole.

05 05 00 42 CDR-EVA Okay, Joe. I'll give it mon - one more try here  
and see if I can get some more, but - I tell you  
one thing, the Base at Hadley is firm.

05 05 00 52 CC Roger. So much for the fairy castle fairy.

05 05 00 58 CDR-EVA Yes. Oh, I'm afraid that's it. I hate to say  
that because it's working good.

05 05 01 05 CC Roger, Dave. There's a lot of information right  
there.

05 05 01 40 CC Jim, this is Houston. The diverter valve is  
yours now.

05 05 01 46 LMP-EVA Okay. Thank you, Joe.

05 05 01 48 CC You had a good clean startup.

05 05 01 56 LMP-EVA Okay. I'm on INTERMEDIATE.

05 05 02 07 CC And, Jim - -

05 05 02 08 CDR-EVA ...

05 05 02 09 CC - - could you verify all your flags are off?

05 05 02 17 LMP-EVA Verified.

05 05 02 19 CC Thank you.

05 05 02 24 CDR-EVA Joe, I can't seem to get the chuck to reset. It  
won't - go counterclockwise out of its seat.

05 05 02 40 CC Dave, try to rotate it 90 degrees both ways, and  
then push sharply down.

05 05 02 47 CDR-EVA I - I know that Joe. It won't rotate 90 degrees  
both ways. It'll only twist the stem. Maybe  
that - the drilling was so tight for it, it's  
locked up in there.

05 05 03 17 CDR-EVA It won't back off, Joe. It turns the drill, and  
it'll turn the stem, but the chuck won't back off.

05 05 03 28 CC Roger. We copy, Dave. Maybe our stems haven't been so bad.

05 05 03 34 CDR-EVA Any suggestions?

05 05 03 46 CC Dave, can you go either clockwise or counterclockwise 90 degrees without the stem turning?

05 05 03 54 CDR-EVA No.

05 05 04 03 LMP-EVA Okay, Joe. The LSM is deployed. It's level and aligned, and I'm reading - The shadow is on the first degree on the plus side.

05 05 04 16 CC Okay, Jim. Thank you. Sounds good.

05 05 04 22 CDR-EVA Okay, Joe. I'll stand by for your suggestions.

05 05 04 24 CC Roger, Dave. Take a breather.

05 05 05 24 CC Dave, this is Houston.

05 05 05 27 CDR-EVA Go ahead.

05 05 05 34 CC Roger, Dave. We're requesting you spend a few more minutes on this experiment. We want you to take the wrench off the Rover. It - it's on the rack, as you know, and try to hold the stem with the wrench and turn the drill off that way.

05 05 06 01 CDR-EVA I - I guess you got to tell me where the wrench is on the Rover, Joe. I don't know of any wrench on the Rover.

05 05 06 16 CC The wrench - the wrench on the handtool carrier, Dave. On the rack - on the rack. I'm sorry. I'm giving you bad information here.

05 05 06 27 CDR-EVA Yes, there's no wrench.

05 05 06 35 CC Dave, that wrench is on the rack that's holding the tubes - right along beside you. Sorry.

05 05 06 45 CDR-EVA The what?

05 05 06 47 LMP-EVA Must mean the - wrench I installed - not the wrench, but the vise.

05 05 06 54 CDR-EVA Oh, the vise. Yes, why didn't he say the vise?  
Sure, sure, the vise.

05 05 07 02 LMP-EVA If that'll work. I don't know.

05 05 07 06 CDR-EVA I was thinking of a pipe wrench, you know.

05 05 07 08 LMP-EVA Yes.

05 05 07 09 CDR-EVA That would probably be the thing to do.

05 05 07 33 CC And, Dave, you're about a - a minute from a flag  
on your water.

05 05 07 40 CDR-EVA Okay. Should I go to AUX now?

05 05 07 43 CC When you get the tone.

05 05 07 48 CDR-EVA Say again.

05 05 07 49 CC Roger. Wait until you get the tone. Just wanted  
to warn you.

05 05 07 55 CDR-EVA Okay. You're clipping your transmissions a little  
bit in the beginning sometimes, Joe, and I miss it.

05 05 08 16 CC Okay, Dave. And if that doesn't work right off,  
we'll ask you to abandon that temporarily and go  
ahead and deploy the LR cubed.

05 05 08 27 CDR-EVA It worked! It worked, Joe. Good thinking back  
there in the back room.

05 05 08 33 CC And good working - -

05 05 08 34 CDR-EVA Okay. I've got a white flag.

05 05 08 35 CC - - up there on the ALSEP.

05 05 08 39 LMP-EVA Do you want me to get it, Dave?

05 05 08 41 CDR-EVA No, I can get it. Okay. AUX WATER coming on.  
Going to be in MIN, Joe?

05 05 08 53 CC Roger, Dave. Thank you. In MIN.

05 05 08 59 CDR-EVA Okay. I'm in MIN.

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05 05 10 22 LMP-EVA Got a malfunction over here on the sunshield,  
Houston. The cord broke. On those pins that have  
to come out to release the aft sunshield.

05 05 10 43 CC Okay, Jim. We copy that. Is that on the LSM?

05 05 10 50 LMP-EVA Oh, no. It's on the central station.

05 05 10 51 CC Oh. Roger.

05 05 10 52 LMP-EVA I guess I'll have to get down on my hands and  
knees to get those too.

05 05 10 57 LMP-EVA Dave, I'll have to get dirty and get down.

05 05 11 00 CDR-EVA Can I help you?

05 05 11 02 LMP-EVA You might have to help me to get back up.

05 05 11 04 CDR-EVA ...

05 05 11 05 LMP-EVA Joe, my ... is clear.

05 05 11 18 CDR-EVA Sure wished I had a UHT.

05 05 11 31 LMP-EVA Oh, I made it.

05 05 11 39 CDR-EVA Careful.

05 05 12 43 CC Jim, this is Houston.

05 05 12 47 LMP-EVA Go ahead, Joe.

05 05 12 49 CC Roger, Jim. We think a shorting switch may have  
been inadvertently depressed. Could you take a  
look at that for us, please?

05 05 13 00 LMP-EVA Sure will. Wish I could blow on it.

05 05 13 14 CC It won't work. I'll guarantee it.

05 05 13 21 LMP-EVA All right. I just pulled the pin.

05 05 13 25 CC Roger. And, Dave, the diverter valve is yours.

05 05 13 32 CDR-EVA Thanks, Joe.



05 05 13 40 LMP-EVA It might have been inadvertently depressed, Joe.  
Check it now.

05 05 13 53 CC Thank you, Jim.

05 05 15 29 CC Jim, this is Houston.

05 05 15 33 LMP-EVA Go ahead.

05 05 15 34 CC Roger, Jim. While you're working there, it looks  
like that switch is still depressed. It doesn't  
really make any difference to us, but when it  
comes time to aline the antenna, you will have to  
be careful not to point the antenna at any of the  
experiment tables. Over.

05 05 15 54 LMP-EVA Okay. Remind me of that, will you.

05 05 15 56 CC We'll be watching.

05 05 15 57 LMP-EVA When I get around to it.

05 05 16 12 LMP-EVA Okay, Joe. Here comes the central station.

05 05 16 17 CC In living color.

05 05 16 27 CDR-EVA Okay, Joe. J-5 on the first probe.

05 05 16 31 CC Roger, Dave. Thank you.

05 05 16 34 CDR-EVA And I'll go back and get the electronics box,  
after I get this second one done.

05 05 18 14 LMP-EVA That sunshield works a little better here without  
a breeze blowing.

05 05 18 20 CC Yes, sir. Only the solar wind. And, Dave and  
Jim, to factor into your thinking here - we'll be  
asking you to leave the ALSEP site in about  
15 minutes.

05 05 18 45 CDR-EVA All right. Okay, Joe.

05 05 19 06 CDR-EVA It's even tougher here, Joe.

05 05 19 38 CDR-EVA Boy, that's really tough rock.

05 05 19 59 CDR-EVA Same problem.

05 05 20 11 CDR-EVA Okay. I got the same problem on the chuck, Houston. I think the - the rock is so tough that the chuck bites into the core stem and just won't release it without that vise.

05 05 20 31 CC Roger, Dave. We copy.

05 05 20 36 CDR-EVA And (laughter) I'm afraid I'm going to have trouble getting the vise off of this other piece here.

05 05 21 29 CC It looks like vise is a good word for it, Dave.

05 05 21 31 CDR-EVA ... tell you, Joe. Boy, Oh, boy.

05 05 21 46 CC Dave, let us suggest to you that you go ahead and deploy the LR cubed. And, Jim, another reminder on your antenna.

05 05 22 02 LMP-EVA Okay, Joe. I'm putting that antenna up now, and I should not point it at any of the experiments. Is that correct?

05 05 22 10 CC Just the experiment tables, Jim, is the thing to steer clear of.

05 05 22 18 LMP-EVA Okay. The antenna is up now. Try and level it.

05 05 22 33 CC Dave, this is Houston. I think maybe we want to worry about this a little later. Could you deploy the LR cubed for us, please?

05 05 22 43 CDR-EVA Sure will, Joe. But let me put the second probe in. I got the - the vise off, and all I got to do is put the probe in. Okay?

05 05 23 15 CC Dave, we'd like for you to stand by on that probe. We think we may be able to drill it deeper later on - -

05 05 23 21 CDR-EVA Okay.

05 05 23 22 CC - - and let's ask you to go to the LR cubed now.

05 05 23 27 CDR-EVA Okay; on the way. I'll stick the probe in the rack, if that's all right.

05 05 23 37 CC Sounds good, Dave.

05 05 24 03 CDR-EVA Okay, then - You want the drill in the Sun, I believe. Don't you, Joe?

05 05 24 09 CC Roger, Dave. It looks good to us; handle down, battery away from Sun. It looks good to us, and the LR cubed, we want west - -

05 05 24 16 CDR-EVA Okay.

05 05 24 17 CC - - and some south of the Rover - however far you think is convenient; and super clean.

05 05 24 25 CDR-EVA Oh, super clean. Yes, sir. Keep her clean.

05 05 24 29 LMP-EVA Okay, Joe. Azimuth is put in, and I'm working on elevation.

05 05 24 35 CC Okay, Jim.

05 05 25 05 LMP-EVA Okay; 35.81, and 4.71. And the shadow device is good. It's leveled.

05 05 25 21 CC Okay, Jim.

05 05 25 22 LMP-EVA ...

05 05 28 25 CDR-EVA ... Okay, Joe. It's alined, and the shadow device is right on the index, and it's super clean.

05 05 28 34 CC You wouldn't be proud of anything less, Dave.

05 05 28 40 LMP-EVA No ... south. Does that look all right to you?

05 05 29 01 CDR-EVA Okay, Joe. What would you like me to do in the cleanup part here?

05 05 29 07 CC Okay, Dave. - -

05 05 29 08 CDR-EVA Let's take the pictures.

05 05 29 09 CC - - You're not going to believe this, but the drill has to be turned 180 degrees.

05 05 29 16 CDR-EVA (Laugh) Oh, I believe it. Okay. No problem. Maybe we can get it fixed. Be a great core if we could drill one here, you know, you'd get some good hard stuff.

05 05 29 42 LMP-EVA Tell you, that time on that stem, Joe, I started hitting good hard, solid material like 8 to 10 inches down.

05 05 30 17 CC Jim, are you deploying the SIDE now?

05 05 30 22 LMP-EVA Yes, I am. Trying to.

05 05 30 27 CC Okay. We'll have to be leaving in about 5 minutes.

05 05 30 34 CDR-EVA Okay, Jim. I - I got your camera. Great. How many pictures does that take?

05 05 30 42 LMP-EVA Takes about 20.

05 05 30 44 CDR-EVA Okay. I've got a 115 on your camera. We're okay.

05 05 31 22 CC Dave, are you picking up Jim's camera now?

05 05 31 27 CDR-EVA I've got Jim's camera. I'm going to take the pictures.

05 05 31 31 CC Roger. If yours is just as handy, it's got a color MAG on it. But ...; whatever you want.

05 05 31 40 CDR-EVA No, I've been taking black and white.

05 05 31 43 LMP-EVA No, I've been taking black and white, Dave.

05 05 31 48 CDR-EVA It shifted around so much there at the end, I lost track.

05 05 32 25 LMP-EVA Okay, Joe. The SIDE is deployed. Let me level it here.

05 05 32 39 CC Roger. And report the pin pulled.

05 05 32 45 LMP-EVA I will.

05 05 32 58 LMP-EVA Pin is pulled.

05 05 33 00 CC Roger. And that's a new Moon record on the SIDE.

05 05 33 21 CDR-EVA Okay, Joe. I got the LR cubed pictures, and it's still super clean.

05 05 33 29 LMP-EVA Okay, Joe. I'm going to depress the shorting switch, even though you say it probably is.

05 05 33 33 CC Roger. That's good, Jim. Depress the shorting switch and turn ASTRO switch number 1 clockwise.

05 05 33 42 LMP-EVA Okay. It's depressed. Turning number - switch number 1 clockwise. Okay. It's fully clockwise, Joe. Why don't you try a transmitter turn on?

05 05 34 15 CC Roger.

05 05 34 22 CDR-EVA Hey, Joe - I mean Jim, when you take your 3 footers, are you leaving the focus at 7?

05 05 34 26 LMP-EVA No, I'm coming down to - No, no, I'm leaving them at -

05 05 34 31 CDR-EVA What are you doing?

05 05 34 33 LMP-EVA No, I'm coming down to 3.

05 05 34 36 CDR-EVA Okay.

05 05 34 38 LMP-EVA No, I'm sorry, Dave. Leave it at 11, 11 and 1/250th.

05 05 34 43 CDR-EVA No, that's not what I'm asking.

05 05 34 46 LMP-EVA Oh, I - I stop it down to 3 feet. Focus at 3.

05 05 34 51 CDR-EVA Okay.

05 05 35 13 CDR-EVA That central station is - such an unsteady base.

05 05 35 29 CC Okay, Dave and Jim. We want you to move back towards the LM now.

05 05 35 38 LMP-EVA Okay.

05 05 35 42 CDR-EVA Get out of the way, and I'll get the central station here real quick.

05 05 35 48 LMP-EVA Did you get the LSM?

05 05 35 49 CDR-EVA Yes.

05 05 35 50 LMP-EVA Let me go over and deploy the sunshield on it then.

05 05 35 53 CDR-EVA No, we got to start heading back.

05 05 35 54 LMP-EVA But it won't take but a second.  
05 05 35 57 CDR-EVA Oh, yes. That'll finish it up, yes. Okay.  
05 05 36 05 CC And, Jim, there's a ESP experiment over  
240 000 miles.  
05 05 36 14 LMP-EVA Don't read a thing.  
05 05 36 47 LMP-EVA Okay, the sunshield is up on the LSM.  
05 05 36 53 CC Okay, guys. Let's go back.  
05 05 36 56 CDR-EVA Okay. Let's head back, Jim.  
05 05 37 06 CDR-EVA \*\*\* right there. Okay. I'll - get rid of this  
stuff.  
05 05 37 15 LMP-EVA ...

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 04 04 01 CC Go ahead, Endeavour.  
05 04 04 12 CC Go ahead, Endeavour.  
05 04 04 13 CMP Houston, Endeavour. How do you read now?  
05 04 04 14 CC Go ahead, Endeavour.  
05 04 04 15 CC We're reading you loud and clear.  
05 04 04 18 CMP Okay, Karl. Okay, in between taking pictures here,  
I've been trying to collect this stuff for the  
waste water dump or for the waste water collection.  
I got the bag out, but I'm having trouble finding  
that female QD. Do you know where it is?  
05 04 04 30 CC Stand by. And, in the meantime, we'd like to  
verify that in NOUN 79, we got 5 degrees.  
05 04 04 38 CMP That's affirmative.  
05 04 04 39 CC Thank you.  
05 04 05 21 CC OMNI Bravo on the way to high gain.

05 04 06 30 CMP Roger. OMNI Bravo.

05 04 07 17 CC And, Al, I have the solar corona start time any-time you're able to copy.

05 04 07 27 CMP Okay, go ahead.

05 04 07 37 CMP Go ahead with the T-start time.

05 04 07 38 CC Roger. T-start is 124:32:22.

05 04 07 48 CMP 124:32:22.

05 04 07 51 CC That's correct.

05 04 10 15 CC Al, you may be interested to know that the fellows on the surface have completed a very successful EVA-1 and are back on the LM at the present time.

05 04 10 28 CMP Very good. EVA-1's finished, huh?

05 04 10 34 CC Except for the ALSEP part of it.

05 04 10 48 CC Al, the best information we have on that female QD fitting is that it would be in the waste management system backup bag in A-8.

05 04 11 06 CMP Okay. I'll look some more.

05 04 14 36 CC Al, we seem to be at the right altitude and we can bring up the HIGH GAIN if you'd give us a PITCH, minus 45; and YAW, 208.

05 04 14 48 CMP Okay. Minus 45 and 208.

05 04 18 55 CC Al, this is Houston. About that - filling up the water bag. Unless you're underway with it already, our basic priority here is to go ahead and get configured for the solar corona shots; and you can forget the water unless you're already into it.

05 04 19 18 CMP Roger. I've got everything, I think, I'll do now, except I still can't find the female QD.

05 04 19 25 CC Okay. I would say let's worry about that later. And the word is that we'll just go ahead with the normal dump on the back side as it's scheduled in the Flight Plan.

05 04 19 42 CMP Okay. That sounds good to me.

05 04 20 11 CC Al, is there any useful comment on the condition of window 5?

05 04 20 22 CMP I don't think so, Karl, other than the fact that it looks very clear. There aren't - It's not smudged or anything right now.

05 04 20 29 CC Very good.

05 04 20 35 CMP In fact, window 5 is in - certainly in better shape than window 1.

05 04 20 41 CC I see.

05 04 20 43 CMP There are a bunch of little specks or spots all over the outside of it. It looks like dust that's collected there. Window 5 is almost clear.

05 04 20 52 CC I see. The UV people are lucky then. Very good.

05 04 25 32 CMP Houston, Endeavour.

05 04 25 35 CC Go ahead, Endeavour.

05 04 25 40 CMP Okay. Just went over the landing site and - grabbed the monocular to take a look and - saw a glint of light off the LM again and it's the same location that I called out before.

05 04 25 42 CMP Beautiful.

05 04 31 28 CC Al, the solar corona photography should is - start in about 1 minute.

05 04 31 36 CMP Roger, Karl. Right with you. Count down 45 seconds.

05 04 31 40 CC Roger.

05 04 31 48 CMP Incidentally, you could probably call it on your DSKY. I'm counting down in P32.

05 04 31 53 CC Okay.

05 04 31 58 CMP Might try it anyway.

05 04 32 12 CC Roger. There - we see it going.



05 04 49 28 CC Al, let me have the HIGH GAIN ANTENNA, AUTO.

05 04 49 37 CMP Roger; AUTO. And I'm maneuvering for the next one.

05 04 49 43 CC Roger.

05 04 52 28 CC Endeavour, we'd like to have an OMNI Delta.

05 04 52 59 CMP ...

05 04 53 04 CC ...

05 04 57 52 CC Endeavour, this is Houston. How do you read?

05 04 58 12 CC Endeavour, this is Houston. How do you read?

05 05 00 25 CC Endeavour, this is Houston. How do you read?

05 05 00 31 CMP Okay, Houston. Looks like we're just going over the hill here. Just wanted you to know it looks like my MISSION TIMER on the main panel is shot.

05 05 00 44 CC Roger, Al. We read and we would like to have COMMAND RESET and LOW BIT RATE.

05 05 00 52 CMP Roger. RESET and LOW BIT RATE.

05 05 00 53 CC Probably - -

05 05 00 54 CMP The timer's - it - the MISSION TIMER stopped at 124:47:37.

05 05 01 17 CC Roger. This is the - -

05 05 01 19 CMP I've reset it for 124:59.

05 05 01 22 CC This is the one on panel 1, is it? Or - the MISSION TIMER?

05 05 01 27 CMP That's affirm.

05 05 01 30 CC Is that - Is that DET in a ina - -

05 05 01 32 CMP That's right.

05 05 01 33 CC Roger.

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05 05 01 38 CMP No. The DET is over on the left side.  
05 05 01 40 CC Roger. You mean the main MISSION TIMER over on  
panel 2, then.  
05 05 01 48 CMP That's affirm. MISSION TIMER on panel 2.  
05 05 01 52 CC Got you.  
05 05 02 15 CC All systems are looking good, Al. See you on the  
other side.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 05 37 22 CC Okay, Dave and Jim, when you get back to the LM, the name of the game is to start your closeout immediately.

05 05 37 35 CDR-EVA Okay, Joe. That'll be in work. Let's don't fiddle with the seatbelts. I'll drive slow.

05 05 37 44 LMP-EVA Okay.

05 05 37 45 CDR-EVA Make more time for that short distance.

05 05 37 57 CC And we're standing by for the TV to come off.

05 05 38 02 CDR-EVA Yes, sir.

05 05 38 17 CDR-EVA On PML/WB.

05 05 38 20 CC Roger.

05 05 38 23 CDR-EVA Roger.

05 05 38 33 CDR-EVA Okay. ... Okay. ON, ON, ON - ON, ON. Okay, ready, Jim.

05 05 38 46 LMP-EVA Ready.

05 05 38 47 CDR-EVA Hold on to that - -

05 05 38 48 LMP-EVA Yes.

05 05 38 49 CDR-EVA - - handrail there, huh?

05 05 38 59 CDR-EVA Make sure we don't get any dust on anything.

05 05 39 03 LMP-EVA LR cubed out far enough.

05 05 39 06 CDR-EVA Say again?

05 05 39 07 LMP-EVA Got the LR cubed out a good ways.

05 05 39 09 CDR-EVA Don't want to get it dusty.

05 05 39 10 LMP-EVA Yes.

05 05 39 39 CC Dave and Jim, we want you to pick up at 6 plus 28 minutes on your checklist. And, Dave, your choice on the TV.

05 05 39 50 CDR-EVA Okay.

05 05 40 03 LMP-EVA Oh, the contents of bag number 1, Joe. - Have we got - Certainly not full. We have core stems in there?

05 05 40 22 CDR-EVA I'm reading you, Jim. I guess he's not.

05 05 40 25 CC Jim, stand by on that. I'm reading you loud and clear. Trying to get a reading. Stand by.

05 05 40 32 LMP-EVA I'm wondering, you know, if it's not full, maybe we ought to take all the samples we have and put in SRC - in bag number 1, so it'll go in SRC number 1.

05 05 40 54 CDR-EVA Okay, let's see. We want to depart - It's heading - shoot! Been in that little building all the time.

05 05 41 04 LMP-EVA Heading northwest, right?

05 05 41 06 CDR-EVA Heading north; the sunlight.

05 05 41 14 CDR-EVA Wait a minute. You'll -

05 05 41 16 LMP-EVA I got ...

05 05 41 17 CDR-EVA Okay.

05 05 41 37 LMP-EVA You'll like Rover read-outs when we stop; right, Joe?

05 05 41 40 CC Jim, when you get to the LM, we think maybe if you - if you think it is easy, just dump the contents of all your collection bags in collection bag 1, and put the whole thing in SRC.

05 05 41 56 LMP-EVA Yes, sounds good.

05 05 41 58 CC Roger. If that's what you're asking; and the core tubes - the full core tubes, you can just leave there in collection bag 1.

05 05 42 08 LMP-EVA Okay, and we'll take the empty one out.

05 05 42 11 CDR-EVA Okay, Jim. Let's stop, and why don't you hop off and let me back up a tad here, and give me the word?

05 05 42 14 LMP-EVA Okay.

05 05 42 15 CDR-EVA Easy does it, easy does it. Got to get rid of that tool; that's in your way.

05 05 42 20 LMP-EVA ... doing it. Okay, you're clear to back up, Dave.

05 05 42 23 CDR-EVA Okay.

05 05 42 26 LMP-EVA Bring it up about another 5 feet.

05 05 42 28 CDR-EVA Okay.

05 05 42 36 LMP-EVA - Well, that's good, right there.

05 05 42 38 CDR-EVA Okay.

05 05 42 41 CC And, Jim. Be advised that that empty core tube - -

05 05 42 43 CDR-EVA Okay, Joe, ... we'll say complete out.

05 05 42 44 CC - - was taken out of bag 1. You don't have to worry about that.

05 05 42 49 LMP-EVA Okay. Heading is 315; bearing 059, 103, 001, 100, 110, 100, 100, and motor temps are still off peg low.

05 05 43 07 CC Copy.

05 05 43 08 LMP-EVA Getting the circuit breakers.

05 05 43 10 CC Roger.

05 05 43 14 LMP-EVA Okay, Joe, you say pick up at 6:28?

05 05 43 16 CC Yes, sir.

05 05 43 20 CDR-EVA 6:28, okay. I think we'll skip the TV here and get the rest of these things done.

05 05 43 27 CC Sounds good.

05 05 43 31 CDR-EVA Think we're going to have to do some dusting before we go in, and it's going to take us a little long. I'll get those, Jim. I'll get them.

05 05 43 38 LMP-EVA Can you get that last one? My fingers just can't pick it - -

05 05 43 40 CDR-EVA Here, I'll get it.

05 05 43 41 LMP-EVA Must be. Okay.

05 05 43 46 CDR-EVA You want to go ahead and pull those?

05 05 43 49 LMP-EVA I'm the one that pulls those, yes.

05 05 43 50 CDR-EVA Yes. You just pull those four, right?

05 05 43 52 LMP-EVA Yes.

05 05 43 53 CDR-EVA Okay, Rover's down.

05 05 44 02 LMP-EVA Okay, Joe. I'm checking the contents of SRC number - or bag number 1.

05 05 44 17 CC Okay, Jim.

05 05 44 19 LMP-EVA Let's see. Bag number 2, looks like all the contents there we leave here.

05 05 44 26 CC Roger.

05 05 44 27 LMP-EVA I'll get the bag under the seat - or the samples under the seat.

05 05 44 50 CC Okay, Dave; and anytime between now and ingress, we'd like you to go to max cooling for 1 minute.

05 05 45 00 CDR-EVA Really? Okay.

05 05 45 02 CC Roger. We think you can use it - -

05 05 45 03 CDR-EVA Hey, Jim?

05 05 45 04 LMP-EVA Yes?

05 05 45 05 CDR-EVA Turn around a minute.

05 05 45 06 CC - - and it'll give us good data for later.

05 05 45 12 CDR-EVA Look over here.

05 05 45 21 CDR-EVA Okay, Joe.

05 05 45 39 LMP-EVA Okay, Joe. I took all the bags - samples out of bag 4, put in SR - in bag number 1.

05 05 45 51 CC Okay.

05 05 45 57 LMP-EVA Now I'm going to put bag 1 in the SRC.

05 05 46 02 CC That a boy.

05 05 46 07 LMP-EVA Hope it'll fit.

05 05 46 30 CDR-EVA Okay, Joe. Into the ETB goes CDR's camera, and MAG November with 76 frames.

05 05 46 39 CC Roger.

05 05 46 52 CDR-EVA Hey, Joe, I need a Roger out of that so I know you're ...

05 05 46 56 CC Roger. Sounds good.

05 05 47 01 CDR-EVA Okay. LMP camera, MAG Lima, 119 frames.

05 05 47 06 CC Roger.

05 05 47 41 CDR-EVA MAG - Hey, Joe. The unused MAGs, I guess we want to take them back in, right?

05 05 47 45 CC That's affirmative.

05 05 47 53 CDR-EVA Yes. Delta and Echo coming in.

05 05 47 58 CC Roger.

05 05 48 00 CDR-EVA Kilo coming in. Oboe coming in.

05 05 48 04 CC Roger.

05 05 48 12 LMP-EVA Boy, that - that seal is really difficult to get on this SRC. Really difficult!

05 05 48 31 LMP-EVA Need a hammer.

05 05 48 39 CC Jim, did you take the protective cover off the seal?

05 05 48 45 LMP-EVA Yes, I did, Joe.

05 05 48 59 CDR-EVA MAG Metro with 62 - 61 frames.

05 05 49 05 CC Roger.

05 05 49 08 LMP-EVA Okay, let's see, Joe. We don't have any other bags to take up, do we?

05 05 49 13 CC That's affirmative, Jim. You read it correctly.

05 05 49 23 LMP-EVA Although we do have one large rock here that we might as well carry up.

05 05 49 31 CDR-EVA Yes. Put it in the bag.

05 05 49 33 LMP-EVA Yes.

05 05 49 34 CC Sounds good.

05 05 49 38 CDR-EVA Easy does it.

05 05 49 42 CC And, Dave, we need maps yet and Charlie Charlie off the DAC.

05 05 49 49 CDR-EVA Yes; okay, I'm just waiting for Jim to move out of the way.

05 05 49 53 CC Roger. While you're waiting, we need the LRV BAT covers open.

05 05 50 02 CDR-EVA Okay, Joe. Let me get to those in a minute here.

05 05 50 05 CC Okay, no hurry. Doing fine.

05 05 50 14 CDR-EVA Got the maps.

05 05 50 20 LMP-EVA And the MESA covers are tidied.

05 05 50 23 CDR-EVA Okay. Oh, boy! Do you know you had a camera jam on that, Jim?

05 05 50 30 LMP-EVA No.

05 05 50 31 CDR-EVA The film jammed in the MAG, and - it stripped the threads, in the film. Whew! MAG Charlie; you got a nothing on Charlie. Let's go! Move! Charlie's in the ETB.

05 05 50 48 CC Okay, Dave. We'll get it next time: No problem.

05 05 50 54 CDR-EVA Yes. Okay, I'm going MAX cooling. Joe, you can give me a mark.



05 05 51 00 CC Roger.

05 05 51 01 CC MARK.

05 05 51 02 LMP-EVA Yes. It should be.

05 05 51 05 CDR-EVA Okay. Call me when you get your minute.

05 05 51 10 CC I'll do it.

05 05 51 14 LMP-EVA Okay, Dave I'm - I'd better clean you.

05 05 51 19 CDR-EVA Oh, okay. You think that's possible? Here's the brush.

05 05 51 30 CC Jim, while you're brushing there, did you get the seal made on the SRC?

05 05 51 37 LMP-EVA Yes, I did, Joe.

05 05 51 41 CC Good show.

05 05 51 46 CDR-EVA Okay, Joe, there's quite a bit of dust on the mirror on the LCRU. As a matter of fact, there's quite a bit of dust all over the Rover. It's very fine kind of dust. Do you want us to maybe brush that off?

05 05 52 07 CC Dave, maybe a token effort, but don't take too long; it doesn't sound too serious to us.

05 05 52 16 CDR-EVA Okay.

05 05 52 20 LMP-EVA Okay, that's - whoa! Right there.

05 05 52 32 LMP-EVA If we can get it off out here, the less we're going to have to put up with in there.

05 05 52 39 CDR-EVA That's really dirty stuff.

05 05 52 46 LMP-EVA Are you dirty yourself, or you - -

05 05 52 48 CC Okay, Dave. Go - go back to whatever cooling you want.

05 05 52 54 CDR-EVA Okay, stand by. Okay.

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05 05 52 59 LMP-EVA That the brush you want?

05 05 53 00 CDR-EVA Huh?

05 05 53 01 LMP-EVA I'll put it away. I'm going to dust off the mirror, there. Go ahead; you - -

05 05 53 05 CDR-EVA Get your antenna?

05 05 53 06 LMP-EVA Yes. What's left of it.

05 05 53 13 CDR-EVA Remember when you go in that my ACA - -

05 05 53 19 LMP-EVA Yes.

05 05 53 20 CDR-EVA - - controller mount is the thing that's hang - you're hanging up on. You sort - sort of have to go easy and get down past that. Okay, see you inside.

05 05 53 32 LMP-EVA Okay.

05 05 53 39 CDR-EVA And back to intermediate, Joe.

05 05 53 54 CC Roger, Dave.

05 05 53 55 LMP-EVA You want both LRV battery covers open, is that correct?

05 05 53 56 CC That's affirmative.

05 05 54 05 CDR-EVA Okay.

05 05 54 20 CDR-EVA There's one open.

05 05 54 45 CDR-EVA Stay open!

05 05 55 02 CDR-EVA There. Oooh, me! They're open. How you doing, Jim?

05 05 55 14 LMP-EVA Getting it.

05 05 55 29 LMP-LM I'm in, Dave.

05 05 55 30 CDR-EVA Good boy.

05 05 55 35 LMP-LM Where are you out there?

05 05 55 37 CDR-EVA On the Rover.

05 05 55 39 LMP-LM Okay, because I've got a pallet here that should come out; I'll put it on the porch.

05 05 55 43 CDR-EVA Okay, I can dump it when I get here.

05 05 55 45 CC Okay, Dave - Jim, take a breather, if you would, please; and, Dave, you're getting a - a - LCRU blankets at 35 percent open at the same time, I'm sure.

05 05 55 59 CDR-EVA Yes, let me - let me just - check on down the checklist, will you, Joe?

05 05 56 04 CC Roger. Roger. No problem.

05 05 56 34 CC Jim, did you carry the SRC up into the LM with you?

05 05 56 40 LMP-LM Yes, I did, Joe.

05 05 56 42 CC Good show.

05 05 56 45 CDR-EVA Hey, Jim.

05 05 56 46 LMP-LM Yes, but -

05 05 56 47 CDR-EVA I've got something for you.

05 05 56 53 LMP-LM Oh, great.

05 05 56 54 CDR-EVA Now I'll take the pallet.

05 05 56 56 LMP-LM Okay.

05 05 57 00 CC Don't tell me, Davey, let me guess.

05 05 57 06 CDR-EVA Say again?

05 05 57 08 CC Roger. Don't tell me; let me guess what that was.

05 05 57 14 CDR-EVA (Chuckle) No, you'd never guess, Joe.

05 05 57 40 CDR-EVA Okay. Joe, I'm going to power down the LTR - LCRU now.

05 05 57 52 CC Jim, we want you just to take a breather there. We're in good shape, and just take it easy a sec.

05 05 58 01 CDR-EVA Okay, there's nothing much \*\*\* okay, LCRU POWER SWITCH is OFF; LCRU blankets - are 35 percent open, that means 65 percent closed.

05 05 58 19 CC Or thereabouts.

05 05 58 20 LMP-LM We need more calculation.

05 05 58 26 CDR-EVA Okay, Joe, I'm ready to hop in. Do you have anything else you need done out here?

05 05 58 37 CC Dave, we're real good on the time, if you'll just stand by a second. You'll carry the ETB up with you, I guess.

05 05 58 48 CDR-EVA Yes, sir. I have it in my hand right now.

05 05 58 56 CC Dave, we are in such good shape on the time, we'd like for you to deploy the solar wind.

05 05 59 05 LMP-LM (Laughter) Gee, I should have done that, Dave, before I came up.

05 05 59 13 CDR-EVA Okay, Joe, I'll give it a try. It's been like 2 years since I've done it; but, I'll give it a try. Where is it, Jim?

05 05 59 22 CC Okay, Dave, I'll tell you what, let's stand by on that - -

05 05 59 23 CDR-EVA We'll have plenty of time next EVA. No problem.

05 05 59 26 CC ... up the flag.

05 05 59 31 CDR-EVA Well, okay. I - I can do it, I think, I used to do it back on 12.

05 05 59 37 LMP-LM Is it not - These days, can everybody put up a - -

05 05 59 39 CC Dave, dealer's choice.

05 05 59 44 CDR-EVA Well, is there something else I can do for you, like gather up some rocks.

05 06 00 08 CC Dave, I guess we don't have anything else for you right now. It's been a outstanding EVA here; why don't you go ahead and get in at your leisure. Might want to pick up that glass rock on your way in.

05 06 00 24 CDR-EVA Okay. Hey, Jim, can you see me out the window?  
Hey, Jim?

05 06 00 33 LMP-LM Yes, I'm - I'm looking for you. You weren't in  
the left window; are you in the right window?

05 06 00 35 CDR-EVA Yes. Talk me through the solar wind; let's get  
it up, that's - they really need lots of data;  
we can give them lots of data.

05 06 00 40 LMP-LM Okay. Just take it out there about 50 feet.

05 06 00 43 CDR-EVA Okay. Right about here, huh?

05 06 00 47 LMP-LM Farther, if you want. Yes. And just - pull the  
tube out to full, extension, - Careful when you  
get to the end; that little thing popped off the  
end.

05 06 00 58 CDR-EVA Okay.

05 06 00 59 LMP-LM Just pull it on out.

05 06 01 01 CDR-EVA Okay.

05 06 01 02 LMP-LM And, careful when you rotate the screen that you  
rotate in the right direction, so it doesn't pop  
off.

05 06 01 06 CDR-EVA Did it - the - -

05 06 01 07 LMP-LM Just ex - extend the tube several sections.  
Make sure they're in the red, indicating it's  
locked.

05 06 01 12 CDR-EVA Okay, red, red, red. Red.

05 06 01 14 LMP-LM Keep - keep pulling.

05 06 01 16 CDR-EVA Okay.

05 06 01 17 LMP-LM And pull that - yes, pull that out.

05 06 01 19 CDR-EVA Oh, yes. What is this ... - -

05 06 01 20 LMP-LM ... you rotate in the right direction so it doesn't  
drop off.

05 06 01 23 CDR-EVA Want to rotate it against the opening, right?

05 06 01 26 LMP-LM Yes.

05 06 01 27 CDR-EVA Like that. Okay; that's easy enough to do.

05 06 01 30 LMP-LM Okay, and then - -

05 06 01 31 CDR-EVA Yes.

05 06 01 32 LMP-LM - - You have that there, and - -

05 06 01 33 CDR-EVA/ Pull it down.  
LMP-LM

05 06 01 34 LMP-LM And make sure you get the - not the wire, but the bottom of the screen over the loop.

05 06 01 39 CDR-EVA Okay, I see that.

05 06 01 57 CDR-EVA Okay the bottom of the screen is over the loop. It says "Sun," I guess that means that's - -

05 06 02 02 LMP-LM Yes.

05 06 02 03 CDR-EVA - - what you face to the Sun, doesn't it?

05 06 02 04 LMP-LM Isn't that a neat experiment?

05 06 02 05 CDR-EVA Yes, that's the kind of experiment I like.

05 06 02 07 LMP-LM Yes.

05 06 02 08 CDR-EVA Okay, we're out here at good distance where it won't get any dust on it from the Rover. And I'll turn it into the Sun here; stick it into the ground. Good core tube. There. Okay, Joe, solar wind is deployed.

05 06 02 31 CDR-EVA And I'm going to - -

05 06 02 32 CC Beautiful!

05 06 02 33 CDR-EVA - - pick up a - -

05 06 02 34 CC Ingress the Falcon, please.

05 06 02 35 CDR-EVA - - a couple of rocks. Yes, sir.

05 06 03 05 CDR-EVA Oh, my! I couldn't resist this one, Jim.

05 06 03 14 LMP-LM That the glass one?

05 06 03 15 CDR-EVA Oh, look at what I got! You wouldn't believe it!  
Okay, pick up the ETB.

05 06 03 25 LMP-LM And we got the LAC [sic] that we should stow out  
on the porch.

05 06 03 31 CDR-EVA Okay.

05 06 03 55 CDR-EVA Well, we don't need the LEC, - oh yes, you mean  
the - -

05 06 03 56 LMP-LM Yes.

05 06 03 57 CDR-EVA - - LEC up there.

05 06 03 58 LMP-LM Yes.

05 06 03 59 CDR-EVA Yes; okay. Okay. Oh, I like 1/6g!

05 06 04 31 CDR-EVA Okay, here's the ETB. How about handling that  
with care; there's a piece of fragile in there.  
I'll get it to you.

05 06 04 45 LMP-LM Grab it here.

05 06 04 46 CDR-EVA Got it? Real easy with it, so we don't get the  
film and stuff dirty. And, the LEC.

05 06 04 59 LMP-LM Let me get your antenna.

05 06 05 00 CDR-EVA Yes, sir.

05 06 05 01 LMP-LM Unhook it here.

05 06 05 02 CDR-EVA And then let me hang up the LEC, here.

05 06 05 13 CDR-EVA Okay, I got hung up. Can you get my antenna? Oops!

05 06 05 20 LMP-LM Can you bend over a little more? Give me a little  
more than that. Okay, your antenna's stowed.

05 06 05 31 CDR-EVA Okay. Come back in here and - man take a dive.

05 06 05 46 CDR-EVA And then load slow.

05 06 05 48 LMP-LM Yes. Got it made.

05 06 05 55 CDR-EVA Yes, if I - Can you get the ETB out of the way?

05 06 06 00 LMP-LM Yes.

05 06 06 09 CDR-EVA ...

05 06 06 12 LMP-LM Just a minute; I'm - Okay, I'm kind of hung - hung up on you, Dave. Let me move back.

05 06 06 19 CDR-EVA Oh, okay.

05 06 06 20 LMP-LM Okay, now you're clear.

05 06 06 26 CDR-LM There you are.

05 06 06 33 LMP-LM Okay, close - PRIME WATER, CLOSED.

05 06 06 37 CDR-LM Oh, wait a minute. I'm not ready to do anything yet. Let me turn around. Joe, do you read us?

05 06 06 47 CC Loud and clear: loud and clear.

05 06 06 52 CDR-LM Okay, PRIME WATER, CLOSED, huh?

05 06 07 05 CDR-LM If I can find it.

05 06 07 07 LMP-LM Want me to get it for you?

05 06 07 15 CDR-LM Okay, PRIME WATER's, CLOSED.

05 06 07 17 LMP-LM Oh, did you -

05 06 07 19 CDR-LM Huh? I got mine.

05 06 07 20 LMP-LM Turn around and get mine.

05 06 07 27 CDR-LM Can you get it? I'll get it for you. Got it. Okay, turn around to the right here. I mean left. I'm sorry. Here, turn around. Okay.

05 06 08 06 LMP-LM Okay, I've got a flag - and a tone.

05 06 08 24 CDR-LM The PLSS seems to have shifted.

05 06 08 28 LMP-LM That's the problem. It seems like it's riding a lot higher.



05 06 08 30 CDR-LM Yes! Wait, wait. No wonder you can't get those things.

05 06 08 37 LMP-LM Wait - You're caught onto here. May be caught on that shelf.

05 06 08 40 CDR-LM ... Okay. Okay, PRIME WATER's, CLOSED.

05 06 08 52 CC Jim, you should be in DISCONNECT on your - -

05 06 08 54 CDR-LM ...

05 06 08 55 CC - - SUIT ISOL valve.

05 06 08 58 CDR-LM God damn!

05 06 09 01 LMP-LM No, I am Joe.

05 06 09 15 CDR-LM Stay right there; can you, Jim?

05 06 09 16 LMP-LM Yes, I'm getting back here in the corner.

05 06 09 28 CDR-LM Okay, hatch is closed and locked. Now, let me move that out of the way for you - Wait. Ain't no room in here.

05 06 09 51 LMP-LM Gee whiz! Okay. Now, can you get to the dump valve?

05 06 10 07 CDR-LM To AUTO?

05 06 10 11 LMP-LM Okay. Dump valve in AUTO.

05 06 10 15 CDR-LM Okay. Now, the next thing is - is PLSS O<sub>2</sub> and PRESS flags may come on during REPRESS. PLSS O<sub>2</sub> greater than 10 percent, manually control - control - Okay, I've got about 10 percent. Why don't you go CABIN REPRESS to AUTO?

05 06 10 34 LMP-LM CABIN REPRESS going to AUTO. Getting - What was the first one?

05 06 10 45 CDR-LM Say again?

05 06 10 46 LMP-LM Oh, I thought the circuit breaker.

05 06 10 48 CDR-LM Come watch EV - oh, wait a minute. You got CABIN REPRESS in AUTO?

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05 06 10 51 LMP-LM Yes.

05 06 10 52 CDR-LM Okay, CB(16) ECS: CABIN REPRESS, close.

05 06 10 54 LMP-LM Now, let me get around the - What am I hung up on?

05 06 11 02 CDR-LM Nothing I can see - but me.

05 06 11 09 LMP-LM Okay, CABIN REPRESS?

05 06 11 10 CDR-LM Okay, there she goes. And, we're up to half; up to 1; 1.5; 2.0. Okay, you can go cabin pressure ... and go PRESS REG A and B to cabin.

05 06 11 56 LMP-LM Let's ...

05 06 11 59 CDR-LM Okay. PLSS O<sub>2</sub> OFF when the cabin is full to 2 and a half, which it is now.

05 06 12 23 CDR-LM Okay, my PLSS O<sub>2</sub> is OFF. And warning light, off. Okay, verify cabin pressure stable at 4.6 to 5, and it looks like it's 4.5 and stable.

05 06 12 37 LMP-LM Okay.

05 06 12 39 CDR-LM The purge valve to depress. CB configuration. Okay? CB(16) ECS: SUIT FAN 2, close.

05 06 12 47 LMP-LM SUIT FAN 2 coming - I - I didn't read - Where are we, Dave? I can't read you.

05 06 12 52 CDR-LM Right here; CB(16) ECS: SUIT FAN number 2, closed.

05 06 12 55 LMP-LM Okay, closed.

05 06 12 56 CDR-LM SUIT FAN DELTA-P closed.

05 06 12 58 LMP-LM Closed.

05 06 12 59 CDR-LM Okay, get these lights up here so we can see this worst one.

05 06 13 10 CDR-LM Okay. ECS caution and H<sub>2</sub>O SEP component lights are out. Doff gloves; stow on the comm panel.

05 06 13 17 LMP-LM Boy, that's a nice idea.

05 06 13 41 CC Jim, your SUIT ISOLATION - -

05 06 13 42 LMP-LM Yes, let's find the ...

05 06 13 43 CC - - valve still shows connect down here.

05 06 13 50 LMP-LM Okay, it's in SUIT DISCONNECT up here, Joe.

05 06 13 55 CC Good enough, Jim. Thank you.

05 06 14 11 LMP-LM Dave, could you -

05 06 14 12 CDR-LM What? What do you need?

05 06 14 13 LMP-LM Could you get my gloves. I tell you, my fingers are so sore.

05 06 14 17 CDR-LM Mine are, too. Don't worry, there you go.

05 06 16 02 CDR-LM Okay, put up the old helmet bag.

05 06 16 16 LMP-LM There's a funny smell in here.

05 06 16 17 CDR-LM Yes, I think that's a lunar dirt smell. Never smelled lunar dirt before, but we got most of it right here with us. Okay, doff helmets with visors, lower shades, stow in helmet bags. Verify safety on the dump valve.

05 06 16 34 LMP-LM Do you have a ...?

05 06 16 36 CDR-LM Can you get that?

05 06 16 43 LMP-LM Okay.

05 06 16 47 CDR-LM Okay. Where are we, here? A DESCENT WATER valve, OPEN.

05 06 17 00 LMP-LM DESCENT WATER, OPEN.

05 06 17 06 CDR-LM Okay. Now remove purge valves, stow in the purse. Uh oh, the purse fell down.

05 06 17 13 LMP-LM I took it down, Dave. I thought that was one of the things that I was hanging up on.

05 06 17 16 CDR-LM Yes; okay.

05 06 17 25 CDR-LM Where did you put it, Jim?

05 06 17 27 LMP-LM I put it right behind you.

05 06 17 33 CDR-LM Man!

05 06 17 42 CDR-LM Oh, yes. Okay. MAG bags all fall out - fell out.

05 06 17 50 LMP-LM Now that purge valve is really dirty.

05 06 17 53 CDR-LM Yes, I bet it is. Okay; I'll show you what you were hanging up on. Thing right here. Oh. Okay: I'll show you later. Okay; purge is up; purge.

05 06 18 13 LMP-LM Mine is up.

05 06 18 15 CDR-LM Yes. Guess - I guess what we ought to do is not get this clean stuff dirty. They really ought to have a - another neat bag for the dirty stuff.

05 06 18 36 LMP-LM We should have kept all those camera bags.

05 06 18 42 CDR-LM Yes. Not too sure we'd get this dirty.

05 06 18 48 LMP-LM Well, we could wrap them in tissue.

05 06 18 51 CDR-LM Well - Yes. Okay, we'll try that. Here, I'll tell you what; I'll put them in this - And we got to use this purse - Let me take all this stuff out of the purse that's clean and stick them in - here. Okay, just hand me the purge valves, I'll take care of it. Let's go on down this thing here. Disconnect the OPS O<sub>2</sub> hose.

05 06 19 33 LMP-LM Okay. It's in work.

05 06 19 43 CDR-LM \*\*\* put that brush in here.

05 06 19 50 LMP-LM True.

05 06 19 59 CDR-LM That's disconnected. Connect LM O<sub>2</sub> hoses, red to red.

05 06 20 07 LMP-LM Blue.

05 06 20 09 CDR-LM Okay.

05 06 20 10 LMP-LM Red to red and blue to blue, huh?

05 06 20 12 CDR-LM Yes. I mean red to blue. Did I say that right? No, reverse them.

05 06 20 21 LMP-LM Okay.

05 06 20 22 CDR-LM Slow. Shoot! Okay.

05 06 21 22 CDR-LM Okay. It says - Okay; diverter valve to horizontal. SUIT ISOLATION - -

05 06 21 33 LMP-LM I'm - I'm not hooked up yet, Dave.

05 06 21 52 CDR-LM Say again?

05 06 21 53 LMP-LM I'm -

05 06 21 54 CDR-LM Can't? Turn around; I'll get you.

05 06 22 12 CDR-LM Can you back into your corner there?

05 06 22 42 CDR-LM Okay, you're plugged in. SUIT FLOW.

05 06 22 52 CDR-LM Yes. PLSS pump, OFF; PLSS fan, OFF. Disconnect PLSS water from PGA; connect LM water.

05 06 23 05 LMP-LM That's a good idea.

05 06 23 08 CDR-LM Oh, boy.

05 06 23 13 LMP-LM ...

05 06 23 24 LMP-LM Yes. It's cooling off. Got a ways to go. Oh, that's okay; let her run.

05 06 23 38 CDR-LM Okay, PLSS mode, both, to 0. AUDIO circuit breaker open and connect to LM comm.

05 06 24 25 LMP-LM ...?

05 06 24 29 CDR-LM \*\*\* ...? Hey, you got your comm?

05 06 24 38 LMP-LM Okay.

05 06 24 40 CDR-LM And AUDIO ( CDR and LMP), VHF A, RECEIVE, and B, OFF. Okay; MODE, ICS/PTT, and RELAY, OFF.

05 06 25 34 CC PRESSURE REGs to A and B, CABIN, please.

05 06 25 48 CDR-LM Okay, that's complete.

05 06 25 51 CC Good show.

05 06 42 38 CDR-LM Hello, Houston; Hadley Base.

05 06 42 41 CC Hello, Hadley Base; this is Houston.

05 06 42 46 CDR-LM Roger. How is everything down there?

05 06 42 51 CC Dave, the dust may have settled up there; I'm not sure if it's settled down here. We've got more data than we know what to do with at the moment. What can we help you with?

05 06 43 02 CDR-LM Oh, just wanted to tell you, we've got two PLSSs charged with O<sub>2</sub>, one at 95 and one at 93.

05 06 43 09 CC Roger. We copy that.

05 06 43 14 CC Real fine day's work up there, guys. ...

05 06 43 21 CDR-LM Okay. Thanks, boss.

05 06 43 35 CC Dave, on that PLSS reading, could you tell us which number belongs to which PLSS, please?

05 06 43 43 CDR-LM We should have done that. Jim's got a 95, and I've got a 93.

05 06 43 49 CC Roger, Dave. Thank you.

05 06 43 56 CDR-LM Give us about 30 minutes to get a bite eat - bite to eat, and we'll press on for the next one. Then we won't have to doff the PLSSs.

05 06 44 08 CC Dave, Deke says okay, but I'm not sure if the question was understood.

05 06 44 17 CDR-LM (Laughter) Okay.

05 06 44 29 CC I thought you added one more word there, like eat and rest.

05 06 44 35 CDR-LM Roger.

05 07 05 54 CC Hello, Hadley Base; this is Houston.

05 07 05 59 CDR-LM Go ahead, Houston.

05 07 06 04 CC Roger, Dave. Just wondered how you were getting along up there. And if you have an estimate of the possible debriefing time, we'll shoot for that down here.

05 07 06 21 CDR-LM Well, Joe, I'd like to get everything cleaned up in here; we got an awful lot of dirt. How about giving us an hour?

05 07 06 31 CC Sounds good, Dave. No hurry at all. And while you're working around there you might be interested in a little conversation from down here. The SIM bay's chewing up data like it's going out of style. We're working beautifully. And, as far as we can determine, the ALSEP is working as advertised; getting all kinds of data from it, and I'll get a good accurate reading for that - on that for you later on. And I think that your traverse goes without comment; it was beautiful, and we're just trying to digest some of the data from that right now.

05 07 07 18 CDR-LM Okay, I'll tell you one thing, Joe. Time sure goes fast out there.

05 07 07 24 CC Yes, sir. You're not telling us anything new, Dave. Thank you.

05 07 07 31 CDR-LM I - I - feel like we spent only 5 minutes at the Front in the whole trip.

05 07 07 36 CC You'll get some more time a little later. Don't - don't worry about that. It seemed like about 4 and a half minutes to us, I think. The - the scenery was spectacular.

05 07 07 50 CDR-LM Well, good.

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

05 05 23 --

BEGIN LUNAR REV 25

05 05 51 18 CC

15, this is Houston. We'd like to have you go WIDE BEAM on the HIGH GAIN ANTENNA, and then to NARROW.

05 05 51 30 CMP Okay, Houston. This is Endeavour. On WIDE BEAM, going back to NARROW.

05 05 51 36 CC Roger.

05 05 51 56 CC That's sounding better, Al. How are things going up there?

05 05 52 03 CMP They're going okay, Karl. Looks like I've caught up a little bit. Got all the dumps out of the way, and got the libration photography. Looks like I'm going to be handicapped a little bit because of the mission timer, but we'll press on.

05 05 52 17 CC All right. Our understanding on the mission timer is, that even though you tried to reset it, it still refused to count up. Is that correct?

05 05 52 26 CMP That's correct. And I thought what I'd do now is reset to zero and start.

05 05 52 33 CC Roger. And for future reference, we'd like - -

05 05 52 38 CMP It counts from zero, Karl. Right?

05 05 52 41 CC Roger - You say it is counting, but it had - it had - to start from zero to start counting again?

05 05 52 50 CMP Yes. Well, let me pick a random number and see if it will count from there. I just tried to tell you the correct times - -

05 05 53 37 CMP Okay, Houston; Endeavour. Looks like we must have just run across a little funny there, Karl, because it started okay now and is running.

05 05 53 45 CC Roger. Do you have a time source, or would you like a hack down here to get it started again, on the right number?

05 05 53 54 CMP I used the CMC time.

05 05 53 58 CC Roger.

05 05 54 38 CC And now for a future reference, we'd like to know whether you found the quick disconnect?



05 05 54 46 CMP Negative.

05 05 54 51 CC We copy.

05 05 55 41 CC We copy. Al, they want me to ask you once more about - tell - tell you once more where - where the location was. The waste management bag in A-8, but I think you know that already. Incidentally, it's a rather short thing, 2 or 3 inches long. It's got a thread on one end and a quick - quick disconnect on the other.

05 05 56 04 CMP Yes Karl, that's exactly what I was looking for. And problem is, the waste - the small waste management bag is not in A-8 right now. I'm going to have to - have to look around. Maybe Dave or Jim got it out on the way out. I'll look around and see if I can find it.

05 05 56 18 CC Okay, fine.

05 05 56 21 CMP I just haven't had - haven't had the free minutes since they came up to do that.

05 05 56 28 CC Right. And there's no reason now to be troubled by it at all. We were just asking that for future reference. Sounds like it's only a matter of it being dis - misplaced somewhere, so let's forget it.

05 05 57 13 CC Endeavour, we'd like to have HIGH GAIN ANTENNA, AUTO.

05 05 57 24 CMP Okay, Houston; Endeavour. You've got HIGH GAIN, AUTO, and I've got the PAN CAMERA POWER, on.

05 05 57 31 CC Very good. Any time - any time on this rev, we'd like to have an update on the magazines. And in the meantime, let me give you a few good words on the surface activity. The boys have spent the last hour deploying the ALSEP, and I think all of the experiments got out, except we had some trouble, as anticipated, with the - with the drill. Dick Gordon is down here saying I told you so. The - Dave was in the process of making - for the world discus record, when he just about fell flat on his face he threw it so hard. That was - that was the high spot of the whole ALSEP deployment procedure.

05 05 58 19 CMP How far did he get it?

05 05 58 23 CC Oh, I suppose we'll claim something like 2 or 3 kilometers. Who knows for sure. (laughter) But the gyrations he went through to keep his footing after that big heave - -

05 05 58 31 CMP Better than golf balls, even.

05 05 58 33 CC Yes, yes. It was really funny to see him scrambling to keep his footing though after he swung around.

05 05 59 47 CC Okay, Al. We're ready to have the PAN CAMERA POWER, off.

05 06 03 05 CC Endeavour, this is Houston. You can turn PAN CAMERA POWER, off now.

05 06 03 17 CMP Roger, Houston. Got it off.

05 06 06 00 CMP Houston, Endeavour.

05 06 06 03 CC Go ahead, Endeavour.

05 06 06 16 CC Endeavour, this is Houston. Go ahead.

05 06 06 22 CMP Okay, Karl. Just for your information, I finally dug all the way through A-8 and got a hold of the quick disconnect. And it's - it's as I expected it. But, it was there, and we're squared away now.

05 06 06 34 CC Very good. That makes people feel better down here. We did stow it, after all.

05 06 06 41 CMP Yes, well, one of my - one of my problems is that I've got the center couch underneath the right-hand couch, and I've also got the L-shaped bag and a few other things stowed on top of A-8. So, it's not quite so easy to get to.

05 06 06 53 CC Right-o. We understand.

05 06 12 30 CC Al, the boys are in the LM, and they're representing the cabin now.

05 06 12 38 CMP Roger, Karl. Sounds like they had a pretty good day.

05 06 12 42 CC Yes, sir. They had a terrific day. I think they're going to sleep well tonight.

05 06 12 51 CMP Yes. I wouldn't be surprised.

05 06 16 33 CC Endeavour, this is Houston. You getting a good look at Littrow up there?

05 06 16 40 CMP Yes, sir. I just went by Littrow. And right over Serenitatis now, coming up on the landing site.

05 06 16 48 CC Very good. Hey, you've been looking at Littrow for a couple of days now. Are you forming any opinions whether that dark area is lava flow or ash flow?

05 06 17 03 CMP Well, Karl, if I had to give you the opinion right now, I'd say it was all some - some kind of ash. I don't - I'm not sure it's flow. But it certainly is - it looks like a deposit over the entire surface. You can see it - mostly in the upland areas and down in the mare areas and mostly in - in valleys - in depressions, this stuff seems to have collected almost like it was - there was some mass wasting down the hills making the - making the valleys darker in color and maybe a little thicker with that kind of material. But there are - there are still at least three different distinctive colorations in the Littrow area, going from dark gray to a sort of brownish color. And it was the dark gray that looked like it was an ash fault to me, and I'm not sure about intermediate. It looks more like it could have been a flow, and I can see even through - through the binocular I can see the contact where it - there's a - It looks like a flow front between that and the mare - the normal mare coloration, which is - which is a little lighter in color.

05 06 18 23 CC Okay. I guess we'd better let you go back to work on Hadley, which is coming up any minute now.

05 06 18 31 CMP Roger.

05 06 23 04 CMP Houston, Endeavour.

05 06 23 07 CC Go ahead, Al.

05 06 23 12 CMP Okay, Karl. I'm over the Hadley area now. I've gone by it. And nothing more to report on the Hadley, except one observation that I meant to make the last pass and didn't. I'll make it now. And that is that the landmark 15 — 40 is readily visible, even with the naked eye. You don't need a sextant to see it.

05 06 23 35 CC Very good.

05 06 23 46 CC Does that secondary crater complex stand out in any special way that gives you some idea as to its origin?

05 06 23 58 CMP Well, I didn't look at it from that standpoint when I was going over it before, but - I guess I'll have to take a special look at that to answer your question.

05 06 34 05 CC Hey, Al, how's that sunset look down below you?

05 06 34 15 CMP Well, I can't see it from here Karl.

05 06 34 20 CC Any chance - you have got light - in the Aristarchus area yet? Seeing anything down there?

05 06 34 27 CMP Negative, Karl. I'm beyond it, and it looks like - I'm looking in the wrong direction anyway. Will say this, though. There is - there - seems to be a cloud that seems to be moving along with me; I guess from that last dump. And it - drifted out. Pretty well dispersed right now, but every little particle of that cloud reflects the sunlight like a mirror.

05 06 34 55 CC That's a very interesting observation. You still see some of it out there now, do you?

05 06 35 04 CMP Yes, that's affirmative. I do, and - Now, I dimmed the lights down; I have a pretty nice view of the Moon in earthshine.

05 06 35 14 CC Ah, hah. Any chance you see Aristarchus? Are you, - Maybe you're not looking that way, I guess. Are you looking down on Aristarchus by any chance?

05 06 35 27 CMP Well, just a second, and I'll turn the lights down and let you know.

05 06 35 30 CC Good. - That Schroter's Valley, you know, and was once known to glow red.

05 06 37 53 CMP Hello, Houston; Endeavour.

05 06 38 00 CC Did you call, Al?

05 06 38 04 CMP Roger, Karl. I've been sitting here looking at Aristarchus, and I finally had to check the map to make sure; because it's - it's so bright in earth-shine, it's almost as bright, it seems like, as it is in sunshine. Very, very bright crater. It looks very much like Copernicus at night.

05 06 38 25 CC I'll be darned. Sounds real interesting.

05 06 38 29 CMP Yes. And I can quite clearly trace out Schroter's Valley going off toward the northwest. I can't see it. It's a little bit out of range; it's north of track, and so it's somewhat out of range for me to see.

05 06 38 44 CC Very good. Hey. Spence is asking me to remind you about the film magazine update if you have any time yet this rev.

05 06 39 00 CMP Okay. I'm going to have to go back through the Flight Plan and get the numbers out. But I will do that.

05 06 39 10 CC Okay. I'm not sure we want you to do that at the expense of anything else here, like to P52. Hang on.

05 06 39 22 CMP So, I'll go ahead and do the P52, Karl.

05 06 39 23 CC Right. We'd rather have you do the P52 if there's any either/or there.

05 06 42 32 CC We've got your torquing angles, Al.

05 06 42 39 CMP Okay, Karl. Get them out in a minute.

05 06 45 06 CC Hey, Al, you've got a couple of people interested down here in particle clouds now. And, first of all, we'd like to have you verify that you saw particles all the way until you went into the shadow. I certainly believe you did. You were

telling me about them just as you were in that position. And likewise, if you have a chance at sunrise tomorrow where you are in that same position with the Sun illuminating you, but not the background, could you see if you - there is any remaining signs of those particles?

05 06 45 38 CMP Okay, be glad to. Now, as far as how long I saw them; I saw them as long as the spacecraft was still in sunlight. However, I was beyond the terminator - surface terminator. And, - right now, looking out the window I don't see any of them.

05 06 45 55 CC Okay, fair enough. And I got some words for you on that bad attitude that we had on the oblique mapping camera photography this morning. If - -

05 06 46 09 CMP Okay.

05 06 46 10 CC Evidently, we - sent you up the right attitude angles, but some how or other we had a - slightly erroneous omicron. And, the actual photograph - I think we were something like 10 or 15 degrees off attitude - were [sic] perfectly good. No problem there. But, we have gone to the Flight Plan and made sure in the future that we will have the proper omicron and everything will be right on the nose.

05 06 46 42 CMP Okay.

05 06 46 43 CC Just in case you were wondering what in the heck went wrong that time. And, I have a TEI-37 any time you have time to copy it.

05 06 46 53 CMP Okay, just a minute.

05 06 47 39 CMP Okay, Karl. Go ahead with the TEI-37.

05 06 47 47 CC Say again, Al.

05 06 47 52 CMP Go ahead with your TEI-37 pad.

05 06 47 56 CC Roger. TEI-37, SPS/G&N; 37350; plus 0.60, plus 1.01; 151:00:17.43; plus 2979.1, minus 0745.2, minus 0243.3; 180, 109, 349; the rest is NA. Ullage, 2 jets for 17 seconds - 17 seconds - and the longitude at  $T_{ig}$  is minus 179.52. That's all.

05 06 49 03 CMP Okay, understand TEI-37, SPS/G&N; 37350; plus 0.60, plus 1.01; 151:00:17.43; plus 2979.1, minus 0745.2, minus 0243.3; 180, 109, 349; 2 jets, 17 seconds; longitude T<sub>ig</sub> is minus 179.52.

05 06 49 34 CC That's all correct.

05 06 53 02 CC Al, how is your exercise machine going up there? Getting all you need for the - big day in the future?

05 06 53 14 CMP Right now I'm trying to figure out your film usage.

05 06 53 17 CC Oh, ho.

05 06 53 26 CMP Yes, the exerciser is working fine. The rope's getting a little frayed right now.

05 06 53 30 CC You're really putting in all your hours on it, are you? Glad to hear that.

05 06 53 39 CMP Got to keep in shape.

05 06 53 43 CC Righto.

05 06 53 47 CMP You might also be interested to know that, at least up to this point, we've eaten every morsel of food that was allotted for us at that time.

05 06 53 56 CC Sounds like you're really living it up, up there. Chuck Berry says he's delighted.

05 06 55 16 CMP Houston, Endeavour.

05 06 55 18 CC Go ahead, Endeavour.

05 06 55 22 CMP Okay, got a quick rundown on the film for you. The DAC magazine Hotel is - has 65 percent left; and for the Hasselblad, mag Metro is - I've used 155 frames; November: used 56 frames; Romeo's used 40 frames; Sugar used 80 frames, and Nikon, I've used 16 frames. And let me reverse the first one just to make it consistent. I've used 35 percent out of magazine Hotel for the 16 millimeter. That makes it all consistent.

05 06 56 12 CC Very good, Al. That came through loud and clear.

05 06 56 55 CC Al, everybody down here is sending up bouquets to you for having done such a great job in a crowded period.

05 06 57 06 CMP Well, thank you very much, sir.

05 06 57 08 CC And all the systems down here are looking in good shape as you go around the corner.

05 06 57 16 CMP Okay, Karl. Thank you.

05 06 57 25 CMP Think I'll get something to eat.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 07 13 48 CC Hadley Base, this is Houston. If you have loose rocks in the cabin and need containers for them, we're suggesting cover bag number 2, or cover bag number 4.

05 07 14 08 CDR-LM Okay. Cover 2 and cover 4 for any extra rocks. Okay.

05 07 31 05 LMP-LM Houston, this is Hadley. Are you ready for the battery management?

05 07 31 16 CC Stand by, Hadley Base.

05 07 31 21 LMP-LM Okay. We're standing by, Houston.

05 07 31 29 CC And, Dave, we're ready.

05 07 31 36 LMP-LM Understand you're ready for the - the battery change.

05 07 31 40 CC That's right, Jim. Standing by.

05 07 31 44 LMP-LM Okay.

05 07 32 44 CDR-LM Okay, Houston. The ED BAT are 37 and 37.

05 07 32 49 CC Roger, Dave. Thank you.

05 07 44 26 CDR-LM Houston, Hadley Base.

05 07 44 29 CC Go ahead, Hadley. This is Houston.

05 07 44 33 CDR-LM Okay. I've got some weights for you, if you're ready to copy.

05 07 44 41 CC Go ahead, Dave. We're ready.

05 07 44 46 CDR-LM Okay. SRC number 1 is stowed. It weighed 36 pounds. And collection bag number 4 weighs 15 pounds.

05 07 45 01 CC Okay, Dave. Thank you.

05 07 45 05 CDR-LM Roger.

05 07 45 10 CC And I've got a number for you. The VHF communication window with Endeavour will open up in about 30 minutes - about half an hour, and you'll have around 10 minutes for conversation with Al, if you'd like that. Over.

05 07 45 30 CDR-LM We'd like that. Thank you.

05 07 45 39 CC Very good, Falcon. And any time you're interested in any lunchtime conversation, we've got more than enough to fill the square down here.

05 07 45 52 CDR-LM Okay, Joe. We'll be giving you a call.

05 07 45 57 CC Roger. And we're in no hurry.

05 07 46 03 CDR-LM Okay.

05 07 49 23 CC Falcon, you can go POWER AMP, OFF; LO bit rate.

05 07 49 30 CDR-LM POWER AMP, OFF; LO bit rate.

05 07 50 57 CC And, Falcon, requesting LO bit rate.

05 07 51 02 CDR-LM LO bit rate.

05 07 52 38 CDR-LM Hey, Houston, we got one comment on our water supply here.

05 07 52 43 CC Go ahead.

05 07 52 48 CDR-LM The bacteria filter that is on the water gun, at some stage in the process today, got broken. It only has a plastic connector on it, rather than a metal connector, and the - the plastic connector chipped, and it started leaking. And we don't know exactly when that happened. We found it when we were getting ready to unsuit - when we were unsuiting to get a drink. And we're not sure whether it spilled a fair amount of water or just the little small puddle that we have here on the - on the floor of the LM. Have you noticed any significant decrease - decrease in water supply?

05 07 53 26 CC Stand by, Dave.

05 07 53 31 CDR-LM Okay.

05 07 53 44 CDR-LM And, of course, Joe, the bacteria filter is no longer usable, if anybody is worried about that. We're - we're not particularly.

05 07 53 51 CC Roger, Dave.

05 07 54 54 CC Dave and Jim, this is Houston. Our data shows no leakage of water at all. We suspect that the little puddle you see on the floor is about all the water that's dripped out there.

05 07 55 08 CDR-LM Okay. Thank you.

05 07 55 12 CC And we also don't expect any problem on that broken bacteria filter, unless maybe you discovered some spiders and worms under the big rock you turned over.

05 07 55 26 CDR-LM No, we're saving those for a surprise when we get back.

05 07 55 30 CC They will be.

05 08 14 28 CC Hadley Base, this is Houston. You're within VHF range of - of Endeavour now.

05 08 14 39 CDR-LM Roger, Joe.

05 08 16 56 CDR-LM Hello, Endeavour; Hadley Base. Hey, we're doing just fine. How are you doing?

05 08 17 14 CDR-LM How things going up there, Al?

05 08 17 29 CDR-LM Okay. You - you're all broken up. You must be just coming over those mountains again. See if you can see any tracks down there.

05 08 17 48 CDR-LM Well, we got all the way up pretty close to - we got to St. George, got to Elbow, and got most of the things done.

05 08 18 01 CDR-LM Yes, it's pretty nice. I understand that the old SIM bay's gobbling up the data faster than the Moon can produce it. Is everything nice and clean up there? Boy, is it dirty down here! But we're going to bring this up.

05 08 18 34 CDR-LM Yes, we're just climbing out of the suits right now, and buttoning them up, and getting ready to power down. You, too? Yes, I guess there's enough room for one guy now, huh?

05 08 18 59 LMP-LM Don't get too spoiled, Al.

05 08 19 07 CDR-LM And save us some food.

05 08 19 10 LMP-LM Yes.

05 08 20 24 CDR-LM Hey, that's great! Can you see the tracks? That's good. Maybe - maybe you can see the ALSEP.

05 08 20 49 CDR-LM Yes, it's west about 300 feet.

05 08 21 04 CDR-LM No, it's not very good. You're looking at best at something that's 2 to 3 feet. Oh, well.

05 08 21 30 CDR-LM Well, have a nice time. We're going to go back to work. We'll talk to you later. Okay.

05 08 36 47 CC Hello, Hadley Base. This is Houston. No need to acknowledge. I have a report from the back room for you. The ALSEP has been turned on. We're getting a very high signal strength from the central station, and every experiment seems to be working normally. It's an outstanding job. I thought you'd be interested in the fruits of your labors there. Over.

05 08 37 19 CDR-LM Well, thank you, Joe. We had a good time doing it. We'll be back with you in about - probably 10 or 15 minutes to talk over the rest of it.

05 08 37 28 CC Roger, Dave. We're in no hurry.

05 08 37 35 CDR-LM We're coming along pretty good. We've got things pretty well cleaned up, and we're getting into our nice white suits now.

05 08 37 40 CC Sounds good.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 07 21 --

BEGIN LUNAR REV 26

05 07 47 44 CC

Endeavour. We'd like to have a narrow beam, please.

05 07 47 53 CMP Narrow beam.

05 07 47 57 CC Thank you.

05 07 48 08 CC And what's new on the west limb of the Moon?

05 07 48 17 CMP Well, I must confess, I wasn't watching. I was eating.

05 07 48 27 CC Enjoy it. Looks like, looking at the Flight Plan, looks like you finally had a restful sort of eat period.

05 07 48 31 CMP That's true, and it certainly was good. Incidentally I did look for the - the particle cloud that was around me at sunrise, and it looked like it had diminished somewhat from the sunrise - or from the sunset terminator. But it may have been - it may have been the angle of the sunlight also.

05 07 48 51 CC But you definitely did see some particles yet?

05 07 48 55 CMP Fewer particles.

05 07 48 57 CC Fewer particles, but still - still some were there, were they?

05 07 49 03 CMP That's correct.

05 07 49 16 CC And how do you enjoy that coquina soup?

05 07 49 25 CMP Almost as good as the parsley soup.

05 07 49 28 CC Wonderful. Brewed it myself.

05 07 49 36 CMP It's better than nothing, you know?

05 07 49 38 CC (Laughter) Is that all you can say for it?

05 07 57 52 CC Al, this is Houston.

05 07 57 59 CMP Go ahead, Houston.

05 07 58 01 CC Okay, if you'll give us ACCEPT, we'd like to up - update your state vector.

05 07 58 10 CMP Okay. You have it.

05 07 58 11 CC Roger. And we've a comm check coming up with the LM and the - the time - the earliest time at which you've got a contact with them is 128:14:14.

05 07 58 27 CMP Understand; 14:14.

05 07 58 29 CC Roger. And Bob is on board now. So I'll be signing off and seeing you in the morning.

05 07 58 43 CMP Okay, Karl. Go home and have a nice dinner and I'll talk to you in the morning.

05 07 58 47 CC Righto.

05 08 00 04 CC And, Al, it's your computer.

05 08 00 10 CMP All righty. Good morning.

05 08 00 13 CC Evening.

05 08 03 37 CMP Houston, Endeavour.

05 08 03 40 CC Go ahead, Endeavour.

05 08 03 45 CMP Okay, Bob. I'm just coming over - over Picard at the present time, and wanted to make a comment that it looks like there are - there are several ring structures inside the - the basin itself. They're all concentric, and I don't see a great deal of relief on those that look like they're in the bottom of the basin. But looking at the - looking at the - scarps around the - the - the outer ring, Picard looks - looks like it's just - almost a caldera-type. They look almost like - fault plains along - along the outside. And I can see in the - in the - in the outer wall very distinct layering. For instance - the top - right at - right at the top is a very thin dark layer, and that runs all the way around. And there's a light-colored layer. And then there are alternating dark and light layers all in about the same - distance from the top of the crater - all the way around.

05 08 05 11 CC Roger; copy, Al. That sounds like a pretty complete description.

05 08 05 25 CMP And, as a matter of fact, Bob, I can make that same observation about Peirce - especially Peirce Alpha. This - I - I notice the same kind of layering and the same kind of horizontal lineaments in the - in the wall of the crater.

05 08 05 51 CC Beautiful. The king'll be proud of you.

05 08 07 12 CMP Houston, Endeavour.

05 08 07 14 CC Go.

04 08 07 19 CMP Okay, Bob. I'm up over Proclus now and that's one of the visual targets. And a couple of comments about Proclus, which weren't too obvious from the pictures we've seen before. The - the edge or the segment of the crater, which is in the excluded zone of the ray pattern - which - the ray pattern, by the way, is very distinct even from directly - directly overhead. That little segment of the crater wall seems to be - discontinuous with the - with the rest of the crater. In other words - the - the crater, if you - if you made a circular ring - and you showed that as the crater, then - then this little chunk in that - in that quarter where the excluded zone is, lies outside of what you would describe as a circle for the crater itself. It's - it's like a little dimple in the crater itself. And I can't see anything in particular there close to the rim that would account for any shadowing - any physical shadowing of the ray pattern. But I - I can see a diagonal fault zone that runs down into that little dimple that I just described a minute ago, and runs into that dimple from the east side. I couldn't pick one out on the west side, but it's very distinct on the east side.

05 08 08 56 CC Beautiful.

05 08 08 57 CMP And, in addition to that, I didn't see - I didn't see a great deal of difference in the - in the terrain or in the structure of the terrain across the excluded zone.

05 08 09 12 CC Got it.

05 08 12 37 CMP Houston, Endeavour.

05 08 12 41 CC Go ahead.

05 08 12 46 CMP Okay. I'm looking right down on Littrow now, and a very interesting thing. I see the whole area around Littrow, particularly - particularly in the area of Littrow where we've noticed the darker deposits, there are a whole series of small, almost irregular shaped cones, and they have a very distinct dark mantling just around - tho - those cones. It looks like a whole field of small cinder cones down there. And they look - Well, I say - I say cinder cones, because they're somewhat irregular in shape. They're not all - they're not all round - they're positive features - and they have a very dark halo, which is mostly symmetric, but not always, around them individually.

05 08 13 41 CC Beautiful, Al.

05 08 14 34 CC And, Al, you might want to be reminded at this point, we're getting toward the VHF.

05 08 14 42 CMP Thanks, Bob. Just going to give them a call. Hello, Falcon; this is Endeavour.

05 08 15 02 CMP Hello, Falcon; Endeavour.

05 08 15 49 CMP Hello, Falcon; Endeavour.

05 08 16 59 CDR-LM Hello there, Falcon. How you doing?

05 08 17 16 CMP Hey, going real fine, Dave. We - we're just doing the photography bit and doing a few visual observations. And I've taken a look at you a couple of times down there. How's it going there?

05 08 17 33 CMP Yes, I am. The rille is just coming into sight now.

05 08 17 42 CMP Well, I looked for him before, but couldn't see him, while I got the monocular.

05 08 17 58 CMP Very good, very good. I understand it was a very successful EVA.

05 08 18 07 CMP Yes, it appears that they're getting some pretty good stuff now.



05 08 18 14 CMP Sure is.

05 08 18 20 CMP I'll bet it is. Okay.

05 08 18 31 CMP Are you finished for the day's activities now?

05 08 18 42 CMP Very good. Get a good night's sleep.

05 08 18 49 CMP Oh, I'm living the life of Riley up here now.

05 08 18 58 CMP Very comfortably.

05 08 19 02 CMP I won't, Jim; I'll save room for you.

05 08 19 09 CMP Save you some food? I'm not sure there'll be any left. I have a well-stocked pantry here.

05 08 20 19 CMP Well, Davy, I think I got you on the monocular.

05 08 20 27 CMP No, I can't see any tracks, Jim, but I can see discoloration, rather circular, that looks like it's around the LM.

05 08 20 47 CMP Is it over east of you?

05 08 20 58 CMP No, I don't have it.

05 08 21 13 CMP Yes, all I've got's the monocular.

05 08 21 34 CMP Okay; get to work, and I'll talk to you tomorrow.

05 08 22 12 CMP Houston, Endeavour. MAPPING CAMERA is going to EXTEND now.

05 08 22 20 CC Copy.

05 08 23 46 CC And, Endeavour. We'd like AUTO and HIGH GAIN, please.

05 08 23 54 CMP Roger, Houston; going AUTO.

05 08 26 14 CMP Houston, the MAPPING CAMERA talkback is gray.

05 08 26 17 CC Roger; copy. Thank you.

05 08 28 33 CC And, Al. We have a mapping camera photo pad for you, when you're ready to copy.

05 08 28 45 CMP Roger, Bob. Go ahead.

05 08 28 50 CC Okay. T-start, 129:26:52; T-stop, 130:26:30.  
And it says note: At T-start, MAP CAMERA IMAGE  
MOTION, INCREASE; talkback barber pole, plus 4.  
And at 130:08, MAPPING CAMERA IMAGE MOTION,  
INCREASE, talkback barber pole. Over.

05 08 29 43 CMP Roger; understand. Mapping camera photo pad.  
T-start, 129:26:52; T-stop, 130:26:30; and at  
T-start you want the image motion increased to  
barber pole, plus 4; and at 130:08, you want  
image motion increased to barber pole.

05 08 30 02 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 08 49 01 CDR-LM Houston, Hadley Base.

05 08 49 21 CC Go ahead, Hadley Base; this is Houston.

05 08 49 27 CDR-LM Okay, we're all settled down now with some good  
beefsteak, and all cleaned up and ready to talk.

05 08 49 36 CC Sounds very good, Dave. We've got a list of  
questions here; some fairly general geology ques-  
tions at the last, and, depending upon your an-  
swers, we'll build a good part of EVA-2 on it.  
Stand by a second; I've lost a lockon. Okay, we'd  
like to begin, though, with some fairly simple  
mechanical questions that'll require a ja, nein  
answer to most of them, I think. And they involve  
ALSEP and - Rover. And I'll just - start off at  
the top of the list here. Dave, which ALSEP  
photos did you get out of the way?

05 08 50 24 CDR-LM I got them all but the heat flow, Joe.

05 08 50 27 CC Roger. Copy all but the heat flow. And, Jim,  
when the LSM sunshield was deployed, do you think  
the instrument stayed more or less steady? Or do  
you think it may have moved a little bit?

05 08 50 46 LMP-LM It might have moved a little, Joe.

05 08 50 52 CC Dave, say again. I didn't copy that.

05 08 50 54 LMP-LM Is there a problem with the - Hey, Joe, this is  
Jim. It - it might very well have moved. In other  
words, it's not level any longer?

05 08 51 05 CC Negative, Jim. We don't necessarily know that.  
As far as we know, the data looks pretty as a  
picture. We just want your own feel for it.

05 08 51 24 CC In other words, we have no reason to believe it  
moved. We just wanted to get some words from you  
on that.

05 08 51 45 LMP-LM I didn't notice any movement when I deployed the  
sunscreen, Joe.

- 05 08 51 49 CC Okay, fine. When you took the double core, did you notice any soil falling out of the core tubes while you put the caps on?
- 05 08 52 04 CDR-LM Yes, there was a slight amount of loss from the lower and a little bit from the upper, but very little.
- 05 08 52 11 CC Okay, that sounds good. And regarding the question about the Rover track, Jim, you told us they were one-half inch deep or less, and we're wondering if that was a typical number over the - the course of the entire traverse, as far as you could notice?
- 05 08 52 34 LMP-LM Well, that was my impression. Half an inch in - in general, but Dave probably has another comment.
- 05 08 52 41 CDR-LM No, Joe, I'd say no more than a half an inch. It seems to ride very lightly; I think the - the bearing on the surface is - is very light, and the wire wheels seem to work very well. They've got good traction, and even though the rear end did break away several times, it was primarily because of the locked-up front wheels. And I was very pleased with the operation. I think the thing performs better than we'd expected.
- 05 08 53 10 CC Okay, Dave, thank you. Now a series of questions about the heat flow. We want you first to - to describe the drilling characteristics, and do you think you're drilling into a layer of rock? Over.
- 05 08 53 28 CDR-LM I'd say yes, Joe. The drilling characteristics are - the gradually increasing requirement for force to get it in are more so than any force I experienced in the ones in training, even though they had the packed soil. One time we did have some that was packed so tightly I couldn't even get it in, but that was because of the weak battery on the training unit at the time. The drilling, - it requires more and more force the deeper you get. And, you could probably see the TV there at the end on the second one, I had the second probe about half way in, and I was putting almost my entire weight. Even though it's 1/6th, there was quite a bit of force behind that drill, much more than I've ever experienced in any training. And I - I had the impression that, yes, we're drilling through rock.

- 05 08 54 29 CC Roger, Dave. We hear you on that. A similar question, was the drill torque high while you were drilling?
- 05 08 54 43 CDR-LM Well, high is a relative term. I had to maintain quite a bit of pressure on it to keep from being turned, but I - I tried in the 1/6 g airplane several times to see if it was too high that - or that I could - if I couldn't hold it, and I could always hold it. And I can hold it here, even though the - the torque was fairly high.
- 05 08 55 03 CC Okay, Dave, that's a clear description. We know that the stem is loose in the hole as far as the rotational motion goes. We're wondering if it's loose in the up and down direction. Do you think you could pull it out?
- 05 08 55 23 CDR-LM I don't know, Joe. I - I don't really know.
- 05 08 55 34 CC Okay, Dave, copy that. Is the drill thermal shroud off the drill unit?
- 05 08 55 44 CDR-LM Yes. You mean the small aluminum colored shroud that goes over the battery?
- 05 08 55 50 CC That's affirm.
- 05 08 55 54 CDR-LM Yes, that's off.
- 05 08 55 56 CC Okay, and were the Boyd bolt guide cups removed from the heat flow experiment?
- 05 08 56 11 CDR-LM Gee, I guess I have to think about what you mean. All the Boyd bolts are off of the - the box, as far as I know.
- 05 08 56 25 CC Okay, Dave. Our question concerns the covers for the Boyd bolts. They're calling them the guide cups down here.
- 05 08 56 40 CDR-LM Do you mean are they off now or were they off when we started?
- 05 08 56 46 CC Dave, we mean are they off now. Did they fall away from the unit when you picked the unit up. It's of - of relative unimportance, really, but it would be an interesting data point.

05 08 57 02 CDR-LM I didn't pay much attention, Joe, but I think all the Boyd bolts came off the heat flow, finally, I think.

05 08 57 18 CC Okay, Dave. Thank you. Jim, was the central station Sun compass on the orange mark when you last saw it?

05 08 57 32 LMP-LM Yes, it was, Joe.

05 08 57 35 CC Okay, and I'm sorry I skipped over a question here. Dave, where is the drill vise and the drill treadle right now, as you remember.

05 08 57 48 CDR-LM The drill vise is next to the second probe, which is the western probe, and the treadle is at the point at which we parked the Rover.

05 08 57 58 CC Okay, that agrees with - -

05 08 57 59 CDR-LM ...

05 08 58 00 CC - - our guess on that. Jim, once again back to the central station. How accurately was the bubble level when you saw it?

05 08 58 15 LMP-LM Oh, it was within - oh, 1/8th to one-quarter of the center.

05 08 58 22 CC Okay, that sounds good to us. Could you tell us whether the north-facing side of the central station can see any portion of the RTG?

05 08 58 38 LMP-LM No, it definitely cannot. Because the RTG is perhaps a - a little south of and east, as far as the central station's concerned.

05 08 58 53 CC Roger, we copy that. And, Dave, could you call out to us the problem with your yo-yo. Do you - and do you think it can be fixed?

05 08 59 05 CDR-LM No, we looked at it when we got back in, Joe. The string broke at its attach point on the inside of the yo-yo.

05 08 59 14 CC Okay, Dave and Jim, you might want to consider switching out the yo-yos. Jim, you may want to pass yours over to Dave for the next EVA.

05 08 59 26 LMP-LM We've already done that, Joe.

05 08 59 30 CC You're always one step ahead of me. Some quick questions about the Rover now. Could you confirm that battery 2 amp-voltmeter always reads zero, please.

05 08 59 53 LMP-LM I guess I can't answer that, Joe. I could never see the amperage on - on 2 when we were driving.

05 09 00 01 CDR-LM Yes, my answer, Joe, would be yes. I never saw a motion of that needle.

05 09 00 05 CC Okay, that's good - plenty good enough for us. As you know, we think that you've got two good batteries, but possibly a failed meter there. And the Rover power consumption looks like it's right on the money, and we've got a lot of gas for the next EVA. The amp-hour meter data which we have does have a couple of erratic points in it. We're wondering if you noticed any meter-movement anomalies.

05 09 00 38 LMP-LM This is Jim. I didn't notice any meter motion or anomalies, Joe.

05 09 00 44 CC Okay, Jim, thank you. And we're assuming that the Rover is now parked facing north. Is that correct?

05 09 00 54 LMP-LM That's correct.

05 09 00 56 CC I could have guessed as much. And a question about the suspension, which sounds kind of exciting. Did you ever notice it hitting bottom?

05 09 01 09 CDR-LM Yes, we hit bottom a couple of times when we hit a rock, and it seemed to respond fairly well. I mean you could just feel that it had bottomed out. I might add something else, too, on your battery problem, Joe. I'm sure you're right about that because I noticed in backing up a couple of times that the front wheels did drive.

05 09 01 34 CC Okay, interesting comment, Dave. Thank you. Now we're getting on to the toughies here, and coming up to a very interesting one. We'd like to know what your best estimation of the LMs position is. Over.

05 09 01 55 CDR-LM Stand by.

05 09 01 57 CC And, Dave and Jim, let me give you some background on that. We've got several points that are in a very tight cluster around the first location we gave you. We think, however, because of bootstrapping a location from Elbow Crater backwards using the Rover navigation system, we think that you may be mistaking Last Crater for Index Crater. And I want you to consider this as you look at your map and think about your present position. Over.

05 09 02 34 CDR-LM My!

05 09 04 26 CDR-LM Joe, you've stimulated an interesting discussion. Give us a couple of more minutes.

05 09 04 35 CC We thought we might, Dave.

05 09 04 45 CC And - Dave and Jim, as you well know, this question is pretty much academic because we're - we're doing great guns, no matter where your exact location is, and it's something we'll construct later. But we're interested nonetheless.

05 09 05 07 CDR-LM Roger.

05 09 05 20 CDR-LM Okay, Joe. How about 733 Bravo Sierra 4? And I guess that's because we are on the northeast side of a - double crater.

05 09 05 37 CC Voila. We understand.

05 09 05 43 CDR-LM Sure nice that Rover will make 12, 13 clicks, isn't it?

05 09 05 47 CC That sure is, Richard's studying the maps here momentarily. In the meantime, could you give us - just a rough guess, a quick rundown as to where the samples at station 1 were taken with respect to the rim of Elbow, and we're interested in distance and direction from the rim. Just a rough guess.

05 09 06 17 CDR-LM Stand by.



- 05 09 06 38 CDR-LM Okay, Joe, 709, Bravo Echo 5, and we moved out about 200 feet to the east of that point in picking up the C radial sample.
- 05 09 06 54 CC Okay, Dave, copied that loud and clear. And, by the way, Rover nav system gave us exactly the same coordinates as you just called down for your LM location. Interesting coincidence, or perhaps not a coincidence. Moving on to the next question. Near Elbow Crater, Dave, you mentioned that your footprints exposed white soil. We wonder if this was a common occurrence. Did you observe similar white soil in footprints elsewhere? Over.
- 05 09 07 27 CDR-LM Joe, I sort of kicked through a rim of a small, 1-meter subdued crater; and, as I did that, I kicked up the white soil. And so I kicked a couple of more times and it spread out; and whether I was - breaking up a very viable rock or not, I don't know. But there was a couple of kickfuls of dirt that was white, and as we came back past it on the - on the return trip to the LM, why, I pointed it out to Jim and he saw it too. And I'm not sure whether that was just at that one small crater, which was an old crater, or whether that was typical of that particular area. We just didn't have time to look at it.
- 05 09 08 12 CC Roger, Dave. Copy that. And coming back to station 1, Elbow Crater, could you give us a quick rundown on the changes in rock distribution around Elbow Crater and, if possible, maybe even the changes in rock types there. Over.
- 05 09 08 34 CDR-LM Stand by 1.
- 05 09 09 00 LMP-LM Joe, our clocks were running pretty fast when we were there, and I guess - we didn't get a chance to look at the distribution very well. As I remember it, there - there were more blocks - not really blocks, but large fragments, on the order of 6 inches to a foot, more on the southern rim, although it wasn't really heavily concentrated; I'd say 10 percent of the surface at most. There was more on the southern rim than on the northern rim. And the ones we sampled all looked pretty much the same. As I remember, the radial sample

didn't show a great difference in rock type. Although, as you know, we just didn't - a chance to do much - looking and thinking then.

- 05 09 09 55 CC Roger, Dave. We copy that, and answers that question very well. But, once again, regarding Elbow Crater, Jim, you called out to us a bench around the east side of Elbow and you were looking down into Elbow from higher up on the front. We wonder if you could compare that bench with breaks in the slope of the rille wall. Over.
- 05 09 10 31 LMP-LM Joe, when I commented on bench there, I would estimate two or three different levels that are very - were very subdued possible benches in Elbow, and I did not see any immediate relation between those subdued benches in Elbow and the - the rille.
- 05 09 10 55 CC Okay, Jim, copy that. That sounds very reasonable. We'd like to move on down towards station 2 now, and - and have a series of questions about station 2. The first one, being, what rock samples did you get from Station 2, and we're more interested in the samples that did not come from the large boulder, but rather what other samples did you get there? Over.
- 05 09 11 24 CDR-LM Okay, stand by.
- 05 09 11 51 LMP-LM Okay, Joe, our - our sum total at Station 2 was two chips off the large rock, soil from the fillet, soil adjacent about a couple of feet away from the rock, soil from beneath the rock, and the double core, and the comprehensive.
- 05 09 12 11 CC Okay, Dave, you called it right on from memory. That's exactly the score sheet we had. Stand by a second. Let me - let me read over this second question. Okay - -
- 05 09 12 26 CDR-LM Okay, Joe. ...
- 05 09 12 27 CC - - regarding the boulder, do you think possibly that the black part of the boulder might be a big clast in a coarse breccia? Over.

- 05 09 12 45 CDR-LM No, I'm not sure, Joe. The breccia that was in there was glass covered, and there was an exposure after I took a chip out of it that was a breccia not unlike 14. As a matter of fact, I'd say it was almost typical of 14s, but maybe only second or third order. There definitely was a - a linear - I call it a contact. Whether it might have been a very large clast inside a very large rock, there's no telling. But there was a definite line there which differentiated two types of rock within that big boulder, and I - I really wouldn't want to guess whether that was a large clast or not.
- 05 09 13 28 CC Okay, Dave, sounds good. Could you tell us where the samples which came off the boulder were taken in relation to this contact that you called out on the boulder? In other words, where did the chips come loose from? Over.
- 05 09 13 48 CDR-LM Okay; if you consider the boulder being divided in fifths, 1/5th of it was a different type, apparently, by this sort of topographic contact. We took one chip from that side and one chip from a corner on the other side.
- 05 09 14 06 CC We copy that; thank you. We'd like for you to summarize the relationship of mare and Apennine Front in the Elbow-St. George area. And, we're looking for any evidence whatever of a contact, an albedo change, or a change in coarse-frag abundance. Over.
- 05 09 14 33 CDR-LM Joe, we looked, and we discussed it before we went out, and we've discussed it since we came back, and we - we honestly didn't see anything.
- 05 09 14 42 CC Roger, Dave; and you discussed it, then, about the same way during the traverse. So it sounds very consistent to us. Do you think that you can drive to either Spur or to Window Crater?
- 05 09 14 59 CDR-LM Let us take a look here, quick.
- 05 09 15 53 CDR-LM Well, there are a number of craters down there in the area of Spur and Window, and those are the only craters up on the Apennine Front. And there are several the same size as Spur and Window, which I think were not evident on the photography because

of the - the albedo and the Sun. I think we could get to some of those craters, yes. I - I'm not sure it would be Spur or Window, but there are some craters up on the side of the Front I'm fairly sure we could get to.

05 09 16 20 CC

Roger, Dave. Copy that. And that is exactly the answer we were after; not necessarily those particular craters, but craters similar to them; and we understand exactly what you're saying. We'd like to ask, was the abundance of white and light-gray rocks described in the vicinity of - of Falcon the same seen along the entire route to St. George, or did this abundance of white and light-gray rocks seem to vary? Over.

05 09 17 06 CDR-LM

Joe, I think we have a great variety of - of fragments out here. I - I wouldn't want to pin down any particular type in any area until we had more time to look. We've got a couple of surprises for you. We have one fragment on the order of 6 inches which is a - a fairly well rounded, highly vesicular basalt with vesicles on the order of 3 millimeters all over it, apparently quite old and rounded, and it's a - a brown - a brownish gray. We also have a - a large piece of glass, just sheer glass, apparently, which is about a foot long and about 6 inches wide and very rough-textured surface; and that was the one that was right out the front window here that I described yesterday. And the basalt we picked up halfway back when I had to change my seatbelt; I saw it on the ground, and I just couldn't resist it. And it's unlike anything you've seen from the Moon before as is the large piece of glass. And I think those are indicators, to me, that we have a great variety of samples out there, and we really need to do some good careful looking as we head down towards the Front.

05 09 18 18 CC

Roger, Dave. Read you loud and clear on that, and that really brings us to our last question. We're in the process of starting to plan your traverse tomorrow. It's going to be a good one. We have no equipment problems that we're looking at right now and we'd like to ask you if there're any particular inputs you would like to make into the planning team regarding tomorrow's traverse. Over.

05 09 18 48 CDR-LM Okay, let us talk it over a minute, please.

05 09 20 41 CDR-LM Joe, we've talked it over, and we think the best thing to do is to stick exactly with the plan we have now. I think we understand what we're looking for, and even though we didn't find any - some of the things we were looking for today, that doesn't mean that we won't find them as we head down to Front Crater. And I - I guess about the only input we'd have would be that, if we can make as good a time on the Rover tomorrow as we did today, perhaps we'd have more time to sample a - a variety of stations along the Front and on the way back. But, in general, I think we'd do better if we stuck with our preflight - preflight plan.

05 09 21 25 CC Right on, Dave. We copy that, and I think we're going that direction. Sounds good. We got a - a couple more general questions and then a - a comment about the 16-millimeter camera, and after that we're going to be closing up shop down here. One more geology question. Do you have any feel for whether the frags around the small fresh craters that you've called out to us are, in general, pieces of the projectile or do you think they're ejecta frags? Over.

05 09 22 06 CDR-LM Well, Joe, I - we're pretty sure they're projectile frags, and that's when we really need to stop and sample.

05 09 22 12 CC Agreed, Dave. We think the same thing here. A quick comment on your 16-millimeter film. We think that that camera, the DAC, is still in good shape. That MAG Charlie was a bad magazine, and we think you can help us out on the other magazines left tomorrow by advancing the film with your finger just to make sure it's moving freely in the magazine before you clip it onto the camera itself.

05 09 22 45 CDR-LM That's a grand analysis, Joe. We're ...

05 09 22 46 CC And that's something you can do while you're packing the ETB. Can do it tonight. Over.

05 09 22 56 CDR-LM Roger, Joe. That's - that's a good analysis. We took MAG Charlie and tried to run it with our fingers and it won't run. It's absolutely jammed right in the beginning. And we'll run the others through tonight to make sure they'll work.

05 09 23 10 CC Sounds terrific. And, Dave and Jim, we'll be standing by for a crew status report. No hurry on that; and, as I say, we're going to close up shop down here. We've got more data, really, than we know what to do with. But we'll work hard on it and be back with you in the morning. I do have lift-off time pad to send to you, Jim, when you're ready to copy.

05 09 23 38 CDR Okay, he's got his pencil out. Go ahead.

05 09 23 42 CC Roger. Lift-off times: T-28, 132:17:54; T-29, 134:16:02; T-30, 136:14:10; T-31, 138:12:19. Over.

05 09 24 19 LMP-LM Okay, Joe, beginning on 28: 132:17:54, 134:16:02, 136:14:10, and 138:12:19.

05 09 24 34 CC Readback correct. Jim. You've been doing good work all day.

05 09 24 43 LMP-LM Well, we're trying.

05 09 24 55 CC Roger. And, Dave and Jim, one last comment which we're - we're pretty sure you're aware of. We - we think we're looking at an EVA tomorrow that'll run about 6 and a half hours, about the same thing we did today. And we do have a few miscellaneous items to clean up, either - most likely at the end of the traverse, so it's liable to be a little shorter distancewise, but otherwise, other than that, it'll be more or less unchanged. Over.

05 09 25 26 CDR-LM Okay, very good, Joe. By the way, did you notice that I had a higher O<sub>2</sub> usage all the way through, and is that why we're looking at 6 and a half instead of 7 hours?

05 09 25 37 CC That's correct, Dave. We've got very good data points on you. It's a steady curve, and the O<sub>2</sub> rate is just a little bit higher than we predicted and from the looks of it, you've really been doing some work up there.

05 09 25 54 CDR-LM Well, do you have any idea why there's a rate? Perhaps maybe a - a zipper could be lubricated or - or something like that?

05 09 26 03 CC Dave, this - this is a metabolic curve, plain and simple. It's not a leak rate at all.

05 09 26 12 CDR-LM Okay, well, I'll breath a little less tomorrow.

05 09 26 15 CC We don't recommend that, although the Surgeon's working on it right now. The numbers though, actually that we're coming up with, Dave, is about - The two numbers are 1150 Btu's per hour, working, and about 700 Btu's riding. Over.

05 09 26 41 CDR-LM Okay; that's a little higher on the riding than I think we expected, but it's sort of a - a sporty job to drive this thing to make sure we don't run into the craters; and if you can get that front steering figured out, it'll sure help.

05 09 26 59 CC Get 6 and a half hours like you did today, guys. Nobody's going to complain.

05 09 27 06 CDR-LM Okay. Roger.

05 09 27 32 CC Dave and Jim, I'm going to sign off now, and I'm getting excited about tomorrow's traverse already. And Bob's coming on. Over.

05 09 27 41 LMP-LM , Okay, Joe. You did a superfine job today, and we sure appreciate you keeping track of us and keep us going in a straight - straight line. We'll be looking forward to seeing you tomorrow.

05 09 27 50 CC Yes, sir, wouldn't miss it for the world.

05 09 32 38 CC And, Falcon, we'd like biomed right, please.

05 09 32 46 CDR-LM Okay, biomed right. There's nothing there right now, but we'll give it to you.

05 09 32 50 CC Roger. Yes. We understand.

05 10 00 13 CC And, Hadley, this is Houston. Over.

05 10 00 23 CDR-LM Go ahead, Houston.

05 10 00 24 CC Roger. You got 5 minutes before you have to turn the lights out, and we'd like SUIT GAS DIVERTER to CABIN, CABIN GAS RETURN to AUTO. And the doctors would like a crew status report, can you believe.

05 10 00 41 CDR-LM Okay; we'll come back to you just for that later.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 08 51 37 CC And, Endeavour, Houston. We can terminate BAT B charge at this time, please.

05 08 51 46 CMP Roger, Houston. Will do.

05 08 55 01 CC And, Endeavour; Houston. We're 4 minutes to LOS. A couple of comments before you go around the corner. First, the surgeon thinks you may have loosened part of your EKG harness while you were exercising. Like you to check that at your convenience. Second, we have a new gamma ray retract time on the back side of 129:20. Over.

05 08 55 44 CMP Roger, Houston. Understand going around the back side. I'll check on that biomed harness. I may have loosened it exercising. And understand you want the gamma ray boom retracted at 129:20.

05 08 55 57 CC Roger. We won't be able to see it to keep track of the times, remember, Al. And, also I guess the mass spec people would appreciate any more comments you can think of. Next time you take a look at those particles at sunrise. Over.

05 08 56 15 CMP Okay, Bob. Will do.

05 08 56 38 CMP Houston, Endeavour. One last comment.

05 08 56 41 CC Go.

05 08 56 45 CMP Okay. When I took the battery B off charge I checked the systems test meter for battery pressure - battery compartment pressure - and it was - the systems test meter read 1.4, which is - looks like it's getting pretty close. Is that test - test meter still working all right?

05 08 57 06 CC Roger. Stand by. We're looking at that.

05 08 57 11 CMP Okay.



05 08 57 46 CC Okay. That's - they say that's nominal. That looks good.

05 08 57 52 CMP Okay. Thank you.

05 08 58 46 CC And, Al, if you read, we'd like to have your DSE configured.

05 09 19 -- BEGIN LUNAR REV 27

05 09 47 38 CC Endeavour, Houston. We'd like REACQ and NARROW, if you can. And we have good biomed data.

05 09 48 20 CMP Houston, Endeavour. How do you read?

05 09 48 22 CC Loud and clear now.

05 09 48 28 CMP Okay. Reading you loud and clear also.

05 09 48 59 CC Endeavour, we have a small series of updates here, if you're ready to copy.

05 09 49 11 CMP Stand by 1.

05 09 49 54 CMP Okay, Houston; Endeavour. Go ahead with your updates.

05 09 49 56 CC Okay. First one is a change to your erasable load printed in the G and C checklist. This change has already been made in the computer. It's on page 9-4 and I'll wait for you on that one.

05 09 50 13 CMP Okay. Stand by.

05 09 50 45 CMP Okay, Bob. I'm here.

05 09 50 48 CC Okay. And on column Delta, line 05, we will change that number from "01571" to "01605." Over.

05 09 51 06 CMP Understand. That's column Delta and octal ID 05, change to "01605."

05 09 51 16 CC That's verified. And all the next updates here are in the Flight Plan.

05 09 51 29 CMP Okay.

05 09 51 37 CMP Okay. Go ahead.

05 09 51 39 CC Okay. At - These are changes to the bistatic radar at 130:52, "POO at PITCH 177 degrees." And we're deleting the "POO at PITCH 171," at 130:54 there.

05 09 52 03 CMP Okay. And what time do you want that? At 130:52?

05 09 52 06 CC That's affirm.

05 09 52 13 CC And at 131 -

05 09 52 16 CMP Okay.

05 09 52 17 CC - at 131:10, we will change the VERB 49 maneuver to bistatic attitude, from "067, 171, 00" to "067, 177, 00." So the PITCH changes to 177. Over.

05 09 52 40 CMP Roger. Understand. Change the PITCH to 177.

05 09 52 43 CC Okay. At 131:32, we're going to change the NOUN 78 values. We're going to change  $R_2$  to "plus 067.00." That's  $R_2$ .

05 09 53 07 CMP Okay. Understand. Change  $R_2$  from "047.50" to "067.00."

05 09 53 14 CC Roger. And at 131:39, the "start auto pitch rate" attitude there will be the same as the VERB 49 inertial attitude updated at 131:10, which means we'll change that to - from "171" on the inertial to "177." Over.

05 09 53 41 CMP Roger. Understand.

05 09 53 47 CC Okay. And I have a camera photo pad for you. Pan camera. Go to T-start at 1 -

05 09 53 56 CMP Okay. Go ahead.

05 09 53 57 CC T-start, 130:18:05; T-stop, 130:19:16. Over.

05 09 54 14 CMP Understand. Pan camera photo pad T-start, 130:18:05; T-stop, 130:19:16.

05 09 54 22 CC Roger. And I have a TEI-37 pad for you if you can find a copy of a pad.

05 09 54 39 CMP Roger. I have a TEI-37 pad. Is there any change?

05 09 54 45 CC Roger. Yes, there is a change.

05 09 54 50 CMP Okay, Go ahead.

05 09 54 52 CC Roger. It's TEI-37, SPS/G&N; 37350; plus 0.60, plus 1.01; at NOUN 33, 150:59:30.08; NOUN 81, plus 2979.1, minus 0748.6, minus 0219.6; 180, 109, 349; and the rest of the pad is unchanged. Ullage, two jets for 17 seconds; and other comments - longitude at  $T_{ig}$  will be minus 179.22. Over.

05 09 56 08 CMP Roger. Understand TEI-37 pad, SPS/G&N; 37350; plus 0.60 plus 1.01; 150:59:30.08; plus 2979.1, minus 0748.6, minus 0219.6; 180, 109, 349; two jet, 17 seconds, and longitude  $T_{ig}$  is minus 179.22.

05 09 56 42 CC Roger. Readback correct; and that's the end of the updates for the moment.

05 09 56 48 CMP All righty.

05 09 57 30 CC And, Endeavour; we'd like to get the callout which was at 129:50 for the gamma ray gainstep to shield off. Over.

05 09 57 51 CMP Roger; understand.

05 09 57 52 CC And, we, - you can get that most anytime soon. For 10 minutes; it is not critical yet, I guess, as far as the start time is concerned.

05 09 58 54 CMP Houston, Endeavour.

05 09 58 56 CC Go ahead, Endeavour.

05 09 59 01 CMP Okay, the DELTA-T on the gamma ray boom retract was 3 plus 07.

05 09 59 07 CC Copy. Thank you.

05 10 01 02 CC And, Endeavour; Houston. When you have a moment, HIGH GAIN in AUTO now.

05 10 01 09 CMP Okay. Going AUTO. And do you want the onboard read-outs now, Bob?

05 10 01 22 CC Yes. We'll take them.

05 10 01 27 CMP Okay. Crew status. Better than most, I guess. PRD was 23135. Battery C, 37; pyro bat A, 37; pyro bat B, 37; RCS in order, 71, 69, 70, 71.

05 10 01 58 CC Okay. We copy all those.

05 10 02 02 CMP Okay; and cryo fans have been cycled.

05 10 02 06 CC Copy.

05 10 11 21 CC Endeavour, Houston.

05 10 11 28 CMP Houston, Endeavour. Go ahead.

05 10 11 30 CC Roger. And the people down here are suggesting that on your presleep checklist, we omit the direct O<sub>2</sub> to ON for the rest of your solo flight because you aren't just breathing down the cabin that much, and I guess it will save a little bit of oxygen and eliminate the possibility of cracking a relief valve there. So we'll delete that section from your -

05 10 11 50 CMP Okay, Bob, that sounds good. I didn't notice. Yes, okay, I noticed last night I set it at 5.7, or it was very close to 6, and it didn't drop a bit during the day today.

05 10 12 07 CC Roger. I guess that's what we're noticing too.

05 10 12 14 CMP Incidentally, just going over the Littrow area again. I described the - what looked some - some, at least, fumarolic vents. They look like small cinder cones to me. And every time I look at them, they - that firms up my impression more and more that they're vol - volcanic cinder cones. Also, I noticed one rille, and I'd like to try and get some pictures of it here before we get too far away from Littrow on the next - maybe tomorrow. Looks very distinctly like the roof, or the - the top of the rille is collapsed in some places, and the rille is exposed in other places.

05 10 12 59 CC Roger. It'll make a few theorists pretty happy about that.

05 10 13 05 CMP Yes, Yes; it might - it might confirm some things about rilles. It's - its a little difficult to see whether it is in fact a collapsed feature in some of the - in those parts of the rille, or whether it's something else that I'm seeing. But it looks very much like portions of - the - the rille have a collapsed roof. And, in fact, the one I was looking at, works it's way into what looks like one of the - one of the ridges. It was very ridgy to the - to the north and then turned into a - a rille as it went south.

05 10 13 47 CC Roger. Copy. Keep talking like that, and we might end up going to Littrow sometime.

05 10 13 54 CMP (Laughter) Yes.

05 10 14 26 CC And, Al, already you've generated enough interest for people to ask if it's underneath you, so that the mapping camera might be getting it now.

05 10 14 37 CMP Yes. The mapping camera should be getting it.

05 10 14 40 CC Beautiful.

05 10 14 45 CMP I suspect the - the mapping camera might not have enough detail to - to pick it up as well as we'd like. Although, I don't know, I can see it with the - with the 10-power binocular without any trouble.

05 10 15 01 CC Copy. And, just so we don't forget it, we got about 3 minutes to T-start for the pan camera.

05 10 15 13 CMP Roger. Right with you. Countdown 2:50 now.

05 10 15 17 CC Right on.

05 10 19 25 CMP Okay, Houston. That - that does the pan camera pass over Hadley Rille, and you can let me know when the lens is tucked in.

05 10 19 39 CC Roger.

05 10 20 00 CC Go ahead.

05 10 20 09 CC And, Al, we verify the lens is tucked. You can  
turn the power off.

05 10 20 16 CMP All righty; thank you, sir.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 10 31 48 CC And, Hadley; this is Houston. Over.

05 10 31 59 CDR-LM Go ahead, Houston.

05 10 32 01 CC Roger. We noticed over the last half hour or so, a 25-pound drop in the water quantity. We're wondering if you guys have been doing something. Know anything about that you could clue us in on?

05 10 32 16 CDR-LM Roger. We just recharged both PLSSs.

05 10 32 19 CC Roger. Was that in the last hour and a half?

05 10 32 24 CDR-LM Roger. This was in about the last, oh, 30, 40 minutes.

05 10 32 28 CC Okay. Copy.

05 10 32 33 CDR-LM Does that fill the gap for you?

05 10 53 46 CDR-LM Houston, Hadley Base.

05 10 53 52 CC Go ahead, Hadley.

05 10 53 57 CDR-LM Okay. We've got a crew status report for you.

05 10 54 04 CC Go ahead.

05 10 54 10 CDR-LM Okay. No medication, and the PRDs on CDR is 5019, and the LMP, 8023. Both PLES - PLSSs took their recharge well, and I think they're ready to go for tomorrow. And I guess we're done for the day, so we're going to roll up the shade.

05 10 54 42 CC Roger, Dave. And one last comment to give you a good night's sleep. That little water leak you guys saw when you came in the cabin this afternoon. Right now, our plots are showing that as 25 pounds. Do you guys care to make any comments about the size of the leak, or anything more about that?

05 10 55 04 CDR-LM Fine. No, except that, when we got in, that little plastic connector on the - yes on the bacteria filter was broken and there was water running out of it.

05 10 55 22 CC Roger; understand. More or less a steady stream?

05 10 55 27 CDR-LM Yes. That's about right.

05 10 55 31 CC Roger. Copy. And I guess we're steady now, and you can go to sleep on that note. We won't promise, but we'll try and not wake you up this morning.

05 10 55 43 CDR-LM Well, if you see something that you'd like to look at, we'd rather have you wake us up.

05 10 55 47 CC Yes, I'm sure.

05 10 56 09 CC Okay, Dave. I think we've said all we want to say on that, and I don't think there's anything else you can do about it at the moment, and we'll just let it go.

05 10 56 21 CDR-LM Okay. What does that do to our profile on the water?

05 10 56 29 CC We're looking at it, Dave. It looks like it puts us a little bit closer to red line, but it's still above the red line.

05 10 56 37 CDR-LM Okay, fine. See you in the morning. Thank you.

05 10 56 41 CC Good night.

05 10 56 45 CDR-LM Good night.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 10 21 37 CC And, Al, while you're getting ready for the mapping camera, if you'll let us, will get an E-memory dump.

05 10 21 46 CMP Okay, Bob. Stand by 1.

05 10 21 48 CC Roger.

05 10 28 01 CC And, Al, we're noticing the laser, I guess - Vance told you earlier, it's kind of going downhill a little bit, and we'd like to turn it off at this



time. It's working about 50 percent right now, so we'd like to turn it off right now.

05 10 28 16 CMP Roger, Bob. Laser is coming off. And the mass spec boom is coming out.

05 10 28 25 CC Copy.

05 10 32 26 CMP Houston, Endeavour.

05 10 32 37 CC Say again, Endeavour.

05 10 32 41 CMP Okay, Bob. I've got some good accurate times for you on the boom extensions.

05 10 32 45 CC Okay.

05 10 32 49 CMP Okay. It's from switch actuation to - when the barber pole goes gray. And the DELTA-T for the mass spec was 2 minutes 39 seconds, 2 plus 39, and the DELTA-T for the gamma ray was 2 plus 41, 2 plus 41.

05 10 33 09 CC Copy, thank you.

05 10 33 14 CMP Roger.

05 10 37 36 CC Roger. We're looking at your torquing angles and you're GO.

05 10 37 44 CMP Roger.

05 10 50 07 CC Endeavour, Houston. Over.

05 10 50 14 CMP Houston, Endeavour. Go ahead.

05 10 50 15 CC Roger. One small change to your Flight Plan. Reminder of the change that we made yesterday, as well. At 133:17, remember the mass spec peoples now want DISCRIMINATOR and MULTIPLIER to LOW. You remember that?

05 10 50 49 CMP Roger, Bob. I've got it. It's showing in LOW at 133:17.

05 10 50 54 CC Roger. Just a reminder. And another reminder: when you get ready to go to sleep, you can go to

REACQUIRE and NARROW with plus 25 and 185, and then we won't disturb you when you come around AOS on the pass after next when you should be - already asleep.

05 10 51 18 CMP Roger. Understand high-gain angles are plus 25 and 185.

05 10 51 23 CC Roger. I think they're in your checklist too, Al.

05 10 51 36 CMP They could be, Bob. I looked for them last night and couldn't find them.

05 10 51 40 CC I figured as much.

05 10 51 45 CMP Roger. And incidently, the DELTA-T on the mapping camera retract was 3 plus 15.

05 10 51 55 CC Copy.

05 10 55 50 CC And, Endeavour, as you go around the hill, good night.

05 10 55 56 CMP Okay, Bobby. Good night.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 11 17 --

BEGIN LUNAR REV 28

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 13 16 00 -- BEGIN LUNAR REV 29

05 13 46 13 CC Hello, Endeavour; this is Houston. Over.

05 13 46 46 CC Endeavour, this is Houston. Over.

05 13 47 15 CC Hello, Endeavour. Endeavour, this is Houston. Over.

05 13 48 07 CC Hello, Endeavour. This is Houston in the blind. If you read, go REACQ and NARROW at angles of PITCH, plus 25; and YAW, 185. That's PITCH, plus 25; and YAW, 185. Over.

05 13 48 45 CMP Hello, Houston; this is Endeavour. Go ahead.

05 13 48 48 CC Okay, Al, this is Houston. You're loud and clear now. I would like to suggest going to the presleep configuration before you bed down for the night there on the comm.

05 13 49 03 CMP Yes. Roger. Will do, Gordo.

05 13 52 02 CC Endeavour, Houston. Over.

05 13 52 08 CMP Yes, go ahead, Gordo.

05 13 52 10 CC Okay. If you've gone through the presleep checklist, we noticed a couple of things. The optics power should go off, and also - in your DAP load, go to all 1's in R-1. And, we'd like a call when you finally turn in and turn the voice mode off, just before you do that, please. Over.

05 13 52 36 CMP Yes. Okay, Gordo. Haven't been through the checklist yet.

05 13 52 40 CC Okay.

05 14 02 45 CC Endeavour, Houston. No need to acknowledge, but we need the MASS SPEC, DISC - DISCRIMINATOR to LOW as per an earlier update. Over.

05 14 03 28 CMP Houston, Endeavour.  
05 14 03 30 CC Go ahead.  
05 14 03 35 CMP Gordon, was that MASS SPEC, DISCRIMINATOR, LOW,  
or MULTIPLIER, LOW? I got an update about 5 hours  
ago. It was - They said MULTIPLIER, LOW.  
05 14 03 51 CC Okay. I guess the update was on the DISCRIMINATOR.  
Actually, they're both supposed to be LOW, MULTI-  
PLIER and DISCRIMINATOR, AL.  
05 14 04 01 CMP Okay. I understand you want them both LOW.  
05 14 04 04 CC That's affirmative.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 15 14 --

BEGIN LUNAR REV 30

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 18 03 43 CC Good morning, Falcon. This is Houston. Over.

05 18 03 56 CDR-LM Morning, Houston. This is Falcon.

05 18 04 00 CC Roger, Falcon; Houston. Loud and clear. And when you're up and ready to converse, let me know.

05 18 04 11 CDR-LM Okay, Gordo. Will do.

05 18 04 15 CC ... First thing we've been concerned about - I guess we'll start off with this is, according to our data, you lost about 25 pounds of water during the post-EVA yesterday, and, we - it - it appears that it leaked out during that problem you had with the broken bacteria filter. What we're wondering is if you've looked around carefully in the cabin, and noticed any sign of that 25 pounds of water. We suggest looking back behind the ascent engine cover, because it possibly would have run back there and not have been obvious to you. Over.

05 18 05 08 CDR-LM Okay. There was some on the floor in the ... deck, and we just never took the time to take a look in the back, but we will.

05 18 05 16 CC Okay. If you find - any water back there, we have some suggestive procedures to clean it up, and we'd like to do that before depressurization.

05 18 05 33 CDR-LM Roger. Will do.

05 18 10 56 CDR-LM Oh, Houston, Falcon. Yes, we do have a little puddle of water back in the - behind the ascent - behind the engine cover.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 18 11 18 CC Okay, Dave. Our suggested procedure for collecting that will be to remove the netting and whatever is required to get down to it. Use a used food bag as a scoop if it's a deep enough puddle to scoop it up and take one of the used LiOH containers that contains a used cartridge that's in the buddy SLSS bag now that's scheduled for the upcoming jettison. Take the LiOH cartridge out of the container, then use the container itself to hold the water as you scoop it up with the food bag. And then when you get down to the point where you can no longer get any more water, use utility towels to mop up the rest. Over.

05 18 12 01 CDR-LM Okay. We'll do our best.

05 18 12 05 CC And if one of you is not - busy, I do have a pad with the lift-off times for rev 32 to 37.

05 18 12 20 CDR-LM Stand by.

05 18 12 33 LMP-LM Good morning, Gordo. I'm ready to copy.

05 18 12 36 CC Okay, Jim. One more tidbit on the water problem. If - according to our figures here; that ETB bag that has your - the cameras and film you are going to use on the next EVA may be back there where the water is, and we suggest you get it up out so it won't get wet. Over.

05 18 13 00 LMP-LM No. That's - that's taken care of.

05 18 13 18 LMP-LM Okay, Gordo. I'm ready for the pad.

05 18 13 20 CC Oh, okay, Jim. T-32 is 140:10:24; T-33, 142:08:33; 34 is 144:06:40; 35 is 146:05:03; 36 is 148:02:57; and 37 is 150:01:04. Over.

05 18 14 11 LMP-LM Okay. 140:10:24; 142:08:33; 144:06:40; 146:05:03; 148:02:57; and 150:01:04.

05 18 14 31 CC Okay Jim. Your readback's correct. And, Jim, one other question. If - if you can remember back to before you went to sleep, this is in reference to the problem you had with the flags at the start of



the EVA-1, and we're figuring that that was probably caused by an air bubble that was in your PLSS feed water system. We're wondering if, when you recharged the PLSS feed water here after EVA-1, were you holding the PLSS in a vertical position? That would eliminate any possibility of a bubble and we wanted to verify if that was the case or was it tilted over somewhat? Over.

- 05 18 15 29 LMP-LM It was tilted over slightly when we recharged after EVA-1.
- 05 18 15 37 CC Okay. Stand by, and I'll see if we want to recharge it or something. We'll check on what they want to do. Can you give us a rough idea of what sort of angle it was tilted at and in which direction?
- 05 18 16 26 CC Jim, this is Houston. Over.
- 05 18 16 34 LMP-LM Go ahead, Gordo.
- 05 18 16 36 CC Did you copy my last question about - I'll repeat it. Can you give us an estimate of how far off of vertical the PLSS was in degrees, roughly, when you did fill it? Over.
- 05 18 16 53 LMP-LM It was about 30 degrees off vertical when we charged it.
- 05 18 16 59 CC Okay. Thank you.
- 05 18 18 40 CC Jim, this is Houston.
- 05 18 18 47 LMP-LM Go ahead.
- 05 18 18 48 CC That 30 degrees is probably enough to cause the problem you saw at the start of EVA-1, and we may, depending on how you do with cleaning up the water and so forth, want you to re - top-off the water and maybe the oxygen also on both PLSSs. We'll have more on that later. I do have a consumable update for 138 hours, when you are ready to copy.
- 05 18 19 14 LMP-LM Stand by.
- 05 18 19 37 LMP-LM Okay. Go ahead, Gordo.

05 18 19 38 CC Okay. RCS Alfa, 85 percent; Bravo, 85; descent O<sub>2</sub> number 1, 71.5; number 2, 68.4; ascent O<sub>2</sub> number 1, 99; number 2, 99; descent water, number 1, 42.3; number 2 is 40.2; ascent water, number 1, 100 percent; number 2, 100 percent; and descent amp-hours are 1157; ascent amp-hours, 572. Over.

05 18 20 35 LMP-LM Roger. I copied all that.

05 18 20 37 CC Okay.

05 18 49 52 CC Falcon, Houston. Over.

05 18 50 00 LMP-LM Go ahead, Houston.

05 18 50 02 CC We've got some conversation to come up to you regarding to some - some updates to the EVA prep and also about the EVA traverse plans, and if that would fit in with what you're doing, let us know and we'll go ahead and give those words to you. Over.

05 18 50 26 LMP-LM Well, Dave is off comm right now, so I don't want to talk about the EVA plan or the traverse plan, but maybe EVA prep, I can talk to you about.

05 18 50 36 CC Okay, Jim. If you get a piece of scratch paper here, I'll give you the - the camera magazines that we figure should be in the ETB and on the cameras at the start of this. They've changed slightly from the - what you loaded last night. Over.

05 18 50 59 LMP-LM Okay. Did - did Dave tell you what we had loaded last night?

05 18 51 03 CC I'm not sure; I'll have to check on that.

05 18 51 06 LMP-LM I don't think we - we have the ETB loaded, and let us tell you what we have in ETB.

05 18 51 20 CC Okay, fine.

05 18 51 36 LMP-LM Okay. The ETB is loaded per checklist and the additional MAG is MAG Papa.

05 18 51 45 CC I understand that's Mag Papa, is that correct?

05 18 51 54 LMP-LM That's affirm.

05 18 51 57 CC Okay. Let me cross-check that here and see if we can get anymore words on that. Let me give you one other suggestion and that's for securing the high gain antenna cable on the Rover. We'd like to suggest that you get the roll of tape out, strip off about 1 foot, and fold a 1- to 2-inch tab on one end of it and wrap that piece of tape around the CDR camera so that after you get down on - to the Rover you can use it to secure the high gain anten - cable to the high gain antenna mast and keep it from flopping around. Over.

05 18 52 46 LMP-LM Okay.

05 18 53 08 CC Jim, this is Houston. Did you copy that about the tape?

05 18 52 15 LMP-LM Yes, we copied.

05 18 52 18 CC Okay. One other thing is we suggest that you each wear your EVA-1 cuff checklist on your right arm for use at the end of EVA-2. That's for both of you. Over.

05 18 53 36 LMP-LM Oh, yes. We've already put that in ETB.

05 18 53 40 CC Okay. And can you give us a post-sleep status report there?

05 18 53 51 LMP-LM Well, we both slept for the full time, and we'll get the PRD readings if required in a little bit.

05 18 54 00 CC Okay. Understand.

05 18 58 24 CC Jim, this is Houston. Over.

05 18 58 31 LMP-LM Go ahead.

05 18 58 33 CC On the ETB load camera stuff, we'd like you to add Delta Delta - 16-millimeter MAG Delta Delta to the bag, and also, if you have your camera loaded with Kilo Kilo, we'd like you to take it off, put Kilo Kilo in the bag, and put Papa Papa on your camera. Those are the only two changes that we see from what we figure you have right now. Over.

05 18 59 14 LMP-LM Let me jot down your recommendations again. Say again.

05 18 59 19 CC Okay, Jim. Add 16-millimeter MAG Delta Delta to the bag load first of all, and then on your 70-millimeter camera, that's the LMP 70-millimeter camera, take off - we assume - that Kilo Kilo is on it now. We'd like you to take that off and put Papa Papa onto your camera. Over.

05 18 59 50 LMP-LM You're suggesting we take 16-millimeter Delta off and take MAG K off my camera and put Papa on my camera, but probably carry Kilo out with us.

05 19 00 08 CC That's affirmative, Jim. Carry Kilo Kilo with you, and I think you said - said it right. But take Delta Delta along, also, in the bag. Over.

05 19 00 23 LMP-LM Understand.

05 19 05 06 CC Jim, Houston. Over.

05 19 05 08 LMP-LM Hello, Houston; Hadley Base.

05 19 05 11 CC Okay. A couple of questions. First of all, we wondered if you have brought up the LGC and cycled it through program 6 there. We haven't got high bit rate and we haven't been able to tell. The other one was how is the water clean up going and can you estimate how much you're able to scoop up there. Over.

05 19 05 34 CDR-LM Okay, Gordo. Two answers. Yes, the program - your computers have cycled, and all of the water is cleaned up and we've got two full LiOH canisters plus about 1/8th of the CSM helmet bag.

05 19 05 52 CC Okay. I'll get a suggestion here for what to do with it now and have it to you in a minute.

05 19 06 04 CDR-LM Roger. It looks like with all the stuff we have to throw over today, we're going to have to use another jettison bag.

05 19 06 20 CC Okay, Dave, you can dump up to one-half of one of those LiOH cans worth into the urine system, if

you wish. And if you can get the rest into the two cans, we suggest you put the lids on, maybe tape them to hold them secure, put them in the buddy SLSS bag, and then jettison them in the upcoming jettison of that buddy SLSS - SLSS bag stuff. Over.

- 05 19 06 56 CDR-LM Okay. Two of those tops don't come off until we depress, I guess, huh?
- 05 19 07 25 CC Dave, Houston. We didn't copy your last transmission. If it was anything significant, say again. Otherwise, don't bother to acknowledge.
- 05 19 07 37 CDR-LM I guess - we just want to make sure that the tops don't come off the LiOH cans when we get ready to jettison.
- 05 19 07 45 CC Okay. Fine.
- 05 19 07 50 CDR-LM And the buddy SLSS bag will just barely hold one cartridge plus the other debris we have. So I think we're going to have to use a jettison bag to put in the other cartridge, the two LiOH canisters, and helmet bag with the water, and I think the helmet bag will hold the water okay. It seems to be fairly waterproof. And I just did the urine stowage as we had it.
- 05 19 08 17 CC Okay. That sounds good to us.
- 05 19 08 37 CDR-LM And I guess we have a question on the water in the helmet bag. Do you think we'll have any problem with that if the bag is hitched up and we keep it in a local vertical position.
- 05 19 08 48 CC Okay. We're just going around the room on that one. And we'll have an answer in a second here.
- 05 19 08 55 CDR-LM Okay.
- 05 19 10 -- BEGIN LUNAR REV 32
- 05 19 23 41 LMP-LM Hello, Houston; Hadley Base.
- 05 19 23 46 CC Go ahead, Hadley; Houston. Over.

05 19 23 53 LMP-LM Okay, our little helmet bag is beginning to drip, so I guess it probably would be better to transfer that into the urine container, right?

05 19 24 02 CC Okay, we agree. In fact we were thinking about suggesting that so you'll have the helmet bag to stow the visor in later for launch. Be easier than trying to tape it down. Go ahead and stick the urine - urinal right into the bag, and it should suck it right out of there.

05 19 24 23 LMP-LM Okay, but we were talking about the helmet bag, not the LEVA bag. We - we weren't going to use the LEVA bags.

05 19 24 29 CC Oh, okay.

05 19 25 20 CC Hadley, Houston.

05 19 25 37 LMP-LM Go ahead, Houston.

05 19 25 39 CC Jim, on the subject mentioned earlier about the - the - your PLSS being filled on a slant and causing the problem you had with the flags, we don't think that's any real problem, but if you're - have concern about it, we think that - filling - refilling the PLSS in a vertical position, and we have a procedure that we feel will take about 10 minutes total to do; we're pretty sure we'll solve that problem. We don't think there's any danger in going ahead and getting the same symptoms as you did on the first EVA, but if you'd rather not, we can do this procedure to get rid of that air bubble. Over.

05 19 26 26 CDR-LM Okay, Jim says he's not worried about it, as long as it's no real problem. We'll just press on.

05 19 26 31 CC Okay, Dave.

05 19 27 34 CC Hadley Base, Houston. The only two items we have remaining to brief you on are the - the EVA plans themselves - themselves and a -

05 19 28 24 CC And Hadley, Houston. The item that slipped me there for a moment was PRD readout when you get a change; that and the traverse plans that are hanging so far.

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05 19 28 38 CDR-LM Okay.

05 19 42 34 CDR-LM Okay, Houston; Hadley Base here. Ready to talk over the EVA with you if you like.

05 19 42 42 CC Good morning, Hadley Base; this is Houston, and we're ready to talk over the EVA.

05 19 42 51 CDR-LM Okay. What do we need out to talk about - or with, maps or anything?

05 19 42 57 CC Dave and Jim, I think that actually you'll have to write very little down, just file a few things away in your memory, but it's going to follow naturally, and I don't think there's any major complication here. Most of it we can - do use a checklist and your knowledge of the Front and traverse rationale, and I'll just take it from the top, if you're ready.

05 19 43 28 CDR-LM Okay, we're ready.

05 19 43 32 CC Roger, Dave. And wondered if you were going to shoot a little pool today?

05 19 43 41 CDR-LM Ah, no, we're saving that for tomorrow, Joe.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 19 43 46 CC

Okay, that sounds like good news. I'm going to start with our general rationale for the 6 and one half hour EVA we're coming up on here, and then I'll get down to some details. I won't give you all the details of the traverse right now, but a lot of them I think we can pick up as we go along, depending really on what we see as we travel along. Basically, the EVA will last, as I said, 6 hours 30 minutes, and this is based on our experience from yesterday. Consequently, the EVA-2 traverse distance has been shortened somewhat to provide good geological exploration with a minimum of travel time, primarily at the Front. We're going to strike out for the Front first, just as planned; however, we're going to skip Station 4 for the time being, range along the Front, and we may very well pick up Station 4 and its corresponding activities on the way home. We're looking for craters like Spur Crater and Window Crater, but I'm using these only as examples of craters that have plainly excavated front material for us, and have provided a variety of fragments to sample. We want to return to the LM with about 1 hour and 30 minutes remaining. And Dave, we're going to ask you to invest some few more minutes on the drilling activity; we've got fairly detailed procedures for you to follow, and I'll go into those when it seems a reasonable time to do so. Jim, at the same time, we're going to ask you to carry out some miscellaneous tasks around the LM - while Dave's out at the drill site. And finally, with about 45 minutes remaining, and this is a one-time-special good deal for you, Jim, we're going to carry out Station 8 activities in the vicinity of the LM. In other words, we will not do our Station 8 activities on our homeward-bound journey from the Front. Now I'll stop here and ask for questions, and then I'll go into some more detailed rationale for the way the traverse will break out later on. Over.

05 19 46 23 CDR-IM

Okay, Joe. That sounds like good planning to us. We're all set. Go ahead.



05 19 46 30 CC

Okay, Dave. Thank you. I'm going to go through the stations and the rationale behind our - some of our decisions now, starting with the first one. Egress the LM, we'll have a couple of small house-keeping chores for you to get out of the way on the Rover for us. And they're basically - we're going to give - invest 30 more seconds in our front-steering problem, and we'll - perhaps a minute in taping up the TV antenna cable, and I'll be back to you on that a little late. Then we're going to strike out immediately for the Front, in other words, head south. We want to delete Station 4, outbound, and the rationale is, as all of us already know, the priority on that is considerably lower than other stations. And we may very well pick up Station 4 on the way home anyway. We're not going to try to range all the way down to Front Crater; we think there are plenty of craters similar to Front along the way, and the long-travel time decreases our geology time along the Front. Now, we want to reroute our front traverses to the area of Window Crater and Spur Crater; in other words, Stations 6 and 7, the Station 6 and 7 area right there in the highly counted boudinage. And we're going to depend very much on the observations from the two of you, and it's going to be dealer's choice - Your choice on exactly where you'd like to range and where you'd like to carry out your major sampling tasks. Let me emphasize that we're looking now, primarily, for a wide variety of rock samples from the Front. We've - You've seen the breccias already. We think there may very well be some large crystal igneous, and we'd like samples of those and whatever variety of rocks which you're able to find for us - but primarily, a large number of documented samples and fragment samples. We're going to add a comprehensive rake and soil sample someplace in this area. Once again, we'd like you to try the rake but, if it doesn't work - with about the first swipe across the surface, we'll give that up as a bad idea; just don't want you to spend too much time using the rake. I'll unkey now and ask for any more questions.

05 19 49 18 CDR-LM

No, no questions Joe. You're really talking our language today. Go.

05 19 49 23 CC Roger, Dave. Finally, and I've touched on this all ready - We'll return, - well, okay, on our way home, once again we'll skip Station 8, but don't get your hopes too high, Jim, because we're going to pick that up right before we ingress the LM, and we're just going to carry that out closer to the LM than we had previously planned. We're going to ask you to pick up the miscellaneous tasks around the LM, Jim, while Dave is out working at the ALSEP site. And finally, the two of you will start on Station 8 activities at the LM, together, after Dave finishes with the - working around with the drill. And that - that, basically, is it. I - let's see, let me go back through again, and comment on a few new activities we've added to - we'll - we'll want you to carry out in addition to things on your checklist, listed under Station 6 and Station 7. And I'll have to unkey and shuffle papers here a minute, and I'll be right back with you.

05 19 50 39 CDR-LM Okay, give us about 5 minutes too, will you please, Joe?

05 19 50 42 CC Roger, Dave. I'll stand by for your call here.

05 19 50 50 CDR-LM Okay.

05 20 06 07 CC Hadley Base, this is Houston.

05 20 06 15 CDR-LM Roger. Go ahead, Houston.

05 20 06 18 CC Roger, Dave. We'd like a rough idea of where you are in your EVA prep at this time. And we'd like an OPS read-out at your convenience. Just a reminder. Over.

05 20 06 33 CDR-LM Okay, I'm zipping Jim right now and we'll call you in a little while.

05 20 06 37 CC Roger. Thank you.

05 20 35 15 LMP-LM Houston, how do you read the LMP?

05 20 35 33 CC Jim, this is Houston. Were you calling?

05 20 35 39 LMP-LM Yes. Just wanted a comm check, Joe.

05 20 35 42 CC You're 5 by.

05 20 37 53 CC Hello, Jim, this is Houston. Our biomed on you is a little noisy. We're wondering if you're all plugged up properly on that or if it's easy to get to those sensors still. Over.

05 20 38 08 LMP-LM They're all plugged up, Joe.

05 20 38 14 CC Roger. Is it your biomed there that we're reading now?

05 20 38 24 LMP-LM No. You're reading Dave's.

05 20 38 27 CC Okay. We're getting quite a noisy return down here. He may want to take a look at those sensors.

05 20 38 37 CDR-LM I'm all buttoned up, Joe.

05 20 38 40 CC Roger.

05 20 38 44 CDR-LM Is it usable data?

05 20 38 47 CC Stand by. And in the meantime, have you put tape over the canisters that are filled with water there? And if so, we're a little worried down here that you may have taped it so well that it's making an airtight seal now, could you comment on that?

05 20 39 08 LMP-LM We put the locks back on, Joe.

05 20 39 16 CC That sounds good.

05 20 40 38 LMP-LM Joe, my PRD reading this morning is 8029 - No, 24.

05 20 40 48 CC Roger, Jim. Copy 8024. Thank you.

05 20 40 56 CDR-LM And, Joe, mine's 5020.

05 20 40 59 CC 5020, Dave; thank you.

05 20 42 15 CC Hello, Jim. This is Houston.

05 20 42 23 LMP-LM Go ahead, Joe.

05 20 42 26 CC Jimmy, we're sitting down here scratching our heads about some data we're getting on your PLSS, and - we'd like to know if the PLSS was vertical yesterday evening when you serviced it or if it perhaps were leaning sharply back against something when you serviced it. Over.

05 20 42 50 LMP-LM No, when we serviced mine last night it was tilted aft about 30 degrees from vertical, and that's - the long dimension was tilted vertical.

05 20 43 12 LMP-LM I gave that information to Gordo this morning.

05 20 43 15 CC Okay. Thank you, Jim. Stand by a second; I'll be back with you in a moment here.

05 20 43 26 CDR-IM And, Houston, it was tilted such that we could get the O<sub>2</sub> high-pressure line in it at the same time we were doing the water servicing to - to save some time. So you can probably get a picture of the angle of it by considering the PLSS on the midstep tilted up so the O<sub>2</sub> line would reach it.

05 20 43 49 CC Okay, Dave. Clear picture. Thank you.

05 20 44 31 CC Hello, Falcon. This is Houston.

05 20 44 37 CDR-IM Go ahead.

05 20 44 40 CC Roger, Dave and Jim. We hate to hold you up here, but we think we - we have a real problem with a bubble of air in your PLSS water, Jim. And we're going to have to ask you to take a few minutes here and do a feedwater recharge on your PLSS. And I'll go over the steps which we'd like you to follow when you're ready to copy them. Over.

05 20 45 15 CDR-IM Joe, rather than copy, let us get the PLSS up in position, and you just talk us through it. Okay?

05 20 45 21 CC I can sure do that, Dave. I'm ready to read when you're ready.

05 20 45 28 CDR-IM Stand by.

05 20 47 49 LMP-LM Okay, Joe. We're ready on that recharge.

05 20 47 59 CC Okay, Jim. We hear you here. And we want to start first with the PLSS being cleanly vertical. And then, your first step is PLSS AUX water, OPEN.

05 20 48 19 LMP-LM Okay. Stand by.

05 20 48 30 LMP-LM Okay, AUX water's OPEN.

05 20 48 32 CC Roger. Next step: LM descent H<sub>2</sub>O, CLOSED.

05 20 48 41 LMP-LM Okay, descent WATER going CLOSED.

05 20 48 46 CC Next step: connect waste management system to PLSS PRIMARY vent.

05 20 49 02 LMP-LM Okay. I'll hook the waste management system to the PRIMARY vent. Stand by on that one.

05 20 49 08 CC Roger.

05 20 49 19 CDR-LM Say, Joe. Does this happen to be anything like the procedures we have on board all ready?

05 20 49 24 CC Dave, from here on out, they're going to be similar. I want to give you a step 4 here, when you're ready.

05 20 49 33 CDR-LM Go.

05 20 49 34 CC Roger. Step 4. Connect LM H<sub>2</sub>O to PLSS H<sub>2</sub>O FILL.

05 20 49 46 CDR-LM Okay. That's in work.

05 20 49 55 CC Okay, Dave and Jim. And from here on, there's - -

05 20 49 58 CDR-LM Connected.

05 20 49 59 CC Roger; thank you. It's going to be line 9 to the end of your checklist, PLSS recharge procedures, and I'll read them to you if you want, I have them right here.

05 20 50 15 CDR-LM No, we can do it, Joe.

05 20 50 17 CC Okay, you should be starting with line - LM descent H<sub>2</sub>O, OPEN.

05 20 50 26 CDR-LM Give me a page.

05 20 50 30 CC Roger. Page 5-6.

05 20 50 36 CDR-LM Okay, I've got it.

05 20 50 38 CC Okay. And the line is LM descent H<sub>2</sub>O, OPEN.

05 20 50 45 CDR-LM Okay, we're right with you. Okay, we'll go ahead from there with the checklist.

05 20 50 50 CC Roger. Follow it right through to the end, Davy; thank you.

05 20 50 55 CDR-LM Roger.

05 20 52 49 CDR-LM Okay, Houston. Those steps are complete down through the left column of page 5-6.

05 20 52 58 CC Okay, Dave. I - guess you pick up business as usual then. And we're standing by. However - Dave, could you put pressure on the lower of your three EKG sensors? We think that may be the problem with our signal down here. And that's just pressure on that sensor from the outside.

05 20 53 22 CDR Okay, the sternal?

05 20 53 25 CC I - I think - I think that's the one.

05 20 53 40 CC And Surgeon tells me it's on the left side, Dave.

05 20 53 47 CDR-LM Okay, you've got pressure on it now.

05 20 53 53 CC Okay. Try pressure on one of the two upper ones, please.

05 20 54 02 CDR-LM Okay.

05 20 54 22 CC Dave, which of the upper ones have you touched now, both of them?

05 20 54 28 CDR-LM Yes, that's the only way we can get to them right now, Joe.

05 20 54 37 CC Dave, could you physically move - I guess maybe we've lost the signal or something.

05 20 54 54 LMP-LM Well, the pressure's removed right now, Joe.

05 20 54 57 CC Okay. Thank you, Jim.

05 20 55 07 CDR-LM And, Joe, the OPS checkout has 5700 on mine and 5600 on Jim's.

05 20 55 15 CC Roger. Thank you.

05 21 00 04 CDR-LM Houston, how's the biomed look?

05 21 00 09 CC Dave, the story on the biomed is essentially the following. We've got a good heart rate on you, or at least readable, when you're perfectly still. Otherwise, we're not able to pull the rate out of the signal return that we're getting. And we've talked it over here. You're going to be the pacing item on this - we're going to give you a go ahead and rely on your own good judgment to keep us posted on crew status. We're all aware that this EVA is physically a fairly easy EVA, with the exception of the drill work coming up towards the last, and we may have more information regarding your biomed sensors. We'll give to you then. Is that reasonably clear?

05 21 01 01 CDR-LM Roger, that's fine, Joe. I'll - I'll cool it all the way.

05 21 01 06 CC Roger, Dave. Thank you. And press on.

05 21 01 12 CDR-LM Okay.

05 21 01 23 CC Jim, it is important that we have your biomed data - Are you plugged into us yet?

05 21 01 33 CDR-LM Yes, he's switching now, you'll - take a look at it.

05 21 01 36 CC Okay. And it's important - -

05 21 01 37 CDR-LM And his sensors are nice and new today.

05 21 01 39 CC Okay, that sounds good.

05 21 01 48 CDR-LM Joe, did you have any trouble with mine last night, or is it just since I put the suit on?

05 21 01 54 CC Dave, we may have dinged them when the suit went on. They looked real fine all night long.

05 21 02 02 CDR-LM Okay.

05 21 02 34 CDR-LM Houston, could you give us a hack on where we stand relative to the time, please?

05 21 02 41 CC Roger, Dave. Sure will. Could you give us a quick estimate of where you are on your EVA Prep Card.

05 21 02 50 CDR-LM Oh, Roger. We're halfway through LM - LMP PLSS donning.

05 21 02 55 CC Okay, I'll be back at you in a minute with some numbers.

05 21 03 02 CDR-LM Roger.

05 21 03 26 CDR-LM I guess what I'm asking, Joe, is where are we relative when - to when you plan for us to come out. You know our mission timer isn't working, so I'd just like to know when you expected us to come out, so we know how to pace it.

05 21 04 15 CC Dave and Jim, this is Houston. We estimate you should be climbing out of the LM about an hour from now, which would make it about a quarter to 7, Houston time. However, we're standing by and whenever you're ready to go, please press on. We are running a little bit behind the nominal time right now.

05 21 04 38 CDR-LM Okay. Well, my question was, when was the nominal time?

05 21 04 49 CC According to the theoretical plan - -

05 21 04 53 CDR-LM Okay. Just wanted to know.

05 21 04 54 CC - - in front of us, you're climbing out of the LM - out of the LM right now.

05 21 05 22 CC And, Jim, be advised your biomed data looks quite clean to us.

05 21 05 32 CDR-LM Roger, Joe.



05 21 06 29 CC And, Jim, this is Houston. I don't know if you copied my last transmission. Your biomed data is quite clean.

05 21 06 38 LMP-LM Roger, Joe. I copied.

05 21 16 42 CC Hello, Falcon; this is Houston.

05 21 16 53 CDR-LM Go ahead, Joe.

05 21 16 56 CC Jim and Dave, while you're working around there, I've got your morning science report. We've just learned here that the X-ray spectrometer people have generated a - or are about to generate a compositional map of the central belt of the Moon based on Al's data. You'll also be interested to hear that the pan camera has photographed at high resolution, the landing site at Hadley Rille - and we're thinking that when we get those pictures analyzed, if it looks good, maybe we should try landing there. Over.

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

05 20 30 19 CC Alfredo, it's looking like wake-up time.

05 20 31 11 CC Good morning, Al. They tell me you're sleeping very well right now, I'm sorry to wake you up.

05 20 32 08 CC Good morning, Al. On the planet Earth, August the first is creeping in upon us, and your bleery eyed Flight - Cap Comm down here is standing by at your service.

05 20 33 25 CMP Hello, Houston. Endeavour.

05 20 33 28 CC Hello, Endeavour. Good morning. How are you doing?

05 20 33 35 CMP Well, other than being rudely awakened, I'm doing fine, Karl.

05 20 33 39 CC Hey, I'm sorry that I have to do that, Al. Sounded like you were sleeping good. Hey, as the first step can you give us HIGH GAIN, AUTO, and give us ACCEPT for a state vector?

05 20 33 55 CMP Okay, Karl. You've got them both.

05 20 33 58 CC Thank you. And we've got about ten minutes until LOS at the present time. When you've got a pencil and a paper, I'll give you a short Flight Plan update and a camera pad.

05 20 34 37 CMP Okay, Karl, go ahead. I'm ready to copy.

05 20 34 42 CC Okay. On the Flight Plan update at 141:03, they simply want you to add the report on the gamma ray and mass-spec boom Delta T's. And at 141:04 there is a "Laser altimeter, ON," which should be transferred down to 141:15. Those numbers come through okay?

05 20 35 30 CMP Roger, Karl. I got you. At 141:03 you want me to report the Delta T's on the retract for the boom; and move the "Laser Altimeter, ON" to 141:15.

05 20 35 43 CC Roger. And, over at 141:55, I guess we're having a look at photo target 25, and there is a friendly little note that goes with this. It says to be performed only if the CMP feels it won't interfere with his eat period. So, this is your choice. Do you want some numbers?

05 20 36 09 CMP Roger. Let's have them.

05 20 36 11 CC Okay. Camera configuration. CM/EL/250/CEX, f/5.6, 1/250th, infinity; 15 frames. And at 142:04, the actual execute: photo target 25; A12, A13 — P25. And, it says CM with window 3, with the same - with the same camera configuration: f/5.6, 1/250th at infinity; and 15 frames at 10 second intervals. Right. And this is magazine Q, pardon me. So much for the short Flight Plan update. Did the photo target 25 stuff come through okay?

05 20 37 38 CMP I think I got most of it. But let me read it back to you just in case. Okay, at 141:55, that would be: set up cameras for photo target 25, at CM/EL/250/CEX, f/5.6, 1/250th at infinity, 15 frames; and then at 142:04 at A12, A13, photo target 25. CM, 3; and the setting's going to be for 15 frames at 20 seconds from MAG Q.

05 20 38 18 CC Okay, everything's right except 15 frames at 10 second intervals - 10.

05 20 38 28 CMP Ah, so. Okay, 15 frames at 10 seconds.

05 20 38 31 CC That's right. And the computer is yours.

05 20 38 36 CC Okay. The only other important thing on this front side pass is to get up the camera pad to you. That's about the same page there - -

05 20 38 53 CMP All right, go ahead.

05 20 38 54 CC - - Okay. The mapping camera photo pad starts 141:17:26; 144:09:30. And right down below is the pan camera pad, 141:46:11; 142:01:31. And as a part of this, just across the page there, at 141:45, we would like to move down that statement, "Mapping camera image motion, increase;" move that down to 57 - 141:57. And that's all.

05 20 39 50 CMP Roger. Understand. The mapping camera photo pad is, 141:17:26; 144:09:30. The pan camera photo pad is 141:46:11; 142:01:31. And move the "Mapping camera image motion, increase to talkback barber pole" from 141:45 to 141:57.

05 20 40 18 CC That's excellent. I - I also have science report, which you can probably pick up on the next rev, and consumables report. And I guess we would like a status report from you. We could either do that now or early in the next rev. How do you feel about it?

05 20 40 49 CMP I can give you the status report now, I think, Karl. Stand by 1.

05 20 41 08 CMP Okay, Karl, I guess - crew status report: Got 6 hours sleep all in one period, and very good night's sleep, I might add; and my PR - No medication, and my PRD is 23149.

05 20 41 37 CC Roger. 23149.

05 20 41 46 CMP And, standby for the consumables.

05 20 42 06 CC What was that comment on consumables? Would you like to copy them now?

05 20 42 14 CMP Roger, Karl. Might as well get them now.

05 20 42 16 CC Okay. The time is 140 hours; RCS total is, 61; quad A, 61; 61; 59; 61; H<sub>2</sub> tanks, 70, 70, 48; O<sub>2</sub> tanks, 75; 78; 60.

05 20 42 47 CMP Roger, Karl. 140:00, RCS total 61; it'd be 61; 61; 59; 61; H<sub>2</sub> tanks, 70; 70; 48; O<sub>2</sub> tanks, 75; 78; 60.

05 20 43 07 CC That's correct. We - and, they say that they would like to have you do the configuring of the DSE that comes up there at 141:35. And if you can listen for another minute, I've got an EECOM status if you'd like.

05 20 43 39 CMP Roger. Go ahead. I'll be doing a P52.

05 20 43 41 CC Go ahead on that and the report is mostly nominal on everything. It says that the fuel cells are nominal. The spacecraft average current has read about 80 amps. Cryo purity is good, judging from the very little effect of the fuel cell purges. The battery charges all have been nominal. The cryo quantities are above the nominal flight plan level, and the ECS system operation has been normal. And that takes care of the EECOM report.

05 20 44 16 CMP Well, that certainly sounds very good, Karl.

05 20 44 34 CC Okay, Al, we're going to have LOS in about a minute and all the systems down here look GO.

05 20 44 44 CMP Roger, Karl.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 21 17 35 CDR-LM We copy. Sounds like a good idea.

05 21 17 39 CC Not half bad.

05 21 17 46 CDR-LM There's lots more to do up here than we could ever handle.

05 21 17 50 CC I'm not so sure, Dave. Looks like you're handling that pretty well.

05 21 20 12 CDR-LM Hey, Houston. In taking a look at things on the PLSS straps, we noticed that Jim's yo-yo had failed yesterday too. So we'll have to do a little improvising there today.

05 21 20 28 CC Roger, Dave. We copy that.

05 21 31 01 CDR-LM Okay, Houston, Hadley Base here. Getting ready for a comm check with the PLSSs if you're ready.

05 21 31 07 CC Roger.

05 21 31 14 CDR-LM Okay. We'll start out, and give you a call in a minute here.

05 21 31 16 CC Roger, Dave.

05 21 31 24 CDR-LM MODE to VOX; VOX SENSITIVITY to max; VHF A, T/R; and B, RECEIVE. CB(16) comm, SE AUDIO, open, and you connect to the PLSS comm.

05 21 33 04 CDR-LM Okay. CB(16) comm, SE AUDIO, close PLSS PTT, MAINTAIN, right; verify. And MODE A, wheel counter-clockwise. Okay. Tone, on; vent flag, P; press flag, O; O<sub>2</sub>, MOMENTARY; PLSS O<sub>2</sub> pressure gage, greater than 85. What have you got?

05 21 33 30 CDR-LM Data comm check with me in Houston. No?

05 21 33 46 CDR-LM How about your - deal?

05 21 33 56 CDR-LM MODE A? Huh?

05 21 34 12 CDR-LM Yes, cycle it back, and your SE AUDIO, closed?

05 21 34 23 CDR-LM You're not triggering. Are you reading me okay?  
Hey, your VOX isn't coming through at all.

05 21 34 38 CDR-LM How about PTT? No.

05 21 34 48 CDR-LM Okay, let's go back to VHF A TRANSMITTER to VOICE.  
A RECEIVER, ON; B TRANSMITTER to OFF; B RECEIVER,  
ON. Okay, give me a call now.

05 21 35 08 CDR-LM No? Okay, Houston. Don't seem to have any side  
tone or any transmission out of the LMP's PLSS on A.

05 21 35 24 CC Roger, Dave. We copy - copy your comment loud and  
clear. We're receiving you clearly. We agree, we  
don't have anything from Jim yet, and we're looking  
at it now.

05 21 35 53 CDR-LM ...

05 21 36 17 CDR-LM ...

05 21 36 34 CC Dave and Jim, this is Houston. We'd like for you  
first to verify the RCU connector to the PLSS.

05 21 36 46 CDR-LM Okay, we'll verify it. Stand by. It's checked but  
we'll check it again.

05 21 36 55 CDR-LM Yes. (Laughter) Joe, he's - Jim's reading you  
okay. So it must be connected.

05 21 37 13 CC Dave and Jim, could you go back to the audio por-  
tion of your cue card there, audio (LMP), and check  
those few steps for us, please?

05 21 37 25 CDR-LM All right. Okay. S-BAND to T/R; ICS, T/R; RELAY  
ON; MODE to VOX; VOX SENSITIVITY, max; VHF A to T/R;  
B to RECEIVE. Okay, and we've verified the A and B  
TRANSMITTER and RECEIVER; TELEMETRY, BIOMED, OFF.

05 21 38 03 CDR-LM Okay; no luck, Houston. May be - might go into  
the circuit breaker?

05 21 38 14 CC Dave, I guess we'll go back up one more step and  
verify the powerdown circuit breaker configuration,  
please.

05 21 38 29 CDR-LM Okay; Jim says you're coming in very weak, Joe. We'll verify the powerdown circuit breakers.

05 21 38 48 CDR-LM Okay. Mine's verified. Jim, how's yours?

05 21 38 52 CDR-LM Okay. Both verified.

05 21 39 00 CDR-LM Houston, both of those are verified.

05 21 39 02 CC Thank you, Dave. We're thinking.

05 21 39 14 CC Dave and Jim, could you check the suit connector, please?

05 21 39 21 CDR-LM (Laughter) Okay. Jim's reading you so the suit connector must be connected.

05 21 39 29 CC Roger - -

05 21 39 30 CDR-LM ... only one way, Joe ...

05 21 39 31 CC Roger, Dave. Roger. We agree with that; but we assume also that he is receiving us very weakly. Is that correct?

05 21 39 42 CDR-LM That's correct.

05 21 39 48 CDR-LM ... cycle that, Jim.

05 21 39 51 CC Falcon. Requesting that you unstow Jim's PLSS antenna, please.

05 21 40 00 CDR-LM Okay. Here.

05 21 40 12 CDR-LM Okay, Joe. That was the problem. I - I'm (laughter) - I'm afraid to tell you, but Jim's antenna is broken, and it was broken yesterday when we got in. When we first started out on the operation, there was a big nick out of the antenna, which we subsequently taped. And now, just below that nick, it's broken off. And I don't know how it got there, but when we first looked at the OPS - antenna had about half of it nicked out. We did tape that yesterday.

05 21 40 57 CDR-LM Okay. There we go.

05 21 41 00 CC Roger, Dave. We copy that.

05 21 41 02 LMP-LM I'm reading you loud and clear.

04 21 41 03 CDR-LM Okay.

05 21 41 04 CC Okay, Jim. We got your call then - -

05 21 41 06 CDR-LM It looks like we'll have to do a little tape job -  
Yes - I guess you didn't - Joe, what I'm doing now  
is holding Jim's antenna together.

05 21 41 18 CC Roger, Dave. And when you hold it together, we  
can read you loud and clear. So that's the problem.  
I guess we need a tape job on that antenna.

05 21 41 28 CDR-LM Yes. I hope we can - hope I can get it taped for  
you.

05 21 41 33 LMP-LM In other words, you want to tape it and leave it  
over there. Leave it erect, you mean leave it up.

05 21 41 39 CDR-LMP Bring your volume down some.

05 21 41 40 LMP-LM It's down. Okay.

05 21 41 43 CDR-LM Let me - tape out. See if I can't do - -

05 21 41 52 LMP-LM - - a taping operation this morning.

05 21 41 54 CC Roger, Jim. And we're reading you 5 by, babe,  
when - when that thing's connected. Sounds like  
that's the problem.

05 21 42 04 LMP-LM Yes, no doubt.

05 21 42 05 CDR-LM Okay. Just stand there now.

05 21 42 12 LMP-LM Yes, I know it, but I don't know how we're going  
to do that, because it's -

05 21 42 16 CC Jim could you go to OFF on your MODE select switch  
while you're taping?

05 21 42 25 CDR-LM Okay. He's off, Joe.

05 21 42 30 CC Okay, Dave. And we're standing by for progress,  
as to how that goes.



05 21 42 38 CDR-LM Okay, Joe. I think we're going to take the top inch off the antenna and use it as a splice.

05 21 42 45 CC That's the old splint trick, you mean.

05 21 42 51 CDR-LM Yes, we'll give that a try, because, unfortunately, the antenna is broken right off at the root.

05 21 43 07 LMP-LM Yes.

05 21 43 35 CDR-LM All right; right there.

05 21 44 01 CC Dave and Jim, we're scratching our heads on that down here; and as you know, all we need really is a - is a small metal-to-metal connection between the broken piece and the root of the antenna coming out. Dave, you may want to tape the antenna over across the top of the PLSS. If you think that'll be mechanically more secure than taping it straight up, we'll rely on you to decide on that one.

05 21 44 34 CDR-LM Okay, Joe. Let's let Jim come back up on comm and lay the antenna across here, and let's see how - how it works.

05 21 44 43 CC Okay. And - -

05 21 44 44 CDR-LM Okay, come back to ...

05 21 44 46 CC - - and, Dave, while you have the tape out there, from the sound of things, maybe you'd better put - -

05 21 44 51 CDR-LM Wait a minute.

05 21 44 52 CC - - some of it in your pocket for later.

05 21 44 56 CDR-LM Okay, now. Stand by a minute, Joe.

05 21 44 58 CC Roger.

05 21 44 59 CDR-LM Give a call, Jim. Now you got it.

05 21 45 07 LMP-LM Joe.

05 21 45 12 CC Okay, Jim. I got one word there. Don't forget your MODE switch.

05 21 45 20 CDR-LM Yes, we're okay. Think of something here.

05 21 46 16 LMP-LM Dropped the tape.

05 21 47 21 CDR-LM Okay, Joe. It looks like the best we're probably going to do here is to be able to tape it up so we have the contact, and then leave the PLSS antenna down rather than erecting it. I'm afraid if we erect it, why, there's - there's not much room to put tape in there, and it may fall off and then we'd be out of business.

05 21 47 39 CC Roger, Dave. We agree with that. And Dave and Jim, you should be advised that there's a very good reason to believe that when you get out on the surface near the LCRU, Jim, you'll be able to transmit as well as receive. Over - even without the antenna. Over.

05 21 48 01 CDR-LM Okay, that sounds good.

05 21 49 49 CDR-LM Okay, Jim. We'll do it again. Can you connect it and go to A?

05 21 49 59 LMP-LM All right.

05 21 50 02 CDR-LMP Too loud.

05 21 50 03 LMP-LM Yes.

05 21 50 04 CDR-LM Okay. You're loud and clear.

05 21 50 06 LMP-LM Houston, how do you read the LMP?

05 21 50 08 CC LMP, you're loud and clear.

05 21 50 13 LMP-LM Okay, very good.

05 21 50 15 CDR-LM Okay, you're still too loud. You got a squeal.

05 21 50 18 LMP-LM Yes, I'll turn it down a little bit. How's that?

05 21 50 20 CDR-LM That's better. Okay. CB(11) COMM, CDR AUDIO, open, and connected to PLSS comm.

05 21 51 11 CDR-LM Okay, I'm in B, I have a press flag in 0; 0<sub>2</sub>, MOMENTARY. Pressure gage, and how do you read, Jim?

05 21 51 20 LMP-LM I read you loud and clear.

05 21 51 21 CDR-LM Okay, you going to check with Houston?

05 21 51 24 LMP-LM Houston, how do you read?

05 21 51 25 CC Dave, we read - Dave and Jim, we read you both loud and clear.

05 21 51 33 LMP-LM Dave, they read me loud and clear.

05 21 51 35 CC Roger. Go on to next step.

05 21 51 37 CDR-LM PLSS mode for you to B and me to A.

05 21 51 46 CDR-LM Okay, how do you read, Jim?

05 21 51 47 LMP-LM Loud and clear.

05 21 51 49 LMP-LM Okay, you're loud and clear to me, and Houston, how do you read the CDR?

05 21 51 52 CC Roger. You're both 5 by.

05 21 51 58 CDR-LM Okay. Let's both go to AR.

05 21 52 02 LMP-LM AR.

05 21 52 03 CDR-LM Okay, AR. You're loud and clear to me; how me to you?

05 21 52 05 LMP-LM Same.

05 21 52 06 CDR-LM Okay, Houston. How do you read the LMP and the CDR again? How's your TM?

05 21 52 13 CC Okay, Dave. We're loud - loud and clear on both, and we're GO for the next step.

05 21 52 23 CDR-LM Okay. My PLSS O<sub>2</sub> quantity is 90 percent. How about yours, Jim?

05 21 52 29 LMP-LM Reading 92.

05 21 52 30 CDR-LM Okay. CB(16) ECS, LCG PUMP, closed.

05 21 52 33 LMP-LM Closed.

Tape 92/8

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05 21 52 34 CDR-LM Okay. LCG, clo - cold as required. CB(16) ECS CABIN REPRESS, close; verify.

05 21 52 40 LMP-LM Verified.

05 21 52 41 CDR-LM SUIT FAN DELTA-P, open.

05 21 52 43 LMP-LM Open.

05 21 52 44 CDR-LM SUIT FAN 2, open.

05 21 52 45 LMP-LM Open.

05 21 52 46 CDR-LM Okay. Verify ECS caution and H<sub>2</sub>O SEP component lights, on about a minute - and there they come.

05 21 52 56 CDR-LM ... get a tone there; okay.

05 21 52 58 CDR-LM SUIT GAS DIVERTER, PULL-EGRESS; verify.

05 21 53 01 LMP-LM That's verified.

05 21 53 02 CDR-LM CABIN GAS RETURN, EGRESS; verify.

05 21 53 05 LMP-LM That's verified.

05 21 53 06 CDR-LM SUIT CIRCUIT RELIEF, AUTO; verify.

05 21 53 08 LMP-LM That's verified.

05 21 53 10 CDR-LM Okay. OPS connect; LMP first. SUIT ISOLATION to suit DISCONNECT.

05 21 53 15 LMP-LM SUIT DISCONNECT.

05 21 53 17 CDR-LM Okay. Why don't you slip around here?

05 21 53 28 CDR-LM Get your OPS.

05 21 53 32 LMP-LM That water is cold, isn't it?

05 21 53 36 CDR-LM Okay.

05 21 53 42 LMP-LM OPS O<sub>2</sub> hose to PGA blue, blue.

05 21 54 13 CDR-LM I'll turn off the LCG PUMP.

05 21 54 23 LMP-LM (Laughter) Okay. It's closed and locked. ...

05 21 54 26 CDR-LM ...

05 21 54 28 LMP-LM ... From the same place.

05 21 54 32 CDR-LM The poststowage handle.

05 21 54 36 LMP-LM Okay. Retrieve purge valve, verify closed, and lock pin IN, and LO. Delta purge valve in red.

05 21 54 46 CDR-LM Okay.

05 21 55 07 LMP-LM Okay. Purge valve is in, and marked, and locked.

05 21 55 13 CDR-LM Okay, diverter valve's on vertical.

05 21 55 16 LMP-LM Okay, repeat on you.

05 21 55 18 CDR-LM Okay. You're going to have to - Yes, you're just going to have to - -

05 21 55 22 CDR-LM Disconnect - My O<sub>2</sub> hose has just sort of drifted up there.

05 21 55 25 LMP-LM Okay. Okay. Okay. Okay, I'll disconnect your hoses.

05 21 55 44 LMP-LM And we'll connect the PLSS O<sub>2</sub> hose. And locked.

05 21 55 57 CDR-LM Okay.

05 21 55 58 LMP-LM Okay. The purge valve. Very low. Okay, all locked, and the pin's in, and locked.

05 21 56 55 LMP-LM Okay. It's - and it's locked.

05 21 57 02 CDR-LM Okay. PGA diverter valve to vertical. Take a little drink.

05 21 57 18 CDR-LM Did you turn the DESCENT WATER off?

05 21 57 24 LMP-LM ...

05 21 57 37 CC And, Dave, that DESCENT WATER was turned off on your PLSS recharge exercise.

05 21 57 46 LMP-LM Roger. We - we figured that out. It's - it's working okay.

05 21 57 49 CC Roger.

05 21 57 52 CDR-LM Okay. VENT WATER, CLOSED. Stow that hose properly; I mean, put it in holster and all.

05 21 57 57 LMP-LM Okay.

05 21 57 58 CDR-LM Cables, too.

05 21 58 15 LMP-LM Okay, stowed.

05 21 58 21 CDR-LM Okay, helmet and glove donning.

05 21 58 35 CDR-LM Okay, position mikes both; PLSS FAN to ON, right; vent flag, clear. Okay, it's coming on. Good tone and vent flag's clear.

05 21 58 56 LMP-LM Okay, your vent flag's clear. Get your LEVA.

05 21 59 04 CDR-LM ...

05 21 59 09 LMP-LM Get the flaps down.

05 21 59 28 CDR-LM Can you - let me get your water. And your foodstick.

05 21 59 45 LMP-LM Here, I'll line it up.

05 21 59 46 LMP-LM You line it up, and I'll push it.

05 21 59 49 CDR-LM It's lined up.

05 21 59 51 LMP-LM Okay. Here. Let me get that.

05 22 00 14 LMP-LM I've got it. (Laughter)

05 22 00 23 LMP-LM There, closed and locked. Back flap.

05 22 00 51 LMP-LM Okay, front flap. My turn.

05 22 01 08 LMP-LM Okay, watch my water spigot here.

05 22 01 10 CDR-LM Yes.

05 22 01 15 LMP-LM Okay. You have to push it some.

05 22 01 23 CDR-LM Oh, you did it.

05 22 01 25 LMP-LM That was easy.

05 22 01 26 CDR-LM Yes.

05 22 01 27 LMP-LM Get the back flap first? The LEVAs.

05 22 01 28 CDR-LM Yes.

05 22 01 30 LMP-LM You'll have to rotate the helmet, too. Shift it just a little bit. No, too much. Shift it back, just a little bit more, a little more to the right, little more, little more. That's - good. Back a little to the left. That's right on.

05 22 01 46 CDR-LM Okay.

05 22 02 02 CDR-LM Okay -

05 22 02 05 LMP-LM Okay, secure the self-doffing straps.

05 22 02 11 CDR-LM Once - and two.

05 22 02 30 LMP-LM Left - and right.

05 22 02 37 CDR-LM Okay. Okay. LCG is cold, yes. That's for sure. Okay. CB(16) ECS LCG PUMP, open.

05 22 02 48 LMP-LM Okay.

05 22 02 56 CDR-LM Get back to your little corner.

05 22 02 58 LMP-LM LCG PUMP coming open. It's open now.

05 22 03 02 CDR-LM Okay. Disconnect LM water hoses, and connect the PLSS water hoses.

05 22 03 08 CDR-LM Okay, in work.

05 22 03 25 CDR-LM Okay, mine's closed and locked.

05 22 03 38 LMP-LM Mine's closed and locked.

05 22 03 39 CDR-LM Okay. Secure the hoses - the LM hoses.

05 22 03 54 LMP-LM In work.

05 22 03 55 CDR-LM Yes.

05 22 03 58 LMP-LM Push them just as far back as you possibly can, Dave.

05 22 04 59 CDR-LM Yes, they're snapped in the ECS handhold. I think they'll hold today.

05 22 05 16 LMP-LM Okay. You got your - hoses stowed?

05 22 05 22 CDR-LM Hoses are stowed.

05 22 05 23 LMP-LM Okay. Do a 180 here, and we'll check all the connectors.

05 22 05 25 CDR-LM Okay. Okay, read to me.

05 22 05 33 LMP-LM Okay. Helmet and visor alined and adjusted.

05 22 05 36 CDR-LM Roger.

05 22 05 37 LMP-LM O<sub>2</sub> connectors, three, locked.

05 22 05 41 CDR-LM Okay. Locked, locked, and locked.

05 22 05 47 LMP-LM Purge valves, one, locked. Okay. Let me put the bootees on here.

05 22 05 52 CDR-LM The purge valve is locked.

05 22 05 55 LMP-LM Water connector, locked.

05 22 05 56 CDR-LM Water connector's locked.

05 22 05 57 LMP-LM Comm connector?

05 22 05 59 CDR-LM Comm connector's locked.

05 22 06 00 LMP-LM PGA diverter valve, vertical.

05 22 06 02 CDR-LM Vertical.

05 22 06 03 LMP-LM Okay, read to me.

05 22 06 04 CDR-LM Okay. Helmet and visor, alined and adjusted.

05 22 06 06 LMP-LM Yes.



05 22 06 08 CDR-LM Okay. O<sub>2</sub> connectors, three, locked.

05 22 06 23 LMP-LM Okay; three are locked.

05 22 06 24 CDR-LM Purge valves, one, locked.

05 22 06 27 LMP-LM Purge valve is locked.

05 22 06 28 CDR-LM Water connector, locked.

05 22 06 29 LMP-LM Water connector is locked.

05 22 06 30 CDR-LM Comm connector, locked.

05 22 06 33 LMP-LM Comm connector is locked.

05 22 06 35 CDR-LM And diverter valve, vertical.

05 22 06 37 LMP-LM Diverter valve is vertical.

05 22 06 38 CDR-LM Okay. Let's take another look at the circuit breaker configuration.

05 22 06 42 LMP-LM Okay.

05 22 06 44 CDR-LM White Dots out plus EVA decals.

05 22 07 06 LMP-LM Okay, mine are configured.

05 22 07 08 CDR-LM And mine are configured.

05 22 07 09 LMP-LM Okay.

05 22 07 10 CDR-LM Don E - EV gloves.

05 22 07 11 LMP-LM In work.

05 22 07 55 CDR-LM ... That graphite makes the hands slide in pretty easy, doesn't it?

05 22 08 00 LMP-LM (Laughter) It doesn't do too good on the PLSS connector though, does it? It's a little bit -

05 22 08 24 CDR-LM Okay, I got two on and locked. Come over and check mine when you get through.

05 22 08 33 LMP-LM Still - working.

05 22 08 36 CDR-LM Okay, hey, call if you want a hand.

05 22 08 46 LMP-LM Just a little stiff.

05 22 08 54 CDR-LM Get enough?

05 22 08 57 LMP-LM Yes. They usually lock?

05 22 09 01 CDR-LM Okay. ... Okay, and a lock and a lock. Okay.

05 22 09 21 LMP-LM Okay. Cuff's up.

05 22 09 24 CDR-LM Okay. PGA DIVERTER to min; verify.

05 22 09 31 LMP-LM That's verified.

05 22 09 33 CDR-LM Okay, and PLSS PUMP, ON, to the right.

05 22 09 35 LMP-LM Going ON.

05 22 09 36 CDR-LM Okay, mine's running.

05 22 09 38 LMP-LM Mine is too.

05 22 09 39 CDR-LM Okay, PRESS REG A and B to EGRESS.

05 22 09 42 LMP-LM A and B going to EGRESS.

05 22 09 45 CDR-LM And we need a pressure integrity check. So next step is PLSS O<sub>2</sub> to ON.

05 22 09 50 LMP-LM O<sub>2</sub> and get it.

05 22 09 59 CDR-LM And my PLSS O<sub>2</sub> is ON.

05 22 10 02 LMP-LM And mine's ON.

05 22 10 05 CDR-LM Okay, and the press flag should clear in 3.1 to 3.4.

05 22 10 13 CDR-LM I'm coming up.

05 22 10 18 LMP-LM Mine's clear.

05 22 10 23 CDR-LM Jim, did you pressurize that quick?

05 22 10 26 LMP-LM No, I'm sorry; no; I didn't clear the - -

05 22 10 27 CDR-LM ... the tone here; yes, mine too.

05 22 10 59 CDR-LM Okay, I'm off the tank.

05 22 11 01 LMP-LM Yes, my flag is clear.

05 22 11 15 CDR-LM My flag's clear.

05 22 11 25 CDR-LM Okay, I'm stable at about 3.8. How about you?

05 22 11 29 LMP-LM Same here.

05 22 11 31 CDR-LM Okay, if I can get that old - O<sub>2</sub> valve. Let's turn them off and do a little check.

05 22 11 39 CC Okay, Falcon. We'll mark in a minute.

05 22 11 46 CDR-LM Okay, mine's OFF.

05 22 11 51 LMP-LM Mine's OFF.

05 22 11 52 CDR-LM Okay.

05 22 12 06 CDR-LM And, Houston, we'll take your call when the minute's up.

05 22 12 09 CC Roger.

05 22 12 45 CC Okay, Falcon.

05 22 12 47 CC MARK 1 minute. Mickey's big hand went above his head.

05 22 12 52 CDR-LM Okay, I'm reading 3.7.

05 22 12 55 LMP-LM Okay, 3.7.

05 22 12 57 CC Outstanding.

05 22 12 59 CDR-LM O<sub>2</sub> back ON.

05 22 13 09 LMP-LM O<sub>2</sub> is ON. And verify the O<sub>2</sub> flag is clear.

05 22 13 12 CDR-LM Mine is clear.

05 22 13 15 LMP-LM Mine's clear.

05 22 13 16 CDR-LM Okay, Houston. How do things look to you down there?

05 22 13 19 CC Okay, Falcon, you're GO for depress.

05 22 13 25 CDR-LM Roger. GO for depress. Okay, Jim, CB(16) ECS CABIN REPRESS, open.

05 22 13 31 LMP-LM Okay. CABIN REPRESS is open.

05 22 13 33 CDR-LM CABIN REPRESS VALVE to CLOSE.

05 22 13 35 LMP-LM CABIN REPRESS, CLOSED. CLOSED.

05 22 13 41 CDR-LM Get it?

05 22 13 42 LMP-LM Yes.

05 22 13 43 CDR-LM Okay, over here.

05 22 13 46 LMP-LM I've got a little tone.

05 22 13 51 CDR-LM Okay, forward dump valve, OPEN, and then, AUTO, at - at 3.5.

05 22 13 57 LMP-LM Okay. ...

05 22 13 59 CDR-LM Cabin pressure; I've got it. You can open it.

05 22 14 06 LMP-LM Okay, I'm going OPEN.

05 22 14 08 CDR-LM Okay.

05 22 14 09 LMP-LM OPEN.

05 22 14 10 CDR-LM 5.0; 4.5; 4.0.

05 22 14 16 CDR-LM MARK; 3.5.

05 22 14 17 LMP-LM Dave, I've got them. Okay.

05 22 14 20 CC MARK; 3.5.

05 22 14 22 CDR-LM Verify cabin at 3.5. Okay, cabin's at 3.5. Two circuits locked up at about 4.4. My PGA is coming through 5 and decaying, and let's put on a watch. Okay. Ready. Forward dump valve to OPEN.

05 22 14 44 LMP-LM Okay, going OPEN.

05 22 14 45 CDR-LM Okay. Verify tone on and H<sub>2</sub>O flag at about 1.2 to 1.7.

05 22 14 53 CDR-LM Okay, 2.5; 2.0; easy does it, 1.5.

05 22 15 35 CDR-LM 2.5. And what's your cuff gage?

05 22 15 50 LMP-LM ... 5.1.

05 22 15 52 CDR-LM Yes, so am I.

05 22 16 07 CDR-LM And, we're about down to .2. Still reading about 5.1.

05 22 16 29 CDR-LM Are you 5.1, also?

05 22 16 34 LMP-LM Coming down about 5.

05 22 16 36 CDR-LM Yes.

05 22 16 37 LMP-LM We'll breath it down.

05 22 16 44 CC And, Falcon - -

05 22 16 45 LMP-LM Won't take long at this rate.

05 22 16 46 CC - - the PLSSs look right on.

05 22 16 50 CDR-LM Okay. Thank you.

05 22 17 00 CC Jim, your PLSS water recharge cured that problem we had yesterday completely, it looks like.

05 22 17 10 LMP-LM Good.

05 22 17 13 CDR-LM Yes, it was worth the effort then.

05 22 17 18 LMP-LM Those tones are a little disturbing.

05 22 17 28 CDR-LM Okay. We'll personally open the forward hatch. Maybe I can get that if you'll slip over there - up tight about as far as you can go. Careful not to get hooked. That's it. Okay.

05 22 17 46 LMP-LM Okay.

05 22 18 03 LMP-LM Okay - got a tone.

05 22 18 29 CDR-LM Can you reach around and hold the hatch so it doesn't blow shut?

05 22 18 32 LMP-LM I got it. No sweat. It's a lit - little easier today.

05 22 18 37 CDR-LM Getting in practice.

05 22 18 38 LMP-LM Yes.

05 22 18 40 CDR-LM Okay. Forward hatch is partially open, and final prep to egress. PLSS PRIMARY WATER, OPEN.

05 22 18 50 LMP-LM Oh, let's see.

05 22 18 55 CDR-LM Let me see if I can get around the hatch here and give you some more room.

05 22 19 00 LMP-LM Maybe I can get my arm in back of it. Yes. I've got my arm back there. No sweat, Dave.

05 22 19 09 CDR-LM Good.

05 22 19 12 LMP-LM Find the controls.

05 22 19 19 CDR-LM Okay. Mine's OPEN.

05 22 19 34 CDR-LM Doing okay?

05 22 19 37 LMP-LM Just about. I think it's on. Yes. It's on.

05 22 19 44 CDR-LM Okay. I'll tell you, my gloves feel a lot better today.

05 22 19 48 LMP-LM (Laughter) Stretched them a little bit yesterday, Dave.

05 22 19 51 CDR-LM Yes. I think you're right.

05 22 19 59 CDR-LM Okay. Rest until cooling sufficient, after we get the water going. And verify the CWEA status. We might do that. The ECS and PREAMPS.

05 22 20 12 LMP-LM Okay.

05 22 20 19 LMP-LM Look at that. ... the clear water flags. Okay.

05 22 20 43 LMP-LM Your water flag's clear now?

05 22 20 45 CDR-LM Yes.

05 22 20 47 LMP-LM Hasn't cleared yet.

05 22 21 32 LMP-LM Okay. Let me get that tape up by your left elbow.

05 22 21 36 CDR-LM Yes. Why don't you take both?

05 22 21 38 CDR-LM Yes, I will; in case I drop one. Stick it right on the cuff checklist.

05 22 22 07 CDR-LM Jim, my water flag is finally cleared.

05 22 22 10 LMP-LM Okay.

05 22 22 21 CDR-LM Okay, Houston. How does everything look to you down there?

05 22 22 32 CC Stand by, Dave.

05 22 22 36 CDR-LM Okay.

05 22 22 44 CC Okay, Dave. Be advised you're GO for EVA.

05 22 22 51 CDR-LM Okay. Thank you. Hey, Jim, let me get the old hatch open here if you can - Okay - yes.

04 22 23 00 LMP-LM Turn the other way, Dave.

05 22 23 01 CDR-LM Okay.

05 22 23 15 LMP-LM Make it all right?

05 22 23 28 CDR-LM Okay, I'm around.

05 22 23 31 LMP-LM Okay. Get the hatch open a little farther today.

05 22 23 33 CDR-LM Oh, yes; it's much better. Okay, I'm going to come around this way today. Little easier.

05 22 23 44 CDR-EVA Just made it.

05 22 23 46 LMP-LM Okay.

05 22 23 56 CDR-EVA Okay.

05 22 24 01 LMP-LM Whoa, Dave, whoa.

05 22 24 02 CDR-EVA Okay.

05 22 24 03 LMP-LM Now you can get down. You were hung up on ...

05 22 24 11 CDR-EVA Okay. How does that look to you?

05 22 24 12 LMP-LM Okay. Yes, that looks like you're pretty well cleared there. You're well centered. I could get your antenna right now if you'd like.

05 22 24 21 CDR-EVA I don't really care. Okay.

05 22 24 25 LMP-LM Hold right there?

05 22 24 29 CDR-EVA Yes.

05 22 24 30 LMP-LM Why don't I hold you in and you can get it. Okay. Your antenna is up.

05 22 24 34 CDR-EVA Okay, you might check the - The water gun came out again.

05 22 24 38 LMP-LM Sure did.

05 22 24 39 CDR-EVA Okay.

05 22 24 48 LMP-LM ... I hit the JETT bag ...

05 22 24 52 CDR-EVA Yes, do that. Here. Okay, Houston. I'm out on the first rung of the ladder, and we'll take care of the jettison procedures here.

05 22 25 04 CC Okay, Dave. According to our calculations, here, you'll just about fill Hadley Rille with water.

05 22 25 17 CDR-EVA (Laughter) Yes, sorry to say.

05 22 25 23 LMP-LM Okay. That's - that a boy. Good.

05 22 25 33 CDR-EVA One can's down.

05 22 25 51 CDR-EVA That's all right, Jim. Just - just take the last one. That a b - oop. Little. ...? That's good. I got it.

05 22 26 03 CDR-EVA Canister going down.



05 22 26 06 LMP-LM Okay, toss it right here. That a boy.

05 22 26 12 CDR-EVA The other can is down. A JETT bag. I mean, the BPLSS bag.

05 22 26 16 LMP-LM Yes.

05 22 26 28 CDR-EVA Okay. ... pick her up ... I've got it. Okay; it's down. And if you can hand me ...

05 22 26 40 LMP-LM Stand by.

05 22 27 09 CDR-EVA Easy does it; that's it. I - -

05 22 27 10 LMP-LM Got her?

05 22 27 11 CDR-EVA Yes.

05 22 27 12 LMP-LM Good.

05 22 27 19 CDR-EVA Okay, down the ladder to the plains of Hadley.

05 22 27 48 LMP-LM ... - -

05 22 27 49 CC Jim, this is Houston with a request.

05 22 27 51 CDR-EVA Good. Go ahead, Joe.

05 22 27 55 CC Roger, Jim. We're seeing some excursions in your DELTA-P, the GLYCOL PUMP 1. We'd like for you to pull the AUTO TRANSFER circuit breaker on that GLYCOL PUMP, and select PUMP number 2. Over.

05 22 28 14 LMP-LM Okay, stand by. Okay, I'm pulling AUTO TRANSFER now and I'm selecting PUMP 2. Is that affirmative?

05 22 28 22 CC That's affirmative; thank you.

05 22 29 05 LMP-LM Okay. Pick up the pallet.

05 22 29 28 CDR-EVA Oh, boy; is that easy and fixed. ...

05 22 29 38 CDR-EVA Okay, PLSS LiOH cans, check the pins are in. Green.

05 22 29 48 LMP-LM ... is green, yes.

05 22 29 49 CDR-EVA They're green?

05 22 29 51 LMP-LM Okay. Transfer the old pallet.

05 22 29 56 CC Sounds good.

05 22 30 03 CDR-EVA Don't have to put an LiOH in it. So, I guess it makes it little easier.

05 22 30 09 LMP-LM Just so there's plenty of food in it, Dave.

05 22 30 10 CDR-EVA Yes, that's a good idea.

05 22 30 41 LMP-LM Joe, do you want - before I get out, do you want to close the AUTO TRANSFER? I'll leave ... - -

05 22 30 47 CC Stand by, Jim. Stand by on that. I think we probably will. I'll give you some words shortly.

05 22 30 56 LMP-LM Okay. I'll call you before I get out.

05 22 30 59 CC Roger.

05 22 32 39 CC Okay, Dave, how're you doing?

05 22 32 44 CDR-EVA Oh, I'm doing just fine, Joe. I'm getting the high gain antenna squared away for you hopefully.

05 22 32 52 CC Okay. And while you're working there, Dave, you did such a beautiful job on fixing Jim's PLSS antenna, we're - we've got another Walter Mitty repair job we'd like for you to carry out for us, please, on the cable lead from the high gain antenna to the LCRU, and when you think you're at a good place to do that, I'll go through a description of what we need.

05 22 33 20 CDR-EVA Gee, I'm right there, Joe.

05 22 33 22 CC Roger, Dave. Basically, our camera keeps hanging - -

05 22 33 25 CDR-EVA Joe, I'm going to put - -

05 22 33 27 CC - - our camera keeps hanging up in that - on that cable, and we'd like for you perhaps, if you think it's feasible, to tape a part of the cable below the fastening device on the staff of the high gain antenna. If you think a piece of tape right there might help, we suggest you go ahead and do that now.

05 22 33 52 CDR-EVA Joe, I just completed that little task. It's all done.

05 22 33 59 LMP-LM Dave, if you are clear, I'm going to pitch the pallet out.

05 22 34 02 CDR-EVA I'm clear, Jim.

05 22 34 13 LMP-LM And, Joe, I'm in a position to get out. Let me know what the final configuration is on the glycol pumps.

05 22 34 18 CC Jim, the best I can do for you right now is ask you to stand by 1 minute. We're going to make a final decision.

05 22 34 27 LMP-LM Okay.

05 22 34 44 CC And, Dave, as you might guess, when Jim comes out, you can delete that step to deploy his antenna.

05 22 34 53 CDR-EVA Yes, sir. Will do.

05 22 34 55 CC I have a very keen sense of the obvious.

05 22 35 02 CDR-EVA No, that's a good reminder, Joe.

05 22 35 05 LMP-LM Don't worry; I wouldn't let him do it, Joe.

05 22 35 08 CC Shows you're thinking.

05 22 35 11 LMP-LM But I sure would - time's a wasting, Joe.

05 22 35 31 LMP-LM You're going to get way ahead of me, Dave.

05 22 35 34 CDR-EVA Right.

05 22 35 35 CC Okay, Jim, requesting you go back - -

05 22 35 37 CDR-EVA ... a little bit.

05 22 35 38 CC - - to PUMP number 1.

05 22 35 43 LMP-LM Okay, going back to PUMP 1.

05 22 35 44 CC Okay, select PUMP 1, Jim, and then close the - -

05 22 35 47 LMP-LM Okay, PUMP 1.

05 22 35 49 CC - - AUTO TRANSFER circuit breaker. Close the circuit breaker when you're on PUMP 1.

05 22 35 56 LMP-LM Okay, AUTO TRANSFER, closed, and I'm egressing.

05 22 36 01 CC Roger. Sounds good.

05 22 37 33 LMP-EVA Okay, I'm down.

05 22 37 37 CC Roger, Jim; copy.

05 22 38 13 CC Dave, this is Houston. - -

05 22 38 15 CDR-EVA Okay, Joe. Let me review the - -

05 22 38 18 CC Go ahead.

05 22 38 23 CDR-EVA Okay. Underneath the CDR's seat pan, I have the 500 millimeter with MAG M attached. I have MAGs Oboe, Papa, and Kilo; and MAGs Foxtrot and Epsilon. I guess that goes with better things, and I'll put Delta on the 16 millimeter here in a minute.

05 22 38 49 CC Roger. Copy that clearly, Dave, and when you are ready to drive the Rover, I've got some words to lay on you about getting those front wheels unstuck.

05 22 39 08 CDR-EVA Okay. Stand by, Joe. Let's - I'll give you a call.

05 22 39 11 CC Okay.

05 22 39 33 CC And, Dave, as you climb on the Rover, we'll want all the meter readings before you start pushing in circuit breakers, please, and I'll remind you.

05 22 39 44 CDR-EVA Okay.

05 22 39 57 LMP-EVA I've got one for you in real time here, Joe. It says to put the battery in the plus-Y footpad in the shadow. We don't have any shadow in the plus-Y. Should I put the battery over in, say, the plus-Z?

05 22 40 15 CC Sounds like a good fallback procedure, Jim.

05 22 40 20 LMP-EVA Okay.

05 22 41 03 CDR-EVA Okay, Joe. I'm about ready to change the LCRU battery now.

05 22 41 07 CC Roger.

05 22 41 13 CDR-EVA And the power is verified, off.

05 02 41 16 CC Roger.

05 22 42 09 CDR-EVA Okay, no problem with the change.

05 22 42 23 LMP-EVA SRC 2 is on the - the table.

05 22 42 28 CC Thank you, Jim.

05 22 42 41 CC And, Dave, we want meter readings before the circuit breakers get closed, please.

05 22 42 48 CDR-EVA All right. Reading, all of them are off scale low, Joe. Oop, except of course the battery volts - about 7.1 on number 1, and number 2 is still 0.

05 22 43 04 CC Okay, copy. That was an easy reading.

05 22 43 13 CDR-EVA Okay, circuit breakers are coming in.

05 22 43 31 CDR-EVA All except the AUX.

05 22 43 34 CC Roger.

05 22 43 40 LMP-EVA Okay, and the organic sample is closed for SRC 2.

05 22 43 45 CC Thank you.

05 22 44 43 LMP-EVA Let's see, Joe. We still have bag 2 - on the right side of the handtool carrier. Should I put it temporarily under my seat?

05 22 45 01 CC Can if you want, Jim. Sounds good.

05 22 45 08 CDR-EVA And MAG Delta is on the 16 millimeter, and it seems to be working okay.

05 22 45 13 CC Okay, great, Dave. Thank you.

05 22 45 19 CDR-EVA Good; okay. And, Joe, I'm in a position to take another crack at that steering, if you'd like to talk me through the procedures.

05 22 45 29 CC Okay, Dave. We want you to exercise the FORWARD STEERING switch by cycling from BUS A to BUS C and back several times, and then stop with the switch finally at BUS Charlie.

05 22 45 46 CDR-EVA Roger; in work.

05 22 45 53 LMP-EVA Joe, I'm going to take bag number 3 off the back of the pallet. Put number 6 there, so we can keep the numbers straight.

05 22 46 02 CC Okay.

05 22 46 07 CDR-EVA And STEERING FORWARD is now in BUS Charlie, and I cycled it three times.

05 22 46 11 CC Okay, Dave. Now proceed on with your normal powerup cycle if you haven't already, and - give me a call when you're - you're ready to start driving.

05 22 46 24 CDR-EVA Okay. Well, we got a few things - Jim still has a few things to do. I just thought I'd - make sure of other little and sundry items if I could.

05 22 46 37 CC Okay, Dave. Basically, the rest of the procedure is just to cycle the FORWARD STEERING circuit breaker, open; and then, close, and then attempt FORWARD STEERING. You can do that when you power-up, and if there's no FORWARD STEERING, we're going to ask that the FORWARD STEERING switch be turned OFF. Do you copy?

05 22 47 01 CDR-EVA Roger.

05 22 47 24 LMP-EVA Hey, Joe; I'm putting bag number 7 on the right-hand side of the tool carrier.

05 22 47 29 CC Roger, Jim. Sounds good.

05 22 47 42 LMP-EVA Okay. I'm going to be transferring some core tubes.

05 22 47 45 CC Roger.

05 22 48 31 LMP-EVA Still have the three core tubes in there, two bag dispensers.

05 22 49 37 CC Dave, when convenient, we'd like for you to confirm for us PML/WIDE BAND, and LCRU on INTERNAL, please.

05 22 49 51 CDR-EVA Okay, Joe. Just a second.

05 22 50 07 CDR-EVA Okay.

05 22 50 24 CDR-EVA Okay, the blankets are open a hundred, but INTERNAL, PML/WB.

05 22 50 41 CC Roger.

05 22 50 45 LMP-EVA And the SESC is going into my seat pan - seat bag.

05 22 51 06 LMP-EVA Oh, we're going to have a lot of bags under my seat, Joe.

05 22 51 10 CC Okay, Jimmy. I hope we can fill some of them.

05 22 51 12 LMP-EVA I guess that will be all right. Oh, we'll do our best.

05 22 51 19 CDR-EVA There. Get the lens brush out. Try to take care of those lens. Hey, that works pretty good.

05 22 51 31 LMP-EVA Work good?

05 22 51 32 CDR-EVA Yes, does it ever. Bright and shiny.

05 22 51 40 LMP-EVA Let's see, you still have some sample bags on your camera, don't you?

05 22 51 44 CDR-EVA Yes, so do you, Jim.

05 22 51 46 LMP-EVA Better put these under the seat then.

05 22 51 47 CDR-EVA Okay.

05 22 51 48 LMP Why don't I just put one under your seat and one under mine?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 21 08 -- BEGIN LUNAR REV 33

05 21 37 46 CC Endeavour, this is Houston. How do you read?

05 21 37 52 CMP Houston, Endeavour. Read you loud and clear.

05 21 37 57 CC Very good.

05 21 38 34 CMP And, Karl, Endeavour. I've got a message for our friends this morning.

05 21 38 39 CC Go ahead, Endeavour.

05 21 38 43 CMP Okay. If the king is there: Mahaba al el-ardmin. Endeavour elaykum salam. [Hello, Earth. Greetings from Endeavour.]

05 21 38 54 CC Beautiful. If he's not down there listening, I'll make sure it gets relayed to him, if I can remember.

05 21 39 10 CMP Okay. And I got some gyro torquing angles for you.

05 21 39 13 CC We're ready to copy.

05 21 39 17 CMP Okay. Stars used were 01 and 36; NOUN 05 was plus four balls 1; NOUN 93 was minus 00:004, minus 00:050, plus 00:041. They were torqued at 140:49:00.

05 21 39 57 CC Roger, Al. That all came through loud and clear. And you're coming up in a few minutes - in a few seconds to a gamma ray gainstep operation.

05 21 40 10 CMP Roger. And then I'll get back with you on the DELTA-P.

05 21 40 13 CC Roger.

05 21 40 21 CMP Okay. The shield is off and the DELTA-Ps, the mapping camera extension was 3 plus 50; the gamma ray retracts was 3 plus 12; and, unfortunately, the mass spectrometer boom, when I go to RETRACT, even now, I get a barber pole. It never did go gray.



05 21 40 56 CC We copy, and we're sorry to hear that.

05 21 41 02 CMP Although, I'm not so sure but what part of our problem is not in the talkback indicator itself. After 3 - well, 3 to 4 minutes, I was watching the talkback and saw no change, so I went to EXTEND and noticed that the talkback jumped about half position in the window. So apparently what's happening is that the talkback is - is not triggering before gray. It's going about half way. There's about a half a barber pole in the window and, if I go to EXTENSION, I get full barber pole. So that may indicate that it's just a talkback problem.

05 21 41 48 CC Roger. We copy.

05 21 41 58 CMP I don't know whether you understand all that or not. But - -

05 21 42 02 CC I'm not sure - -

05 21 42 03 CMP - - I sort of feel like maybe there's a talkback problem.

05 21 42 07 CC Right. Incidentally, how many times did you cycle the switch on the deploy retract?

05 21 42 16 CMP Oh, I guess I probably cycled it three or four times.

05 21 42 20 CC Okay. I guess the reason I asked is I think we have a sus - suspicion there that we have the - that cable not coiling correctly and recycling may - feed the coils correctly and solve the problem.

05 21 42 46 CMP Okay. I'll go ahead and deploy and retract it. I'll cycle it a - a few times here and see if I can get to come in.

05 21 43 26 CC Endeavour, a time hack is coming up very shortly on the pan camera.

05 21 43 35 CMP Roger. ...

05 21 45 41 CC Okay. We have 30 seconds before PAN CAMERA MODE goes to OPERATE.

05 21 45 50 CMP Roger, Karl. Right with you.

05 21 46 25 CC Al, we'd like to have HIGH GAIN ANTENNA, AUTO, now.

05 21 46 32 CMP AUTO.

05 21 48 15 CC Al, if you're not too busy now, I could send you up a science report. And I can cue you on that gamma ray gainstep.

05 21 48 26 CMP Okay. Go ahead.

05 21 48 29 CC Righto. Here we go. On X-ray spectrometer, words by Isi Adler, say the general health of the X-ray experiment is excellent. And a large amount of useful data is being received. The number 1 channel for the number 1 X-ray detector tends to be a little noisy, but on the whole, this is of no great consequence. On the whole, the data is very pleasing. We have high hopes of soon being able to produce a compositional map, along the ground track, for all - for aluminum, magnesium, and silicon. And I just heard some words, that come Monday, I guess that's tomorrow, they begin to hope to produce some crude maps as to how these things are changing with position on the surface. Gamma-ray spectrometer: Analysis of last night's long run of data - last night was about 24 hours ago - indicate the number of definite features corresponding to expected energy for natural radioactivity of potassium, thorium and uranium - and uranium. And to some cosmic ray excited elements. Okay, I guess it's about time for us to run that GAMMA RAY GAINSTEP to SHIELD on (center) and start a - start up the charge on battery A. Maybe I should slow up a second and let you start the charge.

05 21 50 04 CMP Okay, Karl, go ahead. It's on.

05 21 50 14 CC Okay. One more comment on the Gamma-ray spectrometer. It says that regional differences have been observed in the quick-look data. But details will require computer analysis for conformation. So they're beginning to see some point-to-point differences there, also. On the alpha particle spectrometer, we say the alpha particle spectrometer has continued to operate satisfactorily, for

the most part. One of the 10 detectors does show, at certain times, an increased number of counts that are probably detector noise. The internal calibration sources indicate that the gain of the instrument is stable. And - yesterday we heard words to the effect that some radon was being detected, but they're being cautious about saying anything very definite yet - about, exactly what is coming out. Mass spectrometer: it says that mass spectrometer data from the first two periods of operation indicates several constituents which may be native to the lunar atmosphere. In particular, I think we have definite confirmation of - native argon; both mass 40 and mass 36. And the reason that we feel reasonably positive about this, is that there is a jump by a factor of three from the night side to the daylight side, as you would expect for a residual atmosphere, about the Moon. And, there is a final caution here saying identification of argon as a native gas is tentative pending positive determination of contamination levels during the Plus X data collection period. So, we've still got a contaminate - we've - we've still got to calibrate their instrument before they will be completely sure of this data. Photo - photo report says the mapping camera operation is nominal and the laser data - laser data up till now has been very good. I understand that the laser is beginning to drop an occasional pulse that gives them some concern, so that we'll probably not be using the - the laser as extensively as we have in the Flight Plan. There'll be some cutback, I think, to conserve its - its health and energy. Although, the data we're getting is still very good. Data from revs - This is going back to the pan camera. Data from revs 15 and 16 indicate that we're still getting, as we said before, about 80 percent of the photographs good. And we have some estimates here the - of - of what we expect the quality to be on the bad frames; whereas, on the good frames we're expecting a resolution on the order of 2 meters. The bad frames, or the smeared frames, will be giving us about a resolution of 6 meters; about three times degradation of about three in the - in the resolution there. Still be useful data. It says there's no final resolution yet of the problem with the V over H sensor. Because of the V over H malfunction, photos of the landing site on rev 16 were - were

not the best, and we may attempt running the camera in STEREO SELF-TEST MODE on rev 50 over the landing site. And, on the V over H sensor, Al. One of the possible reasons for that malfunction is the possibility of a piece of Mylar, or something, flapping in front of the light-sensing aperture; and, when we rendezvous, we may have a chance to inspect that and see if that would be the source of our problem. I don't know what we could do about it, but at least it would be nice to understand it.

05 21 54 47 CMP

Roger, Karl. We can check that out, and - if we don't see anything there, we can check it out during the EVA.

05 21 54 56 CC

Very good. Good idea. On the - -

05 21 55 01 CMP

And, the mass spectrometer is now fully retracted. Talkback is gray.

05 21 55 08 CC

Wonderful. Just recycling it a couple of times, it finally came in; is that what happened?

05 21 55 16 CMP

Well, it took - I guess probably a half a dozen re - just recycles, jogging it out, then pulling it back in again and that may be - that may be the problem. Maybe that cable's kinking some way or other.

05 21 55 30 CC

Okay. Real glad to hear you got that gray talkback.

05 21 55 41 CC

Incidentally, the boys on the surface just about took a shower bath this morning. They had a small water leak in the conveyor that let loose a couple of gallons of water. It was a major perturbation, although they've got it cleaned up pretty well. And they're running about an hour, to an hour and a half behind their time line on the second EVA. They haven't got out yet.

05 21 56 07 CMP

Roger. Understand.

05 21 56 45 CC

Okay, Al, we have about 10 seconds before we give an image-motion increase for the mapping camera.

05 22 00 59 CC Endeavour, this is Houston. You have 30 seconds until PAN CAMERA MODE goes to STANDBY.

05 22 01 09 CMP Roger, Karl. Right with you.

05 22 03 23 CC Al, we're still waiting for a cue on the lens stow, and in the meantime, photo target 25 is roaring down on us.

05 22 03 34 CMP Roger. ...

05 22 04 02 CC Endeavour, Houston. We can go PAN CAMERA power OFF.

05 22 04 12 CMP Roger. Power OFF.

05 22 09 49 CC Endeavour, this is Houston. When you get the camera stowed, I have one more small item, and then we'll give you some time to get out some food.

05 22 10 00 CMP Okay, it's stowed. Go ahead.

05 22 10 03 CC Okay, Al - we're finding out that the - tight dead band in P20 is using a little more RCS propellant than we'd anticipated. Nothing's critical yet, but we would like to take - some preventive measures here. And we suggest that you go into the DAP - and load in a CSM weight of 30 000 (thirty thousand). And before you erase the current IM weight recorded - the current CSM weight, record it for future use. We think that'll cut down the thruster firing a bit.

05 22 10 46 CMP Okay, understand. Roger. You want me to go back and reload the DAP with a CSM weight of 30 000, and record the current weight that's in there for future use.

05 22 10 58 CC That's correct.

05 22 16 15 CC Endeavour, a news bulletin from the surface says that they are now depressing the cabin; and there is no need for you to acknowledge. Keep eating.

05 22 16 28 CMP Roger, Houston. Understand that and - one point from here, Karl - I'm over the spot in Imbrium, I think, close to where you and Whitiker drew from or figured out, some lava flows coming out of where

the wrinkle ridge is, and at this low Sun angle, I can very clearly see some lava flows coming out of what appears to be a ridge, extending in both directions from the ridge. And I wasn't set up this time to take a picture of it, but it might be interesting on the next pass if we could get a - if we could get a pad to take a picture of that.

05 22 17 14 CC Very interesting. Which window are you looking out?

05 22 17 19 CMP I'm looking out window 3.

05 22 17 24 CC Window 3; that sounds like it's down to the south of you, then.

05 22 17 27 CMP Just slightly north of Contact [?].

05 22 17 31 CC Very good.

05 22 17 32 CMP That's right. Just down in the south, just a little.

05 22 17 34 CC Thank you. Sounds like an interesting observation, and I'm sure the guys down below will be sending you up more work to do as a result. Be careful there, now.

05 22 25 37 CC As I look at the map, Al, it looks to me like you're going smack over Tsiolkovsky every rev now. Is - how is it looking to you?

05 22 25 48 CMP That's just about right, Karl. Coming right over the middle of it.

05 22 25 52 CC That must be a beautiful sight. Hey, I was sort of fascinated by the fact that, on your first couple of revs, you noted that you could really see the peaks sticking up - the central peak before you could see the rim. Is that really true?

05 22 26 09 CMP Well, that's not really true, because - it's - it's so hilly and - and ridgy down in that particular area that you just don't see the rim. And Tsiolkovsky is big enough so that you do get some, at least optical, impressions of the central peak being higher than the ridges. But I think it's just because the - the basin is - is big

enough, is far enough across, that you're - as you're looking from one rim to the other, the curvature kind of gets to you and - and makes the central peak appear higher than it is. But it is a very, very high central peak; it's a - it's a very large mass. And, as a matter of fact - on the last couple of revs, I've been watching the central peak, and I'm pretty sure that I can see some layering - in - in the central peak there and - there should be some pictures of it. I got some pictures looking down on it. But it looks like a big slab that's been stuck up on edge.

- 05 22 26 11 CC Hey, that would be great to get pictures of that. I don't know when you were scheduled to look at that - that landslide on the northwest corner of it, but are you seeing anything of that area?
- 05 22 26 28 CMP Absolutely. I look at it every time I go by and there's just - there's no question in my mind at all that it is a - that it is a rock - avalanche. It - it does have some interesting qualities about it, though. And it's a little bit hard for me to decipher right now, but it seems like the density of crater impacts in that slide is - is greater than in the surrounding terrain, even though the slide had to be implaced on top of the surrounding terrain. Maybe it's just that the craters are - are fresher in that - fresher looking in that particular material, but no question about the lineaments being - parallel to the direction of the travel of the flow in the - in the low main toes [?] and - all the - all the characteristics that I've seen of a - a rock avalanche.
- 05 22 28 20 CC Roger, that sounds interesting.
- 05 22 28 33 CMP I just want to add one other comment to that. So far, I haven't been able to locate the other one.
- 05 22 28 43 CC Say again on that, Al.
- 05 22 28 49 CMP So far, I haven't been able to locate Elvin [?].
- 05 22 28 53 CC Roger, okay.
- 05 22 29 43 CC Al, Elvin heard that, and he feels crushed.

05 22 29 52 CMP Well, tell him not to worry. I'm sure it's there and I'll - I've just got to get a little bit further south around the edge of the crater.

05 22 29 59 CC Okay. Hey, when you can get the Flight Plan and a pencil, I've got a - a few more updates to finish up on this rev.

05 22 30 16 CMP Okay, go ahead.

05 22 30 18 CC Okeydoke, let's go over to 143 hours. And, at 143:09, we want to add - -

05 22 30 27 CMP Say, Houston, Endeavour. Go ahead with your updates, Karl.

05 22 30 30 CC Roger. At 143:09, we would like to add "LASER ALTIMETER, OFF;" at 143:12, in that P20 there, we would like you to do a "VERB 25" instead of a "VERB 24"; and we would like to add, in addition to your two angles there, we would like to add "Omicron plus 161.00." Did that come through?

05 22 31 08 CMP Roger. Understand, we're going to do - Omicron - add Omicron to that - load of plus 161.00.

05 22 31 16 CC Roger. And we're going to do the same trick over on 144 hours and 26 minutes. We want to add, again, to that load, we want to add "Omicron - plus 180.00."

05 22 31 42 CMP Understand. At 144:26, you want to add a "VERB 25 NOUN 78," - "Omicron plus 180.00."

05 22 31 52 CC That's correct. Next change is over on 146:13. And over there we have a "LASER ALTIMETER, OFF," which has already been put OFF before so you can delete "LASER ALTIMETER, OFF."

05 22 32 14 CMP Roger. Delete "LASER ALTIMETER, OFF."

05 22 32 19 CC And then, if we go over to 151 hours. At 151 hours and 10 minutes, we would like to change the pan camera operation there, and we would like to say "stereo, exposure, normal." And at 151:15, we would like to delete the "pan camera exposure, normal."



05 22 32 59 CMP Okay, I understand. At 151:10 you want that to read "stereo, exposure, normal;" and at 151:15 delete that line.

05 22 33 08 CC That's correct, and that's the end of the update.

05 22 33 14 CMP Okay.

05 22 35 29 CC Endeavour, this is Houston. They have some data on that new DAP configuration, with the new weights. I guess we're not sure we want to stick with it, and at this time we'd like you to go back to the normal DAP load with the weight.

05 22 35 47 CMP Okay, Karl. Understand you want me to go back to normal DAP load and normal weight.

05 22 35 52 CC Roger. And, I was so busy talking, I forgot to cue you on the gamma ray boom. I trust that you have started - you got that out yet, or did I talk you out of thinking about it?

05 22 36 05 CMP Negative. It's out.

05 22 36 07 CC Very good. Thank you.

05 22 36 12 CC Did you record a - an extension time on that?

05 22 36 19 CMP No. I didn't get that, Karl.

05 22 36 21 CC That's okay.

05 22 45 07 CC Endeavour, this is Houston. All your systems look GO as you go around the corner, and see you on the other side.

05 22 45 16 CMP Okay, Karl. See you on the other side.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

05 22 51 55 LMP-EVA Put it - yes. That's good.

05 22 52 00 CDR-EVA I'll tell you that lens brush really does the trick.

05 22 52 03 LMP-EVA Yes.

05 22 52 11 CC Hence the name, Dave.

05 22 52 16 CDR-EVA Say again.

05 22 52 17 CC Roger. I say hence the name.

05 22 52 23 CDR-EVA Oh. Roger. Hence the name. Well, our cameras, as you might have expected, got pretty dirty yesterday. As a matter of fact, we were having to wipe the dust off of the settings every time we took a picture so we could see them, and the lenses got pretty dusty, but they're all cleaned off now.

05 22 52 43 CC Yes, sir, we copied and sounds good now.

05 22 53 08 CDR-EVA Give me a call when you're ready, Jim.

05 22 53 09 LMP-EVA Yes. Still sorting out the bags.

05 22 53 18 CDR-EVA Okay. Better to have them right. Get to my tongs, here. Okay.

05 22 54 00 LMP-EVA Okay, Dave, I guess I'm in a position here; I got hand bag number 2 on the right side - position to put your gear on you - -

05 22 54 11 CDR-EVA Okay.

05 22 54 12 LMP-EVA - - gear on me.

05 22 54 13 CDR-EVA Okay, stand by 1, Jim.

05 22 54 16 LMP-EVA Okay. In the meantime I'll look at the seatbelt. If I can do anything with it.

05 22 54 23 CDR-EVA Okay.

05 22 55 34 CDR-EVA \*\*\* Adjust my ... all the way on my seatbelt. Okay, I think without the extension handle, it ought to work okay.

05 22 55 51 CC Dave and Jim, this is Houston. Are you - -

05 22 55 53 CDR-EVA Careful how you do ...

05 22 55 54 CC - - putting the collection bags on now?

05 22 55 58 LMP-EVA Yes. Just starting.

05 22 56 00 CC Okay.

05 22 56 01 CDR-EVA Ready, Jim?

05 22 56 02 CC We think you should wind up with collection bags 3 and 7 on your PLSSs and not collection bag 2, which still should be under the seat.

05 22 56 14 CC I'm sorry, not on the PLSSs, on the handtool carrier. I called that incorrectly.

05 22 56 21 CDR-EVA Two should be on the handtool carrier, right, Joe?

05 22 56 24 CC Right.

05 22 56 25 CDR-EVA Yes.

05 22 56 26 LMP-EVA On the PLSSs, Joe, we're going to put on number 2 and number 5, just like in the - -

05 22 56 31 CDR-EVA No, that's - no, that's wrong.

05 22 56 32 LMP-EVA Huh?

05 22 56 33 CDR-EVA That's wrong.

05 22 56 34 LMP-EVA Oh, you changed it, huh? Somehow we got bag - the wrong gear's in bag 2.

05 22 56 39 CDR-EVA How did that happen?

05 22 56 41 LMP-EVA We still have the core tube - tubes in here.

05 22 56 42 CDR-EVA Oh, yes.

05 22 56 43 LMP-EVA I'll get bag - I'll get bag 3.

05 22 56 45 CDR-EVA Okay.

05 22 56 46 CC Okay, Jim, that's right on - -

05 22 56 47 CDR-EVA Hey, Joe, by the way, bag - Okay.

05 22 56 55 CDR-EVA Joe, bag number 162 has that little glass aggie in it.

05 22 57 05 CC Roger, Davy. You never walked past it. Beautiful.

05 22 57 13 CDR-EVA Okay, okay. Here we go.

05 22 57 24 CDR-EVA Plus a - another couple little samples that were sitting there. Okay, we'll get you - up. Okay, hand me the hammer.

05 22 57 40 CDR-EVA Okay, hammer is on.

05 22 57 42 LMP-EVA Rammer.

05 22 57 44 CDR-EVA Rammer. Okay, the rammer is on.

05 22 57 51 LMP-EVA Okay, I'll get the core tubes.

05 22 57 53 CDR-EVA Okay.

05 22 58 04 CC Jim, this is Houston. While you're being loaded up there, can you glance over and see - confirm for us that the LRV bat covers have closed automatically?

05 22 58 17 LMP-EVA No, the right one is still up.

05 22 58 21 CDR-EVA Yes, the right one is still up.

05 22 58 22 CC Okay, Jim. Thank you. We will ask you to - to move that one down before you climb on.

05 22 58 32 LMP-EVA Okay.

05 22 58 47 CDR-EVA Yes, they really stretch. Hold on the bag a minute, Jim. Strap - the straps really stretch.

05 22 59 00 CDR-EVA Now, if you could stand up straight - just for a second.

05 22 59 03 LMP-EVA Man, I am straight.

05 22 59 04 CDR-EVA Are you kidding!

05 22 59 05 LMP-EVA I'm in a crater (laughter). You want to move back?

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05 22 59 08 CDR-EVA No, I can get it. Okay, take a step forward then. Give me the bag. Okay, a little - little to the left. There. No, rotate left. Now, okay.

05 23 00 01 CDR-EVA Sure glad they put so much Velcro on here.

05 23 00 13 CDR-EVA Okay, now if you could bend over, Jim. Take a step. Well, if you can take a little step forward. Don't fall down in a hole.

05 23 00 22 LMP-EVA Try not to.

05 23 00 23 CDR-EVA Okay.

05 23 00 27 LMP-EVA Get me?

05 23 00 28 CDR-EVA Okay.

05 23 00 52 CDR-EVA \*\*\* Snaps came open there, I guess.

05 23 00 55 LMP-EVA Yes.

05 23 01 10 CDR-EVA Okay. Oh no!

05 23 01 11 LMP-EVA ...

05 23 01 19 CDR-EVA Okay, your bag is secure.

05 23 01 21 LMP-EVA Okay.

05 23 01 24 LMP-EVA Let me pull that flap off there. ...

05 23 01 28 CDR-EVA Okay. Got the 70-millimeter camera and the bags and antenna stowed, taped; I'll close the other LRV battery covers here.

05 23 01 42 CC Roger, Dave. Thanks.

05 23 02 00 CDR-EVA It's closed.

05 23 02 08 CDR-EVA Okay, Jim. Are you ready to hop on?

05 23 02 12 LMP-EVA I will, Dave. Let me just check the MESA blankets.

05 23 02 15 CDR-EVA Okay. I closed them up for you, most of them.

05 23 02 17 LMP-EVA Okay.

05 23 02 27 LMP-EVA The dispenser bag's on?

05 23 02 29 CDR-EVA What are you going to do with those two bags there -  
in front of you?

05 23 02 30 LMP-EVA I'm going to put them under the seat.

05 23 02 32 CDR-EVA Okay.

05 23 02 51 CDR-EVA I wouldn't get rid of bag 2 because it has all your  
tools in it.

05 23 02 54 LMP-EVA Right. Get rid of all my tools.

05 23 03 14 CDR-EVA We can see the solar wind there, Joe, and looks  
like it's blowing.

05 23 03 19 CC Roger. I'm sure it must be, Dave. A little bit,  
at least.

05 23 03 22 LMP-EVA ... stand by, see if I can - buckle myself before  
you get in.

05 23 03 27 CDR-EVA Jim, you don't have to put your seatbelt on now.  
We're just going to drive over to the NAV  
initialization.

05 23 03 32 LMP-EVA You - You're not going to get off there, are you?

05 23 03 34 CDR-EVA No. But you can put it on there. So why don't you  
hop on. Let's go over and get the NAV started.

05 23 03 37 LMP-EVA Okay.

05 23 03 38 CC And we copied that those bat covers are closed - -

05 23 03 39 CDR-EVA As a matter of fact, you don't even have to hop on  
if you don't want to.

05 23 03 40 CC - - so press on.

05 23 03 45 CDR-EVA Okay.

05 23 03 46 LMP-EVA In fact, let me walk. Yes, I'd like to just walk a  
little bit. Not going to go too far?

05 23 03 50 CDR-EVA Nope.

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05 23 03 51 LMP-EVA Don't run off and leave me.

05 23 03 52 CDR-EVA Never happen (laughter).

05 23 03 55 CC Okay, Dave. Once again, we want you to exercise the foring - the forward steering procedure here.

05 23 04 06 CDR-EVA Okay. You want to try it first just the way it was and then we'll try the circuit breaker, right?

05 23 04 15 CC Roger. The FORWARD STEERING switch should be at BUS Charlie, and the FORWARD STEERING circuit breaker should be finally closed, and then attempt forward steering.

05 23 04 34 CDR-EVA You know what I bet you did last night, Joe? You let some of those Marshall guys come up here and fix it, didn't you?

05 23 04 40 CC They've been working. That's for sure.

05 23 04 42 LMP-EVA It works, Dave?

05 23 04 43 CDR-EVA Yes, sir. It's working, my friend.

05 23 04 49 LMP-EVA Beautiful.

05 23 04 52 CC Lot of smiles on that one, Dave. We might as well use it today.

05 23 04 56 CDR-EVA Well - Boeing has a secret booster some where to take care of their Rover.

05 23 05 13 CDR-EVA Oh, that's so much better.

05 23 05 22 CDR-EVA See if I can find a level spot around here.

05 23 05 57 CDR-EVA Okay Houston, I'm at the NAV site, and I'll reset here, and I'll give you the readings.

05 23 06 05 CC Roger, Dave. Standing by.

05 23 06 10 CDR-EVA Okay. As a matter of fact I'll make sure we're balanced, I'll hop off.

05 23 06 19 CDR-EVA Okay, roll is 1 to the left; pitch is about - oh, 1 down; and bearing, distance, and range have recycled to zero and the heading on there now is 305; and the Sun shadow device is about - oh, a half to 1 to the right.

05 23 06 49 CC Roger, Dave. And when you are ready you can start torquing towards 285, and we'll modify that in a minute.

05 23 06 59 CDR-EVA Okay.

05 23 07 16 CDR-EVA Okay. Want to hop on Jim and see if you can get it - -

05 23 07 17 LMP-EVA I was going to get cameras all adjusted. It won't be 12 frames per second.

05 23 07 33 CC Jim, while you are climbing on there, we're going to want you to start out towards course 160 for a distance of 1.9 clicks towards checkpoint number 1.

05 23 07 52 LMP-EVA Just a minute, Joe, I didn't -

05 23 07 54 CDR-EVA Wait - You got to get up, Jim. You're leaning too far back. Grab the handle low. That a boy. Okay, now you can set down. You're in good shape.

05 23 08 04 LMP-EVA Yes, if I can just get down.

05 23 08 07 CDR-EVA As if you're hanging up in something. Watch your hand controller.

05 23 08 10 LMP-EVA Yes.

05 23 08 11 CDR-EVA Oh, you wait, wait, wait, wait, wait, wait. You've got to sort of bias it to the right.

05 23 08 23 CC And, Dave, your torquing angle, exactly 283, over.

05 23 08 30 CDR-EVA Okay, 283, Joe. Can you get your seatbelt, Jim.

05 23 08 33 LMP-EVA I'm doing that right now.

05 23 08 35 CDR-EVA Huh? To the - over - up and over the pocket; let me have it here a minute. There, now bet you can get it.

05 23 08 52 CDR-EVA Let me get it. - -

05 23 08 53 CC Rover, did you - did you copy 283 heading, and we're standing by for total NAV read-outs before you depart the station.



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05 23 09 01 LMP-EVA Okay, Joe. We'll park it at 283. Reading about 284 now. Bearing, distance, and range, of course, are zero; amps are 100, 108, 68, 78, and motor temps: forward and rear are off-scale low.

05 23 09 28 CC Roger, Jim. Copy. And the motor temps are normal.

05 23 09 35 LMP-EVA Okay, you going to torque to 283 Dave.

05 23 09 37 CDR-EVA Yes, just hold on. That darn cannon plug again down there.

05 23 09 41 LMP-EVA You want me to hold it for you.

05 23 09 43 CDR-EVA No. You have to get off and unhook this thing every time.

05 23 09 55 LMP-EVA That's bad because every time you bend over like that you put a strain on that EVA antenna - PLSS antenna.

05 23 10 01 CDR-EVA Do I really?

05 23 10 02 LMP-EVA It bumps against this ... - -

05 23 10 03 CDR-EVA Oh, I have to be careful. Okay. Here we go.

05 23 10 39 CDR-EVA Okay, my seatbelt's on. Is your seatbelt on?

05 23 10 42 LMP-EVA Yes, sir.

05 23 10 43 CDR-EVA Okay. Here we go.

05 23 10 53 LMP-EVA You got to torque that 283? - -

05 23 10 54 CDR-EVA It's almost on 283.

05 23 10 55 LMP-EVA - - yes, yes.

05 23 11 05 CDR-EVA Okay, it's 283. Okay.

05 23 11 13 LMP-EVA Okay, we're off, Joe; we're moving.

05 23 11 16 CDR-EVA What's the heading, partner?

05 23 11 17 LMP-EVA Give us that heading again.

05 23 11 20 CC Roger; and we're marking. We want you to proceed towards checkpoint number 1. Your general heading

is 160 at 1.9 clicks and this may take you down between Salyut and Index Craters.

05 23 11 38 LMP-EVA Okay.

05 23 11 40 CDR-EVA Okay 160. I'd like to go down there and see those just for drill.

05 23 11 48 CC Roger, Dave. No one should come to Hadley Rille without seeing Index Crater, and we'll try to keep you posted on when you're coming up on that.

05 23 11 58 CDR-EVA Okay, fine.

05 23 12 00 LMP-EVA Joe, I'm going to start the camera here. Will you keep track of it? I'm on 12 frames per second.

05 23 12 04 CC Roger, Jim. We're marking it now. Thank you.

05 23 12 05 CDR-EVA Wait a minute. Why don't you hold off for awhile, Jim?

05 23 12 08 LMP-EVA Okay. Never mind.

05 23 12 11 CDR-EVA Hold off. - -

05 23 12 12 CC Roger.

05 23 12 13 CDR-EVA - - Let me get squared away here.

05 23 12 14 LMP-EVA Okay.

05 23 12 15 CDR-EVA Hey, Joe, the steering is a new task, Joe. It's really responsive now. I guess I got pretty used to quiet steering, and this thing really turns.

05 23 12 30 CC Roger, Dave. We don't want it to be too easy for you. - -

05 23 12 32 LMP-EVA Hey, look. We can always disengage the real - the rear steering.

05 23 12 37 CDR-EVA No, I'll get used to it, it's just a matter of getting used to.

05 23 12 48 LMP-EVA Okay, on our left, now, we have a very large subdued crater. I'd estimate 4 or 5 hundred meters across. It has a crater of about 25 meters on its eastern

innerwall about half way to the bottom. And on that smaller crater there's some rock exposed. Looks like some bedrock exposed, in that particular crater.

- 05 23 13 24 CDR-EVA I'm going to hold it here.
- 05 23 13 30 LMP-EVA You want to disengage rear steering, maybe?
- 05 23 13 31 CDR-EVA Yes.
- 05 23 13 32 LMP-EVA Okay, we're stopping, Joe.
- 05 23 13 34 CDR-EVA Just a minute.
- 05 23 13 35 CC Okay, Jim. Stopping.
- 05 23 13 40 CDR-EVA Okay, try it that way.
- 05 23 13 41 LMP-EVA Okay, we're moving again.
- 05 23 13 42 CC Roger. And your description is remarkable, remarkably similar to Index. Perhaps you're looking at Index Crater.
- 05 23 13 56 LMP-EVA I guess it's the largest crater that I've seen, Joe - as far as ... - -
- 05 23 13 59 CC Roger. We'll reserve judgment on that, but keep describing, please. Sounds great.
- 05 23 14 07 LMP-EVA Okay, we're heading 155 and at our 1 o'clock position, there is a - the A Doublet. Shoot, I think it's the doublet we drove across yesterday. I'll tell you in a moment when we see our tracks. Do you want to talk, Dave?
- 05 23 14 29 CDR-EVA I just want to tell them I turned off the rear steering to see how she works with the front and it's really a lot better. The double Ackerman's a little too responsive when you have the lack of traction, especially on the slopes.
- 05 23 14 46 CC Roger, Dave. Copy that. Why don't we save the double Ackerman for the rougher terrain later on.
- 05 23 14 54 CDR-EVA Yes. I think that's a good idea.

05 23 14 58 LMP-EVA Okay, Joe. I mentioned those - It's really a triplet arrangement here that we just passed on our right. I did not see our tracks.

05 23 15 06 CC Roger.

05 23 15 07 LMP-EVA So we're - Oh, definitely east of our track from yesterday.

05 23 15 14 CC Roger. We agree.

05 23 15 15 LMP-EVA We're heading 170.

05 23 15 28 CC Okay, Jim. And you - -

05 23 15 29 LMP-EVA And our range is 0.5.

05 23 15 30 CC - - may very well be coming up on Arbeit Crater.

05 23 15 34 CDR-EVA I think we are.

05 23 15 35 LMP-EVA I think so, Joe.

05 23 15 36 CDR-EVA Yes.

05 23 15 37 LMP-EVA I think so. There's a fairly fresh one here with - angular blocks on the rim.

05 23 15 43 CC Roger. Give us the size - -

05 23 15 44 LMP-EVA Look at that one directly ahead, Dave.

05 23 15 45 CDR-EVA Yes, I see it.

05 23 15 46 LMP-EVA That's pahoehoe.

05 23 15 47 CC - - on the largest.

05 23 15 49 LMP-EVA Yes, the largest ones I would estimate 2 or 3 feet, angular. There's one on the southeast rim that has a flat top. In fact, it looks like a rectangular block. But there are several fragments down there that have the pahoehoe texture that Dave mentioned yesterday.

05 23 16 10 CDR-EVA However subtle, though.

05 23 16 12 LMP-EVA (Laughter) Yes. However subtle.

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05 23 16 15 CC Roger; copy.

05 23 16 21 LMP-EVA Okay, range is 0.6. We're heading 160.

05 23 16 29 CDR-EVA And we're doing about 8 to 9 clicks.

05 23 16 32 CC Okay, Dave. Sounds good. Standing by for amps.

05 23 16 38 LMP-EVA Okay; amp reading is - Let me get my hand down there, Dave. I want to put my hand down there - -

05 23 16 46 CDR-EVA Okay, go ahead. Let me get it.

05 23 16 50 LMP-EVA I'll get it. Okay, reading - the max looks like about 10 amps.

05 23 16 57 CC Roger, good enough.

05 23 16 58 LMP-EVA Get no reading on 2. Okay, coming up on our right is a very subdued crater again. No blocks at all on its rim, and it is about 50 meters in diameter.

05 23 17 16 CDR-EVA Okay. Let me stop and get the rear steering going.

05 23 17 17 LMP-EVA Okay. We stopped, Joe.

05 23 17 19 CC Roger.

05 23 17 24 CDR-EVA Now we're going again, Joe.

05 23 17 25 CC Okay.

05 23 17 27 LMP-EVA And I see a - see a very large crater over at 1 o'clock.

05 23 17 32 CDR-EVA Okay, let me just get the steering squared away here, Jim.

05 23 17 35 LMP-EVA Yes. Okay, we've stopped.

05 23 17 37 CC Roger, Jim; and that might very well be earthlight at 1 o'clock. And Domingo Crater should be on your left, now.

05 23 17 50 LMP-EVA Okay. We'll give you a little more report when we get a little closer to it.

05 23 17 54 CC Roger.

05 23 17 58 LMP-EVA I'm going to hold off too many comments here until Dave gets the steering squared away.

05 23 18 05 CC Roger.

05 23 18 06 CDR-EVA Joe, it feels like the - the rear steering, when I turn it off, doesn't center. Feels like my rear wheels are drifting. So I guess I better turn it back on.

05 23 18 34 CC Roger, Dave. We agree. - -

05 23 18 35 LMP-EVA And we're gradually increasing. A very gentle slope.

05 23 18 36 CC - - maybe you should turn it back on.

05 23 18 43 CDR-EVA Yes, I guess you might think about why they don't center for us.

05 23 18 45 CC Roger. That sounds like the Rover moves like Jim's sand crabs move.

05 23 18 53 LMP-EVA (Laughter) Yes, that's just exactly what it feels like too.

05 23 18 57 LMP-EVA Dave, if you could swing to the right here, we could go by the rim of Earthlight, what Joe is calling Earthlight.

05 23 19 02 CDR-EVA Good. Let's do that. Well, there's a big thing here in front of us, too.

05 23 19 05 LMP-EVA Yes, but we could - can you get around to the right? Maybe not.

05 23 19 09 CDR-EVA No, let's go to the left. We're not going to stop at Earthlight. Let's go left.

05 23 19 12 LMP-EVA Okay.

05 23 19 14 CDR-EVA Because this big excursion there.

05 23 19 22 LMP-EVA Okay, now we're going downslope.

05 23 19 27 CDR-EVA Yes. We're going in and out of the craters.

05 23 19 29 LMP-EVA I get the impression out to our left that there is a shallow depression there.

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05 23 19 35 CDR-EVA Gee, over to the left there is a big hole. Huh?  
See it over there?

05 23 19 41 LMP-EVA Yes.

05 23 19 42 CDR-EVA A big subtle crater. Oops, and we're coming up on  
a sharp one.

05 23 19 50 LMP-EVA Hey, you got those two ahead of us there?

05 23 19 52 CDR-EVA Yes.

05 23 19 56 CDR-EVA See if we can find a reasonable path through here.

05 23 20 08 LMP-EVA Okay, we're heading 140; we're out to 1.0.

05 23 20 14 CC Roger; Jim, copy.

05 23 20 16 LMP-EVA Doing 9 clicks.

05 23 20 18 CC Beautiful.

05 23 20 22 CDR-EVA I think we're going by a very large one here; we're  
at the 9:30, 9 o'clock, Jim, huh?

05 23 20 27 LMP-EVA Yes.

05 23 20 28 CDR-EVA What do you suppose that is?

05 23 20 29 LMP-EVA It could be Domingo.

05 23 20 30 CDR-EVA No, it's too big.

05 23 20 31 LMP-EVA Too big for Domingo?

05 23 20 33 CDR-EVA Couple of hundred meters.

05 23 20 34 LMP-EVA Let's see, 1 out - Let's see, checkpoint 1 is - You  
said 1.7.

05 23 20 51 CC Dave and Jim, that could be possibly Index Crater,  
if you started from where we thought. The distance  
is right on that and continue on towards check-  
point 1.

05 23 21 05 CDR-EVA Okay, I would say that probably was Index. It was  
about that size.

05 23 21 14 LMP-EVA Okay, you've got the right bearing.

05 23 21 16 CDR-EVA Yes. That's nice, huh?

05 23 21 17 LMP-EVA Yes. We're going for 1.7.

05 23 21 20 CDR-EVA Going for - yes, okay, we're 1.2 now.

05 23 21 23 LMP-EVA Yes.

05 23 21 28 CDR-EVA There's a nice deep one there that's smooth and rounded, about 30 meters across.

05 23 21 34 LMP-EVA You know, on one of these trips, we ought to stop at one of these very fresh ones and really tap one.

05 23 21 38 CDR-EVA On the way back we'll get that.

05 23 21 39 LMP-EVA Yes.

05 23 21 43 LMP-EVA I mean these small ones, you know, just filled with - -

05 23 21 48 CDR-EVA Oh, yes.

05 23 21 49 LMP-EVA - - rock debris and glass in the middle. Just do a systematic sampling on it.

05 23 21 53 CDR-EVA Yes.

05 23 21 54 LMP-EVA Like this one over here at 1 o'clock.

05 23 21 55 CDR-EVA Yes, I know what you mean. Okay, bearing is now 3 - 39 and our range is 1.3. Look out, oh!

05 23 22 09 LMP-EVA Oh, whoa baby!

05 23 22 11 CDR-EVA Okay, all right, yes.

05 23 22 15 LMP-EVA Great machine.

05 23 22 16 CDR-EVA Yes, does good.

05 23 22 46 CC Okay, Rover, checkpoint 1 is 160 at 1.9 clicks, and there's no need to stop there. We can press on towards checkpoint 2, if you're satisfied.

05 23 23 01 LMP-EVA Roger. I guess we're okay, Joe.



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05 23 23 04 LMP-EVA Okay, we've got the right bearing. We're at 1.4 now, Joe.

05 23 23 07 CC Okay, Jim, and we're enjoying your description.

05 23 23 15 CDR-EVA Why don't you just give them a running comment; I'll keep my eyes on the road.

05 23 23 20 LMP-EVA Okay, there's a - -

05 23 23 21 CC Sounds like a good idea.

05 23 23 22 LMP-EVA - - a crater on our right now about 50 meters in diameter with a lot of gray fragments on its rim. And we're just passing one that's sitting right on the surface - about 2 feet subangular. I can look out now and see the south cluster and in the - I get the impression of perhaps, some horizontal beds in the first mound in the south cluster. I do see a lot of blocks over in that direction - particularly on the second - the second mound - the west side of the second mound that appears to be in the secondary cluster.

05 23 24 13 CC Roger, Jim. Copy.

05 23 24 14 LMP-EVA Over in - probably over the area of Crescent. Okay, we're 1.7 - and - again we have a very fresh crater on our left with - several blocks.

05 23 24 36 CDR-EVA The blocks about a meter or so and the crater is probably about 15 meters, like it might have excavated or been a secondary, huh?

05 23 24 47 LMP-EVA Yes, well, no- - notice all the debris here, that the surface is covered with more debris in this particular area than what we've seen before.

05 23 24 53 CDR-EVA It sure is.

05 23 24 54 LMP-EVA Just around that particular crater.

05 23 24 56 CDR-EVA Yes, more being probably 2 percent.

05 23 25 00 LMP-EVA (Laughter) Yes.

05 23 25 01 CDR-EVA It's noticeably more.

05 23 25 04 CC Roger. We copy that. And, Jim, you may want to start your camera, if you think this is a good area, and don't hesitate to fire off shots from the hip with your 70 millimeter.

05 23 25 19 LMP-EVA Okay, I'll - I'm going to start the - -

05 23 25 21 CDR-EVA Point it down, Jim; it's pointed up a little too much.

05 23 25 24 LMP-EVA Okay. About like that?

05 23 25 30 CDR-EVA Yes, that's dandy.

05 23 25 32 LMP-EVA Okay, I'm starting my camera, Joe.

05 23 25 35 CC Roger. We got the mark, and we'll watch it.

05 23 25 38 LMP-EVA Tracking okay.

05 23 25 44 CDR-EVA Reckon we can get between those two there?

05 23 25 47 LMP-EVA Yes.

05 23 25 59 CDR-EVA It's a bridge between two, about 20 meters in diameter, a little doublet and the one on the left has got a bunch of debris, and the one on the right has got nothing, huh, or very little.

05 23 26 12 LMP-EVA There was a very large crater over on our - 1 to 2 o'clock position.

05 23 26 17 CDR-EVA Oh, yes.

05 23 26 18 LMP-EVA That's the largest one - oh, I guess it would be equal maybe larger than - well larger than Elbow, certainly.

05 23 26 26 CDR-EVA Yes, it looks like it. You can't see too much of it but it does - -

05 23 26 29 LMP-EVA I don't see that on the map.

05 23 26 33 CC Dave and Jim, we think you might be looking at Earthlight now. It might be - its long dimension is greater than the east-west dimension.

05 23 26 44 LMP-EVA Okay, well that's certainly true. Certainly true. Okay, we would be - you would have us east of Earthlight.

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05 23 26 56 LMP-EVA Hey, here's a big deep one here ... - -

05 23 26 57 CC That's exactly correct. And Arthur Clark would be proud of you.

05 23 26 58 LMP-EVA - - about - maybe 50 meters - Okay, and on the south - I can just barely see the - west slope - western slope of Earthlight. But the southern slope of it, I can also see, has several blocks on it.

05 23 27 25 CDR-EVA Hey, Jim. Check the camera. I don't think it's running. I don't see any change in the - -

05 23 27 32 LMP-EVA Not changing.

05 23 27 33 CDR-EVA - - the quantity indicator. Why don't you feel it?

05 23 27 36 LMP-EVA I did and - -

05 23 27 39 CDR-EVA The film isn't - apparently is not running through.

05 23 27 44 LMP-EVA Okay, it's stopped now.

05 23 27 45 CDR-EVA Yes, why don't you try it again. Make a little turn here.

05 23 27 54 LMP-EVA Okay, it's - it's trying to run, Dave.

05 23 27 57 CDR-EVA Okay, point it to the FORWARD. Let's see if it will - I just noticed that the film counter wasn't going.

05 23 28 02 LMP-EVA Yes. I hope we don't have another - -

05 23 28 07 CDR-EVA Yes.

05 23 28 08 LMP-EVA - - film problem. - -

05 23 28 09 CC Dave and Jim, the film counter may not have dropped off the hardstop yet. It's only been going a couple minutes. We need a range and bearing, if you'll give it to us, please. And continue on, we'll watch the camera.

05 23 28 21 LMP-EVA Okay, bearing is 358; range is 2.2.

05 23 28 28 CC Roger, - -

05 23 28 29 CDR-EVA I think bearing's 338.

05 23 28 30 CC - - and let the camera run.

05 23 28 32 LMP-EVA Yes, isn't that what I said? What did I say?

05 23 28 36 CDR-EVA You said 358.

05 23 28 38 LMP-EVA Okay, 338.

05 23 28 39 CC Roger; copy. 338.

05 23 29 00 LMP-EVA Get around this blocky area here.

05 23 29 09 LMP-EVA Oh, it looks like we're coming down - have to go through a small valley - ...

05 23 29 12 CDR-EVA Yes, sure does.

05 23 29 15 LMP-EVA That valley off to the left.

05 23 29 18 CDR-EVA Oh, yes. And that's a north-south trending, isn't it?

05 23 29 23 LMP-EVA I hope we can get through this way.

05 23 29 25 CDR-EVA Oh, the old Rover will make it - with a few little excursions.

05 23 29 31 CDR-EVA Looks like - it looks more like a valley, you know, that runs east-west.

05 23 29 35 LMP-EVA Yes, sure does.

05 23 29 47 CDR-EVA Look at that big hole there, Jim. Are we up on Dune? Yes, there's a rampart over there.

05 23 29 54 LMP-EVA I was wondering whether we were - could possibly be on Dune.

05 23 29 58 CDR-EVA Could we be at Dune?

05 23 29 59 LMP-EVA Or Crescent?

05 23 30 00 CC Dave, I think you're probably - -

05 23 30 01 CDR-EVA Crescent? Boy, that's the biggest one we've seen.

05 23 30 02 CC - - looking into Crescent.

05 23 30 05 LMP-EVA Yes, think it is - -

05 23 30 06 LMP-EVA Yes, I guess you're right, Joe, because this little one - just to the right of us here, I see it on the map. So - Yes, that's Crescent.

05 23 30 15 CDR-EVA Yes, I guess you're right. That's a big fella isn't it?

05 23 30 21 LMP-EVA In fact, Dune should be dead ahead, Dave; so we'll probably have to steer a little to the right to go around the western side of Dune.

05 23 30 29 CDR-EVA Okay.

05 23 30 30 CC Exactly correct, Jim - -

05 23 30 31 CDR-EVA Here's a blocky area here.

05 23 30 32 LMP-EVA Oh, yes.

05 23 30 33 CC - - your thinking corresponds to ours. And you'll be wanting to head more towards the south - towards - the numbers 334 and 3.3 clicks.

05 23 30 47 CC Jim, disregard - -

05 23 30 48 CDR-EVA You want a bearing of 334?

05 23 30 49 CC - - that's a bad number. You're heading towards checkpoint 2.

05 23 30 56 LMP-EVA Okay. Yes, checkpoint 2. Okay.

05 23 30 59 CDR-EVA Hey, we're in a debris field now, Joe, with fragments on the order of 6 inches to a foot, in general, and maybe - oh, I'd say almost 5, 8 percent coverage. Wouldn't you, Jim?

05 23 31 10 LMP-EVA Yes.

05 23 31 11 CDR-EVA And there are some that are up to a couple of feet that require some maneuvering.

05 23 31 20 CC Roger.

05 23 31 21 CDR-EVA Let's see, I think I'll go left around this one, Jim, and then swing over to the right.

05 23 31 24 LMP-EVA Okay, yes, that'll be good.

05 23 31 27 CDR-EVA Lots of - the smaller ones are deeper here. Man, there's one and that's got direction to it - about 4 meters across and a big block in it on one side - on the south side.

05 23 31 44 CC Roger. - -

05 23 31 45 CDR-EVA ... being about a meter.

05 23 31 46 CC - - just like a secondary impact from the north.

05 23 31 51 CDR-EVA That's just exactly what it looks like, Joe.

05 23 31 54 LMP-EVA Okay, range is 2.7.

05 23 31 58 CDR-EVA Okay.

05 23 31 59 LMP-EVA Should be Dune straight ahead.

05 23 32 03 CDR-EVA Yes, which way do we want to go around? I'll tell you -

05 23 32 05 LMP-EVA To the right.

05 23 32 06 CDR-EVA Right, yes. Okay. Looks like the better way to go from here. Up a little hill here, about 5 - oh, I'd say this must be a 5, 7 percent grade. The Rover's going right up just like it knows what it's doing.

05 23 32 26 LMP-EVA A little more to the right, Dave.

05 23 32 28 CDR-EVA Okay, coming right. I've got to get up on the rim here where I can take a look.

05 23 32 33 LMP-EVA Yes, I'm afraid the rim might be ... - -

05 23 32 34 CC Okay, Jim. And turn off the 16-millimeter camera, please. The film should be run through.

05 23 32 40 CDR-EVA Okay. Not a single motion on the little ball on the indicator, Joe.

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05 23 32 44 CC Okay, Dave. We copy that. We'll worry about it later.

05 23 32 50 CDR-EVA Yes, we tried running that through with our fingers last night and - Guess it didn't do much good.

05 23 32 56 CC We'll get the next one; don't worry.

05 23 32 58 CDR-EVA Let's see -

05 23 32 59 LMP-EVA Okay, we can definitely look down in the - definitely look down in the Dune Crater.

05 23 33 05 CDR-EVA Can we ever.

05 23 33 07 LMP-EVA Man, it sure likes the - a ray of blocks that run north and south on the southern slope of the crater.

05 23 33 20 CDR-EVA Yes, and there's no big rampart like we were thinking we'd see.

05 23 33 29 CDR Man, look at some of those big ones Jim. They're like - 3 meters across.

05 23 33 40 LMP-EVA Okay, we're heading now 250 to get over on the west side of Dune.

05 23 33 50 CC Roger; copy. And, Jim, checkpoint 2 is out at 4.3 clicks - -

05 23 34 00 LMP-EVA And we're doing 10 clicks.

05 23 34 01 CC - - bearing 348.

05 23 34 08 LMP-EVA Okay, 348 at - 4.3.

05 23 34 11 CC That's affirm. And nothing magic about that number as you know.

05 23 34 22 LMP-EVA Understand.

05 23 34 32 LMP-EVA Yes, when we get clear of the west side here, Dave, we could just head - about 180.

05 23 34 40 CDR-EVA Okay.

05 23 34 41 LMP-EVA 170.

05 23 34 42 CDR-EVA Okay.

05 23 34 44 LMP-EVA With the front.

05 23 34 51 CDR-EVA Lots of debris here, woeee! Up again to about 5 to 7 percent. Very rough textured, some angular blocks - gray, partially buried - some of them, and some of them are on the top, huh?

05 23 35 11 CC Roger. And Jim - -

05 23 35 12 LMP-EVA Boy, look up at Hadley Del - -

05 23 35 13 CC - - give us range and bearing, please.

05 23 35 17 LMP-EVA Okay, bearing is 348 and range is 3.0.

05 23 35 20 CC Roger; thank you.

05 23 35 22 LMP-EVA Look up at that Hadley Delta, Dave. Don't you get the impression that those craters, secondary on the side there, are oriented, going right up the slope?

05 23 35 32 CDR-EVA Oh, yes, you called them right, I think - secondaries. I think they just splattered right up the slope. Because they're the only craters on the side of the mountain.

05 23 35 39 LMP-EVA Yes. And they're lined up so nicely. Good sized one ahead, Dave.

05 23 35 46 CDR-EVA Yes sir.

05 23 35 48 LMP-EVA Avoid that fella - stuck in there. Hey, we're going south.

05 23 36 09 CC Okay, Jim, and please continue.

05 23 36 16 LMP-EVA (Laughter) Okay, we're on the - about the southwest side now of Dune Crater. As Dave mentioned, we're heading 155 now. A very fresh crater at our 1 o'clock position with a lot of angular blocks, very slight raised rim about 2 feet above the general surface, but a very fresh crater. It seems like the albedo was lighter around that one - than others that we've seen. In fact, you might be able



to see that on your map, Joe. The lighter albedo in the southwest side of Dune. It's a fresh crater - -

05 23 37 02 CC Roger, Jim. We have it; thank you.

05 23 37 07 CDR-EVA And what's the bearing and range to the next checkpoint, Jim?

05 23 37 20 CDR-EVA It was 348 at 43.

05 23 37 22 CC That's affirm, Jim. And you'll want to head - continue heading south.

05 23 37 30 CDR-EVA Okay, that bearing now is 348 at 33.

05 23 37 36 LMP-EVA Wouldn't it be nice, Dave, - -

05 23 37 37 CC Roger.

05 23 37 38 LMP-EVA - - if we could - line up with - that - that chain of secondaries - -

05 23 37 43 CDR-EVA Yes, that's right.

05 23 37 44 LMP-EVA - - going up the side of Hadley Delta. But now, look up the slope there at - if you can take - -

05 23 37 50 CDR-EVA Yes, I can -

05 23 37 51 LMP-EVA - - your eyes off the road there for a moment.

05 23 37 54 CDR-EVA As a matter of fact, I'm going to stop right here and take a little break.

05 23 37 56 LMP-EVA Okay. Look at 12:30. See that large block sitting up about - I'd guess it's a quarter of the way up Hadley Delta. One of the few - well, probably the only large block on the side of Hadley Delta.

05 23 38 14 CDR-EVA Yes. Hey, by the way, we're stopped now, Joe.

05 23 38 16 CC Roger, Dave. We copy.

05 23 38 21 CDR-EVA Yes - I just wanted to take a little break for a minute. Jim, why don't you pull your camera up and swing it around and get a pan? Let me hold the maps for you.

05 23 38 53 CDR-EVA I'll bet you can get, you know, almost - 90 or 100 degrees of pan there.

05 23 39 05 CDR-EVA And, Joe, I just put my diverter to MIN, and I never tried it on the Rover before, but the controls are very easy to reach.

05 23 39 15 CC Roger, Dave. Interesting.

05 23 39 25 LMP-EVA Okay, we got about a 90-degree there, Dave.

05 23 39 27 CDR-EVA That's very good. Okay, put your camera back on, and I'll give you your maps back.

05 23 39 34 LMP-EVA Okay.

05 23 39 35 CDR-EVA Done?

05 23 39 36 LMP-EVA Yes.

05 23 39 37 CDR-EVA Okay, ready to go?

05 23 39 39 LMP-EVA Yes.

05 23 39 40 CDR-EVA Okay. A drink of water and a little bite of food stick. We're on our way.

05 23 40 10 CDR-EVA Okay, we're moving, Joe, by the way.

05 23 40 14 CC Copy.

05 23 40 17 LMP-EVA I think one of those - one of those craters there dead ahead, Dave, would probably be Spur, up on the side. Yes.

05 23 40 24 CDR-EVA Yes. I think you're right.

05 23 40 26 LMP-EVA Probably the large one at 12 o'clock.

05 23 40 34 CC Okay, Dave and Jim, thinking downstream a little bit, we want to drive past checkpoint 2; continue on towards checkpoint 3, and this is our reconnoiter run along the boudinage of the front.

05 23 40 49 CDR-EVA Okay, understand, Joe.

- 05 23 41 00 CC We're looking in particular for fresh craters, lots of frags, good sampling drill holes into the Front and mare.
- 05 23 41 11 CDR-EVA Roger. And a sweep, and the high water lines and all those good things.
- 05 23 41 26 CDR-EVA Incidentally, Joe, thinking back on something we saw yesterday down towards Mount Hadley, we saw three sort of suggestions of beddings or horizontal linear lines at the base of Mount Hadley. And I got to thinking last night, maybe that was the high water mark for the basin at one time, because there are only three of them down there, and they were unique at the base of that mountain.
- 05 23 41 50 CC It might just be.
- 05 23 42 02 CDR-EVA I think we're arriving at the Front here pretty soon. And the debris has sort of diminished quite a bit. Sort of like we're out of the secondaries.
- 05 23 42 17 CC Dave or Jim, could you give us an estimate of the ... numbers of rock - rock types you're looking at. Have you seen two populations so far?
- 05 23 42 30 LMP-EVA Oh, it - it looks like breccia as far as I can tell, Joe, just driving along.
- 05 23 42 37 CDR-EVA Yes, I sort of agree, Joe. We - It - it's really - The sun is about 45 degrees to us right now, and it's sort of tough to see any differences in the rock types. They all look relatively the same.
- 05 23 42 52 CC Roger. We copy. And press on, troops, with the description. It's beautiful.
- 05 23 43 01 LMP-EVA Okay, we're moving at 10 clicks; we're at 347 on bearing and 3.9 on the range.
- 05 23 43 11 CC Okay.
- 05 23 43 13 LMP-EVA And I'd say the terrain is good for driving, isn't it, Dave?
- 05 23 43 18 CDR-EVA Yes, it's a lot better here.
- 05 23 43 23 LMP-EVA Make better time here along the Front.

05 23 43 24 CDR-EVA Yes, sir. In fact, I bet you we just went by -  
You know, we just changed terrain type almost  
distinctly there, Jim.

05 23 43 33 LMP-EVA Yes.

05 23 43 34 CDR-EVA You know, we don't have the deep craters anymore.  
The deepest around here may be half a meter or so,  
and we don't have the rocks, the debris on the  
surface; just a few. As a matter of fact, right  
here at 347, range 4.0, it's pretty smooth.

05 23 43 56 CDR-EVA There's a crater. A subtle depression; no debris.  
We can navigate that one all right.

05 23 44 03 LMP-EVA There are some fairly good blocks sitting up by  
themselves there - -

05 23 44 06 CDR-EVA Yes.

05 23 44 07 LMP-EVA - - at 11:30. But I guess our primary objective  
is the crater.

05 23 44 13 CDR-EVA Yes. We'll hit that first. Boy, that's a big  
mountain when you're down here looking up, isn't  
it? My oh my! This is as big a mountain as I  
ever looked up.

05 23 44 29 CC Dave, do you see Spur as you look up there? - -

05 23 44 30 CDR-EVA Hey, look at the little chain of craters in that  
one directly ahead.

05 23 44 35 LMP-EVA Oh, yes, I see what you mean, Dave.

05 23 44 36 CDR-EVA You see it?

05 23 44 37 LMP-EVA Yes, there are - Let's see 1, 2, 3, 4 - at least  
4 lined up going upslope.

05 23 44 43 CDR-EVA Yes, right in the wall of the crater.

05 23 44 45 LMP-EVA Yes.

05 23 44 46 CDR-EVA Just perfectly linear and perfectly uniform  
craters, little ones, maybe - -

- 05 23 44 49 LMP-EVA Yes, but look there's a - a rock in below those.  
I wonder if it could have bounced down (laughing) -
- 05 23 44 53 CDR-EVA (Laughing) No, it couldn't have made that many.  
Yes, we're going - At the base of the front, we're  
going down into a little depression that runs  
along the front. We came over another north-south  
trending ridge, and we're going down a little bit,  
and then we're going to start up again.
- 05 23 45 16 LMP-EVA Be interesting to see what happens to the Rover's  
speed here as we start upslope.
- 05 23 45 20 CDR-EVA Yes, because we're starting upslope.
- 05 23 45 26 LMP-EVA I'd estimate 3 to 5 degrees.
- 05 23 45 30 CDR-EVA Yes. Okay, good. Take a little lean to the left  
here. No, that - those weren't very big holes at  
all were they? I guess the shadow made them look -
- 05 23 45 43 CC Dave and Jim, what was the bearing - -
- 05 23 45 45 CDR-EVA Okay, we're 348 for 4.3, Jim.
- 05 23 45 46 CC - - on that chain of craters you described?
- 05 23 45 50 CDR-EVA Joe, it was just a very subtle, little - maybe  
half-foot craters of the size of a 4-meter crater  
that showed up very well in the shadow.
- 05 23 46 03 CC Okay. - -
- 05 23 46 04 CDR-EVA And we're right - And that was just in our 348 for  
4.3 - where we are right now. And we've stopped,  
and let's take a gander around and see which way  
we ought to head.
- 05 23 46 18 LMP-EVA Do you know, Dave, if we could make it out that  
far directly ahead of us - Look at those large  
blocks.
- 05 23 46 23 CDR-EVA You mean - -
- 05 23 46 24 LMP-EVA ... come down slope. Yes. At 12 o'clock.
- 05 23 46 27 CDR-EVA No, the antenna is in my way.

05 23 46 28 LMP-EVA Okay, that's as good a way as any.

05 23 46 33 CDR-EVA We'll head 140 from here.

05 23 46 36 CC That sounds good, and can you see Spur as you look up the slope?

05 23 46 41 CDR-EVA Yes, sir. Dead ahead. It's very visible. And right up on the side, about - oh 5 percent up the slope of Hadley Delta, is a very large block on the surface all by itself, very large, and - Gee, it must be 5 meters. Huh, Jim?

05 23 47 01 LMP-EVA The one at 12 o'clock?

05 23 47 02 CDR-EVA Yes.

05 23 47 03 LMP-EVA Oh, I - I bet you that's - I'd say 5 times that size, because that's another 3 kilometers down there.

05 23 47 11 CDR-EVA All right. I'd buy anything. It sure looks big.

05 23 47 14 LMP-EVA Yes.

05 23 47 15 CDR-EVA I was trying to be conservative.

05 23 47 24 LMP-EVA ... want to go out to this ... point of this - -

05 23 47 25 CC And, Rover, we're standing by for your mark when you roll.

05 23 47 30 CDR-EVA Oh, I'm sorry, Joe. We rolled about a minute ago.

05 23 47 36 CC No problem. - -

05 23 47 40 CDR-EVA And we're right now 347 for 4.4. A little depression here, Jim.

05 23 47 47 CDR-EVA I get the feeling we're leaning left.

05 23 47 55 LMP-EVA Each time we stop, you want to take a look to the left there and see how the slope rises abruptly up the Hadley Delta.

05 23 48 01 CDR-EVA You're right.

05 23 48 03 LMP-EVA Like we're driving in a valley.

05 23 48 10 CC Dave and Jim, what would you think - -

05 23 48 11 CDR-EVA Yes, that's hard work to the old Rover, too.

05 23 48 12 CC - - of the suggestion of going to Spur directly from your present position and use that as your first station?

05 23 48 21 CDR-EVA Yes, I think that might be a good idea, Joe. Let us get out and do a little geology and take a look around. I think - Jim, wouldn't Spur be right about 12:30 to us?

05 23 48 35 LMP-EVA Yes.

05 23 48 41 CDR-EVA Do you have some coordinates for Spur, Joe? Because there's a large rock - -

05 23 48 52 LMP-EVA Yes.

05 23 48 53 CDR-EVA - - on the slope of the Front that we can sample. That Spur should be in that vicinity. We're doing 8 clicks.

05 23 49 03 CC Okay, Dave and Jim. Spur is at bearing 346, range 4.6.

05 23 49 12 LMP-EVA Oh, we're at - We're at Spur then.

05 23 49 13 CDR-EVA We're at Spur. But I don't see it.

05 23 49 18 CC Okay, by that, really - -

05 23 49 19 CDR-EVA Do you see it?

05 23 49 20 LMP-EVA No.

05 23 49 21 CC - - we just mean an equivalent crater. I guess continue your reconnoiter along the Front. Sounds good.

05 23 49 30 LMP-EVA Okay. I don't know how high we want to go on the Front.

05 23 49 33 CDR-EVA I don't either. But we don't want to go too high. I don't think. We're - Hey, that must be - maybe to the right there, Spur. Huh, Jim?

05 23 49 40 LMP-EVA Okay, I'll buy that. Yes.

05 23 49 41 CDR-EVA Yes. That's Spur.

05 23 49 42 LMP-EVA Yes.

05 23 49 43 CDR-EVA Okay, let's head over to this ridge at 11 o'clock. We don't - I think that's Spur right over there.

05 23 49 47 LMP-EVA You don't want to hit Spur now?

05 23 49 48 CDR-EVA No, let's go on down to this rise right in front of us. Okay?

05 23 49 53 LMP-EVA Okay, we know where Spur is. We're passing it - we're - it's at our 3 o'clock position. And we're bearing 346, 4.7, Joe.

05 23 50 03 CC Roger.

05 23 50 06 LMP-EVA And we're moving along the Front now.

05 23 50 12 CC Roger.

05 23 50 15 CDR-EVA Do you think - I think we can do a little contour travel here, Jim. And on the way back pick up that big block up there.

05 23 50 24 LMP-EVA Okay. In other words - I see what you mean - angle uphill.

05 23 50 27 CDR-EVA Yes, angle uphill here - -

05 23 50 28 LMP-EVA Yes.

05 23 50 29 CDR-EVA - - a little bit.

05 23 50 30 LMP-EVA Okay, that'll be better. We can probably - -

05 23 50 36 CDR-EVA Boy, it's right into the Sun, isn't it?

05 23 50 40 LMP-EVA Hey, you want a map to hold over your eyes?



- 05 23 50 43 CDR-EVA (Laughter) No, that's okay.
- 05 23 50 50 LMP-EVA Oh, as we drive up Sun here, I'm looking to the left, and I can see - see Mount Hadley. And the linear patterns in it are really remarkable - dipping to the northwest. And the pattern runs from the very top - The whole mountain has the same pattern - linear pattern.
- 05 23 51 19 CC Roger, Jim. - -
- 05 23 51 20 LMP-EVA Very closely spaced. And - it has the same direction as the dipping beds I mentioned yesterday that intersected the horizontal beds or water - high water marks that Dave just talked about, when we looked at the Spur on High Hadley.
- 05 23 51 41 CC Okay.
- 05 23 51 47 CDR-EVA Okay, see this little crater up on the ridge line here at 1 o'clock? I think that's where I'll head, Jim. We'll call that something or another (laughter). And you know, I can see an - an inflection point here as we go upslope. Another inflection point.
- 05 23 52 03 LMP-EVA Just above us here.
- 05 23 52 04 CDR-EVA Yes.
- 05 23 52 05 LMP-EVA Yes. How far east do we want to go?
- 05 23 52 08 CDR-EVA I think this ought to do it.
- 05 23 52 11 CC Dave and Jim, the first thing we need is just a good sampling stop - -
- 05 23 52 13 LMP-EVA A lot of debris ... -
- 05 23 52 14 CC - - to get a general look around, and we want a crater like Spur or anything similar. But one that's provided a lot of frags for us and perhaps a lot of rock types to sample.
- 05 23 52 27 LMP-EVA Well, we haven't seen any besides the Spur just yet.

05 23 52 30 CDR-EVA There aren't any like that, Joe. Just aren't any. They're all very subtle up here.

05 23 52 37 CC Okay, Dave. I guess we want to continue on towards the east, and keep your eyes open.

05 23 52 45 CDR-EVA Well, we're up on a little ridge here. And I think it would do well for us to stop here and sample the rocks we can see in this area, and then head over to that boulder, there. See how we do, okay?

05 23 53 02 LMP-EVA Okay.

05 23 53 04 CDR-EVA What do you think about that, Joe?

05 23 53 07 CC Okay, Dave. That sounds good. However, we're interested now in typical rock types and hopefully, an area that's going to have a lot of fragments around it, not necessarily just one boulder.

05 23 53 21 CDR-EVA Yes, we have a number of fragments in our local area, none having really been excavated from a particular crater. There is no crater up here which has excavated a lot of debris. They're all very subtle and old, but there are rocks on the surface. So, I think, our best shot here is to hop off and gather up a number of these rocks in our vicinity. I bet we can get - oh, 10, 12 very easy, and then - Think about that.

05 23 53 46 CC Okay, that sounds great. Let's press on.

05 23 53 49 LMP-EVA There's one of those - there's one of those very fresh craters over at 11 o'clock ... - -

05 23 53 54 CDR-EVA Yes, you're right.

05 23 53 55 LMP-EVA There are several of those around.

05 23 53 56 CDR-EVA Okay. Rover power is off and our bearing is - -

05 23 54 01 LMP-EVA I'll give them that.

05 23 54 02 CDR-EVA Okay.

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05 23 54 03 LMP-EVA Okay, Joe; here's some readings. 195, 343, 065, 050; 92, and 100; 75, 81; and motor temps are both - off scale low.

05 23 54 32 CC Roger. Copy cool motors - -

05 23 54 33 CDR-EVA Jim, when you get out, be very careful you don't fall backwards.

05 23 54 36 LMP-EVA Okay.

05 23 54 37 CDR-EVA Say, Jim. Jim. Yes, hold.

05 23 54 38 LMP-EVA I'm holding.

05 23 54 39 CDR-EVA Be careful - be careful you don't go backwards, now.

05 23 54 42 LMP-EVA Yes.

05 23 54 43 CDR-EVA We're on a steep slope. Your belt is caught. Just a minute. Just a minute. Okay, hold on there. By golly, Joe. This Rover is remarkable. I'm telling you, we have climbed a steep hill, and we didn't even really realize it. And, we were going like 10 clicks up this hill, and we're on a slope of - -

05 23 55 03 LMP-EVA It must be at least - -

05 23 55 05 CDR-EVA Oh, 8 degrees or so?

05 23 55 06 LMP-EVA It's 8 to 10 degrees.

05 23 55 07 CDR-EVA 8 to 10 degrees. And we can look back and see the whole - we can see the LM just as loud and clear as can be.

05 23 55 14 LMP-EVA Agreed.

05 23 55 15 CDR-EVA Gosh, I'll tell you, this Rover is really something. Look at that.

05 23 55 26 LMP-EVA Oh, Boy! Okay. I'll take a pan.

05 23 55 29 CDR-EVA And, Joe, when the TV comes on, you're going to get a superpicture.

05 23 55 34 CC Yes, sir. We're standing by.

05 23 55 39 CDR-EVA Okay. Going FM/TV, now.

05 23 55 47 CC Okay, Dave. And we may ask you to dust our TV lens off. We'll ask you to stand by for a reading on that.

05 23 56 05 CC And, Rover, do you read Houston?

05 23 56 08 CDR-EVA Yes, we read you, Joe. What did you - We'll stand by for you. You read us okay?

05 23 56 15 CC Yes, sir. You're loud and clear. And we're standing by for the picture.

05 23 56 21 CDR-EVA Yes. I have to get the antenna alined. It's going to take a little bit here.

05 23 56 27 CC Roger. And just proceed with caution.

05 23 56 29 CDR-EVA Sure. (laughing) I don't know why - Yes. I don't know why we always end up on slopes.

05 23 56 37 LMP-EVA You know, I want to take a picture upslope, Dave, but I can't. I can't get the camera pointed up that way.

05 23 56 47 CC Just do the best you can on that, Jim. No problem.

05 23 56 53 CDR-EVA Okay. You've - you must have the picture now, or at least the antenna is pointed.

05 23 57 01 CC Okay, Dave. We've got the data. And we're working on the picture.

05 23 57 07 CDR-EVA Okay. An - and do you want a dust - Okay, do you want a dust job?

05 23 57 17 CC Stand by on the dust job.

05 23 57 18 CDR-EVA We're starting to move it now. Okay. Well, we're going to leave the Rover here and that's what I wondered - why I wondered.

05 23 57 27 CC Okay, fine.

05 23 57 37 CDR-EVA Boy, what a view. Huh?

05 23 57 38 LMP-EVA It's something.

05 23 57 39 CDR-EVA Boy. Spectacular.

05 23 57 49 CC And do we have a picture down here.

05 23 57 52 CDR-EVA Hey, you couldn't, Joe, because the camera is pointed straight down.

05 23 57 56 CC Roger. It's a closeup of the Rover wheel. (Laughter) And, it's still smoking.

05 23 58 01 CDR-EVA Oh.

05 23 58 04 LMP-EVA Huh?

05 23 58 07 CDR-EVA Okay, Jim. Let's get on with - seeing what's here - here at the front.

05 23 58 12 LMP-EVA I'm with you.

05 23 58 13 CDR-EVA Okay. Let's go up first, so we can come downhill. And, there's one of those fresh little craters.

05 23 58 16 LMP-EVA Yes.

05 23 58 17 CDR-EVA Let's go sample that one.

05 23 58 25 LMP-EVA Got glass in the bottom.

05 23 58 56 LMP-EVA (laughter) I thought - I never thought we'd have a problem like this - on the Moon, like we do on field trips, trying to maintain our balance.

05 23 59 05 CDR-EVA Yes, I never did either.

05 23 59 10 LMP-EVA Oh, boy.

05 23 59 12 CDR-EVA It's a nice little crater, isn't it?

05 23 59 14 LMP-EVA It sure is.

05 23 59 31 CDR-EVA Okay. I'll get you a bag. And, it looks to me like the best thing to do - would be to - scoop the side - scoop - scoop the center where the glass is. Oh, what a beautiful sight. You know, we're a long way from the LM. At least, we can see it.

05 23 59 53 LMP-EVA Yes. That's encouraging.

05 23 59 58 LMP-EVA We never did remark on that very white crater out there northwest of the LM, did we?

06 00 00 03 CDR-EVA No, I don't think we did. It's really, really white though, isn't it? Yes, I've got your bag, and it's number 1 - -

06 00 00 09 LMP-EVA And we're going to sample the glass in the middle of it.

06 00 00 12 CDR-EVA Yes. Start with the middle, and we'll pick up the rim, too. 163.

06 00 00 17 CC Copy 163.

06 00 00 23 LMP-EVA It all felt kind of welded together.

06 00 00 25 CDR-EVA Yes.

06 00 00 29 LMP-EVA More?

06 00 00 30 CDR-EVA Hey, get me another load.

06 00 00 33 LMP-EVA I hope it stays together for us.

06 00 00 35 CDR-EVA Yes. That's good.

06 00 00 37 LMP-EVA Like fragments all glued together. What an intriguing - an intricate pattern.

06 00 00 45 CDR-EVA Good. That's dandy.

06 00 00 47 LMP-EVA Okay.

06 00 00 56 CDR-EVA Get you another one.

06 00 01 00 CC Okay, Dave. And is that still bag number 163?

06 00 01 04 CDR-EVA Yes. Yes, the next one coming up is 164. And, why don't you skip the rim there, Jim.

06 00 01 20 LMP-EVA A little more?

06 00 01 21 CDR-EVA Yes, let's get a good bag full.

06 00 01 24 CDR-EVA Okay, Joe. It's very fine light gray - the rim is. Very fine.

06 00 01 32 CDR-EVA Okay. Can you hold this one, and I'll vee [?] the other one.

06 00 01 44 LMP-EVA TV coming in good now, Joe?

06 00 01 50 CC Roger, Jim. We've got a beautiful picture. We're trying to look into the Sun at the moment, somewhat unsuccessfully. But the TV is working beautifully.

06 00 02 00 LMP-EVA You ought to look up toward - you ought to look up toward Mount Hadley. You can see the - that linor - linear pattern.

06 00 02 13 CC Roger. We'll take a look, and thanks for the recommendation.

06 00 02 22 CDR-EVA Okay, Jim. Let's find ourselves a couple of frags down here. Here's a - there are three within easy range over here.

06 00 02 38 LMP-EVA Frags show up pretty good down front, don't they?

06 00 02 39 CDR-EVA Ah huh. Okay. Let's see.

06 00 02 50 LMP-EVA We could go after some little ones but -

06 00 02 53 CDR-EVA Right there in front of you, Jim. That big one. Get - get that one.

06 00 03 28 CC Okay, Jim. And are you still scooping samples?

06 00 03 35 LMP-EVA We're - we're sampling a rock right now.

06 00 03 44 CC Roger. And, we know you're picking up the representative ones.

06 00 03 47 LMP-EVA Get me a -

06 00 03 50 CDR-EVA Yes.

06 00 03 57 LMP-EVA The number on this bag is 188.

06 00 04 00 CC Roger, Jim. Copy 188. And have you noticed a variety of rock types or just one general kind?

06 00 04 09 CDR-EVA Okay. Let us go through them, Joe, as we pick them up, because we can't tell any difference as they sit on the surface. They're all covered with

dust. And, the first one here is a fine-grained breccia - a microbreccia. And, it's got - it looks like a third order with white clasts in it. The matrix is dark black, and it has glass within a fracture on the side. Not unlike some of the 14's.

06 00 04 36 CC Roger.

06 00 04 38 LMP-EVA I'll put some soil in.

06 00 04 40 CDR-EVA Get that other frag right next to it, Jim. Here let me - I'll - I'll get it. Okay, good boy.

06 00 04 47 CDR-EVA And, Joe, the - the soil is very powdery here.

06 00 04 55 CC Roger. Copy, Dave.

06 00 04 56 LMP-EVA It just looks the same - just the ... here.

06 00 05 03 CDR-EVA Okay. Same thing. Some kind of fragment.

06 00 05 11 CDR-EVA Okay. You give me the bag, and why don't you take a little scoop right there by the side of the - -

06 00 05 16 LMP-EVA Okay.

06 00 05 17 CDR-EVA - - where those two were.

06 00 05 30 LMP-EVA Boy.

06 00 05 31 CDR Can you get it?

06 00 05 32 LMP I - I got to get back uphill. I've got most of it, I think.

06 00 05 43 CDR-EVA That's good. That's fine.

06 00 05 52 CDR-EVA Okay, 188, to confirm again.

06 00 05 54 CC Roger.

06 00 06 04 CDR-EVA Okay.

06 00 06 05 LMP-EVA Dave, there's one upslope with a flat side.

06 00 06 07 CDR-EVA Yes.



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06 00 06 08 LMP-EVA Maybe we could take that back as - take it back as a large one. Do you want to wait until we get over to a fresh crater?

06 00 06 17 CDR-EVA Let's wait until we get to a fresh crater.

06 00 06 19 LMP-EVA Okay.

06 00 06 20 CDR-EVA See if we can get some more typic - Here's one down here - to your right.

06 00 06 24 LMP-EVA Yes. I see it, too.

06 00 06 26 CDR-EVA Let's just make a little circle around the old Rover here and find some variety.

06 00 07 11 CDR-EVA Get it?

06 00 07 12 LMP-EVA Yes.

06 00 07 14 CDR-EVA Okay. Okay; this is a fairly large subangular fragment, which is about 20 percent buried. I'm not sure we'll get that in the bag.

06 00 07 28 LMP-EVA I don't think we will, Dave.

06 00 07 30 CDR-EVA Well, we've got it anyway. See what it looks like here.

06 00 07 36 LMP-EVA Ah ha.

06 00 07 37 CDR-EVA On the bottom - See, it looks like - a light gray microbreccia with some white clast of millimeter size in it, and that's about all. And, the bottom side has slickensides. And I do see some glass spattered on one side. And I also see - one little - looks like an orange crystal in there - like it might be a little piece of olivine. It's got definite reddish-orange color to it.

06 00 08 11 CC Okay. Beautiful.

06 00 08 12 CDR-EVA Get the picture before I step in it.

06 00 08 19 LMP-EVA Okay.

06 00 08 21 CDR-EVA See if we can get this - oop -

06 00 08 23 LMP-EVA I'm sorry. Do you want to try putting it in the bag?

06 00 08 25 CDR-EVA Yes.

06 00 08 26 CDR-EVA This is definitely a different kind of breccia, Joe. It - it's only got light-gray millimeter-size clasts in it, with a fine-grained gray matrix. In the clast, there are about - gee, I'd say 10 percent of the total frag. So it's - it's somewhat different. Here, I can hold it with both hands, if you can stick it in. Let me hold the bag.

06 00 08 51 LMP-EVA Got the bag?

06 00 08 52 CDR-EVA If you can get the thing in there.

06 00 09 04 CDR-EVA Watch my helmet with your - Okay. I've got - -

06 00 09 06 LMP-EVA I don't think we will make it, Dave.

06 00 09 07 CDR-EVA I - I don't think so either. I got it. Let go, let go. ...

06 00 09 12 LMP-EVA (Laughter)

06 00 09 14 CDR-EVA Okay. That's going in your collection bag as a single. And, I think you can remember it, Joe. Sorry about the bag; it just fell. I let it go. It's got slickensides on it.

06 00 09 25 CC Roger, Dave.

06 00 09 34 CDR-EVA Okay, Jimbo. Keep going around the old Rover here, and see if we can find another interesting looking one.

06 00 09 49 CDR-EVA As you can see, probably, with the TV, Joe, there just isn't much in the way of debris around here. It's all -

06 00 10 00 CC Roger, Dave. We agree. Good description and - -

06 00 10 02 CDR-EVA ... Hey, there's one.

06 00 10 03 CC - - we might - set you out a little later looking for a fresh crater that's brought up some frags for us.

06 00 10 12 CDR-EVA Okay. Jim, there's one sitting on top of this little crater over here. Reckon you can get over here to it.

06 00 10 18 LMP-EVA Yes. I was trying to recover that bag, but I gave up on it.

06 00 10 20 CDR-EVA Oh, we got plenty of bags. Don't sweat the bags, we got more than we'll ever - even need.

06 00 10 27 CC And, Jim, on your pan, were you able to sweep around the full 360 degrees?

06 00 10 34 LMP-EVA Yes.

06 00 10 35 CC Okay.

06 00 10 36 LMP-EVA Yes, I have a pan. I'll take another one probably before we leave the area, so you get a little stereo effect.

06 00 10 42 CC Beautiful. We've got film to burn.

06 00 10 44 CDR-EVA Oh, man. This is an interesting one, I think.

06 00 10 48 LMP-EVA You can tell we sank in about 2 or 3 inches ... material.

06 00 10 52 CC Roger.

06 00 10 54 CDR-EVA Jim, I would say that this - that this fragment here hit right before its position. You see that little spot? See that little spot right there in front?

06 00 11 07 LMP-EVA Yes.

06 00 11 08 CDR-EVA I think that rock hit there.

06 00 11 10 LMP-EVA Yes. You can convince me of that.

06 00 11 13 CDR-EVA And it - We'll just have to take a look at it. We can get the pictures here. Wonder from whence it came. If it - if it did hit there it was traveling - -

06 00 11 25 LMP-EVA Traveling west.

06 00 11 26 CDR-EVA Yes. East to west, and it left a little mark about a foot from its present position. And its present position is on the surface, to about 4 inches, sub-angular. And we'll pick it up and take a look at it. As a matter of fact, I'll see if I can't get a closeup of the little spot that it hit here. Now, if I can lean down. Okay. Did you get the down-Sun, Jim?

06 00 11 56 LMP-EVA Yes.

06 00 12 02 CDR-EVA Now, pick it up.

06 00 12 10 LMP-EVA That stuff is really soft.

06 00 12 11 CDR-EVA Yes. Help me get it with the scoop. That a boy.

06 00 12 14 LMP-EVA I'll try. I'll throw it up, and you catch it.

06 00 12 22 CDR-EVA Any luck at all?

06 00 12 32 LMP-EVA ...

06 00 12 36 CDR-EVA Easy does it.

06 00 12 47 CDR-EVA Okay. Let me get down here. Let me use my tongs - to pick it up.

06 00 12 50 LMP-EVA Okay.

06 00 12 51 CDR-EVA Okay; good.

06 00 12 53 LMP-EVA Good.

06 00 12 54 CDR-EVA Hey, hold it right there. Up a little more. I got it.

06 00 13 16 CDR-EVA Man, it's really covered. But it's a very rough surface, very sharp, basically a subangular rock, but with quite a jagged, craggy surface on it. And I can see some spots in there. I guess I'd just have to call it a breccia. It'll never fit in there. Just let me put it in your bag.

06 00 13 35 LMP-EVA Okay.

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06 00 13 37 CDR-EVA And I think we have it fairly well documented.  
It's in collection bag number 3, which will help  
you keep track of it.

06 00 13 45 CC Okay, Dave. Thank you.

06 00 13 47 CDR-EVA They're either big ones, or they're little small  
ones. Okay; got the picture.

06 00 13 58 LMP-EVA There's a crater over to the west, Dave, that has  
a very light albedo that's - -

06 00 14 02 CDR-EVA Yes, let's head that way with the Rover when we  
get going.

06 00 14 05 LMP-EVA Okay.

06 00 14 06 CC Okay. Dave and Jim, when - -

06 00 14 08 LMP-EVA ...

06 00 14 09 CDR-EVA Straight ahead of us. Right here.

06 00 14 10 CC - - you reach a good stopping point, we've got a  
couple of questions.

06 00 14 17 CDR-EVA While you're asking them, I think I'll take another  
pan.

06 00 14 20 CC Okay, Dave - or Jim. It sounds good - -

06 00 14 22 CDR-EVA Okay. Very good. ...

06 00 14 23 CC And, Dave, while he is doing that, could you tell  
us how far away and in what direction is the large  
block which you described?

06 00 14 33 CDR-EVA Yes, Joe. We intend to head in that direction.  
It's right now - due west. It's probably, oh,  
3/10ths of a kilometer or something. And I think  
it's on the same slope - maybe upslope a tad from  
where we are now, but not to much. And on the way,  
there's a nice fresh light-albedo crater, maybe a  
couple of meters across. So maybe we ought to  
pick up those two.

06 00 15 00 CC Okay. Copy. You can see towards the west a  
light-albedo fresh crater. As you look back

towards - Okay. Sounds good. We copy that.  
Thank you.

06 00 15 26 CC And, Dave, another question. Do you think this is a good area for a rake sample?

06 00 15 34 CDR-EVA No, Joe. Definitely not.

06 00 15 36 CC Okay. Copy that.

06 00 15 37 CDR-EVA It's got far - there's nothing here. We - -

06 00 15 42 CC Roger. We agree.

06 00 15 43 CDR-EVA - - ... spinning our wheels.

06 00 15 45 LMP-EVA Hey, swing around and get the down-Sun, Dave.

06 00 15 48 CDR-EVA Here, let me get it. I - I'm in a better position, Jim.

06 00 16 01 CC Dave, do you think that that fresh crater you're looking at might be Spur Crater? We put your present position as halfway between Window and Spur.

06 00 16 14 CDR-EVA No, I - I don't think. It's too small, Joe. I think we picked up Spur as we went back - went by a little while ago. We saw it.

06 00 16 25 CC Okay. We agree with you exactly here, Dave and Jim. And we want you, when you leave this station, to move back towards the west. In other words, towards the direction of the rille, and looking especially for fresh craters.

06 00 16 43 CDR-EVA Okay, Joe. Okay; another little microbreccia. Bag number is 190.

06 00 16 57 LMP-EVA Okay.

06 00 17 05 CDR-EVA You can take another. Get this other one here.

06 00 17 12 CDR-EVA Oh, boy. Look at the bottom of that, Jim.

06 00 17 15 LMP-EVA All glassy, isn't it?

06 00 17 17 CDR-EVA Yes, I hope. Glass all over the bottom of that one. And it looks like another microbreccia. And I don't see any pits in any of these, at all. I do see a couple of glass - yes, there, this one's got a couple of very small glass-filled pits, but most of them are pitless. Okay; 190.

06 00 17 37 LMP-EVA Did you put any other soil in it?

06 00 17 39 CC Roger. 190.

06 00 17 40 LMP-EVA - - ... It's typical.

06 00 17 46 CDR-EVA Okay, Joe. I took the down-Sun from a different side on this one - I mean the cross-Sun from a different side on this one. Do you want to ... that? Okay. And want to stick that in my bag and - -

06 00 17 58 LMP-EVA Yes.

06 00 17 59 CDR-EVA Let's go down and take a look at this little crater right here. There's a little small crater, I guess you can see, Joe, at about 2 o'clock to the TV now. And - -

06 00 18 10 LMP-EVA There you go. Having trouble getting up with it.

06 00 18 21 CDR-EVA Got it?

06 00 18 22 LMP-EVA No, I just got the bag opened.

06 00 18 24 CDR-EVA Oh, really?

06 00 18 26 LMP-EVA Up on a mound.

06 00 18 28 CDR-EVA Well, let me get down. Okay?

06 00 18 33 LMP-EVA Got it.

06 00 18 34 CDR-EVA Okay. Okay; let's move down here. Downhill, with care. Now, it looks like the same - Look down at the bottom of that crater - another little crater with a bunch of debris in it.

06 00 19 08 CDR-EVA If I could find a spot on the side here - -

06 00 19 19 CDR-EVA Hey, look at the little bench on this one.

06 00 19 21 LMP-EVA Yes, I was going to remark about that on the - the downslope side.

06 00 19 25 CDR-EVA Yes. I took a picture of it.

06 00 19 28 CC Jim, it's about time for a stem christy.

06 00 19 35 LMP-EVA (Laughter) I need a snowplow.

06 00 19 49 CDR-EVA Jim, I'd suggest we go down to that little bench.

06 00 19 51 LMP-EVA Yes. We could actually walk in. We could do a radial sample.

06 00 19 55 CDR-EVA Yes. Boy, look at how this zero phase just wipes everything out. Man. We can get this here easy - because we don't want to go too far downhill, because we don't have ... climb back up to our Rover friend. Jeoper, this - They're all too big.

06 00 20 27 LMP-EVA Notice you're kicking up some white material there, Dave?

06 00 20 29 CDR-EVA No, I didn't notice. Hey, you're right.

06 00 20 32 LMP-EVA We ought to trench it.

06 00 20 33 CDR-EVA You're right. Sure should.

06 00 20 35 CC Good idea, Jim. Sounds great. A trench sounds great.

06 00 20 43 CDR-EVA Trench sounds great. Okay.

06 00 20 44 LMP-EVA Trench or a core?

06 00 20 46 CC Yes, sir. A single core would be nice. They're always nice.

06 00 20 52 LMP-EVA You guys are easy to please today.

06 00 20 56 CDR-EVA Why don't we go to the upper rim up there and pick up the core, Joe - Jim, on the way back up?

06 00 21 01 LMP-EVA Okay.

06 00 21 02 CDR-EVA Let's get this - this fragment here - or a bunch of these little ones I guess.



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06 00 21 17 CDR-EVA So much dust - on the camera, it's hard to read the settings.

06 00 21 37 CDR-EVA Okay. I think the big one is too big to put in, as usual. Of course, we'll never be satisfied with that, but I'll take some of these others.

06 00 21 45 LMP-EVA Okay.

06 00 21 47 CDR-EVA I think they're the same. Dust off a little bit. Another breccia.

06 00 22 03 LMP-EVA Bag number is 192.

06 00 22 12 CDR-EVA Hold it and I'll get a bunch of these frags right here.

06 00 22 16 CC Roger.

06 00 22 18 LMP-EVA Not much glass.

06 00 22 34 CDR-EVA Okay. That ought to do it. Why don't you close it up, and I'll - put it ... here. Dying to look at that big rock.

06 00 22 48 LMP-EVA Put this in your bag.

06 00 22 50 CDR-EVA Okay.

06 00 22 59 LMP-EVA Okay?

06 00 23 00 CDR-EVA Yes. Let me borrow your hammer just a - I'll take one whack and see if it will come open.

06 00 23 04 LMP-EVA ...

06 00 23 06 CDR-EVA The visibility - Hold my tongs, please. Let's see if we - it's got any variety up here.

06 00 23 18 CC Not bad at all.

06 00 23 19 LMP-EVA - - ... friable to what you're trying to get.

06 00 23 21 CDR-EVA Sure is. Not bad for a beginner. Okay. Give me the tongs, and let's just get another bag and pick up those two little frags there. What do you say?

06 00 23 43 CDR-EVA Evidently your TV is working okay today, Joe. Is that right?

06 00 23 49 CC It's beautiful, Dave. Either that or it's another ESP experiment.

06 00 23 57 CDR-EVA Okay. A microbreccia with millimeter white clast, and there's a gray clast in there that's about 3 millimeters. It looks a little different. Let me go down and get this other one that came up.

06 00 24 11 LMP-EVA And 193 is the number on the bag.

06 00 24 15 CC Roger. Copy 193. And we're standing by when you start the trench.

06 00 24 17 LMP-EVA Okay.

06 00 24 22 CDR-EVA Okay. Well, would you like a trench or a core, Joe? We'll give you your choice today.

06 00 24 28 CC We'd like one of each, if we could, Dave.

06 00 24 33 CDR-EVA A trench and a core?

06 00 24 35 CC Yes, sir.

06 00 24 39 CDR-EVA Okay. We'll go up and trench it first and see if it's worth coring.

06 00 24 43 CC Okay.

06 00 24 46 CDR-EVA Let's go up on the up - the upper rim up there, and work our way back up to our Rover friend.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 23 06 -- BEGIN LUNAR REV 34

05 23 31 45 CC Endeavour, this is Houston. How do you read?

05 23 31 54 CMP Hello, Houston. Endeavour reads you loud and clear.

05 23 31 58 CC Reading you loud and clear likewise.

05 23 32 42 CC Al, if you have time to listen, I have some - news bulletins down here; and, somewhere in the middle, I'll break in for the HIGH GAIN ANTENNA, AUTO.

05 23 32 46 CMP Okay, Karl; go ahead.

05 23 32 48 CC Right. This is the morning national and world news - the world being, of course, the planet Earth. President Nixon, yesterday, declared his administration is determined to revitalize the American country - -

05 23 33 13 CMP ...

05 23 33 15 CC Go ahead. I missed that one; Al, say again.

05 23 33 20 CMP That's your world right now.

05 23 33 23 CC That's right; that's our world.

05 23 33 26 CMP Our world's up here right now, Karl.

05 23 33 29 CC (Laughter) I - I'll give you some news bulletins on that at the end. Things are coming along good in the EVA. Okay. President Nixon was what - he was at ceremonies dedicating a dam in Iowa, and he said the economic potential of rural areas must be developed, quote, "so that the people who live there can be first-class citizens enjoying a first-class way of life." Unquote. In the labor area, about 4000 Houston area steel workers are expected to be off the job today in a nationwide strike against nine major steel companies. That's beginning to loom as a pretty big factor in economic world down here. Senator Mansfield said Saturday . chances are good that the Senate will reach an agreement to stop talking and speed up a vote on a bill to rescue Lockheed Aircraft Corporation. The President of Pakistan has accused neighboring India of continued artillery strikes across the border and said, quote, "We are very near to war with India;" a very sad note there. And Senator Edward Kennedy and Senator Edmond Muskie are tied for the top spot in the latest Democratic standings, according to the Gallup Poll. I'm sure you'll be fascinated. And, in the world of sports, in football, the Houston Oilers lost their first exhibition game to Los Angeles, 17 to 6. In baseball, the Astros won for a change, and beat the Expos 6 to 4; and in golf, Jack Nicklaus and Arnie Palmer shot a total of 64 to take a four-stroke lead in

the PGA National Team Championships in Ligonier, Pennsylvania. Okay, and we are ready for HIGH GAIN, AUTO, A1.

- 05 23 35 46 CC Up on your planet, the latest word is that the Rover is still functioning - functioning brilliantly, and the fellows are well into EVA number 2 and just recently passed Crescent Crater and Dune Crater - well on their way to exploring the Front at Hadley Delta.
- 05 23 36 12 CMP Sounds great.
- 05 23 36 14 CC Yes, everything's doing great, both in orbit and on the surface. Everybody is very pleased.
- 05 23 36 31 CMP Okay, Karl, if you're through with the news, let me give you some words on Tsiolkovsky.
- 05 23 36 37 CC Great, we're listening.
- 05 23 36 46 CMP Okay, I'll take the items one at a time as they come. First off, the central peak. The central peak is - is a very large - spur peak on the - on the south and east sides, getting blocky on the north side; and there's what appears to be some layering visible on the - on the south and west exposed scarp of the peak, dipping to the north at about 30 degrees.
- 05 23 37 28 CC You're coming through loud and clear.
- 05 23 37 30 CMP The - Okay. The light material - light-colored flow material - around the edges of the - of the basin - texture appear to be nothing more than just simple mass wasting off of the edges - or off the - off of the rims around the basin. The rims themselves are quite - cut with the mass wasting in a - oh, I'd say an extent of about 330 degrees on the north, east, and south sides. Now, on the west side, the rim there is a very, very, large, clean scarp; and when I say clean, it goes almost from the basin floor to the - to the rim itself in one large chunk. And that scarp appears to define the limits of a couple of fault zones that go through that rim of Tsiolkovsky. It was kind - it - I couldn't trace the fault zones beyond Tsiolkovsky from the vantage point I had very well,

but they're very distinct in the wall itself. And one fault zone coincides or - occurs in the same location as the southernmost edge of what appears to be a rock glacier extending northwest into Fermi(?). Now, that rock glacier has all the flow-bending and the - and the loping toes characteristic of what we consider a rock slide; however, one - one - feature about that slide that I mentioned before is that it has what looks like fairly fresh crater imp - impacts on the slide itself and seems to have more impacts - in other words, a higher density of craters - than the - than the surrounding floor of Fermi, although Fermi looks - the floor looks much older - it's much smoother, more like a cally formation.

05 23 40 00 CC

Roger, Al; we're copying.

05 23 40 01 CMP

Looking - Okay. Looking more to the south, I see no evidence of another rock slide to the south. The pictures might indicate - might hint at some kind of a rock slide there, but it appears that it's - that it's more ejecta now. The picture doesn't clearly show the ejecta from Tsiolkovsky, but the ejecta pattern and the flow - the flow lines are - at least observable around the most of Tsiolkovsky, and the ones that we see on the south and west side of Tsiolkovsky seem to be more ejecta than anything else. I couldn't see any distinct unit there that could have been a flow, such as the one in the northwest corner. And it - it appears that what lineaments there are in that particular part of the - of the ejecta are merely e - ejecta patterns. Looking into Waterman, there is a small flow that goes into Waterman, but it doesn't come from Tsiolkovsky itself, and I couldn't locate the source of the flow, but it seemed to just come down the side of Waterman and out into the basin. I do have some pictures of it; maybe we can tell from the pictures. But the - what looks like on the picture, as you're looking at - at the picture in the landmark book, looking at the V-1A, Victor one Able, it looks like there's a - there's a - maybe a breach in the wall of Tsiolkovsky, between Tsiolkovsky and Waterman, possibly allowing some flow into Waterman. Well, visually that - that particular breach in the wall doesn't - doesn't show up. The terrain there is much more level than it would

appear in the photo, and there is, definitely, elevation relief between Waterman and Tsiolkovsky. The flow does come from the direction - on the north side of Waterman toward Tsiolkovsky, and I guess my impression would be that it - that that flow came down the side of Waterman possibly out of some fracture or fault concentric to Tsiolkovsky, but outside the basic rim itself.

05 23 42 37 CC

Roger, Al.

05 23 42 51 CMP

One other comment, I guess. And that is, on the crater pair, just north of Tsiolkovsky - there - the - the smaller of the craters on the west side apparently was - was an original crater, with an impact occurring alongside it. Now, that's a - that appears like mass wasting or some kind of a rock avalanche into the westernmost crater - into the smaller of the two craters, and the - the - the rim of the easternmost crater - I'm sorry - Reverse those directions; I'm looking at it upside down. The smaller crater is - is on the eastern side, has - has what looks like a rock slide in it. The larger crater on the west side has a fairly intact rim, being faulted in a couple of places where it crosses the rim of the crater to the west. But that rim is fairly intact. The rim that was apparently moved or obliterated by the most recent impact was the rim of the smaller crater to the west, and that's where all the rock debris is - has fallen into the crater on the west.

05 23 47 13 CC

Very interesting.

05 23 47 23 CMP

Okay, now, we go on to Picard.

05 23 49 15 CMP

Houston, Endeavour.

05 23 49 20 CC

Endeavour, go ahead.

05 23 49 24 CMP

Okay, Houston. Endeavour's coming up over Picard, and I thought I'd just go ahead and talk while we're going over Picard. First, talking about the color variations, Picard is a slightly different color than the rest of the mare basin. It's - I guess what I would consider Crisium - a light brownish gray. Picard, itself, is - is - is more of a brown tone, and it has a darker halo around it.

I can see some of the brown - material just on the outside of the rim; and outside of that is some darker material that gradually turns into gray of Mare Crisium. Inside Picard, I can see - well, let's see now, let's count them - one, two, three, four, five, six - six distinct rings that go around the inside of Picard. And the - and the walls in Picard are very shallow. It looks like a very shallow, almost like a - a dish - kind of basin, and gently from the edges on in toward the center; and, as I say, I can count - five or six rings inside that are all concentric with the center of the basin. And I can see some definite layering in - in the - particularly in the upper boundary of the rim. Now, as opposed to - to - oh, let's - let's say Lick - Lick is - Lick looks like it's almost completely obscured - feature, now. It - it looks very much like a - collapse. All I can see is a little bit of a - of a ring, a color variation, with some positive relief. And then, inside the crater looks very much like outside - crater, as far as the color and the texture is concerned. However, it does appear to slope gently in towards the center. Looks - Lick looks to me like a very large collapse feature, with the same kind of material both inside and outside the basin.

05 23 52 09 CC

Roger; we're - we're copying loud and clear.

05 23 52 18 CMP

And, I make the same comment about Yerkes. And I'm on beyond them now; I'm looking at Proclus now. And - may as well comment on Proclus while I'm here. Remember yesterday, we were talking about variations in the crater wall to - that - well, don't exactly know how to describe it, but there - there is a tremendous variation in the wall, which does line up with ejecta pattern. If - there's almost a straight wall on the side of Proclus that is minus an ejecta pattern. And then there is some breakthrough directly in the middle of that - of that wall, which makes Proclus looks like it's almost a circular crater. However, the - the truth is that Proclus looks like a - a - an elongate crater with - with one wall steeping [sic] - dipping quite steeply into the crater. And that wall is oriented perpendicular to a line bisecting the excluded zone - dipping into the crater. And then right - right in the middle of that portion, it looks like

there was a - a small - Well, a small piece of that wall was - was also ejected, but it - it was only at the top part of that - of that fault scarp. And so, if you look at it from the right angle, you can see almost a flat plate, which looks like it's cut right into Proclus, and to the - to the north and west of that flat plate is the Crater Proclus, and to the south and east is a small chunk out of the top of it that coincides with the - the - the central part of the excluded zone.

05 23 54 49 CC Roger, Al; we copy.

05 23 54 54 CMP Hope you could understand all that, Karl. I had to talk fast and formulate as I went.

05 23 55 00 CC Roger. It came through loud and clear, and I think it was quite understandable. Very good.

05 23 55 15 CMP Okay; and I'm drawing a couple of little pictures of it to show you when I get back.

05 23 55 21 CC Okay, Al; we have earthshine photography coming up in about 15 minutes. I'd better give you a pad on it, and I also have another pad for later photography on that page - or on the following page.

05 23 55 35 CMP Okay. Okay, Karl. Stand by 1.

05 23 57 10 CMP Okay, Houston. Go ahead with the earthshine pads.

05 23 57 13 CC Roger. Earthshine pad at about 144 hours and 5 minutes in your Flight Plan; the number is 144:10:32.

05 23 57 29 CMP Understand 144:10:32.

05 23 57 32 CC Roger; and on the next page, a map camera photo pad; take it.

05 23 57 40 CMP Go.

05 23 57 41 CC Start, 145:14:16; stop 146:13:56.

05 23 58 19 CC The - did the map camera photo pad - -

05 23 58 21 CMP Okay, I have my mapping camera photo pad.

05 23 58 23 CC Roger.



05 23 58 26 CMP Negative; you - you were cut out.

05 23 58 28 CC Oh, Roger. Mapping camera photo pad. Start, 145:14:16, stop, 146:13:56.

05 23 58 46 CMP Understand T-start, 145:14:16; T-stop, 146:13:56.

05 23 58 53 CC That's correct.

06 00 09 07 CC Al, we've got 30 seconds until the mapping camera comes off. And then, 1 minute later, we start revving up for the earthshine photos.

06 00 09 19 CMP Roger, Karl.

06 00 14 11 CC Okay, we start earthshine photos in about 20 seconds.

06 00 14 29 CMP Roger, Karl; understand. And, listen, since I got all the lights turned out here, how about stepping me through the earthshine photos?

06 00 14 41 CC Roger. Okay, we're plus 4 minutes right now in 6 seconds; four frames at 30-second intervals.

06 00 15 17 CMP And, Karl, I hope these all turn out, because this is the - the area on the last rev that I commented on all the lava flows, and we're right over them now taking pictures.

06 00 15 27 CC Very good.

06 00 16 07 CC Okay, after your fourth frame, you're going to change the shutter to 1/15th of a second. And - and then take four more frames at 30-second intervals.

06 00 16 17 CMP Okay, 1/15th.

06 00 16 34 CC I'm sorry; I could have been counting time for you, too. We're coming up to plus 6 minutes, which should be about the fourth frame at the old setting. We'll mark on 6 minutes.

06 00 16 47 CMP Okay, got it.

06 00 16 49 CC And I'll call out times for you now, too. We go to 1/15th of a second.

06 00 16 55 CMP Okay, I just took one frame at 1/15th.

06 00 16 58 CC Excellent.

06 00 17 22 CC Plus 30 seconds after your first picture.

06 00 17 54 CC Take number 3.

06 00 18 24 CC Take number 4, and change shu - shutter setting to 1/8th.

06 00 18 34 CMP Roger; 1/8th.

06 00 18 41 CC Now we're going to take 10 frames at 30-second intervals. Give me a mark on your first one.

06 00 18 48 CMP Okay -

06 00 18 49 CMP MARK.

06 00 19 23 CC Time for number 2.

06 00 19 28 CMP On.

06 00 19 53 CC Take 3.

06 00 20 23 CC Take 4.

06 00 20 52 CC Take number 5.

06 00 21 22 CC Take number 6.

06 00 21 52 CC Take 7.

06 00 21 57 CMP Roger; take 7, and I just went past the spacecraft terminator.

06 00 22 07 CC Say again? Roger; we copy.

06 00 22 13 CMP Okay, I just went by spacecraft terminator.

06 00 22 17 CC Roger; we copy.

06 00 22 22 CC Take 8.

06 00 22 52 CC Take number 9.

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06 00 23 22 CC

Take number 10. Change the shutter to 1/500th,  
cover the lens, and cycle one frame.

06 00 23 40 CMP

Okay; thank you.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 00 25 09 CDR-EVA Right up here where it's nice and fresh.

06 00 25 25 CDR-EVA Hey, Jimmy - Dig me a little trench when you get up here.

06 00 25 28 LMP-EVA ...

06 00 25 41 CDR-EVA Make it okay?

06 00 25 43 LMP-EVA Yes. Taking my time.

06 00 25 45 CDR-EVA Good idea.

06 00 26 03 LMP-EVA Look at those linear features on Hadley, Dave, if you get a chance - -

06 00 26 06 CDR-EVA I did.

06 00 26 07 LMP-EVA - - to look up there.

06 00 26 08 CDR-EVA On Mount Hadley?

06 00 26 09 LMP-EVA Yes.

06 00 26 11 CDR-EVA Oh, yes! My word! Look it, they're dipping - to the northwest, right?

06 00 26 17 LMP-EVA That's right, that's what I said.

06 00 26 18 CDR-EVA Oh, yes! It's a big - looks like a big block tilted up on its side.

06 00 26 23 CC Just like you called it, Jim - -

06 00 26 24 LMP-EVA Sure does, Dave.

06 00 26 25 CC - - and we're going to ask for 500-millimeter pictures of that when you get back to the Rover.

06 00 26 32 CDR-EVA Boy, I was just going to say, we'd better take some 500-millimeter pictures of it (laughter). Okay, Jim's trenching. Hey, the other side, Jim, I can't see you.

06 00 26 42 LMP-EVA That's all right.

06 00 26 43 CDR-EVA Need any help?

06 00 26 44 LMP-EVA Yes, but I can't - -

06 00 26 45 CDR-EVA Well, let me - I'll move them around. You dig it that way; I'll come around.

06 00 26 48 LMP-EVA No, it's going to be too hard for you to get down in there, Dave.

06 00 26 51 CDR-EVA Yes.

06 00 26 52 LMP-EVA I can trench it here.

06 00 26 53 CDR-EVA \*\*\* just right, right like you got it. Keep digging. Except you'll have to - That's right - Okay, I can see it. That's fine. Boy, when you - when you put your scoop in, it smooths it out flat just like plaster.

06 00 27 07 LMP-EVA I was going to say like cement.

06 00 27 08 CDR-EVA Yes. I can't - I can't see any layering because the - the scoop just - -

06 00 27 15 LMP-EVA Yes. It's all - very similar in color.

06 00 27 22 CDR-EVA Can't tell whether - Nice and cohesive, it holds a straight wall very well. It's very fine powder, just like - graphite. (Laughter)

06 00 27 36 CDR-EVA Okay. Well, why don't we call that a trench? Wouldn't that be nice if you could do that at Station 8?

06 00 27 43 LMP-EVA Oh, I hope so.

06 00 27 45 CDR-EVA Let me get this - Move to your left - and let me get over here. A little farther, Jim.

06 00 27 55 CC Okay, troops. And we'll be asking for an SESC from the bottom of the trench when you get it built.

06 00 28 04 CDR-EVA Okay. Oop! How about a hand, old buddy?

06 00 28 10 LMP-EVA Yes.

06 00 28 13 CDR-EVA Just get in front of me and give me your hand.

06 00 28 15 LMP-EVA Okay; stand by.

06 00 28 21 CDR-EVA Okay.

06 00 28 23 LMP-EVA Okay. That's it.

06 00 28 24 CDR-EVA Yes. Thank you.

06 00 28 27 LMP-EVA Get the pictures?

06 00 28 28 CDR-EVA Yes. I think so. The rim, as all rims around are -  
very soft.

06 00 28 38 LMP-EVA Did you hear him, Dave, he wants the SESC from  
the - the bottom of that.

06 00 28 41 CDR-EVA Okay.

06 00 28 43 LMP-EVA Let me get a bag; I'll sample the bottom.

06 00 28 46 CDR-EVA Okay. I'll get your bag.

06 00 29 14 LMP-EVA First scoop?

06 00 29 15 CDR-EVA Yes.

06 00 29 16 LMP-EVA ... one.

06 00 29 25 CDR-EVA Okay; that's good.

06 00 29 27 LMP-EVA Okay; I'll get the SESC now - -

06 00 29 28 CDR-EVA No, listen. Hey, Joe, listen; we're going to go  
over to this fresher crater, we hope. Maybe we  
ought to get it there rather - unless you really  
need it here. Because there's the little trip  
back to the Rover.

06 00 29 45 CC Dave, tht's affirm. You will be moving over towards  
the fresher crater, and stand by, I'll get another  
reading on your core tube. Copy, you've gotten the  
SESC out of the bottom of the trench now.

06 00 29 57 CDR-EVA No - no, no, no, no. We haven't, Joe, you missed  
it. 166 the bag. We didn't get the SESC - -

06 00 30 02 CC Okay.

06 00 30 03 CDR-EVA - - we just got a sample from the bottom of the trench. And since we - since we have to walk back uphill to the Rover to get the SESC - -

06 00 30 10 LMP-EVA No, it's on your back.

06 00 30 11 CDR-EVA Oh, just do it.

06 00 30 12 LMP-EVA Yes.

06 00 30 13 CDR-EVA I'm sorry. That's right.

06 00 30 16 CDR-EVA Have at it.

06 00 30 22 CC And Jim, if material has fallen into the trench, you might want to scoop it out again.

06 00 30 31 LMP-EVA No, I don't think any has. We're very neat.

06 00 30 35 CDR-EVA Watch it - Stand out of the - Don't get too far down in that - that there crater.

06 00 30 40 LMP-EVA Yes.

06 00 30 42 CDR-EVA I'd just scoop out the bottom and this side a little bit, Jim.

06 00 30 48 LMP-EVA \*\*\* out the bottom, you say?

06 00 30 49 CDR-EVA Yes, dig it a little deep - deeper, I think you can probably - get the thing deeper and -

06 00 31 18 LMP-EVA You want me to hit bedrock, I know.

06 00 31 21 CDR-EVA Yes. Okay; I can't see in the bottom of it, but go ahead. Dig her. Have a - have a scoop load. I think the wall collapsed on you. Okay?

06 00 31 38 LMP-EVA Yes.

06 00 31 42 CDR-EVA Get your scoop up. That - that's it. That's it. That's good, Jim. That's about half - can you get another one? Hey, don't slide down in there, that - that's really slippery.

06 00 31 58 LMP-EVA Yes. I noticed.

06 00 32 05 CDR-EVA \*\*\* ..., that'll be good. Okay. ...

06 00 32 13 LMP-EVA Okay?

06 00 32 14 CDR-EVA Yes, that's good. Boy, it's really easy to -  
pick it up - dump it out, isn't it?

06 00 32 32 CDR-EVA \*\*\* you work yourself out of that crater to your  
left. If you try to come up like I did, you're -  
\*\*\*

06 00 33 06 LMP-EVA Let's see, we probably ought to put that SESC in  
your bag.

06 00 33 11 CDR-EVA Yes.

06 00 33 14 CC Good thinking, Jim.

06 00 33 16 LMP-EVA Here. Give me the easy end. Good.

06 00 33 18 CC And, Jim, did you get an after picture of that?

06 00 33 21 LMP-EVA Hold that for me.

06 00 33 22 CDR-EVA I'll get it. I'll - I'll get it, Joe.

06 00 33 26 CC Okay, Davy.

06 00 33 35 LMP-EVA Okay; it's in.

06 00 33 36 CDR-EVA Okay.

06 00 33 37 LMP-EVA I'll take the scoop.

06 00 33 39 CDR-EVA Okay. And if you'll move out of the way, I'll see  
if I can get in there and take the picture.

06 00 33 49 CC And, Dave, while you're taking that picture, we'll  
be asking for a core tube after that. We want you  
to use an upper core, because we only have one lower  
in the bag right now.

06 00 34 06 CDR-EVA Very well, Joe, we'll get you a core right here.

06 00 34 09 CC Roger. The core, using an upper.

06 00 34 11 CDR-EVA One - core; upper core. Okay.



06 00 34 15 LMP-EVA You know, it's unfortunate, Dave, that we didn't take that down at the lower rim where the white was exposed. Here I don't see the white.

06 00 34 22 CDR-EVA Yes, I didn't either. Maybe we ought to go back down there and do that.

06 00 34 26 LMP-EVA You ... Seems like we'd save the core for someplace where there was definite layering.

06 00 34 30 CDR-EVA Yes, I think so too. I don't think there's - yes.

06 00 34 35 CC Jim, we've got that double left. Do you suppose you could drive a single core down where it's white?

06 00 34 45 LMP-EVA Yes, sure, I'm sure we could.

06 00 34 46 CDR-EVA Yes, we could. Let's go do that. Yes, let's go take advantage of what we know down there on the albedo.

06 00 35 05 CDR-EVA Go ahead. Go ahead.

06 00 35 07 LMP-EVA Yes. I'm right behind you.

06 00 35 08 CDR-EVA By the fresh spot down there.

06 00 35 14 CDR-EVA Okay; you sure see the change. \*\*\* up on the high place here.

06 00 35 32 LMP-EVA Above the bench. Let's try it right there.

06 00 35 46 CDR-EVA Yes, boy, the soil is more granular here, too. Quite a difference from one side of the rim to the other.

06 00 35 52 LMP-EVA Yes.

06 00 36 04 CDR-EVA Okay.

06 00 36 08 LMP-EVA I'm probably just about out of film. Why don't you check with my MAG?

06 00 36 17 CDR-EVA Yes, 180. Okay.

06 00 36 24 LMP-EVA Okay, Joe. And you're suggesting using an upper here?

06 00 36 27 CC That's affirmative, Jim, an upper.

06 00 36 33 LMP-EVA Okay. Okay; I have it, Dave.

06 00 36 38 CDR-EVA Okay. I don't think you'll need your hammer, but I'll get it anyway.

06 00 36 50 LMP-EVA Yes, and I'll get up on the uphill side here.

06 00 36 52 CDR-EVA That's a good idea.

06 00 37 00 LMP-EVA Okay; it's in position.

06 00 37 01 CDR-EVA Okay; I got the picture. 07's the number, Joe.

06 00 37 06 CC Roger.

06 00 37 07 CDR-EVA Oh! (Laughter) Easy. Easy, ... Okay; all the - all the way in very easily with a push, Joe.

06 00 37 15 CC Okay.

06 00 37 16 LMP-EVA Be very - I wonder - -

06 00 37 17 CDR-EVA Yes, it'll be soft, bring it out - be gentle. Don't auger it; you'll spill it.

06 00 37 31 CDR-EVA You got it?

06 00 37 32 LMP-EVA Yes.

06 00 37 34 CC Anything there?

06 00 37 35 CDR-EVA That a boy.

06 00 37 36 LMP-EVA Okay; I have it.

06 00 37 37 CDR-EVA Yes. Watch out. Watch out. Jim, watch out. You're over by the bench now; don't go any farther backward.

06 00 37 42 LMP-EVA Oh, I thought you meant I was about to lose the core.

06 00 37 44 CDR-EVA No. Just don't step backward any farther. Wait, let me get the picture - I'll just walk over there, Jim. Okay.

06 00 38 02 CDR-EVA Okay; here's you cap.

06 00 38 12 CDR-EVA Good core, Joe.

06 00 38 15 LMP-EVA I like those cores like that.

06 00 38 18 CC Yes, sir. So do we. That might even be a great core.

06 00 38 29 CDR-EVA Never know. Put that in my bag. Don't step backwards.

06 00 38 34 LMP-EVA Hear you talking.

06 00 38 42 CDR-EVA Okay, Joe. I'd suggest that we drive on down to that white crater and take the 500's from there. And I can do 500's while Jim's taking a pan. How's that sound?

06 00 38 52 LMP-EVA Okay; it's in, Dave.

06 00 39 00 CC Okay, Dave. That sounds like a good idea. We'd like a frame count from you before you leave - -

06 00 39 03 LMP-EVA ...

06 00 39 04 CC - - and Jim, you may be coming up on a MAG change, depending upon your frame counts.

06 00 39 14 LMP-EVA Yes. Mine's 180.

06 00 39 18 CC Roger. Better change it.

06 00 39 21 CDR-EVA ...

06 00 39 22 LMP-EVA I wish you'd packed the slope a little better, Dave.

06 00 39 25 CDR-EVA Yes - we'll get them to do that next time. But look at the Rover tracks; I'm going to take some pictures of the Rover tracks here. And our boots - our boot prints, both. Look at the difference. That old Rover is light.

06 00 39 39 LMP-EVA It does a lot better than we do.

06 00 39 40 CDR-EVA Yes, it sure does. Much better.

06 00 39 43 LMP-EVA Oh. (Laughter)

06 00 39 50 CC A little something for the soil mechanics, sounds great. And we'd like for you to put several scoops of the soil in bag number 6 on the handtool carrier when you get back to the Rover.

06 00 40 02 CDR-EVA Okay. Go ahead, Jim. Yes, that's a great picture but don't fall down.

06 00 40 10 LMP-EVA (Laughter) That'd be even a better picture. Do you know the surface here is harder than it was over at the - -

06 00 40 17 CDR-EVA Yes.

06 00 40 18 LMP-EVA - - near the crater. At least you'll get a comparison. Boy, those chevrons do a good job of compacting the soil.

06 00 40 30 CDR-EVA Yes.

06 00 40 46 CDR-EVA Man, you know - (Laughter) - I'd sure hate to have to climb up here. (Laughter) Boy.

06 00 40 53 LMP-EVA Yes, let's work ab - above the Rover from now on.

06 00 40 56 CDR-EVA Yes. Well, you got to go up some time.

06 00 41 11 CDR-EVA You'd never get here without this thing. Hey.

06 00 41 21 LMP-EVA Okay. Joe wants scoops of soil in - bag 6, huh? That the one on the back of the pallet - must be.

06 00 41 29 CDR-EVA Yes, but that's - Hey. Why don't we put them in a sample bag, Joe? Why - -

06 00 41 35 LMP-EVA Yes.

06 00 41 36 CDR-EVA I'll get you a sample bag.

06 00 41 39 LMP-EVA Yes.

06 00 41 40 CC Suit yourself, Dave, that sounds good.

06 00 41 41 LMP-EVA ... the sample, I guess, the typical soil by the Rover.

06 00 41 42 CC And troops, before we leave this area, we want you to brush the LCRU and - the TV camera lens. We're running quite hot on the LCRU and think there must be a lot of dirt on it.

06 00 41 58 CDR-EVA Okay. There - there is, Joe, it accumulates fairly rapidly.

06 00 42 06 LMP-EVA Yes.

06 00 42 08 CDR-EVA Why don't you - yes,, get the down-Sun and we'll just scoop - right here.

06 00 42 15 CC And, Dave and Jim, we're after a large volume here, so shovel it in.

06 00 42 22 CDR-EVA All right. Bag number 167. Beginning to shovel large volume.

06 00 42 30 LMP-EVA Yes, I was saving myself for - Arbeit.

06 00 42 37 CDR-EVA Maybe if you go uphill, Jim - you stand uphill.

06 00 42 41 LMP-EVA Be happy to but it - -

06 00 42 42 CDR-EVA Oh, okay. That's okay.

06 00 42 43 LMP-EVA - - I ... to get a full - -

06 00 42 44 CDR-EVA This is fine - this is - Sure, that's good.

06 00 42 53 LMP-EVA (Laughter) Trouble, a large volume means shovel it, but you can't very well transfer it.

06 00 43 02 CDR-EVA Whoop! Easy, easy. Okay. Good. Good load - get another one.

06 00 43 24 LMP-EVA About all I can put in there.

06 00 43 25 CDR-EVA Yes, that's a large volume.

06 00 42 34 LMP-EVA Hey, you're a champion bag shaker, Dave.

06 00 43 37 CDR-EVA (Laughter)

06 00 43 41 CC Yes, sir; yes, sir; three bags full.

06 00 43 43 CDR-EVA You know what I like about doing the bag -  
(Laughter) - You know what I like about doing the  
bags up here, Jim; there's no air in them when  
you fold them up. Okay; and 167 goes in your bag.

06 00 44 01 CC And, Dave, regarding your question on - -

06 00 44 03 CDR-EVA After picture.

06 00 44 04 CC - - the 500-millimeter camera, we want you to take  
those pictures from here, and Jim can be changing  
out his magazine while you take the big camera  
pictures.

06 00 44 16 CDR-EVA Very well.

06 00 44 17 LMP-EVA Okay, Joe. I copy.

06 00 44 20 CDR-EVA I guess - I guess you're thinking of - the lighting  
might change over there and we wouldn't get them  
because of the - getting closer to - Looking up-  
Sun, huh?

06 00 44 28 CC Quite possible, and we might want some more photos  
from there as well. We have the film.

06 00 44 37 CDR-EVA Okay.

06 00 44 38 LMP-EVA Which MAG do you suggest for me, Joe?

06 00 44 44 CC Stand by.

06 00 45 06 LMP-EVA \*\*\* more on Papa, yes.

06 00 45 12 CDR-EVA Okay; Papa.

06 00 45 17 CC And that's ... - -

06 00 45 18 CDR-EVA That what you got, Joe, Papa?

06 00 45 20 CC Roger. Or Oboe.

06 00 45 21 CDR-EVA Well, let's get it on because we're just stand -  
Or Oboe, huh? Okay.

06 00 45 28 LMP-EVA I've got Papa out; we'll go with Papa.

06 00 45 30 CC Okay. And Dave, can you press on with those big camera pictures?

06 00 45 37 CDR-EVA Sure can. Couldn't get them until I got the other film out though.

06 00 45 40 CC Roger; agreed. And Jim, when you finish changing you can do dusting and cleaning of the LCRU.

06 00 45 52 LMP-EVA Okay.

06 00 46 11 LMP-EVA You been using the big brush to clean that - the LCRU, Dave?

06 00 46 14 CDR-EVA Yes, it works fine. Lens cover's off.

06 00 46 24 CC Beautiful.

06 00 46 26 CDR-EVA We'll try about - 250 and an 8, huh? That sound all right to you?

06 00 46 33 CC Roger. Sounds good.

06 00 46 38 CDR-EVA Yes, the camera seems to be working all right. All right, I'll get you - Oh, there's some outcrops up at the top.

06 00 47 17 LMP-EVA Okay; MAG Papa's on my camera, Joe.

06 00 47 19 CC Okay, Jim. Sounds good.

06 00 47 32 CC And Jim, when you finish dusting, we've got some other tasks for you.

06 00 47 40 LMP-EVA You'll have to wait.

06 00 47 43 CC Roger, we're in no hurry.

06 00 47 48 LMP-EVA Dave, that MAG's on - behind the hand controller.

06 00 47 51 CDR-EVA Okay.

06 00 48 14 LMP-EVA I guess you use the lens - lens brush on the TV.

06 00 48 18 CDR-EVA On the - Yes, and it's right in there in that pocket. Don't open the pocket yet, just pull it out, it comes out. That a boy.

06 00 48 38 LMP-EVA Houston, are you going to watch my cleaning operation?

06 00 48 42 CC Yes, sir. Looking right over your shoulder.

06 00 48 48 LMP-EVA All right.

06 00 49 11 LMP-EVA As you can see, it needed it.

06 00 49 13 CC Roger, Jim. And could you dust our lens - -

06 00 49 18 LMP-EVA Want me to clean this - now?

06 00 49 19 CC - - while you are there, please?

06 00 49 23 LMP-EVA Yes. Stand by. Try not to look at me, and I'll clean you off.

06 00 49 38 LMP-EVA Can you point up?

06 00 49 42 CC Jim, clean the top of the camera first, please.

06 00 49 43 LMP-EVA Would you point up a little bit? Oh, okay.

06 00 49 49 CC Yes, that's beautiful. Oh, magnificent! That even made us blink down here.

06 00 50 01 LMP-EVA Okay. The top's clean, if you'll point up a little bit I'll - clean your lens.

06 00 50 12 CC Jim, could you give us a little help on the tilt, we seem to be hung up.

06 00 50 14 LMP-EVA Okay, Joe. Point up, I'll - Okay.

06 00 50 23 CC Thank you, sir.

06 00 50 31 LMP-EVA How does that look to you?

06 00 50 32 CC Would you check the oil, too, please?

06 00 50 36 LMP-EVA (Laughter)

06 00 50 48 CDR-EVA Okay, Joe, I got the 500 pictures and - I took first - Mount Hadley; two horizontal strips up at the top where there are some outcrops, and probably the only two craters that I can see on the side of



any sizable size. And then a vertical strip through one of the outcrops, and a vertical strip through another outcrop, and then two craters that are in - Guess what we'd call - the forward leading edge of Swann Mountain over there, which are quite prominent craters. And then I swung over to a bright fresh one that we see - Oh, to the northwest, way out. And then I turned back around to Hadley Delta and shot upslope at Hadley Delta, and picked up the debris that seems to be exposed up on the top of Hadley Delta. And now the frames say 120.

- 06 00 51 52 CC Roger, Dave. 120.
- 06 00 51 53 LMP-EVA Dave, as long as you got it out, don't you think you ought to take a picture of those large ones? Up - up to the east? In that suggestion of layering just to the right of the large one?
- 06 00 52 03 CDR-EVA Yes, I guess so. Let's do that. Except that it's so much up-Sun, Jim, I'm not sure we're going to get anything in them.
- 06 00 52 09 LMP-EVA Yes.
- 06 00 52 14 LMP-EVA Joe, you have some other tasks for me here?
- 06 00 52 17 CC Jim, we're happy. Give us an EMU status check, please. We'd like a frame count off of Dave's camera, and then we're ready to move out.
- 06 00 52 20 CC On - I forgot - the 16-millimeter, we want you to change out that MAG, run the camera at 1 foot per second for 10 seconds, and then go back to normal.
- 06 00 52 43 LMP-EVA Okay; stand by.
- 06 00 52 50 CDR-EVA I took about 4 more pictures on the 500, Joe, looking out at Silver Spur and the blocks that are exposed up there.
- 06 00 53 01 CC Okay, Dave. Out of curiosity, did you photograph the LM with the big camera?
- 06 00 53 09 CDR-EVA Oh, how did you guess, Joe?
- 06 00 53 15 CC I just can't stay ahead of you.

06 00 53 20 CDR-EVA (Laughter) You're ahead of me all the time. Hey, the film's jammed in that camera, too. That's a problem.

06 00 53 28 CC Roger. Copy, the film was jammed in the DAC. And change out that magazine, please. Install a new one, and start it running at 1 frame per second for 10 seconds.

06 00 53 45 LMP-EVA Sure, that's in work.

06 00 54 14 LMP-EVA Okay; 1 frame per second, Joe. Here we go - 10 seconds.

06 00 54 20 CDR-EVA Okay; and why don't you hop on and let me get your seat belt, we got to get moving. Time's a wasting.

06 00 54 30 LMP-EVA Green light isn't working in it. There's 10 seconds.

06 00 54 37 CDR-EVA Okay.

06 00 54 39 LMP-EVA Okay; we tried tha - that ...

06 00 54 45 CDR-EVA Okay, Jim. Why don't you hop on? Yes. If you can. \*\*\* forget we're tilted backwards.

06 00 55 00 LMP-EVA ...

06 00 55 03 CDR-EVA Good.

06 00 55 05 CC Jim, while you're there, can you look over and get a frame count off of Dave's camera, please?

06 00 55 12 LMP-EVA Yes, as soon as he turns a little bit more to the left.

06 00 55 15 CC Okay.

06 00 55 16 CDR-EVA Okay; can you sit back now, Jim? Okay; just a minute, let me get your pocket. I don't know why your suit is so much wider than mine.

06 00 55 26 LMP-EVA I'm wider.

06 00 55 27 CDR-EVA Don't sit up, sit back.

06 00 55 28 LMP-EVA I'm trying to. Swing around and I'll give them a camera count on you.

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06 00 55 37 CDR-EVA Okay, your seatbelt's on. Good.

06 00 55 41 LMP-EVA Well, when you sit down, I'll get yours.

06 00 55 43 CDR-EVA Yes. Look out there, down-Sun so you won't have  
to - -

06 00 55 46 LMP-EVA Okay; it's 130.

06 00 55 50 CC Roger.

06 00 55 51 LMP-EVA On Dave.

06 00 55 56 CC And Jim, while you're there, could you go to - back  
to normal on the DAC, please? Or, off.

06 00 56 04 LMP-EVA Going back to 12 - back to 12 frames per second.  
You want me to run it at that speed? You want me to  
turn it on at that speed now, Joe, and see if it'll  
work?

06 00 56 15 CC Stand by on that, Jim. Yes, let's give it a go;  
see if it'll work?

06 00 56 24 LMP-EVA Okay; it's coming on now.

06 00 56 26 CDR-EVA Why don't you wait until we start driving? Oh,  
shoot. I forgot the TV.

06 00 56 36 LMP-EVA I think it might be - this one might be working,  
Joe - -

06 00 56 39 CC TV's --

06 00 56 40 LMP-EVA - - because we're at the full mark on the MAG.

06 00 56 46 CDR-EVA Joe, I'm going PML/WB.

06 00 56 49 CC Roger, Dave. And Jim, turn off the DAC until we  
start driving and then we'll get some - moving.

06 00 56 59 LMP-EVA Okay; it's off.

06 00 57 05 CC Okay, troops, we're looking beautiful. We'll ask  
you to move back towards the west - towards the  
large block you saw there, which we think is near  
Spur Crater, and drive towards the fresh crater that  
you've described to us.

06 00 57 21 CDR-EVA Okay, Joe.

06 00 57 29 LMP-EVA Got it.

06 00 57 49 CC Rover, do you read Houston?

06 00 57 54 LMP-EVA Yes.

06 00 57 55 CDR-EVA Yes, I'm working, Joe.

06 00 57 56 CC Okay.

06 00 57 57 CDR-EVA Okay, Jim. Here we go. Can you turn on the -  
2 DRIVE POWER for me?

06 00 58 10 LMP-EVA The up?

06 00 58 11 CDR-EVA Yes, the up ones up, and the down ones down. Can  
you - Oh, I'll get them. You're in as bad a  
position as I am.

06 00 58 17 LMP-EVA They're OFF.

06 00 58 18 CDR-EVA Okay.

06 00 58 26 LMP-EVA That's a ...

06 00 58 29 CDR-EVA Okay, Houston. We're moving out.

06 00 58 32 CC Roger. Got your mark. Dave, we're thinking - we  
want to drive over towards that large block, and  
if you think it's reasonable, we'll ask about a  
15-minute stop there. And afterwards, we'll move  
on towards the fresh crater. What do you think?

06 00 58 49 CDR-EVA Oh, I think that's a good idea. I don't think we're  
going to get any more variety of anything by going  
farther to the east on the - on the Front, Joe. I  
think we've seen the variety that we're going to  
see - except for working our way back.

06 00 59 06 CC Dave, we agree precisely with that down here. We  
think - from your descriptions, that's exactly what  
we've been reading and that's why we want you to  
move to the west.

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06 00 59 19 CDR-EVA Okay. Now here's a little fresh crater, Jim - with white albedo, but I think that's probably a secondary. I don't think that's excavated or anything, do you?

06 00 59 27 LMP-EVA No.

06 00 59 29 CDR-EVA Let's head for that block.

06 00 59 30 LMP-EVA Yes. I lost that block. I hope you - It's just over the ridge, I guess.

06 00 59 36 CDR-EVA Yes. Yes, we'll take it sort of slow here going down-Sun.

06 00 59 40 LMP-EVA Yes, we're heading 278.

06 00 59 44 CC Roger, Jim. And you might want to start the DAC.

06 00 59 46 LMP-EVA Bearing 345; range - Yes, I'm glad you reminded me.

06 01 00 03 LMP-EVA Remind me to stop it when we get there. Boy, you know, looking upslope, look how much more hummocky it is. It's just a different - different terrain.

06 01 00 13 CDR-EVA It sure is. It sure is. Pretty hummocky and driving is much sportier.

06 01 00 25 LMP-EVA Yes.

06 01 00 27 CDR-EVA Oh - Hang on. Hang on, there we go. This Rover is super.

06 01 00 37 CC A little mercy there.

06 01 00 38 CDR-EVA Best tractor I ever drove.

06 01 00 43 LMP-EVA Do we stay above it?

06 01 00 45 CDR-EVA Yes. (Laughter) Oh, yes.

06 01 00 47 LMP-EVA I hope you stay above it.

06 01 00 53 CDR-EVA Yes, wait a minute. (Laughter) What do you think we ought to do here, Jim?

06 01 00 58 LMP-EVA Stop.

06 01 00 59 CDR-EVA Whoa, that a boy.

06 01 01 06 LMP-EVA I wish I could lean up, too.

06 01 01 11 CDR-EVA Okay; Rover's stopped.

06 01 01 13 LMP-EVA Okay; it looks like - from this position - I'd say that's probably Spur down there, the large one, Dave.

06 01 01 18 CDR-EVA Oh, yes. Definitely.

06 01 01 19 LMP-EVA Where you got blocks in - -

06 01 01 21 CDR-EVA Yes.

06 01 01 22 LMP-EVA - - the north rim.

06 01 01 24 CC Beautiful, Jim. Try to get a lock on that beauty - -

06 01 01 25 LMP-EVA There's a real fresh one just down-Sun from here.

06 01 01 26 CC - - and maybe some other landmarks around it so we can drive down to it.

06 01 01 33 LMP-EVA Oh, no problem there - -

06 01 01 34 CDR-EVA No problem there. We - -

06 01 01 35 CC Okay.

06 01 01 36 CDR-EVA - - We'll get to Spur for you, no problem.

06 01 01 39 LMP-EVA Get the read-outs.

06 01 01 41 CDR-EVA Yes. Be careful you don't fall down getting out.

06 01 01 51 LMP-EVA Okay, the readings, Joe. 287, 347, 069, 050, 097 - -

06 01 02 07 CDR-EVA FM/TV.

06 01 02 09 LMP-EVA - - 100, 80, 90, and motor temps are lower limit.

06 01 02 15 CC Okay, Jim. Copied. And proceed carefully now.

06 01 02 25 CDR-EVA \*\*\* you ought to take that tool off of there. It's just hanging you up everytime you turn around.

06 01 02 29 LMP-EVA I haven't had it on at all this morning, Dave.

06 01 02 31 CDR-EVA Really? You haven't hung up on it?

06 01 02 34 LMP-EVA I haven't had it on.

06 01 02 35 CDR-EVA No, the tool on the side of the Rover.

06 01 02 39 LMP-EVA Oh, I see.

06 01 02 40 CDR-EVA Your feet keep hanging up.

06 01 02 42 LMP-EVA Man, is this a steep slope.

06 01 02 51 CDR-EVA It sure is, isn't it? Joe, for lack of good antenna pointing, I'm going to bypass the TV this time.

06 01 03 07 CC Okay, Dave. Whatever you say.

06 01 03 09 CDR-EVA Going back PML/W - Yes, PML/WB.

06 01 03 16 CC And, Dave, we're assuming that you can't get around to the right position - -

06 01 03 19 CDR-EVA The slope is - -

06 01 03 20 CC - - beside the Rover to point that antenna adequately.

06 01 03 25 CDR-EVA Yes, that's right, Joe. And the slope is real steep. And - like I'd mentioned before, the sighting device doesn't transmit enough light to really make it very easy to find the Earth. It could take me a couple of minutes there to be - just to find you, and I think you've seen the same thing. But if you would like, I'll give it a try.

06 01 03 45 CC Negative, Dave. We agree with you exactly. We're in good shape. Just proceed carefully on the - the - the soft powder.

06 01 03 56 CDR-EVA Yes, we're going to do that because it really is. But you can't say that we didn't sample the Apennine Front.

06 01 04 07 CC Jim, did you turn the DAC off yet?

06 01 04 12 LMP-EVA Yes, I did, Joe.

06 01 04 14 CC Okay; good thinking.

06 01 04 15 LMP-EVA It's off, and I'm reading a half a MAG.

06 01 04 18 CC Okay.

06 01 04 19 CDR-EVA Okay; let's attack that boulder. You got your hammer?

06 01 04 23 LMP-EVA Put it back on, I do. Got to be a bear to get back up there, you know.

06 01 04 29 CC Hey, troops, I'm not sure you should go downslope very far, if at all, from the Rover.

06 01 04 37 CDR-EVA No, it's not far. Let me try it, Jim, you just stay there.

06 01 04 40 LMP-EVA I think we can sidestep back up.

06 01 04 43 CDR-EVA It's not that hard.

06 01 04 44 CC Well, but make sure you check it now; just proceed carefully.

06 01 04 50 CDR-EVA Okay; I'm halfway, and I'll go back first. Why don't you stay there, Jim?

06 01 04 53 LMP-EVA Okay. Come back up.

06 01 05 04 CDR-EVA The Rover makes it feel so easy.

06 01 05 06 LMP-EVA I know it. Should have parked right beside it.

06 01 05 13 CDR-EVA Think I will.

06 01 05 15 LMP-EVA If you will, I'll - I'll walk down, Dave. Want me to carry some of those tools?

06 01 05 21 CDR-EVA I can carry them easier.

06 01 05 24 CC Okay, Dave. How's the footing?

06 01 05 26 CDR-EVA I think I'll - The footing is all right, except that you have to work pretty hard - to get back up, so - I think what I'm going to do - -



06 01 05 40 CC Jim, are still up near the Rover?

06 01 05 41 CDR-EVA -- as Jim walks down - Wait a minute until I get there, Jim.

06 01 05 45 LMP-EVA Yes.

06 01 05 46 CC Jim, let's --

06 01 05 47 CDR-EVA Hold on, Jim. Wait a minute, Jim. Don't go yet. Let me drive the Rover down there.

06 01 05 48 CC -- Ask you to walk around to the front there, and just take a general rough guess as to where the Earth is. You don't even have to use the sighting device. Point it about correctly, and we're going to give the TV a try.

06 01 06 02 CDR-EVA Oh, Joe. I can see where the Earth is in general. We're going to make a change here. I'm going to drive down. If I get successfully down there, then Jim can walk down. So we don't have to expend all the energy.

06 01 06 18 LMP-EVA And there's a beautiful little rock track here in - it went in a circular arc.

06 01 06 22 CDR-EVA Really?

06 01 06 23 LMP-EVA Yes. It rolled into the hill. It's amazing.

06 01 06 27 CDR-EVA Well, photograph it.

06 01 06 29 LMP-EVA Yes, I am. Instead of going straight down the hill, it curved into the hill.

06 01 06 36 CDR-EVA That right?

06 01 06 37 LMP-EVA Yes. A little angular fragment, Joe, about 2 inches long.

06 01 06 47 CC Roger, Jim.

06 01 06 48 LMP-EVA Came down slope --

06 01 06 49 CC Fantastic.

06 01 06 50 LMP-EVA -- curved into the hill and stopped.

06 01 06 59 CC And, Dave, are you driving now?

06 01 07 04 CDR-EVA No, Joe. I'll give you a call, Joe. Stand by.

06 01 07 16 LMP-EVA Meantime, I'll be taking a pan from here, Dave.

06 01 07 18 CDR-EVA Yes, good idea.

06 01 07 20 CC Good idea, Jim.

06 01 07 23 LMP-EVA Looks like it's going to be our high point.

06 01 07 25 CC Beautiful.

06 01 07 26 CDR-EVA It's the high point.

06 01 08 20 CDR-EVA Hey, Jim. Could you watch me as I back up here?

06 01 08 24 LMP-EVA Sure can.

06 01 08 33 CDR-EVA Got your eye on me?

06 01 08 35 LMP-EVA I have my eye on you.

06 01 08 37 CDR-EVA Okay. I'm going to back up gently here.

06 01 08 43 LMP-EVA I think I'm going to - move downslope a little bit.

06 01 08 46 CDR-EVA ... you watching me?

06 01 08 47 LMP-EVA Yes.

06 01 08 48 CDR-EVA Very good.

06 01 08 50 LMP-EVA You're doing okay.

06 01 08 58 LMP-EVA ...

06 01 09 03 CDR-EVA ... you know?

06 01 09 05 LMP-EVA ... - is that right?

06 01 09 06 CDR-EVA Yes.

06 01 09 07 LMP-EVA I wouldn't know, but I would think you'd be better off with that ... uphill.

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06 01 09 11 CDR-EVA Yes, I am - until I back it up.

06 01 09 18 LMP-EVA I'm going to finish my pan.

06 01 09 21 CC Roger, Jim and Dave. Proceed very carefully now, please.

06 01 09 26 CDR-EVA Oh, we are. We're doing it really cool.

06 01 09 31 CC Super cool.

06 01 09 35 CDR-EVA Super cool.

06 01 10 09 CDR-EVA How am I doing, Jim?

06 01 10 12 LMP-EVA Doing okay. Want me to come over there and get on?

06 01 10 13 CDR-EVA No - no. Stay there.

06 01 10 20 LMP-EVA That pan's complete, Joe.

06 01 10 26 CC Roger, Jim. Copy that. And, understand you're proceeding down towards that large block now.

06 01 10 40 CDR-EVA Very gently. And I'll even put - put the old girl downhill here, Jim.

06 01 10 47 LMP-EVA ... be rough.

06 01 10 57 LMP-EVA Oh, I wish I had the bigger camera to take a picture of the Rover moving along there.

06 01 11 06 CC And, Dave and Jim. When you stop, we'd like for you to just take a rough guess with that antenna. Give us the right switch setting, and we're going to give it a try with our big dish down here.

06 01 11 19 CDR-EVA Okay. Stand by. Too far from the rocks.

06 01 11 25 LMP-EVA Okay; let's try ...

06 01 11 32 CDR-EVA Okay, Jim, you can come on down now.

06 01 11 33 LMP-EVA Yes. I estimated a what - 20-degree slope?

06 01 11 42 CDR-EVA I don't know.

06 01 11 44 LMP-EVA 15 or 20?

06 01 11 45 CDR-EVA Closer to 15, probably.

06 01 11 53 LMP-EVA Don't - Here. ... The Rover looks like - Although, see the back wheel's off the ground.

06 01 12 02 CDR-EVA Yes. I think I'll get back on.

06 01 12 08 CDR-EVA Tell you what, Jim. We'd better abandon this one.

06 01 12 14 LMP-EVA Afraid we might - -

06 01 12 15 CDR-EVA Here, come on down.

06 01 12 16 LMP-EVA - - ... Rover.

06 01 12 17 CDR-EVA Here, you come down and get on.

06 01 12 18 LMP-EVA Okay. Well, let me take a picture here anyway.

06 01 12 22 CDR-EVA Yes, take a picture.

06 01 12 42 LMP-EVA Are you really - let me hold that Rover and you come up and look at this, because this rock has got green in it, a light green - -

06 01 12 48 CDR-EVA Okay - -

06 01 12 49 LMP-EVA - - color. Come on.

06 01 12 50 CDR-EVA Okay; I'll just stand here until you're through - -

06 01 12 51 LMP-EVA Yes.

06 01 12 52 CDR-EVA - - and then I'll go up and take a look at it.

06 01 12 58 LMP-EVA The first green rock I've seen - light green.

06 01 13 01 CC Roger. We're copying all of it.

06 01 13 04 LMP-EVA Okay. Where do you want me to hold it?

06 01 13 07 CDR-EVA I'll just come down and stand on your side.

06 01 13 08 LMP-EVA On my side?

06 01 13 09 CDR-EVA Yes.

06 01 13 10 LMP-EVA Okay.

06 01 13 11 CDR-EVA You stand there and take a break.

06 01 13 12 LMP-EVA I'm taking one.

06 01 13 13 CDR-EVA Okay.

06 01 13 26 LMP-EVA Okay.

06 01 13 28 CDR-EVA Okay. Are you firmly situated there?

06 01 13 29 LMP-EVA Yes.

06 01 13 32 CDR-EVA Okay.

06 01 13 34 CDR Dave and Jim, use your best judgment here, the block's not all that important, and we'd like you to spend most of the remaining time at Spur Crater. The remaining Front time, that is.

06 01 13 48 CDR-EVA Roger, Joe. We sure will.

06 01 13 52 CC And talk to us if we can give you any help here.

06 01 13 58 CDR-EVA No, we're okay. It's just that this slope's pretty steep, and I just cannot take too much time - here.

06 01 14 07 CC Yes, sir. We're hearing you.

06 01 14 09 CDR-EVA It's a big breccia - that's all it is.

06 01 14 19 CDR-EVA I - I don't see anything, Jim.

06 01 14 22 LMP-EVA About halfway up, maybe you have to look down-Sun to see it. It looks like a light green layer, not necessarily a thick layer. Light green.

06 01 14 34 CDR-EVA You mean on the surface?

06 01 14 36 LMP-EVA Yes, on the surface.

06 01 14 38 CDR-EVA Hey, you're right.

06 01 14 43 CC Can you photograph it, Jim?

06 01 14 48 LMP-EVA I took - I took a couple. Easy, Dave.

06 01 14 52 CDR-EVA Yes. Okay.

06 01 15 03 CDR-EVA Did you take it down-Sun?  
06 01 15 04 LMP-EVA Yes, I took two down-Sun at 7 feet.  
06 01 15 16 CDR-EVA Okay. Take a couple of cross-Sun's here.  
06 01 15 24 LMP-EVA Be great if we'd get some of that - green - -  
06 01 15 28 CDR-EVA Yes.  
06 01 15 29 LMP-EVA - - that green material.  
06 01 15 30 CDR-EVA I'll get it. I think I can get it with my tongs  
all right.  
06 01 15 33 LMP-EVA Gee, that's great.  
06 01 15 59 CDR-EVA It seems to be a - surface material or else it's a  
very frangible clast in this big piece of breccia.  
Dig my tongs into it.  
06 01 16 16 LMP-EVA Sure it's green and not just white albedo again?  
06 01 16 20 CDR-EVA No, it's green.  
06 01 16 22 LMP-EVA It looks green. And I - I noticed just downslope  
from the rock, you kicked up the surface and there's  
some more green there.  
06 01 16 40 CDR-EVA Getting a little.  
06 01 16 50 LMP-EVA This rock is - about 3 meters long.  
06 01 16 57 CDR-EVA Why don't you describe the thing, Jim, while I'm  
down - -  
06 01 16 59 LMP-EVA Subangular - very rough-textured surface. And the  
surface that's facing northwest - is the dark,  
typical breccia. And it looks like - what appeared  
to me - like there's a layer - there that might be  
a foot and a half, 2 feet thick, appears the - a  
light greenish color. Dave's sampling right now.  
06 01 17 30 CC Roger, Jim. Copy you loud and clear. Superb.  
06 01 17 36 LMP-EVA And on the side to the southeast is again the  
breccia. Isn't that right, Dave?

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06 01 17 43 CDR-EVA Yes. And I got a little frag. Don't drop it. There. And I got some green, and I got a frag out of the breccia.

06 01 18 03 CDR-EVA It's fairly loose - breccia, as breccias go. Oh, and there's a great big white clast on the inside, but - man, like an inch or so.

06 01 18 25 LMP-EVA If you want I'll - -

06 01 18 26 CDR-EVA No, no, I'll get it.

06 01 18 27 LMP-EVA Okay.

06 01 18 28 CDR-EVA Stand there, let me work.

06 01 18 41 CDR-EVA \*\*\* does it.

06 01 18 55 CDR-EVA 168, Joe. Got a little bit of the green, and I got a chunk about 3 inches of the rock itself.

06 01 19 04 CC Roger, Davy. Copy.

06 01 19 10 CDR-EVA And I think we'll call it quits on that one.

06 01 19 12 CC Sounds good, Dave. We're interested in moving towards Spur - -

06 01 19 15 LMP-EVA It's going to take us awhile.

06 01 19 16 CC - - but carefully.

06 01 19 17 CDR-EVA Yes. But carefully. Okay, Jim. Just stand right there and let me ease on down.

06 01 19 25 LMP-EVA Yes. It's going to take us a while to work down-slope.

06 01 19 28 CDR-EVA Yes.

06 01 19 39 LMP-EVA I think it'll probably be best for you to get on first.

06 01 19 41 CDR-EVA Yes, I think so.

06 01 19 55 CDR-EVA Put this where I won't lose it.

06 01 20 01 LMP-EVA Hand it to me, I'll put it under my seat.

06 01 20 03 CDR-EVA I can put it under mine. It won't go anywhere. Trouble is, if I get on first, I'm not sure you're going to have a seatbelt.

06 01 20 12 LMP-EVA Well, I don't know that I want to - drop it. I can hold on. We're not going to go that fast here.

06 01 20 20 CDR-EVA That's - that's for sure. Okay.

06 01 20 33 CDR-EVA Okay, I'm on.

06 01 20 35 LMP-EVA Did you get the other strap in? Here, let me strap you in. Dave?

06 01 20 43 CDR-EVA Just a minute. Let me get settled down here first.

06 01 20 45 LMP-EVA Okay.

06 01 20 52 CDR-EVA Tell you what might be better, Jim. Let me ease on down the hill here to a flatter spot for you to get on. Okay?

06 01 21 01 LMP-EVA Okay; yes. No sweat.

06 01 21 03 CDR-EVA You see right at 1 o'clock there, it levels out in that little depressions.

06 01 21 09 LMP-EVA Right down here? Okay.

06 01 21 10 CDR-EVA Okay. Look, why don't you - move back there and let me ease the thing down. Move away from it, so I won't hit you.

06 01 21 19 LMP-EVA Yes, let me back off.

06 01 21 24 CDR-EVA Okay. Back off good.

06 01 21 29 LMP-EVA Yes. In fact, I'd just as soon meet you down where it's level.

06 01 21 34 CDR-EVA What?

06 01 21 35 LMP-EVA If you want, I'll meet you at Spur.

06 01 21 36 CDR-EVA Oh, no. Just going to go right down here. Easier for you to get on.



06 01 21 52 LMP-EVA Just so you - you stay uphill.

06 01 21 55 CDR-EVA The uphill side.

06 01 21 57 LMP-EVA Yes.

06 01 22 02 CDR-EVA There. That's a nice spot, right there.

06 01 22 07 LMP-EVA Okay.

06 01 22 11 CDR-EVA There. Okay.

06 01 22 24 CDR-EVA Why don't you - grab your seatbelt and let me hold it for you, and maybe you can give it a try.

06 01 22 28 LMP-EVA No, I'll - I'll just toss this thing on, Dave.

06 01 22 32 CDR-EVA Easy, easy. Okay. Okay?

06 01 22 39 LMP-EVA All righty.

06 01 22 40 CDR-EVA Okay. Okay, Joe. We're mov - moving now.

06 01 22 47 CC Okay, Dave. And, Jim, if you can easily turn the camera on, might be a good place.

06 01 22 56 LMP-EVA No chance right now, Joe.

06 01 22 58 CC Oh, okay.

06 01 22 59 CDR-EVA Not now, Joe, let us ease our way down.

06 01 23 01 CC Okay.

06 01 23 12 CDR-EVA Okay, Jim?

06 01 23 13 LMP-EVA Oh, yes.

06 01 23 19 CDR-EVA I'll take a little right turn here. Okay. Came up all right; should be able to go down all right.

06 01 23 28 LMP-EVA Going down's a little more tricky.

06 01 23 30 CDR-EVA Yes, we can - get a little a - couple of Christie's here and there.

06 01 23 37 LMP-EVA Over Christie's, heading right for Spur, Joe.

06 01 23 45 CC ...

06 01 23 47 CDR-EVA Not bad, is it? Jog here.

06 01 24 01 CC And, Dave, give us a call as you come up toward Spur - -

06 01 24 02 CDR-EVA We're almost to Spur now.

06 01 24 03 CC - - we've got some parking instructions.

06 01 24 09 CDR-EVA Parking instructions. Okay. Let's see, do we want to hit the upper rim or the lower rim of Spur?

06 01 24 18 LMP-EVA You see that large block on the - -

06 01 24 20 CDR-EVA Yes.

06 01 24 21 LMP-EVA - - the northern rim.

06 01 24 22 CDR-EVA Yes, I think we should work down to the northern rim, right?

06 01 24 25 LMP-EVA Yes, if we're going to sam - sample any blocks there on the rim, that'd be the place to do it.

06 01 24 29 CDR-EVA Yes.

06 01 24 31 CC Sounds good to us. And, Dave, we'd like for you to - to park east of the area you're going to be working in, so - so we can look down-Sun. And park facing west, and we'll give you a NAV update later.

06 01 24 47 CDR-EVA Okay. We're in good shape, Joe. That one wall there has quite a bit of debris, doesn't it?

06 01 24 59 LMP-EVA Yes, and it looks like it's - again has a linear pattern running north and south.

06 01 25 07 CDR-EVA Almost does.

06 01 25 14 LMP-EVA We're talking about the debris that's exposed on the - the north wall - of Spur. And the slope here at Spur is - oh, 8 to 10 degrees.

06 01 25 32 CC Roger.

06 01 25 46 CDR-EVA Okay; I'm parking east on a level slope here. ...

06 01 26 11 CDR-EVA Right down by all the (laughter) ... crater. Be a nice place to park.

06 01 26 20 LMP-EVA Yes, it looks good - good place. Take a - take a break here.

06 01 26 25 CDR-EVA Yes. Yes, I think we're just about level, right there.

06 01 26 32 LMP-EVA Yes.

06 01 26 33 CDR-EVA Okay. Okay, Joe.

06 01 26 35 LMP-EVA I'll - I'll give them a reading if you want, Dave.

06 01 26 36 CDR-EVA Yes, I'll get the TV on.

06 01 26 40 CC Go ahead, Jim.

06 01 26 42 CDR-EVA We're at Spur Crater, Joe.

06 01 26 46 LMP-EVA I'll give them the shadow device, too. Okay; the heading is 290, 349, 7.3, 4.7, 095, 100, 82, 90; motor temps are both lower limit.

06 01 27 14 CC Copy, and standing by for the shadow.

06 01 27 15 LMP-EVA And, the shadow is - it's 4 degrees left.

06 01 27 24 CDR-EVA Let's get the other two.

06 01 27 26 LMP-EVA You mean roll and pitch?

06 01 27 27 CDR-EVA Yes, the pitch is about 3 degrees down, and the roll - -

06 01 27 37 LMP-EVA You have to hold it in the damp position, I guess.

06 01 27 41 CDR-EVA If I can get the - there, it's damping. The roll's 5 degrees, right.

06 01 27 49 CC Roger; we copy. And it was at - -

06 01 27 52 CDR-EVA And, Jim, why don't you get off here, first - -

06 01 27 53 LMP-EVA Okay. - -

06 01 27 54 CC - - first glance that that heading is still a good heading. We'll be back with you.

06 01 27 58 CDR-EVA Okay.

06 01 28 04 LMP-EVA Got it.

06 01 28 08 CDR-EVA Okay.

06 01 28 11 CC And, Dave and Jim - -

06 01 28 12 LMP-EVA I'm off and I'm going to take a pan.

06 01 28 13 CC - - Okay; sounds good.

06 01 28 14 LMP-EVA Okay, I'm with the TV.

06 01 28 15 CC And we - we're looking at about 30 minutes working time here at this station.

06 01 28 22 CDR-EVA Oh, good. Okay, Joe. We're going to FM TV now.

06 01 28 36 CC Roger.

06 01 28 39 CDR-EVA And I'll give you general pointing, and you can try your - your big dish.

06 01 28 45 CC Okay, Dave. Try - try to use the sight on this one and just make sure that the filter is flipped up out of the way, please. The sun filter.

06 01 28 56 CDR-EVA Oh!

06 01 29 29 CC Dave, we had the picture momentarily. We've lost it now. Are you still fighting the antenna?

06 01 29 38 CDR-EVA Yes. You got it now?

06 01 30 11 LMP-EVA We picked up some more green material here, Dave.

06 01 30 13 CDR-EVA Sure it isn't that light gray albedo stuff?

06 01 30 15 LMP-EVA No, it looks green.

06 01 30 16 CDR-EVA ...

06 01 30 19 LMP-EVA The contrast.

06 01 30 20 CDR-EVA No.

06 01 30 23 LMP-EVA No, I see white; I see a light green; and I see a brown.

06 01 30 28 CDR-EVA Hey, Jim.

06 01 30 29 LMP-EVA Yes.

06 01 30 30 CDR-EVA Stand where you are and give me alinement on the antenna, and see if I can get pointed at the Earth. You can turn to your right there - take about three steps right, and if you look up - don't fall back - just look up - you'll be able to aline the antenna in your position relative to the Earth. You'll have to take your visor up probably. Do you see the Earth up there?

06 01 30 56 LMP-EVA Can't get my back ... fall over. - -

06 01 30 58 CC - - Dave and Jim, you could look at the meter on the LCRU and peak up AGC while you move the antenna. Make sure, also, that the sun filter is up off the sighting device.

06 01 31 11 CDR-EVA Joe, it has been ever since we started the shade down and everything else. And there's just not that much - -

06 01 31 18 CC Roger. We understand.

06 01 31 19 CDR-EVA - - light ... really.

06 01 31 20 CC Just checking.

06 01 31 25 CDR-EVA Okay; try the AGC, then. ... radar.

06 01 31 34 CC Okay; that's good. Beautiful, beautiful. Right on the money.

06 01 31 41 LMP-EVA You can use that sound to lock in, Dave.

06 01 31 44 CDR-EVA You know I did that, I didn't even look at that ...; I just used your AGC. All right.

06 01 31 49 LMP-EVA You also get the sound when you're locked on, too.

06 01 31 51 LMP-EVA/ ...  
CDR-EVA

06 01 31 58 CDR-EVA Okay, Jimmy. Let's go to work.

06 01 31 59 LMP-EVA Roger. You don't think there's green here, huh?

06 01 32 05 CDR-EVA No, Jim, I - I don't know. I think it's a gray.  
... gray in the albedo. At least, that would be  
my guess.

06 01 32 25 LMP-EVA Oh, it might be the EV visor that makes it look  
green. But, it's worth sampling. Notice that  
large rock on the northwest side, just on the  
inner edge there.

06 01 32 53 CDR-EVA Yes.

06 01 32 56 LMP-EVA Clearly a breccia. Look - look at the clasts; you  
can see the clasts from here.

06 01 33 00 CDR-EVA You sure can.

06 01 33 01 LMP-EVA And, it looks like it's a different color rock.  
Well, it's a dark -

06 01 33 12 CDR-EVA Okay, let's go sample the rim over here.

06 01 33 15 LMP-EVA Okay.

06 01 33 16 CDR-EVA Down-Sun - to your handy-dandy camera movement.

06 01 33 26 LMP-EVA Houston, you should be pointing right at the LM.

06 01 33 31 CC Roger, Jim. We're looking.

06 01 33 38 CDR-EVA Okay, Jim. There's a good pile of rocks right here.

06 01 33 42 LMP-EVA Hey, look at that light colored rock with - -

06 01 33 44 CDR-EVA Yes.

06 01 33 45 LMP-EVA - - it almost looks like a white vein on top of the  
other rock.

06 01 33 47 CDR-EVA Yes, look at that. How about that, We'll get that  
one.

06 01 33 51 CC Get it now.

06 01 33 52 LMP-EVA It's a - -

06 01 33 53 CDR-EVA Yes. It's a breccia. It's a dark - it's a dark gray rock that looks like a - actually it looks like a big pinnacle with a small gray and white breccia on top of it. The pinnacle is about 6 inches across and 4 or 5 inches high. On top of it is about a 2- to 3-inch subangular frag with a light gray, - or medium gray matrix, and about 20 percent white clast in it. Really unique. It stands out - (laughter) it's amazing. Okay, Jimmy. Let's gather some data.

06 01 34 30 LMP-EVA You've got a sample there, right?

06 01 34 31 CDR-EVA Yes.

06 01 34 32 LMP-EVA Okay.

06 01 34 51 LMP-EVA Got it.

06 01 34 52 CDR-EVA Yes. Okay.

06 01 35 00 LMP-EVA Okay. Oh, there are sparklies and all kinds of breccia. ... the soil.

60 01 35 12 CDR-EVA It's sort of caked on the top, though. Yes. Another black matrix, fine-grained with white clast - millimeter size - and there are some very fine grained little sparkles in there, though..

06 01 35 35 LMP-EVA Okay. I even see some vesicles in it.

06 01 35 38 CDR-EVA Yes. Look underneath there, Jim.

06 01 35 41 LMP-EVA Yes.

06 01 35 42 CC Just standing by for the number, Dave.

06 01 35 43 CDR-EVA 194.

06 01 35 49 LMP-EVA Yes. Let me get the other one that is sitting right next to it. Look how (cough) the upper layer of the soil here is caked.

06 01 36 00 CC Standing by for the number, Jim.

06 01 36 01 CDR-EVA No, better yet, why don't you gather some soil?  
We gave it - -

06 01 36 06 LMP-EVA 194 - -

06 01 36 07 CDR-EVA - - Joe, we gave it to you but you blocked us.

06 01 36 09 CC Thank you.

06 01 36 10 CDR-EVA We'll get it to you. Yes. Let's get soil in this  
bag.

06 01 36 15 LMP-EVA Okay.

06 01 36 18 CDR-EVA Right there by the rock.

06 01 36 19 LMP-EVA Yes.

06 01 36 21 CDR-EVA Leave the rock whole.

06 01 36 22 LMP-EVA Yes.

06 01 36 23 CDR-EVA Is that a glass - glass one, sitting right below it?

06 01 36 27 LMP-EVA It sure looks like it. It was under it, wasn't it?

06 01 36 30 CDR-EVA Yes. Yes. Let me take a picture. Just a minute,  
let me take a picture, and why don't you pick up  
that little piece of glass and put it in the bag,  
too.

06 01 36 46 LMP-EVA Okay.

06 01 36 48 CDR-EVA That must have been under the rock.

06 01 36 50 LMP-EVA Yes.

06 01 36 52 CDR-EVA Okay, I got the picture.

06 01 36 53 LMP-EVA Yes.

06 01 36 54 CDR-EVA Pick up that little rock.

06 01 36 58 LMP-EVA Okay.

06 01 36 59 CDR-EVA That a boy. Okay, let me get a picture. I think  
the next order of business is that neat one there.



06 01 37 10 LMP-EVA Okay, well, there, too - just to the west of you, Dave, is some of that - what we've been calling green material - clearly visible? See what I mean?

06 01 37 28 CDR-EVA Right here?

06 01 37 29 LMP-EVA Right here.

06 01 37 30 CDR-EVA Yes. That's just a light - -

06 01 37 31 LMP-EVA Okay. I'd call it light gray but, we'll check it when we get home.

06 01 37 38 CDR-EVA Well, it's definitely different from the next rock, or the one we just picked up.

06 01 37 41 LMP-EVA Yes. You mean - -

06 01 37 43 CDR-EVA Well, look at this one right here.

06 01 37 45 LMP-EVA That's what I'm talking about.

06 01 37 46 CDR-EVA Okay. Sure is. That's awful big, but I think we ought to sample here anyway, all those little frags.

06 01 38 06 CDR-EVA I've got to admit it really looks green to me, too, Jim, but I can't believe it's green.

06 01 38 10 LMP-EVA Oh, it's a good story - something about green cheese? (Laughter) Who would ever believe it?

06 01 38 28 LMP-EVA I hope it is green when we get it home.

06 01 38 29 CDR-EVA Yes.

06 01 38 30 LMP-EVA Oh, my, it is green.

06 01 38 32 CDR-EVA It is green.

06 01 38 33 LMP-EVA I told you it was green.

06 01 38 34 CDR-EVA You're right, ooh, fantastic - hey hold this! Wait a minute, I can't put this into the bag yet - -

06 01 38 43 LMP-EVA Look at this. This has got be something. ...

06 01 38 51 CDR-EVA Man, that looks almost - now it's gray. The visor makes it green, Jim. (Laughter)

06 01 39 03 LMP-EVA It's green.

06 01 39 04 CDR-EVA A different shade of gray.

06 01 39 07 LMP-EVA Yes, I know. I put my visor up, too.

06 01 39 10 CDR-EVA But it's a very light grain, very fine grain, sure looks like a basalt with some very - less than millimeter-size vesicles in it, maybe 5 percent or so. It's a subangular rock. It's friable - I can - maybe it's not a basalt. It's friable - I can scrape it off with my glove and I put some streaks in it, in case anybody wonders what that is when we get back. But, it's definitely different from anything we've seen before. 195 - let me get another one here.

06 01 39 45 CC Roger, 195. And, it sounds green to me.

06 01 39 53 CDR-EVA With the visor on, Joe, I was about ready to call it a dunite, but I opened up my visor, and I was wrong. I didn't get to call it what I wanted to. Here's another one of the same stuff, Jim.

06 01 40 15 LMP-EVA Okay, why don't - why don't you get a sample - let me take a picture, and you get a sample of the soil, okay. Why don't you just scoop in between them.

06 01 40 30 CDR-EVA Yes. I think this is a big frag here, but, it broke - -

06 01 40 34 LMP-EVA Yes.

06 01 40 35 CDR-EVA - - when it hit. All these pieces are roughly the same.

06 01 40 37 LMP-EVA Yes. Not much soil here, really.

06 01 40 39 CDR-EVA No, it really isn't.

06 01 40 40 CC Dave and Jim, is it your impression that you are sampling on the ejecta blanket of Spur Crater, now?

06 01 40 48 CDR-EVA Yes, sir; probably from the deepest part, because we're right on the rim.

06 01 40 53 CC Sounds good.

06 01 40 59 LMP-EVA Okay, 195.

06 01 41 00 CDR-EVA Wouldn't you agree with that, Jim?

06 01 41 01 LMP-EVA Yes, sir.

06 01 41 15 CDR-EVA Okay. Now let's go down and get that unusual one. - get that unusual - one. There's a dense - and there's another unusual one; look at the little crater here, and the one that's facing us. There is a little white corner to the thing.

06 01 41 34 CC Okay, Dave. Get as many of those as you can, and you might be watching for a place where you think the rake might help you.

06 01 41 43 CDR-EVA Yes. I think we can probably do a rake here, Joe.

06 01 41 47 CC Okay, sounds like a good place. - -

06 01 41 48 CDR-EVA - - Okay, there's a big boulder over there down-Sun of us, that I'm sure you can see - there is a boulder down in front of us I'm sure you can see, Joe, which is gray. And it has some very outstanding gray clasts and white clasts, and oh, boy - it's a beaut! We're going to get ahold of that one in a minute.

06 01 42 07 LMP-EVA Okay, I have my pictures, Dave.

06 01 42 10 CDR-EVA Okay, let's see. What do you think the best way to sample it would be?

06 01 42 14 LMP-EVA I think probably - could we break off a piece of the clod underneath it? Or - or I guess you could probably lift that top fragment right off.

06 01 42 23 CDR-EVA Yes. Let's - let me try. Yes. Sure can. And it's a - a white clast, and it's about - oh, boy!

06 01 42 41 LMP-EVA Oh, man! I got -

06 01 42 42 CDR-EVA Look at that.

06 01 42 44 LMP-EVA Look at the - glint.

06 01 42 45 CDR-EVA Aaah.

06 01 42 46 LMP-EVA Almost see twinning in there.

06 01 42 47 CDR-EVA Guess what we just found. Guess what we just found.

06 01 42 52 LMP-EVA I think we found what we came for.

06 01 42 53 CDR-EVA Crystal rock, huh? Yes, sir. You better believe it.

06 01 42 57 CC Yes, sir.

06 01 42 58 CDR-EVA Look at the plage in there.

06 01 42 59 LMP-EVA Yes.

06 01 43 00 CDR-EVA Almost all plage. ... As a matter of fact - (laughter) Oh, boy, I think we might - ourselves something close to anorthocite, because its crystalline, and there's just a bunch - it's just almost all plage. What a beaut.

06 01 43 18 LMP-EVA That is really a beauty. And, I - there is sa - there's another one down there.

06 01 43 22 CDR-EVA Yes. We'll get some of these.

06 01 43 24 CC Bag it up.

06 01 43 27 CDR-EVA Ah, ah. Beautiful. Hey, let me get some of that clod there. No, let's don't mix them - let's make this a special - one. I'll zip it up.

06 01 43 36 LMP-EVA Okay.

06 01 43 37 CDR-EVA Make this bag 196, a special bag.

06 01 43 40 CC Yes, sir.

06 01 43 41 CDR-EVA Our first one. Don't lose your bag now, Jim. (Laughter) Oh, boy. Okay, let's get some of the other - maybe - Let me take a picture first in here. I got it. No sweat. Now, we got to think of how to get that other piece there. Maybe if you could put your scoop in it, and break off a chip - do you think?

06 01 44 10 LMP-EVA I think I can just - I think it's just a clod. Don't you?

06 01 44 12 CDR-EVA I don't know. Try it. Put your scoop there in the middle and break off a chip.

06 01 44 15 LMP-EVA Yes.

06 01 44 21 LMP-EVA It's not a clod, is it?

06 01 44 23 CDR-EVA Yes. It is a clod.

06 01 44 27 LMP-EVA Want to take this piece here?

06 01 44 28 CDR-EVA Yes. Let me get you a bag. Wait. Let me take a picture first, so you know which one we got. Okay. Go ahead. Number 170.

06 01 44 41 CC Roger. 170.

06 01 44 43 CDR-EVA Okay. (Laughter)

06 01 44 46 CC And, Dave and Jim - -

06 01 44 47 CDR-EVA Boy, that's a beautiful rock - -

06 01 44 48 CC - - Are you working on the outside of the crater or are you - -

06 01 44 50 CDR-EVA - - that other one. Gosh! Look at - -

06 01 44 51 CC - - over the - the lip right now?

06 01 44 55 CDR-EVA Oh, just a tad over the lip on a little bench, but it's -

06 01 44 58 LMP-EVA Dave, could you hold that one?

06 01 44 59 CDR-EVA Yes.

06 01 45 00 LMP-EVA I don't know whether it'll fit in the bag or not. Got it?

06 01 45 03 CDR-EVA No. It dropped. See if you can pick it up again. I think it'll fit in the bag, Joe - Jim.

06 01 45 09 LMP-EVA A little frangible.

06 01 45 10 CDR-EVA Yes. It really is. I think I can get it with the tongs. Here.

06 01 45 14 LMP-EVA Yes.

06 01 45 22 CDR-EVA There's a contact sort of - on there. We ought to try and get the contact if we can. Okay, babe. Open the bag.

06 01 45 44 LMP-EVA Okay, I got.

06 01 45 46 CDR-EVA That a boy. Good show. Post-pick-up picture. Okay; roll that beauty up. Let's go get some more of that.

06 01 45 58 LMP-EVA I think we ought to get over that big rock.

06 01 45 59 CDR-EVA Yes. We're getting there.

06 01 46 00 LMP-EVA Before we run out of time.

06 01 46 01 CDR-EVA All right.

06 01 46 03 LMP-EVA Because I think that big rock is probably more important.

06 01 46 04 CDR-EVA It's a big breccia, though. ... - -

06 01 46 05 CC Dave, we think you might be about to run out of film.

06 01 46 07 CDR-EVA - - this in the bag. That's right.

06 01 46 09 CC - - maybe you better check that now.

06 01 46 14 CDR-EVA All right, Joe. Jim, this one we got to pick up, and then we'll go to the big rock. And if you could - put that in my bag - and then check my film. Joe, this crater is a gold mine.

05 01 46 33 CC And there might be diamonds in the next one.

06 01 46 39 CDR-EVA Yes, babe.

06 01 46 43 LMP-EVA Okay ... - -

06 01 46 45 CC Jim, - -

06 01 46 46 LMP-EVA - - Okay. ... down here.

06 01 46 47 CC - - Get a reading on Dave's camera for us, please.

06 01 46 51 LMP-EVA Oh, he's got a lot left. He's only reading 145.

06 01 46 54 CC Roger, good. Sounds good.

06 01 47 20 CDR-EVA Got her, Jim?

06 01 47 21 LMP-EVA Yes.

06 01 47 26 CC Dave and Jim. - -

06 01 47 28 CDR ...

06 01 47 29 CC - - Did you fill a bag after 170? If so, we missed the number, and we can probably sort it out later.

06 01 47 47 CDR-EVA This one. No, we - I think that was the last one, Joe. We'll rely on you to sort it out later.

06 01 47 54 CDR-EVA Okay, I have - oh - look at this, Jim.

06 01 47 58 LMP-EVA Ha, what a contact!

06 01 47 59 CDR-EVA Look, what a contact!

06 01 48 00 LMP-EVA Yes, man!

06 01 48 01 CDR-EVA I've got - Man, oh man. I got about a 4 incher, Joe. It's subrounded, and on one half of it, we have a very dark, black, fine-grained basalt with some - it looks like some very thin laths in it of plage - nothing else. And, in one region, there is some millimeter-type vesicles along a linear pattern very close to the contact. And, the other side of the contact, we have a pure, solid-white, fine-grained frag, which looks not unlike the white clasts in the 14 rock. But it's a beautiful contact in here. And, we'll call this one bag number - -

06 01 48 52 LMP-EVA 198.

06 01 48 53 CDR-EVA 198.

06 01 48 54 CC Roger. Copy 198. And, Jim, you may have dropped your sample bags.

06 01 49 02 LMP-EVA Yes. I dropped one.

06 01 49 03 CDR-EVA He dropped one, Joe, thank you.

06 01 49 04 LMP-EVA (Laughter) I don't know what we would do without you, Joe.

06 01 49 07 CDR-EVA Hey, isn't that super? Get the picture.

06 01 49 15 LMP-EVA Yes, I got the picture.

06 01 49 16 CDR-EVA Don't fall down. Okay. We'll ease over to that big rock. Looking on the way for anything else unusual.

06 01 49 39 CDR-EVA It's another clod that evidently hit. Let's sample it just to get the - distribution around the circumference of the rim here. Okay. You want to put that bag in my pocket?

06 01 49 53 LMP-EVA Yes, I will as soon as I zip it.

06 01 50 16 LMP-EVA Okay. It's in there.

06 01 50 17 CDR-EVA Okay.

06 01 50 25 CDR-EVA Okay, got enough fingers left to get me another one?

06 01 50 33 LMP-EVA Yes. What would you like? The -

06 01 50 35 CDR-EVA Bag.

06 01 50 36 LMP-EVA Oh, yes, the bag. I was going to - I was wondering why you wanted to use the scoop.

06 01 50 40 CDR-EVA Don't think we can get a scoop on this one. I think it's going to - Oh, look at this one (laughter).

06 01 50 48 LMP-EVA Diamonds, huh?

06 01 50 50 CDR-EVA Don't move out of that - your shadow. No. I got a big - is that glass, or is that basalt? Look at that frag there. Let me take a picture from where - it came from under that rock.

06 01 51 06 LMP-EVA Think so?

06 01 51 08 CDR-EVA Yes. It looks like a big piece of glass. It's got some bubbles in it. Oh, look at that. Isn't that pretty?



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06 01 51 15 LMP-EVA That's a glass-coated breccia.

06 01 51 16 CDR-EVA Yes, but look at the glass.

06 01 51 18 LMP-EVA Okay.

06 01 51 21 CDR-EVA It's shiny. 199.

06 01 51 24 CC Roger, Dave. Thank you.

06 01 51 28 CDR-EVA Let me get some more of this, Jim.

06 01 51 30 LMP-EVA Okay.

06 01 51 34 CDR-EVA Here's - Well - Okay. There's another piece of the frag that it went with.

06 01 51 50 LMP-EVA Okay.

06 01 51 56 CC Dave and Jim - -

06 01 51 57 CDR-EVA ...

06 01 51 58 CC - - we're very pleased with your documented samples here. We think you ought to give some thought pretty shortly now, to getting us a - a rake sample, if you can find a good area. And then we're going to go for some bulk collection - just a lot of soil filling sample or collection bag 6.

06 01 52 19 CDR-EVA Okay.

06 01 52 20 LMP-EVA It seems a shame. We got to go over and sample that big one there.

06 01 52 22 CDR-EVA Yes. We'll do that. Throw it in.

06 01 52 31 CC And, Dave, you're going to want to cinch up Jim's collection bag - -

06 01 52 35 CDR-EVA ...

06 01 52 36 CC - - probably before you go much longer. It's coming very loose there.

06 01 52 40 CDR-EVA Okay. Let me do it right now, Joe, just - don't - so we don't forget it.

06 01 52 45 CC Roger. We sure don't want to lose that one.

06 01 52 47 LMP-EVA Hey, you got something pretty good in there, don't you?

06 01 52 51 CDR-EVA You turn a little right, Jimmy. I mean left, I'm sorry. It sure has come off. I don't know why.

06 01 52 58 LMP-EVA Yes.

06 01 53 03 CDR-EVA Oh, yes, that getting in that Rover bit.

06 01 53 21 CDR-EVA I can fix you here, partner.

06 01 53 24 CC Okay, Dave, while you're working there we're thinking that we'd prefer just a very quick sampling - of - of the large rock, if at all. And perhaps just a quick photographic documentation of that large rock and then some rake sample.

06 01 53 42 CDR-EVA Okay, Joe. Let me get Jim's bag - wait Jim, don't go anywhere yet.

06 01 54 02 CC Dave and Jim, the science input now is that we want to forget that large block entirely. We want a - as large a collection of smaller frags as you can get us, and you'll probably be working near the Rover for those.

06 01 54 20 CDR-EVA Understand, Joe.

06 01 54 22 CC And, we're coming up on about 10 to 15 minutes remaining here.

06 01 54 30 CDR-EVA Okay. Okay, hang on partner. I think I got you - better. Okay, let me get your - unknot your scoop, over. Turn around.

06 01 54 59 CDR-EVA Okay, why don't you go get the rake on.

06 01 55 01 LMP-EVA Okay.

06 01 55 02 CDR-EVA I'll get the gnomon. And while your're putting the rake on I'll photograph this thing, anyway.

06 01 55 08 LMP-EVA Okay.

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06 01 55 09 CDR-EVA I think it looks very much like the 14 rocks.  
06 01 55 12 CC That a boy, Davy.  
06 01 55 13 CDR-EVA Though, it looks maybe a little darker gray.  
06 01 56 28 LMP-EVA Okay, Dave. I'm set up whenever you are.  
06 01 56 30 CDR-EVA Okay; be right there.  
06 01 56 40 CDR-EVA There's a convenient piece broken off, right here.  
06 01 57 02 CDR-EVA Okay.  
06 01 57 12 CDR-EVA Here I come.  
06 01 57 15 LMP-EVA Dave, how about over here?  
06 01 57 18 CDR-EVA Yes. Find a good spot.  
06 01 57 19 LMP-EVA Yes, and while I'm raking, there's a rock over there that has some - a linear pattern in it, that you might want to look at while I'm raking.  
06 01 57 26 CDR-EVA Okay, let me get the pictures of the place.  
06 01 57 30 CC And, Jim, how's your raking going? Are you pulling off any small frags?  
06 01 57 32 CDR-EVA Level ground is great.  
06 01 57 37 LMP-EVA Haven't started yet, Joe.  
06 01 57 39 CDR-EVA Got to document the area first here, Joe.  
06 01 57 42 CC Roger. We couldn't miss that.  
06 01 57 48 CDR-EVA How about right about here, huh? Why don't you - -  
06 01 57 50 LMP-EVA Yes, that's what I was thinking. That's good. You see that rock over at your - just a little south of you?  
06 01 58 03 CDR-EVA Oh, I just ran out of film.  
06 01 58 05 CC Roger, Dave.

06 01 58 06 CDR-EVA Oh, my! Well, we can get that later. Let me change film MAGs while you rake, Jim.

06 01 58 12 LMP-EVA Okay.

06 01 58 13 CDR-EVA And you'd better take the - -

06 01 58 14 LMP-EVA Let me - I'm surprised you're running out all - already, though you must have taken a lot of pictures over there.

06 01 58 17 CDR-EVA Yes.

06 01 58 30 CC And, either Dave or Jim - -

06 01 58 31 CDR-EVA Joe, there was a - -

06 01 58 32 CC - - when convenient - -

06 01 58 33 CDR-EVA - - frag - -

06 01 58 34 CC - - our TV camera's starting to warm up considerably. We'd like for you to clean off the camera top and the LCRU when convenient, please.

06 01 58 45 CDR-EVA All right, Joe. And, mark bag 171 for a frag off of that big boulder. I'm pretty sure it was exposed right on the surface, fairly clean - right next to the boulder and looked like the same material.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 00 25 20 CC Okay, Al, in case you don't have your Flight Plan handy, we need to start a P20 plus X forward in a couple of minutes, and that will be followed by deploy of the gamma ray boom.

06 00 25 39 CMP Roger; Karl, I'm with it.

06 00 28 43 CC Al, are we in time to get a mark from you to when you start the gamma ray boom out?

06 00 28 51 CMP Roger. I'm ready now. Gamma ray boom going out.

06 00 28 56 CMP Now.

06 00 28 57 CC Thank you.

06 00 30 03 CC Hey, time for exercise, Al.

06 00 30 18 CMP Yes, I guess that's right, Karl.

06 00 31 41 CMP Okay, Karl.

06 00 31 42 CMP MARK on the gamma ray boom.

06 00 31 45 CC Thank you.

06 00 34 13 CC Al, you may be interested to know that the Rover boys are up on the slopes of Hadley Delta now. They got themselves up to - to an area where there is a considerable angle on the hillside, I'd guess 20 maybe almost 30 degrees. And it's still very fine soil, which acts a lot like snow. And you should have saw Dave about 5 minutes ago; took a beautiful spill in it.

06 00 34 42 CMP Tell them to be careful.

06 00 34 45 CC Roger.

06 00 41 52 CC Al, as you go around the corner, all your systems are looking good.

06 00 42 00 CMP Roger, Karl.

06 00 42 03 CC See you on the other side.

06 00 42 08 CMP Okay.

06 01 04 -- BEGIN LUNAR REV 35

06 01 29 44 CC Endeavour, this is Houston. How do you read?

06 01 29 50 CMP Hello, Houston; Endeavour. Reading you loud and clear.

06 01 29 56 CC Same here. How goes it up there?

06 01 30 01 CMP Fine, Karl. And I got a couple of comments on Tsiolkovsky, in addition to what I said last rev.

06 01 30 09 CC Go ahead, we're ready to copy.

06 01 30 14 CMP Okay, talk - discussing the - the flow in Crater Waterman, south of Tsiolkovsky, I guess what I said before still applies. The - what looks like on a map is the channel between Waterman and Tsiolkovsky is, in fact, too high for anything to flow between the two. There's - there's definitely some elevation there. However, looking at it this time, it's pretty plain that that channel - or gully, or whatever you call the breach in - in Tsiolkovsky's wall there between Waterman and Tsiolkovsky is caused by a graben-like fault system. There are two faults that run through there, and they run almost north and south right towards the central peaks, diverging - the one - the one on the west side, is slightly - is angled slightly to the northwest, but the other one goes almost directly north. And the source of the lava flow in Waterman appears to be high in the - in the wall of Waterman, on the north edge, right where the fault zone crosses the - the rim of Waterman.

06 01 31 30 CC Roger, Al. We copy.

06 01 31 35 CMP Okay, now there are a couple of other small - small craters around Tsiolkovsky. Particularly, one on the north side, on the northeast corner, the first large crater that you see there, has a very distinctive lava flow or some kind of flow down - down in the crater. And that flow also originates up in the corner or up in the - in the high towards the rim of that particular crater, where there's some contact between the - the Tsiolkovsky rim and the rim of that small crater.

06 01 32 26 CC Roger.

06 01 32 31 CMP Now again, I saw no evidence of - of any kind of a rock slide to the south of Tsiolkovsky, but the one on the west there is, looks - you know every-time I go over it - it certainly confirms my opinion that that's a rock slide. The lineaments, the way the - the thing ended, the lobate - the lobate tongues on it and everything. It's interesting that the rim of Tsiolkovsky, on the west side there, is - different from - across that

fault zone - is quite different from it is around the rest of the crater, maybe suggesting that that's the source of the flow. The rim seems to be not as sharply defined; it's lower and appears to be out from the edge of the basin more than the rest of the - of the boundary or the rest of the ejecta pattern around Tsiolkovsky, and there where that very steep, almost smooth scarp is, on the west of Tsiolkovsky, seems to be the - the point at which it starts.

06 01 33 48 CC

Al, Vance here. You have any comments on the rim of the north, northwest side, where you, (cough) it appears the rim might have slipped or - or you have a - a fault which shows the displacement?

06 01 34 07 CMP

Oh, yes, Vance, very definitely. There are a couple of fault zones, through there, and you can - you can see the displacement quite clearly from the air. The one, the fault zone between Waterman and Tsiolkovsky, is a - is a lot more subtle, but I - but I'm quite sure that that's what's going on there. But the one on the west side is - is very clear. That's - that's true.

06 01 34 29 CC

Al, we'd like to have HIGH GAIN, AUTO.

06 01 34 37 CMP

And, Vance, another comment about that. You got HIGH GAIN, AUTO, by the way. Another comment about that, where that fault zone appears on the west side, there's much less mass wasting into the interbasin of Tsiolkovsky, than there is around the rest of the - of the crater. Most of that mass wasting seems to have taken place outside the crater.

06 01 35 00 CC

That's an interesting observation.

06 01 36 09 CC

Al, Vance and I called up to your apartment a little while ago. Your folks are there. And I guess, as you know, they've got a squawk box look - listening in. - -

06 01 36 19 CMP

- - oh, great.

06 01 36 20 CC

- - listening in on our loop with great interest. Except when you go behind the Moon, then they - then they watch the other show that's taking place

on the surface. They said to say "Hello." And, they sound like they're having a good time up there.

06 01 36 36 CMP Very good. Very good. Hello, folks.

06 01 40 19 CC Al, in 30 seconds we're coming up to a pan camera operation MODE, STANDBY, POWER on.

06 01 40 28 CMP Roger.

06 01 45 36 CC Al, while we're waiting for that pan camera off cue, I've got a couple of photo pads - a couple of Flight Plan updates here for you, if you can copy them.

06 01 45 51 CMP Okay, Karl; go ahead.

06 01 45 52 CC Okay. At 148 hours and 0 minutes, they would like to have you get some good shots on those lava flows you saw over in Imbrium. And the recommendations that we have are as follows: CM3, EL, 250-millimeter lens, CEX f5.6, 1/125th, infinity, five frames at 10-second intervals. Recommend convergent photos starting at TCA minus 30 seconds. The aim point is up to you. Magazine Q, and record frame number. And then on the same page, 148 hours and 18 minutes, we don't need to do that P52 there, because the platform looks very good.

06 01 47 15 CMP Okay, Karl. Understand photos of the lava flows in Imbrium that we noticed on last rev. That'd be CM3/EL/250, CEX f5.6, 1/125, infinity, five frames at 10 seconds, use magazine Q, and try and get convergent stereo starting at TCA minus 30.

06 01 47 38 CC That's correct.

06 01 47 42 CMP And, also, delete the P52.

06 01 47 44 CC Roger.

06 01 48 01 CMP Karl, while we're going over Crisium here. Looking down at Picard at Peirce, and at Lick, I noticed that all of those craters, that's - that's Lick Delta by the way, Lick Delta, Picard, and Peirce, all look like - they're - they're all



about the same. They all have the same ring structure, all have the same low rims. The rims are - are - are what look like very shallow compared to the rims on the other craters I've seen around. And, also, they all have a slightly darker halo effect around the - the entire crater. But the - the color difference is very subtle.

06 01 48 48 CC

Roger, Al. As I look on the map here, they look like they might have been old craters flooded by the mare. Is that - does that seem feasible to you as you look at them?

06 01 49 00 CMP

No, it doesn't to me, Karl. They're a quite different texture inside, and you can see the ring structure clear down to the bottom of the crater. So I would say that they were - they were - they were not flooded craters.

06 01 49 11 CC

Roger. Okay.

06 01 49 52 CC

Hey, Al. Relevant to your observations coming up on Littrow here, Farouk has asked whether the comments that you made previously about Littrow, seeing a - a manteling of dark material everywhere with a few puddles in the valleys, whether that same comment would - pertain to Sulpic, Sulpicia - yes - -

06 01 50 15 MCC

Sulpicius Gallus?

06 01 50 16 CC

- - Sulpicius Gallus. Or do you - -

06 01 50 18 CMP

- - yes, Okay. Sulpicius Gallus. Certainly, Karl.

06 01 50 21 CC

Right. Do they - do they look like very similar areas, or are there some contrasts there?

06 01 50 28 CMP

Okay. I'll let you know when I get there. Unfortunately, I think I'm not - I think I'm going to be out of attitude to take a look at Sulpicius Gallus.

06 01 50 35 CC

Okay. That's for future reference then.

06 01 50 40 CMP

Yes, okay. But I'll - if - if I can see across

Serenitatis there, I'll - I'll give you a hack on that.

06 01 51 05 CC Okay. I guess I should keep quiet awhile and let you look at Littrow coming up in about a minute.

06 01 51 55 CC Al, we can have PAN CAMERA POWER, off, now.

06 01 52 01 CMP Okay. PAN CAMERA POWER, off.

06 01 57 05 CMP Houston, Endeavour.

06 01 57 07 CC Go ahead, Endeavour.

06 01 57 12 CMP Okay. Karl, I can give you at least a partial answer on that question. The - the coloration that seems to be continuous from Littrow all the way around through Sulpicius Gallus is the middle color. It's slightly darker than the rest of the mare basin itself and not quite as dark as some isolated or localized areas within the Littrow area. Now, those - those localized areas in the Littrow area were the areas in which I saw what appeared to be some ver - rather prominent distinctive cinder cones, with their own respective dark halo. And it seemed to be the same darkness as the rest of the material in local areas within the Littrow area. In other words, there are - there are three variations of color. There are three tones of color in the Littrow area. The darker tones are associated with - the - with the lowland areas, like the valleys and like - down on just at the edge of the mare surface. Then there's a lighter tone, which seems to be associated all the way around the - the - the ring or the rim of Serenitatis from Littrow all the way around through Sulpicius Gallus. And I don't see any other colors around Sulpicius Gallus, except that one. And they seem to encompass the area between the first wrinkle ridge and - and the contact between the mare basin and the front there. Sort of like between the Archuan Rilles and the first set of wrinkle ridges in the - in the Serenitatis Basin. And then -

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 01 59 05 CC Roger. Wouldn't be at all surprised.

06 01 59 17 CDR-EVA And I think I'll brush off the camera for you, and I can brush off my camera before I change the film.

06 01 59 20 LMP-EVA And, Joe, this looks like a pretty good place to rake. I've raked one swath here about 2 feet long and I've collected - oh, about 15 rocks.

06 01 59 35 CC That's a jackpot.

06 01 59 42 CDR-EVA Put them in a big pile; I'll be right over.

06 01 59 44 LMP-EVA Okay.

06 01 59 54 LMP-EVA Oh, I don't know whether I want to do that, Dave.

06 01 59 56 CDR-EVA Okay. Well, then, I'll be right over.

06 01 59 57 LMP-EVA Yes.

06 01 59 58 CDR-EVA I'll just do my film --

06 01 59 59 LMP-EVA Though I think we can fill up the bag pretty fast, here.

06 02 00 02 CDR-EVA Okay, then, you take the pictures and I'll just change my film later.

06 02 00 06 LMP-EVA Okay. I'll --

06 02 00 11 CDR-EVA Save - save the film changing here. Let me get you a bag.

06 02 00 20 CDR-EVA Oh, yes. You did get a bunch. 172.

06 02 00 27 CC Roger.

06 02 00 36 LMP-EVA Okay. Got a little more swath.

06 02 00 38 CDR-EVA Yes. It's about 1 meter long and one rake-width wide.

06 02 01 01 CDR-EVA Yes. Good.

06 02 01 07 CDR-EVA Glass on some. Most of them are rounded; right size.

06 02 01 21 CDR-EVA Okay, do another one.

06 02 01 35 CDR-EVA Oh, you're stepping on my tongs. That's all right. I'll get them.

06 02 01 40 LMP-EVA I can get them with the scoop here in a little bit.

06 02 01 43 CDR-EVA Yes. Sure miss that yo-yo. Oh, good! That's three swaths 1 meter long apiece.

06 02 02 04 CDR-EVA Damn bag isn't full yet. Let's shoot for a full bag. What do you say? Take it just a second to go one more sweep there.

06 02 02 13 LMP-EVA Oh, my poor tong. Oh, I don't weigh that much up here, Dave, to break your tongs.

06 02 02 21 CDR-EVA I don't know what I'd do without them.

06 02 02 23 LMP-EVA So don't bury them.

06 02 02 26 CDR-EVA Good, good, good. Shake anymore in the - Yes. That's too bad; we didn't get many out of that one. Why don't you take one over - Let me move the gnomon about 3 inches here, and take one on this side, Jim. Okay? Move the Gnomon back about a foot. Why don't you take a swath here and I'll --

06 02 02 53 LMP-EVA Yes, you know, because we're moving farther - a little farther from the rim --

06 02 02 56 CDR-EVA Yes.

06 02 02 57 LMP-EVA -- You get less and less each swath.

06 02 02 58 CDR-EVA Yes.

06 02 02 59 LMP-EVA This one ought to be a more fruitful one. Either that or my arm's getting tired. That's probably true, too.

06 02 03 14 CDR-EVA How about a double core here, Joe? Got any ideas on that one?

06 02 03 19 CC Dave, we're coming up on the departure time about

10 minutes from now. All we really need is soil from this same area. And we're making money hand over fist. Maybe a few walnut-sized rocks, if there's some around.

06 02 03 35 CDR-EVA We got - Okay, Joe.

06 02 03 36 LMP-EVA A bagful.

06 02 03 37 CDR-EAV We got a whole bagful of those in the comps. And that's in 172.

06 02 03 43 CC Roger; copy 172. I guess all we need is a soil sample from this area and perhaps even larger rocks, if there's some grapefruit to football-size rocks there.

06 02 03 54 CDR-EVA Yes. Yes, we'll just finish off Jim's collection bag here. I want to stow it anyway. Oh, look at that glass spherel - spherule down there. See that big one? I got to - Listen --

06 02 04 07 LMP-EVA Oh, yes. I see it.

06 02 04 08 CDR-EVA Why don't you back off and document the area. Let me get my tongs and pick that up.

06 02 04 11 LMP-EVA Okay.

06 02 04 12 CDR-EVA Perfectly round, about - -

06 02 04 14 LMP-EVA Yes. Here, let me help you.

06 02 04 15 CDR-EVA Yes. Get the tongs.

06 02 04 24 CDR-EVA Okay. Good, good.

06 02 04 26 LMP-EVA Keep an eye on the spherule.

06 02 04 28 CDR-EVA My toes are right on it. I got the tongs.

06 02 04 50 CDR-EVA My little paw. So I'll get you a bag; let you take a picture of that. I'll get a bag; then you can get the soil.

06 02 05 02 LMP-EVA Where you going to put that little spherule?

06 02 05 04 CDR-EVA In the bag.

06 02 05 05 LMP-EVA Not with the soil, though, are you?

06 02 05 07 CDR-EVA Yes.

06 02 05 08 LMP-EVA Okay.

06 02 05 09 CDR-EVA Came out of the soil. I just didn't want to miss it. We'll remember that. That goes in bag number 173, and, well, our friends in the back room are writing that down right now.

06 02 05 22 CC How right you are. And we want to leave in about  
- -

06 02 05 24 CDR-EVA Little fat ball.

06 02 05 25 CC - - 5 minutes, and we still need the soil.

06 02 05 29 CDR-EVA It's coming right now.

06 02 05 31 CC Roger. We see it coming in.

06 02 05 37 LMP-EVA A little more?

06 02 05 38 CDR-EVA Yes. Let's fill the bag.

06 02 05 49 CDR-EVA (Laughter)

06 02 05 50 LMP-EVA Is that a full bag there?

06 02 05 51 CDR-EVA Yes, sir. That's a full bag. That's a full bag.

06 02 05 53 LMP-EVA I want to see you shake that one down.

06 02 05 54 CDR-EVA All right. (Chuckle) Don't guess I will.

06 02 06 06 CDR-EVA Okay. Better have a - 90-percent bag for sure.  
The - -

06 02 06 17 LMP-EVA Don't pour your spherule out.

06 02 06 23 CDR-EVA Okay; I think you need to reconfigure, and we'll get ready to leave here.

06 02 06 27 LMP-EVA Okay. I'll go over and take this off, then.

06 02 06 32 CDR-EVA Yes. Here, let me put this in your backpack. Stand there; that's good. I'll get it.

06 02 06 49 CDR-EVA I'm going to get a couple of big rocks, Jim. Then we'll just fill your bag and - call it a day - here.

06 02 06 59 CC Sounds good, Dave. And we want to move in about 3 minutes. We're coming up against a hard stop here.

06 02 07 09 CDR-EVA Okay; 3 minutes. Okay; that doesn't give us time to really do much then.

06 02 07 17 CC Maybe one big rock wouldn't hurt.

06 02 07 22 CDR-EVA Yes. Jim?

06 02 07 28 LMP-EVA Yes.

06 02 07 29 CDR-EVA Why don't you come over here and get your scoop and scoop me up one big rock?

06 02 07 33 LMP-EVA Okay.

06 02 07 34 CC And -

06 02 07 35 CDR-EVA Now - and get your camera on it, because I don't - I don't have it - any film. How about this one right here that looks like it has some layering in it? Maybe.

06 02 07 46 LMP-EVA Yes, that's the one I was talking about.

06 02 07 48 CDR-EVA Right there?

06 02 07 49 LMP-EVA Yes.

06 02 07 50 CDR-EVA Why don't you - -?

06 02 07 51 LMP-EVA You want to point to it with the - -

06 02 07 52 CDR-EVA Yes, I've got my foot right there. Why don't you take a couple of cross-Suns real quick?

06 02 07 54 LMP-EVA Okay.

06 02 07 55 CDR-EVA Seven feet, cross-Sun? A little too far away, old buddy.

06 02 08 05 LMP-EVA Okay?

06 02 08 06 CDR-EVA Okay. Now come grab your scoop and we'll take it.

06 02 08 14 LMP-EVA It's a pretty big one to try and get with a scoop.

06 02 08 17 CDR-EVA Yes; you're right. I don't see anything else.

06 02 08 19 LMP-EVA This little fracture.

06 02 08 24 LMP-EVA Too big.

06 02 08 25 CDR-EVA Too big. Get another one.

06 02 08 27 LMP-EVA Oh! Here, Dave.

06 02 08 28 CDR-EVA Oh, sure.

06 02 08 29 LMP-EVA Good boy.

06 02 08 31 CDR-EVA Get that - that one on the - on your side.

06 02 08 33 LMP-EVA Okay.

06 02 08 40 CDR-EVA Getting it. That a boy. There.

06 02 08 49 LMP-EVA Should have left the rake on.

06 02 08 52 CDR-EVA Yes. Can you get it? Good show.

06 02 08 59 LMP-EVA Easy does it. Easy does it. That's it.

06 02 09 04 CDR-EVA Up a little more. Keep <sup>your</sup> ~~you~~ balance. Can you get it up higher?

06 02 09 16 LMP-EVA Okay.

06 02 09 18 CDR-EVA Whup! Don't fall backwards.

06 02 09 21 LMP-EVA Yes. Man! I got it.

06 02 09 28 CDR-EVA Good. Okay; fill that square. Okay, Jim. Let's get on the Rover and head back.

06 02 09 37 LMP-EVA Okay, I haven't secured the rake there, yet.

06 02 09 40 CDR-EVA Okay. You secure the rake, and I'll secure the TV, and we'll get moving.



06 02 09 44 CC Sounds good, Dave and Jim. And we want to leave  
- -

06 02 09 45 CDR-EVA I wonder how I'm going to do this.

06 02 09 46 CC - - the TV camera where it is right now. It's  
stowed in the proper position.

06 02 09 53 CDR-EVA Okay. Oh, shoot.

06 02 09 59 LMP-EVA Hardly room there, is there?

06 02 10 00 CDR-EVA Don't have any room there is right. Any place we  
can put your bag on it? Isn't your -

06 02 10 06 LMP-EVA Why don't you put that in one of those bags, Dave?

06 02 10 09 CDR-EVA Yes. I'm going to put it in a seat pan now. And  
then I - Then, why don't you put your bag in here.  
Here, let me have - let me have it. I'm going to  
put your bag in there. Your carrier is awful  
loose, and I don't want to lose that bag. Put  
this on a handtool carrier.

06 02 10 31 LMP-EVA What's in there? Rock?

06 02 10 32 CDR-EVA Oh, I don't know what's in there. No - -

06 02 10 37 CC And, ~~T~~roops - -

06 02 10 38 CDR-EVA - - too many rocks there.

06 02 10 39 CC How many big rocks did you pick up? One?

06 02 10 40 LMP-EVA I think that's our be -

06 02 10 42 CDR-EVA Yes, one, Joe. That's - We're about out of time,  
here.

06 02 10 45 CC Roger. Although we're not hurting all that bad,  
but - -

06 02 10 48 LMP-EVA Yes, sir.

06 02 10 49 CC - - we think you should be climbing - -

06 02 10 50 CDR-EVA Bend over, Jim.

06 02 10 51 CC - - aboard now. Looks like you really put some weight on our suspension system when you loaded it there.

06 02 11 00 CDR-EVA Ha! Wait until you feel this bag.

06 02 11 08 CC It'll - it'll weigh even more when you get it home. And we're interested in getting you to move on out now, Troops.

06 02 11 19 CDR-EVA Going as fast as we can, Joe. Right now.

06 02 11 21 CC Roger.

06 02 11 22 CDR-EVA Okay, Jim. Okay, you want to just stay in FM/TV, Joe?

06 02 11 31 CC Negative, Dave. Go ahead and stow it. We just don't want you to move the television camera. It's in the proper position now. We want you to go ahead and stow the antenna.

06 02 11 41 CDR-EVA Understand. Okay; better let me get in first, Jim. Okay; doing PML/WB.

06 02 11 56 CC Roger, Dave. And don't forget the ignition key.

06 02 12 03 CDR-EVA Yes, sir. Got it. Okay; the brush is going to be under my seat pan.

06 02 12 15 CC Standing by for your heading reading.

06 02 12 21 CDR-EVA Okay; stand by, Joe.

06 02 12 24 LMP-EVA Are you going to give us an update, Joe?

06 02 12 26 CC What's the reading, Jim? You probably won't need it.

06 02 12 31 LMP-EVA 290.

06 02 12 35 CC Torque it to 293, please. 293.

06 02 12 41 CDR-EVA Okay.

06 02 12 42 LMP-EVA Okay; understand 293. You want to let - torque it, Dave?

06 02 12 48 CDR-EVA Yes, go ahead; and then - **S**hoot, you better get in so I can get your -

06 02 12 52 LMP-EVA Oh! Well, - -

06 02 12 53 CDR-EVA Yes.

06 02 12 54 LMP-EVA - - if we're going downslope, I'll just hang on.

06 02 12 55 CDR-EVA No. Seatbelt. Get in.

06 02 12 56 LMP-EVA Okay.

06 02 13 08 CDR-EVA Okay, that looks good. Where's your seatbelt?

06 02 13 13 LMP-EVA Shoot, if I didn't put it down. I didn't think I was going to use it.

06 02 13 15 CDR-EVA Yes.

06 02 13 28 LMP-EVA It's under there, Dave.

06 02 13 29 CDR-EVA I know it. Just can't get it.

06 02 13 31 LMP-EVA Oh.

06 02 13 32 CDR-EVA That scoop there, you can't get it up high enough to use it. That's part of the problem is the scoop holds it way down.

06 02 13 50 CDR-EVA Hope you can get your feet in there.

06 02 14 00 CDR-EVA Okay. Yes.

06 02 14 12 LMP-EVA Okay.

06 02 14 21 CDR-EVA Phew! Oh, are you hard to put to bed! Could you bring your left leg over, Jim? That's it. Okay.

06 02 14 37 LMP-EVA Okay, Joe. When we leave here, I'm in a position to shoot some film.

06 02 14 41 CC Beautiful.

06 02 14 46 LMP-EVA We'll get some down - downhill motion, here.

06 02 14 53 CDR-EVA Okay. Go.

06 02 15 11 CDR-EVA Did you torque it, Jim?

06 02 15 12 LMP-EVA No, I didn't.

06 02 15 13 CDR-EVA Yes or no?

06 02 15 14 LMP-EVA No.

06 02 15 15 CDR-EVA Okay.

06 02 15 16 LMP-EVA I can get it now if you like.

06 02 15 18 CDR-EVA Yes. Get it. Okay.

06 02 15 24 CC Rover - -

06 02 15 25 CDR-EVA Okay; - -

06 02 15 26 CC - - this is Houston.

06 02 15 27 CDR-EVA - - the seatbelts are pulled fast.

06 02 15 28 LMP-EVA Okay; 293.

06 02 15 29 CDR-EVA Go ahead, Houston.

06 02 15 31 CC Dave, we want you to head toward Station 4, and we'll advise you on - what your rate looks like and the task that we want you to carry out once you arrive. Just start off in the direction of Station 4, please.

06 02 15 47 LMP-EVA Okay; give me a heading. I can see it over there, Dave.

06 02 15 51 CDR-EVA Yes.

06 02 15 52 LMP-EVA I see about 330. Would you - That's not going to mean much to you until you get down to the level.

06 02 16 00 CDR-EVA That's right. And the camera's running, Joe.

06 02 16 04 CC Okay; and standing by for a mark when you roll.

06 02 16 09 CDR-EVA We're rolling.

06 02 16 12 CC Roger.

06 02 16 18 CDR-EVA Hey, your camera's loose on the swivel,  
Jim.

06 02 16 23 LMP-EVA No, I'm getting a pan, here. (Laughter)

06 02 16 25 CDR-EVA Oh, really? Oh. That's an awful fast pan.

06 02 16 28 LMP-EVA No, I just wanted to make sure it was running.

06 02 16 31 CC Dave, you'll want to trend - -

06 02 16 32 LMP-EVA The light's not working.

06 02 16 33 CC - - for - course 346, and it's about 1.7 clicks  
to Station 4.

06 02 16 42 CDR-EVA Okay. I'm going to go down sort of slow here,  
Joe, just to make sure we play it cool.

06 02 16 54 CC Sounds reasonable.

06 02 17 34 CC And, Jim. When you finish photography, we're  
standing by for description.

06 02 17 43 LMP-EVA Well, I just had the camera running, Joe. Remind  
me to turn it off when it runs out of film.

06 02 17 47 CC Yes, sir. I've got a hack.

06 02 17 48 LMP-EVA We've got about half a MAG on it.

06 02 17 50 CC Roger. And you're running at 12 frames per sec-  
ond, I imagine.

06 02 17 53 LMP-EVA I think I know what that is. The - -

06 02 17 57 CDR-EVA Right. But we're going down - Sun on - just this.  
Down-Sun isn't going to be very good on the pho-  
tography, Joe, because the zero phase just washes  
it out completely.

06 02 18 12 CC No problem, Dave. Jim might want to swing the  
camera around and point it more towards the right.

06 02 18 21 CDR-EVA Well, we're heading directly downhill, now. We're  
cross-Sun.

06 02 18 25 CC Oh, okay.

06 02 18 27 CDR-EVA Yes, I'm looking out at the - Hey, are we looking at the - the big crater dead ahead?

06 02 18 33 LMP-EVA Is Dune, yes.

06 02 18 34 CDR-EVA Yes.

06 02 18 35 LMP-EVA That should be Dune.

06 02 18 40 CDR-EVA You want to hit the southern ...?

06 02 18 43 LMP-EVA Yes. Yes.

06 02 18 44 CDR-EVA Yes.

06 02 18 46 LMP-EVA But, again, that's - Yes. We didn't see the - the levee, or rampart, on the eastern side.

06 02 18 54 CDR-EVA No, we sure didn't.

06 02 18 57 LMP-EVA So probably any place on the southern rim would be good. Although, from - from here, it almost looks like you could drive around the eastern rim of - Dune. Boy, there's a crater just east of - east of Dune; it looks very recent, and it has - a great number of blocks - that I can see from here. And the largest - from this vantage point - Again, you've probably - y'all have probably seen it on TV. The largest crater, which was Arrowhead - we named Arrowhead - really runs east-west, which we mentioned before, rather than north-south. And on the northern side of a large crater - elongate crater, which runs north - east-west, on the north side, there are a great number of rocks exposed.

06 02 20 06 CC Roger. We copy.

06 02 20 07 LMP-EVA ... our tracks here, as we go downslope.

06 02 20 16 CDR-EVA Rover track. Hit it.

06 02 20 23 LMP-EVA Probably just follow the tracks, huh?

06 02 20 24 CDR-EVA Yes, probably to Dune.

06 02 20 25 LMP-EVA Yes.

06 02 20 26 CC Sounds good.

06 02 20 32 CDR-EVA We know that's a fairly good route.

06 02 20 33 LMP-EVA Yes. Okay; we're heading 320; bearing's 350, and range is 4.3.

06 02 20 42 CC Copied, Jim. Thank you.

06 02 20 52 CDR-EVA Sure, it's - it's bouncier going down, isn't it?

06 02 20 55 LMP-EVA Yes.

06 02 21 02 CDR-EVA Yes, we're about down out of it, now. What a beautiful sight man! Well, we didn't get to 500 in stereo up there, but you got a pan, didn't you?

06 02 21 16 LMP-EVA Yes.

06 02 21 17 CDR-EVA Okay.

06 02 21 26 LMP-EVA Boy, I can't get over those lineations, that layering at Mount Hadley.

06 02 21 29 CDR-EVA Boy, I can't either. That's really spectacular.

06 02 21 31 LMP-EVA That's really beautiful. Talk about organization!

06 02 21 36 CDR-EVA Yes, man.

06 02 21 37 LMP-EVA That's the most organized mountain I've ever seen.

06 02 21 40 CDR-EVA (Laughter) Yes, they're so uniform in width.

06 02 21 44 LMP-EVA Yes.

06 02 21 45 CDR-EVA Nothing we've seen before has had the same - thickness of each bed. Yet those are - -

06 02 21 54 LMP-EVA Uniform thickness from the very top to the bottom.

06 02 21 57 CDR-EVA Yes.

06 02 22 02 LMP-EVA And looking to the north on that spur that we talked about yesterday, we can see the - the horizontal bed again.

06 02 22 09 CC Roger, Jim; copy. Any idea of the dimension on that thickness?

06 02 22 20 CDR-EVA Actually, I'd estimate it's relatively thin, but - yes, I'd say that it's probably - if you took the - the ridge line on Mount Hadley, which is practically horizontal at our present position, and put that into 100 percent, then I'd say those lineations across there - the bedding across there - are probably like a - a quarter of a percent. Wouldn't you, Jim? ...

06 02 22 48 LMP-EVA A third. Yes.

06 02 22 49 CDR-EVA Certainly less than 1.

06 02 22 50 LMP-EVA Yes.

06 02 22 51 CDR-EVA Must be - If you look across the ridge line and then look at the dip to the - northwest there, you could count a couple of hundred, anyway; couldn't you?

06 02 22 59 LMP-EVA Yes.

06 02 23 02 CC Amazing.

06 02 23 03 CDR-EVA A - apparently you couldn't see that on TV.

06 02 23 06 CC No, not at all - -

06 02 23 07 LMP-EVA Yes, I wouldn't think they'd be able to make out detail like that.

06 02 23 08 CC - - Not at all. Hopefully, it's in the photographs, but we're marking it down - -

06 02 23 10 CDR-EVA Yes.

06 02 23 11 CC - - none the less. That TV isn't everything.

06 02 23 18 CDR-EVA And then if you look - yes, horizontal, half - well, all the way up, I guess that - -

06 02 23 25 LMP-EVA Yes.

06 02 23 26 CDR-EVA Would be slumping.



06 02 23 27 LMP-EVA Yes, there - there is. I see it now. Yes.

06 02 23 29 CDR-EVA It just looks like slump, probably.

06 02 23 30 LMP-EVA Yes.

06 02 23 31 CDR-EVA Because it - they're discontinuous, subhorizontal lines, which are pret - pretty much cross-bedded, if it was bedding, and I don't think it is. It just looks like slump-pattern ground.

06 02 23 51 CC And what kind of progress are you making now, Jim.

06 02 23 56 LMP-EVA Oh, we're going at about .8 clicks.

06 02 23 59 CDR-EVA Oh! No, no. Eight. (Laughter)

06 02 24 02 CC Roger. Copy, Dave.

06 02 24 03 LMP-EVA Point 8! That's almost backing up. And we're heading 340, bearing 349, range - 3.9.

06 02 24 23 LMP-LM And we're going up a slight slope, following our track.

06 02 24 33 CC Roger. Copying every word, Jim. Keep talking.

06 02 24 48 CDR-EVA Okay, here's that little tilt. Hang on. Easy does it. Okay.

06 02 25 10 LMP-EVA There's the LM directly ahead of us.

06 02 25 12 CDR-EVA Yes.

06 02 25 13 LMP-EVA Bearing - yes, bearing is right on. Right on the money.

06 02 25 21 CDR-EVA Yes, that's quite a NAV system. Quite a system.

06 02 25 30 LMP-EVA Now we're going 11 clicks.

06 02 25 41 CC Roger, Jim. Copy. And are you progressing towards Dune Crater now?

06 02 25 48 LMP-EVA Yes. Well, we're following our tracks. We thought when we got up here just south of Dune, we'd probably head north-northeast.

06 02 26 00 CDR-EVA Big boulder on the surface. About a foot.

06 02 26 06 CC Okay, Jim. Copy that - -

06 02 26 08 LMP-EVA ... awhile.

06 02 26 09 CC - - And just a factor into your thinking, we can afford a very short stop in the vicinity of Station 4. It doesn't have to be really very close. We're interested in either documented samples or a rake sample there, if you - if you think it looks like a good area for a rake sample.

06 02 26 30 CDR-EVA Okay. Understand, Joe.

06 02 26 33 LMP-EVA But you'd still like the station - to be on the - southern rim, I would think.

06 02 26 38 CDR-EVA Sure!

06 02 26 39 LMP-EVA Yes.

06 02 26 40 CC Probably downwind - -

06 02 26 41 LMP-EVA Like at Autolycus.

06 02 26 42 CC - - from Aristillus - -

06 02 26 43 CDR-EVA Why don't you head for right there, Jim?

06 02 26 44 CC - - or Autolycus, Jim, but the exact position's certainly not critical. Your judgment.

06 02 26 51 LMP-EVA Okay.

06 02 26 52 CDR-EVA Okay. We'll go get some.

06 02 26 55 LMP-EVA Let's see, at about a 12 o'clock position ought to be a good sampling station.

06 02 26 58 CDR-EVA Yes, I think you're right.

06 02 27 02 LMP-EVA Okay, we're heading off now at 025. Heading directly toward the southern rim of Dune.

06 02 27 21 CC Rover, this is Houston.

06 02 27 26 CDR-EVA Go ahead.

06 02 27 28 CC Roger. The MAG's run out on your camera, Jim. You should shut that off, and we don't want you to stray too far from your Rover tracks. Head back more or less the way you came. We have time for about a 10-minute stop someplace south and perhaps a little west of Dune Crater. Over.

06 02 27 48 CDR-EVA Roger, Joe. We'll do that. We're just on the rim of Dune right now.

06 02 27 53 CC Okay. And, Jimmy, did you turn the camera off?

06 02 27 58 LMP-EVA I did, Joe, but apparently it didn't run past - I still have - about 40 - 45 percent left.

06 02 28 14 CC Okay, Jim. Fine.

06 02 28 20 LMP-EVA Yes, I have turned it off.

06 02 28 24 CDR-EVA This is a good spot right here.

06 02 28 27 LMP-EVA Oh, look at those large blocks on that west wall.

06 02 28 30 CDR-EVA Yes, man! Look at the large one right here. Gee, let me get this off.

06 02 28 43 CC Standing by for your mark when you stop. And either Dave or Jim, we're going to need you - for camera and LCRU and the camera lens brushed off before you continue.

06 02 28 58 CDR-EVA Okay.

06 02 28 59 LMP-EVA Okay; we've stopped, Joe.

06 02 29 00 CC Roger. Mark that.

06 02 29 01 LMP-EVA We're reading - 292, 292, 347, 8.9, 3.4, 94100, 89, 90; motor temps, both - low.

06 02 29 24 CC Okay; beautiful.

06 02 29 40 CDR-EVA Okay; LCRU's cleaned off, Joe.

06 02 29 43 CC Okay, Dave. And if you think you can make this a 10-minute stop, we'll forego the TV. We're interested in keeping it pretty short.

06 02 29 51 CDR-EVA Let's - let's forego the TV, Joe.

06 02 29 55 CC Okay. And a rake might be useful -

06 02 30 00 CDR-EVA Okay.

06 02 30 02 CC - - here, but once again, - -

06 02 30 05 LMP-EVA The last ... ditch ahead.

06 02 30 07 CC - - your choice on getting us a few samples.

06 02 30 09 LMP-EVA For a 10-minute stop, Dave, I don't think the rake is - -

06 02 30 12 CDR-EVA No.

06 02 30 13 LMP-EVA - - very good.

06 02 30 19 CC Just depending on however you read the fragment distribution.

06 02 30 26 CDR-EVA Yes.

06 02 30 27 LMP-EVA There are a lot of large fragments here, Joe.

06 02 30 31 CDR-EVA Jim, I've got to change my film MAG. here.

06 02 30 33 LMP-EVA Okay; I'll take a pan.

06 02 30 35 CDR-EVA Take a pan, yes. Good idea.

06 02 32 28 CDR-EVA Jimmy?

06 02 32 34 LMP-EVA Camera's stopped working.

06 02 32 36 CDR-EVA It has? Maybe you're out of film.

06 02 32 41 LMP-EVA I just put this on.

06 02 32 45 CC Is it your camera, Dave?

06 02 32 46 CDR-EVA Is it - well, I'll take the pictures. Let's get one sample. Jim's out of film, or his camera stopped, and I can take the pictures.

06 02 32 56 CC Dave, - -

06 02 32 57 CDR-EVA Why don't we move it over here to a - -

06 02 32 58 CC - - did you change your mag out at the last stop? Yes, I guess you did. Beautiful! Press on.

06 02 33 06 CDR-EVA Jim, let's get down here by these boulders.

06 02 33 08 LMP-EVA Okay.

06 02 33 12 CDR-EVA I think we can get a pretty good distribution.

06 02 33 20 LMP-EVA Joe, I have a partial pan there, and my camera stopped working.

06 02 33 25 CC Okay, Jim. No problem.

06 02 33 50 CDR-EVA These two right here, Jim.

06 02 33 52 LMP-EVA Okay, you've got to take the pictures.

06 02 33 53 CDR-EVA Yes, I'll take all the pictures, if you'll get the -

06 02 34 19 CDR-EVA Got a bag out?

06 02 34 20 LMP-EVA Yes.

06 02 34 29 CDR-EVA Yes, we need another one.

06 02 34 39 LMP-EVA I got her.

06 02 34 41 CDR-EVA Get a bag and you get some soil here. Watch that big one. I want to get that one, too.

06 02 35 00 CDR-EVA Okay; good. Why don't you - you zip the bag. And let me get that other big rock, that -

06 02 35 15 CDR-EVA Location.

06 02 35 41 LMP-EVA In your bag.

06 02 35 51 CDR-EVA I - I didn't notice. Oh, yes. Must be - What number was that, you remember?

06 02 36 01 LMP-EVA No, I don't.

06 02 36 02 CDR-EVA Okay, hold this bag, and it's number 174.

06 02 36 07 CC Okay, Dave. Copy that. 174.

06 02 36 12 CDR-EVA And there's one before that that came off Jim's bag rack.

06 02 36 21 CC Roger. And was that an empty one?

06 02 36 22 CDR-EVA That mine?

06 02 36 23 LMP-EVA Yes.

06 02 36 24 CDR-EVA Read the number on my bag. Joe, just - we'll get to you.

06 02 36 39 CC Okay.

06 02 36 32 CDR-EVA There's 204 in there now. It must have been 203. Okay, back up a little bit, Jim, so I can get the picture. That a boy. Okay. Put that in my pack. Just catch a couple more.

06 02 36 51 LMP-EVA The large gray one to your right with large vesicles in it.

06 02 36 55 CDR-EVA Yes, that big boulder. Yes, man.

06 02 36 56 LMP-EVA Yes. Okay. ...

06 02 37 00 CDR-EVA Get to it.

06 02 37 07 CDR-EVA Huge vesicles. Oh, look at the plagioclase in there. Man, look at the laths, Jim; it's beautiful. Whooo! Vesicles in this must be about 2 to 3 inches - -

06 02 37 22 CC Oh, yes.

06 02 37 23 CDR-EVA - - in size. And it's a big boulder.

06 02 37 30 CC Okay, Dave, we're going to have to sack that one up and think about moving on.

06 02 37 36 CDR-EVA Yes, sir.

06 02 37 44 LMP-EVA Boy, that's a real beauty.

06 02 37 46 CDR-EVA Really is, isn't it?

06 02 37 47 LMP-EVA Want to try and knock a piece off, here?

06 02 37 48 CDR-EVA Yes.

06 02 37 50 LMP-EVA Should come off pretty easy.

06 02 37 51 CDR-EVA Sure looks like it. Get all these.

06 02 38 03 CDR-EVA Okay, if you'll hold my tongs, here.

06 02 38 12 CDR-EVA Okay. Should be able to get it right here in the middle.

06 02 38 23 LMP-EVA Piece?

06 02 38 24 CDR-EVA Have it.

06 02 38 41 CDR-EVA Go.

06 02 38 42 LMP-EVA Okay; that's enough, Dave.

06 02 38 43 CDR-EVA I think you're right.

06 02 38 48 CC And we think you're right.

06 02 38 49 CDR-EVA That one right there.

06 02 39 01 CDR-EVA Okay, good show. Good shape. ...

06 02 39 16 LMP-EVA Now put that large one in my pack.

06 02 39 18 CDR-EVA Here. Oh, shoot, you dropped your pack. Fortunately, it wasn't the one with the rocks in it.

06 02 39 25 LMP-EVA Uh -

06 02 39 26 CDR-EVA How about that? I don't know what it had in it, but it sure didn't have those good rocks in it; and that's why I put those good rocks in the - Oh, well, win a few and lose a few.

06 02 39 39 LMP-EVA Son-of-a-gun.

06 02 39 40 CDR-EVA Put that in my pack; will you, Jim? Okay; this is a large corner of a vesicular rock that's the big boulder sitting here.

06 02 30 53 LMP-EVA Just about all we're going to be able to put in your bag.

06 02 39 56 CDR-EVA Is that right?

06 02 39 57 LMP-EVA Yes, it's just about filled.

06 02 39 58 CDR-EVA Okay. Hey, maybe - let me get those two frags there from the center. Give me - -

06 02 40 02 LMP-EVA Yes.

06 02 40 03 CDR-EVA - - those tongs. You can get out a bag.

06 02 40 06 CC Okay, Dave. And this should be - -

06 02 40 07 CDR-EVA This is the ... of anything we've seen.

06 02 40 08 CC - - the last one. We want to - -

06 02 40 09 LMP-EVA By a long shot.

06 02 40 10 CC - - head them up and point them out.

06 02 40 12 CDR-EVA Okay. Head them up and point them out. 204. Better let me get the other one. Two frags from the center of the - -

06 02 40 26 LMP-EVA No, that - that's not it. Down - No.

06 02 40 29 CDR-EVA Where is it?

06 02 40 30 LMP-EVA Down there. Right there. That's it.

06 02 40 36 CDR-EVA 204 for the two frags in the center of the boulder. And the big chip off the top that's got the vesicles in it is in my pack, solo.

06 02 40 44 CC Roger.

06 02 40 50 CDR-EVA And that's not much for Dune, but I think it's representative.



06 02 40 57 CC Okay. And we're ready to roll.

06 02 40 58 CDR-EVA I hope it's representative because it - Okay. Put that in my bag, Jim?

06 02 41 05 LMP-EVA Yes.

02 06 41 12 CDR-EVA Got it?

06 02 41 13 CC And, Rover, you should be able to easily follow your tracks - -

06 02 41 16 CDR-EVA Huh?

06 02 41 17 CC - - back home.

06 02 41 21 CDR-EVA Sure. I'm sure we can, Joe.

06 02 41 35 CDR-EVA Okay, Jim. Head back to the Rover.

06 02 41 37 LMP-EVA Okay.

06 02 41 46 CDR-EVA Boy, underneath that one is another one with larger vesicles in it.

06 02 42 33 CC Dave and Jim, as you climb back on, we'd like an EMU status check from both of you, please.

06 02 42 41 LMP-EVA Okay, I'm reading pressure, 385; flags are clear, and 50 percent.

06 02 42 49 CDR-EVA Okay. Dust off a little bit here. I'm reading 42 percent, about 3.9, and - dust off - flags are clear.

06 02 43 09 CC Sounds good.

06 02 43 10 CDR-EVA Okay. Jim. Let me have a seatbelt. Oo! Easy, easy, easy.

06 02 43 18 CC Jim, when you get settled, you can check the camera on 12 frames per second and turn it on again, please.

06 02 43 29 LMP-EVA Yes. I don't know why it didn't come on last time, Joe.

06 02 43 31 CC Okay, check it at 12 frames per second, please.

06 02 43 33 LMP-EVA Try it again.

06 02 43 37 CDR-EVA Just sit back as you can now. Can you hold these things for me, Jim? Hold those, too.

06 02 43 55 CDR-EVA There. They're in.

06 02 44 08 CDR-EVA Oh, no, I didn't put a bag on you, did I? Yes, that's right. We're okay.

06 02 44 12 LMP-EVA What did you do with that bag?

06 02 44 13 CDR-EVA I stuck it on the hand tool carrier so it -

06 02 44 15 LMP-EVA That's right.

06 02 44 16 CDR-EVA Yes.

06 02 44 17 LMP-EVA Okay. Boy, you had me worried.

06 02 44 18 CDR-EVA Well, I had me worried, too. I knew - I knew the one with the good rocks, I hadn't lost, because I stuck that in the seat pan. But I thought I'd put one on you, and now I remember I started to put it on you, and your harness looked loose, so I stuck it on the hand tool carrier where it's got a lock. So we're okay.

06 02 44 35 CC And we knew all the time, Dave. We should have told you. Wanted to keep you honest, though.

06 02 44 42 CDR-EVA All right, Joe. Keeps us honest. Okay.

06 02 44 51 LMP-EVA Okay, it looks like the camera is working, Joe. It's just hard to press that in all the way.

06 02 45 03 LMP-EVA We'll try it again on our drive back.

06 02 45 05 CC Okay, Jim. Sounds good. We'll be standing by for your mark.

06 02 45 13 CDR-EVA Okay, I'm on. Get my handy-dandy seatbelt.

06 02 45 30 CDR-EVA Okay. Seatbelt's fastened. I think I'm finally learning how to do that. Okay. Okay, Joe.

06 02 45 44 CDR-EVA MARK. We're rolling.

06 02 45 46 CC Beautiful, Davey. Beautiful. And some more words - -

06 02 45 51 LMP-EVA Camera's on - -

06 02 45 52 CC - - about your next assignments coming up here. Dave, we want you to drop Jim at the LM and I'll talk to him in a minute. - And then you go on over park near ALSEP, headed west.

06 02 46 10 CDR-EVA Okay, understand, Joe.

06 02 46 22 LMP-EVA Boy, there sure are a lot of neat rocks in the Dune. Too bad we can't spend some more time.

06 02 46 28 CC On your next trip.

06 02 46 31 CDR-EVA The third. Yes, next trip. You're right.

06 02 46 36 CC And, Jim, you might want to start the camera.

06 02 46 41 LMP-EVA Yes, it's running, Joe.

06 02 46 45 LMP-EVA Let's see. Think we can get through up here?

06 02 46 48 LMP-EVA Seems to me we could.

06 02 46 50 CDR-EVA Yes, I think you should be able to.

06 02 46 54 LMP-EVA Maybe a little to the right.

06 02 46 56 CDR-EVA Yes, I'll come - I'll come right now. Past this little bump. And we're in a little boulder field. And about a foot, at the biggest, down to about 6 inches.

06 02 47 10 LMP-EVA Yes, it looks like from a crater that hit on the rim of a Dune.

06 02 47 14 CDR-EVA Yes, it sure does.

06 02 47 16 LMP-EVA Joe. We're reading on a bearing of 350, range 3.3.

06 02 47 20 CDR-EVA Okay, and we're on our tracks.

06 02 47 22 CC Roger. And follow them home.

06 02 47 29 CDR-EVA Okay. Gee, it's nice to sit down, isn't it?

06 02 47 37 LMP-EVA Oh, it is.

06 02 47 38 CDR-EVA (Laughter) It's a good deal. You hop off and work like mad for 10 minutes and hop back down - hop on, sit down, and take a break.

06 02 47 59 LMP-EVA Yes, I guess in a couple craters, we remarked that we saw a boulder distribution that looked like it was linear, like it was a ray pattern.

06 02 48 07 CDR-EVA Yes.

06 02 48 08 LMP-EVA But we never did get a chance to really sample any of those. As I recall, there was one on the - we saw one on the - what, south side of the Dune, on the way down.

06 02 48 19 CDR-EVA Yes.

06 02 48 24 LMP-EVA We could probably save some time going back by not following the tracks, you know, because - -

06 02 48 28 CDR-EVA Yes - -

06 02 48 29 LMP-EVA - - we can see the LM.

06 02 48 30 CDR-EVA - - you're right. I think we ought to head right straight ahead on. We can see home.

06 02 48 33 LMP-EVA The only big one over there - only big crater over that way would probably be Earthlight.

06 02 48 40 LMP-EVA I think that's probably Earthlight that we see at 12 o'clock.

06 02 48 47 CDR-EVA Yes.

06 02 48 48 LMP-EVA If we stay - west of Earthlight, we ought to save a little distance.

06 02 48 52 CDR-EVA Yes. Lets get out of this little boulder field first. Okay, now we'll take a little left here. Oh well, we can look at Pluton. We'll see Pluton

all the way. And the LM is silhouetted right against the base of - Pluton so we can't miss that. And just to the right of it is - Schaber Hill which we'll be heading for tomorrow. Okay, by the way, Joe, I guess we ought to tell you about what we saw at that last stop. We gathered a few quick samples that were covered with dust, which we didn't look at very carefully, just so we could get ahold of them. Then the very large boulder, which was probably about 6 feet, sticking up out of the ground, with a very large 3- to 4-inch vesicles, was a very fine-grained, dark, black, basalt, with maybe - Gee, I'd say 15-percent plage in it, wouldn't you, Jim?

06 02 50 00 LMP-EVA Yes, very fine lath.

06 02 50 02 CDR-EVA Yes, a very fine lath and on the top, it had some smaller millimeter-size vesicles, and adjacent to it was another - lighter gray vesicular basalt, which was uniform in vesicularity, in which we didn't have time to sample, but - the vesicles in that looked similar to that one rock that we got yesterday, Jim. The rounded one? Remember that was in the bag alone. Anyway, these - these vesicles were, gee, I'd say 4 millimeters to - some of them were a centimeter all the way through it. And they seemed to - the two rocks seemed to be in contact with each other. Unfortunately, we didn't have time to sample the second one, but we did get a fairly good sample of the - corner of the first one and the central part near one of the vesicles.

06 02 50 57 CC Roger, Dave. Beautiful description. And, Jim, you might - stop the camera now. It's probably run through the film load, and we'd like clicks and amps reading please.

06 02 51 15 LMP-EVA Okay, we're doing - Well, that can wait - okay, the camera is empty, Joe, and we got some coverage there.

06 02 51 38 LMP-EVA And we're going at - at about 10 clicks; amps reads about 10.

06 02 51 46 CC Okay, sounds good.

06 02 51 52 LMP-EVA That might be Earthlight up ahead, Dave.

06 02 51 54 CDR-EVA I think you're right. I guess we'd better go east of it, huh?

06 02 51 56 LMP-EVA Yes.

06 02 52 03 CDR-EVA (Grunt)

06 02 52 05 LMP-EVA We might stand up on our tracks.

06 02 52 07 CDR-EVA Oh, I don't know. I think I'll make it up.

06 02 52 27 CDR-EVA Cross-Sun is pretty good, you know?

06 02 52 29 LMP-EVA Yes. Visibility-wise. Yes, coming down this morning. I guess we - we looked over at Earthlight, didn't we?

06 02 52 44 CDR-EVA Yes.

06 02 52 45 LMP-EVA Commented on the southern rim of it.

06 02 52 54 CDR-EVA Yes, we're in good shape now. It's a straight shot. See the old LM sitting out there? Start making out detail on it. Range, 2.4. I think we're closer than that.

06 02 53 19 LMP-EVA See how it checks out when we get there.

06 02 53 21 CDR-EVA Yes.

06 02 53 27 CC Jim, I've got some words for your next task when you arrive at the LM if you're ready.

06 02 53 36 LMP-EVA Go ahead, Joe.

06 02 53 37 CC Roger. For both of you now: Dave, we want you to stop at the LM and you'll have to offload your collection bags and get configured for the next part of the EVA. Jim, we want you to run a malprocedure on your camera. If you can't get that MAG to work, put on MAG Kilo Kilo and then your first job will be the LM site pans and then photographs of the descent engine and photographs of the solar-wind-composition experiment, the window shade. Those three sets of photographs. Do you copy?

06 02 54 15 LMP-EVA Yes. I understand, Joe.

06 02 54 18 CC Okay. And, Dave and Jim. I'll talk you through the reconfiguration of the equipment when you're ready for it. I think we have a good handle on it down here.

06 02 54 33 CDR-EVA Joe, why don't you wait till we get to the Rover? Because it'll just slip right through us right now.

06 02 54 37 CC Roger, Dave - -

06 02 54 38 CDR-EVA So, wait until we get there.

06 02 54 39 CC - - that's exactly the plan. I'll be standing by, and when it's time, I just talk you through it.

06 02 54 45 CDR-EVA Okay. That's just fine.

06 02 54 53 LMP-EVA As - as far as Dave's bag, Joe, - I forget the number on it, but I'll just take out the - the core tubes that we have not used, and then it will be ready to go in SRC 2. Is that correct?

06 02 55 08 CC It sounds good.

06 02 55 19 LMP-EVA Do you agree with that, as far as Dave's bag?

06 02 55 25 CC That - that agrees, we think, Jim. We'll think it over once again here.

06 02 55 32 LMP-EVA Okay. And I figure - Think you can get through there, Dave?

06 02 55 39 CDR-EVA No. I'm going to go around to the right. Miss this boulder here. There's a directional set of ejecta in it.

06 02 55 46 LMP-EVA It sure is.

06 02 55 47 CDR-EVA Look at that. It's right straight out one side. It - it would be a good place to take a radial sample. That thing came in from - let's see - we'll be going - -

06 02 55 56 LMP-EVA - - yes, we're going north - -

06 02 55 58 CDR-EVA Yes, we're going north and the ejecta pattern is spread out due west about 20 meters across, and it must go out a good 150 meters or so.

06 02 56 08 LMP-EVA To the east, right?

06 02 56 09 CDR-EVA Yes. And our bearing is 347 and our range 2.0 - at that point.

06 02 56 20 CC Roger.

06 02 56 27 CDR-EVA Ooops! (laughter) Some of those babies sneak up on you.

06 02 57 16 LMP-EVA This time we ought to get the covers up on the - the cabin, Dave.

06 02 57 20 CDR-EVA Get the what?

06 02 57 21 LMP-EVA The covers - you know, the Bull Durham sacks.

06 02 57 23 CDR-EVA Yes, I know it. ... - -

06 02 57 25 LMP-EVA Yes - you going to go around to the right?

06 02 57 27 CDR-EVA Yes, I guess we'd better. (laughter) ... - -

06 02 57 29 CC - - Hello, Rover; this is Houston.

06 02 57 33 CDR-EVA Go ahead, Houston. Rover, here.

06 02 57 36 CC Roger, Dave. Be advised that the ALSEP is picking up the rumble of the Rover rolling across the plains.

06 02 57 44 CDR-EVA Is that right? How about that.

06 02 57 47 CC And according to our data, you're heading right for the LM.

06 02 57 50 CDR-EVA Jim, I think - Aah, yes, you can give us a DF on the seismometer.

06 02 57 57 CC Roger. - -

06 02 57 58 LMP-EVA - - There are our tracks, Dave - -

06 02 57 59 CC - - Stand by for practice DF steer.



06 02 58 00 CDR-EVA Yes, but I still think we were straighter -  
06 02 58 01 LMP-EVA Yes.  
06 02 58 03 CDR-EVA Yes, man. Hey, I think this is Index, Jim.  
06 02 58 07 LMP-EVA The one on our left here?  
06 02 58 08 CDR-EVA Yes. In fact, I'm pretty sure it's Index. It's  
got the nice side crater in the north -  
06 02 58 19 LMP-EVA Yes, I thought Index had a larger crater though on  
the north side.  
06 02 58 22 CDR-EVA Well, I don't know how large large is anymore.  
06 02 58 24 LMP-EVA Yes.  
06 02 58 25 CDR-EVA (Chuckle) I give up on distances and sizes.  
06 02 58 27 LMP-EVA Yes, we're 01.7.  
06 02 58 30 CC It's probably Arbeit.  
06 02 58 31 CDR-EVA No. It couldn't be it then.  
06 02 58 32 LMP-EVA I don't think so.  
06 02 58 34 CDR-EVA Arbeit, yes, yes, that's right, that's right. We  
came by that before. Yes. I - we might as well  
just - head on over those tracks, because we know  
we're straight -  
06 02 58 52 LMP-EVA Notice that - that crater at 12:30 to us now.  
06 02 58 55 CDR-EVA Yes. The fresh one.  
06 02 58 56 LMP-EVA It's fresh and has a very light albedo.  
06 02 58 58 CDR-EVA That's November. Got to be November. Yes. That's  
clearly November Crater.  
06 02 59 07 LMP-EVA Yes, we're heading 360; the bearing's 340; and the  
range 1.5.  
06 02 59 14 CC We copy that.

06 02 59 15 CDR-EVA And we were pointing right at November at the time.  
So, Index is over there on the right.

06 02 59 30 LMP-EVA (Laughter) Making me seasick.

06 02 59 34 CDR-EVA (Laughter)

06 02 59 38 CC What - -

06 02 59 39 LMP-EVA What were we -

06 02 59 40 CC - - do you expect traveling on the mare.

06 02 59 41 CDR-EVA (Laughter) See that one right - -

06 02 59 44 LMP-EVA Yes.

06 02 59 46 CDR-EVA Aren't we just about -

06 02 59 47 LMP-EVA Yes.

06 02 59 48 CDR-EVA (Laughter) Pretty good machine, isn't it?

06 02 59 56 LMP-EVA It sure is. Couldn't ask for better. And we're  
going 12 clicks.

06 03 00 05 CC And it's a new outdoor record.

06 03 00 46 LMP-EVA Talk about dusty. Whew!

06 03 00 49 CDR-EVA (Laughter) Yes, bo. But, you know, it sure  
doesn't kick up as much as I thought it would.

06 03 00 56 LMP-EVA No. You know, even if you had rubber tires on  
here, I think you'd kick up the same amount of  
dust.

06 03 01 00 CDR-EVA Yes.

06 03 01 01 LMP-EVA In this kind of terrain.

06 03 01 02 CDR-EVA And you sure wouldn't climb that hill - like we  
did.

06 03 01 10 LMP-EVA Notice that white colored rock there that we just  
went o - -

06 03 01 12 CDR-EVA Yes.

06 03 01 13 LMP-EVA - - over.

06 03 01 14 CDR-EVA Uh huh.

06 03 01 25 LMP-EVA Okay. We're still going at 12 clicks - heading 340.

06 03 01 30 CC Roger. Copy, Jim. And I'm wondering if you caught sight of the small crater you saw outbound, which you described as having bedrock in the bottom?

06 03 01 43 LMP-EVA Haven't - don't think we've come that far yet.

06 03 01 46 CC Okay.

06 03 01 47 CDR-EVA I don't think so, either.

06 03 01 50 LMP-EVA Why? Are you contemplating a stop there?

06 03 01 53 CC Negative. Just curious.

06 03 01 55 CDR-EVA Yes, I see it dead a- -

06 03 01 57 LMP-EVA Where?

06 03 01 58 CC We - -

06 03 01 59 CDR-EVA There it is. See it - -

06 03 02 00 CC - - are interested - -

06 03 02 01 CDR-EVA - - on the horizon - -

06 03 02 02 CC - - in a NAV reading - an odometer reading, and we're going to measure how far away that is from the LM.

06 03 02 09 LMP-EVA Okay.

06 03 02 14 CC You can use that Rover for everything.

06 03 02 20 CDR-EVA Yes, man. Sure can.

06 03 02 24 LMP-EVA Looks like November has a lot of blocks, too, but I can't see any ... I thought the - the

crater that looked like i had bedrock was off to the east of our tracks.

- 06 03 02 34 CDR-EVA It is. Over here to our 11 o'clock. I mean, no - no, I'm sorry, you're right. I was thinking of a different one, Jim. November has a raised rim which is, I think, unique around here.
- 06 03 02 49 LMP-EVA Kind of a - a large rock to the north of November.
- 06 03 02 54 CDR-EVA Yes.
- 06 03 02 55 LMP-EVA That's - it looks like it's half buried.
- 06 03 03 12 LMP-EVA Now, this fresh crater that we're coming up ahead. I - I know we've - we talked about it but I don't know whether - it had - it looked - whether there was any bedrock.
- 06 03 03 20 CDR-EVA Well, we'll see when we get there.
- 06 03 03 22 LMP-EVA Yes.
- 06 03 03 51 LMP-EVA Having a bit to eat.
- 06 03 03 52 CDR-EVA Good.
- 06 03 04 13 CDR-EVA Yes, I think this is the one we culled. Isn't it, Jim?
- 06 03 04 16 LMP-EVA Looks like an excavated bedrock.
- 06 03 04 18 CDR-EVA There are frags on the side. It's got a light albedo which are relatively fresh. I think this is the one, isn't it?
- 06 03 04 27 LMP-EVA Well, we'll give it to them anyway. 352 for .7.
- 06 03 04 31 CC Roger. Copy. Thank you.
- 06 03 04 33 LMP-EVA Let's enter it.
- 06 03 04 36 CDR-EVA Okay.
- 06 03 04 41 CC Dave and Jim, a comment about your equipment off load. The off loading should go exactly as if it were at the end of EVA-1 with regards to transferring core tubes, and so forth. Only the

collection bag numbers will be different. And we'll try to talk you through that.

06 03 05 04 LMP-EVA Yes, you'd better. - I just didn't see that crater that I - That wasn't the one, Dave.

06 03 05 18 CDR-EVA Don't think so?

06 03 05 19 LMP-EVA No, because it was one - it was to the east of us and I looked out and saw a layer of bedrock about a quarter of the way up on the wall.

06 03 05 37 CC Okay, Jim. Give us another odometer reading.

06 03 05 42 LMP-EVA No, I - I haven't seen it.

06 03 05 43 CC Okay. Whenever you pick it up.

06 03 05 44 LMP-EVA I haven't been able to see it on the way back.

06 03 05 48 CC Okay, no problems.

06 03 05 49 LMP-EVA We're almost back to the LM. The freshest one was the one that Dave just gave you - gave you the coordinates on.

06 03 06 02 CC Roger.

06 03 06 06 LMP-EVA Unless this might have been the one.

06 03 06 09 CDR-EVA Where?

06 03 06 10 LMP-EVA Right here. ...

06 03 06 18 CDR-EVA No.

06 03 06 24 LMP-EVA That wasn't the one, that's too large.

06 03 06 38 CDR-EVA The antenna drifted.

06 03 06 44 LMP-EVA Yes. I wonder if that's the best position for thermal.

06 03 06 52 LMP-EVA Oh, that antenna, I'm looking at the LM antenna.

06 03 06 55 CDR-EVA Oh, yes, the radar antenna's pointing straight up.

06 03 07 01 LMP-EVA If it is, that's the light side.

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06 03 07 05 CDR-EVA s. (Laughter) Tracks upon tracks, Jim.

06 03 07 10 LMP-EVA Yes, it looks like a thoroughfare. It looks like a freeway.

06 03 07 12 CDR-EVA Yes, okay. We'll take this fork here. (laughter)

06 03 07 22 CC And, Dave, as you know, the only thing we have to worry about, especially with regard to kicking dirt, the solar wind composition experiment, and the LRT which is pretty far away.

06 03 07 36 CDR-EVA Okay, we'll be careful.

06 03 07 42 CC And we'll mark when you stop.

06 03 07 46 CDR-EVA Roger. We're almost there. Home sweet home.

06 03 08 04 CDR-EVA Okay, Jim, I'm going to drop you off right here.

06 03 08 08 LMP-EVA Okay.

06 03 08 09 CDR-EVA Okay, Joe. Run through what you want to do now.

06 03 08 18 CC Okay, the first thing I guess - -

06 03 08 19 CDR-EVA I might get a MAG.

06 03 08 20 CC - - is to off load the gear as if you were out at the ALSEP sight, with regard to - to transferring cores, et cetera. And we marked - -

06 03 08 32 LMP-EVA Oh ...

06 03 08 33 CC - - your stop.

06 03 08 37 CDR-EVA Yes, I can get off, too.

06 03 08 42 LMP-EVA Okay.

06 03 08 51 CC And, Jim, standing by for your LRV readouts, if you're still there.

06 03 08 57 LMP-EVA Yes, I am Joe. I'm reading 004, 018, 12.5, 002, 91, 98, 92, 98, and motor temps are low.

06 03 09 22 CC Roger, thank you.

06 03 09 49 CC Jim, are you climbing off the Rover now?

06 03 09 51 CDR-EVA Okay.

06 03 09 53 LMP-EVA Yes, we're climbing off.

06 03 09 57 CDR-EVA Let me ask you a question now. Joe, what did you say? You want us to configure now like we would at the ALSEP sight?

06 03 10 07 CC Dave, basically, you just want to unload the collection bags that you're carrying. We want to wind up with collection bag number 2 on the hand tool carrier and number 3 under Jim's seat. In addition to that - -

06 03 10 23 CDR-EVA Okay.

06 03 10 24 CC - - we want number 5 on the hand tool carrier.

06 03 10 37 CDR-EVA 2 and 5 on the hand tool carrier. Okay.

06 03 10 40 CC Roger. And 2 is under Jim's seat right now. We want to trade that out for number 3 going under the seat.

06 03 10 50 CDR-EVA Okay.

06 03 10 51 LMP-EVA I'm wondering if we should take our tools off. We might as well take our tools off, right, Dave?

06 03 11 03 CC Jim, Roger - -

06 03 11 04 CDR-EVA Yes, I think probably so.

06 03 11 05 CC - - take your tools off - -

06 03 11 06 CDR-EVA I think so. Don't you, Joe?

06 03 11 07 CC - - and we're going to ask you to deploy the flag a little later, and you probably will need the hammer for that.

06 03 11 16 LMP-EVA No, I won't need the hammer.

06 03 11 17 CC Okay.

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06 03 11 19 LMP-EVA Not here. I can't get that MAG to operate, Joe.  
I manually advanced it. It just won't kick over.

06 03 11 35 CC Okay, we copy that.

06 03 11 36 LMP-EVA I think I'm going to be forced to -

06 03 11 37 CC Jim. Put on MAG Kilo Kilo on that camera, please.

06 03 11 43 LMP-EVA I was wondering, is Dave going to need his camera  
out there?

06 03 11 46 CDR-EVA No, why don't you take mine. Mine happens to have  
Kilo on it.

06 03 11 48 LMP-EVA Yes.

06 03 11 50 CDR-EVA Here ...

06 03 11 51 CC Boy, that's an outstanding idea.

06 03 11 53 CDR-EVA I don't know where that goes, but I've got two on  
it.

06 03 11 58 LMP-EVA Okay, bag 7. See, this is EVA-3 bag here.

06 03 12 04 CC Roger; bag - -

06 03 12 05 LMP-EVA Yes, so I'll just put it here.

06 03 12 06 CC - - number 2 should be under that seat as well.

06 03 12 12 LMP-EVA Joe, what - we know - let's see you want 2 and 5  
on the hand tool carrier, and the rest under the  
seat, is that correct?

06 03 12 19 CC That's correct.

06 03 12 22 CDR-EVA Okay, stand by.

06 03 12 25 CC And, Dave, we do want you to unload the tools.  
Put them back on handtool carrier. We'll need  
them later at the ALSEP sight, perhaps.

06 03 12 39 CDR-EVA Roger, Joe.

06 03 12 40 LMP-EVA Bend over a little, Dave.



- 06 03 12 41 CDR-EVA Okay. I'd like to take this little cargo here, and take it right over to the MESA.
- 06 03 12 47 LMP-EVA What bag number is it?
- 06 03 12 48 CDR-EVA Well, that's the bag that goes in bag 5. And bag 5 goes in the SRC. Jim, just let me take out the - the unused core tubes. Joe, speak up now if there is anything else you want to put in bag 5. I'm going to take it over to the MESA. Yes, there's - there's no sense in putting bag 5 on the hand-tool carrier, Joe, because it's just about full. Why don't we put it on the MESA or in the SRC, or something.
- 06 03 13 28 LMP-EVA Dave, when you take your camera off, just leave it on my seat.
- 06 03 13 31 CC Dave, the only problem is, if we're able to get the deep samples using the drill stems, we'd like them in the SRC. I guess we'll leave it up to you, your choice. We - maybe better just to take bag 5 over there right now and forego that little nicety.
- 06 03 13 49 LMP-EVA Well, Joe, you didn't -
- 06 03 13 51 CDR-EVA Just a minute, Jim. Just a minute. Now, Joe, you didn't say anything about getting deep cores. You - that's why - here, let's take 3 and - and put it over there. Keep it there. Let me take 2 back, because now that I know that they want to try and get the deep cores, we do need bag 2.
- 06 03 14 08 LMP-EVA Yes, that's the first time anybody said anything about that. That's bag 5, Dave.
- 06 03 14 16 CDR-EVA I mean 5 ...
- 06 03 14 17 LMP-EVA Well, Dave, why not leave 5 there.
- 06 03 14 19 CDR-EVA Okay.
- 06 03 14 20 LMP-EVA If you get the - the cores, bring them back, and we'll put it in there. I just won't load it in the SRC.
- 06 03 14 25 CDR-EVA We'll hold the SRC open.

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06 03 14 26 LMP-EVA Yes, that's right.

06 03 14 27 CDR-EVA Yes. Okay.

06 03 14 28 LMP-EVA I'll hold it open.

06 03 14 29 CDR-EVA Okay.

06 03 14 30 CC Sounds good, Jimmy.

06 03 14 36 CDR-EVA Hey, Jim, I'm going to leave you my camera - -

06 03 14 38 LMP-EVA Yes.

06 03 14 39 CDR-EVA - - right here, on the MESA, huh?

06 03 14 41 LMP-EVA No, just hand it to me now. I'll take it right here.

06 03 14 43 CDR-EVA Okay.

06 03 14 44 LMP-EVA I'll put it on.

06 03 14 45 CDR-EVA Here you go.

06 03 14 46 LMP-EVA Let me read it.

06 03 14 47 CDR-EVA Yes, let me read the numbers on it first. Of course, it's not on all the way, but it's reading 89.

06 03 15 00 LMP-EVA Get that, Joe? My camera, 89?

06 03 15 02 CC Got it, Dave, thank you.

06 03 15 03 LMP-EVA Dave, you're hung up on that strap.

06 03 15 09 CDR-EVA Okay, thanks, Jim. Okay. Now.

06 03 15 21 LMP-EVA Listen, why don't you take my tools off.

06 03 15 23 CDR-EVA Yes. That's a good idea. Get cleaned up here.

06 03 15 34 LMP-EVA I think we only have two bags to go - go up this time.

06 03 15 39 CDR-EVA Yes, here's your hand.

06 03 15 52 CDR-EVA Okay. Here's the rammer.

06 03 15 54 LMP-EVA Okay.

06 03 16 00 CDR-EVA Core tube caps.

06 03 16 05 LMP-EVA Okay.

06 03 16 08 CDR-EVA Tidy up your Velcro.

06 03 16 13 LMP-EVA Let me check yours again, Dave.

06 03 16 15 CDR-EVA Okay.

06 03 16 16 LMP-EVA I don't recall that I tidied yours. Okay, when you get in, your right side is loose. So be careful.

06 03 16 21 CDR-EVA Okay.

06 03 16 28 LMP-EVA Okay. You're tidy.

06 03 16 30 CDR-EVA Okay, right side okay?

06 03 16 33 LMP-EVA Yes.

06 03 16 34 CDR-EVA Okay. Put these core tube caps under the seat. Got more core tube caps now than we know what to do with.

06 03 16 43 LMP-EVA Listen, those rocks that are under the seat. I'll put those in bags - well, that bag that's under there before you drive off.

06 03 16 51 CDR-EVA No, there isn't any bag under there now. I got it right here. It's 7.

06 03 16 54 LMP-EVA No, here's a bag right here. Right, or is that sad- - -

06 03 16 56 CDR-EVA No.

06 03 16 57 LMP-EVA - - saddle bag? That's your saddle bag.

06 03 16 58 CDR-EVA Okay, here's a bag here, 6.

06 03 16 59 LMP-EVA You're going to use that one out there, right?

06 03 17 01 CDR-EVA I don't know. Where do you want bag 7, Joe?

06 03 17 04 CC Bag 7 stays there, Dave. Leave it there.

06 03 17 09 CDR-EVA Hey, where's there? Under the seat?

06 03 17 11 CC Is it under the seat? I think it's under the seat, and I think it's the bag for the next EVA. Keep it there.

06 03 17 18 CDR-EVA Okay, it is. I think it is, yes.

06 03 17 21 LMP-EVA Yes, that's - that's one for the next EVA.

06 03 17 22 CDR-EVA Okay. It's under the seat.

06 03 17 24 LMP-EVA I was going to get those rocks and put it in this bag. Bag 6.

06 03 17 28 CDR-EVA Okay.

06 03 17 33 CDR-EVA Can you get the bag?

06 03 17 34 LMP-EVA Yes.

06 03 17 38 CDR-EVA My arms are a little longer, maybe I can reach it, Jim.

06 03 17 40 LMP-EVA That a boy.

06 03 17 43 CDR-EVA Okay.

06 03 17 45 LMP-EVA I don't want to leave any rocks there.

06 03 17 48 CDR-EVA You're right. Okay. Is that the only one, or do we have another one?

06 03 18 00 LMP-EVA It's the only one. Put A under your seat, huh?

06 03 18 04 CDR-EVA Oh, yes, thank you.

06 03 18 05 LMP-EVA I did.

06 03 18 06 CDR-EVA Great.

06 03 18 20 LMP-EVA I'll just hold up on the SRC closing until -

06 03 18 23 CDR-EVA Yes.

06 03 18 25 LMP-EVA Decide what you're going to do out there.

03 06 18 27 CC Sounds good, Jim.

06 03 18 28 LMP-EVA There's a couple of samples there we probably ought to put in here.

06 03 18 30 CDR-EVA Yes.

06 03 18 34 CC Sounds good, and, Jim, while you're working there, once again - -

06 03 18 37 LMP-EVA Anything else in there?

06 03 18 38 CC - - we want you to get your LM site pans - -

06 03 18 41 LMP-EVA Okay.

06 03 18 42 CC - - pictures of the descent engine and solar wind composition pictures, and then I'll be back at you with the next job. And, Dave, standing by for when you're ready. And, I'll talk about your task coming up here.

06 03 18 56 CDR-EVA Okay, Joe. Are you through with the handtool carrier, Jim?

06 03 18 59 LMP-EVA Yes, I am, Dave.

06 03 19 00 CDR-EVA Okay. I'm going to tidy up the Rover.

06 03 19 17 LMP-EVA Okay, Joe, back at the - on the MESA, I have bags 5, 6, - 3, 5, and 6.

06 03 19 25 CC Roger; copy, Jim. We'll get them later.

06 03 19 33 CDR-EVA And, Joe, I'm on the Rover and ready to go.

06 03 19 36 CC Okay, Dave. We want you to park east of the ALSEP heading toward the west, and as far east as is comfortable for you. Once again with the dust problem in mind - And we want you to clean the TV camera and LCRU before you leave the Rover.

06 03 19 57 CDR-EVA Okay. Park east heading west. And, I'll just get it fairly close to the central station and avoid the dust. How does that sound?

06 03 20 10 CC Roger. Just don't drive too far west. Keep it east, if you could, please.

06 03 20 19 CDR-EVA Okay. Incidentally, at the Rover, our bearing was 018 and range .2. That's pretty good for a trip like that.

06 03 20 28 CC Ain't it, though.

06 03 20 41 CC And, Dave, as you climb off there and get the TV set, and are ready, I'll talk to you about the next drilling job.

06 03 20 50 CDR-EVA All righty.

06 03 21 15 CDR-EVA Okay, I'm going to park right here. And if you get bored, there's a big chunk of dark gray breccia with white clast right in front of the left wheel. Have fun looking at that, maybe.

06 03 21 29 CC Okay, Dave. - -

06 03 21 30 CDR-EVA Brake's on, power's off.

06 03 21 31 CC - - we know you're not too close to the - heat flow experiment holes now. We do want you to be particularly aware of the side which has had its dust cover pulled off of it, too. So it'll be particularly sensitive to dust. And, when you are ready, once again, I've got words on how this drill should work.

06 03 21 51 CDR-EVA Okay, first you want me to dust off your TV. Is that right?

06 03 21 55 CC Yes, sir, please. And the LCRU.

06 03 22 00 CDR-EVA All right, you broke up, Joe, I -

06 03 22 03 CC Roger, Dave - -

06 03 22 04 CDR-EVA Do you want your TV lens dusted off?

06 03 22 05 CC - - dust off the TV and the LCRU, please.

06 03 22 11 CDR-EVA Roger. TV, I understand that, but do you want the TV lens, because we have a mirror we can dust off and we also have a lens we can dust off.

06 03 22 18 CC Yes, sir, both the camera and the lens, please.

06 03 22 24 CDR-EVA All righty. It takes a couple different brushes, I hate to put this big brush on that lens.

06 03 22 32 CC You read it correctly.

06 03 23 24 CDR-EVA There, your eye is all cleaned off.

06 03 23 31 CC Okay, Dave, we're standing by for TV turn on.

06 03 23 38 CDR-EVA Okay. Put the brush back in its proper place. And, I'll go TV remote. And I'll try and point the antenna. And a very good position. East was up all day today.

06 03 24 41 CDR-EVA Are you getting any picture, Joe?

06 03 24 44 CC Say again, Dave.

06 03 24 48 CDR-EVA Are you getting any picture, yet?

06 03 24 53 CC Beautiful picture.

06 03 24 58 CDR-EVA You clipped on the front. I didn't hear what you said.

06 03 25 00 CC Beautiful picture, Dave. Gorgeous picture. Thank you.

06 03 25 05 CDR-EVA Oh, fine. Oh, good. That AGC is a great idea. Okay, Joe, I'm ready to go to work.

06 03 25 17 CC Okay, Dave, we want you to try to get the heat flow drill in at least another section. We - we think that perhaps there might be an extra section added onto the unit you started yesterday.

06 03 25 35 CDR-EVA All righty.

06 03 25 37 CC If you'll tell me what's there, I'll continue. If one or maybe two sections, however many you think you can put on and still drill. Once you get the sections on, we want you to use the drill again. And first, recycle the check several times, as - as you used to do in the simulation, and then start the drill, and put only a few

pounds of force on top of the drill. And, while it's running, if you notice from the torques that it starts to seize up, we want you to try to pull it back out of the hole a bit to free it, as you drill. Over.

06 03 26 29 CDR-EVA To - to free the - the probe, huh?

06 03 26 25 CC Roger, just try to free the torque that the drill is picking up from the soil. It seems to be binding around it. Soil, and/or rock, that's binding around it. And we think that the secret to this - -

06 03 26 38 CDR-EVA Okay.

06 03 26 39 CC - - may be not to put quite so much pressure on the top of the drill.

06 03 26 45 CDR-EVA I see, I understand that.

06 03 26 47 CC And - -

06 03 26 48 CDR-EVA We'll give it a go.

06 03 26 49 CC - - you might want to check it south before you get started.

06 03 26 54 CDR-EVA Yes, sir.

06 03 27 08 CC And, Jim, how are you doing?

06 03 27 12 LMP-EVA Just about finished, Joe.

06 03 27 17 CC Okay, Jimmy. Sounds good. We want you to deploy the flag after you finish the photography. And, we are wondering at the moment where the two empty core tubes are. If they are still in bag 5, we'll want you to carry them in your hand out toward the ALSEP station later on.

06 03 27 38 LMP-EVA They are under my seat, Joe.

06 03 27 42 CC Okay, and unless I miss my guess, your seat is out near the ALSEP now. So that is beautiful.

06 03 27 50 LMP-EVA Yes.



06 03 28 00 LMP-EVA Why do you want them out near the ALSEP, Joe?

06 03 28 04 CC Jim, I don't - -

06 03 28 06 LMP-EVA You want them in the Rover, don't you?

06 03 28 07 CC - - know how to break this news to you, but we are going to do Station 8 out at the ALSEP site, or nearby. Saving it especially for you.

06 03 28 13 LMP-EVA Oh, ha, ha. Oh, thank you, Joe.

06 03 28 18 CC I knew you'd like it.

06 03 28 19 CDR-EVA Hey, Joe, before we got out this morning, you figure - we figured you guys - before we got out this morning, we figured you guys had a conspiracy against us, having Jim doing Station 8 and me drilling at the same time.

06 03 28 31 CC It may work out that way. And, Jim, you just could get the flag out; don't necessarily deploy it. We'll get that later when the TV's back at Falcon. And keep me posted on your progress - -

06 03 28 43 LMP-EVA Okay. Well, listen - -

06 03 28 44 CC - - gear when you're - you finish pulling the flag out of its holder, but not yet deployed, we'll ask you to walk on out to the ALSEP site.

06 02 29 02 CDR-EVA Okay, okay, Joe, I've got the drill on one extra section now. Run through it again, please, just so I don't ...

06 03 29 09 CC Okay, Dave. We are interested in your starting to drill. We've got a lot of power left in the drill, just run it around several times, and don't bear down on it too much, let's - how free, or how freely, it moves in the surficial layer there, first of all.

06 03 29 29 CDR-EVA Okay. Joe, I - I put very little force on it, and it binds up.

06 03 29 41 CC Roger. Any luck by trying to pull it back a bit out of the hole to free it?

06 03 29 48 CDR-EVA No, it pulls me right on down with it.

06 03 29 55 CC Okay, Dave, stand by a second.

06 03 30 00 CDR-EVA Okay.

06 03 30 04 CC Dave, is it possible at all to clear out the flutes on it by lifting up as you turn the power on?

06 03 30 13 CDR-EVA I - I'll try. But it seems to want to pull me with it. (Grunt) There, I got it up.

06 03 30 24 LMP-EVA Joe, I have the flag unpacked here, but not deployed.

06 03 30 33 CC That's - -

06 03 30 34 LMP-EVA I may have -

06 03 30 35 CC - - exactly right, Jim. We want you now to proceed on out toward Dave, and be back with you in a minute.

06 03 30 42 LMP-EVA You want me to carry the staff and the flag out there, huh?

06 03 30 46 CC Negative, negative, leave it near the LM.

06 03 30 48 LMP-EVA We'll pick it up a little later when we come back to the Falcon. Just leave it there in a convenient place.

06 03 30 53 LMP-EVA Oh, okay. (Chuckle) I thought I was going to do the Station 8 with the flag waving in the background.

06 03 31 04 CDR-EVA Okay, Joe. Now I've got the drill partially out. Do you want to try - want me to try and take the - the drill off the probe?

06 03 31 19 CC Dave, we wonder if you can just hold it there. Begin it running, and ease it back down into the hole, but without a whole lot of force, down into the hole.

06 03 31 30 CDR-EVA Okay.

06 03 31 35 CC And, just let it run for a while. There's a lot of power in that battery.

06 03 31 38 CDR-EVA I'm not putting any - I'm not putting any force on it. I'm letting it do it - its own forcing.

06 03 31 47 CC Okay, let her run. We've got a lot of power to burn.

06 03 31 54 CDR-EVA (Chuckle) It's a great massage.

06 03 31 56 LMP-EVA Hey, I want to come out and get some of that.

06 03 32 15 CDR-EVA It starts to bind up every once in a while.

06 03 32 21 CC Okay, Jim. When you get out to the ALSEP sight, once again being very careful with your dust, and particularly the exposed side experiment, we'd like for you to do a photo pan out there. And - stand by. Let's see, stand by.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 01 59 20 CMP As I'm looking at - right now, sorry I interrupted myself there. But looking right now at Bessel, and Bessel has some very distinct layering. In - in fact, Bessel looks like some craters, some volcanic-type craters we've seen on Earth, where, to get alternate lava flows and sedimentary kind of rocks, then the lava flows stick out in the edge of the wall. In Bessel, about a third of the way down, there is a very distinct ledge that can - that can be seen all the way around Bessel. The rest of the - of the crater wall appears fairly smooth, but about a third of the way down is a - is a ledge.

06 02 00 15 CC Roger, Al, your -

06 02 00 16 CMP And that ledge looks like it's caused by a - a harder material.

06 02 00 21 CC Roger. You're coming through loud and clear.

06 02 00 43 CC Do any of the other craters around that area, around Bessel, show the same sort of interior ledge like that?

06 02 01 06 CMP Well, unfortunately, Bessel is the only one of that magnitude around - around that particular area. And I don't see any other craters that appear to go down below - whose depth appears to go down below the depth of the rim in Bessel.

06 02 01 15 CC Right. I - the only two I see possible here are Bessel E and Sulpic - Sulpicius Gallus, and I guess they might not go that deep even so.

06 02 01 51 CC Hey, Al, have you ever looked at Autolycus and Aristillus with the thought in mind of determining which overlaps the other; which is the younger?

06 02 02 08 CMP No, I haven't yet, Karl. Maybe this is a good time to do it.

06 02 13 01 CC Endeavour, we have the MAPPING CAMERA coming OFF in just 1 minute.

06 02 13 07 CMP Roger, Houston.

06 02 18 12 CC Al, I have a couple of comments on the water dump coming up in - 10 or 15 minutes.

06 02 18 23 CMP Okay. Go ahead.

06 02 18 24 CC We'd like to dump down to 10 percent. Stop at 10 percent. And they say that the dump will probably take about 8 minutes, so about 6 minutes after you start dumping, keep an eye on it and stop at 10 percent. And also, they'd like for you again to - to make an observation of the particle cloud at sunset and sunrise terminator, if you would, please.

06 02 18 51 CMP Okay. Will do. And I understand you just wanted me to dump down to 10 percent.

06 02 18 56 CC That's correct. And over at 146:33, where you have a GAMMA RAY GAI - GAINSTEP SHIELD on center, we'd like for you to take - to make one step increase in - in gain there. That's up momentarily, once.

06 02 19 20 CMP And that's at what time?

06 02 19 23 CC That's over at 146:33, where you - they want you to put SHIELD on center. After you have it on center, take it up once momentarily for one step increase in gain, and then leave it on center.

06 02 19 46 CMP Okay. Understand GAINSTEP SHIELD on and - go one step up, and then leave it SHIELD, up.

06 02 19 54 CC That's affirmative.

06 02 21 51 CC Okay, Endeavour. We're coming up to GAMMA RAY GAINSTEP SHIELD OFF in - in about 5 seconds.

06 02 29 56 CC Al, a bulletin from Hadley Rille says that -

06 02 30 00 CMP ... from what?

06 02 30 04 CC Go ahead.

06 02 30 29 CC Go ahead, Al. We're listening.

06 02 30 36 CMP Karl, I didn't call. I'm waiting on you.

06 02 30 39 CC Oh, Roger. A bulletin from Hadley Rille - the crew finished their exploration of the Apennine Front. They got over to Spur Crater and actually into Spur Crater, found there a large block of rock, which probably is a really true sample of the Apennine Front and got some good samples there. And, now they're driving back down by the South Complex and they're digging some samples around Dune Crater.

06 02 31 16 CMP Very good. Sounds like they're doing quite well down there.

06 02 31 20 CC Yes, indeed.

06 02 31 25 CMP I think we're going to give lots of people lots of things to do for a while.

06 02 31 30 CC You said it.

06 02 32 44 CC Okay, Al. In about 20 seconds, we have the gamma ray operation coming up.

06 02 32 53 CMP Roger, Karl.

06 02 33 07 CMP Okay. You've got the GAINSTEP, one step, then it's back at SHIELD up.

06 02 33 14 CC Very good.

06 02 39 56 CC Al, this is Houston. All of your systems are looking in great shape as you go around the corner.

06 02 40 05 CMP Okay, Karl. And we're looking okay up here. Getting ready to do the gegenschein calibration.

06 02 40 13 CC Very good.

06 03 03 -- BEGIN LUNAR REV 36

06 03 29 54 CC Endeavour, this is Houston. How do you read?

06 03 30 00 CMP Hello, Houston; Endeavour. Loud and clear.

06 03 30 03 CC Good to hear your cheery voice. How is everything up there?

06 03 30 09 CMP Just fine. It took us a little longer to lock up that time.

06 03 30 17 CC Yes, a couple of minutes, but it still wasn't bad.

06 03 30 39 CMP And, Karl, on the waste water dump, I overshot 10 percent, just a little bit, but I'm reading - I'm reading about 10 percent now.

06 03 30 48 CC How much was that?

06 03 30 54 CMP I'm reading 10 percent.

06 03 30 55 CC Roger. Reading 10 percent now. I copy that.

06 03 31 26 CC Al, we'd like to have I - HIGH GAIN, NARROW and AUTO.

06 03 31 50 CMP Okay, Houston. You got it.

06 03 31 52 CC Very good. Thank you.

06 03 32 05 CMP

And, one other thing, Karl. The attitude-change from the gegenschein-calibration attitude to plus X forward SIM attitude was pretty squarely in the middle of gimbal lock. And I had to do some maneuvering to get around it, using a little extra fuel. You might run that back through with FAO.

06 03 32 30 CC

Roger. We copy.

06 03 32 52 CC

Al, still a little trouble on the HIGH GAIN. Let's go WIDE BEAM for a second or two and back to NARROW.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 03 33 26 CC And, Dave, take a breather there.

06 03 33 30 CDR-EVA Yes, it (laughter) it's tightening up again, Joe, and I'm not putting any force on it all. It pulls itself down in, and then it starts to bind up.

06 03 33 45 CC Roger. Copy.

06 03 33 49 LMP-EVA Dave - Dave, I hope we get a chance to pick that rock up before we go back.

06 03 33 52 CDR-EVA Which one?

06 03 33 54 LMP-EVA Over here. That black glassy one.

06 03 33 56 CDR-EVA Oh, is it a nice one?

06 03 33 58 LMP-EVA Yes. - -

06 03 33 59 CDR-EVA It looks - -

06 03 34 00 LMP-EVA - - get a look; sitting right on the surface.

06 03 34 02 CDR-EVA I ... so.

06 03 34 03 LMP-EVA Yes.

06 03 34 06 CC Dave, as you can tell, that drill is going down. We're going to ask for about 2 more minutes and call it quits probably. But just take a breather there.

06 03 34 13 CDR-EVA Oh, I - I - no I just don't want to break it.

06 03 34 31 LMP-EVA Joe, I'm at the ALSEP sight, and I'm tippy-toeing over to the LSM.

06 03 34 39 CC Roger.

06 03 35 26 CDR-EVA Gee, Joe, I think I got through something. It's easier.

06 03 35 34 CC Roger, Dave. And we're learning things.

06 03 35 39 CDR-EVA Yes, I guess we are. Let me take a little break here. It just started easing up there and went



down a little easier. Like (laughter) we might have got through a layer, huh?

06 03 35 48 CC Roger. I hope we're not going to let the air out.

06 03 35 56 CDR-EVA Yes, and me.

06 03 35 59 LMP-EVA Dave, I'm wondering, if we're really serious about Station 8, whether maybe we could get started on that, and I could be doing - -

06 03 36 05 CDR-EVA Yes.

06 03 36 06 LMP-EVA - - my task while you're working there.

06 03 36 07 CDR-EVA ... Station 8.

06 03 36 08 CC That sounds good to us, Jim and Dave. I think maybe you could put another section on that.

06 03 36 15 CDR-EVA Yes, sir, I could if can - let's - let's see if I can get the drill out.

06 03 36 34 CDR-EVA It's bound up again, Joe.

06 03 36 35 CC Roger.

06 03 36 36 CDR-EVA ... steel <sup>vice.</sup> ~~vice.~~

06 03 36 43 LMP-EVA Joe, you had a question about the bubble on the central station?

06 03 36 49 CC Jim, we're happy with that; no problem.

06 03 36 54 LMP-EVA Okay; because it's setting - The outer edge of the bubble is at the outer edge of the black mark.

06 03 37 02 CC Okay. Copy. Thank you.

06 03 37 03 LMP-EVA Black circular mark.

06 03 37 05 CC Thank you. Jim, you've got your camera there - -

06 03 37 07 LMP-EVA Hey, Dave, you all set?

06 03 37 08 CC - - you might go out and start the photographic flow site, if that looks like a reasonable thing.

06 03 37 18 LMP-EVA Okay. Dave didn't get those pictures yesterday, huh?

06 03 37 21 CC Negative, we didn't - -

06 03 37 22 CDR-EVA I didn't get the heat flow, Jim.

06 03 37 23 CC - - get those yet.

06 03 37 24 LMP-EVA Okay.

06 03 37 25 CC And - -

06 03 37 26 LMP-EVA Okay.

06 03 37 27 CC - - have you taken a photo pan from the ALSEP site?

06 03 37 30 LMP-EVA I'm on my way. No. ...

06 03 37 33 CC Okay. We'd like that please.

06 03 37 34 LMP-EVA I'll probably be running out of film.

06 03 37 37 CC Okay, there's still more MAGs - -

06 03 37 39 LMP-EVA I'll have to go back and change MAGs.

06 03 37 40 CC - - under the seat there, if you want to change them out.

06 03 37 42 LMP-EVA Yes. Okay.

06 03 38 34 LMP-EVA Okay, the pan at the ALSEP site's complete. I'll go out and photo the heat flow.

06 03 38 44 CC Roger.

06 03 40 32 CC Okay, Dave, take heart. You've got just 1 minute of drilling left.

06 03 40 39 CDR-EVA (Laughter) Okay, Joe. Just the - the only things that give out are the hands. I'll tell you, you know, all this working with the gloves on, it - after a while -

06 03 41 08 LMP-EVA Okay, Joe, this MAG ran out. I'm going to go back and change.

06 03 41 11 CC Okay, Jim.

06 03 41 21 CC And, Dave, we're satisfied with this drill hole. Suggest you stop, pull the drill off, and implace the heat flow probe.

06 03 41 31 CDR-EVA Okay. We made a little money, didn't we?

06 03 41 35 CC Hand over fist.

06 03 42 16 LMP-EVA I don't think we have another color MAG out here, do we, Joe? We'll have to use black and white - -

06 03 42 23 CC That's affirm, - -

06 03 42 24 LMP-EVA - - ... the pictures.

06 03 42 30 CC - - Jim. That is to say, any MAG that's empty.

06 03 42 31 LMP-EVA Does Oboe look good?

06 03 42 32 CC - - MAG that's still full and not exposed, and you can look at the frame number.

06 03 42 38 LMP-EVA Oh, I thought you'd be able to give me a quick reading.

06 03 42 45 CC Sorry. Oboe Oboe.

06 03 42 50 LMP-EVA I already have it.

06 03 45 03 CDR-EVA Somehow, all this wire down close to the probes got wrapped with Teflon or something; makes it a lot bigger than we've been used to seeing.

06 03 45 53 CDR-EVA Joe, looks like, - h-m-m - we may have a problem. Let's see. Can always pull those out and put four more in.

06 03 46 16 CDR-EVA Joe, I don't think I got the probes all way down. I think that probably one of those cores may have - been bent or something. What do you think about that?

06 03 46 33 CC Stand by.

06 03 46 44 CC Dave, would it be possible to pull it up a little bit so you can see the top of the probe and then put the rammer jammer right on top of it?

06 03 46 53 CDR-EVA That's where I had it, Joe. Right on top. The probe went down a couple, two out of the four.

06 03 47 05 CC Dave, pull the probe out all the way, and see if the rammer jammer alone will go in, please.

06 03 47 13 CDR-EVA Okay.

06 03 47 38 CDR-EVA Sure does.

06 03 47 44 CC Roger, Dave.

06 03 47 50 CDR-EVA And the front of the probe looks okay.

06 03 47 53 CC Okay. Why don't we try it again?

06 03 47 59 CDR-EVA All righty.

06 03 48 14 CDR-EVA Of course the tip of the rammer jammer is smaller than the tip of the probe.

06 03 48 26 LMP-EVA Okay, Joe, the ALSEP pictures are complete.

06 03 48 29 CC Roger. Jim, we copy that. Stand by a minute.

06 03 48 44 CC And, Jim, - -

06 03 48 45 CDR-EVA That's it, Joe, it won't go further unless I try and force it.

06 03 48 46 CC - - we've decided it's about time you start on your Station 8 trench, if you would, please.

06 03 48 53 LMP-EVA Thanks a lot.

06 03 48 57 CDR-EVA Hey, Joe, it won't go in any further than that without really trying to force it. I could - I could try and push it with the rammer if you want, but I - I suspect the first thing (laughter) would be the rammer would collapse.

06 03 49 07 CC Stand by.

06 03 49 08 CDR-EVA ... could try.

06 03 49 19 CC Okay, Dave, our reading is - using your calibrated arm, put about 15 to 20 pounds of force on it, and we'll be satisfied with whatever we get.

06 03 49 32 CDR-EVA Okay.

06 03 49 42 CDR-EVA No way.

06 03 49 44 CC Okay. That's good.

06 03 49 49 CDR-EVA It's stuck, Joe, and I think where it's stuck is where the - third probe joins the second probe. And I - you know, you can never get those things apart, but we could stick - I got four other probes in here, if you want me to pull out the four I got and stick the other four in - in hopes that it gets down some distance. We could try that if you like.

06 03 50 10 CC Stand by. Dave, we'd like the rammer jammer reading and have it pulled out, then we'll take what we got. It's a good job.

06 03 50 24 CDR-EVA Okay. Sorry I couldn't get it all the way in, because that sure isn't very far. Bravo 9.

06 03 50 34 CC Roger.

06 03 50 48 CC And, Dave, could you give - -

06 03 50 49 CDR-EVA Not like that.

06 03 50 50 CC - - us an outside reading.

06 03 50 55 CDR-EVA An outside reading? What do you mean?

06 03 50 58 CC Never mind, we got it already off the TV, of just how high the pipe comes up above the surface. We'd like for you to make sure the dirt is solid against the outside of the pipe, and then ask you to police the area as best you can of foreign objects.

06 03 51 19 CDR-EVA Okay.

06 03 51 20 CC And as you - -

06 03 51 21 CDR-EVA The thing I'm going to do, Joe, is realine the ...  
- -

06 03 51 22 CC - - leave, we want you to make sure the cables are lying as flatly as possible on the surface.

06 03 51 31 CDR-EVA Okay. And I'll also make sure that - the boxes are lined.

06 03 51 38 CC Good idea.

06 03 52 00 CDR-EVA And I'll leave this here; maybe the next guy can fix it.

06 03 52 06 CC Roger.

06 03 52 23 CC And, Dave, you'll be interested to know that probe went in as far as it will go. That's as deep as the hole was.

06 03 52 32 CDR-EVA Really? You'd have fooled me.

06 03 52 36 CC Roger. And, Dave, and while you are there at the box, could you check to see if the Boyd bolt cup - the sleeves - have been taken away from the box.

06 03 52 49 CDR-EVA No they haven't, Joe. There were a couple of red washers sitting on the - the connectors there. The sleeves are gone, yes.

06 03 53 05 CC Okay, we copy. Thank you.

06 03 53 14 CC And, Jim, how are you doing?

06 03 53 19 LMP-EVA Oh, I picked up a pink rock and a black rock. And they're documented. I'm just resting up for Station 8.

06 03 53 31 CC Not a bad idea.

06 03 53 33 LMP-EVA There's possibility we're just - ...

06 03 53 38 CC Roger. You're lost without the gnomon.

06 03 53 44 LMP-EVA Yes.

06 03 54 12 CDR-EVA Okay, Joe, alined and the - number is just about down to the centerline on 2.

06 03 54 24 CC Okay, Dave, copy. And, Jim, what are you up to there?

06 03 54 30 LMP-EVA Oh, I'm just checking the central station.

06 03 54 34 CC Roger, the alinement's beautiful.

06 03 54 36 CDR-EVA And, Joe, if Jim took - Hey, don't - don't touch it.

06 03 54 41 CC Hey - the camera's working perfectly.

06 03 54 47 CDR-EVA Okay.

06 03 54 48 LMP-EVA I won't touch it, Joe; I swear!

06 03 54 51 CDR-EVA Hey, Joe, if Jim took a picture of the heat flow box, the one he took probably isn't representative of the proper alinement, which it now has.

06 03 55 01 LMP-EVA I'll come over and take another one.

06 03 55 03 CDR-EVA Okay. Come on over.

06 03 55 06 CC Jim, just make sure you are well clear of the antenna, with your PLSS there, old friend.

06 03 55 26 LMP-EVA I need an antenna like that on my PLSS.

06 03 55 41 LMP-EVA I picked up that gl... black glassy rock, Dave.

06 03 55 43 CDR-EVA Good.

06 03 55 44 LMP-EVA And I picked up another pink one that looked like it had a lot of the plagioclase glass in it.

06 03 55 49 CDR-EVA Good. Step on this; I'm trying to get it stretched out flat. There.

06 03 56 09 CDR-EVA Okay, it's dandy. It's got some dirt on it, but that's all right. Okay, Joe, what's next on the agenda?

06 03 56 20 LMP-EVA Station 8.

06 03 56 22 CC I copied your question, Dave, and stand by and take a breather. We're thinking about it here.

06 03 56 31 LMP-EVA Dave, if you'd just pick a site, I could sure start digging.

06 03 56 36 CC Dave, why don't you do that?

06 03 56 37 CDR-EVA Okay, Jim.

06 03 56 38 LMP-EVA I've been resting.

06 03 56 44 CDR-EVA Okay, just go after it here.

06 03 56 48 LMP-EVA I'll be over at the Rover, Dave.

06 03 56 49 CDR-EVA Be right there.

06 03 57 51 CC Dave, we've got some instructions when you are ready.

06 03 57 56 CDR-EVA Ready, go.

06 03 58 01 CC Roger, get Jim started on the ditching experiment, if you would please, and then I've got another good one to lay on you here. Don't quite know how to explain it. We'd like for you to try to get the deep core for us with the drill.

06 03 58 17 CDR-EVA (Laughter) Aw, Joe, you didn't even have to tell me, because I knew darn well that was coming with the stuff that we must be on top of here. Okay.

06 03 58 28 CC Roger. Look at it like this - -

06 03 58 29 CDR-EVA Shall we take ... at the top?

06 03 58 30 CC - - Jim is going to be digging at the same time.

06 03 58 35 CDR-EVA Roger.

06 03 58 38 LMP-EVA Well, the thing is, do we want to do the whole Station 8 activity - the comprehensive sample?

06 03 58 44 CDR-EVA Sure. I guess if they want to do Station 8, they want to do Station 8.

06 03 58 47 LMP-EVA Okay.

06 03 58 49 CDR-EVA (Laughter) I guess. Comprehensive sample first, I reckon. Okay, LRV is not parked in the right spot - they could get TV.

06 03 59 00 LMP-EVA Hey, let's just turn it around. Lift it up and turn it.

06 03 59 03 CDR-EVA No, they won't like that because the TV is all messed up then. Oh, boy. Listen. Let's just play it out here in front, right out over there and pretend like that is the side of the LRV, except the 16-millimeter won't be in the right spot. Oh, boy. Show biz.



06 03 59 21 LMP-EVA You co... - we could aim the 16 out this way -  
out to the west.

06 03 59 28 CDR-EVA Yes, let me - let me - hey - hey, Houston; what  
would you rather have - 16 millimeter movies of  
Station 8 or TV movies of Station 8?

06 03 59 43 CC Dave, we copy that question. Stand by.

06 03 59 49 CDR-EVA You know, by the time we stand by, and they get  
to a decision - -

06 03 59 52 CC Roger; and we'll take TV; that's plenty good  
enough.

06 03 59 55 CDR-EVA - - ... Jim, let's - Oh, okay.

06 03 59 59 CC And, Jim, you just get - -

06 04 00 00 CDR-EVA Fine.

06 04 00 01 CC - - started with the trench there - -

06 04 00 02 CDR-EVA We could turn the Rover around and ... - -

06 04 00 03 CC - - And, Dave, once you get him started, we can  
begin with the drill.

06 04 00 10 CDR-EVA Okay.

06 04 00 11 LMP-EVA Okay, I - I - I guess we want to really start the  
trench first, Dave.

06 04 00 14 CDR-EVA Yes, let me get the gnomon.

06 04 00 16 LMP-EVA Yes, and I'll get the comprehensive later, if we  
have a chance.

06 04 00 18 CDR-EVA Okay, Jim, and you - -

06 04 00 19 CC That's affirmative, Jim.

06 04 00 20 CDR-EVA - - you better - boy. I better have your camera,  
because - I have - let's go out here where it's  
fresh.

06 04 00 31 LMP-EVA Let me take the camera off.

06 04 00 34 CDR-EVA Bring it to me.

06 04 00 35 LMP-EVA Yes.

06 04 00 37 CDR-EVA Well, just leave it there. ... take it, and I'll come, too.

06 04 00 39 LMP-EVA You're coming by here anyway.

06 04 00 41 CDR-EVA Yes.

06 04 00 42 LMP-EVA Just get me started, - -

06 04 00 45 CDR-EVA Okay.

06 04 00 46 LMP-EVA - - you want me to dig down to that bedrock.

06 04 00 48 CDR-EVA Say again?

06 04 00 49 LMP-EVA You want me to dig down to bedrock.

06 04 00 50 CDR-EVA Oh, that's - yes, that's down. Yes. Bedrock. You remember how to - you know how the Rover would normally be - -

06 04 00 55 LMP-EVA Yes, we need your - We need the pictures.

06 04 00 58 CDR-EVA Yes, I'll get it.

06 04 01 13 CDR-EVA Okay. I got it.

06 04 01 17 CC Dave, a couple of comments here, and Jim as well. We're going to be departing this sight for the closeout in about 30 minutes. So you're looking real good on the time, and we'll just pick up whatever we can. No rush on any of it. Dave, you'll want to think a minute about where that treadle probably is.

06 04 01 38 CDR-EVA Yes, I think I know where it is, Joe. I've been thinking.

06 04 01 48 CDR-EVA Okay, Jim. Have at it, old buddy.

06 04 01 52 LMP-EVA Okay, Dave. Thanks for getting me off to such a good start here.

06 04 01 56 CDR-EVA Over there by the gnomon (laughter).

06 04 01 59 LMP-EVA Yes.

06 04 02 00 CDR-EVA And take a little right turn there and let me get the down-Sun prepicture here. I've got it. Okay, have at it - while I go find my favorite little piece of gear. I see it.

06 04 02 13 LMP-EVA You've got your favorite task and I've got mine.

06 04 02 15 CDR-EVA Yes, man.

06 04 02 25 CDR-EVA Okay, my pan - out of the way real quick.

06 04 02 56 LMP-EVA Joe, do you only - only want it 12 inches deep?

06 04 03 01 CC What ever you think's reasonable, Jim.

06 04 03 05 LMP-EVA I'm down that far already.

06 04 03 09 CC Boy, you do fast work.

06 04 03 59 LMP-EVA The wall that I'm - too bad the TV's there, Joe. You can't see the wall. Too bad; the wall is very smooth.

06 04 04 12 CC Now, you're bragging. - -

06 04 04 13 LMP-EVA The wall is fine, yet very cohesive.

06 04 04 15 CC Roger. And we'll stand by for a verbal description in fact.

06 04 04 25 CC Any sign of layering?

06 04 04 29 LMP-EVA No signs of layering. I do find some small fragments - white fragments, black fragments. I just exposed a very small fragment about 3 millimeters of a black clast. But the wall that I've got here is only - No signs of layering at all.

06 04 04 51 CC Roger.

06 04 05 03 CDR-EVA Tell me when you're ready for pictures, Jimmy.

06 04 05 08 LMP-EVA I think I'm just about ready, Dave.

06 04 05 12 CDR-EVA Okay. Okay.

06 04 05 23 CDR-EVA Okay, let me take your pictures then.

06 04 05 25 LMP-EVA Come over and see what you think. Check.

06 04 05 29 CDR-EVA Oh no, I think that - you're not getting the penetrometer all the way down there. It's a great trench.

06 04 05 35 LMP-EVA But not - not wide enough, you don't think?

06 04 05 37 CDR-EVA I don't think it'll be big enough for the ears.

06 04 05 38 LMP-EVA Not long enough, huh? Okay.

06 04 05 40 CDR-EVA Yes, I hate to tell you that. Sorry about that.

06 04 05 45 LMP-EVA Do you want to make a bet on that one?

06 04 05 48 CDR-EVA Oh, yes.

06 04 06 05 LMP-EVA When I get down under the 12-inch layer, the surface is much harder - harder to dig through.

06 04 06 14 CC Copy that, Jim - -

06 04 06 15 LMP-EVA Looks like more of that bla - black glass fragments. Much more cohesive down about -

06 04 06 33 LMP-EVA Well, we ought to get a good sample at the bottom of this.

06 04 06 36 CC Yes, sir.

06 04 06 39 LMP-EVA Boy, it's easy to make a flat bottom because it's - so hard. I can see why Dave had a hard time digging through it - going through it now.

06 04 07 03 CDR-EVA You know, Jim, I got a checklist on the left arm for one thing that's going on now, and a checklist on the right arm for something else that's going on now (laughter).

06 04 07 12 LMP-EVA Wild, isn't it?

06 04 07 15 CDR-EVA (Laughter) Unreal.

06 04 07 39 CDR-EVA Okay. Change 16.

06 04 07 55 CDR-EVA Okay. It looks like the Echo magazine worked okay.

06 04 08 04 CC Roger, Dave. Was that from you?

06 04 08 10 CDR-EVA Yes, sir. That's from me, and I'm going to put Foxtrot on the 16.

06 04 08 13 CC Okay, beautiful.

06 04 08 19 CDR-EVA Do this according to Hoyle.

06 04 08 35 CC Jim, that's a beautiful trench. Let's stop with that one and document it. We'll want samples from the bottom please.

06 04 08 41 CDR-EVA You're kidding!

06 04 08 42 LMP-EVA Say, I think I've hit bedrock. I think I've hit the bedrock! Okay, Dave, here you are.

06 04 08 53 CDR-EVA Yes, I'm coming over right now. ... taking my time - -

06 04 08 57 CC Dave, you might want to bring the S - ESC from under the seat.

06 04 09 08 CDR-EVA Okay, Joe.

06 04 09 26 LMP-EVA I'll take a break while you photo, Dave. Probably a good idea.

06 04 09 28 CDR-EVA Good idea. I'll come do some photo ... Oh, that's a neat trench.

06 04 09 38 LMP-EVA Do you think it's long enough?

06 04 09 39 CDR-EVA Oh, yes. That's just super.

06 04 09 47 LMP-EVA I really do think I'm almost down to bedrock. It really is hard.

06 04 09 50 CDR-EVA That right?

06 04 09 52 LMP-EVA Yes, we ought to have us some - good sample there from the bottom.

06 04 10 11 CDR-EVA It looks like it has a little color change down there, too.

06 04 10 14 LMP-EVA Yea, maybe a - a slight. Seems to get a little darker, a lighter and a little darker.

06 04 10 24 CDR-EVA A shadow in the way here.

06 04 10 35 CDR-EVA I have the photos.

06 04 10 36 LMP-EVA Walls are just about vertical on the - on the trench, Joe.

06 04 10 40 CDR-EVA Okay, we need an SESC.

06 04 10 42 CC Roger, Jim.

06 04 10 43 CDR-EVA Three quarters full.

06 04 10 44 LMP-EVA Yes, sir.

06 04 10 52 CC Okay, Dave and Jim. Jim, we think you can collect the samples here pretty well. And, Dave, in order to get that - that drill task accomplished, we're going to have to get you started on that shortly.

06 04 11 07 CDR-EVA Okay, I - he can't get the SESC very well by himself, I don't think, Joe. It's tough for two of us to get.

06 04 11 20 CC Okay. When you finish that, press on with the drill.

06 04 11 22 CDR-EVA Okay, that whole bit.

06 04 11 28 CDR-EVA Okay, I need another scoop.

06 04 11 29 LMP-EVA Okay.

06 04 11 37 CC And while you're looking down in there, how deep do you think it is now?

06 04 11 51 CDR-EVA Easy, don't - don't leave the handle on me, I'll drop it; it's too slippery. I need one more.

06 04 11 55 LMP-EVA Okay.

06 04 11 59 CDR-EVA Oh, I'd say it's 14 - 16 inches deep, Joe.

06 04 12 05 CC Extraordinary. Thank you.

06 04 12 16 LMP-EVA Okay, babe; it tilted up?

06 04 12 19 CDR-EVA Yes.

06 04 12 23 CDR-EVA White clast in there. A little bit more; keep coming. Good job.

06 04 12 31 LMP-EVA Think we got enough.

06 04 12 32 CDR-EVA Yes, sir. We got 75 percent full.

06 04 12 34 CC Outstanding.

06 04 12 35 LMP-EVA Okay, you're going to leave me, and I'll sample it myself. I guess I'll fill the bags myself then.

06 04 12 42 CDR-EVA I guess you'll have to.

06 04 12 43 LMP-EVA Okay.

06 04 12 46 CDR-EVA Okay - unless you want to go do the drill.

06 04 12 49 LMP-EVA Not at all, brother.

06 04 12 51 CDR-EVA You got her.

06 04 12 52 LMP-EVA I'll do all this -

06 04 12 59 LMP-EVA Why don't you loan me your checklists (laughter).

06 04 13 00 CDR/LMP (Laughter)  
-EVA

06 04 13 02 CDR/EVA Oh, yes. Guess what (laughter). Yes, I - (laughter). Oh, I think I can ... Joe'll talk me through it. Hey, which bag do you want to put the SESC in, Joe, while I got it here? I'm sure you've been thinking of that. No. (laughter) I didn't figure I'd get it. Yes, I'm going to toss this one in there - -

06 04 13 31 CC Anyone's fine.

06 04 13 32 CDR-EVA - - for now so I can get going. Oh, too late; put up. Jim?

06 04 13 41 LMP-EVA Yes.

06 04 13 43 CDR-EVA Okay. Nothing; press on.

06 04 13 46 LMP-EVA Okay, Joe, I'm going to do a little (laughter) sampling of the trench.

06 04 13 58 CC I hear you.

06 04 14 03 CDR-EVA ... on to the bags. A little unorthodox. I'm going to drill. Watch me.

06 04 14 22 LMP-EVA Probably won't be quite as much of a sample here, since I'm doing it myself, Joe.

06 04 14 34 CC Dave, is the SESC stowed now?

06 04 14 39 CDR-EVA Oh, it's in a seat pan right now; we'll get to it later, Joe.

06 04 14 42 CC That's fine. That's a perfect place; couldn't have suggested any better myself.

06 04 14 49 CDR-EVA Good.

06 04 14 52 CC And D. R., as you probably know already, all we - we need from this EVA is really the hole in the ground. The drill will probably give out on us during your rest period. And, if need be, we can pull up whatever you get later on.

06 04 15 09 CDR-EVA Okay, Joe. Fine.

06 04 15 12 CC You wouldn't want to go on towards the North Complex without visiting the ALSEP site again, would you?

06 04 15 19 CDR-EVA Shoot no. Never.

06 04 15 26 LMP-EVA Okay, Joe. The soil samples from the bottom of the trench is in 252.

06 04 15 32 CC 252; great.

06 04 15 41 CC And, Dave and Jim, we're coming up on 15 minutes, 1 5 minutes before closeout.

06 04 15 51 CDR-EVA Doing our best, Joe.



06 04 15 52 CC Roger, and you've done yeoman service.

06 04 15 58 CDR-EVA I had to get in your way there, old buddy.

06 04 16 00 LMP-EVA I'll get out of here.

06 04 16 02 CDR-EVA Yes, that'd be a good idea. I need to use this area.

06 04 16 13 LMP-EVA Joe, I'm going to skip sampling the - side, I'm just going to sample the top over here.

06 04 16 23 CC Okay, Jim. Sounds good, if you don't see layering.

06 04 16 26 LMP-EVA So I can get on with the penetrometer.

06 04 16 34 CC Okay.

06 04 17 06 CDR-EVA Shadows really make a difference up here.

06 04 17 16 LMP-EVA Okay, Joe; on the top of the trench, 253.

06 04 17 21 CC Roger; 253.

06 04 17 23 CDR-EVA Hey, Jim, you're in the way of the camera, old buddy.

06 04 17 26 LMP-EVA Am I stealing your picture?

06 04 17 27 CDR-EVA Yes, if we're going to use all that film.

06 04 17 31 LMP-EVA I got to get some bags here, man.

06 04 17 33 CDR-EVA Oh, shoot.

06 04 17 35 CC That's fine. We can still see.

06 04 17 39 LMP-EVA Dave's talking about the other one. Okay, I'm going for the penetrometer.

06 04 17 54 CDR-EVA Your camera's in your seat pan if you need it.

06 04 17 57 LMP-EVA No, I don't think I'll - I can't take pictures and do penetrometer at the same time.

06 04 18 01 CDR-EVA Why not?

06 04 18 05 LMP-EVA Sorry about that.

06 04 18 06 CC Dave, you'll get a warning horn on - and you'll want to - over to your AUX WATER shortly. Just wanted to advise you.

06 04 18 15 CDR-EVA Okay, Joe. Thank you.

06 04 18 28 CC And, Dave, you'll want it to drop into the ground as slowly as you can easily control.

06 04 18 35 CDR-EVA Oh, I forgot. I'm sorry. Just in a hurry to get it done, and I just forgot your one inch per second, and I'll do that. Some days! Okay, I got a horn, a tone, and AUX WATER.

06 04 19 10 CC And, Dave, go to MIN COOLING, please.

06 04 19 13 CDR-EVA Hey, Jim. Jim, would you get my AUX WATER.

06 04 19 17 LMP-EVA Yes.

06 04 19 18 CDR-EVA I - I just can't feel in there.

06 04 19 20 LMP-EVA Yes, I know what you mean. Okay. It's on. You want me to put you on MIN COOLING at the same time?

06 04 19 29 CDR-EVA No, I got the MIN COOLING part, I just couldn't feel the AUX WATER.

06 04 19 32 LMP-EVA Okay. I can go it, I'm right here.

06 04 19 36 CDR-EVA No, I - I got the MIN COOLING.

06 04 19 37 LMP-EVA Okay.

06 04 19 51 CDR-EVA Oh, my!

06 04 20 05 CDR-EVA Cable's caught on the collar.

06 04 20 09 CC Roger.

06 04 20 12 LMP-EVA Okay, Joe, I have the half-inch cone installed, and I'm going to - sitting on 1, I'm going to index it to 2.

06 04 20 19 CC Okay, Jim. Dave, as soon as you get that unstuck, you'll want to back it off one and one-half turns. It'll come loose.

06 04 20 33 CDR-EVA I know, Joe. You can't bend over as far here as you can in one-g.

06 04 20 49 LMP-EVA Joe, I hope you can watch this on TV. The ground plate - I pull it down, and the spring is too strong. It pulls the ground plate up.

06 04 20 59 CC Okay, Jim, we watch. No problem.

06 04 21 03 LMP-EVA The ground plate's there. Maybe it'll stay there - -

06 04 21 09 CC That's no problem.

06 04 21 10 LMP-EVA - - And I'm doing the one adjacent - I'm doing it adjacent to the trench.

06 04 21 15 CC Roger.

06 04 21 16 LMP-EVA - - right here. And I'm pushing. I'm bottomed out.

06 04 21 29 CC Roger.

06 04 21 30 LMP-EVA These prints might stay here, Dave, so I can photograph them at - later.

06 04 21 33 CDR-EVA Yes.

06 04 21 34 LMP-EVA Where I took it. Okay; that was adjacent to the trench. I'm indexing the 3, and I'm going to do the trench bottom.

06 04 21 48 CC Beautiful. And, Dave, you might check your film MAG, if you're back at the Rover now - see if it's run out, and I'm talking about the DAC - -

06 04 21 56 CDR-EVA No, it wouldn't have gone - run out by now, Joe. That's what I'm saying. It wouldn't have run out by now. I just turned it on; 12 frames per second, and it looks like it's 90 percent gone.

06 04 22 08 CC Okay, beautiful; outstanding.

06 04 22 13 CDR-EVA And, hey, I need a call when my sublimator gets going, Joe.

06 04 22 20 LMP-EVA Okay; I'm in the trench bottom, and I'm pushing. And I'm bottomed out.

06 04 22 31 CC Roger. And, Dave, the diverter valve is yours.

06 04 22 38 CDR-EVA Thank you! Okay, I'm starting for 4 - -

06 04 22 44 CC ... flags for you, please.

06 04 22 53 CDR-EVA Yes. The water flag's clear, Joe. Oh, that feels so good.

06 04 23 00 LMP-EVA Okay, I'm going for the Rover tracks.

06 04 23 03 CC Roger.

06 04 23 27 LMP-EVA Okay, I'm on the very freshest Rover track.

06 04 23 32 CC The very freshest.

06 04 23 36 LMP-EVA And I'm pushing.

06 04 23 37 CC Roger.

06 04 23 38 LMP-EVA And it's bottomed out.

06 04 23 50 LMP-EVA I'm indexing to 5.

06 04 23 53 CC Roger.

06 04 23 56 CC And, Dave and Jim - -

06 04 23 57 LMP-EVA ...

06 04 23 58 CC - - it's coming up on 5 minutes remaining before close out.

06 04 24 04 CDR-EVA Okay.

06 04 24 16 LMP-EVA Okay, adjacent to the Rover tracks. Pushing.

06 04 24 21 CC Roger.

06 04 24 25 LMP-EVA Bottomed out. We don't want to leave here before I get a chance to collapse my trench, Joe.

06 04 24 42 CC You've got 5 minutes, Jim. Play it accordingly; and I thought that was my job.

06 04 24 59 LMP-EVA Okay, I'm going for the plate.

06 04 25 02 CC Roger.

06 04 25 24 CDR-EVA I see why we planned all this before I came.

06 04 25 41 LMP-EVA Okay, the plate's installed.

06 04 25 43 CC Roger, Jim.

06 04 25 47 LMP-EVA Did I index it after the last one, Joe?

06 04 25 50 CC Say again.

06 04 25 53 LMP-EVA I don't think I indexed it after the last one.

06 04 25 57 CC Okay; try it again. No problem. We've - -

06 04 25 59 LMP-EVA An index?

06 04 26 00 CC - - got several here. Index it again.

06 04 26 03 LMP-EVA I'm indexing to 6.

06 04 26 05 CC Roger.

06 04 26 08 LMP-EVA Indexing to 6 here for trench bottom.

06 04 26 10 CC Okay.

06 04 26 38 LMP-EVA Okay, here goes it for trench bottom.

06 04 26 39 CC Roger.

06 04 26 45 LMP-EVA Bottomed out.

06 04 26 46 CC Okay.

06 04 26 59 LMP-EVA Indexing to 7.

06 04 27 01 CC Roger.

06 04 27 15 LMP-EVA Okay, I ought to be collapsing the trench sides -  
I hope.

06 04 27 47 LMP-EVA Okay, I'm about 4 inches out from the side of the  
trench.

06 04 28 05 LMP-EVA And I'm pushing. It's bottomed out -

06 04 28 09 CC Beautiful.

06 04 28 10 LMP-EVA - - with a slight amount of collapse.

06 04 28 12 CC It won't collapse?

06 04 28 13 LMP-EVA No, I'm continuing to push. Yes, it's collapsed!

06 04 28 18 CC Okay.

06 04 28 19 LMP-EVA - - ... collapse

06 04 28 23 LMP-EVA I'll take quick pictures there, so you can see the locations of all those.

06 04 28 43 CC Dave, are you working on the last stem there?

06 04 28 46 CDR-EVA Yes.

06 04 28 48 CC You are one fast worker. Okay, Dave, and take a breather, and I've got one last instruction for you here. Wi - we - Using the drill, we want you to break it loose and then let the drill and stem sit there in the surface, and we'll pull it out later.

06 04 29 11 CDR-EVA Okay. Let me finish it off.

06 04 29 25 CC And just leave the drill on the stem handle away from the Sun as long as the loops pull free.

06 04 29 35 CDR-EVA What?

06 04 29 37 CC Roger. As long as the threads pull - pull free from the hole.

06 04 29 46 CDR-EVA Yes. Well, we'll try that now. Yes, we can get it. Okay, Joe, we're in good shape.

06 04 29 55 CC Okay, Dave; we want the handle away from the Sun, and we're ready for you go get back to the Rover.

06 04 30 03 CDR-EVA Wait a minute, Joe. Not sure I'll ever get it out. What - what bothers me, Joe, is - Okay, hand - - handle away - away from the Sun?

06 04 30 17 CC Roger. And that drill ought to be good when we come back to it.

06 04 30 23 CDR-EVA Okay. Handle away from the Sun. Box is sort of dirty.

06 04 30 31 CC And, Jim, we want to end your tasks here, and we want you on the Rover, too, please.

06 04 30 41 LMP-EVA Let me take a few pictures here, and let me walk back. I can get there faster.

06 04 30 45 CDR-EVA Get pictures of the drill will you, Jim? Take notes. Hey, just south of the drill, I really need a - I already did a pan here. Get your trench and get a couple of pictures of the drill to show its position.

06 04 30 56 LMP-EVA Okay.

06 04 30 59 CC Okay, Jim. A few pictures and you can walk back and, Dave, we want you to start on the Rover, please.

06 04 31 08 CDR-EVA Yes, Joe. I'm on the way.

06 04 31 11 CC Okay.

06 04 31 30 LMP-EVA Okay, Dave. I think everything - you're not going to drive too fast are you?

06 04 31 33 CDR-EVA Heck no.

06 04 31 34 LMP-EVA Okay, I'll meet you back there.

06 04 31 35 CDR-EVA Yes.

06 04 31 41 CDR-EVA Makes dust when you drive fast.

06 04 31 45 LMP-EVA Keep it clean.

06 04 31 47 CDR-EVA Okay, Joe, you going back PM1/WB.

06 04 32 17 CDR-EVA Okay, Joe, I'm back at the LM.

06 04 32 23 CC Okay, Dave, copied you back at the LM, parking the Rover normally, and we're standing by for TV again.

06 04 33 11 LMP-EVA Hey, Dave, you do have some cores now to go in the SRC. Is that right?

06 04 33 15 CDR-EVA No.

06 04 33 16 LMP-EVA No?

06 04 33 18 CDR-EVA No, Jim, I didn't get them out yet.

06 04 33 19 LMP-EVA Okay. Well, I guess I'll go ahead and put the bag - that I have here in SRC 2.

06 04 33 28 CC Jim, if you can get the SESC in there that would be great, and then go ahead and close out that rock box.

06 04 33 39 CC No problem on those drill stems, we'll get them later.

06 04 34 01 CC And, Dave, this is Houston. If there's dust on the LRV BAT covers, brush it off before you open them, please.

06 04 34 11 CDR-EVA Okay, Joe. I guess we head north, cross-Sun, if I remember. ...

06 04 34 30 LMP-EVA Put it in your parking place.

06 04 34 32 CDR-EVA Huh?

06 04 34 33 LMP-EVA Put it in your parking place here.

06 04 34 36 CDR-EVA Yes. This is north, cross-Sun isn't it.

06 04 34 38 LMP-EVA Yes.

06 04 34 39 CDR-EVA What I thought.

06 04 34 50 CDR-EVA There's north, cross-Sun; okay. How's that, Jim, is that okay for you?

06 04 34 55 LMP-EVA Yes.

06 04 35 01 CC And, Dave, this is Houston.

06 04 35 05 CDR-EVA Go ahead.

06 04 35 07 CC Roger, Dave. While you're brushing the LRV BAT covers, you might as well give the whole area a good dusting and cleaning - the LCRU covers, the TCU, the - the television camera, please.



06 04 35 23 CDR-EVA Be glad to, Joe.

06 04 35 35 CDR-EVA Taking three up this time, Jim?

06 04 35 37 LMP-EVA Huh?

06 04 35 38 CDR-EVA This going up, man?

06 04 35 39 LMP-EVA Yes. Let's put all those rocks - I can get those, Dave.

06 04 35 43 CDR-EVA Okay, here's one for you.

06 04 35 48 CDR-EVA Going to set it right up by your camera. Okay?

06 04 35 51 LMP-EVA Okay.

06 04 36 00 CC And, Jim, are you packing the rock box yet?

06 04 36 07 LMP-EVA Yes, I am.

06 04 36 08 CC Roger. Did you happen to get a number off the SESC?

06 04 36 18 LMP-EVA No, I didn't, but - shoot, you ought to be able to track that one, Joe.

06 04 36 22 CC We'll <sup>track</sup>~~track~~ it, no problem.

06 04 36 48 CC And, Dave, we assume you are dusting and cleaning now, and we'll be standing by for TV.

06 04 36 55 CDR-EVA Good. Okay, Joe. I'm not sure I'm going to take the time to give you the TV unless you really need it.

06 04 37 02 CC Dave, we got a lot of time, we're going to do - deploy the flag now, and we need the TV, please.

06 04 37 11 CDR-EVA (Laughter) Okay, Joe.

06 04 37 17 CC And we're in good shape on the time. We're back at the IM, and we got a lot of time to work with, so no problem.

06 04 37 24 CDR-EVA Okay, Joe. Why don't you give us about 5 minutes with no comment and let us cool it for a while, okay?

06 04 37 32 CC Roger.

06 04 37 37 CDR-EVA Cool it, Jim. Just take it easy. Take a break. That's enough.

06 04 37 42 LMP-EVA Okay.

06 04 37 43 CDR-EVA We got plenty of time, and we're going to cool it right now.

06 04 37 45 LMP-EVA Okay. Having the same problem with that SRC today as I did yesterday, I have to pound on the handle - to get it sealed.

06 04 37 58 CDR-EVA Okay, well just take your time. Let's just -

06 04 38 01 LMP-EVA Yes, I'm not rushing.

06 04 38 02 CDR-EVA Use this 5 minutes as part of our rest period tonight.

06 04 38 09 CC Dave and Jim, while you're taking a breather there, let me make a comment. We got 37 minutes before repress, so we're in good shape on the time; and, just for your own information - I know you're curious - your oxygen consumption has been considerably less today, considerably less, and we're running well over a 7 hour PLSS capability.

06 04 38 31 CDR-EVA Okay, Joe. Very good. Just give us 5 minutes worth of nothing, will you?

06 04 38 43 CDR-EVA Just make sure we got a good last 27 minutes.

06 04 38 46 CC Yes, sir.

06 04 38 51 LMP-EVA Dave, I'm going to get you to give me a hand with this.

06 04 38 54 CDR-EVA Sure.

06 04 38 56 LMP-EVA Almost a two-man operation.

06 04 39 05 CDR-EVA Bring it over here.

06 04 39 07 LMP-EVA Huh? At the - want to go to the MESA table? Let's go to MESA table.

06 04 39 10 CDR-EVA No, it's - it's well, yes, it's easier to work with; it's higher.

06 04 39 23 LMP-EVA Okay. I didn't push down on it, I'll lock it.  
It - or - you might have to hit it down.

06 04 39 31 CDR-EVA Oh, yes. (laughter) ... power play ... - -

06 04 39 35 LMP-EVA That's what I had to do. I had to pound it with  
my fist yesterday.

06 04 39 39 CDR-EVA Okay, let me - let me hold your arm, and use your  
arm as ... Okay?

06 04 39 44 LMP-EVA Okay.

06 04 39 46 CDR-EVA Oh, my. Let me try it this way.

06 04 39 56 CDR-EVA Even my total body weight won't do it, so I'm  
going to have to stick one arm under you.

06 04 40 00 LMP-EVA Okay, you have to - I had to pound it yesterday to  
get it closed.

06 04 40 05 CDR-EVA Well, it closes, but it doesn't lock.

06 04 40 07 LMP-EVA Well, I'll have to push it locked.

06 04 40 10 CDR-EVA Really?

06 04 40 11 LMP-EVA Yes, it didn't-it won't spring locked.

06 04 40 14 CDR-EVA Okay.

06 04 40 16 LMP-EVA Try it again, Dave.

06 04 40 17 CDR-EVA It's that close?

06 04 40 18 LMP-EVA Yes.

06 04 40 26 LMP-EVA ...

06 04 40 40 LMP-EVA You ought to have that seal pretty well made now.

06 04 40 43 CDR-EVA Yes. Try it again.

06 04 40 53 LMP-EVA Gee, ...

06 04 40 55 CDR-EVA Jim, it's never going to lock. You know why?  
The lock isn't in the right place. Look at that.  
That little - look at where the handle is relative

to the lock, you'll never get it over, I've got the handle all the way down.

- 06 04 41 06 LMP-EVA Yes.
- 06 04 41 07 CDR-EVA That lock will never lock this way.
- 06 04 41 08 LMP-EVA Okay, let's look at the right one and see if the right one is the same way.
- 06 04 41 11 CDR-EVA Okay.
- 06 04 41 13 LMP-EVA That right one's the same way, I don't know how I ever got the one locked yesterday.
- 06 04 41 16 CDR-EVA All right, it can't lock, because the handle was bent up above the lock; there's no way.
- 06 04 41 21 LMP-EVA Yes.
- 06 04 41 22 CDR-EVA Okay, let's take the stuff out of there and leave the S - the SRC. Just leave it, take the stuff in without it.
- 06 04 41 30 LMP-EVA No, we'll take it that way.
- 06 04 41 32 CDR-EVA What do we want the SRC for? It's not closed.
- 06 04 41 33 LMP-EVA Well, I think we probably have a seal - if we keep these handles in this position, because the seal - the - -
- 06 04 41 38 CDR-EVA Yes. That's true.
- 06 04 41 39 LMP-EVA - - the seal is already made. If we could tape those handles down, we'd probably have a vacuum in there.
- 06 04 41 45 CDR-EVA Okay.
- 06 04 41 46 LMP-EVA Wait. Be careful we don't release them.
- 06 04 41 48 CDR-EVA Okay, yes, you're right. Okay, what else do you have to do here? About it? Well, let's take a look at things.
- 06 04 41 55 LMP-EVA Dust each other off.

06 04 42 02 LMP-EVA Hey, let's get those cover bags.

06 04 42 04 CDR-EVA Oh, that's a good idea.

06 04 42 05 LMP-EVA I'll get them if you got something to do out there.

06 04 42 07 CDR-EVA Yes. Let me get the TV going here.

06 04 42 27 CDR-EVA Okay, got some more rocks on the seat pan, too, Jim.

06 04 42 32 LMP-EVA Okay.

06 04 42 40 CDR-EVA Okay, Joe, I want to put you on the TV ... if I can't find the - the old Earth here.

06 04 42 49 CC Super, Dave, we're waiting and we still have a full half hour remaining; good shape.

06 04 42 59 CDR-EVA Okay, I suggest we take it and go nice and slow and easy.

06 04 43 02 CC That's exactly right.

06 04 43 09 LMP-EVA Okay, I have the sample containment bags out here, Dave. I'll just leave them here on top.

06 04 43 16 CDR-EVA Okay.

06 04 43 17 LMP-EVA I'll come over and pick up those other rock samples.

06 04 43 33 CDR-EVA Okay, Joe, the AGC says you ought to have a picture.

06 04 43 37 CC We've got a beautiful picture.

06 04 43 43 CDR-EVA Of the streaks on the ma - on the battery covers, huh?

06 04 43 46 CC You never know what you might like to look at.

06 04 43 56 CDR-EVA Yes. I can even see the Earth. You know, another - another problem is, the Earth is getting - getting smaller.

06 04 44 06 CC Roger, Dave. That's one of Kepler's mission rules.

06 04 44 12 CDR-EVA Right. Okay, I got the LCRU battery covers dusted off, and the console on the LRV isn't too bad, I dusted that off. It wasn't too bad anyway.

06 04 44 33 CDR-EVA And I guess the next order of business - get the rocks all packed.

06 04 44 51 LMP-EVA Okay, Dave, I've got all the rock samples \*\*\*

06 04 44 55 CDR-EVA Okay. Get the ETB and get all our film.

06 04 45 06 LMP-EVA The only task is getting all this stuff up.

06 04 45 09 CDR-EVA Yes. We'll use the old -

06 04 45 18 CC Dave and Jim, once again our TV camera is stuck in the down position. I wonder if you could give us some help there. And we'd also like an amp-hours reading from the Rover, and a battery temp, please.

06 04 45 34 LMP-EVA I'll get that, Dave.

06 04 45 35 CDR-EVA Can you hold it?

06 04 45 36 CC Thank you.

06 04 45 37 CDR-EVA He's up.

06 04 45 40 LMP-EVA You're welcome. I'll get that other gear stuff while you pack.

06 04 45 45 CDR-EVA Okay.

06 04 45 48 LMP-EVA Okay, amp-hour readings - is 91 and 96. Battery temp is 100 - on both.

06 04 46 03 CC Beautiful, Jim; are we ever making the miles on that Rover.

06 04 46 09 CDR-EVA That's surprising climbing those hills, too. Could you hand me the cameras over there, Jimmy?

06 04 46 15 LMP-EVA Yes. Let's see, I should pull the circuit breakers on the Rover.

06 04 46 18 CDR-EVA I can get them easier over here.

06 04 46 20 LMP-EVA If you got fingers left for it.

06 04 46 21 CDR-EVA Not much, - -

06 04 46 22 LMP-EVA ...

06 04 46 23 CDR-EVA - - but I'll try - 1, 2, 3, 4!

06 04 46 28 LMP-EVA Okay. Got her?

06 04 46 32 CDR-EVA Yes. Okay.

06 04 46 40 LMP-EVA Okay, and there should be another one around here.  
Oh, it's up on the MESA. You want me - I'll get  
it for you.

06 04 46 45 CDR-EVA No, keep going. Yes. Okay. If you want ...

06 04 46 47 LMP-EVA I don't have anything to do.

06 04 46 49 CDR-EVA Okay. Okay, Joe, MAG Kilo is in and the - some-  
body's camera with a MAG on it (laughter).

06 04 47 01 CC Roger.

06 04 47 12 CDR-EVA MAG Lima is in the ETB; MAG November, MAG Delta,  
MAG Echo.

06 04 47 57 LMP-EVA Here's a camera, Dave.

06 04 48 01 CDR-EVA Okay. CDR camera with MAG Oboe.

06 04 48 06 CC Roger.

06 04 48 51 CDR-EVA MAG Metro.

06 04 48 57 CC Roger.

06 04 49 25 LMP-EVA Why don't I start transferring some of this stuff,  
Dave?

06 04 49 29 CDR-EVA Okay. How?

06 04 49 31 LMP-EVA Take it up.

06 04 49 32 CDR-EVA Be careful.

06 04 49 36 LMP-EVA Any problem there, Joe, if I start taking this  
stuff up?

06 04 49 43 CC Stand by, Jim. Just take a breather. Lots of time.

06 04 49 49 LMP-EVA Yes, I know there's lots of time, I'd just as soon take my time while I'm getting it up there.

06 04 49 52 CDR-EVA Yes. Why - why don't we cool it. Oh - did you get the pictures around the LM, by the way?

06 04 49 59 LMP-EVA Yes.

06 04 50 00 CDR-EVA You did? Okay.

06 04 50 01 LMP-EVA All the pictures are taken care of. The TV cable hanging out here is really dangerous.

06 04 50 07 CDR-EVA Yes. That sure is.

06 04 50 18 LMP-EVA Okay, I'll wait, Dave. I won't take anything up.

06 04 50 21 CDR-EVA Well, we're just about done here. MAG Foxtrot into the ETB. Get everything you needed out of the - your seat pan?

06 04 50 31 LMP-EVA Yes.

06 04 50 32 CDR-EVA Got all the rocks?

06 04 50 33 CDR-EVA Okay. Guess I got all of the film.

06 04 50 49 CC Jim, this is Houston.

06 04 50 54 LMP-EVA Okay. Go ahead, Joe.

06 04 50 56 CC Roger, Jim. At your leisure, we'd like for you to deploy the American flag, please.

06 04 51 06 LMP-EVA Okay. Hey, we ought to keep that camera out, Dave.

06 04 51 13 CDR-EVA (Laughter) I'm getting it out right now (laughter).

06 04 51 18 LMP-EVA One with a color magazine. That is black and white, though.

06 04 51 22 CDR-EVA \*\*\* does? Fix that if we get plenty of time. Which one works? Mine or yours.



06 04 51 30 LMP-EVA Yours.

06 04 51 33 CDR-EVA Okay.

06 04 51 35 CDR-EVA Why don't you get started on a picture of this.

06 04 52 18 LMP-EVA I'll take the staff out, Dave.

06 04 52 20 CDR-EVA Yes.

06 04 52 21 LMP-EVA Drive it if I need to.

06 04 52 30 CDR-EVA Yes. We don't have any color.

06 04 52 33 CC Dave, we'll get color next time no problem. - -

06 04 52 34 CDR-EVA Any color film left, Joe?

06 04 52 35 CC - - you've got a beautiful color TV camera looking at you.

06 04 52 40 CDR-EVA Oh. Okay.

06 04 52 45 LMP-EVA That's a shame.

06 04 52 47 CDR-EVA Yes, I hate black and white.

06 04 52 50 CC And, Jim, if possible we'd like for you to come around north of the Rover there to deploy, and we're tracking the camera that direction.

06 04 53 00 LMP-EVA You tell me when I'm in a good position.

06 04 53 02 CDR-EVA Hey, o - over here, Jim.

06 04 53 03 LMP-EVA It would be better to have the - -

06 04 53 05 CDR-EVA Yes.

06 04 53 06 LMP-EVA - - the IM as a - as a - -

06 04 53 08 CDR-EVA Right here where we usually do it.

06 04 53 10 LMP-EVA Or Hadley.

06 04 53 11 CDR-EVA Huh?

06 04 53 12 LMP-EVA Have Hadley in the background.

06 04 53 13 CDR-EVA Sure, right there.

06 04 53 17 CC Beautiful right there.

06 04 53 20 LMP-EVA Suppose that's too -

06 04 53 44 LMP-EVA Okay, I'm pushing the staff in.

06 04 53 46 CDR-EVA Okay.

06 04 53 59 LMP-EVA I'll hit it a few times so it'll stay up here for a few million years.

06 04 54 02 CDR-EVA Good idea.

06 04 54 07 LMP-EVA Of course, it might make it too low.

06 04 54 10 CDR-EVA I don't think so.

06 04 54 31 CDR-EVA Pretty - you've got to admit. Okay.

06 04 55 08 LMP-EVA Let's see, probably want to swing it around perpendicular to the camera, huh?

06 04 55 15 CDR-EVA Okay. It's pretty good. Why don't you stand there?

06 04 55 21 LMP-EVA Let me get up on the high part.

06 04 55 23 CDR-EVA Okay. Gee, I wish we had color.

06 04 55 24 LMP-EVA Yes.

06 04 55 27 CC We'll have color tomorrow, Dave - -

06 04 55 28 CDR-EVA That's great just to look at it there.

06 04 55 29 CC - - Saved it especially for you.

06 04 55 33 CDR-EVA Okay. Okay. Okay. I've backed up here so I get all of that in there. There, that's good. Good. Got the mountain, got the LM. Great.

06 04 55 58 LMP-EVA Got it?

06 04 55 59 CDR-EVA Yes.

06 04 56 11 CDR-EVA \*\*\*

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06 04 56 23 CC And, Jim, you'll get a - a feedwater tone in about a minute. Just wanted to warn you, and we're coming up on 20 minutes remaining, 20.

06 04 56 32 LMP-EVA Okay. Oh, that is a good picture.

06 04 56 35 CDR-EVA Isn't that a neat picture?

06 04 56 38 LMP-EVA ... little

06 04 56 42 CDR-EVA \*\*\*

06 04 56 43 LMP-EVA Try another setting. How about an f/8?

06 04 56 45 CDR-EVA Yes, try f/8.

06 04 56 47 LMP-EVA Leave it at - -

06 04 56 48 CDR-EVA Yes.

06 04 56 49 LMP-EVA - - f/11 now.

06 04 56 50 CDR-EVA Yes. That's what it called for in the -

06 04 56 51 LMP-EVA Yes.

06 04 56 54 LMP-EVA Okay, I'm taking you again, boss.

06 04 56 56 CDR-EVA Okay.

06 04 56 58 LMP-EVA Oh, you look colorful.

06 04 56 59 CDR-EVA How about that. Even with the dirt, huh? Okay.

06 04 57 07 CDR-EVA You like that flag there, Joe?

06 04 57 10 CC It's beautiful.

06 04 57 15 CDR-EVA Yes. We think it's pretty nice, too.

06 04 57 40 LMP-EVA Can I get in now?

06 04 57 44 CC Jim, you're coming up on feedwater tone, probably.

06 04 57 45 LMP-EVA ... Joe?

06 04 57 55 CDR-EVA Okay.

06 04 57 57 LMP-EVA That was good timing, Joe. I've got it. Dave will you put me on -

06 04 58 01 CDR-EVA Yes.

06 04 58 02 LMP-EVA Get my DIVERTER valve, too, to MIN if you would.

06 04 58 04 CDR-EVA Sure. DIVERTER valve's to MIN; AUX WATER is OPEN. Okay, we got everything?

06 04 58 23 LMP-EVA Think we do.

06 04 58 25 CDR-EVA Now to start back in.

06 04 58 26 CC Okay - -

06 04 58 27 CDR-EVA Okay. - -

06 04 58 28 CC - - Dave and Jim, we know you've dusted off our TV gear, we want you to open the LRV BAT covers, please. And give us a status check - -

06 04 58 38 CDR-EVA Roger, we haven't du - -

06 04 58 39 CC - - of the battery mirrors. Mainly, are they dusty or not?

06 04 58 45 CDR-EVA Good thought.

06 04 58 47 LMP-EVA Let me wait until I get a good startup on mine, Dave.

06 04 58 48 CDR-EVA Okay.

06 04 58 49 LMP-EVA Don't like to go to INTERMEDIATE before getting in.

06 04 58 52 CDR-EVA Not a bad idea.

06 04 58 54 LMP-EVA We got to dust each other off, too.

06 04 58 55 CDR-EVA Yes, I need to dust these battery covers, too.

06 04 58 56 LMP-EVA Okay, I'll bring the brush around.

06 04 59 18 CDR-EVA It's really glued.

06 04 59 30 CDR-EVA There, it's open.

06 04 59 36 CDR-EVA Oh, Jim, the maps. I almost forgot the maps.

06 04 59 41 CC Dave, this is Houston.

06 04 59 44 CDR-EVA Go ahead, Houston.

06 04 59 45 CC Roger, Dave. I think you still need the MAG from the DAC and from the 500-millimeter camera.

06 04 59 54 CDR-EVA No, they're both in here, Joe. And I called them both out. Both tucked away in ETB.

06 05 00 12 LMP-EVA One of the mirrors is cracked, huh?

06 05 00 14 CDR-EVA Which one?

06 05 00 15 LMP-EVA TV.

06 05 00 16 CDR-EVA Really?

06 05 00 18 LMP-EVA Yes.

06 05 00 19 CDR-EVA See that? Yes. Two little squares.

06 05 00 44 CDR-EVA Oh, we've got to turn the camera around too, Jim.

06 05 00 47 CC Okay, Jim, your diverter valve - -

06 05 00 48 CDR-EVA Turn the DAC around ... to point - -

06 05 00 53 LMP-EVA High option now, huh? Okay.

06 05 01 06 CDR-EVA Okay, let's head on in, Jim.

06 05 01 11 LMP-EVA How'd you want the covers done?

06 05 01 14 CDR-EVA Here, let me dust you off; you're dirty. Let's head on in.

06 05 01 41 CDR-EVA Okay, turn around to your left. ... here.

06 05 01 58 CDR-EVA Okay. That's most of it.

06 05 02 04 LMP-EVA How did your front get so dirty? Oh, I know. Pulled an Irwin.

06 05 02 40 CC And, Dave and Jim, while you're doing the dusting there, did you get a check on the LRV mirrors for us? If so, I must not have copied.

06 05 02 49 CDR-EVA Yes, they're both open, and all four have been dusted.

06 05 02 54 CC Okay, good.

06 05 03 02 LMP-EVA That tape came off your PLSS, Dave.

06 05 03 03 CDR-EVA Did it really?

06 05 03 04 LMP-EVA Yes, it's ripped on both sides now.

06 05 03 07 CDR-EVA I wonder where I'm getting that.

06 05 03 08 LMP-EVA Might be getting it in the Rover.

06 05 03 10 CDR-EVA Yes. Could be. I can see where I'm getting it. No, couldn't be there. No, the seats are smooth.

06 05 03 17 LMP-EVA Okay, Dave.

06 05 03 21 CDR-EVA Okay. Give me the brush. I'll put it back. You can head in and crank up the LEC, and we'll haul all that stuff up nice and easy like.

06 05 03 26 LMP-EVA Okay. Okay, I won't even try and take a bag up now.

06 05 03 30 CDR-EVA No, let's take it easy.

06 05 03 32 LMP-EVA Okay.

06 05 03 33 CDR-EVA We have plenty of time and nothing's pressing.

06 05 03 42 LMP-EVA What's the battery that I have stowed here under this footpad, Dave?

06 05 03 46 CDR-EVA That's the LCRU battery - -

06 05 03 47 LMP-EVA Yes.

06 05 03 48 CDR-EVA - - for the next go.

06 05 03 49 LMP-EVA Yes.

06 05 03 50 CDR-EVA I guess we leave it there, don't we - -

06 05 03 51 LMP-EVA Yes.

06 05 03 52 CDR-EVA - - Houston?

06 05 03 53 LMP-EVA Yes. Leave it in the shadow.

06 05 03 54 CDR-EVA Yes.

06 05 03 55 CC That's affirm.

06 05 03 56 LMP-EVA Don't step on it.

06 05 03 57 CDR-EVA Okay.

06 05 03 58 LMP-EVA \*\*\* knock it out of it's little blanket.

06 05 04 05 LMP-LM You're going to have to come up and hand me the LEC because we didn't - you didn't - -

06 05 04 07 CDR-EVA Yes.

06 05 04 08 LMP-LM - - get it in last time.

06 05 04 09 CDR-EVA Okay, I'll do that.

06 05 05 05 CC Dave, this is Houston.

06 05 05 09 CDR-EVA Houston, go.

06 05 05 10 CC Roger, D.R. We're thinking that that SRC is not closed very well. We're wondering if it'll go on the LEC properly.

06 05 05 26 CDR-EVA Yes, it certainly - yes, you're right. It would probably, but I guess we'll not take a chance. I'll carry the ... - -

06 05 05 36 CC Okay. Fine.

06 05 05 39 LMP-LM I could send some tape out, Dave.

06 05 05 41 CDR-EVA What?

06 05 05 42 LMP-LM I can send some tape out. Hey, Dave, I know what you could do.

06 05 05 46 CDR-EVA What?

06 05 05 50 LMP-LM Is put it in one of those Bull Durham sacks.

06 05 05 54 CDR-EVA No, I - I'll carry it up easy.  
06 05 05 57 LMP-LM Okay.  
06 05 06 09 CDR-EVA Okay, I'll carry it up right through here.  
06 05 06 34 CDR-EVA How are you doing in there?  
06 05 06 35 LMP-LM I'm in.  
06 05 06 36 CDR-EVA You are?  
06 05 06 37 LMP-LM Yes, I'm waiting for you.  
06 05 06 38 CDR-EVA Okay.  
06 05 06 39 LMP-LM A lot easier when the hatch's opens.  
06 05 06 40 CDR-EVA Huh?  
06 05 06 41 LMP-LM It's a lot easier with the hatch open.  
06 05 06 43 CDR-EVA Oh, all the way you mean, huh?  
06 05 06 44 LMP-LM Yes.  
06 05 07 00 LMP-LM Maybe a little 5 psi on that SRC will close it.  
06 05 07 05 CDR-EVA Yes. Let's see, let me get up to where I can -  
hand them around to you.  
06 05 07 25 CDR-EVA Well, I don't know whether you can get it or not.  
Maybe.  
06 05 07 31 LMP-LM Here, can I help you?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 03 03 -- BEGIN LUNAR REV 36  
06 03 33 57 CC Endeavour, let's go back to REACQ.  
06 03 35 14 CC Al, we'd like to go PITCH, minus 11; YAW 12,  
without changing the mode switch.  
06 03 35 25 CMP Understand; minus 11 and 12.



06 03 35 28 CC Affirmative.

06 03 36 48 CC WIDE - Al, we need to go to WIDE for a couple of seconds and then back to NARROW.

06 03 37 45 CC Endeavour, could we have WIDE BEAM again for a couple of seconds and then NARROW.

06 03 38 37 CC Endeavour, this is Houston. How do you read?

06 03 38 44 CMP Houston, I'm reading you loud and clear, 5 square.

06 03 38 48 CC Good. Sorry about all of this HIGH GAIN switching problem. We're - we'll try to get it squared away - away real quick. I'll let you get back to your parsley soup.

06 03 39 05 CMP Okay. I was just getting it out.

06 03 39 17 CMP And, Karl, you'll be interested to know I had a very good exercise period this time.

06 03 39 22 CC Very good. Glad to hear it.

06 03 42 46 CC We're all squared away on the HIGH GAIN now, Al. Thank you.

06 03 42 53 CMP Okay, Karl. Was there a problem associated with my gear or with yours?

06 03 43 08 CC We sus - we suspect that there was some problem about the new attitude, and we were getting some sort of reflection off your skin up there.

06 03 43 23 CMP I see. Okay.

06 03 44 25 CC Endeavour, we'd like to have HIGH GAIN, AUTO.

06 03 44 36 CMP Okay. You got AUTO.

06 03 55 50 CMP Houston, Endeavour.

06 03 55 56 CC Endeavour. Go ahead.

06 03 56 01 CMP Okay. While I'm trying to get a bite of lunch here, I thought I'd just tell you that after the dump, the same thing happened - the same kind of cloud, the same kind of particles that - that I

described yesterday. And they've just about - they've just about dispersed now. Well, you know, Karl, the interesting thing, I guess I hadn't thought about it before, but when you're sitting up here looking at the surface through one window, it's just pitch black out the other windows. So you go from a very bright scene in one window to a black in the other.

06 03 56 36 CC Yes. So, actually out - out the dark window - -

06 03 56 38 CMP ...

06 03 56 42 CC Out the dark window, you are still able to see particles.

06 03 56 42 CMP Yes, I see particles; there's no cloud now.

06 03 56 48 CC You - you did see - -

06 03 56 49 CMP You could until just a few minutes ago, and the particles dissipated rather quickly; and now I don't see any particles out that window.

06 03 56 59 CC Roger. We copy.

06 03 58 41 CC Al, another bulletin from the lunar surface. The fellows have been back at the LM for some time and working again on the ALSEP. And the problems they had with the drill, they're trying to catch up with now. And yesterday they got in one of the heat sensors and then had trouble finding the time to get in the second one. But they did get the second one in today, and I guess now they're going to go after the core - the core drill sample.

06 03 59 22 CMP Sounds like they're pretty busy down there, Karl.

06 03 59 25 CC Yes, they are having a good time there, all right.

06 03 59 33 CMP Well, good for them. I'm having a hard time keeping my lobster bisque in the bag up here.

06 03 59 39 CC Hey, that sounds like a tough life you've got there.

06 04 00 49 CC I just stopped to look at the clock, Al, and I see that the flow photos are coming up on us almost immediately, if you'd like to take them.

06 04 01 04 CMP Roger.

06 04 02 23 CC As I look at the Flight Plan, I had that marked at 148 hours and zero minutes. They must have given you a 5-minute pad there. As I see your position on the Moon, you've got a while before you get there. Is that correct?

06 04 02 40 CMP Right, Karl. That's the way it looks to me.

06 04 02 43 CC I have you coming up on Hadley, right - Well, you just passed Hadley, I guess.

06 04 02 50 CMP Yes, that's right. I'm just going over Archimedes now.

06 04 02 53 CC Righto.

06 04 06 47 CMP Karl, Endeavour. Just for your information, at present time I'm right over Timocharis, and Lambert's coming up on - the - on the - it's just to the south of me - with Lambert R a very subdued ring just to the - to the south of Lambert. And the photos I want to take are over around the area of Mount La Hire and La Hire Rilles, a little bit west of Lambert.

06 04 07 20 CC We copy that.

06 04 07 21 CMP And, as a matter of fact, I have - Mount La Hire seems to be in view now and looks like I'm heading right at it.

06 04 07 33 CC Hey, as I look at the map here, it looks like about three - three hills with a crater in the top of each - Look like volcanos here, although this map is lousy from that point of view. What do they look like to you?

06 04 07 51 CMP Well, I can see a - the - the - they're a chain of hills - ridges, and I can't see much more than that from here right now.

06 04 08 02 CC Roger.

06 04 09 37 CMP Okay, Karl, if you're following on the map, I'm right south of the intersection of the La Hire Rilles and the wrinkle ridge that runs off to the northwest there, just by Mount La Hire. In fact, I'm directly over Mount La Hire now, and it looks like there's a volcano in - or not a volcano, but a crater, in the top of the westernmost hill.

06 04 10 02 CC Roger.

06 04 10 09 CMP And I'm starting to take some pictures to the west now.

06 04 10 13 CC We copy.

06 04 11 59 CC Al, can you clarify a little more exactly where you're photographing. I see a wrinkle ridge running northwest toward Caroline Herschel from the La Hire Rilles, so this is where I'd guess you're working. Is that correct?

06 04 12 22 CMP Negative. That's the large wrinkle ridge running off toward C. Herschel. No, I'm working directly west of La Hire Rilles in that open area out there. Say on a line between Evler and Heis.

06 04 12 40 CC Roger. I copy.

06 04 12 46 CMP And there's nothing particularly significant that you can see on the map there. It's just that the La Hire Rilles seem to be associated with a lot of those flows, and the flows - there are so many of them, they are - and they're so overlapping and intermingling that I just want to get some general pictures of those flows coming out of La Hire.

06 04 13 07 CC Roger. That sounds like a very interesting region, and I see over by Diophantus there, you've got some very prominent rilles at the present time that are probably just on the - on the terminator, aren't they?

06 04 13 22 CMP Yes, Karl. I'm - I'm beyond the terminator now.

06 04 13 48 CC Next time you get the Flight Plan in hand, let me give you the T-start for the zodiacal light photography.

06 04 14 10 CMP Okay. Go ahead.

06 04 14 14 CC Okay. 148:34:26, zodiacal light photo pad.

06 04 14 26 CMP Understand, 148:34:26.

06 04 14 29 CC That's affirmative.

06 04 15 17 CC Say again, Endeavour.

06 04 15 23 CMP Go ahead.

06 04 15 26 CC Disregard, Al. I thought I heard you call, and it was just something else in the background, I guess.

06 04 15 35 CC Jim is busy drigging - digging trenches there by the LM, and he just about dug a hole big enough to - to build a swimming pool in. He did a good job.

06 04 16 13 CC And you see as far south as the Carpathian Mountains, Al?

06 04 16 41 CMP That's negative, Karl. I'm in - I'm - I'm beyond the terminator now in total darkness.

06 04 16 47 CC Right.

06 04 16 56 CC If you - if your orbit ever brings you far enough south to look at those Carpathian Mountains, I should think that would be pretty interesting. I - well, you probably know better than I, I guess, that's probably an overflow of Procellarum into Imbrium there. Probably sort of - well, if that's true, it should have the appearance of the front edge of a lava flow, although it is a tremendous thing.

06 04 32 28 CC Endeavour, this is Houston. The Rover boys have finished their tasks - most of their tasks with the ASLEP, and they are just now beginning ingress into the LM. Dave managed to get the core drill

completely in; and, although he hasn't pulled it out yet, he'll pull it out on the next EVA. The time to set the mission timer or to set your count-down for the zodiacal light photos is going to be about in 1 minute. And the word down here is that all of your systems are GO; everything is looking super.

06 04 33 17 CMP Roger, Karl. Thank you very much. See you on the other side. And, if you'll check my DSKY, you'll see I got the time count down there, too.

06 04 33 24 CC Very good.

06 04 33 32 CMP And I'm even managing to finish my lunch. Thank you.

06 04 33 37 CC That is a soft life up there, when you get a chance to finish your lunch.

06 04 33 45 CMP You better believe it. Sometimes it's not so easy.

06 04 33 52 CC I can believe it.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 05 07 33 LMP-LM If you'll hand me the LEC. I used that yesterday. I can use the hook on the LEC to grab it and pull it up.

06 05 07 38 CDR-EVA Okay, wait. Maybe I can just stick my middle in here.

06 05 07 42 LMP-LM The LEC makes a good handle - a good claw to grab those.

06 05 07 45 CDR-EVA Oh that - yes, that's a good - oh, the front part of yours.

06 05 07 49 LMP-LM Yes.

06 05 07 50 CDR-EVA Okay.

06 05 07 51 LMP-LM Hand it to me.

06 05 08 01 CC Dave and Jim. We're standing by for the four pieces of luggage as they go in. We'd like for you to call them out to us.

06 05 08 09 CDR-EVA Sure will.

06 05 08 21 CC And, Dave, this is Houston. The next time you go back to the Rover, we need some help on that good old TV camera again. We got it stuck pointed straight up.

06 05 08 33 CDR-EVA Oh, my. You're looking at the Earth, Huh? Earthgazing.

06 05 08 51 CDR-EVA Okay. The SRC is in, Joe.

06 05 08 54 CC We copy.

06 05 09 04 LMP-LM Okay. The ETB is up, Dave - the LEC rather.

06 05 09 08 CDR-EVA Okay. Just a second.

06 05 09 15 CDR-EVA Straight up. (Laughter) I knew Ed would get hung up sooner or later. Hey, Joe.

06 05 09 26 LMP-LM Are you ready?

06 05 09 27 CDR-EVA No, no, not yet, Jim. I was just fixing the TV.

06 05 09 29 LMP-LM Oh.

06 05 09 30 CC Thank you, Dave. We were belly-up there, momentarily.

06 05 09 36 CDR-EVA Well, that's all right, Joe. Nobody is perfect.

06 05 09 51 CDR-EVA Chow is sure getting short. Okay, partner, how about it?

06 05 09 57 LMP-LM ... What am I pulling up?

06 05 10 03 CDR-EVA ETB.

06 05 10 09 LMP-LM Tell me when to slow down.

06 05 10 10 CDR-EVA Okay. You're doing fine. Keep going. Okay, now. That's it. Now pull it once [sic] more time. Okay. Right - Oh, shoot. I'm sorry. There's so much dirt on this thing. Okay. Okay, now ease it over. Okay. There you go. Got it?

06 05 10 43 LMP-LM Yes.

06 05 10 54 LMP-LM Guess I got dirty again.

06 05 10 58 CDR-EVA Brush yourself off.

06 05 11 00 LMP-LM Yes. That's better. The LEC is ready to come back out, Dave.

06 05 11 24 CDR-EVA Okay.

06 05 11 50 CDR-EVA Okay. I'm going to just carry the rock bags up. It's a lot easier.

06 05 11 59 LMP-LM Okay. When you get down, pull the LEC out.

06 05 12 02 CDR-EVA Yes, I will.

06 05 12 04 LMP-LM Stow it on the porch.

06 05 12 05 CDR-EVA Oop. ...



06 05 12 09 LMP-LM Yes, that's what I thought. Watch the lid  
doesn't come open.

06 05 12 13 CDR-EVA (Laughter) How'd you guess.

06 05 12 46 LMP-LM Just hold up, Dave. I'll get my claw and use  
it to grab the -

06 05 12 49 CDR-EVA Okay.

06 05 13 04 LMP-LM Got it.

06 05 13 05 CDR-EVA Good. Okay. I'll be right back with another  
one.

06 05 13 08 LMP-LM Okay.

06 05 13 09 CDR-EVA I think we got a few rocks today.

06 05 13 11 LMP-LM I think we made up for yesterday.

06 05 13 12 CDR-EVA Yes.

06 05 13 28 CDR-EVA Let's see, we got our food in, don't we?

06 05 13 32 LMP-LM Yes. You working up an appetite?

06 05 13 34 CDR-EVA Boy, you better believe.

06 05 13 50 CC Dave, this is Houston. Give me a call on  
what you're loading now, please.

06 05 13 55 CDR-EVA Oh, I just took in - What rock bag was that,  
Joe - I mean Jim?

06 05 14 01 LMP-LM Well, we are going - we have the - we have all  
the samples.

06 05 14 05 CDR-EVA I know. But what rock bag did I just give  
you?

06 05 14 07 LMP-LM Oh.

06 05 14 08 CDR-EVA You know?

06 05 14 09 LMP-LM It's number 6.

06 05 14 10 CDR-EVA Okay.

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06 05 14 11 CC Okay. And I guess the ETB to go, is that right?

06 05 14 16 CDR-EVA The ETB is in, Joe.

06 05 14 18 CC Okay; four items. I'm just marking down four marks here.

06 05 14 20 CDR-EVA Oh, I'm sorry, Jim.

06 05 14 24 LMP-LM Why don't you pull that strap out, Dave? Get it out of the way.

06 05 14 27 CDR-EVA Okay.

06 05 14 28 CC And, Dave, give me a call when you go over towards the LCRU and Rover again. One last instruction, and it's an easy one.

06 05 14 39 CDR-EVA Okay.

06 05 14 53 CDR-EVA ... , Jim.

06 05 14 54 LMP-LM Okay, Dave. You can pull all of this out.

06 05 14 57 CDR-EVA Okay.

06 05 14 58 LMP-LM Stow the hook out there.

06 05 15 00 CDR-EVA Yes, I'll do that. Hold on to the hook until I get it all down.

06 05 15 09 LMP-LM Yes.

06 05 15 14 CDR-EVA Okay. Let go of the hook, I got it.

06 05 15 16 LMP-LM Okay.

06 05 15 37 CDR-EVA Okay. Back down.

06 05 15 55 CDR-EVA You got another little - oh, the cover bags are all out here, right?

06 05 16 00 LMP-LM That's right.

06 05 16 02 CDR-EVA Okay. Good show. I'll bring those up with me on the last trip. All right, Houston, what would you like to do with our friendly Rover?

06 05 16 10 CC Okay, Dave. A few - let's see, three easy steps. The LCRU power OFF, the LCRU blankets 100 percent open — and that's a change — 100 percent open, and the TV is presently pointed exactly how we would like it left. Over.

06 05 16 33 CDR-EVA Okay. The third one is the easiest - the second one is the easiest. And I'll turn the LCRU power OFF right now.

06 05 16 45 CC Roger.

06 05 16 50 CDR-EVA There, it's OFF. Okay. The power is OFF, and the blankets are 100-percent open anyway, as you can probably see.

06 05 17 00 CC Roger.

06 05 17 01 CDR-EVA So, it looks like it's all tidied up for the night.

06 05 17 04 CC Roger.

06 05 17 10 CDR-EVA Anything else, before I hop in, Joe?

06 05 17 21 CC Not a thing, Dave. Beautiful job all around.

06 05 17 24 CDR-EVA Friendly Hu - Houston, anything else before I hop in?

06 05 17 31 CC Not a thing, Dave.

06 05 17 35 F Flight Director wonders if you want to go drill a couple more holes?

06 05 17 38 LMP-LM Sounds like you turned them off, Dave.

06 05 17 42 CDR-EVA Sure does.

06 05 17 45 CC Dave, can you read Houston?

06 05 17 57 CDR-EVA Okay. Are you configured for me to come in, Jim?

06 05 17 59 CC Dave, can you read Houston?

06 05 18 00 LMP-LM Yes. Any time, Dave.

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06 05 18 03 CDR-EVA Okay. Yes. I wonder if I ought to go back and turn that back on and talk to him, the problem is?

06 05 18 13 CC Negative, negative. Transmitting in the blind.

06 05 18 17 CDR-EVA Yes.

06 05 18 19 LMP-LM Well, the LCRU is in a good - -

06 05 18 20 CDR-EVA Yes, I know it, but why don't we have comm?

06 05 18 25 CC Stand by, Dave. Stand by. Stand by.

06 05 18 28 LMP-LM That's correct.

06 05 18 30 CDR-EVA On the LCRU?

06 05 18 31 LMP-LM It's coming in.

06 05 18 32 CC Stand by, Dave. We hadn't transferred comm to the LM. We're happy. Please get on in. No further instructions.

06 05 18 42 CDR-EVA Oh, okay, Joe.

06 05 18 44 CC Okay, beautiful.

06 05 18 51 LMP-LM Okay. Dave is coming up now.

06 05 18 53 CC Outstanding.

06 05 19 27 CDR-EVA Okay. ... both arms ...

06 05 19 34 LMP-LM ... just push those off to the right there, Dave.

06 05 19 36 CDR-EVA Yes, make sure - make sure I get them all in though, so we don't have any hanging up in the cabin ...

06 05 19 48 CDR-EVA Get my antenna, Jim?

06 05 19 50 LMP-LM Okay. Can you come in a little farther? Okay. Hold it right there. Got to preserve one good antenna.

06 05 20 01 CDR-EVA Yes.

06 05 19 03 LMP-LM But mine worked pretty good with - in the stowed position.

06 05 20 06 CDR-EVA Sure did.

06 05 20 08 LMP-LM Maybe you ought to put yours down there. Save a little time.

06 05 20 13 CDR-EVA Get it?

06 05 20 14 LMP-LM No, just take it easy.

06 05 20 16 LMP-LM I'll be glad to.

06 05 20 33 CDR-EVA \*\*\* ...

06 05 20 34 LMP-LM You think? I - think it was just a ...

06 05 20 43 CDR-EVA Yes.

06 05 20 44 LMP-LM Anything I can do?

06 05 20 45 CDR-EVA No, just stay right there. ...

06 05 21 02 LMP-LM Okay. It's stowed.

06 05 21 03 CDR-LM Okay.

06 05 21 09 LMP-LM You're getting a little farther in. Now you can raise up. Dave, you can start to raise up.

06 05 21 16 CDR-LM Okay.

06 05 21 20 LMP-LM Dave, shift a little to your right, if you can.

06 05 21 22 CDR-LM Okay. ...

06 05 21 27 LMP-LM Lean forward, you're hung up on my RCU.

06 05 21 32 CDR-LM Oh, really? Thank you.

06 05 21 34 LMP-LM Okay. You're - you're -

06 05 21 37 CDR-LM Am I still hung up?

06 05 21 38 LMP-LM No. If you - Let's see, swing to your right, if you can.

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06 05 21 42 CDR-LM Okay.

06 05 21 43 LMP-LM There you go.

06 05 21 46 CDR-LM Okay. Get turned around here.

06 05 21 53 LMP-LM Okay. PRIME water closed.

06 05 21 59 CDR-LM Okay. Now, if you can get mine.

06 05 22 01 LMP-LM Get yours? All right.

06 05 22 02 CDR-LM I think I can probably get it.

06 05 22 03 LMP-LM I can get it easier, probably.

06 05 22 04 CDR-LM Get it then. Can you?

06 05 22 14 LMP-LM Yes, it's closed.

06 05 22 16 CDR-LM Okay. Can you get yours?

06 05 22 17 LMP-LM No, I'm going to need you to get mine.

06 05 22 19 CDR-LM Well, I'm going to have to get the door partially closed here.

06 05 22 33 CDR-LM Gee, it's so much nicer outside.

06 05 22 37 LMP-LM Do you want me to turn?

06 05 22 39 CDR-LM Yes, you'd better - if you can. Boy, you're really jammed in there, Jim.

06 05 22 47 LMP-LM Yes. No flap to control.

06 05 22 50 CDR-LM Okay. PLSS main line water.

06 05 22 56 LMP-LM ...

06 05 22 59 CDR-LM Jim, I sure can't reach it from here.

06 05 23 01 LMP-LM How did we do it yesterday?

06 05 23 03 CDR-LM Turn left. Can you come forward and turn left? Turn right. Just turn right the way you were, maybe all the way around.

06 05 23 13 LMP-LM But I'm hung up on it Can't really ...

06 05 23 19 CDR-LM Come forward. Oh, I know. Go up - up - to - to the tool harness on your bar. If you could go up and turn right, you'll unhook. Up and turn right? Yes. No, you're not - you're going to have to - you're going to have to get your water by yourself, I'm afraid, until we get repressed.

06 05 23 45 LMP-LM Well, we can depress with the water on.

06 05 23 47 CDR-LM Yes.

06 05 23 48 LMP-LM We'll just get a little water in the cabin.

06 05 23 50 CDR-LM Have to, because I'm not coming - Okay. Post-EVA. Water closed. Forward hatch closed and locked. Okay. Let's get that.

06 05 24 05 LMP-LM I have to get unlocked here, though, to get around.

06 05 24 07 CDR-LM I know it. Okay. Let's see if I can tell - closed and locked, I think.

06 05 24 19 LMP-LM Unless you can - you can't reach around me to get - are you - -

06 05 24 23 CDR-LM You - you have to raise your right side up and go to your left. It would be the best thing you could do. That's it. Keep coming. Up and left, up with the right and over to your left. That a boy. Good show.

06 05 24 37 LMP-LM There we go.

06 05 24 38 CDR-LM Yes, you're clear.

06 05 24 39 LMP-LM Okay.

06 05 24 40 CDR-LM Now, help me get the - Easy does it. Go easy.

06 05 24 48 LMP-LM Yes, I am.

06 05 25 00 CDR-LM Okay.

06 05 25 03 LMP-LM Okay. You can read to me. Okay?

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06 05 25 05 CDR-LM Well, let me - maybe I can get your water, if you go forward. Can - can you move into the corner?

06 05 25 12 LMP-LM Yes. I can rotate around to the right, Dave.

06 05 25 16 CDR-LM Okay. You - you've got to move.

06 05 25 19 LMP-LM Move which way?

06 05 25 21 CDR-LM Jim, into the corner, because I can't get my arm up - to your ... Now, we've got it. Okay. PRIM feed water if OFF.

06 05 25 45 LMP-LM Good.

06 05 25 46 CDR-LM I think.

06 05 25 48 LMP-LM Good show.

06 05 25 49 CDR-LM Now, if you can come around and get the hatch.

06 05 25 50 LMP-LM I got it. It's AUTO.

06 05 25 51 CDR-LM Okay. Okay. Both to AUTO, and then CABIN RE-PRESS to AUTO.

06 05 25 58 LMP-LM CABIN REPRESS, that was the first one?

06 05 26 00 CDR-LM Yes, sir. CABIN REPRESS to AUTO. Okay. CB - CB(16)ECS CABIN REPRESS, closed.

06 05 26 14 LMP-LM CABIN REPRESS, closed.

06 05 26 19 CDR-LM Okay. Coming up - .5 -

06 05 26 48 CDR-LM 2.0.

06 05 27 21 CDR-LM 4.1. Okay. We're about there. PRESS REG A and B to CABIN. Get them?

06 05 27 37 LMP-LM Yes.

06 05 27 38 CDR-LM And PLSS O<sub>2</sub> to OFF.

06 05 27 40 LMP-LM A and B to CABIN.



06 05 27 51 CDR-LM My PLSS O<sub>2</sub> is OFF. CABIN warning light should be off. Let me check it here.

06 05 28 01 LMP-LM And my O<sub>2</sub> is OFF.

06 05 28 03 CDR-LM Okay. Verify cabin pressure stable at 4.6 to 5. And we're just about 4.5 or 6. Slowly coming up. Okay, use the purge valve to depress the PGA if you need to do that, which I guess we don't. Okay, verify EBs - EVA CB configuration. You can get in your corner for a minute, and let me turn around.

06 05 28 33 LMP-LM Okay. Mine's verified.

06 05 28 42 CDR-LM Okay. Let me take a look.

06 05 28 55 CDR-LM Okay, mine's verified. Okay, CB(16) ECS: SUIT FAN number 2, closed.

06 05 29 02 LMP-LM SUIT FAN 2, closed.

06 05 29 04 CDR-LM Okay, SUIT FAN DELTA-P, closed.

06 05 29 05 LMP-LM Closed.

06 05 29 06 CDR-LM ECS caution SEP comp lights come on; those should go out. Okay, ECS and comp SEP lights are out.

06 05 29 21 CDR-LM Doff the gloves, stow on comm panel.

06 05 29 23 LMP-LM Oh, good.

06 05 29 47 CC Dave and Jim, while you're enjoying that, stand by to copy a new EVA record - 7 hours plus 12 minutes plus 53 seconds. And I'll be prepared to sign your sporting certificates a little later.

06 05 30 06 CDR-LM Oh, how about that; thank you, Joe.

06 05 30 16 LMP-LM Okay, gloves off, ...

06 05 30 22 CDR-LM Did you get them both off?

06 05 30 23 LMP-LM Yes.

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06 05 30 25 CDR-LM Okay, doff the helmets with visors, and lower shades - and stow in the helmet bag.

06 05 31 03 CDR-LM Oh, that feels good.

06 05 31 09 LMP-LM Okay, you're ... - get this up. Can you reach it?

06 05 32 15 CDR-LM Okay.

06 05 32 18 LMP-LM PLSS safety's on the dump valve.

06 05 32 20 CDR-LM Okay. Verify safety, DESCENT WATER valve to OPEN.

06 05 32 23 LMP-LM And - WATER - OPEN.

06 05 32 30 CDR-LM Okay, remove purge valve, stow in the purse.

06 05 32 43 LMP-LM Oh-ho, ho-ho - Kind of stuck, isn't it?

06 05 32 46 CDR-LM Kind of stuck, it is. It's got a little dirt in here. Just have to work on that later.

06 05 32 57 LMP-LM Yes. Here's mine, Dave.

06 05 32 59 CDR-LM Okay. Dusty.

06 05 33 01 LMP-LM ...

06 05 33 37 CDR-LM Okay, disconnect OPS O<sub>2</sub> hose.

06 05 33 48 CDR-LM ...

06 05 34 10 CDR-LM Okay, mine's off. And - let's see. Connect the LM O<sub>2</sub> hoses, red to red and blue to blue.

06 05 34 25 LMP-LM ... way and I'll turn around and see if I can get -

06 05 34 28 CDR-LM Okay. Probably should have dusted it off better.

06 05 35 13 LMP-LM Up - ... it again.

06 05 35 15 CDR-LM Huh?

06 05 35 16 LMP-LM Push it in again.

06 05 35 17 CDR-LM Okay.

06 05 35 27 LMP-LM You just got a magic touch.

06 05 35 30 CDR-LM It was easy, how did you do it?

06 05 35 33 LMP-LM Turned out, it was already unlocked. ...  
Okay. ...

06 05 35 49 CDR-LM It helped to have it back that far.

06 05 35 50 LMP-LM Did it?

06 05 35 51 CDR-LM Yes, yes. Didn't have any trouble getting it  
off ...

06 05 36 17 LMP-LM Let's do it this way.

06 05 36 34 CDR-LM Okay, get those suit plugs.

06 05 36 37 LMP-LM If you don't mind, I'll have you plug mine up.

06 05 36 39 CDR-LM Okay, yes; I thought you had them - Sorry.

06 05 36 52 CDR-LM Okay.

06 05 36 58 LMP-LM Better to come the other way, let me pass the  
other way.

06 05 37 00 CDR-LM Okay.

06 05 37 07 LMP-LM Got them?

06 05 37 10 CDR-LM No, I don't, Jim.

06 05 37 12 LMP-LM Where are they?

06 05 37 13 CDR-LM I want to get the - ... here. Why don't you  
turn around and back into your little corner?

06 05 37 25 LMP-LM Okay.

06 05 37 57 LMP-LM \*\*\* out of my suit.

06 05 37 58 CDR-LM What?

06 05 38 00 LMP-LM Water being blown out - \*\*\* the water's coming  
from.

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06 05 38 04 CDR-LM Water?

06 05 38 07 LMP-LM ... water, it's been blowing out my - helmet duct.

06 05 38 13 CDR-LM You'll have to back up, Jim.

06 05 38 17 LMP-LM That - that water off?

06 05 38 19 CDR-LM ... check.

06 05 38 24 LMP-LM It is coming out - Yes, you're right.

06 05 38 29 CDR-LM Let me check it.

06 05 38 33 LMP-LM I don't think it's off.

06 05 38 46 CDR-LM Whew, it sure wasn't. Up and off.

06 05 38 57 LMP-LM ... the rest of the ...

06 05 39 18 CDR-LM Hey, you're going to have to go over here, Jim, it won't reach you.

06 05 39 22 LMP-LM No way.

06 05 39 24 CDR-LM It won't reach you that way, Jim. You - it just - just drop it. No. No, wait. Turn -

06 05 39 40 LMP-LM Dave, I'm coming that way, may - Don't.

06 05 40 03 LMP-LM Be easier to go in through the top.

06 05 40 28 CDR-LM Can't do it unless I take these off.

06 05 40 49 CDR-LM Okay. Ear plugs. PGA diverter valve, horizontal.

06 05 40 58 LMP-LM Horizontal.

06 05 40 59 CDR-LM SUIT FLOW, for both, PLSS PUMP, OFF to the left; PLSS FAN, OFF to the left. Disconnect the PLSS H<sub>2</sub>O from the PGA and connect the LM H<sub>2</sub>O.

06 05 41 22 LMP-LM You've disconnected me already, huh?

06 05 41 26 CDR-LM The water, yes.

06 05 41 27 LMP-LM ... How about the water connected -  
06 05 41 38 LMP-LM Connected.  
06 05 41 40 CDR-LM Okay. Okay, it's connected. PLSS MODE, both,  
to O.  
06 05 42 40 CDR-LM Okay, the AUDIO panels. Switch up A to RECEIVE  
and B OFF. ICS/PT -  
06 05 53 23 CC Falcon, Houston.  
06 05 53 29 CDR-LM Hello, Houston. Go ahead.  
06 05 53 31 CC Okay, Davy, when you get to 8 - 6 on water  
recharge, I've got a change for you. When you  
can take it, just let me know.  
06 05 53 40 CDR-LM Okay, Richard. We'll do that.  
06 05 53 45 CC You two guys really know how to impress people,  
I'll tell you.  
06 05 53 52 CDR-LM Well, you know, we sure have a lot of good  
things going for us.  
06 06 31 40 LMP-LM Houston, this is Hadley Base.  
06 06 31 42 CC Go ahead, Jim.  
06 06 31 46 LMP-LM Yes, are y'all ready to go ahead with this  
battery management? It's called for at 13:29.  
06 06 31 51 CC Roger. We're watching and you're GO.  
06 06 31 57 LMP-LM Okay.  
06 06 32 06 CC Now, I know where you are in the checklist.  
06 06 32 13 LMP-LM We're trying to get through lunch time here.  
06 06 32 15 CC Well, the sooner you do it, the sooner you get  
to sleep, and we'll be very anxiously awaiting  
that.  
06 06 33 24 LMP-LM Dick, I missed your comment when we lost comm  
there.

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06 06 33 32 CC Jim, I gave you a go-ahead on that battery, and concerning your lunch, we're anxiously awaiting you to do all that so you can get to bed. We've got a time problem, as you might well recognize.

06 06 33 46 LMP-LM Yes, I understand.

06 06 33 47 CC And, we'll talk to you a little bit about that when you get a chance.

06 06 33 53 LMP-LM Okay.

06 06 34 24 CC Jim, verify POWER AMP's PRIMARY.

06 06 34 31 LMP-LM That's a - I'm sorry, I got the wrong one, Dick.

06 06 34 36 CC Okay, we didn't have you on high bit rate, but we'll get it as soon as you do.

06 06 34 47 CC Okay, we are looking at your batteries now, they look great.

06 06 35 27 CC Okay, Jim, we're getting good high bit rate and we'll watch those batteries for a little while.

06 06 35 36 LMP-LM Okay.

06 06 37 05 LMP-LM Houston, ED batteries both checked at 37.

06 06 37 09 CC Thank you, Jim.

06 06 37 57 LMP-LM Houston, this is Hadley. I have a weight report for you.

06 06 38 01 CC Go ahead.

06 06 38 05 LMP-LM Roger. SRC was 40, bag 3 was 30, bag 6 33 for a total of 103.

06 08 38 16 CC Copy, Jim.

06 06 39 33 LMP-LM And Houston, Hadley Base again, standing by for your cue to go PCM, LO, and POWER AMP, OFF.

06 06 39 45 CC Say, Jim, just give us a couple more minutes. I'll call you back on it.

06 06 39 52 LMP-IM Okay.  
06 06 40 22 CC Falcon, Houston. Okay, we're through looking  
at your batteries. You can proceed.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 05 01 -- BEGIN LUNAR REV 37  
06 05 27 57 CC Endeavour, Houston. Over.  
06 05 28 50 CC Endeavour, Houston. How do you read?  
06 05 29 20 CC Endeavour, Houston.  
06 05 31 02 CC Endeavour, Houston. How do you read?  
06 05 31 29 CC Endeavour, Houston. How do you read?  
06 05 32 14 CC Endeavour, Houston. How do you read?  
06 05 32 22 CMP And Houston, Endeavour loud and clear, and I've  
got you locked up now.  
06 05 32 26 CC Roger. I thought you were trying to tell us  
something.  
06 05 32 35 CMP Not trying to tell you a thing, Bobby.  
06 05 34 03 CC And Al, this is Houston. If you've got a  
moment, we've got the usual number of little  
updates to give you.  
06 05 34 14 CMP Go right ahead, sir. For a change, I'm ready  
to copy.  
06 05 34 16 CC Okay. First of all, we're going to cancel the  
VHF comm check at 149:37. Your buddies just  
got into the LM down there, and we don't think  
they'll be ready, and we won't push them at this  
time on that.  
06 05 34 32 CMP Okay. Understand.  
06 05 34 34 CC And the second one is it looks like we'll be  
delaying your mapping camera business at 150:10

in the Flight Plan, and we'll get back to you later on exactly what we'll be doing and when on that. And now if you'll turn to 151 hours, we have a mapping camera photo pad for you.

06 05 34 58 CMP Do you mean a pan camera photo pad?

06 05 35 00 CC Negative. It says M-A-P.

06 05 35 07 CMP At 151?

06 05 35 09 CC Stand by.

06 05 35 30 CC Okay, Al, a little explanation. It's a photo pad I'm due to read you at 150 and 10. You can find the little block there, and it happens that the pass and all that will be taking place on the 151-hour frame. So it's at the 151:10 - 150 and 10 that you'll find the little squares for it.

06 05 35 50 CMP Okay, I'm with you. Yes, when you call out a time like that, that's the time I go to in the Flight Plan.

06 05 35 55 CC Roger. I thought that's what you should do - but I guess I was wrong. Okay, T-start, 151:09 - -

06 05 36 04 CMP Okay, 150 plus 10?

06 05 36 06 CC Roger. Okay. T-start, 151:09:22. T-stop, 152:09:01. And there's a little note that says at T-start - -

06 05 36 27 CMP Roger. Understand.

06 05 36 30 CC ...

06 05 36 42 CMP Go ahead with the rest of the pad, Bob.

06 05 36 44 CC Okay. At T-start, MAPPING CAMERA IMAGE MOTION, INCREASE, talkback barber pole plus 4. At 151:52:00, MAPPING CAMERA IMAGE MOTION, INCREASE, talkback barber pole. And then I have a pan camera photo pad, if you're ready to copy that.

06 05 37 14 CMP Okay. Let's get this mapping camera straightened out first. T-start is 151:09:22, T-stop,



152:09:01. At T-start, go IMAGE MOTION, INCREASE, to barber pole plus 4; at 151:52:00, go IMAGE MOTION, INCREASE, to barber pole.

06 05 37 34 CC Roger. And this pan camera is the one at 151:03 in the Flight Plan.

06 05 37 43 CMP Roger. Go.

06 05 37 45 CC Okay. It says T-start, 151:13:13. T-stop, 151:37 to 01. And the next pan camera pad will be voiced up next rev. Over.

06 05 38 06 CMP Okay, Bob. Understand. T-start is 151:13:13; T-stop, 151:37:01.

06 05 38 18 CC Roger. Copy.

06 05 38 50 CC Okay, Al, and another addition is that at 1505 in the Flight Plan, you'll see some mapping camera activities, and you'll find that 150:05.

06 05 39 09 CDR Okay, go ahead.

06 05 39 12 CC Roger. And we will move the activities that start with the LASER ALTIMETER, ON - that's the third line down in that little block - move the activities starting with LASER ALTIMETER, ON, to MAPPING CAMERA IMAGE MOTION, INCREASE, to (talkback barber pole)/ON which is the last line in that little block. Those will be moved to 151 hours and we will supply you with a T-start later.

06 05 39 47 CMP Roger; understand. All items between LASER ALTIMETER, ON, and MAPPING CAMERA IMAGE MOTION, INCREASE, to barber pole should be moved to a GET of 151:00 and you'll supply a start time later.

06 05 40 01 CC Roger.

06 05 40 13 CC And Al, that T-start - turns out I gave to you - is the 151:09:22.

06 05 40 25 CMP I see. Convenient, isn't it?

06 05 40 28 CC Well, sort of.

06 05 52 57 CC Endeavour, Houston. Over.

06 05 53 02 CMP Go ahead, Houston; Endeavour.

06 05 53 04 CC Roger. Whenever you got a moment, we've got a few questions the king would like to have asked of you concerning your photo activities so far.

06 05 53 15 CMP Roger. Go ahead.

06 05 53 16 CC Okay. Hey, Al, Vance here. If you've got a pencil and paper and I'll let you write these things down; should take about 5 minutes.

06 05 53 28 CMP Okay, just a second.

06 05 53 47 CMP Okay, Vance, go ahead.

06 05 53 49 CC Okay. These are going to all refer to your visual sighting targets, and so the first one is V-1B, Tsiolkovsky. You don't need to pull out the book, just - but I'll reference them to the pages in the book. First question - or the first comment is, would you mark the area on - in your book - on the central peak where you saw layering, and when you get back, we can look at it.

06 05 54 29 CMP Okay, got that one. Go ahead.

06 05 54 31 CC Okay. You spoke of a crater on the northeast side of Tsiolkovsky's rim, and you said it had a fault line. Could you mark that on your map, also?

06 05 55 01 CMP Okay. I think I already have, but I'll double check.

06 05 55 04 CC Okay. Next, referring to the - the rim of Tsiolkovsky, you know, the famous sections that appear to be moved inward and outward. The question - Does it appear to you that the west segment of the wall moved inward, or did the northwest segment move outward?

06 05 55 45 CMP I think it's just the other way around, Vance, I'll - I'll check it again and mark it on the map next time by; but, as I recall, I think the west section looks like it's moved westward.

06 05 55 56 CC Okay. Next, and this would be V-1A, question 2. We'd just like to have you make sure that you - taken a look at that one.

06 05 56 20 CMP Okay. What's the title on V-1A?

06 05 56 23 CC Okay, that's Tsiolkovsky, also. Question 2.

06 05 56 30 CMP Oh, I see. Yes, okay. Yes.

06 05 56 33 CC Okay, going to V-2. Referring to Picard, you talked about the layering on Picard wall. Do the layers have a uniform thickness and any estimate of how thick the layers are?

06 05 56 47 CMP Yes.

06 05 56 56 CC You might speak of the thickness of the layers in terms of the total depth of the crater.

06 05 57 06 CMP In terms of the depth of the crater - or in terms of the diameter of the crater?

06 05 57 11 CC Well, either way - most convenient with you.

06 05 57 24 CMP Well, okay. That's a - that's a little difficult to do because the layering is - most of the layering is pretty - pretty thin. I would say - maybe 1/20th of the thickness or the - 1/20th of the depth of the crater and - very small - comparison with the total diameter. I'd say maybe a 1-percent thickness layer as compared to the diameter.

06 05 58 04 CC Okay.

06 05 58 09 CC Okay, going to V-5. This is Littrow. Al, you mentioned the cinder cones, and there's just some curiosity on the relative size of these cinder cones. And - in judging the size, it's 12 kilometers between each line on your V-5 photo. And while we're at it, are the cinder cones fairly evenly distributed or are they concentrated in the spots on this darkest unit?

- 06 05 58 59 CMP They're concentrated in spots on the darkest unit, and they seem to be concentrated in localized areas also within the darker units, there'd be a relatively high density of these small cones, and then a few scattered ones in the - you know, in the outlying areas. But I would say they were concentrated within the darker areas, more on the lowland side, you know, in the valleys and in what looks like the lower areas. And within - within concentrations of cinder cones there seems to be one locus of major activity, one locus of the greatest number of cones, and then they thin out beyond that.
- 06 05 59 45 CC Okay. Maybe you can mark that on your map where you see these concentrations.
- 06 05 59 56 CMP Yes, I can do that, but I think the pictures will be better, Vance, because the cinder cones are much smaller than the definition in the picture.
- 06 06 00 03 CC Okay. And, I'll give you one more, V-8, and that's the landing site. Just like to make sure you try to get an opinion of questions 1 and 2 and the age relationship also on that question we asked earlier about Aristillus and Autolycus. And that's all I'll give you right now.
- 06 06 00 30 CMP Yes. Okay, Vance. I'm over the landing site now and that unit up along the western edge of the Front there to the northeast of the landing site very definitely looks like a flow unit that's - that's flowed along or parallel to the base of the front.
- 06 06 00 52 CC Okay. Copy that. I guess you've got some other stuff coming up.
- 06 06 00 55 CMP You can make - you can make out some - -
- 06 06 01 08 CC Go.
- 06 06 01 34 CC Okay, that's about it, Al. I'll turn you back to Bob and - just some things to mull over.

06 06 01 42 CMP Okay, Vance, thank you much.

06 06 01 44 CC Righto. Okay, Al. And we'd like the high gain antenna to AUTO and when you've got a moment, we'll pass you up a TEI-45 pad, but I guess there's no big rush on that.

06 06 02 01 CMP Okay. And, incidentally, on this mapping camera pass, you started that block at LASER ALTIMETER, ON. Do you want that to start at - at the covers opening or do you want me to go ahead and extend the camera now?

06 06 02 21 CC We had a pad that started at MAPPING CAMERA COVERS, OPEN, and they explicitly took that one away and gave me one that started at LASER ALTIMETER, ON. So I presume they want the first two lines done.

06 06 02 36 CMP Okay. Well, I'm going to go ahead and open the covers and extend the camera, then.

06 06 03 01 CMP Okay, camera's extending.

06 06 03 04 CC Copy.

06 06 17 06 CC And Endeavour, Houston. Over.

06 06 17 16 CMP Houston, Endeavour. Go ahead.

06 06 17 18 CC Roger. At your convenience, we'll take P00 and ACCEPT and send you up a state vector, and - we need ACCEPT, and we'll send you up a state vector and clock update. And, I've got a TEI-45 pad, at your convenience.

06 06 17 37 CMP Okay, Bob. Ready for both.

06 06 17 42 CC Okay, we're talking to you and I've got the TEI-45; says SPS/G&N: 37264; plus 0.60, plus 1.00; 166:38:58.32; plus 2832.6, plus 0290.1, minus 0078.2; 180, 129, 009. Rest of the pad is NA. Notes: 1, longitude at  $T_{ig}$  plus 163.63; 2, assumes no plane change. And ullage is 17 seconds - -

06 06 18 57 CMP Roger. Understand.

06 06 19 12 CC Okay, Al. And ullage is 17 seconds, two quads, Bravo and Delta. Over.

06 06 19 28 CMP Okay, Houston. Understand. TEI-45, SPS/G&N: 37264; plus 0.60, plus 1.01; 166:38:58.32; plus 2832.6, plus 0290.1, minus 0078.2; 180, 129, 009. That's two jets for 17 seconds, and you want quads B and D used. And this assumes no plane change, and longitude at  $T_{ig}$  is plus plus 163.63.

06 06 20 02 CC Roger. And, the NOUN 48 values are plus 060 and plus 100. Is that right?

06 06 20 17 CMP Roger. Plus 100 - plus 060 and plus 100.

06 06 20 21 CC Okay. Readback good.

06 06 21 25 CC And Endeavour, the computer is yours again.

06 06 21 35 CMP Roger, Houston.

06 06 29 26 CC And Endeavour, Houston. We'd like to terminate battery A charge at this time.

06 06 29 36 CMP Roger, Houston. Terminating A.

06 06 35 57 CC And Endeavour, as you go around the hill, you're looking good. We'll look for you on the other side.

06 06 36 06 CMP Okay, Houston. See you on the other side.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 06 40 32 LMP-LM Rog, Roger. We'll reconfigure.

06 06 44 05 CC Falcon, Houston. PCM, LOW, please.

06 06 44 15 LMP-LM Roger; PCM, LOW.

06 07 13 10 CC Falcon, Houston. Jim and Dave, can you let me know whereabouts you are. I've got some word for you before you get to PLSS recharge and the ETB stowage.

06 07 13 22 CDR-LM Okay. Jim's just getting out of his suit now. I'm out of mine.

06 07 13 27 CC Okay, Dave. I bet that feels good.

06 07 13 33 CDR-LM Yes, boy.

06 07 13 35 CC Look - on that telemetry biomed, since we looked at you last night, you can leave that where it is in the right position, and we'll look at - at Jim tonight.

06 07 13 45 CDR-LM Okay, fine. And I'll tell you the secret to living up here is getting out of these suits. It really makes the difference.

06 07 13 51 CC Yes, I believe you're absolutely right. Okay, and I owe you a word on your PLSS recharge. When you have those things in that good vertical position, they want you to charge that descent water for 10 minutes instead of 5 you have on your checklist.

06 07 14 18 CDR-LM Okay, that's easy enough. 10 minutes instead of 5. We'll do that.

06 07 15 15 CC Okay, Dave. The only additional thing I have for you - you can just listen to this. Before you put the film away in the ETB, I've got a little word on the 16 millimeter stuff, and also I'll talk to you about Jim's 70 millimeter when you come back to me.

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06 07 15 34 CDR-LM Okay, Dick. We'll give you a call as soon as we get to that point.

06 07 16 07 CC And, I just thought I would let you know that you worked right through - right through your eat period.

06 07 16 16 CDR-LM We were just looking at that, as a matter of fact. I think we got 10 minutes left, don't we?

06 07 16 22 CC No, I'm sorry about that, old friend.

06 07 16 28 CDR-LM By golly you're right. We just went by it, didn't we. Oh, well, we have to skip some of the things up here, I guess.

06 07 31 20 CDR-LM Okay, Houston, Hadley Base here. We're ready to talk about the ETB.

06 07 31 27 CC Dave, can you hold up until we clear up the comm, please?

06 07 31 33 CDR-LM ...

06 07 31 42 CC Okay, Dave; this is Houston. How do you hear me now?

06 07 31 48 CDR-LM You're loud and clear.

06 07 31 52 CC Well, stand by. We're getting a lot of static again. Okay, it seems to have cleared up, Dave. On your ETB loading, if you've got page 8-7 there for the ETB, I've got just a couple of changes.

06 07 32 10 CDR-LM Okay, I've got it right in front of me with a pencil. Go ahead.

06 07 32 13 CC Okay. Here's - On the black and white MAG column which - It has VV and WW, add Roger Roger.

06 07 32 37 CDR-LM Okay. Add Roger to V - Victor Victor, right?

06 07 32 43 CC Okay, Dave. You're down quite a bit. Scratch the black and white magazine Mike Mike that was on the 500. Leave that onboard the IM, and you can use WW, which is on the next line up there, for



the 500 millimeter. Add two more 16 millimeters, Golf Golf and Hotel Hotel.

- 06 07 33 12 CDR-LM Okay. So far I've added Roger, scratched Mike, and added Golf and Hotel in the 16.
- 06 07 33 19 CC Okay. You can use WW on the 500. On this 1600 millimeter stuff, some instructions that never got up to you and didn't get to us until today, on those 16 millimeter MAGs, the limit on advancing that film is one frame, and there are two red perforations - two red marks along side the window there, and if you can line up a perforation hole with those two red marks, we ought to be in business on the 16 millimeter.
- 06 07 33 52 CDR-LM Dick, we did that today. We knew about that primarily because of the split ring problem. And we made sure all along that those perforations were lined up with the red marks - -
- 06 07 34 05 CC Okay.
- 06 07 34 06 CDR-LM ... MAGs today, too.
- 06 07 34 07 CC Okay, that's very good. Then we've done all we - we've done all we can with the 16, and I don't know what you've done with Jimmy's 70 millimeter. But the only thing we can assess - suggest from down here - If there's still - the MAGs still has exposures left, play the game with the two white windows on the camera and the magazine. And if that MAG doesn't work, try to find one that does, I guess.
- 06 07 34 36 CDR-LM Okay. We haven't had a chance to exercise it yet, but we'll go through everything we can figure, and if it doesn't work, we'll give you a call.
- 06 07 34 43 CC Yes, I knew you would. I just wanted to remind you of it. Would you verify the MESA HEATER circuit breaker open for me?
- 06 07 35 03 CDR-LM Okay, it was closed and now it's open.

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Tape 970

06 07 35 06 CC Okay, thank you. And I guess you still have taping procedures for your PLSS, and we'll call you when the VHF window comes up with Al. Further, there will be no science debriefing for you guys tonight. You did such a superb job today that we don't have very many questions down here. And we would like to use that time to get you gone, and get you to bed. As you can well guess, we're holding lift-off time right where it is, and we want you to get a good night's sleep, so we're going to have to steal some time from somewhere and we're doing the best we can. We're looking at the EVA for tomorrow for you.

06 07 35 47 CDR-LM Okay, Dick. We know it's in good hands and we'll be standing by. We'll give you a call when we get around to those PLSS recharges.

06 07 35 54 CC Okay, very good, Dave. And if you - you want to talk to Al this pass?

06 07 36 00 CDR-LM Yes, let's say hello to our old Endeavour buddy up there.

06 07 36 04 CC Okay. I'll give you a call.

06 07 52 37 CC Falcon, Houston. Over.

06 07 52 43 CDR-LM Go ahead.

06 07 52 45 CC Roger, Al is going to give you a call on simplex Alpha about now.

06 07 52 52 CDR-LM Okay, thank you.

06 07 54 27 CC Falcon, this is Houston. Al has been calling you.

06 07 54 36 CDR-LM ...

06 07 54 44 CDR-LM Okay, Endeavour, Falcon. You must be on the other side of the mountains and we'll just stand by until you get over it, because you are always broken over there on the other side.

06 07 55 12 CDR-LM Hi, Endeavor to Falcon. How are you?

06 07 56 30 CDR-LM Endeavor, Falcon. You're broken. How's this?

06 07 56 37 CDR-LM Okay, we'll wait until you get closer overhead, so you get past the mountains.

06 07 56 49 CDR-LM How are things going up there? Get lots of good data?

06 07 57 03 CDR-LM Yes, we are too, we're - Got a little over 100 pounds today. Got up the side of the mountain. Got a good look around. Things are going real well. Oh, man, it was super, just super. We got some great pictures for you. Yes, I tell you, I hope you can see these Rover tracks, because outside the IM here, it looks like a freeway.

06 07 57 43 CDR-LM Okay, make a nice little place for them.

06 07 57 50 LMP-LM Hey, Al, throw my soap down, will you? And my spoon.

06 07 58 00 LMP-LM I really need my soap. Save me a little bit.

06 07 58 16 LMP-LM I - I suggest you wait until tomorrow night, Al, ...

06 07 58 28 LMP-LM Yes, I tell you, our - our suits were pretty ... yesterday, but ...

06 07 58 36 CDR-LM Very well. Holding up real good.

06 07 58 42 CDR-LM Well, the Rover is doing absolutely super. We were going up the side of that mountain like ...

06 07 58 54 CDR-LM Yes, it's a - really a super fine machine.

06 08 01 21 CC Falcon, Houston. Over.

06 08 01 29 CDR-LM Go ahead Houston.

06 08 01 30 CC Roger, we've seen - water usage in the last few minutes, can you confirm that this is a PLSS refill?

06 08 01 41 CDR-LM That's correct. We're 9 minutes into the 10 minutes refill.

06 08 01 46 CC Roger. Beautiful. Thank you and we have two other items for you here. I have some lift-off times, when Jim is ready to copy. And I'd like

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Tape 972

to rein - reinforce for your consideration Dick's comments on sleep time. We have a hard limit down here of 7 hours from the time you crawl into the hammocks until the time we can figure on your arising to start activities tomorrow. Do you understand?

06 08 02 18 CDR-LM Yes, Roger. I think we're making some time up. We're in pretty good shape. We're almost finished with dinner. We've got one PLSS just now finishing it's recharge, and the suits are all stowed and we've stowed some of the rocks, so we're in pretty good shape.

06 08 02 31 CC Okay, and the sooner you can call me to say if you're in the hammocks, that's fine with me.

06 08 02 44 CDR-LM I understand your problem.

SEPARATE, SIMULTANEOUS COMMUNICATIONS IN USE LINK BETWEEN CC AND CM

06 09 59 -- BEGIN LUNAR REV 39

06 07 26 11 CC And, Endeavour; Houston. How do you read?

06 07 26 17 CMP Houston - Houston, Endeavour. Loud and clear.

06 07 26 19 CC Okay. Ready for - the usual updates?

06 07 26 29 CMP Okay. Go ahead.

06 07 26 30 CMP Okay. Pan camera photo pad for your 151:50 in the Flight Plan.

06 07 26 42 CMP Go ahead.

06 07 26 43 CC Okay. It's 151:57:14 for T-start. T-stop is 151:58:27. Over.

06 07 27 02 CMP Understand. T-start, 151:57:14. T-stop, 151:58:27.

06 07 27 09 CC Roger, Al. And we got a couple of VHF's - we got a single VHF window for you if you want to try and get hold of the crew down below. AOS is 151:51:25 and 152:04:15 for LOS. Over.

06 07 27 14 CMP Okay, I understand. AOS with LM is 151:51 and LOS is about 152:04.

06 07 27 52 CC Roger. And if you'll give us a cue just a little bit ahead, we'll get them to go to VOICE so they can pick you up.

06 07 28 01 CMP Okay, will do.

06 07 28 02 CC Okay. And second item, Al, is we're not going to put the mass spect boom out tonight because of the problems we've been having with deployment. And so, we want to delete the following operations of the Flight Plan. Starting on 152:10 - 152:10. We will delete the boom deployment at 152:10. We will delete the EXPERIMENT and ION SOURCE, ON, and STANDBY, at 152:13. And we will delete the MULTIPLIER, DISCRIMINATOR, and ION SOURCE functions at 152:45. Over.

06 07 28 56 CMP Okay, Bob. Understand 152:11, delete mass spect deployment, that whole line, and then delete the line that turns the experiment on at 152:13, and then at 152:45, delete the MULTIPLIER DISCRIMINATOR steps.

06 07 29 16 CC Roger. And, going over to the next page at 153:36, we will delete GAMMA RAY: GAINSTEP, SHIELD OFF.

06 07 29 33 CMP Understand. Delete SHIELD OFF at 153:36.

06 07 29 37 CC Roger. And then going down to 153:46, we'll delete SHIELD ON.

06 07 29 50 CMP Understand. Delete SHIELD ON at 153:46.

06 07 29 54 CC Roger. And a - a general question here, Al. We've been talking on the ground and we'd appreciate any comments on the general photo results you been having, any difficulties or problems you've been experiencing in the general photographic work, both gegenschein, zodiacal-light type, and surface type. So far, we've generally assumed that negative reporting was - meant that everything was going well. Is that right?

06 07 30 28 CMP Hello, Houston, Endeavour.

06 07 30 30 CC Yes, I read you loud and clear, Al.

06 07 30 35 CMP Okay. You went away on me there. ... question about?

06 07 30 44 CC Stand by, Al.

06 07 31 05 CC Al, how do you read Houston?

06 07 31 10 CMP Okay. I read you loud and clear.

06 07 31 12 CC Okay. Did you copy my question there on comments concerning your procedures on the photo, general - generally both gegenschein, zodiacal light, and surface?

06 07 31 31 CMP You say - The question is, do I have any questions on it?

06 07 31 35 CC Roger. My question was, did you copy my question?

06 07 31 45 CMP Why don't we start from scratch again, Bob; you were cut out there quite a bit when you first started talking, and it sounds like I'm reading you okay now. So why don't we just start all over again.

06 07 31 54 CC Yes, I think we have a little comm problem with the IM, which affected us. Okay. People on the ground have generally been assuming that negative reporting on any difficulties with the command module photo procedures meant that everything was going along swingingly. Is that a correct assumption?

06 07 32 13 CMP That is a correct assumption, right.

06 07 32 16 CC Okay. We'll continue to make that assumption. Thank you.

06 07 32 23 CMP Yes, so far everything - particularly the zodiacal light and the gegenschein calibration and that sort of thing has been going just as per Flight Plan.

06 07 32 34 CC Beautiful.

06 07 52 05 CMP Houston, Endeavour.

06 07 52 08 CC Go ahead, Endeavour.

06 07 52 12 CMP Okay, Bob. I'm going to try to give them a call now, down at Falcon.

06 07 52 16 CC Okay. Stan - Go ahead and I'll - You won't get them right off, but I'll tell them to go to VOICE.

06 07 52 24 CMP Okay. And I'm going to call them on SIMPLEX A.

06 07 52 28 CC Understand. SIMPLEX Alfa.

06 07 52 34 CMP Affirmative.

06 07 53 13 CMP Hello - Hello, Falcon. This is Endeavour.

06 07 53 53 CMP Hello, Falcon. This is Endeavour.

06 07 54 08 CMP Hello, Falcon. Endeavour.

06 07 54 39 CMP Hello there, Falcon. This is Endeavour.

06 07 55 06 CMP Hello, Falcon. Endeavour.

06 07 55 15 CMP I'm doing fine. How are you doing?

06 07 55 39 CMP How do you read me now, Falcon?

06 07 56 24 CMP Hello, Falcon. This is Endeavour.

06 07 56 32 CMP You're a little broken too, Dave. How's it going?

06 07 56 40 CMP Okay, I'm just about overhead now.

06 07 56 46 CC And Endeavour, you're about 30 seconds from your pan camera.

06 07 56 53 CMP Roger.

06 07 56 59 CMP Oh, getting lots and lots of good data. How about you?

06 07 57 09 CMP Very good.

06 07 57 17 CMP Pretty spectacular up beside that mountain, I bet.

06 07 57 24 CMP Good. I hope I got some good ones for you, too.

06 07 57 33 CMP Yes, I'll bet it does. Well, you can collect you another bunch of rocks tomorrow and bring them home.

06 07 57 45 CMP And we'll make a place for whatever you bring home.

06 07 57 55 CMP You forget something, Jim?

06 07 58 02 CMP Don't mind if I use it, do you?

06 07 58 10 CMP Well, I haven't had a chance to use it yet, but I might tonight.

06 07 58 21 CMP Yes, that's true. I guess it will pay for us all to do that tomorrow night.

06 07 58 35 CMP How are they holding up?

06 07 58 39 CMP Understand the Rover's doing fine.

06 07 58 50 CMP Sounds great.

06 07 58 59 CC Okay, Al, PAN CAMERA, OFF, please.

06 07 59 04 CMP Okay.

06 07 59 49 CMP Falcon, you still there?

06 08 00 08 CMP Falcon, can you read Endeavour now?

06 08 00 16 CC And Endeavour, Houston. We still don't have the PAN CAMERA, OFF, as far as we can see.

06 08 00 32 CMP Roger. Power coming OFF now, Bob.

06 08 00 36 CC Okay.

06 08 00 37 CMP Sorry about that. I didn't get it turned off quite as quick as I wanted.

06 08 00 39 CC I guess that's what Spence was trying to tell me.

06 08 00 45 CMP Roger. I went to STANDBY on your call before.

06 08 00 49 CC Okay. Thank you. Hey, and Al, we'd like to get HIGH GAIN ANTENNA, AUTO, from you. And sometime, at your convenience, you might send us down a film-usage pad.



06 08 01 04 CMP Okay. I'll set - I'll compile that on the way around the next time.

06 08 01 11 CC Roger. Thank you.

06 08 03 43 CC And Endeavour, Houston. Over.

06 08 03 49 CMP Houston, Endeavour. Go ahead.

06 08 03 50 CC Roger. We'd also like, when you turn off the mapping camera in the next few minutes, we'd like you to delay turning off the laser altimeter and closing the covers until we give you a call from the ground. We'd like to look at the laser altimeter on with the mapping camera off for a few minutes.

06 08 04 09 CMP Okay. Will do.

06 08 04 11 CC Thank you.

06 08 12 56 CC Al, Houston. Over.

06 08 13 02 CMP Houston, Endeavour. Go ahead.

06 08 13 04 CC Al, would you turn the LASER, OFF, and we'll call you shortly and have you turn it back ON.

06 08 13 16 CMP Okay, Vance, going OFF now.

06 08 13 18 CC Roger. Okay. We're ready for it back ON. Thank you.

06 08 13 31 CMP Back ON.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 08 15 10 CDR-LM Houston, Falcon.

06 08 15 13 CC Roger, Falcon. And I guess we're a little gun shy, but we're still seeing some water usage, and we'd like to confirm that you're getting some good out of it, and it's not running out on the floor.

06 08 15 25 CDR-LM Well, listen. We're glad you're watching. We like that and we're charging the second PLSS right now, and we're about 5 minutes into it.

06 08 15 34 CC Say again, Dave; you're kind of weak.

06 08 15 40 CDR-LM I said, we're glad you're watching, and we're charging the second PLSS now, and we're about 5 minutes into it.

06 08 15 48 CC Okay, very good.

06 08 25 34 LMP-LM Houston, this is Hadley Base, ready to copy pad - lift-off pad.

06 08 25 45 CC Go ahead, Hadley. This is Houston.

06 08 25 52 LMP-LM Yes, Bob. Ready to copy lift-off values for T-38 through 41.

06 08 25 58 CC Roger. ...

06 08 26 27 CC Okay, Jim. We have T-38 is 151:58:58, T-39 is 153:57:03, T-40 is 155:55:07, T-41 is 157:53:14. Over.

06 08 27 10 LMP-LM Roger, Bob. Copied 151:58:58, 153:57:03, 155:55:07, and 157:53:14. Over.

06 08 27 23 CC Roger. Good readback, Jim, and I think that's all I have on my list here. We'd like a crew status report sometime before you go to bed, but unless you guys have a question, that's about all I have here on the ground.

06 08 27 39 LMP-LM Okay, our PLSS recharge is about complete.

06 08 27 43 CC Okay, copy.

06 08 33 01 LMP-LM Bob, this is Jim.

06 08 33 14 LMP-LM Houston, this is Hadley Base.

06 08 33 43 LMP-LM Houston, Hadley Base.

06 08 33 46 CC Go ahead, Hadley.

06 08 33 56 CC Hadley Base, this is Houston. Over.

06 08 33 58 LMP-LM Bob, this is Jim. Bob, this is Jim calling.

06 08 34 02 CC Go ahead.

06 08 34 13 CC Jim, this is Bob; go ahead.

06 08 34 18 LMP-LM Yes, I was wondering whether you'd heard from the Endeavour that's sailing through the Northwest Passage. It should be at Point Barrow now. He said he would be - try to give us a call.

06 08 34 29 CC Tonight?

06 08 34 33 LMP-LM Or sometime while we're on the Moon.

06 08 34 35 CC Okay. We've heard nothing that I know of.

06 08 34 40 LMP-LM Okay. Somehow he was going to try and come through Mission Control down there.

06 08 34 43 CC Okay. No, we - I haven't seen anything while I've been in here, and, Jim, you and Dave might think also that - -

06 08 34 50 LMP-LM ... problem.

06 08 34 51 CC Go ahead. Stand by, Jim.

06 08 35 03 LMP-LM Yes, we - your transmission was cut out. Say again, Bob.

06 08 35 12 CC Okay, Jim. It turns out we do indeed have said message, which reads: "We carry out our separate voyages in the spirit of Endeavour which unites people in their efforts to overcome the common tasks when confronted by the elements of sea and wind or harsh environment of space. Hopefully, this voyage will bring the nations of Earth closer

together as we explore beyond our planet in the name of Endeavour." And so forth. Okay?

06 08 35 42 LMP-LM Very good. Thank you for the message, Bob.

06 08 35 44 CC Okay, and another message that you guys might pause to consider is that the Surgeon is going to want you to change your sponges and tapes in the morning.

06 08 36 02 LMP-LM Roger; we understand.

06 08 36 04 CC Okay. We'll be standing by for a call when you go to sleep.

06 08 36 14 LMP-LM Roger.

06 09 14 27 CDR-LM Hello, Houston; Hadley Base.

06 09 14 31 CC Go ahead, Hadley.

06 09 14 35 CDR-LM Okay. Start your clock.

06 09 14 38 CC Beautiful, and we'd like to verify a couple of things before you go to bed; 1, that you called up the computer and then put it back to sleep; and 2, that you've changed the lithium hydroxide canisters.

06 09 14 51 CDR-LM Roger. Both verify.

06 09 14 54 CC Roger. And do you have any crew status?

06 09 15 03 CDR-LM Oh, yes. We're both fine. No medication and in the sack.

06 09 15 09 CC Okay, and that was a super day today, Jim - Dave and Jim. We'll wake you up in approximately 7 hours.

06 09 15 18 CDR-LM Okay, Bob. Thank you. We had a great time.

06 09 15 21 CC It looked that way.

06 09 15 26 CDR-LM No kidding?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK BETWEEN CC AND CM

06 08 18 11 CC Endeavour, Houston.

06 08 18 17 CMP Houston, Endeavour. Go ahead.

06 08 18 18 CC Roger. We'd like to see the LASER ALTIMETER, OFF at this time, and you can follow up on the rest of those things per the Flight Plan; closing - retracting the mapping camera, et cetera, and closing the cover.

06 08 18 39 CMP Okay, Houston. That's in work.

06 08 18 42 CC Okay, and we'd also like you to verify if the gamma ray boom is out at the present time.

06 08 18 58 CMP That's negative. It's going out now.

06 08 19 02 CC Copy. Thank you.

06 08 25 43 CMP Houston, Endeavour.

06 08 26 09 CMP Hello, Houston. Endeavour.

06 08 28 26 CC Endeavour, you called Houston?

06 08 28 34 CMP Houston, Endeavour. Yes. I sure did, Bob.

06 08 28 37 CC Roger. I was talking to Jim and Dave. Go ahead.

06 08 28 43 CMP Okay. You still logging Delta Ps on extend and retracts.

06 08 28 49 CC Yes.

06 08 28 56 CMP Well, I guess that means yes. Delta P and the gamma ray extend was 2 plus 37, and on the mapping camera, retract was 3 plus 32.

06 08 29 07 CC Roger. Copy, Al.

06 08 29 12 CMP Okay.

06 08 33 10 CC And, Endeavour; Houston. We see you going around the corner. You're looking good to us; we'll see you on the other end.

06 08 33 19 CMP Okay, Houston. See you on the other side.

06 08 33 22 CC Bye, bye.

06 09 23 11 CC Endeavour, Houston. Over.

06 09 23 19 CMP Hello, Houston. Endeavour.

06 09 23 22 CC Okay, Endeavour. We've got a couple of long-sort-of dissertations to read to you. One, is a dissertation and two, a question. So if you've got a minute, let me know, and I'll talk to you between bites of your supper.

---

06 09 23 43 CMP Okay. Go ahead.

06 09 23 44 CC Okay. It says here. We've observed the use of P30 for long periods of time and this appears to be degrading the P20 attitude calculations during narrow deadband camera activity. And this is causing a slight increase in RCS usage. If you want to use P30, they're recommending you follow the following procedures. And you won't be doing any of it tonight, obviously, and I think we'll come up and let you copy them down tomorrow. This is just, I guess, to acquaint you with the problem and let you think about it tonight while you're sleeping. The procedures we're recommending, when you use P30, as are follows: One, reselect P20; that is, release P30 once every 30 minutes, and allow the computer to integrate its state-vector forward. This is about a 30-second dealy [sic]. And then, number 2, do not input a  $T_{ig}$  time of more than 30 minutes into the future, while you're in narrow dead band. Does that make sense to you?

06 09 24 45 CMP Yes. Keep talking.

06 09 24 47 CC Okay. As I say, we'll come back up and let you copy down some of those specific words again tomorrow, before you get involved. The second long one concerns clarification of the mass spec behavior, when it fouled up about 12 hours ago. And they're asking us, to ask you the following questions, to try and clarify what - what was going on. First of all, was the talkback ever one-half barber pole during the extend, while attempting to recycle for retraction? Over.

06 09 25 22 CMP The answer to that one is no.

06 09 25 24 CC Okay. Two, was the barber pole indication a half or between a half and three quarters of full during retract?

06 09 25 44 CMP Don't know how to answer that one, Bob, because the barber pole itself - if you get a full barber pole, you only get about two thirds.

06 09 25 54 CC Okay. Understand. Did the talkback change state after approximately -

06 09 25 59 CMP And I was getting about half of that.

06 09 26 03 CC Okay. You're getting about half of the normal two thirds?

06 09 26 12 CMP That's correct.

06 09 26 13 CC Okay. Third question. Did the talkback change state after approximately 3 minutes, or was it a half barber pole all the time during the retraction?

06 09 26 31 CMP Well I can't answer that one, specifically, since I didn't sit there and watch the barber pole all the time.

06 09 26 39 CC Okay.

06 09 26 40 CMP However, I did - When I went back to the mass spec, to cycle the thing to DEPLOY and RETRACT to see if there was any possibility of the cabling out there getting kinked, that was when I noticed that it went to half barber pole on the retract side.

06 09 26 56 CC Okay. Copy that. And did you - talk the back - did you ever tap the barber pole when it was half barber pole?

06 09 27 13 CMP I'm sorry. Say again.

06 09 27 14 CC Did you ever tap the talkbacks to see if you could make it flip over?

06 09 27 27 CMP I noticed a couple of times, when I went to RETRACT, the barber pole would go - it would go full barber pole and then very slowly slip down to about half barber pole and stay there.

06 09 27 39 CC Okay. But did you tap the talkback at any time?  
Tap?

06 09 27 45 CMP Oh, did I tap it? Negative. Negative.

06 09 27 48 CC Okay. And, during the recycling of the switch, can  
you estimate the maximum time you were in the EXTEND  
position?

06 09 28 12 CMP I'm not sure I understand your question. You mean  
the maximum time I was in the EXTEND position during  
the retract cycle?

06 09 28 26 CC Stand by.

06 09 30 16 CC Al, what's wanted is the total accumulative time  
that you went back to the EXTEND position, and  
back and forth, while you were trying to recycle  
it in order to free it. In other words, if you  
went back to 30 seconds, and then to RETRACT, and  
then back to EXTEND for 40 seconds, et cetera.  
What was the total accumulated time, or an esti-  
mate thereof, that you were in the extend position?

06 09 30 46 CMP Okay, Bob. I'd - I would estimate that I was in  
the EXTEND position a total of about 15 seconds.

06 09 30 56 CC Okay. And what was the longest single time?

06 09 31 02 CMP Oh, probably 4 seconds.

06 09 31 05 CC Okay. A couple of other small ones, Al. Reminding  
you that we - we're deleting the cabin pump up  
from the presleep checklist. And a reminder when  
we get to the presleep checklist and the crew  
status, would you please remember to give us the  
PRDs. We just didn't get that from the crew on  
the ground and the Surgeons were very anxious  
to get yours, at least. And we also, I guess, are  
due some P52 torquing angles.

06 09 31 39 CMP Okay. He wants my PRD, even though it's the one  
that's not working, huh?

06 09 31 46 CC Well - they - Anything is better than nothing.



06 09 31 55 CMP I guess you're right. Here's some torquing angles for you, Bob. Used stars 41 and 43. NOUN 05 was plus four balls 1; NOUN 93 was plus 00028, minus 00031, plus all zeros. And it was torqued out at 152:46:00.

06 09 32 25 CC Roger. Copy. 01, 28, 31, all balls; 152:46:00.

06 09 32 40 CMP And I've got a film update for you there, Bob, to give to Spencer.

06 09 32 44 CC Go ahead.

06 09 32 49 CMP Okay. The magazines used today, and the exposures. These are a total - a total frame readings, too. Magazine Q is reading 31, magazine F is reading 111, magazine T is 37 and that one's been changed out for Uniform, for U, Uniform. And Uniform is now reading 31.

06 09 33 21 CC Roger. Copy, Al.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO AIR-TO-GROUND VOICE TRANSCRIPTION

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 09 52 40 CMP Houston, Endeavour.  
06 09 52 43 CC Go ahead, Endeavour.  
06 09 53 04 CC Endeavour, Houston. Go ahead.  
06 09 53 09 CMP Okay, Houston. I got your status reports for you, if you're ready to copy.  
06 09 53 13 CC All righty.  
06 09 53 17 CMP Okay. Crew status, no medication Everything seems to be fine. PRD is 23163.  
06 09 53 31 CC Go.  
06 09 53 32 CMP And the onboard read-outs: battery C, 37; PYRO BAT A, 37; PYRO BAT B, 37; RCS A, 70; B, 68; C, 69; and D, 70.  
06 09 53 53 CC Roger. Copy all that stuff, Al. And, Al, we'd like one final confirmation and that is that you've got NARROW REAQUIRE and PITCH is plus 25, YAW 185. Over.  
06 09 54 13 CMP That's - that's verified.  
06 09 54 15 CC Okay.  
06 09 54 28 CC Okay, Al. That's all we've got. You can turn the light out and go to sleep.  
06 09 54 35 CMP Okay, I'll do just that.  
06 09 54 38 CC Roger. Roger.  
06 09 57 -- BEGIN LUNAR REV 39  
06 10 55 -- BEGIN LUNAR REV 40

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

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APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 12 53 --

BEGIN LUNAR REV 41

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 14 51 -- BEGIN LUNAR REV 42

06 16 01 57 CC Good morning, Hadley Base. This is Houston calling.

06 16 02 35 CC Good morning, Hadley Base. This is Houston calling. Schoen guten Tag. Wie geht's euch?

06 16 02 45 CDR-LM Guten Morgen, mein Herr. Ist gut.

06 16 02 50 CC Schoen guten Morgen, Dave.

06 16 03 01 CC And we have a beautiful day planned for the two of you.

06 16 03 07 CDR-LM Very good.

06 16 03 25 CC A beautiful good morning, Jim. Has the Sun risen over Hadley Mountain, yet?

06 16 03 36 CDR-LM Well, give us about 30 minutes here and we'll take a look.

06 16 03 40 CC I wouldn't be at all surprised and I've got things for you to copy. I'm standing by.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 16 10 43 LMP-LM Houston, Hadley Base.

06 16 10 47 CC Good morning, Jim.

06 16 10 54 LMP-LM Morning, Joe. Got one question for you. When we repressed the cabin after yesterday's EVA, my water valve was not completely off, and we lost a little water out of the sublimator during the repress. Then during the recharge, I noticed on the OPS water vent portion that initially there were a lot more bubbles in the sight glass. After the 10 seconds, why, it got down to a point there were just a very few bubbles. But I'm wondering whether there might not be a special procedure involved because we did the repress with the water valve open. Over.

06 16 11 48 CC Jim, we copied all that. We'll think about it and be back with you with an answer in a few minutes. By the way, the passive seismometer people tell me that there must be somebody moving around in the LM. Is that true?

06 16 12 05 LMP-LM Oh, we're moving this morning, Joe.

06 16 12 09 CC Roger. You're shaking that seismometer. And, Jim, I have updates to read to you when you're comfortably ready.

06 16 12 23 LMP-LM Okay. Stand by.

06 16 12 40 LMP-LM Okay, Joe. I'm ready for the updates.

06 16 12 46 CC Roger, Jim. I'll start with lift-off times. T-43, when you're ready.

06 16 13 00 LMP-LM Okay. I'm ready.

06 16 13 02 CC Roger. T-43, 161:49:31; T-44, 163:47:36; T-45, 165:45:40; T-46, 167:43:49; T-47, 169:41:53. Over.

06 16 13 46 LMP-LM Okay. Beginning at lift-off for REV 43, 161:49:31; 163:47:36; 165:45:40; 167:43:49; 169:41:53. Over.

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- 06 16 14 05 CC Roger. Readback is correct. Contact tower when you're ready for departure. And I have LM consumables update when you're ready for those.
- 06 16 14 22 LMP-LM Go ahead.
- 06 16 14 25 CC Roger. At GET 160: RCS A, 85.0; B, 85.0; O<sub>2</sub> descent 1, 59.9; 2, 56.7; O<sub>2</sub> ascent number 1, 99; number 2, 99; H<sub>2</sub>O descent number 1, 18.3; number 2, 16.5; H<sub>2</sub>O ascent, 100 percent on both 1 and 2; amp-hours: descent, 803; ascent, 572. And I have a - a note on your descent water when you're ready.
- 06 16 14 26 LMP-LM Go ahead.
- 06 16 14 28 CC Roger. Just wanted you to be aware that the descent water may show, over the next few hours, between 1 and 0 pounds. You'll have actual usable water, perhaps as much as 22 and a half pounds. It might not be quite that much. It depends upon the measurement errors. However, we're very well aware of your water situation; it's no problem at all. We just don't want you to be alarmed if you come up with a zero reading at - at any time on that water. And, that's about all we have for the time being. We're standing by for your crew status report. We'd like also the radiation devices this morning. And we - I think we have a very nice traverse plan laid out for you. We can talk about that as you start to get ready. Over.
- 06 16 16 26 LMP-LM Okay. We copy.
- 06 16 16 31 CC And, Dave and Jim, basically the EVA is going to last somewhere between 4 and 5 hours, so it will be a short EVA. I'm told that we checked off the 100 percent science completion square sometime during EVA-1 or maybe even shortly into EVA-2. From here on out, it's gravy all the way, and we're just going to play it cool, take it easy, and see some interesting geology. It should be a most enjoyable day. Over.
- 06 16 17 11 CDR-LM Okay, Joe. Thank you. We're looking forward to it.

06 16 18 32 LMP-LM You do my ... here.

06 16 19 03 LMP-LM Probably want us to hit the rille for all that good rille photography.

06 16 19 19 CC Jim, this is Houston. You're keying your mike off and on. You might be sitting on it or stepping on it or pressing on it.

06 16 19 32 LMP-LM Okay. I have BIOMED, LEFT, right now.

06 16 19 37 CC Roger, Jim. I don't know if you copied. I just wanted you to be aware your mike was being keyed on from time to time, perhaps inadvertently.

06 16 19 51 LMP-LM We understand, Joe.

06 16 23 16 CC Jim, this is Houston. Regarding your PLSS question, everything looks normal to us down here. It seems like there's no problem there at all.

06 16 23 28 LMP-LM Roger. We copy. Thank you, Joe.

06 16 24 52 LMP-LM And, Joe, Dave fixed my camera last night so there shouldn't be any problem with it this morning.

06 16 25 00 CC And I bet he fixed it with a piece of tape, didn't he?

06 16 49 58 LMP-LM Houston, this is Jim. I'm sensed now, and I'm going to put the BIOMED on RIGHT so you can check on my sensors.

06 16 50 06 CC Roger, Jim. We copy that. Thank you.

06 16 50 -- BEGIN LUNAR REV 43

06 16 53 44 CC Jim, this is Houston. We've got good biomed data.

06 16 53 55 LMP-LM Thank you, Joe.

06 17 19 33 LMP-LM Houston, this is Hadley Base. We're about to be off comm here for a short period.

06 17 19 41 CC Okay, Jim. We copy and we're looking for BIOMED, LEFT, when you do.

06 17 36 35 LMP-LM Houston, 15. Back on comm. Hadley Base checking in.

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06 17 36 42 CC Thank you, Jim. We read you.

06 17 36 49 LMP-LM Okay, Joe. Our inventory shows that we do not have any more color MAGs available. Can you check your inventory down there?

06 17 37 01 CC Roger.

06 17 37 33 CC Hadley Base, this is Houston. We think, Jim, that MAG Tango Tango is on your camera in the ETB now, and Tango Tango is color. Over.

06 17 37 48 LMP-LM Okay. Thank you.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 17 38 46 LMP-LM Joe, this is Jim. We confirm. We do have color on my camera.

06 17 38 53 CC Okay, Jimmy. Real fine.

06 18 00 33 CC Hello, Hadley Base. This is Houston calling. Over.

06 18 00 40 LMP-LM Go ahead, Joe.

06 18 00 45 CC Roger, Jim. We're looking for a rough hack on where you might be in your EVA number 3 prep. We're standing by for a crew status report plus the radiation devices. And, we're wondering when you might be switching over for Dave's biomed data. Over.

06 18 01 06 LMP-LM Okay. He's getting in his suit now. We could switch over to his biomed right now. Well, stand by, it'll be a few minutes.

06 18 01 13 CC Okay, fine. Thank you, Jim.

06 18 01 29 LMP-LM Okay. Why don't you check Dave's biomed now.

06 18 01 46 CC We got it, Jim. Clean as a whistle. Thank you.

06 18 01 55 LMP-LM Okay, Joe.

06 18 08 04 LMP-LM Houston, this is Hadley Base. Do you want to leave the BIOMED on LEFT? And I'm going S-band voice to voice.

06 18 08 15 CC Roger, Jim.

06 18 08 22 LMP-LM And, are you ready for the battery management called out at 160?

06 18 08 30 CC Stand by. Okay, Falcon. We're ready.

06 18 08 38 LMP-LM Okay, in work.

06 18 08 49 LMP-LM ED batteries both check at 37.

06 18 08 52 CC Copy.

06 18 15 33 LMP-LM Houston, this is Hadley Base. We'll be starting the EVA-3 prep card in about 3 or 4 minutes.

06 18 15 43 CC Roger, Jim. We copy that, and we want to just remind you again on the bottom of 8-10, the page in your checklist there, the SUIT GAS, DIVERTER valve should be at EGRESS and CABIN GAS RETURN at EGRESS. Over.

06 18 16 06 LMP-LM Okay. Thank you, Joe.

06 18 20 31 CC Hadley Base, this is Houston. We're still showing the CABIN GAS RETURN in CABIN. Could you reverifiy that it's in EGRESS? Please.

06 18 20 52 LMP-LM CABIN GAS RETURN is presently in AUTO. I think we pick it up at EGRESS a little later on in the procedure.

06 18 21 07 CC Jim, Roger. Actually we should have picked that up on page 8-10 in your checklist. So we think it should be in the EGRESS position now.

06 18 21 19 LMP-LM Okay. I'm going EGRESS.

06 18 46 24 CDR-LM Houston, Hadley Base. We'll be coming to you with a comm check in about 2 or 3 minutes.

06 18 46 29 CC Roger, Dave. Looking forward to it.

06 18 46 36 CDR-LM Okay.

06 18 47 14 CC Dave and Jim, this is Houston. Be advised we've got an EVA update for you, which you can copy on- to the checklist if you want, or we can read it to you as you progress through the EVA, and we can talk about that when you want to. Over.

06 18 47 34 CDR-LM Well, where does it fall, Joe, and what does it concern.

06 18 47 37 CC Okay, Dave. It's going to be very simple changes to the checklist. I think just a few words concerning the general picture will be plenty sufficient, and then we'll give you the details as you come to them. I just want to give you an idea of - of how the traverse is going to look before you actually get strated. Over.

06 18 47 57 CDR-LM Oh, okay. You mean our cuff checklist?

06 18 48 01 CC Roger. You're going to be able to follow your cuff checklist for EVA-3 almost exactly. Just a few changes.

06 18 48 11 CDR-LM Okay. Well, can we proceed on here - and you want to give us the changes now? It might be better for us to proceed on out, and you change us as we drive or something.

06 18 48 22 CC Okay. That sounds like the second option is a good one, Dave. Although you might want the big picture before you proceed on out.

06 18 48 32 CDR-LM Well, why don't you give us the big picture now, before we get too deep in the comm checks and all.

06 18 48 45 CC Okay. Roger, Hadley Base. Taking it from the top, we're going to ask you to stop first at the ALSEP site and spend a few minutes recovering the successfully drilled core tube and, then follow that with the Grand Prix photography. From there press on towards Station 9, as planned. We're going to skip the Delta stop in between. Station 9 is exactly as we planned it. From Station 9, up to Station 10, exactly as we planned it, and at Station 10, we're going to hit a branch point. We can update you there when you arrive at Station 10. The two options are basically, to head north for the Complex, although we think it's more probable we'll just want to loop back towards the north across Alligator Chain doing good mare sampling, and wind up at Quark West crater, that's the western crater of the Quark triplet, and use that as a Station 14 stop. Over.

06 18 50 07 CDR-LM Okay. I guess we'll proceed on to Station 10 and take a look at it there. I'd sort of - would like to get up to the North Complex if we can.

06 18 50 15 CC Roger, Dave. We copy that, and it may well be we can get up there. We'll just see how it goes.

06 18 50 26 CDR-LM Okay. On with the comm check.

06 18 50 29 CC Okay.

06 18 51 22 CDR-LM MODE, VOX; VOX SENSITIVITY, MAX; VHF A, T/R; B, RECEIVE. Okay, CB(16) COMM: SE AUDIO, open; and collect [sic] - Have you connected those ...

06 18 51 54 CDR-LM Okay, CB(16) COMM: SE AUDIO, closed; PLSS PTT, MAINTAIN (right); PLSS mode to A; wheel, counter-clockwise.

06 18 52 05 LMP-LM Okay, I'm A.

06 18 52 06 CDR-LM Okay. PLSS O<sub>2</sub> pressure gage greater than 85.

06 18 52 10 LMP-LM Verified; reading 94.

06 18 52 12 CDR-LM Okay, you're 5 square to me; check with Houston.

06 18 52 16 LMP-LM Houston, how do you read the LMP?

06 18 52 18 CC LMP, you're loud and clear.

06 18 52 23 LMP-LM You're the same.

06 18 52 25 CDR-LM CB(11) COMM: CDR AUDIO, open and connect to the PLSS comm.

06 18 53 34 CDR-LM Okay. CDR's to B; PLSS O<sub>2</sub> pressure gage is reading 91 percent, and - how do you read me, Jim?

06 18 53 44 LMP-LM Oh, I read you loud and clear.

06 18 53 45 CDR-LM Okay, you make a comm check with Houston.

06 18 53 51 CC And, Houst - -

06 18 53 52 CDR-LM You make a comm check with Houston?

06 18 53 53 CC Houston reads - -

06 18 53 54 LMP-LM Houston, how do you read the LMP.

06 18 53 55 CC Jim, both you and Dave are loud and clear.

06 18 53 59 LMP-LM Okay.

06 18 54 01 CDR-LM Okay, PLSS mode: LMP to B and CDR to A. Okay, I'm on A. How do you read?

06 18 54 09 LMP-LM Loud and clear.

06 18 54 10 CDR-LM Okay, Houston, how do you read the CDR on A?

06 18 54 12 CC CDR, you're 5 by.

06 18 54 17 CDR-LM PLSS mode (both) to AR. Turn on.

06 18 54 24 CDR-LM Okay, how do you read me on AR?

06 18 54 26 LMP-LM Read you loud and clear.

06 18 54 27 CDR-LM Okay, Houston, how do you read the CDR on - on AR?

06 18 54 29 CC Dave, you're loud and clear.

06 18 54 32 CDR-LM Okay, you're 5 by, and how's the TM? Okay, you make a check with Houston.

06 18 54 43 LMP-LM Joe, how do you read the LMP?

06 18 54 44 CC Okay, Jim, you're 5 by and the TM's good.

06 18 54 52 LMP-LM Okay.

06 18 54 53 CDR-LM Okay. CB(16) ECS: LCG PUMP, closed, which it is; as required. CB(16) ECS: CABIN REPRESS, close; verify.

06 18 55 01 LMP-LM Verified.

06 18 55 02 CDR-LMP SUIT FAN DELTA-P, open.

06 18 55 03 LMP-LM Open.

06 18 55 04 CDR-LM SUIT FAN 2, open.

06 18 55 05 LMP-LM Open.

06 18 55 06 CDR-LM Okay, verify ECS caution, H<sub>2</sub>O SEP COMPONENT lights, on about a minute. Okay, here they come. SUIT GAS DIVERTER, FULL EGRESS; verify.

06 18 55 15 LMP-LM Verified.

06 18 55 16 CDR-LM Cabin GAS RETURN, EGRESS; verify?

06 18 55 19 LMP-LM That's verified.

06 18 55 20 CDR-LM SUIT CIRCUIT RELIEF, AUTO; verify.

06 18 55 23 LMP-LM That's verified.

06 18 55 24 CDR-LM OPS connect: SUIT ISOLATION to SUIT DISCONNECT.  
Disconnected LM O<sub>2</sub> hoses and secure about the PGA.  
Okay. Let it come back around here.

06 18 55 46 CDR-LM You can get for ...

06 18 55 47 LMP-LM Why don't I take care of you and you take care of  
me?

06 18 55 49 CDR-LM Yes. I think you ought to.

06 18 55 51 LMP-LM Okay, you want me to put you on SUIT DISCONNECT?

06 18 55 53 CDR-LM Not yet. Why don't you come on around?

06 18 56 08 CDR-LM Okay, you're on SUIT DISCONNECT, yes.

06 18 56 25 LMP-LM Secure that about the PGA, Dave. Why don't you  
put those under one of my belts?

06 18 56 30 CDR-LM \*\*\* Okay.

06 18 56 57 CDR-LM Okay, OPS O<sub>2</sub> hose is closed ... The purge valve -  
Okay, it's closed, locked LOW and the pins in.

06 18 57 15 CDR-LM Closed and Locked. Get your PGA diverter valve to  
vertical. Okay, and you can get me. ... Wait a  
minute.

06 18 57 31 LMP-LM ... Okay, we'll go to SUIT DISCONNECT on you.

06 18 57 36 LMP-LM Here. Here are your straps. Okay, we'll connect  
to OPS.

06 18 58 23 LMP-LM It's connected and it's locked. Okay, Dave, to  
L - LOW.

06 18 58 43 LMP-LM Okay, it's connected and locked. Okay, and your  
PGA diverter valve should be vertical.

06 18 58 50 CDR-LM Right.

06 18 58 51 LMP-LM Okay.

06 18 58 53 CDR-LM Okay, last drink.

06 18 59 47 LMP-LM Okay, got that back as far as we possibly can.  
There, ...

06 19 00 07 CDR-LM That's going to come out with the ETB. ...

06 19 00 23 CDR-LM Okay. DESCENT WATER VALVE, CLOSED.

06 19 00 26 LMP-LM There's water going through it now.

06 19 00 29 CDR-LM Okay, position of mikes. And helmet and glove  
donning. PLSS FAN to ON, to the right. And  
flags should clear. Mine clears.

06 19 00 46 LMP-LM That's clear. It's clear.

06 19 00 49 CDR-LM Don helmets and LEVAs, check the drink bag position.  
Okay, let me get yours here. ...

06 19 01 59 CDR-LM There we go. Closed and locked.

06 19 02 12 LMP-LM Okay, LEVAs.

06 19 02 24 CDR-LM Front flap secure. Okay. You're locked.

06 19 02 53 LMP-LM ...

06 19 02 55 CDR-LM How about that?

06 19 03 20 LMP-LM Okay.

06 19 03 21 CDR-LM Okay. Secure tool harness self doff straps to  
LEVAs. Okay, let me get yours. There's the  
right one. Left one. Okay.

06 19 04 06 CDR-LM Okay.

06 19 04 11 LMP-LM ... pretty cold?

06 19 04 13 CDR-LM Yes. Okay.

06 19 04 14 LMP-LM Okay. ... okay.

06 19 04 27 CDR-LM Okay. CB(16) ECS LCG PUMP, open.

06 19 04 29 LMP-LM Open.

06 19 04 31 CDR-LM Disconnect the LM water hose. Connect the PLSS water hose. Okay, in work.

06 19 05 06 LMP-LM Okay, mine's connected and locked.

06 19 05 08 CDR-LM Okay. Mine's connected to LUMP. Says, "Connect PLSS - Okay, stow LM hoses."

06 19 05 25 CDR-LM I'll have to wait until you turn around here.

06 19 05 52 LMP-LM Getting them back as far as you can?

06 19 05 53 CDR-LM Yes.

06 19 05 57 LMP-LM Water gun still secure.

06 19 05 58 CDR-LM Yes.

06 19 06 11 CDR-LM Okay. ...

06 19 06 16 CDR-LM Okay, verify the following. Turn around, and we'll check all that stuff.

06 19 06 30 LMP-LM Okay. ... I'll read to you, okay?

06 19 06 32 CDR-LM Okay.

06 19 06 33 LMP-LM Helmet and visor alined and adjusted.

06 19 06 36 CDR-LM Okay, they're alined and adjusted and locked.

06 19 06 39 LMP-LM O<sub>2</sub> connectors, three?

06 19 06 40 CDR-LM Okay. Locked. Yes, and that one's locked and the bootie's on. That one's locked and the bootie's on.

06 19 06 53 LMP-LM Okay. Purge valve.

06 19 06 54 CDR-LM Purge valve's locked, closed.

06 19 06 59 LMP-LM Water connector.

06 19 07 01 CDR-LM Locked.

06 19 07 02 LMP-LM Comm connector.

06 19 07 04 CDR-LM Locked.



06 19 07 05 LMP-LM And diverter valve, vertical.

06 19 07 06 CDR-LM Vertical. Okay, helmet and visor, alined and adjusted.

06 19 07 12 LMP-LM Okay, it is.

06 19 07 13 CDR-LM O<sub>2</sub> connectors, three, locked.

06 19 07 32 LMP-LM They're locked. Let me get the bootee ...

06 19 07 48 CDR-LM There are bootee's on all those connectors there.

06 19 07 50 CDR-LM Yes, you're right.

06 19 07 51 LMP-LM Okay, and, Dave - -

06 19 07 52 CDR-LM Purge - purge valve, locked.

06 19 07 57 LMP-LM It's locked.

06 19 07 58 CDR-LM Water connector, locked.

06 19 08 00 LMP-LM Locked.

06 19 08 01 CDR-LM Comm connector, locked.

06 19 08 05 LMP-LM Comm connector is locked.

06 19 08 07 CDR-LM PGA diverter valve, vertical.

06 19 08 16 LMP-LM Stand by a minute, Dave.

06 19 08 17 CDR-LM Okay.

06 19 08 29 LMP-LM Okay, you're locked. And it's vertical.

06 19 08 32 CDR-LM Okay, verify EVA CB configuration. And then, David, put on the gloves.

06 19 08 51 CDR-LM Here's your other glove over here on your left, Jim.

06 19 08 52 LMP-LM Okay. Thanks, Dave.

06 19 08 53 CDR-LM Will do.

06 19 09 10 LMP-LM Okay, my circuit breakers are verified.

06 19 09 14 CDR-LM And mine are verified. Glove don ...

06 19 09 20 LMP-LM Final test.

06 19 09 23 CDR-LM Yes.

06 19 10 23 LMP-LM And mine are locked.

06 19 10 26 CDR-LM Stand by.

06 19 10 54 CDR-LM And mine are locked.

06 19 10 56 CC Dave, this is Houston. How do those gloves feel today?

06 19 11 04 CDR-LM (Laughter) Gee, I don't know how to answer that, Joe. Sure be nice when I get through with the drill and I can take off the overgloves.

06 19 11 13 CC Roger. Wondered if you're going to shoot a little pool today with Colorado Fats, there.

06 19 11 21 CDR-LM Joe, today's the day for a little pool.

06 19 11 25 CC I was thinking the same thing.

06 19 11 31 CDR-LM Okay, let's verify the locks and the gloves.

06 19 11 35 LMP-LM Okay.

06 19 11 46 CDR-LM Okay, I'll verify yours. Okay, your's are locked, and locked. Okay. ... the covers over.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 17 59 36 CC Endeavour, this is the planet Earth calling. We'll start off the day this morning - with a little bit of wake-up music for you. And if you appreciate our selection, you may respond with an E-memory dump, if you are able to hear me at the present time.

06 18 00 17 (Music: "Tijuana Taxi" by Tijuana Brass)

06 18 00 26 CC Endeavour, this is the planet Earth calling this morning. We'll start off with a little bit of wake-up music and then we'll get into the day's activities. If you are awake enough to hear this, you can express your appreciation for our fine music by sending us down an E-memory dump.

06 18 02 18 CC Endeavour, this is Houston. How do you read now?

06 18 02 31 CC Endeavour, this is Houston. If you are reading give us - give us ACCEPT and we'll send up a state vector.

06 18 02 46 CMP Allo, terre. Salute de l'Endeavour.

06 18 02 51 CC Good morning, Al. How's the morning up there?

06 18 03 00 CMP Well, I'll let you know when I wake up, Karl. I had another very peaceful evening.

06 18 03 07 CC Glad to hear it.

06 18 03 34 CC We're ready for HIGH GAIN, AUTO, Endeavour. And I have - and I have a Flight Plan update, the most important one being that, at 162:06, in about 3 minutes, we will delete - delete the "GAMMA RAY GAINSTEP, SHIELD, OFF."

06 18 04 10 CMP Okay, Karl; understand. Let me get the Flight Plan out here.

06 18 04 25 CMP Okay; "GAMMA RAY GAINSTEP, SHIELD, OFF" has been deleted.

06 18 04 28 CC Roger. And I have mapping camera photo pad and some further Flight Plan updates when you are ready to copy.

06 18 04 38 CMP Okay; go ahead.

06 18 04 41 CC Mapping camera photo pad down there at 162:55. T-start: 162:59:30, T-stop: 163:59:11.

06 18 05 02 CMP Okay, understand. Mapping camera photo pad, T-start: 162:59:30; T-stop: 163:59:11.

06 18 05 13 CC That's correct, and further Flight Plan changes; we have very few today. At 162:16 we can delete the "GAMMA RAY GAINSTEP, SHIELD, ON."

06 18 05 28 CMP Understand. 162:16 delete "GAMMA RAY GAINSTEP, SHIELD, ON."

06 18 05 33 CC Roger. Over on 163:10. We add "MAP CAMERA, IMAGE MOTION, INCREASE" with appropriate barber pole comment. Increase, and then leave it on. "Increase/on" would be a better way of reading that to you.

06 18 06 02 CMP Okay; understand. At 163:10, you want the IMAGE MOTION INCREASE to barber pole and on.

06 18 06 08 CC Roger. And at 163:40, we can add, "MAPPING CAMERA, IMAGE MOTION, INCREASE/ON." And also, "GAMMA RAY, GAINSTEP, SHIELD, OFF."

06 18 06 40 CMP Understand. At 163:40, you want the IMAGE MOTION, INCREASE to INCREASE, ON. Do you want that - How many steps past barber pole do you want it?

06 18 06 59 CC Okay, Al. I - I missed the beat there. The one at 163:10 was talkback barber pole plus 4 steps at that time. And at 163:40, take it to talkback barber pole, and leave it there.

06 18 07 34 CC Did that come through okay?

06 18 07 36 CMP Okay; understand. The one at 163:10 is IMAGE MOTION, INCREASE to barber pole plus 4, and then on. And then at 163:40, is INCREASE to barber pole on, and GAMMA RAY, GAINSTEP, SHIELD, on.

06 18 07 41 CC Roger. 163:40, that was SHIELD, OFF; O-F-F. And at 163:50, the GAMMA RAY, GAINSTEP will go SHIELD, on; SHIELD O-N.

06 18 08 02 CMP Okay. Understand 163:40 SHIELD is OFF; and 163:50, the shield goes on.

06 18 08 08 CC Roger. And that's the end of the mapping camera and the Flight Plan update.

06 18 08 16 CMP Roger.

06 18 08 18 CC The computer is yours, Al. And I have consumables update, if you would like it.

06 18 08 25 CMP Okay; go ahead.

06 18 08 28 CC GET is 162 hours 0 minutes; RCS total 60; Quad A: 60, 60, 59, 61; hydrogen tanks: 65, 64, 46; oxygen tanks: 71, 74, 58.

06 18 08 59 CMP Understand. RCS total is 60. That's with quads: 60, 60, 59, 61; H<sub>2</sub> tanks: 65, 64, 46; and O<sub>2</sub> tanks: 71, 74, 58.

06 18 09 12 CC That's correct.

06 18 09 18 CMP And where do we stand on the RCS budget, Karl.  
Do you know?

06 18 09 34 CC Stand by on that, Al. We'll give you a good report in a few minutes.

06 18 10 41 CC Endeavour, this is Houston. On your RCS fuel, you are running roughly 6 percent below Flight Plan values, and you're still running roughly 15 percent above the redline. Quad Charlie is the lowest - the most critical quad. But, there's no big deal at the present time in any of them. Quad Charlie, incidentally, is 10 percent above the red.

06 18 11 10 CMP Okay, Karl.

06 18 11 11 CC Quad Charlie, incidentally, is 10 percent above the redline.

06 18 11 18 CMP Okay. Sounds fine.

06 18 13 51 CC Endeavour, this is Houston. The latest information from Hadley Rille is that the crew is awake and about 1 hour from egress time. This EVA number 3 has been shortened in length somewhat to about 4 and a half hours in order to get our time line back on time for the nominal ascent. You can expect that you'll have some company later this afternoon.

06 18 14 33 CMP Very good, Karl. And, let's see, I guess I can give you a crew status report if you want it.

06 18 14 40 CC Fire away.

06 18 14 42 CMP Okay. I've got 7 and a half hours of sleep in one period. No medication. The PRD is 23164.

06 18 14 54 CC We copy, Al.

06 18 18 35 CMP Houston, Endeavour. If you're copying the DSKY, the gyro torque angles are up.

06 18 18 41 CC Roger. We've copied them, thank you.

06 18 19 26 CC Endeavour, this is Houston. Couple of quick questions. First of all, the Surgeons see something of a dif - difference in your heart rate between the two nights sleep, and, just out of medical curiosity, they'd like to have your subjective evaluation. Did you sleep better last night than the night before, or vice versa?

06 18 19 49 CMP Gee, I guess subjectively, I slept pretty well both nights.

06 18 19 54 CC Just about equal, in other words? Okay, and -

06 18 20 00 CMP Yes, I think so, or maybe I slept a little better last night.

06 18 20 03 MCC Better last night?

06 18 20 04 CC Glad to hear that. You're con - confounding their theories. On -

06 18 20 34 CC Al, we'd like to have you verify tape motion at LOS; and if it isn't, start the tape running for us.

06 18 20 44 CMP Roger.

06 18 20 46 CC And - on this P30 business, I see - something of a - a long comment they made to you last night. Is everything on that clear?

06 18 21 03 CMP Roger, Karl. I think so. I - I guess the story there is we'll stay away from using the pocket P30 as much as possible, and when we do use it, especially when we're in dead band, we won't let it run more than 30 minutes.

06 18 21 21 CC Okay. Everybody down here thinks that's a - a great philosophy. Good.

06 18 21 47 CMP And, Houston; Endeavour. There were a couple of questions on the Flight Plan. I guess I'm wondering what we're going to do about the mass spec today. We've got some things in here. Of course, we didn't use it last night. So there are, I guess, a few steps that you're to delete.

06 18 22 02 CC Righto. We don't intend to use the mass spec today, so you can delete these particular steps about retracting, or about extending the boom, et cetera. We just are not - That was it. Delete any action on the mass spec.

06 18 22 16 CMP Okay. Okay, Karl. Understand.

06 18 23 45 CC Endeavour, this is Houston. As you go around the corner, all your systems look to be in good shape.

06 18 23 53 CMP Roger, Houston. See you at the other side.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 19 12 17 CDR-LM PLSS - Okay, PLSS DIVERTER on MIN, verify.

06 19 12 26 LMP-LM Okay. PLSS DIVERTER on MIN, Jim? Verified.

06 19 12 30 CDR-LM Okay, verify PLSS PUMP, ON, to the right.

06 19 12 33 LMP-LM Pump coming on.

06 19 12 35 CDR-LM Mine's running and -

06 19 12 37 LMP-LM Same.

06 19 12 38 CDR-LM PRESS REG A and B to EGRESS.

06 19 12 40 LMP-LM A and B are EGRESS.

06 19 12 43 CDR-LM Okay. With the PLSS O<sub>2</sub> ON, we'll do a pressure integrity check. Find that little valve down there.

06 19 12 54 LMP-LM And my O<sub>2</sub> is coming on.

06 19 13 00 CDR-LM And my O<sub>2</sub> is on. And the press flag should clear 3.1 to 3.4. Cuff gage could come up - should come up 3.7 to 4.0. And I'm coming up.

06 19 14 01 CDR-LM Okay, I'm off the peg.

06 19 14 16 LMP-LM Okay, read to 3.8.

06 19 14 20 CDR-LM Okay. I'm coming. Here we go 3.6, .7, .8.

06 19 14 34 CDR-LM Okay, I'm stabilized. My O<sub>2</sub> flag is clear. If you can get a hold of that little valve again, let's turn them off and get an integrity check.

06 19 14 43 LMP-LM Okay.

06 19 14 44 CC And, Houston marks one minute, and you have got good pumps.

06 19 14 47 CDR-LM Mine's off now.

06 19 14 51 LMP-LM And mine's off.



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06 19 14 53 CDR-LM Okay, thank you, Joe. Give us a call after your minute.

06 19 15 46 CC One minute, MARK.

06 19 15 50 CDR-LM Okay. I'm reading 3.75.

06 19 15 54 LMP-LM I'm reading 3.7.

06 19 15 56 CDR-LM Okay, ... good. Okay, O<sub>2</sub> back on.

06 19 16 01 LMP-LM Coming back on.

06 19 16 05 CDR-LM Okay, verify the O<sub>2</sub> flag is clear.

06 19 16 09 LMP-LM Mine's clear.

06 19 16 10 CDR-LM Okay, let me turn the card. Can you go forward, Jim?

06 19 16 14 LMP-LM Yes.

06 19 16 19 CC And, Hadley Base, we're ready for depress. Two magnificent suits.

06 19 16 27 CDR-LM Good. Oh, bad place to have to change that card.

06 19 16 43 CDR-LM Okay. Got a GO for the depress. CB(16) ECS: CABIN REPRESS to open.

06 19 16 50 LMP-LM Standby.

06 19 17 00 LMP-LM Open.

06 19 17 01 CDR-LM Okay, CABIN REPRESS valve to CLOSE.

06 19 17 04 LMP-LM CABIN REPRESS going CLOSED. Now.

06 19 17 08 CDR-LM Okay. And the over - the forward dump valve OPEN, then AUTO at 3-1/2.

06 19 17 15 LMP-LM Okay, standby.

06 19 17 25 CDR-LM Okay, I've got my eyeball on the pressure gage, go ahead.

06 19 17 28 LMP-LM Okay. Going open now.

06 19 17 32 CDR-LM Okay. 4.5, 4.0, -  
06 19 17 38 CDR-LM MARK, 3.5.  
06 19 17 39 LMP-LM Okay. AUTO.  
06 19 17 41 CC Houston marks it.  
06 19 17 44 CDR-LM Okay. Verify cuff gage doesn't drop below 4.6.  
I'm looking at 5.1.  
06 19 17 50 LMP-LM I'm looking at 5.5. ...  
06 19 17 55 CDR-LM LM suit pressure locked up at 4.5. Okay. Some-  
thing about the watch.  
06 19 18 06 CDR-LM And overhead - forward dump valve to OPEN.  
06 19 18 09 LMP-LM Okay. I'm going OPEN. It's OPEN.  
06 19 18 11 CDR-LM Okay. Stand by for a tone and the water flag at  
1.2 to 1.7. Cabin is down to about 2.2.  
06 19 18 31 CDR-LM Are you coming back around?  
06 19 18 32 LMP-LM No. Don't think I will, not right now.  
06 19 18 34 CDR-LM Yes. Why don't you wait until we get this down a  
little bit. Cabin is still 1.0.  
06 19 18 49 LMP-LM Okay, I have a water flag.  
06 19 18 52 CDR-LM Okay.  
06 19 18 58 CDR-LM 0.5 on the cabin.  
06 19 19 50 CDR-LM Okay. If you can move forward, Jim, I can get  
back in here and -  
06 19 19 54 LMP-LM Okay.  
06 19 19 56 CDR-LM I'm working ...  
06 19 20 02 LMP-LM Okay; I'm in the corner.  
06 19 20 03 CDR-LM Good. I'll get in mine.

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06 19 20 20 CDR-LM Okay, see if I can -

06 19 20 22 LMP-LM Make it?

06 19 20 23 CDR-LM Nope. Not yet.

06 19 20 38 CDR-LM Okay, I'm going to let the cabin go down some more.

06 19 21 25 CDR-LM Okay, I'm trying again here. There we go.

06 19 21 35 LMP-LM There go our - ice pellets.

06 19 21 40 CDR-LM Okay. Forward hatch handle - dump valve to AUTO.  
Can you - can you get that one?

06 19 21 49 LMP-LM I'll move back. Stand by.

06 19 22 00 LMP-LM Don't close the door. Can you hold it there  
while I get around?

06 19 22 04 CDR-LM Yes. I've got it now.

06 19 22 11 LMP-LM Okay, it's back to AUTO.

06 19 22 12 CDR-LM Okay. Okay.

06 19 22 27 CDR-LM Oh, wait a minute. You've got to leave it in OPEN.  
The card's all arranged different here.

06 19 22 34 LMP-LM ... Sorry about that.

06 19 22 37 CC Houston confirms. Leave it open.

06 19 22 42 CDR-LM Open ... latch. Okay, now. PLSS PRIMARY WATER  
to OPEN.

06 19 22 52 LMP-LM That's in work.

06 19 22 53 CDR-LM Okay.

06 19 23 15 LMP-LM Okay, mine's OPEN.

06 19 23 18 CDR-LM Mine's OPEN.

06 19 23 22 CDR-LM Okay, H<sub>2</sub>O flag should clear in 2 to 4 minutes.

06 19 24 51 CDR-LM Okay, my water flag's clear.

06 19 24 54 LMP-LM Mine is too.

06 19 25 12 CDR-LM Okay; verify PGA 3.7 to 4.6; and mine's at about 4.2.

06 19 25 18 LMP-LM And mine's 4.1.

06 19 25 21 CDR-LM Okay, caution lamps - PREAMPS and ECS.

06 19 25 30 CDR-LM H<sub>2</sub>O SEP COMPONENT light's on. Lower EV visor.  
On we go. How's the PLSS look to you down there, Houston?

06 19 25 46 CC They both look good, Hadley Base. And, Dave, you can have your diverter valve.

06 19 25 54 CDR-LM Oh, thank you, Joe. Okay, Jim, I'm going to get over here and open the door.

06 19 26 01 LMP-LM ...

06 19 26 13 CDR-LM Do you see what I'm hung on, Jim?

06 19 26 14 LMP-LM Just a minute.

06 19 26 17 CC And, Jim, diverter valve is yours as well. - -

06 19 26 19 LMP-LM ... Okay, standby. Let's see if I can turn around here, Dave.

06 19 26 27 CDR-LM Okay.

06 19 26 39 LMP-LM Back behind me?

06 19 26 40 CDR-LM Say again.

06 19 26 42 LMP-LM If you can turn right, I'm turning left.

06 19 26 46 CDR-LM Okay. That's right. Doesn't matter.

06 19 26 56 LMP-LM ... turn that way. ... Try the other way.

06 19 27 08 LMP-LM Am I pushing against you?

06 19 27 09 CDR-LM Yes. You sure are.

06 19 27 14 LMP-LM I'll have to turn the other way then.

06 19 27 15 CDR-LM No, go back in your corner. Maybe I'm unhooked now. Are you back in your corner?

06 19 27 20 LMP-LM Yes. I'm back here as far as I can.

06 19 27 24 CDR-LM Okay. I'm clear. Open the door. Oop. Door won't open all the way.

06 19 27 38 LMP-LM Hitting my foot, I guess.

06 19 27 40 LMP-LM Yes. It's hitting your PLSS.

06 19 27 44 CDR-LM Stand up over there. There, okay.

06 19 27 47 LMP-LM Before you go out though, let me turn around so I can watch you.

06 19 27 52 CDR-LM Okay.

06 19 28 13 CDR-LM How are you doing?

06 19 28 14 LMP-LM Oh, I'm okay. Where are you?

06 19 28 16 CDR-LM Oh, I've just got my feet out.

06 19 28 19 LMP-LM Okay, let me turn around then.

06 19 28 21 CDR-LM Well, I'm not sure you can (laughter). I'm going out. I'm all right. Then you can turn around easier when I get to - to where you get my antenna.

06 19 28 30 LMP-LM Oh, okay. I'll just stay over here in the corner then.

06 19 28 33 CDR-LM Okay.

06 19 28 43 LMP-LM In fact, if you want, Dave, shoot, I'll get your antenna when we get down to the surface.

06 19 29 06 CDR-EVA Okay, I'm out.

06 19 29 09 LMP-LM Okay, I'm going to turn around.

06 19 29 20 CDR-EVA You might - See the little cover on the outside hatch handle? You might cover that; it's open.

06 19 29 27 LMP-LM Okay. Stay there on the porch until I get all the gear out to you.

06 19 29 35 CDR-EVA Oh, yes.

06 19 29 36 LMP-LM Like the JETT bag and -

06 19 29 37 CDR-EVA Yes.

06 19 30 00 CDR-EVA How you doing? Go easy.

06 19 30 05 LMP-LM Doggone COMM cord of yours was hung up on me.

06 19 30 09 CDR-EVA Oh.

06 19 30 16 LMP-LM Okay, ... JETT bag.

06 19 30 17 CC Jim, this is Houston. Could you verify for us, please, that one of the two dump valves is OPEN?

06 19 30 25 LMP-LM Yes, the forward one is OPEN, Joe.

06 19 30 28 CC Sounds good, Jim. Thank you.

06 19 30 35 CDR-EVA Okay. Send her out.

06 19 30 36 LMP-LM ... and then I'll get you the ETB.

06 19 30 42 CDR-EVA It's the world's biggest JETT bag.

06 19 31 17 CDR-EVA Standing by with the ETB there ...?

06 19 31 18 LMP-LM Yes, standing right by.

06 19 31 20 CC And, Dave, while you're waiting. A word about the polarimetric filter. We are going to ask you to pick that up from the MESA and put it on your camera from the very first. We've got a dandy spot for you to do some polarimetric photographs later on.

06 19 31 38 CDR-EVA All righty. Okay, I'm heading down, Jim.

06 19 31 48 LMP-LM I don't see the LEC out there. Where is it; down on the surface?

06 19 31 52 CDR-EVA A, no; it's over here on the right.

06 19 31 54 LMP-LM Okay; listen, when you get down, Dave, remember that LCRU battery is in that footpad.

06 19 31 59 CDR-EVA Roger.

06 19 32 01 CC Good thinking, Jim - -

06 19 32 02 LMP-LM As soon as you get down, I'll come down, I'll get your -

06 19 32 06 CDR-EVA Oh, it's in the checklist somewhere.

06 19 32 10 LMP-LM Sure. Okay; if you're clear, I'll come down.

06 19 32 19 CDR-EVA Yes. Clear.

06 19 32 21 LMP-LM Okay.

06 19 32 24 CDR-EVA Well, it's nice to be outside where you can stretch a little bit.

06 19 33 23 LMP-EVA Okay, the hatch is closed, Joe.

06 19 33 27 CC Okay, Jim. Thank you.

06 19 33 35 CDR-EVA And, Joe, the LCRU POWER is going to INTERNAL now.

06 19 33 39 CC Okay, Dave. And could you check the LRV bat covers closed at the same time?

06 19 33 48 CDR-EVA Now they're open and I will close them now.

06 19 33 54 CC Roger. Those automatic devices fail us every now and then.

06 19 34 00 CDR-EVA Yes. I reckon nothing's perfect. Okay, they're closed.

06 19 34 11 LMP-EVA Okay, Joe. I'm on the surface.

06 19 34 13 CC Roger, Jim.

06 19 34 15 LMP-EVA I'll come over and get your antenna, Dave.

06 19 34 16 CDR-EVA Okay.

06 19 34 17 LMP-EVA Although - although it doesn't appear like you really need it.

06 19 34 19 CDR-EVA Sure doesn't, does it? Why don't we just leave it there?

06 19 34 23 LMP-EVA Okay. If we have marginal comm, I'll lower it.

06 19 34 25 CDR-EVA Yes.

06 19 34 27 CC Roger. And you're both loud and clear.

06 19 34 32 CDR-EVA Good.

06 19 34 46 LMP-EVA Did you get the LCRU battery already, Dave?

06 19 34 48 CDR-EVA No, I haven't.

06 19 34 57 CDR-EVA You're supposed to get that.

06 19 34 58 LMP-EVA Yes. I know it. That's why I reminded you - on it being down here.

06 19 35 07 CDR-EVA Reminded me of what?

06 19 35 08 LMP-EVA It was in the - this footpad instead of the plus-Y.

06 19 35 11 CDR-EVA Oh, okay.

06 19 35 19 LMP-EVA Might be a little dirty.

06 19 35 20 CDR-EVA Really. Brush it off.

06 19 35 41 CDR-EVA Okay, Houston. Into the CDR's footpan goes MAG Union.

06 19 36 00 CDR-EVA And we got a little bit on November, so we brought that along. Organized here.

06 19 36 28 CDR-EVA The LMP's camera with Tango.



06 19 36 31 CC Roger.

06 19 36 39 CDR-EVA CDR's can go - camera with Sierra.

06 19 36 52 CDR-EVA MAG Romeo. And MAG Whiskey, which I'll put on the 500.

06 19 37 50 CDR-EVA And I'll check it out.

06 19 38 28 CDR-EVA And it's all right.

06 19 38 58 LMP-EVA Okay, Joe. I have a BSLSS bag out.

06 19 39 02 CC Okay, Jim. And, Dave and Jim, we'll lose comm here perhaps. However, we'll get it back when the batteries change, so don't worry.

06 19 39 16 CDR-EVA Okay. Understand, Joe. And into the ETB go 16-millimeter H - Hotel, Juliet, and Golf.

06 19 39 43 CDR-EVA Item. And we'll put Foxtrot on the camera.

06 19 40 40 LMP-EVA Dave, I'm going to stand up on the Rover. Get the BSLSS bag locked.

06 19 40 45 CDR-EVA Here. Maybe I can reach it, Jim. Let me try it, Jim. ... - -

06 19 40 47 LMP-EVA That's all right. My arms are longer. Just a second.

06 19 40 51 CDR-EVA Okay. I'll give you your maps so you can put them on.

06 19 41 05 CC Dave, a reminder to pick up the polarimetric filter when you're at the MESA.

06 19 41 14 CDR-EVA Thank you, Joe.

06 19 41 17 CDR-EVA ...

06 19 41 21 LMP-EVA It's hard to get into the lock, Dave. I think - If you have any difficulty just let me stand up. I can lean over and get it. Down. We have to swing that lock on the left side forward to lock it in there.

06 19 41 47 CDR-EVA Oh, yes. I'm not sure you're going to get to that at all.

06 19 41 54 LMP-EVA I could get it if I could stand up and lean over.

06 19 42 00 CDR-EVA You can try. Be careful.

06 19 42 58 CDR-EVA Okay, Joe; I have the polarimetric filter.

06 19 43 02 CC Okay, Dave, and just plug it on to your camera at your convenience. You'll want to change the exposure time to 1 over 125, and you might call out the filter position.

06 19 43 17 CDR-EVA Okay. Let me get to it later, Joe.

06 19 43 19 CC Roger; no hurry.

06 19 43 27 CDR-EVA Is that the BSLSS lock on the - you said the left side or right? Oh, it is - I see it.

06 19 43 32 LMP-EVA Left side.

06 19 43 33 CDR-EVA I can get it.

06 19 43 34 LMP-EVA What?

06 19 43 35 CDR-EVA I can reach that.

06 19 43 36 LMP-EVA If you can reach around the - if you want, I - I could -

06 19 43 38 CDR-EVA No, I can get it.

06 19 43 42 LMP-EVA You can't reach the strap, the bag's too wide.

06 19 43 51 CDR-EVA Up or down?

06 19 43 52 LMP-EVA Forward.

06 19 43 53 CDR-EVA It was already in forward. Must have got it. Now it's got to go aft, Jim.

06 19 44 00 LMP-EVA It's easy to lock.

06 19 44 03 CDR-EVA Here, I'll hold the bag down. Just push it aft.

06 19 44 15 LMP-EVA Push af - Oop! If it's aft, no sweat, Dave, just leave it there. I'll push it aft. Let me work on it. You've got other things to do.

06 19 44 21 CDR-EVA All done.

06 19 44 33 CDR-EVA You'd think I'd see what the problem is.

06 19 44 39 LMP-EVA It is forward.

06 19 44 41 CDR-EVA No, it's aft; that's right. Blocked.

06 19 45 07 CDR-EVA Well -

06 19 45 08 LMP-EVA If there's any question, Dave, let's put it under my seat, rather than lose it.

06 19 45 13 CDR-EVA We're not going to lose it, Jim.

06 19 45 14 CC That sounds good to us, Jim. It's not worth the trouble.

06 19 45 21 LMP-EVA Yes. Here. I got it. It's locked.

06 19 45 26 LMP-EVA Huh.

06 19 45 57 CDR-EVA Okay, Joe, I'm going to change the LCRU battery.

06 19 46 01 CC Roger. Just in time.

06 19 46 06 CDR-EVA Okay, power's going ...

06 19 46 09 LMP-EVA Joe, we have bag 7 on the lefthand side of the tool carrier and bag 2 on the right side.

06 19 46 18 CC Jim, we - we copy that - -

06 19 46 21 LMP-EVA And I'm wondering whether we should leave - leave it there ...

06 19 46 22 CC - - if it's easy to do just keep bag - bag 2 under the seat and follow your checklist normally. Bag 2 is just an extra bag for us.

06 19 46 46 LMP-EVA We still have some tools in bag 2, Dave. I'll just leave that bag there and put bag - our last collection bag under my seat.

06 19 46 55 CDR-EVA Okay. Why don't you tell them when they come back up here.

06 19 46 57 LMP-EVA Yes.

06 19 46 58 CC Dave and Jim, do you read Houston?

06 19 47 07 CDR-EVA Okay, LCRU is on internal. Blankets are 100 percent open.

06 19 47 32 CDR-EVA Get new - new sample collection bags for us, Jim?

06 19 47 36 CC Jim this - -

06 19 47 37 LMP-EVA Yes, I ...

06 19 47 38 CC - - is Houston. We prefer bag 2 under your seat shelf and bag 7 on the handtool carrier, instead.

06 19 47 47 LMP-EVA Well, bag 7 is Dave's bag. It's on the - the left side. It's just a question of which one you want on the right side. In other words, which one do you want on me?

06 19 47 57 CC Jim, bag 8 on the right side, please. And that's a new bag.

06 19 48 03 LMP-EVA Okay, and you want bag 2 under the seat?

06 19 48 05 CC That's right, exactly. And then we can follow the checklist exactly from here on in.

06 19 48 13 LMP-EVA Okay.

06 19 48 24 LMP-EVA So bag 2 is under my seat. Some of Dave's equipment. I'm putting bag 8 on the right side of the tool carrier.

06 19 48 34 CC Right on.

06 19 49 02 LMP-EVA Got a lot of sample bags, Dave. I'm going to put the extra ones under my seat.

06 19 49 05 CDR-EVA Okay, good idea.

06 19 49 15 CC Dave, what was the source of the battery you just plugged in for us?

06 19 49 24 CDR-EVA I knew - that - it was, a - came out of the - out of the LMP's footpan was where I picked it up. The one that was in the plus-C footpan.

06 19 49 43 CC Okay, Dave. Thank you.

06 19 49 56 LMP-EVA Dave, you're going to go out to the ALSEP, huh?

06 19 49 58 CDR-EVA Yes, I guess we're both going out there.

06 19 50 00 LMP-EVA Okay, let me meet you out there. Are you all done?

06 19 50 03 CDR-EVA Yes, I'm done here.

06 19 50 04 LMP-EVA You haven't got the tools on. How could you be done?

06 19 50 08 CDR-EVA Put them on here; okay.

06 19 50 13 CC Dave, before you get on the Rover, we need a reading from the meter on our LCRU, please.

06 19 50 24 CDR-EVA Sure, Joe. Stand by. I'll get that.

06 19 50 27 CC And we're asking because we may have a chilly battery on our hands. We've got good TV picture, but the voltage is not quite up to par.

06 19 50 37 CDR-EVA All right. Maybe I should have put it in the Sun instead of the shade.

06 19 50 46 CDR-EVA Let me go take a look at that. Wait. Oh, gosh, let's get dressed up here first.

06 19 50 52 LMP-EVA Yes, I'll stand by here.

06 19 50 59 CDR-EVA Okay, take a look at this here.

06 19 51 08 CDR-EVA Okay, Joe. What reading would you like?

06 19 51 13 CC AGC first, Dave.

06 19 51 21 CDR-EVA All right. 3.4.

06 19 51 28 CC Copy. Now we need power.

06 19 51 34 CDR-EVA Okay. I guess you want all three, and that saves us some transmissions.

06 19 51 39 CC Go ahead.

06 19 51 45 CDR-EVA Temperature is 2.0; the power is 1.0.

06 19 51 57 CC Okay, Dave; we copy. Thank you. And, Dave and Jim, as you move out to the core site, we're going to ask you, Jim, just to help Dave with the core removal.

06 19 52 13 CDR-EVA Oh, good (laughter). Good.

06 19 52 16 LMP-EVA That shouldn't take him more than a half an hour. I might just let him do the whole thing. He needs some experience.

06 19 52 41 CDR-EVA Okay, the hammer's on. Rammer's on.

06 19 52 52 LMP-EVA Are the caps?

06 19 52 54 CDR-EVA Okay. ...

06 19 53 13 CDR-EVA Got another cap? This one doesn't fit.

06 19 53 15 LMP-EVA Doesn't fit?

06 19 53 18 CDR-EVA Doesn't fit. Yes, I probably have another one under my seat. Okay. Yes, it won't go in at all.

06 19 53 37 LMP-EVA ... that one.

06 19 53 38 CDR-EVA Yes. There, that goes on okay.

06 19 53 54 LMP-EVA Just a minute. I'll be right back there -

06 19 53 55 CDR-EVA Yes.

06 19 53 56 LMP-EVA The seat's hung up a little bit.

06 19 54 07 CDR-EVA Okay.

06 19 54 08 LMP-EVA ... you'll turn around, I'll get - this bag on me first. Put this bag on me so I'm configured.

06 19 54 16 CDR-EVA Yes. I will.

06 19 54 18 LMP-EVA Give me bag number 8. I'm just closing the top on this one.

06 19 54 23 CDR-EVA Come on out here a little ways. Okay. There you are. Just a minute. Stiff new bag.

06 19 55 38 CDR-EVA Up there. Great. Stiff new bag. Gummit.

06 19 55 48 CC Jim, when it's convenient for you, I guess we're going to need Dave's PLSS antenna deployed.

06 19 55 57 LMP-EVA Okay.

06 19 56 28 CDR-EVA Can you move away just another step, Jim?

06 19 56 30 LMP-EVA Okay.

06 19 56 31 CDR-EVA Bend over good, here. Okay. Whew. That bag is all folded up so much, I can't get to it. Now you can get my antenna.

06 19 56 48 LMP-EVA Okay. It's deployed.

06 19 56 49 CDR-EVA Okay. My bag. Top's not closed.

06 19 57 32 CC Dave, while you're getting buttoned up there, when you move out to the drill site, we'll want you to photograph the collapsed material in the trench and do a photo pan ar - around the core there. And, Jim, maybe you can see if maybe you can pull the core out of the ground while Dave's doing that, and then he'll give you a hand.

06 19 57 59 LMP-EVA Okay. You're secured there, Dave.

06 19 58 02 CDR-EVA Okay. And, let me talk to you, Jim, about pulling that core out, because there's a - I think we finally figured it out last week, how to do it.

06 19 58 11 LMP-EVA One thing, Dave, before you leave.

06 19 58 14 CDR-EVA What? Yes. Get my camera.

06 19 58 26 LMP-EVA I've got - I've got the color.

06 19 58 27 CDR-EVA I know it.

06 19 58 48 CC Good thinking, Jim.

06 19 59 01 CDR-EVA He's always thinking.

06 19 59 05 CC Ain't he though.

06 19 59 32 CDR-EVA Okay, babe. Here we go.

06 19 59 41 LMP-EVA I'll meet you out there.

06 19 59 42 CDR-EVA Okay.

06 19 59 43 LMP-EVA Hope you - hope you took a couple because the first one was probably exposed.

06 20 00 01 CDR-EVA Oh, by the way, why don't you put this MAG on here; 16, we forgot to do that.

06 20 00 26 CC Dave, this is Houston. When you climb onboard the Rover - -

06 20 00 28 LMP-EVA ... MAG.

06 20 00 29 CC - - do not push in the NAV circuit breaker. We'll do the in - initialization out at the drill site.

06 20 00 39 CDR-EVA Okay. You mean pull out the NAV circuit breaker.

06 20 00 45 CC Roger.

06 20 00 47 CDR-EVA We got MAG Fox. MAG Fox on the 16.

06 20 00 54 CC Got it.

06 20 00 59 CDR-EVA Joe, there's so much dust on the camera that -  
By the way, Jim, let me get your camera lens while we're at it.

06 20 01 08 LMP-EVA Okay.

06 20 01 09 CDR-EVA I can't get the polarimetric filter on right now. I'll work on that.

06 20 01 19 CC Roger, Dave. We copy, and it's worth only a few-second try.



06 20 01 28 CDR-EVA Okay. Too bad, because it just won't go on. It's -  
such a tight tolerance on that thing anyway.

06 20 01 43 CC Your judgment, Dave. If it's not going on, give  
it a toss.

06 20 01 49 CDR-EVA Well, I think maybe it's - it's so sticky I can -  
When we get to where we need to do it, why, maybe  
I can just stick it on there, because it's stick-  
ing pretty good.

06 20 02 01 LMP-EVA Maybe I can - -

06 20 02 02 CC Okay.

06 20 02 03 LMP-EVA - - hold it on for you, Dave. It'll be a little  
easier.

06 20 02 05 CDR-EVA No, you couldn't. It's not coming. It's not going  
to help any, Jim.

06 20 02 07 LMP-EVA Dave, I've got the lens brush here, if you want  
me to clean your lens.

06 20 02 10 CDR-EVA Yes.

06 20 02 20 CDR-EVA Okay. Okay. Head for the site.

06 20 02 30 LMP-EVA Okay. I'll meet you out there.

06 20 02 43 CDR-EVA Okay. NAV circuit breaker is open. Oop, forgot  
the TV.

06 20 03 03 CDR-EVA Pm1 to CB, Joe.

06 20 03 06 CC Thank you.

06 20 03 10 CDR-EVA TV camera is positioned. Antenna is stowed.

06 20 03 32 CDR-EVA Circuit breaker is coming in.

06 20 03 35 CC Roger. And NAV circuit breaker should be out.

06 20 03 40 CDR-EVA It's out. Right. Okay. Go!

06 20 03 55 CC Dave, when you get out to the site, if you'll park down-Sun, we'll give you NAV alinement when you get ready to go.

06 20 04 13 CDR-EVA And we're rolling.

06 20 04 15 CC Roger.

06 20 04 24 CDR-EVA Everything is working today.

06 20 04 26 CC Beautiful, Dave. And did you copy park down-Sun, give us the readings, and we'll aline the NAV system when you press on towards Station 9.

06 20 04 38 CDR-EVA Okay. I understand, Joe.

06 20 05 02 CC Dave, while you're driving there, we're going to want you to take apart our core stems. We'll have Jim pack them away in bag 2, which is under his seat, and then we'll do the Grand Prix photographs before we start driving off toward Station 9.

06 20 05 22 CDR-EVA Okay. Understand.

06 20 05 36 CDR-EVA Oop. Go ahead, Jimmy. Let me - I'm going to back up a minute, Jim. Okay?

06 20 05 49 LMP-EVA Okay.

06 20 05 55 CDR-EVA ... before, huh?

06 20 05 57 LMP-EVA Kind of bogged down, isn't it?

06 20 05 59 CDR-EVA Sure is. I never saw it do that. Oh, I know why. No.

06 20 06 11 LMP-EVA Okay. You're moving forward.

06 20 06 13 CDR-EVA Okay. Oop.

06 20 06 16 LMP-EVA Kind of dug in there.

06 20 06 17 CDR-EVA Yes, it sure did, didn't it? \*\*\* seen that happen. Trusty old Rover. Get us going down-Sun here, so I can get those NAV readings.

06 20 06 40 CDR-EVA Still got to get in position, so I can do my tricks with the drill.

06 20 07 07 CDR-EVA Okay, Joe. I'll push in the NAV circuit breaker. And the - the Sun shadow device is reading about one-half to the left, pitch is reading about 2 down, and roll - Jim, let's go back there a minute. Roll is reading 2 left.

06 20 07 35 CC Copy, Dave.

06 20 07 45 CDR-EVA Okay. Now to the drill. We last left our friend -

06 20 07 57 LMP-EVA Now it's our friend.

06 20 07 59 CDR-EVA Yes, it is. And if you could - okay, if I can -

06 20 08 04 LMP-EVA Okay. Check me out on it. \*\*\* what should I do there?

06 20 08 14 CDR-EVA The object is to pull it out of the ground. But I'm not sure we can do that without driving a drill.

06 20 08 21 LMP-EVA I don't think so either. Why not just drive it a little bit to break it loose.

06 20 08 23 CDR-EVA It's broke loost [sic].

06 20 08 25 LMP-EVA Oh.

06 20 08 26 CC Dave and Jim, this is Houston - -

06 20 08 27 CDR-EVA ... pulled it up yesterday.

06 20 08 28 LMP-EVA Well, one of us get on one side -

06 20 08 29 CC - - we're standing by for Rover powerdown and TV remote.

06 20 08 35 CDR-EVA Okay, Joe. I didn't know you wanted the TV out here, too.

06 20 09 00 CDR-EVA Okay. TV. ... down. Sun position is at - Bad one for the old Earth, but I'll do it on the AGC. So you ought to have it, Joe.

06 20 09 15 CC Okay. Thank you, Dave. Appreciate that. And by watching, maybe we can give you a few words of advice on this drill.

06 20 09 26 LMP-EVA Dave, I'm thinking maybe if you get on one side, I'll get on the other. And maybe the two of us, by hooking an arm under that, can lift it out.

06 20 09 33 CDR-EVA Okay. Let's try it.

06 20 09 36 LMP-EVA Okay. You say when. 1, 2 - -

06 20 09 37 CDR-EVA When.

06 20 09 38 LMP-EVA - - 3. 1, 2, 3.

06 20 09 43 CDR-EVA A little bit. Let me get a - get this down a little bit. I'd like to get down and get a - but it's got a long way to go.

06 20 09 51 LMP-EVA Yes. I know it. But if we break it loose - 1, 2, 3. Okay. 1, 2, 3.

06 20 09 58 CDR-EVA Okay. That's enough. Hold it. I - I suspected as much. Joe, do you think - Looks to me like the only answer is going to be to back it off with the drill.

06 20 10 15 CC Roger. Let's do that.

06 20 10 20 CDR-EVA Okay. Except that treadle is going to go.

06 20 10 29 LMP-EVA Now, watch the treadle.

06 20 10 30 CDR-EVA I know it.

06 20 10 32 LMP-EVA Don't want me to push it? Can I push it down and stand on it? We got it - -

06 20 10 40 CDR-EVA No, no, no, no. There's another - the other problem is you got to break - I guess we could pull the whole - -

06 20 10 46 LMP-EVA Pull - pull the whole thing out, huh?

06 20 10 48 CDR-EVA - - thing out and put it up on the vise and take it apart.

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06 20 10 51 LMP-EVA Yes.

06 20 10 52 CC Sounds good.

06 20 10 54 CDR-EVA That's about the only way we're going to do it.  
Now we got to get it back down. That'll do. Turn  
it around and stand -

06 20 11 16 LMP-EVA Stand clear of the treadle.

06 20 11 18 CDR-EVA Can't stand clear of it, because - should have  
left the treadle down there.

06 20 11 43 CC Dave, this is Houston. Is the treadle on the  
ground now?

06 20 11 50 CDR-EVA Hey, Joe. Stand by, will you?

06 20 11 52 CC Okay. We're standing by.

06 20 11 53 CDR-EVA ... this thing. And if we get hung up, we'll let  
you know, and - We'll give you a progress. If  
you - if you keep asking questions, we got to stop  
what we're doing and talk to you. ...

06 20 12 02 CC Roger. We understand. No problem.

06 20 12 05 CDR-EVA I know you're - I know you're anxious, but I guess  
we've had as many hacks at this drill - We'll ask  
you if we get hung up.

06 20 12 26 CDR-EVA There, now. Little - (laughter) Sucked me right  
back down (laughter). That was a good idea, but  
that didn't work either (laughter). What happens,  
Joe, is that, when I turn the drill on, the drill  
drills - like all drills should.

06 20 12 51 LMP-EVA There you go, Dave. Put a little angle on it.  
I was just going to suggest that.

06 20 12 58 CDR-EVA Oh, brother.

06 20 12 59 LMP-EVA I think you broke it loose.

06 20 13 00 CDR-EVA Let's see, I've got a flag. \*\*\* be a tone. No  
flag. Ninety percent on the oxygen.

06 20 13 17 LMP-EVA Everything else okay?

06 20 13 19 CC Looks good to us, Dave. You might check your cuff gage.

06 20 13 22 CDR-EVA See if we can get it to ...

06 20 13 25 LMP-EVA Yes, David; it's okay.

06 20 13 30 CDR-EVA Let me get an elbow under it.

06 20 13 31 LMP-EVA I've got another ...

06 20 13 34 CDR-EVA I - I don't think it's worth doing, Jim. We're not going to get it out.

06 20 13 41 LMP-EVA I could put a lot of pressure on it this way.

06 20 13 43 CDR-EVA Yes. Let me try, too.

06 20 13 44 LMP-EVA Okay. 1, 2, 3. Here it comes. 1, 2, 3.

06 20 13 55 CDR-EVA How many more do we have?

06 20 13 57 CDR/LMP- Just one more.  
EVA

06 20 13 58 CDR-EVA 1, 2, 3. Now we're making a little progress. Tell you what we're going to have to do is - just break the drill, take the drill off, and then break the stems off one by one here and put the drill back on and pull it up again. Are you guys not interested in this thing? In Houston?

06 20 14 23 LMP-EVA I'll get the wrench.

06 20 14 26 CDR-EVA Yes, get the wrench.

06 20 14 32 CC Dave, how - how many inches has it moved upwards?

06 20 14 40 CDR-EVA Well, we've got it up about 3 feet. And I think we can do it piecemeal, if you're really that interested.

06 20 14 51 CC Roger. We copy.

06 20 14 52 LMP-EVA Here's the wrench.

06 20 14 53 CDR-EVA Bring it, I'll tell you, you sure invested an awful lot in this thing. I got a little bit.

06 20 15 19 LMP-EVA You don't think there is any chance of us pulling it all the way out, Dave?

06 20 15 22 CDR-EVA Well, let's try again.

06 20 15 23 LMP-EVA Yes. If we could just get our shoulder under that.

06 20 15 26 CDR-EVA Okay.

06 20 15 28 LMP-EVA Let me get down here, and get a shoulder under it.

06 20 15 32 CDR-EVA Okay. ... Hold it. Ready?

06 20 15 36 LMP-EVA No. Wait a minute.

06 20 15 37 CDR-EVA 1, 2, 3. Oops, slipped off. Wait, maybe you can get an arm under it now. There you go. Do this way.

06 20 15 46 LMP-EVA Oh, this is like isometrics.

06 20 15 48 CDR-EVA Yes. Okay.

06 20 15 49 LMP-EVA 1, 2, 3.

06 20 15 53 CDR-EVA Okay. One more.

06 20 15 54 LMP-EVA That's too hard for me. I think I can grab it here.

06 20 15 57 CDR-EVA Okay. You tell me when.

06 20 15 58 LMP-EVA Okay.

06 20 15 59 CDR-EVA 1, 2, 3. 1, 2, 3. We ... down there.

06 20 16 05 LMP-EVA Oh, we can - Easy, easy, easy. Don't order it; just hold it now. Don't bend it. I'll never get it apart. 1, 2, 3. 1, 2, 3.

06 20 16 20 LMP-EVA It's kind of stuck there.

06 20 16 21 CDR-EVA Let's take a break.

06 20 16 22 LMP-EVA Yes.

06 20 16 32 LMP-EVA Why don't you go to MAX cooling?

06 20 16 33 CDR-EVA Yes. Yes, I just thought of that.

06 20 16 38 LMP-EVA Joe, you having trouble with your TV?

06 20 16 42 CC You better believe.

06 20 16 45 CDR-EVA Yes, it hung down.

06 20 16 47 CC And, Jim, why don't you take a breather and tip it up for us, please. Thank you.

06 20 16 55 LMP-EVA ..., tipping it for you.

06 20 17 02 CDR-EVA Nothing like a little PT to start the day out. Try it again, here.

06 20 17 07 CDR/LMP Okay.  
-EVA

06 20 17 08 LMP-EVA I'm ready.

06 20 17 09 CDR-EVA 1, 2, 3. Okay, it's coming. It's coming. Okay. Let me get underneath it here. Okay, 1, 2, 3. (laughter) Okay.

06 20 17 22 LMP-EVA One more.

06 20 17 23 CDR-EVA 1, 2, 3, okay. I've got it. Okay. Let me have it now.

06 20 17 26 LMP-EVA Okay. You've got it. Good.

06 20 17 30 CDR-EVA Okay. Now if you'll close the gate.

06 20 17 32 LMP-EVA Okay. Gate's closed.

06 20 17 39 CDR-EVA Okay.

06 20 17 40 LMP-EVA Want me to put up the - the vice here?

06 20 17 42 CDR-EVA No. Just leave it alone.

06 20 17 43 LMP-EVA Okay. It's up.



06 20 17 44 CDR-EVA Yes, you don't - you haven't helped me ... yet. ...

06 20 17 49 LMP-EVA I have; I thought you did, too.

06 20 17 52 CDR-EVA It's a two-man job. Okay. 1, 2, 3 up. There we go!

06 20 17 57 LMP-EVA We almost flew with it.

06 20 17 58 CDR-EVA I've got it. Okay. Man, oh man.

06 20 18 08 LMP-EVA Here, let me see. I'll get the caps for that.

06 20 18 12 CDR-EVA It's in bag 2, I think.

06 20 18 14 LMP-EVA Yes.

06 20 18 15 CDR-EVA Put all the stuff back here, if you can. I can just work the problem right here.

06 20 18 17 LMP-EVA Okay.

06 20 18 19 CC Jim, all the gear's in bag 2. And as you pull it apart, we want you to put the fill stems back into bag 2, please.

06 20 18 30 LMP-EVA Yes. We understand.

06 20 18 44 CDR-EVA Okay. I'm going to need you to help me get this treadle up to the front, Jim.

06 20 18 48 LMP-EVA Okay.

06 20 18 51 CDR-EVA Bring the whole bag back here, so I can work it.

06 20 18 54 LMP-EVA Oh, okay.

06 20 18 55 CDR-EVA Just bring the bag back here, and I'll just work it like I usually do. You can be doing something useful, instead of just standing.

06 20 19 02 CC Jim, we need pictures of your beautiful trench there and the collapsed wall. And we'd like, I guess, a photo pan around this remarkable core hole.

06 20 19 14 CDR-EVA Here. Come on; bring it on over here, Jim. Jim, bring it on over here.

06 20 19 17 LMP-EVA Yes.

06 20 19 18 CDR-EVA Joe, just stand by until we get this settled down, and then we'll come at you for what is our next task.

06 20 19 24 CC Okay.

06 20 19 28 CDR-EVA You're going to have to just hold off on jumping ahead of us, because - because we always have to come back and ask you what you said anyway.  
Okay - -

06 20 19 36 CC Read you loud and clear.

06 20 19 37 CDR-EVA - - Jim, ... get you to help me take the treadle off.

06 20 19 40 LMP-EVA Okay.

06 20 19 42 CDR-EVA So if you'd get on the other side, we can jiggle it and move it up towards the drill.

06 20 19 45 LMP-EVA Okay. Okay.

06 20 19 55 CDR-EVA You can't - you got to put - You can't put any up or down on it. It's got to be - sideways.

06 20 20 01 LMP-EVA No, it's - -

06 20 20 02 CDR-EVA Let me try.

06 20 20 06 LMP-EVA It's locked on there, isn't it?

06 20 20 07 CDR-EVA No, it shouldn't be. Boy. Boy. ... If you could hold it up there, Jim. Hold it on the - on the handtool carrier.

06 20 20 29 LMP-EVA Yes. Let me try - -

06 20 20 30 CDR-EVA Let me - let me hold it. You just twist the drill off.

06 20 20 32 LMP-EVA Okay.

06 20 20 37 CDR-EVA Okay, now. Just rotate the drill left. That a boy. Just rotate it left. Easy does it. Easy does it. Keep it straight if you can. There you go. One more. Just a little - keep it straight.

... little bit, here. Hold it up. ... ease it off. Easy does it. Ease \*\*\* that's right, I took my camera off. Okay. Just stand - hold ...

06 20 21 18 LMP-EVA You want me to stand by here, Dave?

06 20 21 21 CDR-EVA Yes. Just hold on it for me.

06 20 21 37 CDR-EVA Handy dandy caps aren't here. Well, listen, I can get it from there, I think, Jim. Go ahead.

06 20 21 44 LMP-EVA Okay. I'm going to take these pictures that Joe requested. And if you need any help, just holler, and I'll be right back.

06 20 21 49 CDR-EVA Okay.

06 20 21 50 LMP-EVA Because I'm right here. Here's my - here's my trench, now.

06 20 21 57 CDR-EVA Okay.

06 20 22 22 CDR-EVA Okay, Joe. On the drill top end goes Alfa.

06 20 22 29 CC Copy Alfa.

06 20 22 34 CDR-EVA On the bit goes Beta.

06 20 22 37 CC Roger.

06 20 23 00 LMP-EVA Okay. I have the photos of the trench. Did you say you wanted a pan from this location, Joe?

06 20 23 07 CC Roger.

06 20 23 13 LMP-EVA Okay.

06 20 24 16 CDR-EVA Golly, there's some stuff in there.

06 20 24 23 LMP-EVA Please come on out.

06 20 24 24 CDR-EVA Coming. Okay, Joe. On the top section goes Charlie.

06 20 24 34 CC Roger.

06 20 24 37 CMP-EVA And I ... a better bag, but you're going to have to go in here.

06 20 24 43 LMP-EVA I grabbed your camera, Dave.

06 20 24 44 CDR-EVA Yes.

06 20 24 45 LMP-EVA MAG's jammed. ...

06 20 24 47 CDR-EVA Is it?

06 20 24 49 LMP-EVA That's the one that jammed yesterday, isn't it?  
Yes.

06 20 24 51 CDR-EVA No, It worked - Is that right?

06 20 24 53 LMP-EVA It was working there for a while, and then it  
jammed again.

06 20 24 55 CDR-EVA Okay. Hey, Joe, what bag do you want these core  
stems to go in.

06 20 25 00 CC Bag number 2, Dave.

06 20 25 04 CDR-EVA Bag number 2 doesn't have any pockets.

06 20 25 07 CC No problem.

06 20 25 15 CDR-EVA Okay. There will be a problem when we start  
working in the bag.

06 20 25 23 CC Negative, Dave. That's an extra bag now, and  
we'll keep that in mind.

06 20 25 30 CDR-EVA Okay. Now let's see. Get the treadle off. ...

06 20 25 50 CDR-EVA Okay. Delta is the cap on top of the next section.

06 20 26 26 CDR-EVA Jim, did you get the vise on right?

06 20 26 31 LMP-EVA Sure did.

06 20 26 32 CDR-EVA No, it's backwards.

06 20 26 33 LMP-EVA Can only go on one way, Dave.

06 20 26 35 CDR-EVA Really!

06 20 26 46 CDR-EVA It's not working. There it goes. Oh!

06 20 26 56 LMP-EVA Okay. The pan's complete here, Joe.

06 20 26 59 CC Super.

06 20 27 02 CDR-EVA I think I'll take advantage - take advantage of the time and put a black and white on my camera.

06 20 27 11 CC Sounds good.

06 20 27 12 CDR-EVA You have a new MAG on there today, Jim. It couldn't have been the one that failed - failed yesterday.

06 20 27 17 LMP-EVA No, I had the color MAG on there, TT. That's the ones that was on there yesterday.

06 20 27 20 CDR-EVA No it wasn't, either. TT is brand new.

06 20 27 23 CC That's right, Dave. Tango Tango is a brand new MAG.

06 20 27 38 LMP-EVA Okay. I'll - I'll throw a little malfunction procedure on it then.

06 20 27 45 CC Okay. That a boy.

06 20 27 46 CDR-EVA I hate to tell you, Jim, but that - oh boy, this vise is on - I swear it's on backwards.

06 20 28 03 LMP-EVA The holes on the handtool carrier only line up one way.

06 20 28 09 CDR-EVA Doesn't work then. How many hours you want to spend on this - drill, Joe? Like the - the vise doesn't bite strong enough. I get it gripped so I can break the sections.

06 20 28 28 LMP-EVA Dave, if you want, I can get on the other end and hold it steady.

06 20 28 30 CDR-EVA Well, you can try.

06 20 28 31 LMP-EVA Yes.

06 20 28 32 CDR-EVA See if it does any good. But the vise - ones - or the training ones hold good. There's never any problem with them.

06 20 28 38 LMP-EVA Okay. Let me get on the other end. Some taps behind your left boot.

06 20 28 45 CDR-EVA Oh, shit. I knocked them off again.

06 20 28 47 LMP-EVA Here I'll take them.

06 20 28 48 CDR-EVA No. Go get the vise - I mean the drill. I think we're about through with this.

06 20 28 52 LMP-EVA Okay. I've got it.

06 20 28 53 CDR-EVA Okay. Won't bite. Try - don't hold it that way. Hold it straight in the vise, if you can, Jim. See how it - see how it sits?

06 20 29 03 LMP-EVA Yes.

06 20 29 04 CDR-EVA Okay. See, it doesn't grab. There, that's got it there. Okay. Hold it like that. Man, oh man. Okay. Hold it right there.

06 20 29 21 CC Dave, the treadle may be jammed against the fender. There it moves away.

06 20 29 29 CDR-EVA ... There.

06 20 29 43 CDR-EVA Trouble is - Okay. Let go a minute. Okay. Now, ... a little ways. Hold it again, Jimmy. Here.

06 20 29 59 LMP-EVA Yes, I got it.

06 20 30 06 CDR-EVA Okay. Oh boy. Joe, I haven't heard you say yet you really want this - that bad. Don't mean to tell me you really want it this bad.

06 20 30 22 CC It's hard for me to say, Dave. Beautiful.

06 20 30 29 LMP-EVA I'll get those caps for you, Dave.

06 20 30 31 CDR-EVA Okay.

06 20 30 32 LMP-EVA You need those now?

06 20 30 33 CDR-EVA Yes.

06 20 30 34 LMP-EVA Okay.

06 20 30 49 CDR-EVA Okay. Thank you. Okay. Cap number Echo ... the next section. Okay. Now, old buddy, if you think you can have some luck taking that off - I'll tell you what, got to break it again.

06 20 31 23 CC Dave, how many more sections are coming apart?

06 20 31 25 LMP-EVA If you can ... the wrench, I'll hold the treadle.

06 20 31 27 CDR-EVA Okay.

06 20 31 29 CDR-EVA Oh, stand by, Joe. We've got 1, 2, 3, 4.

06 20 31 33 CC Thank you.

06 20 31 35 LMP-EVA Say, I've got a pair if you can -

06 20 32 24 CDR-EVA That doesn't look right either. It's going the other way. Man, how did that treadle get like that?

06 20 32 48 CDR-EVA It's moving.

06 20 32 49 LMP-EVA Yes.

06 20 32 50 CDR-EVA It - it's broken.

06 20 32 51 LMP-EVA I can get it.

06 20 32 58 CDR-EVA It's really jammed.

06 20 32 59 LMP-EVA ...

06 20 33 00 CDR-EVA Work it out towards you - because of the cap. See what I mean?

06 20 33 04 LMP-EVA Yes.

06 20 33 05 CDR-EVA Take that and the end of your right hand should come through, while I work on the rest of them here. Okay. Foxtrot on the next section.

06 20 33 20 CC Roger.

06 20 33 45 LMP-EVA If I had known this, I would have left my cover gloves on, Dave.

06 20 33 48 CDR-EVA Well, don't mess with it then. Don't mess your gloves up. I'll do it.

06 20 33 51 LMP-EVA Oh, they're okay. I'll take it.

06 20 33 54 CDR-EVA This vise just won't hold. There's something wrong with it.

06 20 34 11 CDR-EVA The vise doesn't work - at all. I have to have you hold it, the -

06 20 34 26 CDR-EVA ... an hour and 15 minutes into it already. We're still fiddling with this thing. Okay. The treadle is off.

06 20 34 33 LMP-EVA Beautiful.

06 20 34 35 CDR-EVA Stick this in here. Now, hold that section for me.

06 20 34 41 LMP-EVA Okay. Did before.

06 20 34 44 CDR-EVA It's not - it's just not gripping.

06 20 34 57 CC Dave and Jim, this is Houston.

06 20 35 05 CDR-EVA Go ahead.

06 20 35 06 CC Roger, troops. What's your best guess?

06 20 35 08 LMP-EVA ... back that way, Dave?

06 20 35 09 CC Do you think you can turn off the bottom-most drill section?

06 20 35 17 CDR-EVA Joe, you can see on the TV. That's what we got. Now the vise - the - the wrench - my hand wrench works okay. The one on the back of the handtool carrier doesn't seem to want to work for some reason. It may just be because of the threads on the - the stems. We just - I just can't get them broken apart. And that's the main problem. The - the wrenches don't work.

06 20 35 43 CC Dave and Jim, put that section on the ground, if you would, please. We'll pick it up on the way back. And we want you to continue on with the Grand Prix.



06 20 36 03 CDR-EVA All right. Good enough. Do that.

06 20 36 06 LMP-EVA Stick it in there, Dave. We might be able to return it just like that.

06 20 36 08 CDR-EVA Yes, I think probably so. I don't know where we're going to put it in the command module. I'll think of something. Let me see. Let me put it someplace where we don't ding it. There's no place to put it. I'll lay it right here on the treadle. I guess we ought to take it back. There's more time invested in that than anything we've done. Okay. Get your camera.

06 20 36 36 LMP-EVA Okay. Roger. Let's see. We don't want the drill on here. What do you want to do with the drill?

06 20 36 40 CDR-EVA Oh, just leave it right here.

06 20 36 42 LMP-EVA Put it on the surface there?

06 20 36 44 CDR-EVA Yes.

06 20 36 59 CDR-EVA Got a good MAG? Why don't you check it out and see if it runs?

06 20 37 01 LMP-EVA I did. I checked it out at 1 foot per second earlier.

06 20 37 05 CDR-EVA Okay.

06 20 37 06 LMP-EVA I'll give it a short burst here.

06 20 37 08 CC Good thinking, Jim.

06 20 37 15 CC Dave, while you're climbing on the Rover, we'll take - -

06 20 37 17 CDR-EVA High gain antenna is getting - -

06 20 37 18 CC The meter readouts and your heading is 292.

06 20 37 26 CDR-EVA Okay. Joe, I never did any systems reset, but it - They were all sitting zero when I stopped here.

06 20 37 38 CC Good enough for me.

06 20 37 42 CDR-EVA PML/WB.

06 20 38 05 CDR-EVA Okay. Let's get our little - handy.

06 20 38 10 LMP-EVA Okay. I have the camera set.

06 20 38 12 CDR-EVA Okay.

06 20 38 22 CDR-EVA Okay. The Sun should be over your right shoulder, so why don't you take a right turn there. You should be 45 degrees looking up towards ... Hill over there.

06 20 38 33 LMP-EVA You want to do a - a quick turn there so you don't get dust on my experiments.

06 20 38 36 CDR-EVA Oh, sure. Watch out. Going backwards, Jim.

06 20 38 39 LMP-EVA Ah, no sweat.

06 20 38 41 CDR-EVA Yes.

06 20 39 13 LMP-EVA If you want, you can do a left turn there, Dave. And I'll move back a little more.

06 20 39 17 CDR-EVA Okay. If I can get my seatbelt on.

06 20 39 39 CC Dave, before you move out, you want to doublecheck your heading at 292.

06 20 39 46 CDR-EVA Okay, Joe.

06 20 40 00 CDR-EVA Torquing now.

06 20 40 13 CDR-EVA A long way to go. I think this torquing switch ... switch that is spring loaded.

06 20 40 25 LMP-EVA It would help.

06 20 40 35 CDR-EVA Be with you in a minute, Jim. I've got to torque another 90 degrees or so.

06 20 40 40 LMP-EVA No rush.

06 20 40 43 CC Enjoy the scenery, Jimmy.

06 20 40 50 LMP-EVA Yes. I'm looking to find out where all the big rocks are.

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06 20 40 53 CC Sounds good. And tell Dave once again that you don't want any dust on your experiments.

06 20 41 08 CDR-EVA Hey, Joe, you never did tell me that drill was that important. Just tell me that it's that important, and then I'll feel a lot better.

06 20 41 17 CC It's that important, Dave.

06 20 41 23 CDR-EVA Okay. Good. Because I - then I don't feel like I wasted so much time.

06 20 41 31 CC No. Quite seriously, Dave and Jim, that's undoubtedly the deepest sample we'll - out of the Moon for perhaps as long as the Moon itself has been there.

06 20 41 49 CDR-EVA Well, that sounds good. Okay, Joe. I'm torqued at 292. And, Jim, I'll - take a left turn right here.

06 20 42 15 CDR-EVA Making sure I don't get any dust on your experiments.

06 20 42 22 LMP-EVA Okay.

06 20 42 23 CDR-EVA You're in a good spot.

06 20 42 24 LMP-EVA I'm ready for you.

06 20 42 26 CDR-EVA Okay. Wait, let me get over here and get set up.

06 20 42 34 LMP-EVA Okay. Let me move back a little bit then.

06 20 42 36 CDR-EVA No, you're okay. Right there. The Sun is over your right shoulder. That's just about right. Okay. Take a little left turn there. I'll start up and go constant, if you are ready.

06 20 42 54 LMP-EVA I'm ready.

06 20 42 55 CDR-EVA Okay. Okay; here's about 7 clicks.

06 20 43 05 LMP-EVA Camera is on.

06 20 43 10 CDR-EVA Seven kilometers an hour. Tell me when to turn.

06 20 43 16 LMP-EVA Okay; you can turn now.

06 20 43 18 CDR-EVA Okay.

06 20 43 19 LMP-EVA Bitter.

06 20 43 25 CDR-EVA Okay. Here comes acceleration. Couple of di-do's here. Up to 12 clicks.

06 20 43 38 LMP-EVA Ride'em Bronco.

06 20 43 39 CDR-EVA Yeah man. Okay. I'm going to make a right turn.

06 20 43 47 LMP-EVA You've kicked up a very nice rooster tail.

06 20 43 49 CDR-EVA Good. Make a right turn here. And I'll come back across, and give you a hard stop - if I can find us a smooth spot to get going here.

06 20 44 10 CC Jim, this is Houston here. How does that camera seem to be working?

06 20 44 13 CDR-EVA Okay. Here we go.

06 20 44 17 LMP-EVA It feels like it's working, Joe.

06 20 44 20 CDR-EVA Here's the hard stop.

06 20 44 21 LMP-EVA Okay. We'll check it. Ah, shoot!

06 20 44 24 CDR-EVA Didn't work?

06 20 44 25 LMP-EVA Not working.

06 20 44 26 CDR-EVA You're kidding?

06 20 44 27 LMP-EVA The indicator is still at full.

06 20 44 28 CDR-EVA Oh, boy. Want to try another MAG?

06 20 44 32 LMP-EVA Guess we should.

06 20 44 33 CDR-EVA No, let's do it later - because I'd have to get off and get unstrapped and everything else. ... get to the seatpan.

06 20 44 39 LMP-EVA Okay. I still indicate full, Joe.

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06 20 44 44 CC Okay, Dave and Jim. That was a good try. Let's press on towards Station 9. Let's take a good clean comfortable look at that rille.

06 20 44 55 CDR-EVA Yes, that's a good idea, Joe. Best idea you've had all morning. I don't know what's wrong with this camera. I checked all the film again and ran it through with my finger a few times and made sure that the film was right on the - the preparations were right on the red mark. So -

06 20 45 15 CC Roger, Dave. We hear you. Sounds like you followed the owner's manual.

06 20 45 21 CDR-EVA Oh, wait a minute. I - uh oh, just stay right there. Let me get off. I get off and you ... over and get your seatbelt.

06 20 45 42 CC Dave, while Jim is climbing on there, could you get us some Rover read-outs, please?

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

06 18 48 -- BEGIN LUNAR REV 44

06 19 14 01 CC Endeavour, we'd like to have NARROW BEAM on the HIGH GAIN.

06 19 14 16 CMP Okay, Houston. Got it.

06 19 14 23 CC Very good, Al. You're coming through loud and clear. What's new up there?

06 19 14 30 CMP Oh, just had a very nice breakfast and ready for today's activities.

06 19 14 36 CC Excellent.

06 19 14 58 CC Our major business on this rev is to get squared away for plane change. And, as soon as we have good comm, I want to review with you the changes we need in your SPS burn cue card.

06 19 15 16 CMP Okay. Stand by.

06 19 17 04 CC Endeavour, this is Houston. I guess we can go ahead with the plane change data anytime you're ready to copy.

06 19 17 14 CMP Okay, Karl. Stand by 1.

06 19 17 16 CC Let's start out with the cue - with the cue card, if that's okay with you.

06 19 17 54 CMP Okay, Karl. Go ahead.

06 19 17 56 CC Okey-doke. As you know, this burn is going to be fairly normal burn on bank B only. The only really special thing to remember is to close that SPS pilot valve main B at 2 minutes before the burn. To make sure that we've got all the verifications and everything else straight though, let's go back into the cue card and do some verifying right after you cycle the cryo fans and before you go into your DELTA-V check. And at that point, we've got, first of all, EMS FUNCTION, OFF. Verify that before you put in the EMS breakers. Second is the circuit breakers, EMS MAIN A and B, both of them, closed. Third step there is to verify that the circuit breakers, GROUP 5, both of them, are closed. And the fourth step there is to verify at this point that both of your SPS PILOT VALVE circuit breakers are open. The only other change to the front side of your cue card is the trivial point down below when you're checking your STABILIZATION CONTROL circuit breakers on panel 8, that there's only 10 of them closed at this time, instead of 12.

06 19 19 34 CC Right. That's the STABILIZATION CONTROL - -

06 19 19 38 CMP Roger, Joe. - -

06 19 19 39 CC - - and SPS breakers.

06 19 19 40 CMP - - I understand. Yes. The SPS burn is going to be a nominal bank B burn - bank B only burn. But to get set up for it, we want to check - after cycle cryo fans, check that EMS is off, get the two EMS circuit breakers in, check that the GROUP 5 circuit breakers are closed, and check that the SPS PILOT VALVES both are open at that time. And

then down where it says CB STABILITY CONTROL, panel 8, and SPS 10 or 12, we'll make that a 10.

06 19 20 11 CC Roger. And then over there on the back of the card. Would you give us HIGH GAIN, AUTO, right now, Al?

06 19 20 26 CMP Okay.

06 19 20 33 CC And on the back side of the card at - at minus 2 minutes, we have - the DELTA-V - just above the DELTA-V THRUST, we want to put in the circuit breaker, SPS PILOT VALVE MAIN B, closed, at that point, followed immediately by your DELTA-V THRUST switch, which in this case is your B switch, not your A switch. Cross out the "A." Down below - -

06 19 21 02 CMP Roger; understand.

06 19 21 03 CC Down below - -

06 19 21 04 CMP SPS PILOT VALVE MAIN B, closed, before DELTA-V THRUST B switch to ON.

06 19 21 10 CC That's affirmative. And down below at plus 3 seconds, you can cross out the DELTA-V THRUST switch, NORMAL, there since this is a single bank burn. And - Al, we'd like to have HIGH GAIN ANTENNA, WIDE BEAM, for about 5 seconds and then, NARROW.

06 19 22 03 CC And the final point in the checklist is in the cleanup down below, preferably after circuit breaker SPS PITCH 1 and YAW 1, open. Let's get our circuit breakers cleaned up here. Let's put in circuit breaker SPS PILOT VALVE MAIN B, open. Also, circuit breaker EMS, both of them, open.

06 19 22 38 CMP Roger; understand. In the cleanup, about where CB SPS PITCH 1 and YAW 1 are open, we'll pull CB SPS PILOT VALVE MAIN B, open, and CB EMS, two, open.

06 19 22 52 CC That's correct. And that - assuming that your cue card was clean to start with, that should give you a - a good cue card, not only for the plane change but also for any rescue maneuvers and also for the shaping burn.

06 19 23 08 CMP Roger; understand.

06 19 23 14 CC I have - and, I have - the comments here on trimming your residuals, if you're ready to copy those.

06 19 23 33 CMP Okay. Stand by.

06 19 23 55 CMP Okay. Go ahead.

06 19 23 57 CC Okay. LOPC residuals. First of all, trim  $V_{gy}$  to 0 - 0.2 feet per second. Next, and this is because our quad C RCS is low and we're trying to conserve it, in - in the trimming. If you have a negative  $V_{gy}$ , roll 90 degrees counterclockwise and use your minus-Z thrusters. If you have a positive  $V_{gy}$ , roll 90 degrees clockwise, and use your minus-Z thrusters. And, one final comment here is during - during the burn, we would like to keep the OXIDIZER FLOW VALVE in the DECREASE - DECREASE position.

06 19 24 57 CMP Understand you want the OXIDIZER FLOW VALVE in the DECREASE position.

06 19 25 02 CC Affirmative.

06 19 25 13 CC And did everything come through on the trim?

06 19 25 28 CMP Roger, Karl. You - you wanted to add to - to the - trim rules that we already have established for the plane change. That if the residual is a plus  $V_{gy}$  greater than 2/10ths of a foot per second, then we roll clockwise 90 degrees and use the minus-Z thrusters. Otherwise, the same as printed in the Flight Plan.

06 19 25 55 CC That's affirmative, Al.

06 19 26 01 CMP And, also you want the PUGS valve in decrease.

06 19 26 07 CC That's affirmative. And the next - the next bit of information I have for you is the plane change pad.

06 19 26 28 CMP Okay, go ahead.



06 19 26 31 CC Okay. Purpose, PC, SPS/G&N; 37202; plus 0.33, plus 1.07; 165:11:31.96; minus 0009.2, plus 0330.3, plus 0018.4; 0 roll, 0 pitch, 0 yaw; 064.4 - Say that again for H<sub>A</sub>. 0064.4, H<sub>p</sub> is plus 0053.3; 0330.9, 0:18, 0319.1; 36, 012.8, 39.2; the rest is NA. The set stars are Deneb and Vega; 189; 256; 330. Ullage, we would like two quads, B and D quads; 17 seconds, 17 seconds. And that's all.

06 19 28 17 CMP Okay, understand. This is plane change 1; SPS/G&N; 37202; plus 0.33, plus 1.07; 165:11:31.96; minus 0009.2, plus 0330.3, plus 0018.4; roll, pitch, and yaw are all zeros; 0064.4, plus 0053.3; 0330.9, 0.18, 0319.1; 36, 012.8, 39.2. Vega and Deneb are set stars. And 189; 256; 330. Ullage is two jets, 17 seconds, using quads B and D.

06 19 29 18 CC That's all correct.

06 19 29 54 CC Al, we'd like to verify that the OXIDI - OXIDIZER FLOW VALVE was in the DECREASE position at the end of the last burn and has been there since then.

06 19 30 08 CMP Negative, Karl. It was in NORMAL at the end of the last burn, which was the circularization burn and it was - it's been in NORMAL since then. It's in DECREASE now; I put it there after you called it out on the pad.

06 19 30 21 CC Thank you, Al.

06 19 31 10 CC Just a reminder, Al. Since I've been reading a lot of things to you about the PAN CAMERA MODE, STANDBY; POWER, on.

06 19 31 20 CMP Roger. It's there now.

06 19 31 32 CC And I have a TEI-52 pad anytime you're ready to copy.

06 19 31 51 CMP Okay, go ahead.

06 19 31 54 CC TEI-52, SPS/G&N; 36003; plus 0.60, plus 1.07; 180:31:51.88; plus 3030.0, minus 0893.9, minus 0231.0; 180, 088, 346; the rest is NA. We have two jets for 17 seconds with the B and D quads,

Bravo and Delta quads. The lambda at  $T_{ig}$  is plus 177.77; and it assumes LOPC; and ascent, REFSMMAT.

06 19 33 14 CMP Roger; understand. TEI-52, SPS/G&N; 36003; plus 0.60, plus 1.07; 180:31:51.88; plus 3030.0, minus 0893.9, minus 0231.0; 180, 088, 346; two jet, 17 seconds, using quads B and D. And lambda  $T_{ig}$ , is plus 177.77; and the pad assumes the plane change and asc - ascent REFSMMAT.

06 19 33 59 CC That's all correct.

06 19 34 11 CC Endeavour, we're ready for PAN CAMERA POWER, OFF, now.

06 19 34 22 CMP Roger. POWER is OFF.

06 19 41 51 CC Endeavour, a reminder on the GAMMA RAY GAINSTEP. We need the SHIELD OFF at this point.

06 19 46 37 CC Endeavour, this is Houston. We have one small change in our setup for the plane change burn, and that is that we would like to leave the oxidaze - OXIDIZER utilization VALVE on - in the NORMAL position. We'd like it NORMAL instead of DECREASE as we previously told you.

06 19 47 06 CMP Okay, going NORMAL on the PUGS VALVE.

06 19 47 10 CC Roger; and the boys on the surface have the TV tuned up for us now, and we're getting some lovely landscape pictures - Hadley Delta, et cetera. Those hills there are just beautiful, round, bare hills, a lot like the ones you see around San Francisco. It's a beautiful sight. They're just about loading up the Rover and getting ready to head off toward the south com - first of all, to the rille for a quick visit and then off to the South Complex.

06 19 47 44 CMP Roger, Karl; understand. And you say they are going to cut it a little bit short today?

06 19 47 49 CMP Right. They're going to cut it between 1 and 2 hours short because they got in - they wanted to get their normal sleep today; and, I guess they

won't do quite so much exploration in between, but they still expect to get to the South Complex. Pardon me, that's the North Complex.

06 19 48 08 CMP Roger, understand.

06 19 59 06 CC Endeavour, this is Houston. It's time to turn off the mapping camera.

06 20 02 05 CC Endeavour, this is Houston. If you'll go POO now, you'll have a shorter maneuver down in your maneuver to the P52 attitude. And, if you'll give us ACCEPT, we'll send up state vector and other burn information.

06 20 02 22 CMP Okay, Karl. You've got it; POO and ACCEPT.

06 20 07 38 CC Al, the computer is yours; you've got a state vector, a target, and a REFSMMAT.

06 20 07 47 CMP Okay, Karl; thank you.

06 20 07 58 CMP And, Houston; Endeavour. I've got the SIM bay powered down now, and turning back all the jets - turning on all the jets.

06 20 08 07 CC Roger, Al; we understand.

06 20 09 15 CC Endeavour, this is Houston. You can expect us to give you a NO - GO/NO GO for LOI before LOS. No, that's - that's right; that's a GO/NO GO for plane change - pardon me, I'm a little bit behind time here - before LOS, and, since - since your burn is so close to AOS, we'd like to give you a procedure here, so that we can lock up without your having to go over there to throw - to throw any switches. Can you copy it now?

06 20 09 51 CMP Roger, Karl; go ahead.

06 20 09 55 CC Okay. After LOS, we'd like to have you put the HIGH GAIN TRACK to MANUAL, and dial in PITCH, minus 10; YAW, 251. When the high gain angle - when the HIGH GAIN ANTENNA meters read PITCH, minus 10 and YAW, 251, then go to TRACK and REACQ with NARROW BEAM. Then, if your SQUELCH is off, your high gain antenna acquisition will be indicated at AOS by a loss of noise.

06 20 10 43 CMP Okay. Understand you want me to position PITCH, minus 10, YAW pl - YAW to 251; go REACQ, NARROW, and make sure the SQUELCH is off.

06 20 10 52 CC That's affirmative.

06 20 12 31 CC Endeavour, this is Houston. You're GO for plane change 1.

06 20 12 39 CMP Houston, Roger; Endeavour. Understand GO.

06 20 17 39 CMP Okay, Houston; Endeavour. I've got the gyro torquing angles up. You through copying them?

06 20 17 43 CC Endeavour, we've copied them. Thank you.

06 20 17 48 CMP Okay.

06 20 21 18 CC Endeavour, this is Houston. We're 2 minutes from LOS, and all of your systems look to be in excellent shape.

06 20 21 28 CMP Roger. Thank you, Karl.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 20 45 52 LMP-EVA I'll get those to you, Joe. Starting with heading - -

06 20 45 59 CC Go.

06 20 46 00 LMP-EVA - - 772 - -

06 20 46 01 CDR-EVA You're going to have to get off. Do it later. Hop off. Get it later.

06 20 46 31 LMP-EVA Okay, give me that extension handle, now<sup>3</sup>.

06 20 46 48 CDR-EVA Okay, now, why don't you try hopping up here again? Easy. Want me to hold the camera for you?

06 20 46 56 LMP-EVA I can hold it.

06 20 47 02 CDR-EVA Don't lean so far back when you get on, Jim. What's happening here? You get - Let your PLSS down a little bit.

06 20 47 19 CDR-EVA Okay, you're on and strapped in.

06 20 47 36 LMP-EVA Okay. Rover read-outs, Joe: 720 on BEARING; DISTANCE, .2; RANGE, 0; AMP-HOURS, 90, 95, 100, 105; and MOTOR TEMPs are still off-scale, low.

06 20 47 58 CC Thank you, Jim. Copied.

06 20 48 02 CDR-EVA Okay. Ready?

06 20 48 03 LMP-EVA I'm ready to go.

06 20 48 05 CDR-EVA Okay. \*\*\* me a heading?

06 20 48 06 LMP-EVA Give me a heading - head west, man. We're heading towards Station 9. Head about - -

06 20 48 15 CDR-EVA Oh, I'd say 270, until they give us an - an update.

06 20 48 18 CC That sounds good, - -

06 20 48 19 CDR-EVA Okay. That's a - -

06 20 48 20 CC - - Jim. 265 - -

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06 20 48 21 LMP-EVA Head a little to the north, - -

06 20 48 22 CC - - to 270 - -

06 20 48 23 LMP-EVA - - ...

06 20 48 24 CC - - for about 1.8 clicks. And just enjoy it.

06 20 48 26 CDR-EVA Okay.

06 20 48 28 LMP-EVA And we're moving.

06 20 48 29 CDR-EVA Yes. We're going around the ALSEP, too.

06 20 48 33 LMP-EVA Yes, let's not drive through the ALSEP.

06 20 48 35 CDR-EVA Yes. It's too bad the camera didn't work because there was some neat bumps there.

06 20 48 38 LMP-EVA Yes. Oh, man. Look -

06 20 48 42 CDR-EVA Is that a glass ball right there?

06 20 48 43 LMP-EVA Yes.

06 20 48 44 CDR-EVA Right on top of the surface - -

06 20 48 45 LMP-EVA Yes.

06 20 48 46 CDR-EVA - - about 2 inches or so.

06 20 48 47 LMP-EVA There's several here. Here's one over at 1 o'clock.

06 20 48 48 CDR-EVA Yes.

06 20 48 50 LMP-EVA Almost like a - a - a black spherule of glass.

06 20 49 01 CC We copy that.

06 20 49 02 LMP-EVA Okay. We're heading - right now we're heading - swinging around more to the west. We're HEADING 270. RANGE, .1.

06 20 49 17 CC Roger, Jim. Copy. And shortly, you'll be - -

06 20 49 21 LMP-EVA Man!

06 20 49 22 CC - - passing the Quark Triplet that's on your right, probably, and we'll be most likely be directing you back towards the western crater in that triplet for some mare sampling towards the end.

06 20 49 36 LMP-EVA I see them and they look - look rather fresh. There's a lot of angular light-colored blocks - fragments on the - on the rim, Joe. So, mark our position here; we're BEARING - 110 and RANGE, .2.

06 20 49 59 CC Okay, fine.

06 20 50 08 LMP-EVA We dropped into a shallow depression there, and that was the Quark Triplet there on the - the northwest side of that shallow depression.

06 20 50 17 CDR-EVA Ooo, but look at this nice, little, new fresh one.

06 20 50 20 LMP-EVA Yes. But there're not too many fragments on the - on the rim.

06 20 50 24 CDR-EVA No. You're right. Oh, there's a ... - -

06 20 50 27 LMP-EVA There's a very large depression in a - ahead of it.

06 20 50 30 CDR-EVA Yes.

06 20 50 31 LMP-EVA We don't want to drive through that.

06 20 50 32 CDR-EVA I don't know whether we do or not. Let's take a look at it.

06 20 50 34 LMP-EVA Oh, I wouldn't think so, Dave.

06 20 50 36 CDR-EVA Let's take a look at it. Look at the big boulder there, Jim.

06 20 50 41 LMP-EVA Yes. I saw that one. ... - -

06 20 50 42 CDR-EVA About 3 feet, angular.

06 20 50 43 LMP-EVA A very large depression here. I'd say, let's go north of it.

06 20 50 45 CDR-EVA Yes. I think you're right.

06 20 50 47 CC Roger. We agree.

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- 06 20 50 50 LMP-EVA Oh, yes. I can't - I really can't te - really can't tell how wide it is, but at the very sh - shallowest - or the deepest portion of it, it looks like there's a - a crater.
- 06 20 51 01 CDR-EVA I get the - the idea that it's - It looks collapsed north to south, doesn't it? Sort of looks elongate.
- 06 20 51 11 LMP-EVA I don't - Look at our map here. ... just a little. Sure can't pick that up.
- 06 20 51 21 CDR-EVA No, sure can't.
- 06 20 51 25 LMP-EVA Let's see, we're going about 8 clicks. And we're kind of dropping down as we go around the - And we're heading 320 - we're - on the - the northeast rim of this very shallow depression. By shallow, it - The slopes are probably 3 degrees. And I guess the - at the deepest part there, it's probably - oh, 200 feet deep. Right now, we're on the - the north side of that depression.
- 06 20 52 10 CDR-EVA Hang on.
- 06 20 52 11 LMP-EVA Yes. Now, we're swinging around to the west, HEADING, 270. Heading right towards Bennett Hill. Dave, I'm going to call that big crater, Wolverine.
- 06 20 52 32 CDR-EVA Oh, that's a good name. Good name for a big crater.
- 06 20 52 42 LMP-EVA Okay, BEARING is 113, and we're at .6.
- 06 20 52 47 CDR-EVA There's another big one, Jim. Whoo, and look at that rock over there.
- 06 20 52 51 LMP-EVA Oh, yes.
- 06 20 52 52 CDR-EVA Look at that one.
- 06 20 52 53 LMP-EVA Sitting right on the surface - -
- 06 20 52 54 CDR-EVA Yes.
- 06 20 52 55 LMP-EVA - - a block angular frag on the northwest - side about one-quarter of the way down - -
- 06 20 53 03 CDR-EVA Yes.



06 20 53 04 LMP-EVA - - by the crater. But, a very subdued crater.  
That block is - -

06 20 53 09 CDR-EVA Isn't that something? We're going to drive right  
by it, anyway.

06 20 53 15 CC And, Jim, don't hesitate to fire off pictures right  
and left here. We've got lots of film.

06 20 53 22 LMP-EVA Oh, I wish I - I wish I could, Joe.

06 20 53 28 CDR-EVA Right there.

06 20 53 31 LMP-EVA Okay, we've stopped.

06 20 53 32 CDR-EVA Just for a second though.

06 20 53 33 CC Okay.

06 20 53 34 LMP-EVA You getting them?

06 20 53 44 CDR-EVA Got it.

06 20 53 48 LMP-EVA Okay, we're moving.

06 20 53 49 CC Roger.

06 20 53 51 CDR-EVA Hey, that's something, isn't it? I bet it chipped  
that hole, Jim. It went right in - it came from  
that - it made that crater there. And it came  
from 250 - I mean (laughter) 070. That angular  
projectile about a foot across, Joe, had made a  
secondary about a meter across, and it came from  
a 070 HEADING. I bet you anything, because the -  
Oh, that was neat. One part of the frag was covered  
with glass, and the central part of the crater was  
covered with gl - glass. Obviously a secondary,  
and obviously made by that angular frag.

06 20 54 32 LMP-EVA Dave, we've got another shallow depression here  
up ahead. And I - I don't know whether - I'd say,  
we'd be better off staying to the north, wouldn't  
you?

06 20 54 39 CDR-EVA I don't know. We're making good time.

06 20 54 40 LMP-EVA Okay. Let's - -

06 20 54 41 CDR-EVA Why don't we - -

06 20 54 42 LMP-EVA - - let's go through it then.

06 20 54 43 CDR-EVA There's a big - there's a big - -

06 20 54 45 LMP-EVA A fresh one out at 1 o'clock.

06 20 54 46 CDR-EVA Yes.

06 20 54 47 LMP-EVA A - a very - It looks like a large fresh one.  
There are a lot of angular, light-colored blocks  
on its rim. Yes - -

06 20 54 57 CDR-EVA ...

06 20 54 58 LMP-EVA - - we're going through there, huh?

06 20 54 59 CDR-EVA Yes. You - to go around it - -

06 20 55 00 LMP-EVA Yes.

06 20 55 01 CDR-EVA - - We're making good time.

06 20 55 02 LMP-EVA Okay.

06 20 55 03 CDR-EVA Down here to the left, it looks pretty flat.

06 20 55 04 LMP-EVA Okay, we're heading through another shallow de-  
pression, similar to the last large depression  
that we described. What's that fragment at  
12 o'clock to us? Another piece of glass, I  
suppose.

06 20 55 17 CDR-EVA That shiny one here?

06 20 55 18 LMP-EVA Yes. Another glassy fragment, angular - about  
3 inches long, sitting right on the surface.

06 20 55 31 CDR-EVA And, you know, it's really - the - the surface is  
smooth, but it's pretty rough out here. Smooth  
on a small scale, and there's lots of - you really  
cou - -

05 20 55 42 LMP-EVA Bet you - -

06 20 55 43 CDR-EVA - - you really could get lost here. Yes. Up and  
down.

06 20 55 47 LMP-EVA Up and down. Yes. It was great going uphill. Going up to the Front, you could always look back and see the LM. It's like driving over the big sand dunes in the desert.

06 20 56 01 CC Roger, Jim - -

06 20 56 02 LMP-EVA Pretty rough on the one you're seeing now. We'll walk - -

06 20 56 05 CC - - Pretty description. And you're looking for NAV readings of 1.8 clicks at 088, when you're at Station 9.

06 20 56 13 CDR-EVA Hey, ...

06 20 56 15 LMP-EVA Okay, we're 10 now on RANGE. BEARING, 101. And now there's another very large shallow depression. And, Dave, they're all about the same size.

06 20 56 26 CDR-EVA Yes, you're right. Go around the south of this one.

06 20 56 31 LMP-EVA I think their the - you know, the first really shallow depressions, they're very subdued craters we've seen. And there are just three in a line that run east-west.

06 20 56 40 CDR-EVA Yes, I'd say, they're probably about 100 meters across and maybe - what, 25 - 10, 15 meters deep?

06 20 56 48 LMP-EVA Yes.

06 20 56 54 CDR-EVA Man.

06 20 56 56 LMP-EVA Well, I thought we'd whip right over to the rille. I didn't think we'd have this type of terrain.

06 20 57 01 CDR-EVA Yes, it was a lot easier driving yesterday.

06 20 57 03 LMP-EVA Yes.

06 20 57 07 CDR-EVA Surprises, surprises.

06 20 57 11 LMP-EVA Look at that rock over at - oh, 1 o'clock. It's right - well, it was on the horizon; like kind of a pedestal.

06 20 57 16 CDR-EVA Yes.

06 20 57 18 LMP-EVA You - you can see a lot of them right on the horizon. Okay. We probably want to - When you can, Dave, swing around to the west; we're going a little too far south here.

06 20 57 30 CDR-EVA No. We're doing fine. Say again the - the coordinates, Joe, of the - of the station.

06 20 57 36 CC Dave, you're driving towards 1.8 clicks; 088, BEARING.

06 20 57 45 CDR-EVA Roger. We're doing good. We're 092, now; heading slightly south.

06 20 57 50 LMP-EVA Yes. Well, what I'm thinking, there's nothing unique about Station 9, is there? Except maybe Scarp Crater.

06 20 57 55 CC And you're thinking correctly, Jim - -

06 20 57 56 LMP-EVA Scarp Crater is over this way.

06 20 57 57 CDR-EVA Okay.

06 20 57 58 CC - - Anywhere along there's beautiful.

06 20 58 02 LMP-EVA I was thinking, you know, just a good sample point - -

06 20 58 05 CDR-EVA Yes.

06 20 58 06 LMP-EVA - - along the rim. And, we can - minimize the distance.

06 20 58 13 CC Right on, Jim. Just don't drive too far west.

06 20 58 16 LMP-EVA I was going to say, I thought I could see it.

06 20 58 20 CDR-EVA Yes. (Laughter) Okay. (Laughter) Yes, Joe, we'll let you know when the slope gets up to 26.

06 20 58 28 LMP-EVA I think I can see the far side of the rille, now.

06 20 58 32 CDR-EVA I think we're coming up on the rim of it.

06 20 58 33 LMP-EVA Yes.

06 20 58 50 CDR-EVA Take a little jog over here to where it's a little smoother.

06 20 58 54 CDR-EVA It's a steep slope, isn't it? Yes, I think we can ma - it. No, it's another fresh crater.

06 20 58 59 LMP-EVA Yes, fresh crater. And, you do kind of get the impression there's a rille - or a rim here.

06 20 59 04 CDR-EVA Yes.

06 20 59 06 LMP-EVA A levee. Off to the left there, the higher part.

06 20 59 09 CDR-EVA Yes, sure do. I see how it is.

06 20 59 12 LMP-EVA There's a rough one - rou - rough terrain ahead of it.

06 20 59 14 CDR-EVA Yes.

06 20 59 17 LMP-EVA We dropped down into another - another little valley. There's another one of those shallow depressions off on at 1 o'clock. Right now our BEARING is 8 - 89, RANGE 1.4.

06 20 59 28 CC Roger.

06 20 59 29 CDR-EVA Look at this one, Jim. It must be - holy cow. This must be - I'm going to go around to the left here. Yes. Towards the right, there's - fairly smooth on the right. Yes, it's closer here.

06 20 59 45 LMP-EVA Okay, we're heading down into another depression. It has oh, one, two, three - three other recent craters. The one of the - the southern rim looks to be the most recent. In fact, it's kind of a doublet with a smaller crater in - in the north rim of it.

06 21 00 03 CDR-EVA Well, look at the two here. Yes, this one.

06 21 00 04 LMP-EVA Another doublet there on the left.

06 21 00 05 CDR-EVA Yes. Another one.

06 21 00 10 LMP-EVA Okay; we're HEADING, 087. Right now, we're HEADING, 2 - oh, about 250. RANGE, 1.5. Boy, look at the fresh blocks ahead of us.

06 21 00 28 CDR-EVA Yes.

06 21 00 29 CC Roger. We copy - -

06 21 00 30 LMP-EVA That might - I - I wonder if - are we - -

06 21 00 31 CC You must be very near Scarp Crater.

06 21 00 34 LMP-EVA I was going to say, that's probably Scarp Crater.

06 21 00 36 CDR-EVA Good fresh one.

06 21 00 37 LMP-EVA Yes.

06 21 00 38 CDR-EVA It's a beauty.

06 21 00 39 LMP-EVA It sure kicked up a lot of rocks. You - What are you going to do, go - go on the north side of it?

06 21 00 44 CDR-EVA I want to take a look and see if that's it. Yes. Boy, it's really fresh with a lot of debris. Nice ejecta blanket. Nice ejecta blanket. Good typical one. That's Scarp. And we're 088 for 1.6. I'd say this is probably Scarp Crater, wouldn't you?

06 21 01 09 LMP-EVA I would, because we can definitely see the far side of the - -

06 21 01 12 CDR-EVA Yes. The rille.

06 21 01 13 LMP-EVA - - the rille now.

06 21 01 14 CDR-EVA Yes.

06 21 01 15 LMP-EVA We - we could drive back to this one. Sample it, right?

06 21 01 17 CDR-EVA Yes.

06 21 01 18 LMP-EVA Let's - let's press on to the - -

06 21 01 19 CDR-EVA Take a look.

06 21 01 20 LMP-EVA Yes. Make you - -

06 21 01 21 CC Roger. We agree - -

06 21 01 22 CDR-EVA Yes, but this is so much ... anyway.

06 21 01 23 CC - - and with any luck at all, that is Scarp Crater.

06 21 01 27 CDR-EVA Yes, let's - yes, let's do this one anyway, Jim.  
Driving back means - Okay, I - wait a minute - let -  
let me get to where I can -

06 21 01 44 LMP-EVA And we can definitely see the west side of the  
rille from here.

06 21 01 47 CDR-EVA Yes.

06 21 01 49 LMP-EVA Probably see - oh, 10 to 15 percent of the far  
side.

06 21 01 53 CC Copy.

06 21 01 55 CDR-EVA Let me - I'll get it for you.

06 21 01 59 LMP-EVA And the reading, 267, 088, 2.2, 1.6, 90, 92, 100,  
108, and MOTOR TEMPs are still low.

06 21 02 22 CC Roger.

06 21 02 28 CDR-EVA Got them okay? Good.

06 21 02 31 LMP-EVA I'm going to see if I can fix my camera.

06 21 02 34 CC Good idea. Jim and Dave -

06 21 02 36 CDR-EVA Which way is - -

06 21 02 37 CC - - the far TV camera's still tilted down. Could  
you fix it for us, please?

06 21 02 42 LMP-EVA Roger.

06 21 02 43 CDR-EVA There you go; it's up. I'll try and get you on  
the AGC. You ought to be there. AGC looks good.

06 21 02 51 CC Okay. Thank you, Dave. And a word on that camera.  
We'll position it before the - the two of you start  
the move, and just leave it in whatever position we  
put it in.

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06 21 03 03 CDR-EVA Okay. We're not parked very good for you to see, Joe, but I - I guess - breaks.

06 21 03 21 CC Dave, could you give us - -

06 21 03 23 CDR-EVA Document the thing here.

06 21 03 24 CC - - an EMU status check, please?

06 21 03 28 CDR-EVA Yes, sir. I've got clear flags about 74 percent, and 3.85.

06 21 03 39 CC Sounds good.

06 21 03 44 LMP-EVA I've got 3.85, flags are clear, and 75 percent.

06 21 04 00 CC And, Jim - -

06 21 04 01 CDR-EVA Okay, let me give you some help.

06 21 04 02 LMP-EVA Yes.

06 21 04 03 CC - - do you want some help on that 70-millimeter camera MAL procedures?

06 21 04 09 LMP-EVA Well, I'm holding the trigger depressed and advancing the film, manually, to see if it'll - -

06 21 04 15 CC That's right on.

06 21 04 16 LMP-EVA - - kick over. But it's not. I guess - it's not working. I guess, the only thing I could do at this point is change the MAG.

06 21 04 26 CC Jim, before you do that, could - Try rotating the lens in front. It may be hung up between detents.

06 21 04 38 LMP-EVA Okay, I'll try that. You mean the locking device on the lens itself?

06 21 04 42 CC That's right.

06 21 04 49 LMP-EVA No, it's locked. Dave, you want to take the time here to let me change the MAG?

06 21 05 01 CDR-EVA Yes, why don't you try it, Jim?

06 21 05 02 LMP-EVA Okay, I'll try it - -

06 21 05 03 CC Sounds good to us, Jim.



06 21 05 04 LMP-EVA - - it's the only thing to be done.

06 21 05 05 CDR-EVA I think I'll get to work here and - -

06 21 05 06 LMP-EVA Okay.

06 21 05 07 CDR-EVA - - pan - -

06 21 05 08 LMP-EVA Okay.

06 21 05 09 CDR-EVA I'll get a pan from the rim of Scarp. And the rim is very, very soft. My boot sinks in a good - If I push on it, a good 4 inches. And the - and the whole center part of the crater is just full of debris. Very angular, glass in the center. It's about - oh, - I guess, 40 meters across and maybe 5 or 6 meters - No, - not that much - 3 or 4 meters deep. And a slightly raised rim. An ejecta blanket that goes out about one crater diameter, quite uniform. I don't see any rays. There are slickensides on some of the fragments. And we'll get the sample in a second here.

06 21 06 04 CC Roger.

06 21 06 38 CC Jim, you might try cycling that camera without a MAG in it, if we've caught you in time here.

06 21 06 46 LMP-EVA Yes, you have; just right. Okay, I'm trying it.

06 21 07 06 LMP-EVA Yes, I think the camera's working, Joe. I'm going to put MAG Romeo on.

06 21 07 12 CC Sounds good.

06 21 07 13 CDR-EVA That MAG worked for a while this morning, didn't it, Jim?

06 21 07 15 LMP-EVA Yes.

06 21 07 45 LMP-EVA Camera's got so much dust on it, I -

06 21 07 51 CDR-EVA There's a little bench in the bottom of Scarp Crater, halfway up - about a tenth the diameter of the crater. And it's only in - and it seems to be all the way around, somewhat irregularly.

06 21 08 07 CC Roger, Dave. Please continue.

06 21 08 13 CDR-EVA Okay, I'm going to get a couple of samples from the rim here - on the surface. Oops, the first one I tried to pick up, just fell apart. Get a couple pieces of it. Won't be able to look at it for you, but I'll bring it home. It's a clod - it's just a caked clod. And it's in 273.

06 21 08 42 LMP-EVA I'll come over there, Dave. I put on the other MAG; it doesn't work. I think the shutter's working on the camera, but the drive is not.

06 21 08 48 CDR-EVA Okay, it was working fine last night.

06 21 08 53 LMP-EVA Okay, I'll come over.

06 21 08 55 CDR-EVA Okay. This stuff is really soft; 73.

06 21 09 04 CC Roger.

06 21 09 27 LMP-EVA Well, if you want, Dave, I can take your camera and do all the documentation pictures.

06 21 09 30 CDR-EVA No, I can do it just as well. Look at that, there's slickenside on that one. Okay. Get some on the rim. Trying - -

06 21 09 43 LMP-EVA Boy, this is - well, you've probably commented - sure is a - a unique crater. \*\*\* unique - that we've seen so far.

06 21 09 53 CDR-EVA Yes, you're right.

06 21 09 55 LMP-EVA Very soft on the rim.

06 21 09 56 CDR-EVA Isn't it, though?

06 21 10 11 LMP-EVA Boy, you sink in about 6 inches.

06 21 10 14 CDR-EVA Just like big pieces of mud, don't they? Okay, let's take a couple of steps out the rim here. I got one on the rim.

06 21 10 25 LMP-EVA You did get the sample already?

06 21 10 27 CDR-EVA Yes. Let's go down here - you know - a ways out in the ejecta, and see if we can get a couple more. Here's a nice big one. It's too big for the bag. There's so much sparklies in it, Jim. Think we can get that in the bag? I'll try.

06 21 10 56 LMP-EVA You know, this - this has the appearance of those small ones that we sampled, with the exception, there's no concentration of glass in the very center, except every fragment has glass on it.

06 21 11 06 CDR-EVA That's right. Well, not every fragment, mo-many of these clods don't have any at all. Most of them don't have any glass. Get that one there. Get me a - oh, you got a bag, okay. Just a second here.

06 21 11 54 CC Dave and Jim, this is Houston. When you finish this, we suggest you move over closer towards the rim of the rille.

06 21 12 05 LMP-EVA Yes.

06 21 12 07 CDR-EVA Roger, Joe. Bag number 255 is covered with dirt, but it looks just like a big piece of glass.

06 21 12 16 LMP-EVA You want me to put some fines in with this, Dave?

06 21 12 18 CC Roger. Jim, throw in a little soil there, please.

06 21 12 21 CDR-EVA Here, let me have the bag.

06 21 12 29 CDR-EVA You get - Don't mess up where the rock was, but pick up that little glass ball next to you, too. See that little glass ball next to where you scooped up?

06 21 12 38 LMP-EVA To the left of it, you mean?

06 21 12 39 CDR-EVA Yes.

06 21 12 42 LMP-EVA That's an idea.

06 21 12 43 CDR-EVA Yes. That's all. That's it. Now we're about full. Bet you dropped it, Jim.

06 21 12 47 LMP-EVA Yes.

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06 21 12 53 CDR-EVA Get it? Okay.

06 21 13 22 CDR-EVA Okay.

06 21 13 23 LMP-EVA On the way.

06 21 13 26 CC Dave and Jim, this is Houston with the news report for you.

06 21 13 32 CDR-EVA Go.

06 21 13 34 CC Roger. Be advised your command module pilot, Alfredo, just did a perfect plane change burn.

06 21 13 43 CDR-EVA Oh, that's good news. But, we knew he would.

06 21 13 49 CDR-EVA Roger. He's coming back to look for you.

06 21 13 54 CDR-EVA Good for him. Hey, Jim.

06 21 13 58 LMP-EVA Yes?

06 21 14 00 CDR-EVA I'll tell you - -

06 21 14 01 LMP-EVA You got to drive slowly. In fact, let me walk - -

06 21 14 03 CDR-EVA No.

06 21 14 04 LMP-EVA - - I can walk as fast as you can drive.

06 21 14 05 CDR-EVA No, you can't. No way. Okay?

06 21 14 11 LMP-EVA I'll hop on, but I'll just - I don't need the belt.

06 21 14 18 CDR-EVA Where's your camera?

06 21 14 20 LMP-EVA Under the - under - Yes, I put it under - -

06 21 14 25 CDR-EVA Let me take one crack at it. Get the - Where did you put it?

06 21 14 27 LMP-EVA Oh, it's on - on my - RCU.

06 21 14 31 CDR-EVA Oh, yes. Let me take one crack at it here, before we go.

06 21 14 35 LMP-EVA Okay, the master craftsman.

06 21 14 37 CDR-EVA Yes, maybe I -

06 21 14 38 LMP-EVA Yes. Take it off.

06 21 14 40 CDR-EVA Okay.

06 21 14 41 LMP-EVA I thought it would be easier to work if I -

06 21 15 30 CDR-EVA Feels like it's trying to drive.

06 21 15 31 LMP-EVA Yes, the - the shutter's driving, but the - it's not driving the film.

06 21 15 36 CDR-EVA Right. A pity. Yes, it's above them.

06 21 15 46 LMP-EVA Right.

06 21 15 47 CDR-EVA Want - want to carry it or chuck it in the - -

06 21 15 49 LMP-EVA I think I'll just put it in the seat.

06 21 15 51 CDR-EVA Yes. ...

06 21 16 28 CDR-EVA Joe, we'll try and see if we can - run your TV while we're running.

06 21 16 46 CDR-EVA Okay, hang on good.

06 21 16 48 LMP-EVA Yes.

06 21 16 49 CDR-EVA Ready?

06 21 16 50 LMP-EVA Ready. Okay, we're moving west.

06 21 17 01 CC Roger.

06 21 17 03 CDR-EVA I'll be going about the same heading, Joe. Maybe - maybe you can - I'll just keep this heading and with any luck at all, you might be able to point out the front and take a ride with us. Going slow. I see the camera moving.

06 21 17 17 LMP-EVA Boy, I - I - oh, I - On the far side of the rille there, Dave, I sure see layering - over at 1 o'clock.

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06 21 17 24 CDR-EVA Okay, let's get up here first. Yes. Sure do.

06 21 17 38 CDR-EVA See if we can find one of the Twins here.  
(Laughter)

06 21 17 48 CDR-EVA \*\*\* get the feeling like we're coming up the  
rille ridge line, don't you?

06 21 17 49 LMP-EVA I think the - \*\*\* one of the Twins was 30. There's  
a fresh one. That little boulder's ... good blocks  
down there.

06 21 17 58 CDR-EVA Yes, look -

06 21 18 01 CC Dave, this is Houston.

06 21 18 12 LMP-EVA Good places all along here to sample - large  
blocks on this side of the rille.

06 21 18 17 CDR-EVA Yes, you're right.

06 21 18 18 LMP-EVA Look down there at 12:30. It looks like the  
block's there, almost in position.

06 21 18 23 CDR-EVA Sure do. That's a big outcrop.

06 21 18 25 LMP-EVA Yes.

06 21 18 26 CDR-EVA And we are on The Terrace. And there is a terrace.

06 21 18 28 LMP-EVA Yes.

06 21 18 31 CDR-EVA Pretty good slope.

06 21 18 33 LMP-EVA We could probably drive down there, though.

06 21 18 35 CDR-EVA I think we can drive over - straight ahead, and  
stay on a fairly level contour. We don't want to  
- go down.

06 21 18 44 LMP-EVA Well, you want to just drive up to where - -

06 21 18 55 CDR-EVA \*\*\* Twins.

06 21 19 03 CDR-EVA Think that's Rim Crater, there.

06 21 19 09 CC Could very well be, Dave.

06 21 19 16 LMP-EVA \*\*\* at 12 o'clock there.

06 21 19 17 CDR-EVA Yes. Think I'm going to park right up here.

06 21 19 25 LMP-EVA \*\*\* drive down to them?

06 21 19 26 CDR-EVA Yes. This should be right where we park.

06 21 19 27 LMP-EVA That would be a - be a good picture for Houston.

06 21 19 31 CDR-EVA Wouldn't it, though?

06 21 19 32 LMP-EVA Yes.

06 21 19 33 CDR-EVA I think they'll enjoy that.

06 21 19 34 LMP-EVA It might be at ...

06 21 20 46 CC Dave, when you climb off, could you - -

06 21 20 47 CDR-EVA ... TV by the AGC.

06 21 20 48 CC - - Dust off our - our TV lens, please?

06 21 20 54 CDR-EVA Certainly. We're off and stopped; and let me get on with this task here.

06 21 21 02 CC Okay - -

06 21 21 03 CDR-EVA We're at a nice place to stop and we're - -

06 21 21 04 CC - - and, Jim, you may want to use Dave's camera to record this on film, while Dave uses - -

06 21 21 06 LMP-EVA I am.

06 21 21 07 CC - - the 500-millimeter camera.

06 21 21 14 LMP-EVA That's exactly what we're doing.

06 21 21 15 CDR-EVA And, you must have dropped comm there, Joe. That's what we're in the process of doing here. After I dust your eye off.

06 21 21 27 CDR-EVA How's that, Joe?

06 21 21 41 CDR-EVA That a boy; swing it around there, and you're going to see a spectacular place. Boy, oh, boy.

06 21 22 01 CC Dave, if you're still there, we'd take some Rover read-outs, but it's not crucial.

06 21 22 08 LMP-EVA I'll get them, Dave.

06 21 22 09 CDR-EVA I've got them right here; 90, 92 - The VOLTAGEs, 68, 68; BATTERY TEMPERATUREs, 101 - and about 110; and MOTOR TEMPs are off-scale, low. The BEARING is 088; the RANGE is 1.8; DISTANCE, 2.5.

06 21 22 31 CC Right on; thank you.

06 21 22 40 CDR-EVA And, I have the 500 out.

06 21 22 42 CC And look at that rille.

06 21 22 47 CDR-EVA How about that?

06 21 22 48 CC How about that, geology fans?

06 21 22 50 CDR-EVA I can see from up at the top of the rille down, there's - there's debris all the way. And, it looks like some outcrops directly at about 11 o'clock to the Sun line. It looks like a layer. About 5 percent of the - the rille wall, with a vertical face on it. And, within the vertical face, I can see other small lineations - horizontal about maybe 10 percent of that - that unit. And that unit outcrops along the rille. It's about 10 percent from the top, and it's somewhat irregular; but it looks to be a continuous layer. It may be portions of - of flows, but they're generally at - at about the 10-percent level. I can see another one at about 12 o'clock to the Sun line, which is somewhat thinner, maybe 5 percent of the total depth of the rille. However, it has a more well-defined interior - internal layering of about 10 percent of - of its thickness. I can see maybe 10 very well-defined layers within that unit.

06 21 24 12 CC Beautiful, Dave, beautiful.

06 21 24 14 CDR-EVA As I go down the rille, below this - okay - below this upper layered - at 10 percent - there seems to be mostly debris in the order of large angular fragments, maybe the largest being like 5 percent of the total depth of the rille. And then they - they gradually break on down to very small fragments



and a talus slope. I see no significant collection of talus at any level. It seems to be fairly uniformly distributed in patches all the way down, to as far as I can see, to the bottom of the rille. In looking on to my - 12:30 to 1 o'clock - on up the rille - And, I guess we'll get a little closer, when we get down to sampling it down there. Why, it - it looks very much the same. Outcrops of this one unit, irregularly spaced, discontinuous, but along the general 10 percent of the top line; with the talus sliding down into the bottom of the rille. I see no differences in color. However, the vertical section of the - of the unit, which is exposed, looks to be somewhat lighter in gray. The blocks, which have fallen down into the talus, seem to be - have a - a more tan - or different tone of gray or color to them. Sort of like the - the fresh vertical section was more recently exposed. Let me - let you digest that for a minute, and let me take a bunch of 500's. I'll get you the vertical and the horizontal and - boy, there's lots of things to shoot at over there. Jim, where'd you take the pan? Right over here?

06 21 26 17 LMP-EVA There's a little circle on the ground.

06 21 26 18 CDR-EVA Okay.

06 21 26 30 CDR-EVA Okay. Lens cap is off.

06 21 26 36 CC Good show.

06 21 26 44 CDR-EVA Okay. First, I'll get you a horizontal strip along the two outcrops.

06 21 27 02 LMP-EVA Okay, Joe. I just sampled a - a fragment here with a great number of vesicles - vesicles about 2 millimeters in diameter. It's in 274.

06 21 27 15 CC Roger, Jim.

06 21 27 24 CDR-EVA And, I'll get you a horizontal strip of the - I guess I have to say there is more accumulation of talus at about - the 60 percent from the top level, that I can see, Joe. If I think about it for a minute, I can see more talus accumulation there, so that there might be some change in slope, but

it's not apparent by looking at the slopes. And I'll get you a horizontal strip there.

- 06 21 27 56 CC Isn't that something?
- 06 21 28 10 LMP-EVA And down about - oh, 20 feet from where Dave's taking a picture, there's a - a block about 2 feet; it's almost rectangular. And, the top surface is covered with large vesicles. It almost looks like a contact there between a thin - that thin layer of vesicles and a more - a rock that's a little lighter in color with fewer vesicles. In fact, there's real - really orien - orien - horizontal orientation of the vesicles in this one. I'll take a closeup on it.
- 06 21 28 46 CC Beautiful, Jim. Thank you.
- 06 21 29 16 CDR-EVA Oh, and there's a - looks like a crater in the far wall, at about 9 o'clock to the Sun line. It's a round, circular depression, almost doesn't look like the kind of crater that would occur in a - a slope like that. There's no buildup at the bottom. It's - The rim seems to be fairly parallel to the slope of the rille. Get that one.
- 06 21 29 42 CC Okay, Dave.
- 06 21 29 51 CDR-EVA Horizontal strip across it. Horizontal strip above it, which should take in the upper 10 percent. Vertical strip through it.
- 06 21 30 12 LMP-EVA Let me know if I get in your way, Dave.
- 06 21 30 13 CDR-EVA Yes. You're okay.
- 06 21 30 14 LMP-EVA You are looking - looking to the south along the rim, along the - this side of the rille. Dave, could you comment on that horizontal bedding that's probably - oh, at least 1 kilometer south us? And higher - higher elevation.
- 06 21 30 32 CDR-EVA On the other side?
- 06 21 30 33 LMP-EVA No, this side.

06 21 30 35 CDR-EVA No, I didn't even look on this side, to tell you the truth, Jim. Oh, there's a - I can see a couple of outcrops on the far side, which look like they might be in place at about the 40-percent level - of the rille. Very large boulders with fractures in them, rounded. It's hard to tell whether they're really in place, but they may be in place covered by - by talus. And they're about 50 percent down. Let's see if there's any continuity to it. I can see some suggestions of continuity there. Jim, look at that. Well, it looks like that the talus of fragments and fines is covering another layer. Or sug - a suggestion of continuity of outcrops, which are rounded, at about the 40- to 50-percent level down.

06 21 31 31 LMP-EVA Yes, I see what you mean. Yes.

06 21 31 32 CDR-EVA See that?

06 21 31 33 LMP-EVA Yes.

06 21 31 34 CDR-EVA All the way across.

06 21 31 35 LMP-EVA Yes.

06 21 31 38 CDR-EVA It's worth a few pictures.

06 21 31 44 LMP-EVA You know, I'm really surprised - -

06 21 31 45 CDR-EVA Okay.

06 21 31 47 LMP-EVA - - that the - the bedding is as obvious.

06 21 31 49 CC Frame number, Dave.

06 21 31 50 CDR-EVA Yes, it is. Yes. Okay, let's summarize your - Oh, frame number, yes; 76.

06 21 32 00 CC Okay.

06 21 32 01 CDR-EVA I guess that'll do it for here. To - to summarize here, I think we see from the top to the bottom, one distinct layer about 10 percent, which has the multilayers within it. And, another at about 40 percent, which looks like a solid unit of a

somewhat tanner hard rock, but it's covered with fines and talus. And, we haven't seen to the bottom; I think we'll get a chance to look further down - oh - on it -

06 21 32 37 LMP-EVA Hang on.

06 21 32 38 CDR-EVA Yes. All right.

06 21 32 43 LMP-EVA Yes. Very soft there.

06 21 32 51 CDR-EVA I - stumbled over that rock. Okay. Ease that up for me?

06 21 32 58 LMP-EVA Yes.

06 21 33 13 LMP-EVA Just a minute, let me get it down a little lower.

06 21 33 14 CDR-EVA Yes. That did it.

06 21 33 28 CDR-EVA Pretty durable little fellow.

06 21 33 29 LMP-EVA Yes.

06 21 33 30 CC Okay, Dave. - -

06 21 33 31 LMP-EVA ... you want ...? I should have put this on the lens.

06 21 33 33 CDR Sounds good.

06 21 33 34 CC - - you might check the lens; and, if it looks reasonably clean, see if you could get the bit of outcrop on the near side to the south.

06 21 33 41 CDR-EVA Okay. Lens is reasonably clean. And - I'll brush it off anyway.

06 21 33 52 CC Roger. That or blow on it.

06 21 33 57 CDR-EVA Oh, that's better. There.

06 21 34 03 CC Okay, and - -

06 21 34 04 LMP-EVA Joe, I'm documenting another rock - here that looks fairly - representative of what's - on the surface here.

06 21 34 35 CDR-EVA Okay. I got the stop down to - to eight. Now -  
see what I can do down -

06 21 34 44 LMP-EVA See what I was talking about down there, Dave?

06 21 34 45 CDR-EVA No. What do you see?

06 21 34 47 LMP-EVA I see a horizontal bedding.

06 21 34 49 CDR-EVA Oh, yes. I see what you're saying. Some -  
somewhat - looks like it might be dipping very  
slightly to the east.

06 21 34 57 LMP-EVA Yes. Right. You can see the - the exposed upper  
surface of that layer.

06 21 35 02 CDR-EVA Yes. You're right. Yes, agree. Got it.

06 21 35 20 LMP-EVA ... You going to shoot some more, I'll go out  
and get some more rocks there.

06 21 35 22 CDR-EVA Let me - let me come help you.

06 21 35 25 LMP-EVA While you pick the - pick - pick a few.

06 21 35 29 CDR-EVA Yes. Okay, that's enough 500 and -

06 21 35 35 LMP-EVA But I think we ought to - maybe either move down-  
slope - -

06 21 35 40 CDR-EVA Yes. Let's - -

06 21 35 41 LMP-EVA - - to - to the large block.

06 21 35 42 CDR-EVA Yes. Let's go down there and sample.

06 21 35 43 LMP-EVA Okay.

06 21 35 44 CC Frame count, Dave?

06 21 35 46 CDR-EVA This time I'll look and make sure I don't fall  
over some silly rock. 86, Joe.

06 21 35 54 CC Okay.

06 21 36 06 CDR-EVA Okay, Jim. Let's go -

- 06 21 36 09 LMP-EVA Why don't you head down, I'll be right behind you. I've got one more here I want to gather.
- 06 21 36 14 CDR-EVA Okay. Except I don't have a camera, so I can't do anything. I'll go look - go look.
- 06 21 36 26 LMP-EVA Pick out one, and I'll come down and document it.
- 06 21 36 28 CDR-EVA Right. Let's - We'll just ease down to this out-crop here in front of us. Good solid firm ground here, Joe. Good footing. As you could probably see.
- 06 21 36 45 CDR-EVA And I'll see how it is going back up. Yes. No problem coming back up.
- 06 21 37 00 CDR-EVA Ease back down. Oh, did you - Oh, yes, you looked at the big one there that has the - -
- 06 21 37 04 LMP-EVA Yes, I took some closeups of that.
- 06 21 37 05 CDR-EVA Boy, that's a beauty.
- 06 21 37 06 LMP-EVA You should see the vesicles in there - and the alinement - the orientation - of the vesicle.
- 06 21 37 11 CDR-EVA Called organization, huh?
- 06 21 37 12 LMP-EVA Yes.
- 06 21 37 17 CDR-EVA Oh, I can almost see - ... Looks like little pits in the dirt.
- 06 21 37 31 CC Dave, - -
- 06 21 37 32 LMP-EVA ...
- 06 21 37 33 CC - - is that a reasonable area for a rake sample, do you think?
- 06 21 37 34 CDR-EVA No kidding. Yes, definitely, Joe. It sure is.
- 06 21 37 41 CC Okay, maybe that's the quick way to get a bunch of them.
- 06 21 37 45 CDR-EVA ...

06 21 37 49 LMP-EVA I didn't bring the rake.

06 21 37 50 CDR-EVA ...

06 21 37 51 LMP-EVA We can take the rake sample near the Rover. Right?

06 21 37 52 CDR-EVA Yes, right.

06 21 37 53 LMP-EVA Okay.

06 21 37 54 CC Okay, sounds good.

06 21 37 59 CDR-EVA Aha! Here's some - oh, well, we got to get some of that. Gosh, big angular blocks. Vesicles. It looks like a basalt, and I think I see plage in it. To break a chip off from one of those.

06 21 38 25 CDR-EVA Coming?

06 21 38 26 LMP-EVA Yes, right behind you.

06 21 38 27 CDR-EVA Okay. Let's sample this out - see these frags right on the surface here?

06 21 38 31 LMP-EVA Yes.

06 21 38 32 CDR-EVA Just looks - like it came from somewhere.

06 21 38 37 LMP-EVA Yes, they're all - all the same.

06 21 38 40 CDR-EVA Yes. And it looks like - -

06 21 38 42 LMP-EVA Pick one and I'll take the pictures.

06 21 38 45 CDR-EVA Okay. Right there. We'll do that one right there.

06 21 38 52 LMP-EVA What? The -

06 21 38 53 CDR-EVA Yes.

06 21 38 54 LMP-EVA Get a fragment off it, you mean?

06 21 38 55 CDR-EVA Yes. Uh, huh.

06 21 38 56 LMP-EVA Okay.

06 21 38 57 CDR-EVA That big one. Let me - -

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06 21 38 58 LMP-EVA Just this side of the gnomon.

06 21 39 02 CDR-EVA The right; you're right.

06 21 39 04 CC And, Dave and Jim. This'll be probably our last documented sample that we'll have time for. We're going to ask you to move on back to the Rover when you're finished here for a rake sample.

06 21 39 18 CDR-EVA Okay.

06 21 39 20 CC And we're looking at about 10 to 15 more minutes at this stop. No more.

06 21 39 25 CDR-EVA Careful. Careful. Don't do like me.

06 21 39 29 LMP-EVA Yes, I thought that was - That's a big rock there.

06 21 39 31 CDR-EVA It sure is.

06 21 39 35 LMP-EVA ... up.

06 21 39 36 CDR-EVA Good picture.

06 21 39 37 LMP-EVA Go ahead.

06 21 39 38 CDR-EVA Did you get the tube?

06 21 39 39 LMP-EVA Yes.

06 21 39 51 CDR-EVA Watch. Keep your eye on it. Did you see where that frag went?

06 21 39 58 LMP-EVA No, I didn't see that.

06 21 40 00 CDR-EVA Keep your eye on what I got here. There.

06 21 40 03 LMP-EVA Okay.

06 21 40 04 CDR-EVA Oh, oh, oh, oh, oh. Don't lose that one.

06 21 40 06 LMP-EVA I see it.

06 21 40 07 CDR-EVA Okay, I got the tongs. Get your bag out.

06 21 40 37 LMP-EVA Are we going to have time to go down and sample the -



06 21 40 39 CDR-EVA Apparently not.

06 21 40 40 LMP-EVA The bedrock.

06 21 40 52 CC Stand by for an answer on that, Jim. And in the meantime, we have a truly magnificent view of the two of you here.

06 21 41 01 CDR-EVA Okay.

06 21 41 02 LMP-EVA Thanks.

06 21 41 05 CDR-EVA Joe, this is - it's a tan, fine-grained crystalline rock. I've got to say that, because it's got - up to 2-millimeter laths of plage in it randomly oriented. And the matrix is a sort of light gray to tan. It's a very well - indurated rock. On the outside, I've got nice glass-filled tip, and some other pits in it. It's sure solid and - sure looks crystalline. It's a beauty. It came from this large block over here at 275.

06 21 41 53 LMP-EVA You want to put some of those other fragments that are - -

06 21 41 54 CDR-EVA Yes.

06 21 41 55 LMP-EVA - - ...

06 21 41 56 CDR-EVA Why don't I just get some of the other frags right there.

06 21 41 57 LMP-EVA Yes.

06 21 41 58 CDR-EVA Bring your bag.

06 21 41 59 CC And, that is a beauty. And, Dave and Jim, we've got an answer on your question when you're ready.

06 21 42 07 CDR-EVA We're ready.

06 21 42 08 CC Roger. If you think you can get pieces of true bedrock, we'll be willing to give up mare sampling station on the way back to the LM.

06 21 42 22 CDR-EVA Well, I think we can get - I think right - -

06 21 42 27 LMP-EVA Yes, to the north of us.

06 21 42 28 CDR-EVA Yes.

06 21 42 29 LMP-EVA Yes.

06 21 42 30 CDR-EVA Right over there I think - -

06 21 42 31 LMP-EVA Yes.

06 21 42 32 CDR-EVA - - That's true bedrock.

06 21 42 33 LMP-EVA Yes.

06 21 42 34 CDR-EVA It's just too massive not to be. Okay, that one's too much. Watch it! Here let me hold that frag. Get a scoop for the fines, and then - and then - put the other frag in the - in the bag, too. Up - Yes. That one - right there - that a boy. Okay. Okay, now.

06 21 43 02 CDR-EVA Okay, Joe. That chip off the old boulder there was 275. Why don't you get this one. And I'll get - Oh, man - seven bags. Let me get a bag off of you there.

06 21 43 20 CDR-EVA Okay.

06 21 43 28 CDR-EVA Sure miss having two cameras.

06 21 43 30 LMP-EVA Yes. Slow us down.

06 21 43 40 CDR-EVA Little ones here. And 278.

06 21 43 48 CC Copy that. And out of sheer curiosity, how far back from what you would call the edge of the rille are the two of you standing now?

06 21 44 02 CDR-EVA All right. I don't know - well, from where the - about 50 meters from where I guess we'd say we see real outcrop.

06 21 44 12 CC Roger, Dave. How far back from the lip of the rille do you think you're probably standing?

06 21 44 19 CDR-EVA Can't tell, I can't see the lip of the rille.

06 21 44 22 CC Okay. It looks like you are standing on the edge of a precipice on TV; that's why we're asking.

06 21 44 29 CDR-EVA Oh, oh. Oh, gosh, no, Joe. It slopes right on down here. The same slope. It's just a little inflection here. Jim, you should of - here. Get your afterpictures, too.

06 21 44 44 LMP-EVA Okay?

06 21 44 46 CDR-EVA Get a little closer, so you get that big chip out of there. A little closer, Jim. Yes, that's right. Okay. Let's go down and get a chunk of the bedrock here.

06 21 45 05 LMP-EVA Oh, you're getting the bedrock here, huh?

06 21 45 06 CDR-EVA Yes.

06 21 45 07 LMP-EVA Okay. I thought you were going to press on to the north.

06 21 45 13 CDR-EVA Well, he said go get the bedrock, and I think we ought to try and get it if we can. Because this sure looks like a bedrock to me. I looked at the rille and down the rille to the south, and it's just a - one great big massive layer of the same kind of fragmental debris on the order of meters. Quite well-rounded.

06 21 45 31 LMP-EVA Yes, but the thing that bothers me, Dave, is look to the north there.

06 21 45 34 CDR-EVA Yes.

06 21 45 35 LMP-EVA And there's a flat area there, it looks like it might be the top of the - the bedrock.

06 21 45 38 CDR-EVA Yes.

06 21 45 39 LMP-EVA And those blocks are - are - seem to be slightly different.

06 21 45 41 CDR-EVA Darker.

06 21 45 42 LMP-EVA They're al - -

06 21 45 43 CDR-EVA A little darker.

06 21 45 44 LMP-EVA - - almost have columnar joining. Look to the north there.

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06 21 45 47 CDR-EVA Yes, I see what you are talking about. Come on down here and let's get a frag off of one of these boulders and then we'll head on back to the Rover.

06 21 45 54 LMP-EVA Okay.

06 21 46 00 CDR-EVA That's a good one.

06 21 46 13 CDR-EVA You get the cross-Sun from over here, Jim?

06 21 46 15 LMP-EVA On that side?

06 21 46 16 CDR-EVA Yes.

06 21 46 17 LMP-EVA Okay.

06 21 46 28 CDR-EVA Okay. That's for the pictures.

06 21 46 37 LMP-EVA Yes, Stand by.

06 21 46 40 CDR-EVA Hey, Joe, these rounded fragments down here are on the order of meters in size; expose some very large - oh, 2 - 3 centimeter vesicles - rather than the finer stuff that Jim saw back there before. And I believe, when I take a chip out of this, we're going to find it's the same kind of crystalline basalt. And they're all - well, they're subangular - looks like they've been weathered. Fairly clean on the surface and all buried. And I can look down to the south, and it's just a whole mass of great big boulders along the terrace here. And there's another breakoff down into the - into the rille. And I'm - I guess, we're just about at the lip.

06 21 47 25 CC Amazing.

06 21 47 26 LMP-EVA I got the pictures.

06 21 47 27 CDR-EVA Okay.

06 21 47 40 CDR-EVA Beautiful stuff. Okay; I got them all located - in bag -

06 21 47 53 LMP-EVA Okay; 281.

06 21 47 55 CC Roger.

06 21 47 56 CDR-EVA Okay.

06 21 48 05 CDR-EVA Thought I had them located.

06 21 48 06 LMP-EVA Right here, Dave. Right under my - -

06 21 48 09 CDR-EVA Yes, that's right. Okay.

06 21 48 28 CDR-EVA Okay; this is a - looks like a darker, fine-grained, black, vesicular basalt, with vesicles on the order of millimeters. Nonuniformly disb - distributed. There are a mass of plagioclase about 3 millimeters long, and it may be a half a millimeter wide, randomly oriented throughout. And that's about the only other mineral I see. And that - did you get the number on that, Jim?

06 21 48 57 LMP-EVA Yes.

06 21 48 58 CDR-EVA Okay.

06 21 48 59 LMP-EVA I gave it to them.

06 21 49 00 CDR-EVA There's one other frag down here that fell. About like that. Let me get a couple of rounded ones here, too, that are just on the surface. I can't tell - can't tell what that is, but we'll put it in anyway, as representative of surface material - at least the fragmental surface. Okay; why don't you zip that one? Here let me zip it, and you can take the afterpicture, Jim.

06 21 49 31 LMP-EVA Okay.

06 21 49 33 CDR-EVA Boy, it hurts not<sup>to</sup> have two cameras. Oh, well.

06 21 49 47 CDR-EVA Oh, wait a minute. Cover up what I just did.

06 21 49 55 LMP-EVA Okay; I have it.

06 21 49 56 CDR-EVA Okay. Tell them that was 281.

06 21 50 04 CC Roger; we copied. And, Dave, when you finish this, we'd like you to move back towards the Rover.

06 21 50 12 CDR-EVA Yes, I think we ought to do that. Let me stick the hammer on you.

06 21 50 26 CDR-EVA Boy, what a rock.

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06 21 50 29 LMP-EVA I just wonder if that rock to the north - -

06 21 50 30 CDR-EVA Okay.

06 21 50 31 LMP-EVA - - up there is the same.

06 21 50 33 CDR-EVA I don't know but - -

06 21 50 34 LMP-EVA Maybe we could stop there for the - maybe you can stereo pan.

06 21 50 38 CDR-EVA Yes. Okay, let's head back to the Rover.

06 21 50 44 CC Right on, Dave - -

06 21 50 45 CDR-EVA And, Joe, I think - -

06 21 50 46 CC - - and we want a rake sample near the Rover - -

06 21 50 47 CDR-EVA - - Did you want to take a - Did you want to take a position shot of that ... sample.

06 21 50 48 CC - - and the soil sample with that - -

06 21 50 49 CDR-EVA Take a location shot down there - -

06 21 50 50 CC - - and a double core, please.

06 21 50 51 CDR-EVA - - and then that way. Okay?

06 21 50 52 LMP-EVA Okay.

06 21 50 53 CDR-EVA Yes. Get it at infinity, f/8 - f/8 at infinity and maybe take another one up here - another 15 or 20 meters or so. Get a good stereo down to the south.

06 21 51 23 CDR-EVA Hold until we get back to the Rover to talk about the rake sample, Joe. Because you'll just have to tell us again.

06 21 51 30 CC That's fine, Dave, sure will.

06 21 51 31 CDR-EVA Oooh! Oooh! You can see a boulder exposed to the surface here, which has got layering within it. It's been weathered away, apparently, and just the surface top is exposed but the boulder must be - oh, about a meter long with 2- to 3-inch layers in

it. Would you get a picture of that where I stopped, Jim, just a - a quicky cross-Sun? See where that thing is exposed there?

06 21 52 03 LMP-EVA Oh, yes.

06 21 52 04 CDR-EVA See those little layers.

06 21 52 05 LMP-EVA Beautiful.

06 21 52 07 CDR-EVA Okay. I think a cross-Sun stereo would be neat right there.

06 21 52 10 LMP-EVA Okay.

06 21 52 11 CDR-EVA Here. As a matter of fact, I'll drop the gnomon; that'll tell them what it was - Just to get a real quick picture. Oh, you're kicking up white albedo.

06 21 52 23 LMP-EVA Yes. I know it.

06 21 52 24 CDR-EVA That's the only place I've seen it. Get a little closer, huh?

06 21 52 40 LMP-EVA Okay.

06 21 52 41 CDR-EVA Good. Too bad we don't have time to pick some up, but we'll get probably pieces. Good footing.

06 21 53 04 CDR-EVA Okay, Joe. Say again your - rake requirement. They're different from others?

06 21 53 11 CC Negative. No different - Dave - just a few frags using the rake - -

06 21 53 16 CDR-EVA Oh.

06 21 53 17 CC - - if you think it's reasonable.

06 21 53 20 CDR-EVA Yes, I think there's probably good statistical samples to be had here.

06 21 53 41 LMP-EVA Go, partner.

06 21 53 42 CDR-EVA Hey, why don't you hand me the - camera? Oh, that's right.

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06 21 53 47 LMP-EVA Okay, yes I will - so you can take the pictures - -

06 21 53 50 CDR-EVA Yes.

06 21 53 51 LMP-EVA - - while I'm - -

06 21 53 52 CDR-EVA While you're raking.

06 21 54 00 LMP-EVA If you take it off, it'd be faster.

06 21 54 12 LMP-EVA Okay. Pick a spot. I'll rake.

06 21 54 17 CDR-EVA Why don't we - why don't we take a few steps down, Jim?

06 21 54 19 LMP-EVA Okay.

06 21 54 20 CDR-EVA So we get where there's more - more frags down here, I think.

06 21 54 29 LMP-EVA Looks like they'll be large - too large down there.

06 21 54 31 CDR-EVA No. Right here. \*\*\* a good spot.

06 21 54 41 CDR-EVA All down the hill.

06 21 54 46 LMP-EVA I think I'll rake downhill.

06 21 54 48 CDR-EVA Yes. Make it easy on yourself. Just a minute, let me get the down-Sun here. \*\*\*

06 21 55 07 CDR-EVA Have at it, Verner. [?] And I'll pick us out a route to go when we leave here. Get up to North Twin, and there's a nice outcrop up there, too.

06 21 55 23 LMP-EVA Okay. I need a bag.

06 21 55 24 CDR-EVA Yes, sir. Okay. 282. Ooop, oh. Gee, I just walked right into your area. Sorry. Oh, you getting some. Looks like some laths, vesicular basalt, nonvesicular basalt. Do it again.

06 21 55 47 LMP-EVA Okay, I'll try to avoid that larger one there.

06 21 55 49 CDR-EVA Yes. And I think I kicked up some more light-colored albedo. I think, if we have some time when you get through, we ought to - ought to make



a quick trench, here, maybe. It looks like maybe the upper couple of inches might be - the dark gray and below it the very light gray albedo.

- 06 21 56 17 CDR-EVA Okay; there's two swaths about a meter long and one rake-width wide.
- 06 21 56 24 CC Okay, Davy. And are those frags?
- 06 21 56 26 CDR-EVA ... down about - oh, I'd say - Yes.
- 06 21 56 32 CC Outstanding.
- 06 21 56 33 CDR-EVA These are frags - that I have in my hand? Yes. They are. He's - He's getting about - oh, 8 to 10 in each one, and it seems like there's a fair variety in there.
- 06 21 56 44 CC Wouldn't be at all surprised.
- 06 21 56 48 CDR-EVA Yes. Hey, do it once - once - Let me move the gnomon here. We'll - They can reconstruct that. Take another swath over here so -
- 06 21 56 57 LMP-EVA Do the ... so I can take two swaths, if you want.
- 06 21 56 59 CDR-EVA Yes, I think we're getting something here. Yes.
- 06 21 57 13 CDR-EVA Yes. It looks like you're getting a good - 2 to 3 inches down, as you rake through there.
- 06 21 57 18 LMP-EVA Must be hung up on a large one here.
- 06 21 57 25 CDR-EVA Yes, that's right.
- 06 21 57 39 CDR-EVA Okay.
- 06 21 57 40 LMP-EVA I'll rake another one. Take one more. We'll fill the bag.
- 06 21 57 44 CDR-EVA Hey, Joe, how about a quick single core here.
- 06 21 57 49 CC Yes, sir, or maybe even a double core. We think you can probably drive two of them.
- 06 21 57 56 CDR-EVA Okay. I think we probably can, too. I was just giving you a little bait there.

06 21 58 02 CC Roger. A piece of cake compared to that drill.

06 21 58 09 CDR-EVA (Laughter) Good - -

06 21 58 11 LMP-EVA Even I can agree with that, Joe.

06 21 58 14 CDR-EVA Good. Good, comprehensive sample. Now we need some soil. I think that's probably the best one they'll see.

06 21 58 31 CDR-EVA Okay. Soil.

06 21 58 54 CDR-EVA Okay. Get one more load.

06 21 59 01 LMP-EVA There's a big rock in there, huh? Okay, there you go. Okay.

06 21 59 09 CDR-EVA Okay, maybe one more. Let's get a - whole bag full.

06 21 59 17 CC A comprehensive - -

06 21 59 18 CDR-EVA That a boy.

06 21 59 19 CC - - to end all comprehensives.

06 21 59 23 CDR-EVA Yes. I think this is a number 1 kind, Joe. \*\*\* on to that, or you can put it in my pack while I zip this.

06 21 59 31 LMP-EVA Okay.

06 21 59 35 CDR-EVA 283 for the soil.

06 21 59 40 LMP-EVA Did you give him the number for this one?

06 21 59 41 CDR-EVA Yes. Good.

06 21 59 46 LMP-EVA Got it? Close it up.

06 21 59 52 CDR-EVA Wait a minute. Here, I'll hand you this one; the other one, too.

06 21 59 54 LMP-EVA Oh, okay.

06 21 59 56 CDR-EVA Now, I'll get yours. It's ... Okay, let me get the pictures.

06 22 00 11 LMP-EVA Listen, I'll go and take the rake off.

06 22 00 14 CDR-EVA Yes.

06 22 00 15 LMP-EVA Get us set up for the core.

06 22 00 16 CDR-EVA Core. Good idea.

06 22 00 18 CC Sounds good, Jim.

06 22 00 29 CDR-EVA And, Joe, you can remember on this particular sample that I - I moved the gnomon about 2 feet, so Jim could get a 1, 2, 3, 4, - I guess we got 1, 2, 3, 4, 5 swaths there.

06 22 00 47 CC Roger.

06 22 00 51 CDR-EVA About a meter each. But you know, I don't know, a double core - We may find ourselves driving into bedrock if we're not careful.

06 22 01 01 LMP-EVA Yes, I'm afraid of that.

06 22 01 07 CDR-EVA Give it a go.

06 22 01 08 LMP-EVA Okay.

06 22 01 12 CDR-EVA There's a nice crater here - on the edge. Maybe we hit the rim of that crater.

06 22 01 21 CC Sounds good, Dave.

06 22 01 26 CDR-EVA Cut the rim of the crater, Jim. I bet we can do a good one right there.

06 22 01 29 CC Dave. Sorry - -

06 22 01 30 CDR-EVA And, I see some white-colored albedo near the - -

06 22 01 31 CC - - bad information I gave to you. I guess we'd prefer it away from the rim.

06 22 01 37 CDR-EVA Yes, sir. Okay.

06 22 01 40 CC And if we hit bottom - -

06 22 01 41 CDR-EVA And there's light-colored albedo ... by the lower side of the - -

06 22 01 42 CC - - We hit bottom.

06 22 01 45 CDR-EVA Okay, this - right here, Jim. This ought to do - -

06 22 01 47 LMP-EVA Okay.

06 22 01 48 CDR-EVA - - as good as anything.

06 22 01 52 LMP-EVA \*\*\* grab the core while you take the pictures.

06 22 01 55 CDR-EVA Yes.

06 22 01 56 LMP-EVA Both of them? Grab one at a time ... get the ...

06 22 02 01 CDR-EVA Yes. Put one on. I'll take the pictures, and then I'll get you.

06 22 02 03 LMP-EVA Yes. Okay, I have a number.

06 22 02 08 CDR-EVA Okay. And it's - it's a little si - Maybe we can do it here.

06 22 02 21 CC Jim, did you call the number?

06 22 02 26 LMP-EVA 09.

06 22 02 28 CC Thank you.

06 22 02 30 LMP-EVA 09 or 60?

06 22 02 34 CC Oh, we'll figure it out.

06 22 02 39 LMP-EVA You know, the - that light-colored albedo normally occurs on the lower - lower rim or the downhill rim.

06 22 02 48 CDR-EVA Yes. Go ahead, Jim. Get the other core. You're right.

06 22 02 56 LMP-EVA I have it if you'll - -

06 22 02 57 CDR-EVA Okay.

06 22 02 58 LMP-EVA - - pull the thing, and - -

06 22 02 59 CDR-EVA Yes. \*\*\* do that.

06 22 03 09 CDR-EVA Here's your hammer.

06 22 03 28 CDR-EVA Okay. Let me get ready to take your picture.

06 22 03 35 LMP-EVA Okay. It's in position.

06 22 03 37 CDR-EVA Okay. I have the picture.

06 22 03 39 LMP-EVA Pushing.

06 22 03 40 CDR-EVA Good.

06 22 03 41 LMP-EVA I'll push a little more.

06 22 03 42 CDR-EVA Yes. Got a half a tube - ooh. Good, nice. You got three-quarters?

06 22 03 46 LMP-EVA Yes. It feels like it's - hung up on a rock.

06 22 03 48 CDR-EVA Okay. I got the picture. Go ahead and hammer. Rock, huh? No, it's going in. You're getting it. There's a full core. Have at it. You're getting a couple inches a stroke. Very nice. Okay. There's one and a half. Good. Doing good.

06 22 04 10 LMP-EVA Change arms here.

06 22 04 16 CDR-EVA Notice when you hit it, the whole ground around it raises up - for about an inch away from the - the core. You've got about three more smacks, and you ought to have it all the way in.

06 22 04 36 CDR-EVA Hey, good. I'll give you a double core on that.

06 22 04 38 LMP-EVA Okay.

06 22 04 39 CDR-EVA Good show. Okay, I got the picture.

06 22 04 49 LMP-EVA Very lucky - -

06 22 04 50 CC You can check off the double core square - -

06 22 04 51 LMP-EVA - - Two and two.

06 22 04 52 CC - - on that one, Jim.

06 22 04 57 CDR-EVA Okay. I got the cap. Go ahead and pull back.

06 22 04 59 LMP-EVA I like the ones where I can push them in, Joe.

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06 22 05 08 CDR-EVA That a boy. I think you got a good one.

06 22 05 20 LMP-EVA Yes. Yes, we went right through a rock.

06 22 05 23 CDR-EVA Yes.

06 22 05 24 LMP-EVA No wonder it was hard pounding. Got a rock right in the bottom of the -

06 22 05 30 CDR-EVA Might - might clean it off so you get a good seal on the cap, Jim. Get a good seal?

06 22 05 36 LMP-EVA I'm not going to get too good a seal because po - a portion of the rock - You know.

06 22 05 39 CDR-EVA That's what I mean. If you could clean that off.

06 22 05 42 LMP-EVA I think we got a good seal.

06 22 05 43 CDR-EVA Okay. Let me ra - Oh, Yes. Take off your end and I'll ram it.

06 22 05 54 CDR-EVA Okay. Yes. All my tools here. Okay.

06 22 06 05 CDR-EVA Here, push the rammer, will you? Okay?

06 22 06 08 LMP-EVA Got it.

06 22 06 09 CDR-EVA Good. Ready? Let me try holding this here on this end.

06 22 06 16 LMP-EVA It's twisting off.

06 22 06 17 CDR-EVA Oh, good. Now hold mine; and you can pull yours off easy; and I'll get you a cap.

06 22 06 24 LMP-EVA Hold that end.

06 22 06 25 CDR-EVA Yes.

06 22 06 26 LMP-EVA Screw this off.

06 22 06 36 LMP-EVA Is it?

06 22 06 37 CDR-EVA \*\*\* show. Okay. Let me get you a cap here.

06 22 06 52 CDR-EVA Here's your cap. You got two hands full.

06 22 06 56 LMP-EVA \*\*\* sit it there. I'll pound it on.

06 22 07 08 CDR-EVA \*\*\* Okay.

06 22 07 15 CDR-EVA On, I can't get that cap on any more than that.

06 22 07 33 CDR-EVA \*\*\* that one. Hey, we' e got two handy-dandy core tubes.

06 22 07 37 LMP-EVA If you can hold this, I'll put them both -

06 22 07 40 CDR-EVA Aaach! Okay.

06 22 07 44 CC Standing by for the - -

06 22 07 45 CDR-EVA Hey, Joe, that's a good double core!

06 22 07 46 CC - - number on that before you tuck it away.

06 22 07 50 LMP-EVA Okay, 4. And that was - Let's see, 4 was the lower and 60 was the upper.

06 22 07 57 CC Thank you, Jim. Copied.

06 22 08 03 CDR-EVA Which one did I hand you?

06 22 08 06 LMP-EVA No, I know 60 was the top one.

06 22 08 08 CDR-EVA Yes, you put that on first - -

06 22 08 09 LMP-EVA Yes.

06 22 08 10 CDR-EVA - - right? Okay, because I think you did - -

06 22 08 11 CC Dave, while you're getting loaded up there - -

06 22 08 12 CDR-EVA - - ...

06 22 08 13 CC - - our next request is two undocumented 6-inch blocks, and then we'll want you on the Rover driving north.

06 22 08 23 CDR-EVA Okay, Joe. After a picture. We're all loaded up.

06 22 08 34 LMP-EVA Two undocumented 6-inch blocks.

06 22 08 35 CDR-EVA Yes.

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06 22 08 36 LMP-EVA \*\*\* a choice on that.

06 22 08 37 CC Roger - -

06 22 08 38 CDR-EVA You get one and I'll get one.

06 22 08 39 CC - - Just for - variety.

06 22 08 40 CDR-EVA It's a vesicular one. Hey, here's a good vesicular one.

06 22 08 45 LMP-EVA I got one that was -

06 22 08 48 CDR-EVA You got one that's vesicular, or not?

06 22 08 50 LMP-EVA Yes. But -

06 22 08 52 CDR-EVA Huh?

06 22 08 53 LMP-EVA Yes, I do. But - -

06 22 08 55 CDR-EVA Okay.

06 22 08 56 LMP-EVA - - I don't know if we want to be too selective here if we're supposed to move on.

06 22 09 00 CDR-EVA Yes. Right. Okay.

06 22 09 23 CDR-EVA Oh, me.

06 22 09 30 LMP-EVA Want me to come down, Dave?

06 22 09 31 CDR-EVA No. Got a good one.

06 22 09 36 CC I guess so.

06 22 09 44 CDR-EVA A little better than 6 inches, but it was neat looking.

06 22 09 49 CC Well, that makes up for it.

06 22 09 54 CDR-EVA (Laughter)

06 22 10 10 LMP-EVA I'll probably move that camera over onto your side, Dave, so - so I can just put rocks on that side.

06 22 10 15 CDR-EVA My side's full.



06 22 10 18 LMP-EVA Can't put my camera over there, huh?

06 22 10 20 CDR-EVA No. There's room in your - your -

06 22 10 28 CC Dave and Jim - -

06 22 10 30 CDR-EVA Okay. ... the Rover.

06 22 10 31 CC - - we want you to climb aboard now and head north about .3 or .4 clicks by the easiest route, and we'll pick up the stereo pan with the big camera.

06 22 10 42 CDR-EVA Okay.

06 22 10 46 CC And, Davy, we suggest you - you take those big camera pictures of the same items you photographed before, and, Jim, you can get the pan.

06 22 10 56 CDR-EVA Okay. Fine, Joe. Here, let me just give you my camera now, Jim. Let's see how we ga - how we're doing. 120 on the frames on my camera, Sierra.

06 22 11 09 CC Copy. Thank you.

06 22 11 18 CC Dave, we also need the TV cameras turned off at this time, and see if you could brush the top of the camera with your glove, please. It's getting very warm. I'm sorry, that bad input - -

06 22 11 31 CDR-EVA Sure, Joe.

06 22 11 32 CC - - brush the top with the brush.

06 22 11 36 CDR-EVA (Laughter)

06 22 11 37 LMP-EVA I'll get the brush.

06 22 11 40 CDR-EVA Gary's quick today on you, isn't he?

06 22 11 44 CC He's sitting on me.

06 22 11 45 CDR-EVA No, you get in and - and then I can - I can brush - Yes. I can brush and tie you in, then.

06 22 11 51 LMP-EVA No.

06 22 11 52 CDR-EVA If you'll hop in.

06 22 11 53 LMP-EVA We're not going that far, Dave.

06 22 11 54 CDR-EVA Yes. Three-tenths of a click, yes, let's get it - let's - I want you tied in.

06 22 11 57 LMP-EVA Okay.

06 22 12 05 CDR-EVA Joe, the top of the camera has virtually no dust on it whatsoever. The LCRU does, but the top of the camera is almost clean.

06 22 12 16 CC Okay; thank you.

06 22 12 19 LMP-EVA I think we're just getting to a - get to a high Sun angle.

06 22 12 23 CC Might be right.

06 22 12 24 CDR-EVA Yes. I think so, too.

06 22 12 25 LMP-EVA Because I notice - I feel - I feel a little warmer today than I did yesterday.

06 22 12 36 CDR-EVA Yes, I do, too, as a matter of fact. You're right.

06 22 12 46 CDR-EVA Okay, Joe, your TV's going off now.

06 22 12 54 CC Roger, Dave. Thank you.

06 22 13 07 LMP-EVA Ready to go?

06 22 13 08 CDR-EVA Okay.

06 22 13 13 CDR-EVA Man, am I going to miss 1/6g. This is neat.

06 22 13 41 CDR-EVA Okay. I'm strapped in. You're strapped in. Soon as I can get the switches on here. Okay, Joe, now you're going to have to say again where you want us to go, because - -

06 22 13 56 LMP-EVA Just north, Dave, along the side of the rim.

06 22 13 58 CDR-EVA I thought you said something about 3/10ths of a click, didn't you?

06 22 13 59 LMP-EVA Yes.

06 22 14 00 CC That's affirmative Dave. - -

06 22 14 01 LMP-EVA Okay. I'll tell you what, we were - -

06 22 14 02 CC - - Just 3/10ths to 4/10ths of a click - -

06 22 14 03 LMP-EVA ...

06 22 14 04 CC - - via the easiest route north, and all we need is the photography from the point where you stop.

06 22 14 13 CDR-EVA Okay.

06 22 14 15 LMP-EVA Tell you when you get to 2.8, Dave - distance - I'll let you know.

06 22 14 19 CDR-EVA Okay.

06 22 14 20 LMP-EVA (clears throat)

06 22 14 24 CC And, troops - -

06 22 14 25 CDR-EVA Okay. We're moving, Joe.

06 22 14 26 CC - - what you're picking up is just the base for the stereo photography.

06 22 14 32 CDR-EVA Right.

06 22 14 34 LMP-EVA It's fairly easy driving here, isn't it?

06 22 14 36 CDR-EVA Sure is. It's a lot easier than the other place.

06 22 14 38 LMP-EVA Yes.

06 22 14 41 LMP-EVA Fairly good soil. - -

06 22 14 43 CDR-EVA Okay - -

06 22 14 44 LMP-EVA - - We're doing about 8 clicks.

06 22 14 49 CDR-EVA Look, there's a big one.

06 22 14 51 LMP-EVA We're heading - 310 to 320.

06 22 15 00 CDR-EVA You don't want me to run - run us over that big one there, do you?

06 22 15 02 LMP-EVA Please, not.

06 22 15 03 CDR-EVA (Laughter)

06 22 15 06 LMP-EVA Take it easy on the old Rover. I'll get a good trade-in value on it.

06 22 15 13 CDR-EVA Yes. How much farther we got to go? I got to plan where we're heading here.

06 22 15 18 LMP-EVA About another 2/10ths to go; I'm reading - -

06 22 15 20 CDR-EVA Okay.

06 22 15 21 LMP-EVA - - \*\*\* 27 - Oh, another click, Dave. Maybe up by that large block at 12:00 o'clock.

06 22 15 27 CDR-EVA Yes.

06 22 15 28 LMP-EVA If you can negotiate that?

06 22 15 29 CDR-EVA Gee, the one with the great big vesicles in it.

06 22 15 30 LMP-EVA Oh, notice that fresh one that's just this side of it? It looks like a light color, almost a yellow - ray that extends to the west of it?

06 22 15 37 CDR-EVA Ooops. No, I can't now. I'm busy driving.

06 22 15 38 LMP-EVA Yes.

06 22 15 39 CDR-EVA (Laughter)

06 22 15 40 LMP-EVA Oh, and - -

06 22 15 41 CDR-EVA Keep talking.

06 22 15 42 LMP-EVA - - very fresh crater right on the rim of her.

06 22 15 45 CDR-EVA Ooooh, look at this. This is one of the Twins.

06 22 15 47 LMP-EVA Yes. It probably is, yes.

06 22 15 48 CDR-EVA Man, we're right at it, and it's a deep fellow.

06 22 15 57 CDR-EVA Keep a little momentum going here.

06 22 15 58 LMP-EVA Yes. There's a flat part over there to the left.

06 22 16 04 CDR-EVA Yes. Look at that great ves - vesicular there. Looks exactly like - Uh, oh - Guess what we just lost again - the front steering. Oh, I know what - there. Turn the switch on; it works a lot better.

06 22 16 20 LMP-EVA We're at 2.8, Dave. So ...

06 22 16 22 CDR-EVA Getting close, huh?

06 22 16 23 LMP-EVA Yes.

06 22 16 24 CDR-EVA Let me get to this level spot over here. Okay, up on the rim of the Twin there would be a great place to take a pan.

06 22 16 34 LMP-EVA Either that or over on those rocks over at 11 o'clock.

06 22 16 38 CDR-EVA Yes, maybe, maybe. ... to the rim of the Twin there.

06 22 16 45 CDR-EVA Okay. We stopped, Joe.

06 22 16 47 CC Okay, Dave. Thank you.

06 22 16 48 CDR-EVA What you reading, the coordinate?

06 22 16 50 LMP-EVA Yes. Okay; heading 310, 093, 028, 020, 90, 92, 102, and 110.

06 22 17 17 CC Okay, Jimmy. Thank you. And thinking downstream, here, all we need is photography from this stop, and we're looking towards arriving back at the LM in about 45 minutes.

06 22 17 32 CDR-EVA Okay. Shoot! No time to go to the Northern Complex, huh?

06 22 17 36 LMP-EVA Do you want TV, Joe?

06 22 17 38 CC Yes, please.

06 22 17 43 LMP-EVA You got it.

06 22 17 49 CDR-EVA Hey, Jim, up on the - up on the rim. Right over here on the rim.

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06 22 17 53 LMP-EVA Okay. The - the rim of - -  
06 22 17 54 CDR-EVA Yes.  
06 22 17 55 LMP-EVA - - Twin.  
06 22 17 56 CDR-EVA Right there on the rim. Then you get the crater  
and you can get - all over the place. Then I can  
take the 500 from up there, too.  
06 22 18 56 CDR-EVA Okay, Joe. The crater is very uniform. It has  
debris on the order of - oh, a foot or so - almost  
throughout. No accumulation of talus at the bot-  
tom, and it's got fines covering everything, noth-  
ing really sharply exposed. And most of the  
fragments are subangular and it looks like non-  
vesicular, although I do see one high vesicular  
one right in the bottom. And it's about 60 meters  
across and maybe - oh, 10 meters deep, smooth sides,  
and a very slightly raised rim.  
06 22 19 35 LMP-EVA Dave, let me tur - -  
06 22 19 36 CDR-EVA Ooop. I'm sorry.  
06 22 19 37 LMP-EVA I'll just complete this.  
06 22 19 41 CDR-EVA And, as craters go around here, it's deep.  
06 22 19 57 CC Jim, are you taking your pan, now?  
06 22 20 02 LMP-EVA Yes. Pan's complete.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 20 46 -- BEGIN LUNAR REV 45 .  
06 21 09 45 CMP Okay, Houston. I've got 1 minute and 45 seconds  
until the burn.  
06 21 09 50 CC Roger, Endeavour. Houston reads you loud and  
clear, and we're standing by.  
06 21 11 06 CMP Average g.  
06 21 11 09 CC Roger.

06 21 11 18 CMP Ullage.

06 21 11 41 CMP Thrust on.

06 21 11 54 CMP Thrust off.

06 21 13 00 CMP Houston, Endeavour. If you're copying the DSKY, you'll see residual as .2, .2, and .3, so no trim.

06 21 13 09 CC We copy and concur, Al, and it looks like a beautiful burn.

06 21 13 17 CMP Yes, sir. It certainly does.

06 21 23 02 CC Al, if you'll give us ACCEPT, we'll send up a lift-off REFSMMAT and a RLS update.

06 21 23 12 CMP Okay, Karl. And if you're ready, I'll give you the rest of the burn status report. It's just the EMF and things like that.

06 21 23 19 CC Go ahead.

06 21 23 23 CMP Okay.  $T_{ig}$  was on time, and looked to me like the burn time was 18 seconds; DELTA- $V_c$  was minus 10.6; fuel is now 26.4; oxidizer is 26.2; and increase-decrease is decrease 25.

06 21 23 50 CC Thank you. We copy.

06 21 24 19 CC And, Al, in case of confusion on that MASS SPEC, we do want the experiment switch on STANDBY.

06 21 24 28 CMP Oh, okay, Karl. Yes there must have been some confusion on it because I had scratched that off my Flight Plan. Okay, going STANDBY. .

06 21 25 17 CC Endeavour, Houston. The latest bulletin from Hadley Rille tells us that the crew, after spending an unusual amount of time at the LM trying to get back the core drill with which they were only partially successful, are now moving across the lunar surface and they're currently at Hadley Rille giving us some beautiful views of the rille.

06 21 25 47 CMP Very good. How is the TV from there, Karl?

06 21 25 50 CC Our TV down here is just beautiful.

06 21 25 57 CMP Good. Save a copy for me.

06 21 26 00 CC We sure will, Al.

06 21 26 06 CC Hey, Al, Vance says, "Do you want us to put it on your EMF?"

06 21 26 10 CMP Tell Vance he's got the wrong EMF, I'm afraid. Sure would like it, though.

06 21 26 21 CC Righto.

06 21 26 25 CMP And you tell Vance I got cartoons on right now.

06 21 26 28 CC Say again.

06 21 26 33 CMP Just tell Vance I got cartoons on. He'll know.

06 21 26 41 CC Okay, Al.

06 21 26 59 CC Al, we'd like to have you stay in ACCEPT, but give us a VERB 33, ENTER.

06 21 29 13 CC Endeavour, this is Houston. We'd like to have the GAMMA RAY GAINSTEP up three times, please.

06 21 29 26 CMP Roger, Karl. GAINSTEP up three times.

06 21 29 29 CC Affirmative.

06 21 30 00 CC Al, you can go to BLOCK now. We've had some conflict in commands in that update to you and you got your LR - RLS update, but you didn't get the new REFSMMAT.

06 21 30 16 CMP Okay, Karl; understand.

06 21 31 22 CC Endeavour, this is Houston. Will you please give us ACCEPT.

06 21 31 30 CMP Okay, you've got ACCEPT.

06 21 33 16 CC Al, give us VERB 33, ENTER. And that should complete your REFSMMAT - -



06 21 33 26 CMP Okay. You got it.

06 21 33 27 CC - - and you can go to BLOCK.

06 21 33 33 CMP Okay. Thank you, sir.

06 21 34 15 CC Endeav - Endeavour, we would like HIGH GAIN, AUTO.

06 21 34 24 CMP AUTO.

06 21 34 28 CC Thank you.

06 21 41 02 CC Al, the medics told me that they can see that you are exercising per the Flight Plan. Would you like to know what peak value you get? Peak value on heart rate, that is.

06 21 41 15 CMP Yes. I'd be interested in that, Karl.

06 21 41 16 CC Yes. Let's see how high you can - you can - -

06 21 41 17 CMP Yes.

06 21 41 18 CC - - work her up. It'd be good to really churn her up for a while.

06 21 41 52 CC Okay, they got you at about 100 beats per minute in a moment.

06 21 42 00 CMP Very good.

06 21 42 25 CC We record 116.

06 21 42 47 CC You made 120. Man, you must be burning that thing up.

06 21 43 26 CC Got you at 126.

06 21 46 22 CC They say that looked like a real good stretch of exercise there, Al. Should stand you in good stead a couple of days from now.

06 21 46 32 CMP Roger. I sure hope so, Karl; been keeping it up just for that reason.

06 21 46 35 CC Very good.

06 21 46 40 CMP And I think it makes a difference in - in your - whole outlook and - the - restful way that you can do this flight, too. A little exercise and I get a good night's sleep also.

06 21 46 54 CC Yes, you're probably right.

06 21 55 57 CC Al, I have a REFSMMAT zero time for you when you have time to copy.

06 21 56 10 CMP Okay, Karl. Go ahead.

06 21 56 11 CC 171:37:18.89.

06 21 56 26 CMP Understand 171:37:18.89.

06 21 56 32 CC That's affirmative.

06 22 08 31 CC Al, we've got your angles and you can torque them.

06 22 08 39 CMP Okay, Karl. Torquing on the minute.

06 22 17 48 CC Endeavour, this is Houston. All of your systems are GO as you go around the corner, and I hope to have a science update for you on the next rev. In the meantime, I can report that the X-ray data is beginning to show very clear patterns from highlands to mare regions. It looks as though we are going to - we - we are high in magnesium in the mare and high in aluminum in the highlands, which tends to confirm the anorthosite theory for the highlands. It gets rather exciting when the data starts adding up like that. And the laser altimeter has shown us that the back side of the Moon is indeed further from the center of the Moon than the front side. This had been a theory previously, and now you seem to have proved it with good solid data. Lots of things are beginning to fall into place, and - What a mission, that's all we can say.

06 22 18 56 CMP Sounds pretty good so far, Karl. And I'm getting the SIM bay ready to have another shot of that.

06 22 19 09 CC Okay; we've been watching your maneuvering there. Have a good go at it.

06 22 19 16 CMP Okay, Karl.

06 22 19 26 CC

And the Rover boys at Hadley Rille have just had a tremendous session picking up all sorts of useful samples. The TV has been beautiful, the - All sorts of layering shows - in the - in the edge - in - in the - in the rille walls, and it's just very exciting.

06 22 20 05 CMP

It sounds great.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 22 20 01 LMP-EVA Pan's complete and I ... - -

06 22 20 03 CC Beautiful, and maybe you could give us a hand - -

06 22 20 04 LMP-EVA - - moving a little bit to the north.

06 22 20 05 CC - - with the TV camera.

06 22 20 10 LMP-EVA Oh, okay. (Laughter) Looks like you're looking back at - at Earth.

06 22 20 17 CC Yes, sir, and our necks are - are killing - -

06 22 20 19 LMP-EVA Can you see yourself?

06 22 20 20 CC - - us here.

06 22 20 36 LMP-EVA Well, there's a large block there just to the north of that, Dave. It looks like it might have a contact in it - between a dark, very vesicular basalt and that light colored - tan.

06 22 20 51 CC Thank you, sir. And, Dave, are you firing off the big camera?

06 22 21 00 CDR-EVA Yes.

06 22 21 16 LMP-EVA I've got an angular fragment here - subangular, about 4 feet by 5 feet, and the vesicles on - that are facing to the southwest are very large vesicles, about 3 inches, 2 to 3 inches in diameter. ... - -

06 22 21 39 CC Amazing. Amazing.

06 22 21 40 LMP-EVA - - then there's a gradual - -

06 22 21 42 CC Leave it there - -

06 22 21 43 LMP-EVA - - transition - -

06 22 21 44 CC - - though, Jim. The Rover's not stressed for it.

06 22 21 45 LMP-EVA - - gradual transition - (Laughter) Oh, I'd love to bring it back. I guess I'll just take some closeups here.

06 22 21 53 CC Yes, sir, please.

06 22 21 55 CDR-EVA Got the tongs? Oh, you got your - your thing, yes - -

06 22 21 59 LMP-EVA I don't have my scoop all [?]; I'll estimate -

06 22 22 01 CDR-EVA It won't work.

06 22 23 05 LMP-EVA Just to the north of this - the large one. I just mentioned, there're two other large fragments. And there's a fracture right between them, and they also have the large vesicle pattern.

06 22 23 20 CC Roger, Jim. Copy.

06 22 23 22 LMP-EVA I've already sampled this one. And the - the material that has the large vesicles has long laths of probably plagioclase.

06 22 23 35 CDR-EVA How long, Jim? What's a long lath?

06 22 23 38 LMP-EVA Yes, long lath's about - centimeter.

06 22 23 45 CC Roger, Jim. We copy that. And as much as we hate to, we're going to have to get you aboard the Rover, heading back across the mare towards the east, please.

06 22 23 55 LMP-EVA Okay.

06 22 23 59 CDR-EVA ... is 155.

06 22 24 03 CC Good show, Davy.

06 22 24 53 LMP-EVA Getting ready to move out, Dave?

06 22 24 56 CDR-EVA Yes.

06 22 25 21 CDR-EVA Leave something here for the next guy. Okay, hop on, and we'll get on with it here.

06 22 25 43 CDR-EVA Get your ol' handy dandy seatbelt fixed up there because we'll be going all the way back.

06 22 25 54 LMP-EVA Yes, \*\*\* on.

06 22 25 57 CDR-EVA Okay.

06 22 26 07 CDR-EVA Okay, TV's coming off.

06 22 26 11 CC Okay, Dave. Thank you.

06 22 26 21 CDR-EVA And TV camera'll be aft and down.

06 22 26 24 LMP-EVA \*\*\* knock that seatbelt off, Dave, I'll have to get off and get it.

06 22 26 26 CDR-EVA I'll get it.

06 22 26 28 LMP-EVA But you can't.

06 22 26 29 CDR-EVA Oh, really? Okay, hop off. Why don't you let me get it and hold it?

06 22 26 47 LMP-EVA Okay, babe.

06 22 26 48 CDR-EVA ...

06 22 26 58 CDR-EVA Too much back, Jim - you go back too much. Come to your right now. Come to your right. Come to your right. That's it. Now you're in. That's it, Jim. ... too far back when you get on it.

06 22 27 32 CDR-EVA Okay, you're in.

06 22 27 38 CDR-EVA Hey, Joe, are you planning a mare stop on the way back?

06 22 27 42 CC Dave, we're standing by for a mark when you're rolling. And we'd like for you to press on back towards the drill site. We've got a procedure for you to - to separate two sections of the deep stem from the other two sections, and we're going to carry the two halves into the LM that way.

06 22 28 04 CDR-EVA Okay.

06 22 28 06 CC And the mare site, Dave; we will do a good mare site, but fairly near the LM.

06 22 28 15 CDR-EVA All righty.

06 22 28 30 CC Are you buckling up for safety?

06 22 28 35 CDR-EVA Yes, man. We always do that. Okay; switch coming on.

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06 22 28 49 CDR-EVA Okay, Joe. We're moving.

06 22 28 51 CC Okay.

06 22 28 56 LMP-EVA Right to 093.

06 22 29 02 CC Sounds about - -

06 22 29 03 LMP-EVA ... give it a turn and go by slow.

06 22 29 04 CC - - right, and you might pick up your Rover tracks before long.

06 22 29 12 CDR-EVA Oh, what a big mountain that Hadley is! Whew!

06 22 29 17 LMP-EVA Yes, it's beautiful. Might want to swing a little more to the left, here, Dave.

06 22 29 22 CDR-EVA Yes. Let me go around to the right of this - Sure we can get between those two craters ahead of us there. Yes, think I'll come this way.

06 22 29 39 LMP-EVA Yes, the mountains up here are truly beautiful.

06 22 29 46 CC Roger, Jim. We copy you loud and clear.

06 22 29 56 CDR-EVA Okay, now turn to the right.

06 22 30 05 LMP-EVA 097, Dave.

06 22 30 07 CDR-EVA Okay.

06 22 30 08 LMP-EVA That's a friendly shallow depression there at - -

06 22 30 10 CDR-EVA Yes, we'll go south of that.

06 22 30 24 CC Jim, this is Houston.

06 22 30 25 CDR-EVA Boy, it's just over hill and dale, isn't it?

06 22 30 27 LMP-EVA Yes.

06 22 30 29 CDR-EVA Go ahead, Joe.

06 22 30 32 CC Roger. If you can take your - -

06 22 30 33 LMP-EVA Go ahead.

06 22 30 34 CC - - eyes off the - the scenery and the road for a moment, I could ex - explain the core stem separation procedure, if you'd like it now.

06 22 30 48 LMP-EVA Fire away.

06 22 30 54 CC Roger. Your choice. I can give you the procedure now or we can wait until we get past - Oh, okay. Sorry, didn't understand. We think you can put the four sections of the core stem in the vise. Jim, you move it horizontally, put horizontal torque on the stem and tighten it up in the vise, while, Dave, you use the wrench and try to separate it.

06 22 31 25 CDR-EVA Well, we tried that, Joe, but we'll try it again. It's worth another go. That was just about what we tried the last time - by putting - trying to put horizontal and vertical forces and everything else on the vise, and the vise just doesn't seem to grip like it should, not - not nearly as well as the wrench does. And I don't really know why. It might be a little loose.

06 22 31 47 CC Okay, Dave. Copy that. It may also be that it's quite dusty, and the brush might help you out there.

06 22 31 56 CDR-EVA Okay. We'll try that. Didn't try that.

06 22 32 00 CC And to set your minds at ease, we think that even if you can't separate it into two pieces, we can get the whole thing into the LM. So we'll bring it home anyway. We'd like it in two separate pieces, though.

06 22 32 15 CDR-EVA Well, I guarantee you we're not going to leave it here now after we got that much invested into it. Oops!

06 22 32 32 LMP-EVA We're looking directly east now as we head back to the LM - Did you put your vis - visor down?

06 22 32 38 CDR-EVA Haven't yet, but I think I just might.

06 22 32 40 LMP-EVA Boy, that Sun is really fierce.

06 22 32 49 LMP-EVA And I can see as I look to the east several places up the slope - Big Rock Mountain where there're outcrops exposed.



06 22 33 04 CC Roger, Jim. Copy - -

06 22 33 05 LMP-EVA One about a quarter of the way up directly east from us - That was Big Rock Mountain.

06 22 33 06 CC And the name of the mountain again, please.

06 22 33 12 LMP-EVA That was Big Rock Mountain.

06 22 33 14 CDR-EVA You know, Joe, Big Rock-o Candy Mountain.

06 22 33 18 CC Roger; we copy. And do we have a big smile here in the MOCR.

06 22 33 30 LMP-EVA (Laughter)

06 22 33 35 CDR-EVA I'm not going in there, Jim, no.

06 22 33 37 LMP-EVA I hope not. (Laughter) Haven't picked up our tracks yet - Think we're probably still a little north of them.

06 22 33 44 CDR-EVA Yes. Because we came 3/10ths north.

06 22 33 50 LMP-EVA We're heading 105, range 1.4.

06 22 33 56 CC Copy, and sounds good.

06 22 34 01 LMP-EVA Can't see the LM today.

06 22 34 06 CDR-EVA Oh, look at the mountains today, Jim, when they're all sunlit; isn't that beautiful?

06 22 34 09 LMP-EVA Really is.

06 22 34 10 CDR-EVA By golly, that's just super! It's - You know - unreal.

06 22 34 20 LMP-EVA Dave, I'm reminded of a favorite Biblical passage from Psalms. I look unto the hills, from whence cometh my help. But of course, we get quite a bit from Houston, too. Okay, we're heading - 13 - 140.

06 22 34 43 CDR-EVA We've got to go around this - -

06 22 34 45 LMP-EVA Yes.

06 22 34 46 CDR-EVA - - crater here, buddy.

06 22 35 02 LMP-EVA What's your estimate of the - when we'll be able to see the LM?

06 22 35 07 CDR-EVA Who's, mine?

06 22 35 08 LMP-EVA Yes, do you think we'll be able to see it at 1 kilometer?

06 22 35 10 CDR-EVA No. I think we're going - -

06 22 35 12 LMP-EVA I - -

06 22 35 13 CDR-EVA - - to be going up and down the valleys here.

06 22 35 15 LMP-EVA - - No, I think I see the top of it, Dave; at 12 o'clock.

06 22 35 17 CDR-EVA Really?

06 22 35 18 LMP-EVA Yes. Just barely see the top of it.

06 22 35 20 CDR-EVA Okay, well, you look far range, and I'll look near range.

06 22 35 24 LMP-EVA Yes. And there are our tracks.

06 22 35 27 CDR-EVA Yes, we got our tracks. How about that?

06 22 35 29 LMP-EVA And the Rover's [sic] a little black blob over there at about 12:30.

06 22 35 35 LMP-EVA That's exactly where the NAV system says it is.

06 22 35 46 CDR-EVA I think we'd do better going straight ahead on, don't you?

06 22 35 49 LMP-EVA Yes. Yes ... just got that one depression over that next ridge. Might want to just drive through it, huh?

06 22 35 55 CDR-EVA Yes, let's see how we do it.

06 22 35 56 LMP-EVA Wasn't that the deep one, though, that had the - the crater - in the - in the lower part?

06 22 36 02 CDR-EVA Yes. It's saying 093 and heading 08, so coming right's going to help us some.

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06 22 36 16 CDR-EVA No, we're okay.

06 22 36 17 LMP-EVA Yes.

06 22 36 19 CDR-EVA Okay.

06 22 36 20 LMP-EVA Yes. This is a better - better route than we used coming out.

06 22 36 22 CDR-EVA Yes.

06 22 36 34 CDR-EVA Wish we could get that 16-millimeter camera ...

06 22 36 37 LMP-EVA I'll - I'll change MAGs on it.

06 22 36 39 CDR-EVA Yes.

06 22 36 41 LMP-EVA See if that helps.

06 22 36 50 CDR-EVA How about that for maneuvering, huh?

06 22 36 57 LMP-EVA Slick!

06 22 37 03 CDR-EVA This thing would really be great in shirtsleeves up here, you know it?

06 22 37 12 CC Jim, concerning that 16-millimeter camera, if you're changing the MAG out, you might try the one-frame-per-second trick at the beginning. It worked before.

06 22 37 25 LMP-EVA Yes, I did that this morning, Joe, on this MAG.  
It - -

06 22 37 30 CC Roger. You've got plenty of MAGs.

06 22 37 31 LMP-EVA - - didn't work; I'll try it again, though.

06 22 37 32 CC Keep trying.

06 22 37 35 LMP-EVA Yes, we will. By the way, do you want us to bring back those jammed MAGs or shall we junk them?

06 22 37 53 CC Let me check with Stan.

06 22 38 03 LMP-EVA Boy, look at the few big boulders up there.

06 22 38 05 CDR-EVA Yes, that's pretty neat.

06 22 38 07 LMP-EVA Up on the slope of - -

06 22 38 08 CDR-EVA Yes, it's appropriately named, don't you think?

06 22 38 11 LMP-EVA Yes, it is.

06 22 38 16 CDR-EVA It's the only one around here.

06 22 38 26 CC Dave and Jim, we think it will be just as easy for you to bring them back, and we'll troubleshoot them.

06 22 38 34 CDR-EVA All right, we'll do that.

06 22 38 50 CDR-EVA You know, so far in the past, our NAV system has always been biased pointing us to the right a little bit more than we should, so I'm going to bias it a tad left here. Because I know if we get too far left, we'll pick up our tracks. I've noticed on the other two trips when we got back, it was asking us to head 8 degrees or so to the right. So -

06 22 39 22 LMP-EVA See our tracks - running to the east there - 12 o'clock position. Just over that - that next ridge, we should - -

06 22 39 33 CDR-EVA Yes, you're right.

06 22 39 34 LMP-EVA - - should see the LM.

06 22 39 35 CDR-EVA Oh, we cut a big chunk out.

06 22 39 36 LMP-EVA Yes. Range now, .5.

06 22 40 05 CDR-EVA Hey, this shade really helps. It's no problem at all driving up-Sun, with the center visor down. In fact, I reckon we're making pretty good time.

06 22 40 22 LMP-EVA Going about 11 clicks there.

06 22 40 24 CDR-EVA Yes.

06 22 40 28 LMP-EVA There's the LM, 12:30.

06 22 40 30 CDR-EVA How about that! By golly, we must have come just about straight back. And the BEARING - -

06 22 40 36 LMP-EVA Yes, it's great.

06 22 40 37 CDR-EVA - - says 096, and I'm - -

06 22 40 39 LMP-EVA Hey, let me take a picture right here.

06 22 40 40 CDR-EVA Oh, yes.

06 22 40 41 LMP-EVA Slow down a little bit ... - -

06 22 40 42 CDR-EVA Yes, let me stop on the - on the rim here and point you.

06 22 40 46 LMP-EVA Okay.

06 22 40 47 CDR-EVA Oh, isn't that pretty! Okay, Oop - too much, huh? Let me go around. There, how's that?

06 22 41 03 CDR-EVA Little more, or are you okay?

06 22 41 05 LMP-EVA Swing it.

06 22 41 06 CDR-EVA Okay.

06 22 41 07 LMP-EVA Okay.

06 22 41 16 CDR-EVA Still on a 5.6?

06 22 41 17 LMP-EVA Yes.

06 22 41 19 CDR-EVA That's a super picture.

06 22 41 21 LMP-EVA Swing it a little more to the right and let me - make sure -

06 22 41 23 CDR-EVA Okay, there you go.

06 22 41 26 LMP-EVA Got it.

06 22 41 27 CDR-EVA Okay. Let's see. We'll go find the ALSEP site; I think we've been there before.

06 22 41 37 CC And Dave and Jim - -

06 22 41 38 LMP-EVA Boy, this ALSEP ... (Laughter)

06 22 41 39 CC - - I want you to notice how we planned the fourth stop - -

06 22 41 40 CDR-EVA No, I don't think it was.

06 22 41 41 CC - - at the ALSEP site for you.

06 22 41 46 CDR-EVA (Laughter) Yes, it's got to be a new all-time record. It will probably stand forever.

06 22 41 53 CC Roger. It'll certainly - -

06 22 41 54 CDR-EVA Sure would like to do some more geology up here someday.

06 22 41 55 CC - - scare the competition.

06 22 42 02 LMP-EVA Yes, we didn't get a chance to get up the Northern Complex and see Pluton, Icarus - -

06 22 42 06 CDR-EVA I know it.

06 22 42 07 LMP-EVA - - Eagle Crest.

06 22 42 09 CDR-EVA Dog-gone. All the good places.

06 22 42 11 LMP-EVA Yes, the really big surprise was up there.

06 22 42 19 CDR-EVA Jim, I'll go around the north here and - avoid the dust. Our trusty ALSEP.

06 22 42 37 CDR-EVA Hey, that's - that's a pretty nice picture right there, Jim. Let me point you - -

06 22 42 41 LMP-EVA Swing around there, I'll take some.

06 22 42 42 CDR-EVA That's really pretty.

06 22 42 44 LMP-EVA What kind of MAG?

06 22 42 45 CDR-EVA Oh, you got black and white. Better change that MAG, buddy. Okay, there you go right there.

06 22 43 01 CDR-EVA Got it?

06 22 43 02 LMP-EVA Yes, I'll change it out when we stop.

06 22 43 10 CDR-EVA Try slowing here. There's our trusty drill.

06 22 43 15 LMP-EVA I thought you left it in your - in the erect position.

06 22 43 18 CDR-EVA No. No.

06 22 43 31 LMP-EVA Friendly plains of Hadley.

06 22 43 35 CC Dave and Jim, this is Houston.

06 22 43 40 CDR-EVA We've stopped, Houston. We're at ALSEP.

06 22 43 47 CC Roger, troops. We're thinking that when you - -

06 22 43 51 CDR-EVA Okay. We're reading.

06 22 43 52 CC - - arrive back at the drill site - Jim, why don't you hop off and pick up the three important items there, the drill stem, the treadle, and the wrench. And, Dave, you can drive on back and park by the LM. Over.

06 22 44 09 CDR-EVA Okay, give me your camera, Jim.

06 22 44 12 LMP-EVA Got it, Joe. In work. Okay, I'll just skip the NAVs.

06 22 44 20 CDR-EVA Yes.

06 22 44 21 LMP-EVA Just get the - Okay. Let's see - you have all the - the other stems in the bag.

06 22 44 35 CDR-EVA Yes.

06 22 44 36 LMP-EVA You have the - do you have the wrench in there, too, don't you?

06 22 44 40 CDR-EVA Yes. I think so. If it's not there, I've got it in the bag.

06 22 44 44 LMP-EVA It's not - it's not here by the treadle. So all I'll do is pick up - pick up the treadle?

06 22 44 54 CDR-EVA I don't know why we need the treadle.

06 22 44 55 LMP-EVA I don't either ... - -

06 22 44 56 CC Just take it on back. We might use it as a wrench.

06 22 45 05 CDR-EVA Yes, I guess you could. Right.

06 22 45 09 CC And that's a Walter Mitty plan number 2.

06 22 45 23 LMP-EVA Okay, I have the treadle, stems, and I'm - heading back.

06 22 45 45 CDR-EVA Okay, I'm off the Rover, Joe.

06 22 45 53 LMP-EVA When I get up there, Joe, I'll give you the readings.

06 22 45 55 CC Okay, Jimmy. We're standing by.

06 22 46 32 CC Dave, are you arriving at the LM, now? - -

06 22 46 33 CDR-EVA ... at the Rover.

06 22 46 37 LMP-EVA Yes, Dave's been here for a couple minutes.

06 22 46 41 CC Okay, sorry. I guess I missed it.

06 22 46 44 CC We're standing by for TV, Dave.

06 22 46 47 LMP-EVA And the heading is - -

06 22 46 50 CDR-EVA Roger, Joe.

06 22 46 52 LMP-EVA The heading is 001, 032, 5.1, 08890, 108, 113, and motor temps are still low.

06 22 47 19 CC Copy, Jim. Remarkable NAV system.

06 22 47 26 LMP-EVA Sure is.

06 22 47 37 LMP-EVA Okay, AGC shows you should have it, Joe.

06 22 47 41 CC Okay.

06 22 47 51 LMP-EVA Dave, are you going to use that camera?

06 22 47 54 CDR-EVA Yes, sir.

06 22 47 55 LMP-EVA Okay, cause I want to - we never have taken any dust pictures of the Rover.

06 22 47 59 CDR-EVA I'll do it right now.

06 22 48 01 LMP-EVA You need two cross-Sun and one down-Sun.

06 22 48 08 CDR-EVA Okay.

06 22 48 09 LMP-EVA At - f/11, 1/250th, 11 feet.

06 22 48 11 CDR-EVA All the way, huh?



06 22 48 12 LMP-EVA Yes. And also the - got to take a photograph of the Solar Wind.

06 22 48 17 CDR-EVA Okay. I'll get it.

06 22 48 19 CC And we need some help on our camera, Dave.

06 22 48 22 CDR-EVA Oh, yes ...

06 22 48 31 LMP-EVA I guess we kind of follow the checklist here for a while, huh?

06 22 48 40 CC Jim, that's affirm, but we want you to break down the core stem first, please; that is, separate it.

06 22 48 50 LMP-EVA (Laughter) Of course! The crew will break down; the stem never will.

06 22 48 59 CDR-EVA Okay, I got a pan of the Rover. Let me have that stem, there. Jim, keep going the way you're going. Let me have the stem. Don't bother with the treadle, yet. Let's -

06 22 49 26 CDR-EVA Oh, shoot! The tool isn't in there. Must be in your seat. You didn't - you didn't see the tool out there?

06 22 49 33 LMP-EVA No. All I saw was a UH - T.

06 22 49 39 CDR-EVA Must be in your seat then.

06 22 49 45 LMP-EVA Is it?

06 22 49 49 CDR-EVA Let's see - oh, shoot, I don't see it.

06 22 50 01 LMP-EVA I'll look out there again, but the only thing I saw was a UHT - lying on the surface out there. Did you have a UHT in that area?

06 22 50 06 CDR-EVA Yes, yes.

06 22 50 07 LMP-EVA That's all that was out there.

06 22 50 09 CDR-EVA But, you know, I - I thought I put the tool in the bag, with the stems.

06 22 50 17 LMP-EVA Maybe it just -

06 22 50 19 CDR-EVA How could it get out and the stems not get out?

06 22 50 23 LMP-EVA How many stems did you have?

06 22 50 24 CDR-EVA Two.

06 22 50 27 LMP-EVA I don't know, Dave.

06 22 50 30 CDR-EVA I don't know either. Maybe we'll have to use the treadle. It's not on my side either. Darn. Whew! Man that's hot! I'll tell you what - the treadle - -

06 22 50 52 LMP-EVA Hold it, and I'll get on the end there of the - with the ...

06 22 50 55 CDR-EVA Okay.

06 22 51 01 LMP-EVA I don't know how we're going to get the treadle over the cap, though. I'll have to come in from the other end.

06 22 51 05 CDR-EVA No, the other end's got the same kind of cap, Jim.

06 22 51 07 LMP-EVA I don't think I can get it through the hole with the cap on. I'll take the cap off and go gently. I'll put the cap back on. Let's see which way should the treadle? - That's right. I guess it - - Easy does it.

06 22 51 32 CDR-EVA No, we'll never - No, wait. Don't do that - don't do that - we'll never get the treadle off. No, don't put the treadle on. We'll never get it off. We've got nothing to get it off with. Back off. Pull the treadle off. Best thing - Joe, will this stem fit in the LM some place?

06 22 51 50 LMP-EVA I think it will.

06 22 51 52 CC We think so, Dave.

06 22 51 56 CDR-EVA I - I think that's what we're going to do. We're going to take the stem with us - just like it is. Think if we try and fiddle with it, we're going to mess it up.

06 22 52 12 CC We hear you, Dave. And our camera is turtle-up again.

06 22 52 21 CDR-EVA Okay. A-h-h-h. Now. Okay.

06 22 52 29 LMP-EVA Did you get it?

06 22 52 30 CDR-EVA I got one off.

06 22 52 36 LMP-EVA Okay, I'm going to work with the 16 here and see what I can do.

06 22 52 39 CDR-EVA Good.

06 22 52 40 CC What did you do, Dave?

06 22 52 41 CDR-EVA Boy, I tell you - my hands - done. Well, Joe, I just decided it was time to take that drill apart, and I took it apart.

06 22 52 59 CC That sounds easy enough.

06 22 53 00 CDR-EVA So, now we have a three-stem section and three one-stem sections.

06 22 53 07 CC That ain't half bad.

06 22 53 12 CDR-EVA (Laughter)

06 22 53 19 CC Dave, we're standing by for - -

06 22 53 20 LMP-EVA - - ... - -

06 22 53 22 CC - - a cap number on that - -

06 22 53 23 CDR-EVA - - and the single stem's brushed ... - -

06 22 53 24 CC - - and, Jim, we need some help with the camera.

06 22 53 26 CDR-EVA Here's the cap - and - I know it is here. Hotel is the upper part of the three-stemmed section.

06 22 53 38 CC Copied.

06 22 54 02 CDR-EVA Those caps aren't on there very good, Jim, so better be awful careful of it. Awful careful.

06 22 54 10 LMP-EVA Put it in the bag. I - can't.

06 22 54 13 CDR-EVA Oh, I see what you mean, yes. That one.

06 22 54 16 LMP-EVA I'll brush this MAG Alfa.

06 22 54 18 CC Dave, bag 2 for that short section and, Jim, we need help on our TV camera, please.

06 22 54 29 CDR-EVA Okay, I'll get it, Jim. You try and get that 16-millimeter working. You guys have almost lost control on this camera, haven't you?

06 22 54 50 CC Dave, point it down - please.

06 22 54 52 CDR-EVA ...

06 22 54 57 CC Thank you.

06 22 54 58 CDR-EVA Joe, I'll point it down.

06 22 55 02 CC It's okay, Dave, it's okay now.

06 22 55 03 CDR-EVA How far down do you want it?

06 22 55 04 CC It's okay.

06 22 55 05 CDR-EVA How about that?

06 22 55 26 CDR-EVA Boy, I tell you what I need now is some Gatorade. Wow! I could drink 3 gallons of the stuff. I opened up my checklist here and look at all that work and that reminds me - Work time.

06 22 55 46 CC Dave and Jim, this is Houston.

06 22 55 47 LMP-EVA Hey, Joe, I have MAG Golf on here now. Go.

06 22 55 51 CC Roger. We need a EMU status check from both of you, and we're 5 minutes from closeout. All we need is a few grab samples.

06 22 56 01 CDR-EVA Okay, I've got 50 percent. The flags are clear and 3.9.

06 22 56 10 LMP-EVA I'm 3.85, flags are clear, and I'm reading - 60 percent.

06 22 56 20 CC Thank you, Jim and Dave. Got it.

06 22 56 36 CC Okay, troops, we're asking for the undocumented samples to go into - -

06 22 56 37 LMP-EVA Joe, it sounds like it's running already at one frame per second.

06 22 56 38 CC - - the BSLSS bag, please.

06 22 56 49 LMP-EVA We didn't catch that comment, Joe.

06 22 56 51 CC Roger, Jim, I'm sorry, I cut you out. Asking that the undocumented samples go into the BSLSS bag.

06 22 57 05 LMP-EVA Okay.

06 22 57 12 CDR-EVA We'll do that. Just grab a bunch, huh?

06 22 58 28 CDR-EVA Hey, Joe, how about bag - oh, well, okay - BSLSS bag.

06 22 58 56 LMP-EVA Joe, when I start the camera it runs for about 3 seconds and then stops.

06 22 59 02 CC Okay, Jim. We copy that. Thank you.

06 22 59 10 LMP-EVA I can put on another MAG, if you like.

06 22 59 25 CC Negative, Jim. I think we should just go ahead with your other tasks.

06 22 59 39 LMP-EVA Okay.

06 22 59 41 CC And, Jim, we've got another question - -

06 22 59 42 LMP-EVA - - Do you want to get that descent engine sample?

06 22 59 43 CC - - on the photography for you. We would like a picture of the Rover saddle which hung up on original deployment. Do you have one of those already?

06 22 59 56 LMP-EVA No, but I'll go get one, Joe.

06 22 59 57 CC Okay, sounds good.

06 22 59 59 LMP-EVA Right now.

06 23 00 02 LMP-EVA Dave, we have everything - everything in this bag that you're going to put in it, right? In this bag here?

06 23 00 06 CDR-EVA Yes. But how about the rocks under the seat?

06 23 00 08 LMP-EVA Yes. I've already put those in there. That's why I wanted to get the right bag.

06 23 00 10 CDR-EVA Yes, that's everything I've got.

06 23 00 13 LMP-EVA Well, we've got the SES - a SESC in here - that has not been used - of course, there're remaining caps.

06 23 00 28 CDR-EVA Okay, I'm working on the bag 2, right now, Joe.

06 23 00 38 CDR-EVA Taking the caps out of it that we have not used, we've got an SESC here that hasn't been used, and then I'm putting - the rocks and samples that are under my seat in bang [sic] - bag 2.

06 23 01 07 LMP-EVA Hey, Joe, I got your picture of the saddle - a couple of them.

06 23 01 10 CC Okay. Fine.

06 23 01 15 LMP-EVA What else would you like?

06 23 01 55 LMP-EVA Did you document this large one, Dave?

06 23 01 58 CDR-EVA Sort of.

06 23 02 01 LMP-EVA Okay, I'll try to get it in this bag, then. It'll be a heavy bag. I think I'll wait and put that in the - BSLSS bag.

06 23 02 19 CDR-EVA Okay.

06 23 02 55 CDR-EVA I've got to get the tool - whenever you're ready, I'll get the tools off of you. I'll be packing the ETB in the meantime.

06 23 03 02 LMP-EVA Okay.

06 23 03 13 LMP-EVA Better go over and get the - engine bell sample.

06 23 03 18 CDR-EVA They want to get that?

06 23 03 19 LMP-EVA I guess so; I don't know. That part of the closeout?

06 23 03 23 CDR-EVA Yes. But I heard you ask him; I didn't hear any answer.

06 23 03 25 CC Dave, that's affirmative. You just should be following your checklist for closeout, now.

06 23 03 33 CDR-EVA Okay.

06 23 03 35 LMP-EVA Yes, I'm ready to ... - -

06 23 03 36 CC And we're plenty comfortable on the time.

06 23 03 40 LMP-EVA - - yes, well, we ought to get the descent engine sample first.

06 23 03 43 CDR-EVA Okay. Let's get the descent engine sample, Jim.

06 23 03 45 LMP-EVA Okay, well I don't need my bags for that.

06 23 03 47 CDR-EVA No. I've got a bag, if you'll get the - -

06 23 03 51 LMP-EVA I'll get the SESC.

06 23 03 52 CDR-EVA - - yes, and a scoop.

06 23 03 54 LMP-EVA Yes.

06 23 04 24 CDR-EVA We had to do so much work around the - the Rover, there's hardly a spot that's not - messed up.

06 23 04 38 CDR-EVA Okay. Let me get the pictures.

06 23 05 07 CDR-EVA Okay. Need to fill that little jewel. Fill it!

06 23 05 27 LMP-EVA Don't spill it, I want to get the top part.

06 23 05 32 CDR-EVA I won't.

06 23 05 42 LMP-EVA Get some more in there?

06 23 05 44 CDR-EVA Yes, scoop up the top layer there right next to the one you just scooped. You can put the top half inch or so.

06 23 06 10 CDR-EVA That looked good, Jim. Okay, I can take care of the rest.

06 23 06 17 LMP-EVA Take that back - Or you can just put it in my bag; that's where it's supposed to go.

06 23 06 26 CDR-EVA Okay. Boy! Both hands are numb!

06 23 06 47 LMP-EVA Save your DSKY finger.

06 23 06 49 CDR-EVA (Laughter) Yes. In we go.

06 23 06 59 CDR-EVA Boy, they sure make them tight. Okay. ...

06 23 07 15 LMP-EVA Got it in?

06 23 07 16 CDR-EVA Yes. Okay. I'll take the -

06 23 07 17 LMP-EVA I'll move off.

06 23 07 18 CDR-EVA Jim, give me your scoop; while you're moving give me your scoop and I'll bring it over to you.

06 23 07 24 LMP-EVA Okay, listen. You're gonna keep that camera for a while - -

06 23 07 29 CDR-EVA Yes.

06 23 07 30 LMP-EVA - - will you take the - a down-Sun of the Solar Wind, for me?

06 23 07 32 CDR-EVA Yes. Sure.

06 23 07 33 LMP-EVA F/11 at 7 feet.

06 23 07 34 CDR-EVA Okay.

06 23 07 35 LMP-EVA I'll - collect it.

06 23 07 38 CDR-EVA Okay.

06 23 08 23 CDR-EVA Let's get going.

06 23 08 24 LMP-EVA Go ahead. You've got to get there first.

06 23 08 26 CDR-EVA I know. I'm just right behind you.

06 23 08 27 LMP-EVA Oh, good. I was waiting for you to pass me.

06 23 08 37 CDR-EVA I'll tell you, at the high Sun angle, it's warm isn't it?

06 23 08 42 LMP-EVA It is.

06 23 08 54 LMP-EVA You know, to collect these large rocks, Dave, if we had time, you could almost use the Rover and drive out there.



06 23 09 01 CDR-EVA No, I don't think we have time.

06 23 09 04 CC Jimmy, we've got plenty of rocks.

06 23 09 06 CDR-EVA Okay, down-Sun. Okay, okay, good. I got the picture.

06 23 09 14 LMP-EVA Okay.

06 23 09 30 LMP-EVA How much stuff there is on this -

06 23 09 34 CDR-EVA Say again.

06 23 09 35 LMP-EVA How much stuff there is on this sunscreen.

06 23 09 40 CDR-EVA Yes. Sure is, isn't it? Okay.

06 23 09 53 CDR-EVA Okay, Joe, while Jim's getting that, I'm going to load the ETB.

06 23 09 59 CC Okay.

06 23 10 05 CDR-EVA And, I've got this - -

06 23 10 06 LMP-EVA It's not rolling up very well Joe; I've got to roll her up manually.

06 23 10 10 CC Sounds okay, Jim, just as clean as possible.

06 23 10 12 CDR-EVA Whiskey. And -

06 23 10 16 LMP-EVA Okay.

06 23 10 22 CDR-EVA Okay, Joe, Whiskey, Sierra, Victor - Do you want any of the 16-millimeters to stay out, or are we through with those?

06 23 10 36 CC Dave, you might save one for the drive-away. Put the rest in the ETB, please.

06 23 10 46 CDR-EVA Okay. Union, and I'll save Item - this would be a good item for the drive-away.

06 23 10 56 CC Okay.

06 23 10 57 CDR-EVA Juliett - and Hotel - and Kilo - and Foxtrot.

06 23 11 31 CDR-EVA ... the maps - -

06 23 11 51 LMP-EVA I'm ready to get the tools off, Dave, any time you are.

06 23 11 52 CDR-EVA Okay. That's a good time to do it.

06 23 11 54 LMP-EVA So am I. Okay, the Solar Wind is - MESA table.

06 23 12 12 CDR-EVA Okay. Heck, we don't have to do anything; let's just take them off. Picture of ...

06 23 12 23 LMP-EVA Yes, I'm taking it.

06 23 12 24 CDR-EVA Okay. Turn around and I'll get your bag. The other way. The other way. Right there.

06 23 12 34 LMP-EVA Okay.

06 23 12 36 CDR-EVA ... could you bend over, Jim?

06 23 12 49 CDR-EVA Okay. That's your bag.

06 23 12 52 LMP-EVA Got it off?

06 23 12 53 CDR-EVA Yes. It's off; you're clear.

06 23 12 56 LMP-EVA Hey, I guess we might be able to consolidate the contents of both those bags into one.

06 23 13 01 CDR-EVA That probably would help.

06 23 13 03 LMP-EVA But we can do that inside.

06 23 13 05 CDR-EVA Yes. And, then - okay, why don't you get mine?

06 23 13 14 LMP-EVA Can you bend over a little?

06 23 13 20 CDR-EVA Might as well doff the tool harnesses out here.

06 23 13 27 LMP-EVA Yes. That's a good idea. Why not? See if it works. And you're clear.

06 23 13 31 CDR-EVA Okay.

06 23 13 34 LMP-EVA Did you put my bag in my seat? ...?

06 23 13 39 CDR-EVA Your bag? What bag?

06 23 13 41 LMP-EVA The collection bag off the side.

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06 23 13 42 CDR-EVA Where'd you put it?

06 23 13 43 LMP-EVA Right here in the seat -

06 23 13 44 CDR-EVA No, here it is, right here.

06 23 13 45 LMP-EVA Oh, I see. Okay.

06 23 13 46 CDR-EVA I put it on the handtool carrier - Give it to you and you can consolidate. I guess those undocumented ones we want to put in the BSLSS bag.

06 23 13 56 LMP-EVA Hey, let me deploy your - it didn't come off - let me pull it off.

06 23 14 00 CDR-EVA I didn't get the lanyard. It fell off my head.

06 23 14 04 LMP-EVA Pull off your other side.

06 23 14 05 CDR-EVA Okay.

06 23 14 06 LMP-EVA Okay, it's off.

06 23 14 07 CDR-EVA Good. You get mine?

06 23 14 08 LMP-EVA Yes.

06 23 14 12 CDR-EVA That's good. ...

06 23 14 20 LMP-EVA Good.

06 23 14 50 LMP-EVA You didn't put any rocks in the BSLSS bag.

06 23 14 53 CDR-EVA No, I didn't, because they're on the floor there. I just never had a chance to get it up to put in there.

06 23 14 58 LMP-EVA Dave, rather than waste time out here, I'm just going - -

06 23 15 00 CDR-EVA Yes.

06 23 15 02 LMP-EVA - - to leave these all like they are. I think we can stow them just as well that way.

06 23 15 04 CDR-EVA I think you're right.

06 23 15 07 LMP-EVA We ought to put them all over on the MESA table.

06 23 15 08 CDR-EVA Okay. I've got one little thing to take care of here next on my checklist.

06 23 15 20 LMP-EVA I'll get the penetrometer drum, so don't worry about that.

06 23 15 26 CDR-EVA Okay.

06 23 15 27 CDR-EVA I'm going to take care of that other little item here, which is now due.

06 23 15 30 LMP-EVA Yes. Maybe you ought to lift up the front end of the Rover, so you're clearly visible.

06 23 15 40 CDR-EVA That's a good idea. Let's just swing it around - Let me get this side here. Let's just swing it clockwise for about - why don't you grab the handle over there and let's just swing it clockwise for about 15, 20 degrees.

06 23 15 56 LMP-EVA Here. That enough?

06 23 15 58 CDR-EVA Yes. That's good. Okay, Houston. If you've got your big eye there why we have a -

06 23 16 04 CC Davy, you're going to have to realine our antenna, please.

06 23 16 12 CDR-EVA (Laughter) Yes. Clever you should think of that, Joe.

06 23 16 16 LMP-EVA Figures.

06 23 16 18 CC I had a subtle reminder.

06 23 16 28 CDR-EVA Okay, you should have it, according to my AGC.

06 23 16 37 CC Yes, sir.

06 23 16 38 CDR-EVA Get one, Joe.

06 23 16 40 CC Yes, sir, we have it.

06 23 16 42 CDR-EVA Okay, why don't you follow me - follow me around to the MESA.

06 23 16 48 CC Okay.

06 23 16 49 CDR-EVA And turn on your zoom. Just to show that a good postal service takes care of the mail just about any place in the universe, I have the pleasant task to cancel the - I'll wait till you get around here. You've got a slow TV today. Meantime -

06 23 17 43 CDR-EVA Tell me when you get a good picture, Joe, and I'll show you something.

06 23 17 48 CC Roger, Dave. We're doing the best we can.

06 23 17 54 CDR-EVA Okay.

06 23 17 55 LMP-EVA If you want, Joe, I can help you.

06 23 17 59 CC Okay, Jim. We could use it. Ed's whipping the horses, but it just doesn't work.

06 23 18 06 LMP-EVA Okay. Be right with you.

06 23 18 19 LMP-EVA I'll point your - point the TV right at Dave. How's that?

06 23 18 28 CC Tally-ho.

06 23 18 30 LMP-EVA Hold it right there, Houston.

06 23 18 32 CDR-EVA Okay? Got a good picture, Joe?

06 23 18 39 CC Good picture, Dave. Have at it.

06 23 18 43 CDR-EVA Okay. To show that our good postal service has deliveries any place in the universe, I have the pleasant task of canceling here on the Moon, the first stamp of a new issue dedicated to commemorate United States achievements in space. And I'm sure a lot of people have seen pictures of the stamp. I have the first one here on an envelope, at the bottom it says, "United States in Space, a decade of achievement," and I'm very proud to have the opportunity here to play postman. I pull out a cancellation device. Cancel this stamp. There's August the second, 1971, first day of issue. What could be a better place to cancel this stamp than right here at Hadley Rille.

06 23 19 48 CDR-EVA By golly, it even works in a vacuum.

06 23 20 00 CDR-EVA But not too well. But it's the first time, so I guess they're just learning.

06 23 20 11 LMP-EVA You can put a thumbprint on there, Dave.

06 23 20 14 CDR-EVA Well, there wasn't room left. I've got several dusty thumbprints. Now, I'll stick this back in our special mail pouch here, and we'll deliver it when we return.

06 23 20 32 CC Roger.

06 23 20 40 CDR-EVA I think that's pretty good after only 10 years. Here we are spending 3 days on the Moon. That's moving ahead.

06 23 20 52 CC Dave, this is Houston.

06 23 20 58 CDR-EVA Go ahead.

06 23 20 59 CC Roger. We're wondering if you could use that to mail home an ounce of rocks, please.

06 23 21 06 CDR-EVA Well, all right. I'll do that. I'll bet we could.

06 23 21 14 CDR-EVA And I'll stick this on the ETB. Joe, hold your camera right there. I'll be right back. There's something I think you'll find rather interesting. It'll only take a minute.

06 23 21 29 LMP-EVA I'll put this penetrometer drum in the ETB, Dave.

06 23 21 33 CDR-EVA Okay.

06 23 21 34 LMP-EVA As well as the - Solar Wind.

06 23 21 42 CC Jim, we copied both Solar Wind and penetrometer drum in the ETB.

06 23 21 52 LMP-EVA Not quite yet. I haven't put the Solar Wind in yet but I will, shortly. I want to watch this.

06 23 21 58 CDR-EVA Joe, I hope you have a good picture there. I've got - -

06 23 22 00 CC Beautiful picture, Dave.

06 23 22 04 CDR-EVA Well, in my left hand, I have a feather. In my right hand, a hammer. And I guess one of the reasons we got here today was because of a gentleman named Galileo a long time ago who made a rather significant discovery about falling objects in gravity fields. And we thought that - where would be a better place to confirm his findings than on the Moon? And so we thought we'd try it here for you. And the feather happens to be appropriately, a Falcon feather for our Falcon, and I'll drop the two of them here and hopefully, they'll hit the ground at the same time.

06 23 22 43 CDR-EVA How about that?

06 23 22 46 CC How about -

06 23 22 47 CDR-EVA This proves that Mr. Galileo was correct in his findings.

06 23 22 59 CC Superb.

06 23 23 06 CDR-EVA Okay, let's see. What else do we have here?

06 23 23 07 LMP-EVA Penetrometer drum, 70 millimeters, 500 millimeters, 16 millimeter.

06 23 23 11 CDR-EVA Maps.

06 23 23 16 LMP-EVA I can get the maps, if you want them.

06 23 23 17 CDR-EVA Okay, the Solar Wind is in there now, Joe. Solar Wind, penetrometer drum. ETB.

06 23 23 31 CDR-EVA Nothing like a little science on the Moon, I always say.

06 23 23 36 CC Been saying it for years.

06 23 23 54 CDR-EVA Okay, Jim, we got it all in the ETB? I'll seal it up. If - if Joe's happy. Joe, are you happy with our ETB, now?

06 23 24 05 CC Dave, I'd be happy if you'd police the area there under the seats and on the console.

06 23 24 15 CDR-EVA Yes, I'll do that, Joe, for sure.

06 23 24 18 CC Okay, thank you.

06 23 24 21 CDR-EVA As a matter of fact, I still want to get that BSLSS bag off. We know what we'll need it for.

06 23 24 32 CC And in particular, Dave, we're looking for MAGs Tango and Romeo.

06 23 24 40 CDR-EVA Oh, I'm pretty sure I got them in, Joe. I was reading all that stuff out to you. I hope - got a chance to copy it all.

06 23 24 52 CC Okay. Just check in those seats there and on the consoles and we're happy.

06 23 25 02 CDR-EVA Okay.

06 23 25 28 CDR-EVA Jim had tossed the penetrometer -

06 23 25 32 CC Jim, a word on that core stem. When one of you takes it in - into the LM, you can stow it on the floor against the mid-step, the Z-27 bulkhead.

06 23 25 48 LMP-EVA Okay. Doing a little with the handy tools here.

06 23 25 58 CC Dave.

06 23 25 59 CDR-EVA Let's see, Joe - Under the seatpan is empty.

06 23 26 02 CC Roger.

06 23 26 03 LMP-EVA I'm not reading Joe very well.

06 23 26 08 CC Jim, we're reading you loud and clear. It's okay.

06 23 26 16 LMP-EVA Oh, yes, I had my volume low; that might have something to do with it.

06 23 26 35 CC Dave, this is Houston. When you drive the Rover out to its final parking site, we'd like you to take the dust brush, please; in fact, both dust brushes, please.

06 23 26 46 CDR-EVA All right, Joe. Okay, I have them both right here now. Jim, I'm all ready to go.



06 23 26 58 LMP-EVA Yes, I just released it, Dave, it should come off;  
had to use the tongs.

06 23 27 04 CDR-EVA Resetting the NAV system.

06 23 27 06 LMP-EVA Okay, Dave, I'll get the gate for you and you'll  
be ready to go.

06 23 27 09 CDR-EVA Yes. I got it. Okay, I think we have everything.  
All set, buddy?

06 23 27 16 LMP-EVA Yes.

06 23 27 17 CDR-EVA Okay. Oh, Jim. Oh, ho, ho. How about the  
16-millimeter MAG, Jim?

06 23 27 30 LMP-EVA One that didn't work?

06 23 27 32 CDR-EVA But it looks like it did. It's got a little on it.

06 23 27 36 LMP-EVA Oh, it wasn't driving. I was just checking it out.

06 23 27 39 CDR-EVA I wonder if they want us to bring MAG Golf back.  
We'd better bring it back.

06 23 27 47 CC Jim, you might try that - -

06 23 27 48 LMP-EVA I've got this one large rock in the beast.

06 23 28 00 CDR-EVA Say again, Joe. Try another MAG?

06 23 28 06 LMP-EVA No, it's too late for that.

06 23 28 07 CDR-EVA Yes.

06 23 28 36 CDR-EVA Hey, Jim?

06 23 28 37 LMP-EVA Yes.

06 23 28 38 CDR-EVA Here's MAG Hotel in your camera, and I can't get  
off; you might work on that while I drive\*\*\* ...  
Hey, hey Jim, would you check my lowers - lower  
hooks on my PLSS. Are they hooked?

06 23 28 59 LMP-EVA I'll check. Yes, they're both hooked.

06 23 29 04 CDR-EVA Okay. My OPS on good? Check that.

06 23 29 14 LMP-EVA What made you wonder?

06 23 29 15 CDR-EVA I bounced; the PLSS bounced a little.

06 23 29 21 LMP-EVA Well, it looks like you're secure.

06 23 29 22 CDR-EVA Okay.

06 23 29 23 LMP-EVA Watch the TV cable.

06 23 29 33 CC Dave and Jim, for your information - -

06 23 29 36 CDR-EVA Okay, Joe, I'm getting ready to drive it.

06 23 29 37 CC - - the TV camera's gotten so hot we've turned it off temporarily, here.

06 23 29 44 CDR-EVA Okay.

06 23 29 49 CC Okay, Dave. And your NAV system should be zeroed, and we're looking for a range distance reading, which you know.

06 23 30 01 CDR-EVA Righto! I'm just about getting on it right now.

06 23 30 13 CDR-EVA Stow your antenna, Joe, for a few minutes. Going PML/WB.

06 23 30 27 CC Roger.

06 23 30 48 LMP-EVA Okay, I got that MAG off, Dave.

06 23 30 50 CDR-EVA Good. Put it in the ETB.

06 23 31 14 CDR-EVA Okay. 096.

06 23 31 21 LMP-EVA And you're going to bring the dust brush back with you, then, huh?

06 23 31 24 CDR-EVA Yes. Remind me. I'll wait here for you.

06 23 31 30 LMP-EVA And 096 - -

06 23 31 32 CDR-EVA Okay, we're - Ooooh! We almost ran in the middle of a big crater.

06 23 31 42 CDR-EVA Distance, 1/10th.

06 23 32 13 CC Dave, are you getting off yet?

06 23 32 18 CDR-EVA I'm - I'm driving, Joe. Sorry about that.

06 23 32 20 CC Okay, fine. A couple of requests: when you get there, we'd like for you to report on possible dust condition on the battery mirrors, and we'd also like for you to tap the AMP-HOUR meter just to see if the readings change.

06 23 32 37 CDR-EVA Joe, wait - Joe, stand by. Break, break. Hey, Joe, wait until I get there, will you, please? I've got to concentrate on driving right now.

06 23 32 45 CC Roger.

06 23 32 50 CDR-EVA Just going to have to repeat it again.

06 23 32 53 CC No problem.

06 23 33 26 CDR-EVA Oh my! I blew it, Joe. I left the RESET on. No wonder I couldn't find my way. I was wondering why I wasn't getting anything.

06 23 33 36 LMP-EVA Why don't you drive back fast and reset?

06 23 33 38 CDR-EVA I will.

06 23 33 40 CC Plenty of time, Dave, and I should have called it.

06 23 33 48 CDR-EVA But you know, with the cratering out here, if you're going to see the lift-off, I'm almost tempted just to take a shot up on a rise, here. If I take it right to the exact spot, I'm afraid that you're not going to see it, Joe, because of the depressions and the hummocky, and everything. What do you think about that?

06 23 34 08 CC Sounds good.

06 23 34 12 CDR-EVA I think I'll just stay out here and put you at about 300 feet, which we are. There's a nice little rise here. And I'll point you - you want to be heading 255. Yes, that's all messed up, too. Just slightly, okay. South and west, I got a good spot for you, Joe. Joe, what's my relative azimuth at the Sun right now, with west.

06 23 35 05 CC 30 degrees, Dave.

06 23 35 10 CDR-EVA 30 degrees, okay. I can give you a nice spot here.

06 23 35 18 CC Okay, it's about, between 30 and 40 degrees.

06 23 35 24 CDR-EVA Okay, I think I've got a good place for you. Right up on a rise. We're about 300 feet away. I think you'll like this.

06 23 35 44 CDR-EVA Okay. Switches are off. Brakes on. Now tell me what else you wanted to do, Joe, that was different, besides dust.

06 23 35 58 CC Okay, Dave. Tap the AMP-HOUR meters just to see if the readings change.

06 23 36 06 CDR-EVA Okay, wait a minute. I'll dust off the LCRU.

06 23 36 30 CDR-EVA Camera's dusted and the LCRU's dusted. Tap the AMP-HOURS. And the AMP-HOURS read 83 and 90.

06 23 36 51 CC Okay, Dave, and the rest of the readings please.

06 23 36 58 CDR-EVA Oh, okay. 00 on the amps, of course; the battery temps, 112 and 119; and motor temps are still off scale low.

06 23 37 21 CC Okay, Dave. Set up your circuit breaker configuration and open the BAT covers, please.

06 23 37 32 CDR-EVA All righty. It worked. Everything is going to be open except BUS A and BUS C and the AUX circuit breaker. The AUX is now CLOSED. BUS B is OPEN, BUS D is OPEN. Open the others.

06 23 38 10 CDR-EVA AMP-HOURS, OPEN. Okay, Joe, all circuit breakers are now open with the exception of AUX, BUS A, and BUS C.

06 23 38 33 CC Roger, Dave, and POWER EXTERNAL, TV REMOTE.

06 23 38 42 CDR-EVA Okay, stand by. Let me - I'm in the middle of getting your covers, here. Just a second.

06 23 38 47 CC Okay. And comment on the dust on the battery mirrors. Do not brush them, though.

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06 23 38 54 CDR-EVA Oh, okay. Well, there's a little dust on the central mirror. But the other two seem to be fairly clean. I just happen to have a camera, which I'll take a picture for you.

06 23 39 14 CC Okay.

06 23 39 15 CDR-EVA So you'll know what everything looks like.

06 23 39 16 CC Why not?

06 23 39 31 CDR-EVA Okay, I'm going to POWER - there's so much dust on here. The down position is REMOTE, right, Joe? I mean external AUX.

06 23 39 49 CC That's affirmative.

06 23 39 53 LMP-EVA Use that dust brush, Dave, to dust it off?

06 23 39 56 CDR-EVA It's in a shadow and I can't see.

06 23 39 59 LMP-EVA Oh.

06 23 40 00 CC No problem, Dave. The down position.

06 23 40 11 CC And, Dave. We'd like for you to aline the high gain per the checklist procedures, but we're standing by for your readings on how possible you think that is, because of the dim intensity of the Earth.

06 23 40 52 CC Dave, do you read Houston?

06 23 41 01 CC Hadley Base, do you read Houston?

06 23 41 11 CC Hadley Base, do you read Houston?

06 23 41 16 CDR-EVA Yes. Now, 5 by, Joe.

06 23 41 18 CC Okay. And I guess we're standing by for your high gain alinement per the checklist.

06 23 41 30 CDR-EVA Okay, stand by.

06 23 41 51 CC Jim, how are you doing.

06 23 41 56 LMP-EVA Oh, fine, Joe. Transferred a few bags up to the porch.

06 23 42 02 CC Sounds good.

06 23 42 11 LMP-EVA We have about three more to transfer up.

06 23 42 15 CC Super.

06 23 42 41 CC And, Dave, you might want to check TV REMOTE.

06 23 42 50 CDR-EVA Okay, Joe. Just a second.

06 23 43 30 CC Dave, give me a call on your present activity.

06 23 43 36 CDR-EVA Oh, just cleaning up the back of the Rover, here, a little, Joe.

06 23 43 40 CC Okay.

06 23 43 45 CC And, Dave, we do not have our TV yet. You might want to check TV REMOTE.

06 23 43 54 CDR-EVA Okay, Joe.

06 23 44 26 LMP-EVA It's sure hard to see the Earth.

06 23 44 38 CDR-EVA Cycled it. You were in TV REMOTE.

06 23 44 42 CC Okay, you might want to - -

06 23 44 44 CDR-EVA We're back again.

06 23 44 45 CC You might want to verify the AUX circuit breaker in.

06 23 44 59 CDR-EVA That's verified, Joe. The AUX circuit breaker is in.

06 23 45 02 CC Thank you.

06 23 45 04 CDR-EVA But you probably aren't getting it because - We haven't found the Earth yet. Looking into the Sun, it's just tough in trying to aline this thing.

06 23 45 20 LMP-EVA You want me to go out there and see if I can assist in any way, Dave?

06 23 45 23 CDR-EVA No. I'm going to try it from the other side, now.

06 23 45 30 CC Dave, maybe the best idea is just to use the AGC technique.

06 23 45 37 CDR-EVA Yes, I will.

06 23 45 40 CC That's plenty good enough.

06 23 45 45 CDR-EVA Okay. Hang right there, Jim, for a minute.

06 23 45 55 LMP-EVA Okay. And you can use that background sound, too.

06 23 46 03 CDR-EVA Yes.

06 23 46 04 LMP-EVA When you've locked on.

06 23 46 05 CDR-EVA Oh, Earth! Where are you? Can't get my visor. There, I think I might be able to find him.

06 23 46 22 CDR-EVA How are we doing, Joe?

06 23 46 25 CC Ha, ha.

06 23 46 34 LMP-EVA Why don't I come out and watch the EGC meter.

06 23 46 37 CDR-EVA No, I got it.

06 23 46 38 LMP-EVA Good.

06 23 46 42 CDR-EVA Okay, Joe, you should be alined.

06 23 46 45 CC Okay, Dave, thank you.

06 23 46 50 CDR-EVA I'll wait till you give me a go because - Make sure you've got what you need.

06 23 47 06 CC Dave, cycle the switch INTERNAL and EXTERNAL once for us, please.

06 23 47 14 CDR-EVA All right.

06 23 47 24 CDR-EVA INTERNAL. EXTERNAL.

06 23 47 37 CC And we got it.

06 23 47 41 CDR-EVA Good show.

06 23 47 43 CC Thank you D.R.

06 23 47 52 CDR-EVA And, Joe, let me verify that the position of the Earth and the grid is the important thing and not the angle at which the grid intersects the local vertical. Is that correct?

06 23 48 07 CC Dave, that's more or less correct. I think we're satisfied with the alinement here. We just need some help on tilting our camera up to the level.

06 23 48 19 CDR-EVA Okay, just a second.

06 23 48 32 CC Dave, we need some help bumping our camera up, please.

06 23 48 40 CDR-EVA Okay, Joe. Work, camera!

06 23 48 48 CC Okay, thank you. And I guess our only other request - -

06 23 48 51 CDR-EVA Come on camera.

06 23 48 52 CC - - is to take the dust brush with you back to the LM.

06 23 48 54 CC However, we may have also - -

06 23 48 59 CDR-EVA I can get one last pan here.

06 23 49 00 CC Roger. And we may have overshoot on the camera. We might - might have to have some help getting it back towards the horizontal.

06 23 49 12 CDR-EVA (Laughter) Okay. One last comment on the mountain that's south of Hadley. I can see some large outcrops on the upper slopes - on the upper 10 percent. And they really stand out and there's a talus downflow. As a matter of fact, it almost looks like we have some layering on the upper slopes - the upper 10 percent, apparently - -

06 23 49 38 CC Okay, Dave, we copy that. We need the camera fixed.

06 23 49 44 CDR-EVA Yes sir. Going right there.

06 23 49 47 CC Roger, and we're interested in - -

06 23 49 49 CDR-EVA ... 05 degrees.



06 23 49 50 CC Roger. We're interested in moving on back towards the LM. Carry the dust brush with you.

06 23 49 59 CDR-EVA Okay. How - How's the camera? Is it okay?

06 23 50 20 CDR-EVA Back to LM.

06 23 50 22 CC Okay.

06 23 50 24 CDR-EVA The camera all right now? That last time you called, the tilt-up was only up about 10 degrees.

06 23 50 32 CC Roger, Dave. I think Ed must have lost control.

06 23 50 38 CDR-EVA Well, Ed's been doing pretty good.

06 23 50 41 CC You're right. He has.

06 23 50 42 CDR-EVA He has a pretty high batting average.

06 23 50 46 CC He surely does.

06 23 51 07 CC Dave and Jim, we're ready for you to move the baggage up into Falcon and climb in.

06 23 51 17 CDR-EVA Okay.

06 23 51 18 LMP-EVA Okay.

06 23 51 20 CC As the space poet Rhesling [fictitious poet in Robert Heinlin's "The Green Fields of Earth"] would say, we're ready for you to come back again to the homes of men on the cool green hills of Earth.

06 23 51 31 CDR-EVA Thank you, Joe. We're ready, too, but it's been great. Fabulous place up here.

06 23 52 06 LMP-EVA Dave, I'm going to start getting in.

06 23 52 07 CDR-EVA Good.

06 23 52 08 CC Roger.

06 23 52 09 CDR-EVA Let me brush off maybe a little, partner. I'm almost through.

06 23 52 29 CDR-EVA Good time?

06 23 52 30 LMP-EVA Yes. ...  
06 23 52 40 CDR-EVA Brush you off.  
06 23 52 50 CDR-EVA ... really cling to that stuff. Getting it  
off your -

SEPARATE, SIMULTANEOUS COMMUNICATION LINK IN USE BETWEEN CC AND CM

06 22 44 -- BEGIN LUNAR REV 46  
06 23 13 59 CC Endeavour, this is Houston. How do you read?  
06 23 14 36 CC Endeavour, this is Houston. How do you read?  
06 23 15 19 CC Endeavour, this is Houston. How do you read?  
06 23 15 28 CMP Hello, Houston; Endeavour. Loud and clear.  
06 23 15 31 CC Roger. Hear you likewise, loud and clear.  
06 23 16 51 CC Endeavour, we'd like HIGH GAIN, AUTO.  
06 23 17 00 CMP Okay. It's in AUTO.  
06 23 18 02 CC Endeavour, we need WIDE BEAM for 5 seconds and  
then NARROW.  
06 23 21 06 CC Endeavour, would you confirm that X-RAY is ON,  
please.  
06 23 21 23 CMP Endeavour, negative. It's - it's off right now,  
Karl.  
06 23 21 28 CC Roger. We'd like to have it on, please.  
06 23 21 40 CMP Roger. Going ON. And sorry about that, Karl. I  
switched it one position thinking I had it in ON,  
but it was really OFF.  
06 23 21 50 CC Righto.  
06 23 22 15 CC Al, another bulletin from Hadley Rille. The crew  
is back at the LM and starting their closeout. Just  
a few minutes ago, I saw them perform the philatelic  
wonder of the century.

06 23 22 34 CMP So, it's all out now, huh?

06 23 22 36 CC Roger.

06 23 23 23 CC And, Al, you'll be fascinated to know that Galileo's theory of gravitation has been confirmed. Dave just dropped a hammer and a feather, and they hit the ground simultaneously.

06 23 23 38 CMP Did you ask him what kind of a feather it was?

06 23 23 42 CC A falcon feather; yes, indeed.

06 23 23 46 CMP How about that.

06 23 24 55 CC Al, we're up to the time to turn PAN CAMERA MODE, STANDBY and POWER, ON.

06 23 25 03 CMP Okay, Karl.

06 23 25 19 CC Hey, we got a few special words also on water dumps - I guess you got one coming up in about 3 hours. They're anxious, in the future, that we don't run the waste water below 10 percent, because of possible malfunctions of the waste inlet valve, causing the suit exchanger to have oxygen breakthrough. So they'd appreciate your keeping a close eye on the - on waste dumps and - waste tank water quantity.

06 23 25 53 CMP Okay, Karl. Will do.

06 23 28 48 CC Endeavour, PAN CAMERA POWER, OFF, now, please.

06 23 28 55 CMP POWER is coming OFF.

06 23 29 57 CC Al, while you're eating up there, we've got the morning news. Are you in a situation to listen?

06 23 30 07 CMP Okay; yes, Karl. Glad to hear it.

06 23 30 10 CC Okay. It looks like we've avoided a steel strike down here. The steel workers and management agreed to a one-dollar per hour day increase last night, boosting the straight time rate to \$4.45 per hour. Maybe we should take up that trade, huh?

06 23 30 29 CMP Sure sounds like it.

06 23 30 31 CC The mercury dipped to 68 degrees yesterday, a record low for the 1st of August in Houston; we've had some real pleasant weather here. Too bad that either you or I haven't been - had a chance to get outside to enjoy it, huh?

06 23 30 48 CMP Yes, wait until next week, and we'll take a vacation.

06 23 30 51 CC You said it. Representative Edith Green, Democrat of Oregon, said, "students and parents have been misled into thinking that a college degree is the only road to success." She advocated more vocational and technical training. On the sport scene, Arnold Palmer and Jack Nicklaus combined their talents to score an easy six-stroke victory in the National PGA Championship at Ligonier, Pa. They were 27 under par into 72 holes. The Astros smothered Montreal 8 to 1, but are still in the second division, 11 and a half games behind San Francisco. And here is a flash hot off the wire. It's only - it's only 200 years old, but very apropos of the leak that you sprang a couple of nights ago and also the big leak in the LM a couple of days ago. And the - the dispatch is as follows: The Endeavour, the original Endeavour, sprang a leak off the Great Barrier Reef at 11:00 p.m. on 11 June - on 11 June 1770. It was necessary for them to dump 40 tons of consumables to prevent sinking; then they sailed on with 40 feet of water in the hold. And this information comes to you courtesy of Honeysuckle Tracking Station in Australia.

06 23 32 24 CMP Hey, that's very nice of Honeysuckle to tell us that. And I guess you ought to know that when we sprang a leak the other night, we didn't notice that any water had escaped. But when I made the plane-change burn today, I found it, and it was sitting right in the middle of the after - of the heat shield.

06 23 32 43 CC (Laughter) Very good. How much water was there? Can you estimate that?

06 23 32 49 CMP Had a great big puddle of water.

06 23 32 51 CC A pint?

06 23 32 53 CMP Oh, I'd estimate maybe a pint. Yes.

06 23 32 56 CC Okeydoke.

06 23 35 30 CC Al, here's a little more of an update on the operation of the SIM bay experiments. The gamma-ray, X-ray, and alpha-particle spectrometers are continuing to collect good scientific data. I already told you about the - the X-ray data showing regional differences very clearly. I went downstairs and and looked at it myself, and it really is almost on a kilometer-by-kilometer basis you can see, when you go from a highland in - into a mare. Very interesting. The laser altimeter, as I already told you, has shown a lot of interesting things about the altitudes on the Moon. But - I'm not sure whether you know it or not - but it's essentially belly up at the present time. We don't have much hope for it in the future. But the data that we did get out of it was very interesting and very good. And I guess that's about all I can say at the moment.

06 23 36 36 CMP Roger, Karl. Thank you. That all sounds very interesting.

06 23 36 43 CC I'm not sure I told you previously - -

06 23 36 45 CMP And, Karl, you say - that the laser altimeter is just about gone now, huh?

06 23 36 55 CC Yes. I think most people have admitted that it's not - it's giving us useless data. It has given us useless data on the last couple of attempts to use it, and we have very little hope for it now.

06 23 37 19 CC Indicentally, the pan camera is deteriorat - deteriorating to some extend. That V over H problem is getting - getting worse, not - it's - it's not completely bad yet, but we're getting a lower percentage of good frames, maybe 60 or 70 percent now.

06 23 37 51 CC And in connection with this de - deterioration of the pan camera, there is some feeling that as time

goes by it's getting poorer and poorer and that maybe we should occasionally pulse it on the self - test cycle to take just a - five frames on - on interesting regions as we go along in order to get the film used up before it really deteriorates to a greater degree. I guess we're asking for your opinion on that. Do you have any feeling about that?

06 23 38 24 CMP

No, but it sounds like a good idea. It seems to me like, good or bad, it'd be a shame to leave some unused film in the camera.

06 23 38 33 CC

Roger. Well, we'll hang loose on that, and I think - I think really we ought to get a better evaluation down here as to how we - how to really use up that remaining film. People are thinking about it now.

06 23 38 45 CMP

Right. I agree.

06 23 39 59 CC

Al, when I talked about pulsing the self-test there, I - I didn't completely have the picture clear in my own mind. If the V over H sensor is giving us problems, this is one way to get around it, because, if we take our five frames in self-test, we're essentially cutting the V over H sensor out of the circuit and taking a - a nominal image motion compensation there, which would be better for us. So it's possible that, when we wind up using that film, that we'll have somebody sitting down in the lower equipment bay — probably after you're all three together again — pulsing that switch every 30 seconds.

06 23 40 41 CMP

Roger, Karl; understand. It sounds fine.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

06 23 53 08 CDR-EVA Get it - off your - okay; when you're ready, you can dust me off.

06 23 53 39 CC Jim, while you're dusting there, how many suitcases have you carried up?

06 23 53 41 LMP-EVA What's this? Oh, I only have - two up there. There are two more down here plus the ETB - -

06 23 53 53 CC Okay, and - -

06 23 53 54 LMP-EVA - - and the core stem up there on the porch. - -

06 23 53 56 CC Okay; good.

06 23 53 57 LMP-EVA ... porch.

06 23 53 58 CC Good. And that core stem will go inside and lie on the floor against the midstep.

06 23 54 07 LMP-EVA Okay; we understand.

06 23 54 13 CDR-EVA Man, I'm glad we got that core!

06 23 54 15 LMP-EVA (Laughter) Davy's core! I'll tell you. Okay, Dave, I think you - I figure we're going to get you.

06 23 54 26 CDR-EVA Okay.

06 23 54 27 LMP-EVA Let's take that along and - Oh, here's another MAG. Stick this in your pocket. That's a broken one. I'll put it in for you.

06 23 54 39 CDR-EVA Okay.

06 23 54 41 LMP-EVA That do it?

06 23 54 43 CDR-EVA Yes. These two over here.

06 23 54 47 LMP-EVA Want to use the LEC?

06 23 54 49 CDR-EVA I think - oh, I think it'll be okay, Jim. Yes.

06 23 55 34 LMP-EVA Okay, I'm getting in, Dave.

06 23 55 36 CDR-EVA Yes.

06 23 56 00 CDR-EVA I think with a little practice, Jim, I could jump all the way to the porch.

06 23 56 12 LMP-LM Okay; I'm in.

06 23 56 14 CDR-EVA Okay.

06 23 56 15 LMP-LM And if you will - come up; if you can hand me that tool, it'll help.

06 23 56 20 CDR-EVA Oh, yes, I will. ... ETB; let me get you the tool.

06 23 56 37 LMP-LM Okay, I have it.

06 23 56 40 CDR-EVA Okay. Go back down and get the others.

06 23 57 40 LMP-LM Right over on your right there, partner.

06 23 57 41 CDR-EVA Got it.

06 23 58 46 CC How you doing, Dave?

06 23 58 50 CDR-EVA Getting the last one right now, Joe.

06 23 58 53 CC Oh, boy.

06 23 59 31 CDR-EVA Okay.

06 23 59 45 LMP-LM Dave, just a reminder on the - stems there.

06 23 59 51 CDR-EVA Yes. Let me get you this bag.

06 23 59 54 LMP-LM Yes. There.

06 23 59 58 CDR-EVA Got it?

06 23 59 59 LMP-LM Got it.

07 00 00 00 CDR-EVA Good. Those are good little holders, there.

07 00 00 02 LMP-LM Yes. Last thing will be the stems.

07 00 00 07 CDR-EVA Yes.



07 00 00 15 LMP-LM Go, partner!

07 00 00 16 CDR-EVA Get them?

07 00 00 18 LMP-LM Yes, I got them.

07 00 00 19 CDR-EVA Okay. Watch it. The caps are on not very tight;  
so be careful.

07 00 00 23 LMP-LM Lie it on the floor, here.

07 00 00 25 CDR-EVA Why don't you put it back up in the - That's all  
right.

07 00 00 27 LMP-LM Well, I'm afraid it'll get bumped there, Dave.

07 00 00 29 CDR-EVA Yes.

07 00 00 30 LMP-LM I guess we'll just have to be careful and not  
step on the thing.

07 00 00 34 CDR-EVA Okay.

07 00 00 35 LMP-LM Elt [?]

07 00 00 37 CDR-EVA Okay; coming in.

07 00 00 38 LMP-LM Okay, let me - Hold on, Dave, let me - -

07 00 00 40 CDR-EVA Oh, yes. Move out of the way.

07 00 00 41 LMP-LM Move the LEC out to you.

07 00 00 43 CDR-EVA Okay.

07 00 00 45 LMP-LM I'll get behind my - to the hatch.

07 00 00 49 CDR-EVA Okay.

07 00 01 10 CDR-EVA Okay; LEC's over that side.

07 00 01 17 CC Jim, this is Houston.

07 00 01 20 LMP-LM Okay, I'll move. Go ahead, Joe.

07 00 01 23 CC Roger, Jim - -

07 00 01 25 LMP-LM Okay, Dave. I think you can get in now.

07 00 01 26 CC - - We're hoping you've got four sample - four collection bags and an ETB - -

07 00 01 32 LMP-LM In the middle.

07 00 01 33 CC - - in the cabin with you now.

07 00 01 36 LMP-LM Yes, we do.

07 00 01 39 CC Right on.

07 00 01 40 LMP-LM We've even got the core stems.

07 00 01 42 CC Okay, and - -

07 00 01 43 LMP-LM Hold it there, Dave. I'll get your antenna.

07 00 01 45 CDR-EVA Okay.

07 00 01 49 CC And, Dave and Jim, I've noticed a very slight smile on the face of the professor. I think you very well may have passed your final exam.

07 00 02 02 CDR-EVA (Laughter) Okay.

07 00 02 07 LMP-LM Okay, let's go, Dave.

07 00 02 08 CDR-EVA Okay. Coming through.

07 00 02 12 LMP-LM A little more to your left, if you can.

07 00 02 14 CDR-EVA Okay.

07 00 02 15 LMP-LM Straight ahead. More to your left? Okay.

07 00 02 21 CDR-EVA Okay.

07 00 02 24 LMP-LM Okay. Got it?

07 00 02 27 CDR-LM Yes.

07 00 02 28 LMP-LM You're hung up a little on me. If you can shift to your right -

07 00 02 30 CDR/LMP Okay.  
-LM

07 00 02 33 CDR-LM Okay. Just don't let me get that cover. Okay.  
Say, why don't we close the door?

07 00 02 46 LMP-LM Yes.

07 00 02 55 LMP-LM PRIM water, closed.

07 00 02 58 CDR-LM Okay.

07 00 03 04 LMP-LM Now let me get yours.

07 00 03 07 CDR-LM I can -

07 00 03 11 LMP-LM Trouble? Maybe I'll struggle too.

07 00 03 13 CDR-LM I got it.

07 00 03 14 LMP-LM Now I'll get you to get mine, then.

07 00 03 16 CDR-LM Yes.

07 00 03 18 LMP-LM Sit there.

07 00 03 19 CDR-LM If you can turn around - Okay, back into your corner.  
Let me get back into my corner. There. Now I think you can turn around.  
Get any further left? Oh, wait. Just let me try it.

07 00 03 48 CDR-LM Tell you what. (Laughter)

07 00 03 49 LMP-LM Just say your problem.

07 00 03 53 CDR-LM I - I don't. Your - Thinking maybe I could shift your PLSS some.  
Yes. There, I shifted your PLSS. Now you try it. Pull your shoulder back.  
Get it? That was off.

07 00 04 14 LMP-LM Yes, I know. I can't get down that low. Get down that low.  
Go ahead and repress with it open.

07 00 04 19 CDR-LM Let me try it.

07 00 04 33 CDR-LM Cooling. Oxygen. PLSS water, right there. Okay, I got you.  
Okay. Now.

07 00 04 42 CC Troops, we need that - -

07 00 04 43 CDR-LM Come on now.

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07 00 04 44 CC - - water off.

07 00 04 45 CDR-LM Okay. We're fixed.

07 00 04 47 LMP-LM Yes, Joe; it's off.

07 00 04 49 CDR-LM Get back in your corner if you can. Look. You got to - have to turn right so you can get the dump valve.

07 00 04 57 LMP-LM I've already got it. In AUTO.

07 00 04 59 CDR-LM Really?

07 00 05 00 LMP-LM Yes.

07 00 05 01 CDR-LM Okay, just move back so I can get the door, now.

07 00 05 07 LMP-LM Go farther? Go back in my little corner?

07 00 05 10 CDR-LM Yes.

07 00 05 11 LMP-LM Yes.

07 00 05 13 CDR-LM That a boy. Okay. Now we're cooking.

07 00 05 34 CDR-LM Man!

07 00 05 45 CDR-LM Closed and locked, babe.

07 00 05 46 LMP-LM Okay. Okay, dump valves both to AUTO.

07 00 05 54 CDR-LM They are.

07 00 05 55 LMP-LM Okay; CABIN REPRESS to AUTO.

07 00 06 00 CDR-LM Stand by.

07 00 06 02 CC Jim, we're having trouble verifying your water off.

07 00 06 11 LMP-LM Well, we'll check it here on the repress.

07 00 06 16 CC Jim - -

07 00 06 17 LMP-LM Okay, Dave. ... - -

07 00 06 18 CC - - we'd like for you to check it now. You're going dump water in the cabin if you miss it.

07 00 06 24 CDR-LM Okay; get in your corner, Jim; I'll get you from the rear. Turn around and get in your corner. Go back to your little corner. Oh, my.

07 00 06 50 CDR-LM If I could just feel something.

07 00 06 51 LMP-LM You must have got it, Dave. I just got a tone.

07 00 06 54 CDR-LM Did you? Okay, Joe. Now can you confirm it?

07 00 06 59 CC Looks good.

07 00 07 01 LMP-LM Yes, I've got an A flag. You got it.

07 00 07 04 CDR-LM Well, it was off. Okay. CB(16) ECS: CABIN REPRESS, close.

07 00 07 12 LMP-LM Closed. Okay, up she comes. ...

07 00 07 28 CDR-LM There's 1. 1.5. 2. 2.5.

07 00 08 09 CDR-LM 3.5.

07 00 08 20 CDR-LM Four.

07 00 08 29 CDR-LM Okay; PRESS REG A and B to CABIN.

07 00 08 32 LMP-LM Okay.

07 00 08 33 CDR-LM ...

07 00 08 39 CC Dave and Jim, this is Houston.

07 00 08 40 LMP-LM Okay; A and B are in CABIN.

07 00 08 43 CDR-LM Okay; PLSS O<sub>2</sub> going off.

07 00 08 47 LMP-LM Joe's trying to call us.

07 00 08 48 CDR-LM Yes, I know it.

07 00 08 50 CC Troops - -

07 00 08 51 CDR-LM Go ahead, Houston.

07 00 08 52 CC Roger, Dave and Jim. Ed's coming on the line down here. Just wanted to say I enjoyed it.

07 00 08 59 CDR-LM Oh. Well, thank you, Joe. You did a superfine job. Appreciate you keeping such good track of us.

07 00 09 05 CC Wouldn't have missed it for anything.

07 00 09 06 LMP-LM Thank you, Joe.

07 00 09 12 F Hadley Base, this is Flight Crew. The whole Mission Control team wants to take their hats off to you for a fine job. It was a lot of fun.

07 00 09 22 CDR-LM Well, thank you, Gerry. We'd like to take our hats off to the whole team. By golly, you guys are really sharp down there, and we sure appreciate it. Because you know as well as we do we sure couldn't do it without you.

07 00 09 40 CDR-LM Okay, let's see. CABIN warning light's off. Cabin pressure's stable at about 4.5. Is purge valve to depress? We're depressed. I am. Aren't you?

07 00 09 51 LMP-LM Yes.

07 00 09 52 CDR-LM Verify EVA circuit breaker configuration. If you can move forward, I can get in there and verify it - mine.

07 00 09 58 LMP-LM Stand by.

07 00 09 59 CDR-LM Are you trying to get your O<sub>2</sub> off?

07 00 10 00 LMP-LM Yes. Okay; it's off.

07 00 10 04 CDR-LM Good. Okay.

07 00 10 18 LMP-LM Okay; my circuit breaker's are okay except -

07 00 10 22 CDR-LM FAN 2 through FAN DELTA-P, which we'll pick up.

07 00 10 25 LMP-LM Yes.

07 00 10 26 CDR-LM Check mine here. Okay. Mine are okay. Let's see. CB(16) ECS: SUIT FAN 2, close.

07 00 10 39 LMP-LM Okay, closed.

07 00 10 41 CDR-LM SUIT FAN DELTA-P, closed.

07 00 10 42 LMP-LM Closed.

07 00 10 43 CDR-LM Okay; doff the gloves and stow on the comm panel.

07 00 10 47 LMP-LM Wait. I didn't depress. I'm going to have to use the purge valve.

07 00 10 50 CDR-LM Oh, you didn't, huh? Oh. Okay. Can you get it, okay?

07 00 10 56 LMP-LM Yes. Stand by.

07 00 11 14 LMP-LM No, I can't, Dave. I'll have to turn around.

07 00 11 16 CDR-LM Okay. Let me get out of your way. Okay, come on around.

07 00 11 23 LMP-LM It's coming down, but very slowly.

07 00 11 25 CDR-LM Okay; come on around.

07 00 11 36 CDR-LM Okay; put you in HIGH flow, here.

07 00 11 39 LMP-LM There you go. Okay.

07 00 11 43 CDR-LM Okay; let's take off your gloves. When you get down.

07 00 12 40 LMP-LM I'll verify the safety, here.

07 00 12 42 CDR-LM AUTO. Safeties on the dump valve. Next thing is to remove purge valves, anyway. DESCENT WATER valve, OPEN, when you get to it, Jim.

07 00 12 56 LMP-LM Okay; in just a moment. Back up a little bit. Okay, DESCENT WATER is coming OPEN.

07 00 13 07 CDR-LM Okay.

07 00 13 25 LMP-LM What's next?

07 00 13 26 CDR-LM Okay; pull the purge valve out. You did it. Disconnect OPS O<sub>2</sub> hose.

07 00 13 33 LMP-LM In work.

07 00 13 53 LMP-LM Okay; mine's out.

07 00 13 57 CDR-LM Okay; and the next thing is connect the LM O<sub>2</sub> hoses.

07 00 14 00 LMP-LM Red to red and blue to blue.

07 00 14 03 CDR-LM Red to red and blue to blue. Yes, we've got to do a dump.

07 00 14 06 LMP-LM Yes.

07 00 14 48 CDR-LM We better make sure we got them under the OPS - PLSS. Okay. Okay; I go to SUIT FLOW. Get that. Ahh! Phew!

07 00 15 25 LMP-LM Doesn't look like my prime water is off.

07 00 15 28 CDR-LM Say again?

07 00 15 29 LMP-LM Doesn't feel like the prime water is off.

07 00 15 30 CDR-LM I - I've got bare hands, now. Let me get back here. They've been off.

07 00 15 36 LMP-LM Getting water in the suit.

07 00 15 37 CDR-LM I know it. There, it's off. It - it - it was off, and you must have bumped it, maybe.

07 00 15 50 CDR-LM It was off, but you are getting water, all right.

07 00 15 53 LMP-LM I feel it running down my legs.

07 00 15 54 CDR-LM Yes, I can't understand that. It was off. I mean it wasn't off then, but I turned it - I remember turning it off, and it went off.

07 00 16 03 LMP-LM Yes, it's probably catching up on something, Dave, just like it did yesterday.

07 00 16 06 CDR-LM Yes.

07 00 16 07 LMP-LM I turned around. Okay. My O<sub>2</sub> hose is disconnected, and going to SUIT FLOW.

07 00 16 11 CDR-LM Okay. Then SUIT ISOLATION, SUIT FLOW; PLSS PUMP, OFF.



07 00 16 15 LMP-LM PLSS PUMP, OFF.  
07 00 16 16 CDR-LM FAN, OFF.  
07 00 16 19 LMP-LM FAN, OFF.  
07 00 16 20 CDR-LM Okay. Disconnect PLSS water from PGA and connect LM water to PGA.  
07 00 16 26 LMP-LM In work.  
07 00 17 01 CDR-LM Okay; water's connected.  
07 00 17 04 LMP-LM How about a little LCG pump action?  
07 00 17 06 CDR-LM Yes, sir.  
07 00 17 07 LMP-LM It called for?  
07 00 17 08 CDR-LM Not yet. Let's press on down here.  
07 00 17 12 LMP-LM Okay.  
07 00 17 13 CDR-LM You - your flow ought to cool you there; it's cooling me pretty good.  
07 00 17 15 LMP-LM Yes.  
07 00 17 16 CDR-LM Okay. PLSS MODE, both to O. AUDIO circuit breaker, open, and connect to LM comm.  
07 00 17 20 LMP-LM Okay.  
07 00 17 44 CDR-LM Okay; you back on?  
07 00 17 52 CDR-LM Back on, Jim?  
07 00 18 05 CDR-LM Back on, Jim?  
07 00 18 41 LMP-LM Okay.  
07 00 18 42 CDR-LM Yes, that's better. Okay, AUDIO panels for both of us, VHF A to RECEIVE - and B to -  
07 00 18 56 LMP-LM Back over here.  
07 00 18 57 CDR-LM B to OFF. MODE, ICS/PTT, and RELAY, OFF.  
07 00 21 48 CC Hadley Base, Houston. Do you read?

07 00 21 55 CDR-LM Roger, Houston; Hadley Base. Go.

07 00 21 57 CC Okay; could we have the POWER AMP on, please?

07 00 22 07 CDR-LM POWER AMP coming on.

07 00 41 51 LMP-LM Houston, this is Hadley Base with a weight report for the day.

07 00 41 56 CC Okay, Hadley Base. We're ready to copy.

07 00 42 02 LMP-LM Okay, Ed, the BSLSS bag was 2 5, 25; bag number 7 was 24; and bag number 2 was 23 for a total of 72.

07 00 42 17 CC Okay, we copy. Do you have a bag 8 number?

07 00 42 25 CDR-LM We do, but we don't - we're not - we don't have any rocks in it.

07 00 42 28 CC Okay; you have no weight to that. Roger. And, Jim, the - -

07 00 42 30 CDR-LM But we shuffled the contents of - -

07 00 42 32 CC The only thing we need to advise you before you go on here is to tape the caps on your long core stem, both ends of it, before you depress.

07 00 42 48 LMP-LM Okay; we understand.

07 00 42 50 CDR-LM And, Ed, we shuffled - we took the contents out of bag 8 and consolidated into bag 7.

07 00 42 57 CC Okay. Bag 8 went into bag 7. Thank you. And be advised: we're going to delete your P22 to give you a little more time; we're a little bit pressed on lift-off time, now.

07 00 43 12 CDR-LM Okay.

07 00 58 39 CC Hadley Base, Houston. Observe you doing your pressure integrity check. We'd like your cuff gage read-out, please.

07 00 58 52 CDR-LM Okay. 3.7 to 3.6 in a minute.

07 00 58 56 CC Very good, thank you.

07 00 59 01 CDR-LM Roger.

07 01 00 21 CDR-LM Okay, Houston. Hadley Base standing by for a GO for depress.

07 01 00 27 CC Okay, Hadley Base; you're GO for depress.

07 01 00 33 CDR-LM Okay. Thank you.

07 01 12 13 CDR-LM Houston, we're into the launch prep now.

07 01 12 17 CC Okay; very good. And I have a couple of items on the stowage of this long core tube, when you'd like to talk about it.

07 01 12 31 CDR-LM Go ahead, Ed.

07 01 12 33 CC Okay. First of all, we'd like to wrap it in the in - interim stowage shelf from your ISA, and tape - tape that around it. And then we'd like to take two 24-inch pieces of your tiedown webbing, which is in your right-hand stowage compartment, and put that through the BSLSS sample bag floor fittings; two of them per fitting.

07 01 13 08 LMP-LM Okay. Understand.

07 01 13 09 CC And then just lay your core stem down on - in that along the plus-Z 27 bulkhead. Tie it down securely and then strap the BSLSS in place over it.

07 01 13 23 LMP-LM Okay.

07 01 14 17 CC And, Falcon; Houston. When you get ready to store all these bags, we have a few words for you.

07 01 14 25 CDR-LM Okay. We'll give you a call.

07 01 14 47 LMP-LM And, Houston, are you ready for the - battery reconfiguration?

07 01 14 55 CC Okay; let's have it.

07 01 15 00 LMP-LM Okay.

07 01 15 53 CC Okay, Falcon. We observe the batteries coming on, and I have lift-off time when you're ready.

07 01 16 02 LMP-LM Stand by.

07 01 16 14 LMP-LM Okay, Ed. I'm ready to copy the LM ascent pad.

07 01 16 17 CC Okay; I don't have an ascent pad for you, but I have the lift-off time. It's 171:37:22.36.

07 01 16 33 LMP-LM Okay. Copied 171:37:22.36.

07 01 16 38 CC I think I heard that. Let me read it back: 171:37:22.36. And I have some star changes for the P57.

07 01 16 50 LMP-LM Okay; go ahead.

07 01 16 52 CC Roger. For the P57 coming up right now, let's use star 5 and detent 3 and you should find it at a cursor of 182.2 and the spiral of 284.0.

07 01 17 13 LMP-LM Roger; I copied that.

07 01 18 03 CC And, Falcon, when you get around to it, how about an ED bat, check, please?

07 01 18 12 LMP-LM Roger, Ed. 37 on both.

07 01 18 14 CC Thank you.

07 01 18 19 CDR-LM And, Ed, an E-memory dump coming down.

07 01 18 22 CC Okay; we're ready. Let her come.

07 01 18 29 CDR-LM On the way.

07 01 19 39 CC Okay. Hadley Base, Houston. We got your E-mod. We're ready to give you an uplink if we can have POO and DATA.

07 01 19 55 CDR-LM All righty, POO and DATA. You got it.

07 01 22 45 CC Falcon, Houston. Looks like we need to do a VERB 96. You're doing - going through an integration loop.

07 01 22 55 CDR-LM Yes. I thought that POO and DATA might get you in trouble. Okay; how's that?

07 01 23 07 CC Okay; we'll try again.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 23 54 06 CC Al, we're ready to have GAMMA RAY GAINSTEP back to center.

06 23 54 15 CMP Okay; going SHIELD on.

06 23 55 00 CC And it looks like you're going to have your fun this rev by having a good look at Aristarchus, huh?

06 23 55 10 CMP Yes, that's right, Karl. I've looked at Aristarchus a couple of times already in earthshine, and I'll tell you, even in earthshine, that thing is spectacular. I can see Schroter's Valley; it shows up very white, and the Crater Aristarchus with the rays extending to the west are all - they're all very, very visible.

06 23 55 29 CC Roger.

06 23 55 43 CMP And I'm just at the terminator now.

06 23 55 49 CC We copy.

07 00 04 11 CC We see you moving over to the antisolar point to take some gegenschein photos. It's about time we solved that problem, Al. Take some good ones. That Nikon camera ought to do a good job for us.

07 00 04 26 CMP Well, we are all set up here, Karl; and, if the Nikon will do it, we'll get them.

07 00 04 33 CC Very good.

07 00 04 43 CC Did you see the seven rilles of Aristarchus, Al?

07 00 04 52 CMP Certainly did. ... Not much to relate at this time as far as Aristarchus - descriptions - visual observations are concerned in earthshine. As a matter of fact, it was so close to the terminator that I wasn't really dark-adapted enough to see much except the very light-colored crater Aristarchus and its ejecta pattern and a very light-colored Schroter's Valley and - which kind of surprised me. Schroter's Valley has about the same lightness as the interior of Aristarchus itself.

07 00 05 39 CC Roger. Didn't see any red spots up there, huh?

07 00 05 45 CMP No, I sure didn't.

07 00 05 58 CC Al, the time line on the surface is going very well now, and they're just about ready to repress.

07 00 06 07 CMP Oh, very good.

07 00 06 09 CC Hey, as I look back over towards Tsio - Tsiolkovsky, I see your new orbit is taking you over the Crater Alden. Do me a personal favor and sneak in a shot of it, if you can.

07 00 06 22 CMP Okay.

07 00 16 13 CMP Houston, Endeavour.

07 00 16 17 CC Endeavour, go ahead.

07 00 16 22 CMP Okay. You ready for me to turn the DATA SYSTEMS, OFF?

07 00 16 42 CC Roger, Al. If you have secured the SIM bay experiments, we're ready for the DATUM [sic] SYSTEM, OFF.

07 00 16 50 CMP Okay, we're secured now.

07 00 17 47 CC Okay, Al; as you go around the corner, all of your systems are looking in good shape. Have fun with the gegenschein photos.

07 00 17 57 CMP Okay, Karl; hope so, and see you around the other side.

07 00 18 01 CC Righto.

07 00 42 -- BEGIN LUNAR REV 47

07 01 06 07 CC Endeavour, Houston standing by.

07 01 06 16 CMP Houston, Endeavour's on.

07 01 06 18 CC Okay, Al. Good morning.

07 01 06 24 CMP Is it morning, Ed?

07 01 06 26 CC Yes, it's morning down here, Al. Al, we've got a couple of changes for you. We're going to delete the P22, because the LM crew needs a little extra time, and substitute a P24 from the command module for it. If you've already got your camera on the sextant, sorry about that. If not, delete it.

07 01 06 49 CMP Okay. I've already got it on, but that's no problem.

07 01 06 53 CC Okay, we'll give you a P24 land mac - landmark track pad whenever you're ready.

07 01 07 05 CMP Okay, go ahead.

07 01 07 07 CC Okay. Your target's the LM. T-1, 169:34:08; T-2, 38:15; TCA, 40:38; T-3, 41:06; south, 3 nautical miles; and your attitude will have changed a little, Al. We're using roll, pitch, and yaw of 000, 350/231, and 000. NOUN 89, latitude, 26.107; longitude over 2, plus 01.828; altitude, minus 013.26; and, at 169:25 in your Flight Plan, change the R-2 of NOUN 78 to minus 080.00.

07 01 08 50 CC Al, I gave you a wrong time. One - -

07 01 08 51 CMP Roger, Ed; copy -

07 01 08 55 CC 169:15 is the time where that should be. I don't see it there.

07 01 09 04 CMP Okay, Ed. I have - I have that one in the Flight Plan now; at 169:15, R-2 is minus 068.00.

07 01 09 13 CC That's affirm; and we're substituting minus 080.00.

07 01 09 26 CMP Understand; substitute for that minus 080.00.

07 01 09 30 CC That's affirm, Al.

07 01 09 31 CMP Okay; here goes the landmark tracking pad. P24 on the LM, T-1, 169:34:08; T-2 is 38:15, 40:38, 41:06; that's 3 miles south; roll, pitch, and yaw are 000, 350/231, 000. NOUN 89's are plus 26.107, plus 01.828, minus 013.26; and I've changed R-2 of the DAP load.

07 01 10 12 CC Okay, Al; and we will need marks on them, of course.  
07 01 10 18 CMP Roger.  
07 01 10 23 CC Be back with you in a little while.  
07 01 10 27 CMP Okay.  
07 01 20 33 CC Endeavour, Houston.  
07 01 20 38 CMP Houston, Endeavour; go ahead.  
07 01 20 40 CC Al, it seems like we had a - error on that last  
pad I read you. The altitude should be minus  
001.33. Understand?  
07 01 20 54 CMP Understand the altitude should be minus 001.33.  
07 01 20 57 CC That's affirm. Sorry about that.  
07 01 26 28 CC Endeavour, Houston. OMNI Charlie, please.  
07 01 26 34 CMP OMNI Charlie.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 01 26 15 CC Falcon, the computer is yours.

07 01 26 19 LMP-LM Roger; thank you.

07 01 30 42 CC Endeavour and Falcon, Houston. We're going to delete the VHF check at this pass just to give you a little more time.

07 01 30 54 LMP-LM Roger.

07 01 31 04 CC That's fine. We just won't - bother with - the LM with it.

07 01 37 37 LMP-LM Houston, Falcon. Do you have the torquing angles?

07 01 37 43 CC Okay, you can torque.

07 01 37 47 LMP-LM Roger; torque at 38.

07 02 01 30 CC Falcon, Houston. How do you read?

07 02 01 37 LMP-LM Go ahead, Houston. 5 by.

07 02 01 48 CC Roger. How are you coming with your stowage? We have these locations available - still - if you're not too well stowed up yet.

07 02 01 55 CDR-LM Well, we were just mushing along with it by the checklist here, and why don't you go through what you have in mind? I'm sorry. We're pressing on. We'll take a listen to what you got here.

07 02 02 07 CC Okay. What we were expecting was bags 4 and 6 in the ISA, bag 3 on the aft engine, - behind the aft engine, and 2 and 7 in the right and lefthand stowage compartment with 7 in the lefthand, 2 in the righthand.

07 02 02 33 LMP-LM Ed, let me tell you where we - where we have them.

07 02 02 37 CC Okay.

07 02 02 42 LMP-LM We have - the aft engine cover is bag 3. The lefthand midsection is bag 2. The righthand - side is bag 7.

07 02 03 10 LMP-LM And the one remaining bag, we figured we'd put in the ISA.

07 02 03 17 CC Okay, Jim. We seem to have bag - that would either be bag 4 or 6, and we seem to have both of them indicated for the ISA.

07 02 03 32 LMP-LM Okay - we'll put - in other words, you'd like bags 4 and 6 in the ISA. That would work out fine.

07 02 03 38 CC That's great, and it sounds like the rest of it's as per plan. And be advised we're showing total weight of slightly in excess of 230 pounds which is a little over what we expected. However, by deleting a plane change, we're going to have plenty of fuel for it.

07 02 03 57 LMP-LM Roger; thank you.

07 02 27 12 CC Falcon, Houston.

07 02 27 19 LMP-LM Go ahead, Ed.

07 02 27 20 CC Give us a little bit of idea of where you are, Jim. We're starting to worry about time a little bit.

07 02 27 28 LMP-LM We're just configuring circuit breakers, right now.

07 02 27 30 CC Okay. One thing we do need. Did you weigh your ISA? And we need a weight on it, please.

07 02 27 44 LMP-LM It's all weighed and stowed.

07 02 27 47 CC Okay. Have you got a weight that we can have?

07 02 28 00 LMP-LM Stand by 1.

07 02 28 01 CC Ah, if it's too much trouble, ignore it, Jim, but if you have it real handy, I'll take it.

07 02 28 11 LMP-LM We'll give you a weight here shortly.

07 02 28 13 CC Okay; thank you.

07 02 37 01 CDR-LM Okay, Houston; Falcon.

07 02 37 04 CC Go ahead, Falcon.

07 02 37 09 CDR-LM Okay. In the rendezvous radar self - test and a VERB 63, I have no shaft variation - on the NOUN 72. The trunnion's going about a half a cycle per second, but the shaft seems to be at 220 - although the crosspointers are moving.

07 02 37 27 CC Okay, we copy that. Stand by 1.

07 02 37 45 CC Dave - if there's any chance you can see the shadow? The antenna is moving, is it not?

07 02 37 57 CDR-LM Yes, and it looks like it's moving in shaft; I can't really tell, but I - I - The shadow's moving and the crosspointers are moving.

07 02 38 04 CC Okay. Thank you.

07 02 39 48 CDR-LM Okay, Houston, the designate seems to work okay. You... - -

07 02 39 51 CC That's - that's affirm, Dave. We suspect you might have drifted into a stop.

07 02 40 00 CDR-LM Okay, it sounds reasonable.

07 02 40 11 CC And, Falcon; Houston. Observe you're starting your AGS load, I'd like to give you the pad before you do that.

07 02 40 23 LMP-LM Okay, I was wondering when you were going to send it up, Ed.

07 02 40 26 CC Been waiting for your call, Jim. Okay, I've got a direct pad, a coelliptic pad, and a CSI pad for you.

07 02 40 37 LMP-LM Okay, ready for the ascent pad.

07 02 40 39 CC Okay, here comes the direct: 171:37:22.36; 5530.4, 0032.0, minus 000.4; plus 37742; plus 01722; plus 58516; plus 56943; plus 0032.0; plus 0149.6; TPI is 172:29:39.00; LM weight, 10936.

Tap: 110/4  
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T<sub>ig</sub> one REV late, 173:35:34. Coelliptic Ascent  
Pad: 171:40:13.41; 5532.0, 0020.0, minus 000.5;  
plus 37742; plus 01722; plus 58550; plus 56943;  
plus 0020.0; the rest NA. Read back.

07 02 42 43 LMP-LM Okay, for direct. Readback 171:37:22.36; 5530.4,  
0032.0, minus 000.4; plus 33742; plus 01722;  
plus 58516; plus 56943; plus 0032.0; plus 0149.6;  
172:24:039.00; 10936. T<sub>ig</sub> one rev late, 173:35:34.  
CSI - coelliptic rather: 171:40:13.41; 5532.0,  
0020.0, minus 000.5; plus 37742; plus 01722; plus  
58550; plus 56943; plus 0020.0.

07 02 43 52 CC Okay, Jim. One error on the direct, NOUN 37, TPI  
time, it should be 172:29:39.00.

07 02 44 11 LMP-LM Okay, 172:29:39.00.

07 02 44 15 CC That's affirm. Now the CSI pad. 172:35:08.00;  
174:27:all zeros; 049.0; plus all zeros; 0155.1;  
0267.0; plus 049.0, plus all zeros, plus 001.0.

07 02 45 04 LMP-LM Okay. CSI pad, 172:35:08.00; 174:27:all zips;  
plus 049.0; all zips; 0155.1; 0267.0; plus  
049.0, plus all zips, plus 001.0.

07 02 45 27 CC That's a good readback, Jim. Be advised, we had  
a little comm problem with the command module  
before he went over the hill. We're going to be  
a little busy with him at AOS giving him some  
numbers and an uplink. And we were wondering  
down here, did you get any - food after you got  
back in? And the medics would also like your  
PRD readings from page 12-4.

07 02 46 00 LMP-LM No - stand by on that.

07 02 46 38 CC Falcon, Houston, if you are having to dig the  
PRDs out, skip it for now, please.

07 02 46 45 LMP-LM Okay, we will.

07 02 47 49 LMP-LM Okay, Houston. The RCS hot-fire looks okay.

07 02 47 55 CC Okeydoke, Falcon.

07 02 49 11 CC And, Falcon; Houston. For your P57, we'd like to use star 5, again, and you should find it in detent 3, at a curser of 184 and a spiral of 282.

07 02 49 29 LMP-LM Okay, we - we already have those, Ed. Thank you.

07 02 49 31 CC Okay, I - I think I inverted them. It's a spiral of 282 and a curser of 184.

07 02 49 39 LMP-LM Oh, that's okay; we'll find it. It's a good start.

07 02 55 17 LMP-LM And, Ed, I'm ready to call out the AGS K-factor whenever you have it.

07 02 55 21 CC I'm trying to get it for you now, Jim. You beat me by about 15 or 20 seconds.

07 02 55 54 CC Falcon, Houston; your AGS K-factor 170:00:00.80.

07 02 56 12 LMP-LM Roger; copy 170:00:00.80.

07 02 56 16 CC That's affirmed.

07 02 58 33 CC Copied your angles.

07 02 58 39 CDR-LM Okay. Thank you.

07 02 58 42 CC And be advised, I have some new rendezvous radar angles for you, Dave. I'll explain them when we get there.

07 02 58 52 CDR-LM Okay Ed. Stand by 1.

07 02 59 16 CDR-LM Okay, Ed; go with the - radar angles.

07 02 59 18 CC Roger; 186 and 277. And the reason for this, Dave, is that the command module is a little bit more in an elliptic orbit than we're used to, and I'll have some more words about your TPI burn after while - after we look at it a little more.

07 02 59 38 CDR-LM Okay, fine.

07 02 59 40 CC Roger; his orbit's 64 by 54, about a 10-mile difference in perilune and apolune.

07 02 59 53 CDR-LM All right.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 01 29 05 CC Endeavour, Houston. On your HIGH GAIN go WIDE with MANUAL please.

07 01 29 17 CMP Roger. WIDE and NARROW - WIDE and MANUAL.

07 01 29 19 CC Thank you, Al.

07 01 29 25 CMP Okay. Any angles you want me to put in?

07 01 30 42 CC Endeavour and Falcon, Houston. We're going to delete the VHF check at this pass, just to give you a little more time.

07 01 31 00 CMP Roger. Endeavour's got the VHF set up anyway.

07 01 31 04 CC That's fine. We just won't - bother the LM with it.

07 01 31 11 CMP Okay. You might tell them though, I got my - if you want to check out the rendezvous radar I've got the transponder on.

07 01 31 19 CC Al, you're in the mud. You'll have to try me on that one again.

07 01 31 25 CMP Okay. Just wanted to let you know that I've also got the rendezvous transponder on.

07 01 31 30 CC Okeydoke. Thank you Al.

07 01 33 14 CC Endeavour, Houston. One minute to T-1.

07 01 33 20 CMP Roger. Thank you.

07 01 37 45 CC Thirty seconds to T-2.

07 01 38 03 CC Ten seconds to T-2, Endeavour.

07 01 38 10 CMP Roger.

07 01 41 37 CMP Okay, Houston; Endeavour. Through with tracking, but I'm not sure they're very good marks.

07 01 41 43 CC Okay, Al; we understand. High Sun angle may have made it difficult.

07 01 41 56 CMP Yes, I seemed to have a lot of interference and sextant, from the landmark, by the sight - part of the optics.

07 01 42 03 CC Understand, Al.

07 01 42 16 CC Al, do you think you saw him at all?

07 01 42 24 CMP Yes. I think the first couple of marks were on him, Ed, but I couldn't hold him.

07 01 42 29 CC Okeydoke.

07 01 42 31 CMP I kept - I kept losing him.

07 01 57 51 CC Endeavour, Houston. In the blind, give us the best OMNI, please.

07 01 58 17 CC En - Endeavour, Houston. Best OMNI, please.

07 01 59 52 CC Endeavour, Houston. In the blind, best OMNI, please.

07 02 00 03 CC Endeavour, Houston. Best OMNI.

07 02 00 13 CC Hello, Endeavour. Best OMNI, please.

07 02 01 08 CC Endeavour, Houston. Give us best OMNI, please.

07 02 01 18 CC I -

07 02 01 55 CC Ende -

07 02 01 59 MCC Endeavour, Houston. Best OMNI.

07 02 02 13 MCC Endeavour, Houston. Best OMNI.

07 02 07 23 CC Endeavour, Houston. How do you read?

07 02 07 32 CC Endeavour, Houston. Best OMNI please.

07 02 07 55 CC Endeavour, Houston. How do you read?

07 02 08 29 CC Endeavour, Houston. How do you read?

07 02 08 44 CC Endeavour, Houston. In the blind. Best OMNI please.

07 02 09 54 CC Endeavour, Houston. Best OMNI please.

07 02 11 08 CC Endeavour, Houston.

07 02 13 34 CC Endeavour, Houston. How do you read?

07 02 13 59 CC Endeavour, Houston. How do you read?

07 02 14 40 CC Endeavour, Houston.

07 02 14 47 CC Endeavour, Houston. In the blind. How do you read?

07 02 15 02 CC Endeavour, Houston. Give us your best OMNI, please.

07 02 15 29 CC Endeavour, Houston. In the blind. I'm going to give you a lift-off time: 171:37:22.36. We'll uplink you at AOS since we have no contact. And, Endeavour; Houston. TPI, 172:29:39.00. I'll repeat, lift-off, 171:37:22.36; TPI 172:29:39.00. CSM weight for your DAP 35995.

07 02 17 15 CC And, Al, if you read. Let's come around to AOS. Trying to get comm. We'll have a lot of work to do.

07 02 17 35 CC Endeavour, Houston. One minute to LOS.

07 02 17 41 CMP Roger, Houston; Endeavour. And did you get the gyro torquing angles, Ed?

07 02 17 47 CC Al, we haven't had you for the last 20 minutes. Did you get my uplinks - or rather my pads up?

07 02 17 57 CMP Negative.

07 02 17 58 CC Okay. Let me give you one quickly, you've got 40 seconds to LOS. T<sub>ig</sub> is 171:37:22.36. TPI, 172:29:39.00. Your CSM weight 35995. I'm going to lose you in about 15 seconds. We'll get all your uplinks and the rest of the pads at AOS.

07 02 40 -- BEGIN LUNAR REV 48

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK BETWEEN CC AND CM SECURED

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 03 00 52 CC 2, all zeros. We copy 47053.

07 03 00 54 CDR-LM ... ASCENT BATS, OFF.

07 03 00 59 CDR-LM Roger. ASCENT BATS going On now, Ed.

07 03 01 02 CC And we copy.

07 03 01 42 CC And, Falcon, we will not uplink you at lift-off minus 35. You can press on with your checklist.

07 03 01 52 CDR-LM Okay. Thank you.

07 03 03 57 CC Endeavour; Houston. Standing by.

07 03 04 03 CMP Hello, Houston; Endeavour.

07 03 04 05 CC Okay, Al. Loud and clear.

07 03 04 11 CMP Okay, Ed. I'm in REACQ NOUN now.

07 03 04 15 CC Roger. And, Falcon, your 047053 are okay. Al, did you get the TPI and lift-off time for the direct ascent before LOS? Over.

07 03 04 30 CMP Affirmative.

07 03 04 31 CC Okay. Let us have POO and ACCEPT, and we'll give you an uplink.

07 03 04 39 CMP You have it.

07 03 04 40 CC Okay. Let me give you the coelliptic pad, Al.

07 03 04 47 CMP Go ahead.

07 03 04 48 CC Okay. At - lift-off is 171:40:13.41. And GET is CSI, 172:35:08.00, and NOUN 37, your T<sub>ig</sub> TPI is 174:27, all zeros. Read back.

07 03 05 30 CMP Okay. I understand on a direct ascent, it's lift-off, 171:37:22.36; TPI, 172:29:39.00; CSM weight, 35 995; coelliptic lift-off, 171:40:13.41; CSI, 172:35:08.00; TPI, 174:27:00.00

07 03 05 59 CC Okay, Al. That's a good readback. And, Al, let me advise you that be - because of your orbit, the TPI is going to be nonnominal in angle, about the - about the same DELTA-V; however, a different angle. We'll have more words after insertion.

07 03 06 20 CMP Okay. Do you want the gyro-torquing angles on that last P52?

07 03 06 24 CC That's affirmative. I'm ready to copy.

07 03 06 29 CMP Okay. Minus 4 balls 6, minus 00017, and minus 00017, and they were torqued out at 17006.

07 03 06 43 CC Copy minus 4 balls 6, minus 3 balls 17, minus 3 balls 17, torqued at 17006.

07 03 06 57 CMP Roger.

07 03 06 58 CC And give us AUTO on the HIGH GAIN. And, Al, we're not going to bother with your - P27 pad readup, unless you're especially wanting it.

07 03 07 13 CMP Negative, Ed.

07 03 07 57 CDR-IM And, Endeavour; Falcon. You're five square to us on the relay. How do we sound?

07 03 08 04 CMP Hello, Falcon; Endeavour. You're loud and clear.

07 03 08 10 CDR-IM Okay. We're all set. Ready to - get us some warm chow?

07 03 08 16 CMP Yes, sir.

07 03 08 23 CDR-IM Great. I'll tell you, cold tomato soup isn't too good.

07 03 08 59 CC Endeavour, the computer is yours.

07 03 09 04 CMP Roger, Houston.

07 03 09 23 CC Endeavour, Houston.

07 03 09 28 CMP Go ahead, Houston.

07 03 09 29 CC Al, were you having any comm difficulties before LOS on the - our last pass. We lost you for about 20 to 25 minutes.

07 03 09 39 CMP Sure didn't notice any, Ed. I was busy down in the LEB, but I didn't get any - any signal in the headset indicating that we'd lost S-band lock, and I had the SQUELCH OFF.

07 03 09 50 CC Okeydoke.

07 03 14 29 CC Endeavour, Houston. OMNI Delta.

07 03 14 36 CMP OMNI Delta.

07 03 14 37 CC And, Falcon; Houston. I have some PIPA biases, when you'd like them.

07 03 14 49 CDR-LM Stand by, Ed.

07 03 16 06 CC Falcon, Houston. Verify SLEW. We're about to hand over.

07 03 16 15 LMP-LM We're going SLEW.

07 03 17 26 CC Falcon, Houston. Handover complete. Verify AUTO, please.

07 03 17 37 LMP-LM Roger. Going back to AUTO.

07 03 21 29 CC And, Falcon; Houston. I still have some PIPA biases I need to give you.

07 03 26 06 CC Okay. Falcon, Houston. Observe you're into VERB 83 at lift-off minus 12. We're right on schedule. I have a couple of updates for you, please.

07 03 26 34 CC Falcon, Houston. Do you read?

07 03 26 55 CC Falcon, Houston. In the blind while we're looking at our comm problem. Your PIPA bias: VERB 21 NOUN 01 ENTER. ENTER it - put that in if you hear me.

07 03 27 40 CDR-LM Houston, Falcon.

07 03 27 42 CC Okay, Falcon. There we have you. We had a little net problem. I have a PIPA bias update for you.

07 03 27 51 CDR-LM Well, stand by. You ready to watch the APS pressurize?

07 03 27 57 CC Okay, let's let her go.

07 03 28 00 CDR-LM Okay, here comes tank 1. And we'll stand by for your call for tank 2.

07 03 28 13 CC Roger.

07 03 28 22 CC Okay. Go with tank 2, looks good.

07 03 28 27 CDR-LM Okay. Tank 2 coming now.

07 03 28 34 CC Looks good down here.

07 03 28 39 CDR-LM Okay, thank you. Looks good up here.

07 03 28 41 CC And, Dave, you're GO for the direct rendezvous. Both guidance systems look good; PGNS is your recommendation.

07 03 28 49 CDR-LM Roger. Go for direct on the PGNS.

07 03 29 19 CC Falcon, are you still with us?

07 03 29 24 CDR-LM Roger.

07 03 29 25 CC Okay. Have a couple of numbers I need to read for you, Dave, when you're ready.

07 03 29 35 CDR-LM Okay. Pencil's out. Go ahead.

07 03 29 38 CC Okay. PIPA bias is Y PIPA: VERB 21 NOUN 01, 1454 ENTER; and the data is 04366 ENTER. X PIPA: VERB 21 NOUN 01; address, 1452 ENTER; data 04672 ENTER.

07 03 30 08 CDR-LM Okay. Here's the readback on that Ed. VERB 21 NOUN 01; 1454 ENTER; 04366. And, then VERB 21 NOUN 01; 1452 ENTER; 04672.

07 03 30 23 CC That's a good readback. And when you have your Timeline Book out, I'd like to change some range and range rate numbers because of this ellipticity of the command module orbit.

07 03 30 37 CDR-LM Okay, Ed. Do you want those PIPA biases loaded now?

07 03 30 41 CC That's affirm.

07 03 30 44 CDR-LM All right.

07 03 31 28 CDR-LM Okay, Ed. What are the changes in the Timeline Book?

07 03 31 31 CC Okay. The range and range rate at insertion: range rate is 137; range, minus - sorry, the range is 137; range rate, minus 431; at plus 5 minutes, range 117; range rate minus 398; and at 10 minutes, range is 98, range rate minus 355.

07 03 32 10 CDR-LM Okay, I copied that data.

07 03 32 14 CC Good enough.

07 03 32 30 CDR-LM Falcon, Endeavour, on VHF. How do you read?

07 03 32 47 CDR-LM Okay, Falcon; Endeavour. How do you read us now? 5 by?

07 03 32 52 CC Loud and clear.

07 03 33 05 CC And, Falcon; Houston. We'd like you to change your 053 number to plus 01722.

07 03 33 20 LMP-LM Copy. The 053 to plus 01722.

07 03 33 25 CC That's affirm.

07 03 34 00 CC Falcon, Houston. Can you make your VHF check, so we can hand over the network, please?

07 03 34 07 CDR-LM Roger. We tried, and I got no response, and I'll stand by. We should be hot miked to the Endeavour.

07 03 34 28 CDR-LM Okay, Houston. We've got trouble on the VHF check - as he approaches the mountains back there - we usually don't get him until he's almost overhead, because of the interference.

07 03 34 37 CMP Okay, Falcon, there you are. I've got you now.

07 03 34 38 CDR-LM Oh, okay.

07 03 34 40 CC Understand VHF check is good now. - -

07 03 34 41 CMP Reading you 5 square on VHF there, Dave.

07 03 34 47 CDR-LM Roger. VHF check is GO, Ed. Falcon here.

07 03 34 53 CC Endeavour, Houston. We're going to hand you over now.

07 03 34 59 CMP Endeavour, Roger.

07 03 35 28 CDR-LM VOX - Hey, Houston, Falcon. How do you read on VOX?

07 03 35 31 CC Okay, loud and clear, Dave, and you're GO for lift-off. And I assume you've taken your explorer hats off, and put on your pilot hats.

07 03 35 42 CDR-LM Yes sir, we sure have. We're ready to do some flying.

07 03 35 49 LMP-LM Standing by for 1 minute.

07 03 35 50 CDR-LM Okay.

07 03 35 51 LMP-LM Guidance steering is in.

07 03 35 52 CDR-LM Okay.

07 03 36 22 CC Mark. One minute.

07 03 36 25 CDR-LM Okay, MA - - MASTER ARM is ON; I have 2 lights.

07 03 36 56 LMP-LM Average g is on.

07 03 36 59 CC ...

07 03 37 16 CDR-LM ABORT STAGE; ENGINE ARM to ASCENT. 99 PRO.

07 03 37 25 CDR-LM Good lift-off. Automatic. Yaw left. Pitch over.

07 03 37 43 CDR-LM Phasing, about 306.

07 03 37 53 CDR-LM Hey, good smooth ride, Ed.

07 03 37 56 CC Roger. Copy now.

07 03 38 05 CDR-LM All looks good at 30.

07 03 38 24 CC Falcon you're GO at - -

07 03 38 25 CDR-LM ...

07 03 38 26 CC - - 1 minute. AUTO start; normal shutdown.

07 03 38 31 CDR-LM Roger. AUTO start and normal shutdown.

07 03 38 33 CC Both guidance systems are good, Dave.

07 03 38 38 CDR-LM Okay, looks good up here. It almost sounds like the wind whistling, doesn't it.

07 03 38 55 LMP-LM Boy, what a view of the rille, huh? Bolder tracks slip down into it.

(Music - "Air Force Song")

07 03 39 25 CDR-LM ... on the ...

07 03 39 53 CDR-LM ... right on profile.

07 03 40 19 CC Falcon, Houston. You're looking good at 3 minutes.

07 03 40 25 CDR-LM Okay. ...

07 03 40 30 CDR-LM Roger. The only thing unusual I noticed is the RCS OXIDIZER manifold pressure oscillates every time the jets fire. That's backing up to the ...  
- -

07 03 40 44 CC Copy.

07 03 41 26 CC Falcon, Houston. You're GO at 4.

07 03 42 25 CDR-LM ... radar lockup.

07 03 42 26 LMP-LM 5 minutes. ...

07 03 42 53 CC Falcon, Houston. You're still looking good. Your PGNS is showing a slight radial error, but it's a little bit lower than nominal. But everything's GO.

07 03 43 05 CDR-LM Roger. Understand.

07 03 43 35 CDR-LM ... rendezvous radar ...

07 03 43 38 LMP-LM ... a thousand to go. ... 500.

07 03 43 41 CDR-LM Okay.

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07 03 44 06 CC Falcon, Houston. Trim AGS.

07 03 44 11 CDR-LM Roger. Understand. Trim the AGS. ... connection?

07 03 44 19 CC Falcon, Houston. Trim in plane only.

07 03 44 24 CDR-LM Roger, in plane only on the AGS. ...

07 03 44 29 CDR-LM \*\*\* ARM is OFF. Okay. We'll shut down on the PGNS. Okay, AUTO shut down. ... AGS 500.

07 03 44 51 CDR-LM 502. ...

07 03 45 01 LMP-LM AGS MASTER ALARM.

07 03 45 06 CC Copy.

07 03 45 09 LMP-LM Hey, we got a MASTER ALARM on the AGS, but we trimmed the AGS.

07 03 45 17 CC Okay, is your - -

07 03 45 18 CDR-LM Stand by for a tweak or a trim.

07 03 45 21 CC Okay. - -

07 03 45 23 LMP-LM That's the self test. Okay.

07 03 45 29 CDR-LM PGNS says its in a 40.6 by 8.9.

07 03 45 40 CC Roger, we copy. Guidance still looks good to us.

07 03 45 46 CDR-LM Okay.

07 03 45 57 CC Falcon, your AGS still looks good.

07 03 46 02 LMP-LM Okay, we copy.

07 03 46 03 CDR-LM Okay. Understand. AGS still looks good.

07 03 46 16 CC Falcon, Houston. No tweak.

07 03 46 22 CDR-LM Roger, no tweak. Thank you.

07 03 46 29 CMP Okay, Falcon; Endeavour. I got you locked up on the VHF at 127.

07 03 46 36 CDR-LM Okay, I understand. 127, Al. You reading?



07 03 46 44 CMP Roger, go ahead.

07 03 46 46 CDR-LM Okay, we're pitching up the radar track attitude. We didn't get a lock on it on the way up. We'll give you a call as soon as we get locked up.

07 03 46 52 CMP Okay. I was watching for that and I'll let you know.

07 03 47 18 CDR-LM And, Houston, we're watching the roll angle.

07 03 47 24 CC Falcon, Houston. We have you at a 42 by 9. You're looking good.

07 03 47 31 CDR-LM Okay. 42 by 9.

07 03 47 47 CDR-LM ... , Jim?

07 03 48 14 LMP-LM ...

07 03 48 34 CMP There, you're locked on now.

07 03 48 38 CDR-LM Roger. We're locking up now.

07 03 48 39 CMP Roger. Got good signal strength on you.

07 03 48 45 CDR-LM Roger.

07 03 48 55 CMP VHF range has us at 117 now. 117.

07 03 49 00 CC Endeavour, Houston. We're ready to uplink you.

07 03 49 05 CMP Go ahead. You've got POO and ACCEPT.

07 03 49 19 CMP What kind of range is radar giving you, Dave?

07 03 49 43 CC And, Falcon; Houston. We will not up-link a state vector to you, your PGNCS and AGS are both good. And we will keep them independent.

07 03 49 56 CDR-LM Falcon, Roger.

07 03 51 53 CC Endeavour, Houston; the computer's yours.

07 03 51 59 CMP Roger.

07 03 52 06 CC Okay, Falcon; Houston. I have a MSFN TPI for you and some words.

07 03 52 16 LMP-LM Go ahead. I'm ready to copy the TPI, Ed.

07 03 52 19 CC Okay, it's an off-nominal TPI and angle. DELTA-V X, 66.3; DELTA-V Y, plus 7.8; DELTA-V Z, minus 31.2; total 73.7. TPF DELTA-V will be 26.0. You're going to be pointed almost along the line of sight for TPI. You can omit the roll maneuver for TPI, your choice. And you will undoubtedly break lock.

07 03 53 03 LMP-LM Okay, on the pad I have plus 66.3, plus 7.8, minus 31.2; and total for 73.7, and 26.0 for TPF.

07 03 53 16 CC That's affirm. And the approach at TPF is going to be right along the local horizontal.

07 03 53 25 CDR-LM Okay, thanks for the information, Houston. I think if radar's working good, and we get a good solution, we will probably stay heads up and go ahead and accept the breaklock.

07 03 53 35 CC Roger. Roger. And, Endeavour; Houston. The same goes for you. Your attitude, if you were to have to make the burn would be along the line of sight as well.

07 03 53 51 CMP Endeavour, Roger.

07 03 53 55 CDR-LM And, Houston; Falcon. I have a visual on the Endeavour now. And the COAS is exactly boresighted; the radar needles are boresighted, and the PNGS needles are boresighted, and the AGS needles are boresighted, so we're looking pretty good.

07 03 54 10 CC Very good, Dave.

07 03 54 23 CC And, Falcon; Houston. As far as we can tell, your AGS is completely GO. We see no reason for the master alarm yet.

07 03 54 33 CDR-LM Understand.

07 03 55 07 CDR-IM Okay, Endeavour; Falcon. I'm looking at about 94 miles 355 feet per second.

07 03 55 14 CMP Oh, Roger. I'm looking at 94 miles also.

07 03 55 17 CDR-IM Okay, good show. And the PNGS state vector agrees with that.

07 03 55 40 CC And, Falcon; Houston. You're GO for an APS TPI. You have 180 feet available.

07 03 55 48 CDR-LM Oh, Roger. Understand. GO for the APS TPI, thank you.

07 03 56 38 CMP Falcon, Endeavour. You got your lights on, Jim?

07 03 56 44 CMP Okay.

07 03 56 59 CC Falcon, Houston.

07 03 57 04 CDR-LM Houston, Falcon. Go.

07 03 57 05 CC Be advised your direct rendezvous TPI charts are NO GO because of this elliptical rendezvous. Your midcourse charts are good.

07 03 57 19 CDR-LM Okay. Understand. The TPI charts are NO GO, and the midcourse charts are good.

07 04 01 08 CDR-LM Roger. Tracking light's on.

07 04 01 20 CDR-LM I don't see your tracking lights.

07 04 02 13 CDR-LM Falcon, Endeavour. I don't have your lights.

07 04 02 28 CDR-LM Okay.

07 04 03 08 CDR-LM Houston, Falcon. What's your LOS time?

07 04 03 24 CC Falcon, Houston LOS in 12 minutes.

07 04 03 31 CDR-LM Roger; 12 minutes. Okay.

07 04 03 37 CMP Yes. I got your lights now, Dave.

07 04 03 38 CDR-LM Okay. Very good.

07 04 04 30 CMP Okay, Falcon; Endeavour. I'm getting some large updates on you there, Dave, on the first mark.

07 04 04 38 CDR-LM Okay.

07 04 04 49 CMP That's right. Yes, that's right. VHF's going okay. First optics is - is off. I bypassed two of them. I'll take the third.

07 04 05 09 CC Falcon, Houston.

07 04 05 14 CDR-LM Houston, Falcon. Go.

07 04 05 16 CC Roger, we need to tweak up your PIPAs a little bit more, Dave, before TPI.

07 04 05 24 CDR-LM Okay, fine. Pencil's out; go ahead.

07 04 05 27 CC Address 1452, 05210; address 1456, 03170. And those are both VERB 21 NOUN 01.

07 04 05 50 CDR-LM Okay, we copy. A VERB 21 NOUN 01; 1452 should be 05210, and 1456 should be 03170.

07 04 06 02 CC Good readback.

07 04 07 34 CMP Okay, Dave. The first update was the only large one. The rest of them are all falling in.

07 04 07 38 CDR-LM Okay, very good.

07 04 09 09 CDR-LM Okay, Houston, Falcon. We're seeing a fairly large difference in Z between the onboard solutions and the ground solutions. But, I guess that can be expected at the recycle.

07 04 09 18 CC I'm checking it for you now, Dave. Your PGNS and AGS seem to agree pretty well.

07 04 09 26 CDR-LM Roger. And I think we can expect a fairly large Z at the recycle.

07 04 09 28 CC I'll give back some words on the MSFN TPI in a minute.

07 04 09 35 CDR-LM Roger.

07 04 10 08 CC Falcon, Houston. We're going to watch it for a few more minutes and see how they converge with the other solution.

07 04 10 16 CDR-LM Roger.

07 04 10 57 CMP Okay, Dave. I've got a recycle solution for you. Roger. Minus 69.4, minus 6.2, plus 12.0.

07 04 11 14 CC Endeavour, Houston. I need OMNI Alfa.

07 04 11 22 CMP OMNI Alfa.

07 04 12 15 CC And, Falcon; Houston.

07 04 12 21 CDR-LM Houston, Falcon. Go.

07 04 12 22 CC Roger, FIDO thinks you had a good solution, but not a great solution before. He's now saying the Z component will be - should converge to about a minus 19. And if it does, your approach angle will be more nominal - rather than along the horizontal.

07 04 12 42 CDR-LM Okay, that sounds like we're all converging to the same spot. Thank you.

07 04 12 46 CC We agree, Dave.

07 04 14 14 LMP-LM Okay, Houston; Falcon. Our polar plot is showing us pretty nominal. I guess we'll probably stay with the nominal procedures on the TPI.

07 04 14 23 CC Roger, Falcon. We have you a minute to LOS. Your solutions look good in both computers. We'll see you on the other side. And be advised, we did ~~monitor your lift-off~~, and we can confirm you lifted off.

07 04 14 40 CDR-LM Well, very good. That's nice to know, thank you much. Save the tapes for us, will you.

07 04 14 51 CC Say again, please.

07 04 14 55 CDR-LM Save the TV tapes for us, will you please.

07 04 14 58 CC Will do, and you're 30 seconds from LOS, Falcon.

07 04 15 04 CDR-LM Roger. See you around the corner.

07 04 15 06 CC Roger, Roger, Dave.

07 04 15 47 CC And, Endeavour; Houston. I have you 30 seconds from LOS.

07 04 15 55 CMP Endeavour, Roger. See you on the other side.

07 04 15 57 CC Okeydoke, Al.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 04 39 -- BEGIN LUNAR REV 49

07 05 02 27 CC Falcon, Houston. Standing by.

07 05 02 33 CDR-LM Roger, Houston. Falcon had a good TPI; it burned a small midcourse 1, and a small midcourse 2. Presently, we have a visual on the command module and all the solutions have been agreeing very well.

07 05 02 45 CC Okay. Did you write down your solutions, Dave?

07 05 02 51 CDR-LM Yes, we got them all in.

07 05 02 53 CC Okay. We'll ask you for them later.

07 05 02 57 CDR-LM Okay.

07 05 03 58 CMP Houston, Endeavour.

07 05 04 00 CC Hello, Endeavour. Standing by.

07 05 04 05 CMP Okay, TV's up to ...

07 05 04 07 CC Say again.

07 05 04 13 CC Roger, copy. TV's on.

07 05 04 31 CC Endeavour, Houston. We're not tracking your high gain, yet.

07 05 04 38 CMP Okay.

07 05 05 23 CC We have your picture, Endeavour.

07 05 05 33 CMP Roger.

07 05 05 44 CMP-IM Okay, I've got you visually there, Falcon.

07 05 06 46 CMP-IM Yes. You're looking good.

07 05 07 50 CMP You're very garbled, Dave. Say again.

07 05 08 04 CDR-LM Okay, I got you at 1.28 mile.

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07 05 08 08 CMP Okay, we're right with you.

07 05 08 32 CC Endeavour, Houston. Give us AUTO on the HIGH GAIN, please.

07 05 08 40 CMP On AUTO.

07 05 09 13 CDR-LM Okay, 1 mile and 27 feet per second on the radar.

07 05 09 17 CMP Roger.

07 05 10 31 CC Endeavour, Houston. Do you have the Falcon on your monitor?

07 05 10 45 CMP No, I wasn't watching it, Ed. Stand by 1.

07 05 11 05 LMP-LM Okay, 3000 feet, braking down to 20.

07 05 11 51 CC Don't waste any time on it, Al.

07 05 12 18 LMP-LM Okay, 1500 feet, braking down to 10.

07 05 14 11 LMP-LM Okay, 500, braking to 5.

07 05 15 18 SC ...

07 05 15 29 SC ... Falcon ...

07 05 15 44 CDR-LM Okay, Houston. We're station keeping at about 120 feet or so.

07 05 15 50 CC Roger. Dave, during the command module pitch-around, we'd like for you to take a look at the V over H sensor in the SIM bay, if you can. Do you know how to spot it?

07 05 16 06 CDR-LM The which sensor?

07 05 16 07 CC V over H.

07 05 16 17 LMP-LM Yes, it's - it's on the pan camera gadget.

07 05 16 20 CDR-LM Okay, I guess we're not - Well, Al's talking to us.

07 05 16 26 CC Okay, what we're looking for is to see if anything is in the way of the lens of that sensor.

If you're not familiar, I can give you a page number in your LM Data Systems Book. Just take a look at it.

07 05 16 50 CDR-LM Okay, stand by 1.

07 05 16 56 CMP No, it's not - it's not on the lens, Dave. It's right alongside the lens on the body of the camera - -

07 05 17 00 CC We've got a picture of it, Al.

07 05 17 01 CMP - - it tells us what speed to take the pictures at.

07 05 17 05 CDR-LM Okay, we'll get a picture of it.

07 05 17 06 CMP Okay.

07 05 17 20 CMP Okay. I'll go ahead and do your pitcharound.

07 05 17 40 CMP And, Dave, give me - give me a call when you start.

07 05 17 45 CDR-LM Okay.

07 05 17 59 CDR-LM Houston, what page is that on in the LM Systems Book?

07 05 18 02 CC Okay. It's page 43 in the LM Systems Bo - Data Book.

07 05 18 10 CDR-LM Okay.

07 05 18 11 CC Okay. On the right-hand side, Dave, you see that one little line that says, "Mapping and pan cameras N<sub>2</sub> PRESS systems assembly."

07 05 18 21 CDR-LM We haven't got it out yet. Stand by.

07 05 18 23 CC Okay.

07 05 18 35 CMP Yes, I'll go the higher rate, Dave.

07 05 19 01 CMP Okay, here we go.

07 05 19 03 LMP-LM Go ahead.



07 05 19 11 CDR-LM Hey, it looks good, you're going the right way.

07 05 19 37 CC Dave, while he's pitching, I'll tell you - should be about the middle of the SIM bay by the Mapping Camera.

07 05 20 18 CDR-LM Very nice maneuver, Endeavour.

07 05 21 05 CDR-LM Okay, Houston. We don't see it labeled in here. Where - Is it labeled on the picture?

07 05 21 10 CC Negative. As soon as you have the picture, I'll tell you where to look.

07 05 21 15 CDR-LM Okay, we got the picture; tell us where to look.

07 05 21 17 CC Okay, way over on the right-hand side, where it says, "Mapping and pan cameras N<sub>2</sub> PRESS system assembly."

07 05 21 34 CC It's on the right picture.

07 05 21 41 CDR-LM The one with the covers open?

07 05 21 43 CC That's affirm. Between the end of that arrow and the lens, about halfway, is a little dot that represents the V over H assembly. Now, the camera lens will be covered - rather it will be folded up so you will not be able to see it; however, that is the item you are looking for, represented by the small circle about halfway in between the end of the arrow and the lens of the camera.

07 05 22 12 CDR-LM Okay, I see a small circular object there just - just to the right of the handle, and I don't see anything covering it.

07 05 22 23 CC Are you talking about the diagram or in the SIM bay.

07 05 22 28 CDR-LM No, in the SIM bay.

07 05 22 30 CC Okay. That's what we wanted to know.

07 05 22 37 CDR-LM Yes, it's a little round, black - -

07 05 22 39 CC That's it - that's it.

07 05 22 40 CDR-LM - - ... type of affair, right?

07 05 22 44 CC If you can snap a picture of it, we'd appreciate it.

07 05 22 54 CDR-LM Okay, we'll get one, Ed. Stand by.

07 05 23 31 CDR-LM Okay, we've got the picture, Houston, and we'll proceed on with the docking.

07 05 23 34 CC Thank you, sir.

07 05 23 39 CMP Okay, I'll pitch back around now, Davy.

07 05 23 40 CDR-LM Okay.

07 05 24 01 CC And, Falcon; Houston. Do you have any comments on the SIM bay, anything look out of the ordinary?

07 05 24 09 CDR-LM No, it looks very clean. The doors are all covered, and all the booms are retracted; and it looks neat and tidy.

07 05 24 16 CC Thank you.

07 05 25 26 CMP Okay, where'd you go ?

07 05 25 30 CDR-LM We should be right where we were. Have you completed your maneuver?

07 05 25 33 CMP Roger.

07 05 25 34 CDR-LM Okay, we're in the same inertial attitude, I'll come back around to you. ...

07 05 27 24 CMP There you are.

07 05 28 03 CDR-LM Okay, Endeavour. Would you handle stationkeeping, we're going to pitch and yaw now.

07 05 28 09 CMP Okay.

07 05 28 20 CDR-LM Pitching down.

07 05 29 09 CDR-LM Okay.

07 05 30 09 CDR-LM Okay. ... Endeavour, it's all yours.

07 05 30 14 CMP Okay, Houston. Ready to get ... ARM, ON.

07 05 30 21 CC Stand by.

07 05 30 26 CMP Roger. I'll ... turn on the LOGIC when you're ready.

07 05 30 29 CC Okay, bring it on.

07 05 30 34 CMP LOGIC 1 - LOGIC 2.

07 05 30 48 CC Go for PYRO ARM.

07 05 30 56 CMP Roger.

07 05 35 52 CMP ... barber pole.

07 05 35 54 CDR-LM ...

07 05 35 56 CC Roger.

07 05 35 58 CDR-LM ...?

07 05 36 11 CMP Okay. You ready to come in?

07 05 36 13 CDR-LM All set.

07 05 36 28 CDR-LM Hard dock.

07 05 36 30 CC Roger. Roger. Copy hard dock. And, Falcon, if you'll give us 105 and 67, we should have your steerable .

07 05 36 41 LMP Roger. 105 and 67.

07 05 36 51 DR Good show, Endeavour. It's nice to be aboard again.

07 05 36 53 CMP Welcome home.

07 05 36 55 CDR Thank you.

07 05 37 06 CC And Falcon, Houston. Now that we have the steerable back, when you get a moment, pull the ECS AUTO TRANSFER, open, and then the GLYCOL PUMP 1 open.

07 05 37 23 CDR Roger. ECS AUTO TRANSFER is open - and I'll open the GLYCOL PUMP 1 now.

07 05 37 29 CC Roger. We want to get a little data down here.

07 05 37 36 CDR Okay, do you want us to select 2, or just let it run?

07 05 37 38 CC Negative. Just wait for 30 seconds.

07 05 37 43 CDR Okay, we'll stand by for your call.

07 05 37 45 CC Thank you.

07 05 37 49 LMP And, Houston; Falcon. Do you have an update for us for the LM weight/CSM weight?

07 05 37 54 CC Roger. Stand by. LM weight, 5444.

07 05 38 09 LMP Roger. LM weight 5444.

07 05 38 11 CC And I don't have a CSM weight at the moment. And you can close the GLYCOL PUMP 1 first and then the AUTO TRANSFER.

07 05 38 21 CDR Roger. Closing GLYCOL PUMP 1 now - AUTO TRANSFER now.

07 05 38 28 CC Roger, and I thank you.

07 05 39 05 CMP Go ahead. All right, I got it.

07 05 39 36 CC And, Endeavour; Houston. A couple of changes to the command module - LM/command module transfer list on stowage items, when you get a break.

07 05 39 54 CMP Okay, Houston. Stand by 1.

07 05 40 05 CC And, Falcon, we'll take DATA and up-link you.

07 05 40 11 CDR You've got it.

07 05 40 12 CMP Okay, Houston; Endeavour. You might as well give me those updates now.

07 05 40 18 CC Okeydoke, Endeavour. On page 2 - 283 -

07 05 40 33 CMP Okay, go.

07 05 40 35 CC Okay, Al. About the middle of the LM to command module transfer list, the second DECOM bag and the fourth DECOM bag - scratch.

07 05 40 50 CMP Understand. Scratch second and fourth DECOM bags.

07 05 40 53 CC That's affirm. And the - at the bottom, write "Collection bag (3) in A-9."

07 05 41 19 CMP Understand. Add "Collection bag (3) in A-9."

07 05 41 21 CC Roger. And they're going to give you a - a section of core stem, three sections long, you'll have to put that on the left-hand tray along A-1 and A-2, and secure it with - with either you LM tiedown rope or your extra webbing in there.

07 05 41 40 CMP Roger. I understand. The core tubes go along A-1, A-2, tied down on the tray.

07 05 41 43 CC That's affirm. You got it.

07 05 42 27 CMP Dave, you want to verify that the dump valve's in AUTO?

07 05 42 37 CC Roger. Standby 1.

07 05 42 39 CDR Verify.

07 05 42 40 CMP Okay, I'll go ahead and start equalizing the pressure.

07 05 42 41 CDR Okay, good.

07 05 43 12 CC And, Falcon; Flight - or rather, Falcon, Houston. FIDO's on pins and needles for your TPI solution if you can get a moment to read it to us.

07 05 43 23 CDR Roger, we'll do it right now.

07 05 43 38 CDR Okay, Houston. I assume that you got the recycle before we went around the corner there.

07 05 43 43 CC That's affirm.

07 05 43 47 CDR Okay, on the final comp, I'll read PGNS, AGS and CMC, if you are ready to copy them, in that order, in local-vertical coordinates.

07 05 43 56 CC Roger. Ready.

07 05 44 00 CDR Okay. For the PGNS: plus 70.3, plus 5.9, minus 17.7. For the AGS: plus 70.4, plus 5.9, minus 19.1. The CMC: minus 69.1, minus 6.1, plus 16.1. We burned the PGNS on time, and we had about a 4-foot-per-second overburn on the APS, which we trimmed out to 2/10ths.

07 05 44 41 CC Copy.

07 05 44 47 CDR Okay, the residuals were - for the PGNS after the trim - were plus .2, plus .2, and minus .4.

07 05 44 56 CC Copy. And assume midcourses were ...

07 05 45 02 CDR Roger. We'll give you those, too.

07 05 45 27 CDR Okay, and I'll give you the same answers for mid-course 1 if you're ready to copy, Houston.

07 05 45 31 CC Okay.

07 05 45 36 CDR Okay, PGNS was minus 1.1, 0, and minus 1.1. AGS was minus 1.5, 0, and minus 3.0. CS - CSM, plus 1.5, minus .2, plus 1.9. And we burned the PGNS solution to 0.1 and .2.

07 05 46 03 CC Thank you, Dave, that's fine. Appreciate it.

07 05 46 07 CDR Okay, you want midcourse 2?

07 05 46 11 CC No, we'll take you PGNS - we'll take all the rest of them; we'll get them later.

07 05 46 17 CDR Okay, fine. It was pretty smooth all the way, every thing looked nice, and the data went in very well, and I thought it was a super rendezvous.

07 05 46 27 CC Very good. Getting home's the main thing.

07 05 46 32 CDR Yes, but you know, these systems are just magnificent.

07 05 46 36 CC Yes, they sure are, Dave. Okay, we suggest you press right along with your transfer and cleaning up.

07 05 46 46 CDR Roger. We're in work right now.

07 05 46 48 CC And whenever Jim's ready to do the targeting, we'll read him a pad on that.

07 05 46 56 CDR Okay, stand by, we'll give you a call.

07 05 47 42 LMP Okay, Ed. I'm ready to copy the impact pad.

07 05 47 49 CC Okay, understand you're ready for the LM impact pad, Jim; is that correct?

07 05 47 56 LMP Yes, if that's what you have to pass.

07 05 47 58 CC Okay, it's a P30 pad. 179:06:22.50; NOUN 81, minus 0121.9, plus 0056.0, plus 0148.8; 0071.1 minus 0037.1, 0200.3; 1:27; 047, 174. The rest is NA. And the LM weight is 5444.

07 05 48 52 LMP Roger. Readback for P30 pad. 179:06:22.50; minus 0121.9, plus 0056.0, plus 0148.8; 0071.1, minus 0037.1, 0200.3; 1:27; 47, 174. And LM weight is 5444.

07 05 49 22 CC Good readback, Jim.

07 05 49 43 CC And, Falcon; Houston. The computer's yours.

07 05 49 51 CDR Roger.

07 05 49 53 CC And we want to leave it in DATA, of course.

07 05 50 01 CDR Okay, we'll leave it in DATA. It's all yours now.

07 05 50 27 CC And, Endeavour; Houston. Before you get LOS and get too busy with transfer, I need to give you a camera photo pad for the next pass.

07 05 50 41 CMP Okay. Go ahead, Houston.

07 05 50 45 CC Okay, this is the one on that 174:50, A1. T-start - for the map camera - T-start, 174:50:04; T-stop, 175:49:36. Your IMAGE MOTION BP plus 4 at T-start, and BP at 175:30:00. And your pan camera photo pad, to be copied at 175:20. T-start, 175:34:32; T-stop is 36:52.

07 05 51 42 CMP Roger, Ed. Understand mapping camera photo pad is T-start, 174:50:04; T-stop, 175:49:26. And at T-start, you want IMAGE MOTION to go barber pole plus 4.

07 05 51 59 CC That's affirm.

07 05 52 00 CMP And, at 175:30, understand you want IMAGE MOTION to go to barber pole.

07 05 52 07 CC That's affirm, Al. And the correct time for the T-stop on that was 175:49:36.

07 05 52 20 CMP Understand, 49:36.

07 05 52 37 CMP And the pan camera photo pad is T-start, 175:35:42; T-stop, 175:36:52.

07 05 52 48 CC Roger. The T-start, 175:34:32; T-stop is good.

07 05 53 05 CMP Understand, T-start is 175:34:32.

07 05 53 08 CC That's a good readback now, Al.

07 05 55 12 CMP Yes, it's, pressurized, Jim. Can you read me? Okay, tunnel's pressurized and I'm up in it now, checking the latching.

07 05 57 41 CDR Hello, Houston. The Falcon is back on its roost and going to sleep.

07 05 57 47 CC Very good.

07 05 57 54 CDR She's all yours now, Ed. We're going to go off comm and put her to bed.

07 05 57 59 CC Okay, one item, Dave. You're not marking these bags before you hand them to Al, are you?

07 05 58 10 CDR The bags are all numbered. We've got the collection bags in the cover bags with the proper numbers on them, and that was all we were planning to do.

07 05 58 20 CC Okay, you're not helping him with the stowage when you pass them in, are you? I would change your Flight Plan if you did; otherwise, I'll just give it to him.



07 05 58 33 CDR Well, I guess the best thing would be to go ahead and give it to him, because we'll just pass them over then.

07 05 58 39 CC Okay, I've given them to him already. Thank you.

07 05 58 43 CDR Yes, that fine, he - he's got a much better handle on the stowage over there anyway than we do.

07 06 02 20 CC Endeavour, Houston.

07 06 02 25 CMP Houston, Endeavour. Go ahead.

07 06 02 27 CC Al, we observed when you were in P79, just before the docking, that you got a P00 D00. Do you have any words on that?

07 06 02 39 CMP No, I don't, Ed.

07 06 02 55 CC And, Endeavour; Houston. We're going to have to update your Flight Plan with a couple of items before you go around the corner, whenever you can get around to it.

07 06 03 07 CMP Okay, Ed, let's go ahead and do them now.

07 06 03 11 CC Roger. And, Al, give us a VERB 74 while I'm talking to you.

07 06 03 22 CMP Roger. VERB 74.

07 06 03 24 CC Okay, the first Flight Plan update is the - at 174:12.

07 06 03 37 CMP Okay, go ahead.

07 06 03 39 CC Okay, where it says the "Mapping camera laser experiment covers, open," et cetera, et cetera - delete that.

07 06 03 50 CMP Roger. Go ahead.

07 06 03 51 CC And the second line after that, the "Map camera track," et cetera, et cetera; delete that, we're going to move those to 174:40.

07 06 04 11 CMP Okay, understand.

07 06 04 13 CC Okay, down a little bit in the next group of words where it says "Laser altimeter, on" at 174:17, we're going to scratch that.

07 06 04 27 CMP Okay, scratch laser altimeter.

07 06 04 30 CC We're going to move that to 174:49.

07 06 04 42 CMP Roger. Move to 174:49.

07 06 04 45 CC Okay, and at 175:49, going to add a - another LASER ALTIMETER, OFF.

07 06 05 07 CMP Roger, understand. At 175:49, LASER ALTIMETERS, OFF.

07 06 05 13 CC Okay, the next item is at 1 - Stand by on that a minute. And at 175:54, delete the LASER ALTIMETER, OFF.

07 06 05 37 CMP Understand. At 175:58 [sic], delete LASER ALTIMETER, OFF.

07 06 05 46 CC That's affirm.

07 06 05 48 CMP Okay.

07 06 05 49 CC And at 176:02, the next page right after all those words, we want to add in the "Map camera" - that's about 176:02 - "MAP CAMERA/LASER EXPERIMENT COVERS, CLOSE, talkback's barber pole, flash gray, then OFF."

07 06 06 25 CC Looks like that item came down there about 4 minutes later, Al.

07 06 06 35 CMP Roger that, I see it now.

07 06 06 38 CC Yes, I just now saw it, too. I presume they want it moved up there a few minutes. And at 178:02; Oh, sorry about that - at 177:56, put in a "LOGIC POWER (2), OFF.

07 06 07 15 CMP Okay, I understand LOGIC POWER, both of them, OFF, at 177:56.

07 06 07 20 CC Roger. Next page, 178:02, "LASER ALTIMETER, ON," delete.

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07 06 07 40 CMP

Delete "LASER ALTIMETER, ON," at 178:02.

07 06 07 44 CC

Okay. And at 179:40, following page, delete "LASER ALTIMETER, OFF" - and about 179:41, delete those two lines, "MAP CAMERA/LASER EXPERIMENT COVERS" and "LOGIC POWER (2), OFF." Delete those.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 06 08 02 CMP Okay. Delete the three lines at 179:40, "LASER ALTIMETER," "MAPPING CAMERA COVERS," and "LOGIC POWER, OFF." Delete those three lines.

07 06 08 12 CC Okay. I think we got them all that time, Al. Thank you.

07 06 08 15 CMP Okay.

07 06 09 17 CC And, Endeavour, Houston. If you can holler at Dave and Jim, remind them that - to get their radiation meters out of their pockets. We'd still like those readings we didn't get earlier.

07 06 09 34 CMP Roger, Houston.

07 06 10 48 CC Okay, Endeavour, Houston. Can we have AUTO on the HIGH GAIN? And request Falcon to go to AFT OMNI as he goes over the hill or after he's over the hill.

07 06 11 02 CMP Okay. You want Falcon to go AFT OMNI.

07 06 11 04 CC Yes, at LOS. And you're about 3 and a half minutes from LOS now.

07 06 11 16 CMP Okay, I'm in AUTO and they're going to go to AFT OMNI at LOS.

07 06 11 20 CC That's firm. And ask them when they do that to verify TRACK MODE, SLEW.

07 06 13 53 CC And, Endeavour, we're about 40 seconds from LOS; see you on the other side.

07 06 14 00 CMP Okay, Ed. Thanks much.

07 06 37 -- BEGIN LUNAR REV 50

07 07 01 07 CC Apollo 15, Houston. Standing by.

07 07 01 13 CMP Houston, 15. Still in the midst of doing a little house cleaning.

07 07 01 21 CC Okay; kind of figured that, Al.

07 07 06 37 CC Endeavour, Houston. Would you ask Falcon to switch to FORWARD OMNI?

07 07 06 46 CMP Roger, Houston.

07 07 06 48 CC And, Al, do you want to verify - verify that you got your mapping camera started at 174:50?

07 07 06 58 CMP Yes. Roger, Ed. Was 1 minute late on that - on the mapping camera, but we got it started at 1 - at 174:51.

07 07 07 05 CC Okay, Al. Thank you.

07 07 08 31 CMP Houston, 15.

07 07 08 32 CC Go ahead, 15.

07 07 08 37 CMP Roger, Ed. One other thing, I didn't get the P52 put in.

07 07 08 40 CC Okay, I understand, no P52.

07 07 08 45 CMP Affirm.

07 07 08 50 CC Al, I'll keep track of your cameras for you and give you a warning on the stops and starts.

07 07 08 56 CMP Okay; if you would, that would help.

07 07 09 15 CC 15, Houston. Give me REACQ and NARROW, please.

07 07 09 21 CMP Okay, REACQ and NARROW.

07 07 13 44 CC 15, Houston. We're having a lot of trouble with the LM COMM. Apparently, we're right in - in the midst of the OMNI. Let's try AFT again, please.

07 07 14 00 CMP Houston, I was talking with Dave. Say again.

07 07 14 03 CC Roger. Let's try the LM AFT OMNI again, please.

07 07 16 21 CC 15, Houston.

07 07 16 26 CMP Roger, Houston. Go ahead.

07 07 16 28 CC How about the GAMMA RAY GAIN switch? Snap it three times for us, please, Al.

07 07 16 35 CMP Okay, three times.

07 07 22 02 CC Apollo 15, Houston.

07 07 22 07 CMP Houston, 15.

07 07 22 09 CC Al, we're going to change your mapping camera procedures. I'm going to call them to you on time rather than read them to you now. So press on, and I'll give you a warning here in about 5 or 6 minutes.

07 07 22 23 CMP Yes, that'd be fine, Ed. Just give me a couple minute warnings, so I can get over to the camera. As you probably know, the LEB TIMER's not working.

07 07 22 31 CC Roger. I'll keep you posted on time; press on.

07 07 22 37 CMP Okay.

07 07 24 56 CC Apollo 15, Houston.

07 07 25 01 CMP Go ahead, Houston.

07 07 25 02 CC Al, we observe that your - got P00 up instead of P20. Better check your attitude and get her back in P20, and let's see if our camera is pointed at anything.

07 07 25 15 CMP Okay.

07 07 25 46 CMP Houston, 15.

07 07 25 48 CC Go ahead.

07 07 25 52 CMP Roger. That just happened about 15 seconds ago. You must have caught it just as it went to P00. And I don't think we're even out of the dead - band.

07 07 26 00 CC Very good. And, Al - yes, stand by. We still got a couple of minutes yet. What I'm going to do is have you RETRACT the MAPPING CAMERA with it still running and then turn it off. We're

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running a little test on it. And I'll call back for you in a couple of minutes.

07 07 26 20 CMP Okay.

07 07 28 21 CC Apollo 15, Houston. Stand by to RETRACT the MAPPING CAMERA.

07 07 28 28 CMP Okay, standing by.

07 07 28 31 CC MARK. Start retracting.

07 07 28 38 CMP Okay; it's retracting now.

07 07 28 40 CC Take about 4 minutes, Al, and I'll call you after that.

07 07 28 46 CMP Okay.

07 07 31 54 CC Okay. Apollo 15, Houston. Turn your MAPPING CAMERA, OFF.

07 07 32 05 CMP Okay, Ed. MAPPING CAMERA going OFF.

07 07 32 06 CC Roger. The LASER ALTIMETER, OFF. And the MAP CAMERA/LASER COVERS, CLOSED.

07 07 32 14 CMP Okay, LASER ALTIMETER's OFF.

07 07 32 19 CC And I'll have the PAN CAMERA T-start here in just about 2 minutes. I'll call you and give you 15 or 20 seconds warning.

07 07 32 28 CMP Okay.

07 07 34 18 CC 15, Houston. Stand by for T-start on the PAN CAMERA.

07 07 34 28 CMP Standing by.

07 07 34 32 CC MARK. T-start, PAN CAMERA.

07 07 36 40 CC 15, Houston; stand by for PAN CAMERA, OFF.

07 07 36 52 CMP 15. Roger.

07 07 36 54 CC MARK. PAN CAMERA, OFF.

07 07 36 59   CMP       It's OFF.

07 07 37 01   CC        Okay, Al, that completes all that for us. Thank  
                  you.

07 07 37 08   CMP        Okay, Ed. Thank you very much.

07 07 37 13   CC        Go ahead, 15.

07 07 38 00   CC        Okay, Apollo 15; Houston. We're getting a little  
                  itchy for some LM data. We'd like for them to  
                  bring up the steerable if they can, please, at  
                  146 and 29.

07 07 38 14   CMP        Okay, Ed. Have them bring up the steerable.

07 07 38 17   CC        Roger. Angles 146 and plus 29.

07 07 38 26   CMP        Understand. Angles 146 and plus 29.

07 07 38 46   CC        And, 15, we verify that your PAN CAMERA is in,  
                  and you can turn the POWER, OFF, on it.

07 07 38 53   CMP        Okay.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 07 43 29 CC Apollo 15, Houston. You can start your maneuver to jettison attitude at any time. And I have a slight update to the attitude.

07 07 43 44 CMP Okay, Houston, 15. Standby 1.

07 07 43 48 CC Roger. Standing by.

07 07 47 59 CC Apollo 15, Houston. Your GAMMA RAY, GAINSTEP, SHIELD, OFF, please.

07 07 48 10 CMP Okay, Ed. GAMMA RAY, GAIN, SHIELD going OFF.

07 07 48 31 CMP Houston, 15.

07 07 48 33 CC Go ahead, 15.

07 07 48 39 CMP Okay, Ed, it looks like the chaos is slowing down a little bit here, if you want to talk about the Flight Plan.

07 07 48 44 CC Okay, Al. You can start your maneuvering to your LM jettison attitude most anytime. And I'll update the attitude for you. It's ROLL 14, PITCH 38, and YAW 344.

07 07 49 13 CMP Roger. And understand the LM jettison attitude is ROLL 014, PITCH 038, and YAW 344.

07 07 49 27 CC Roger. And the time is 177:20:33.

07 07 49 35 CMP Understand. Jettison time is 177:20:33.00.

07 07 49 40 CC That's right; and the CSM SEP time here is 177:25:33.

07 07 49 59 CMP Understand. The CSM SEP is 177:25:33.

07 07 50 02 CC Roger. And your CSM weight for your DAP is 36,370.

07 07 50 15 CMP Understand. DAP weight is 36,370.

07 07 50 19 CC Roger. And I'll call this GAMMA RAY, GAINSTEP, SHIELD, back on, Al. We want to let it go for 10 minutes yet.

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07 07 50 27 CMP Okay, GAINSTEP comes back to SHIELD, on.

07 07 50 30 CC Negative, negative. I'll call it back on in 10 minutes.

07 07 50 38 CMP Roger. Roger. Understand.

07 07 57 06 CC Apollo 15, Houston.

07 07 57 12 CMP Houston, 15; go ahead.

07 07 57 13 CC Roger. Would you ask Dave and Jim to make sure that we go ahead and get steps 4 and 5 on page 14 of their checklist before LOS here. And then, as soon as we get into attitude, we can take a look at all this before we go LOS. We got about 16 minutes.

07 07 57 37 CMP Okay, understand. That's steps 4 and 5 on page 14.

07 07 57 40 CC That's affirm.

07 07 57 52 CC And, Apollo 15; Houston. Also, go ahead and get the P30 and et cetera, et cetera.

07 07 58 05 CMP Roger. Understand. Go ahead and get the P30 in the LM.

07 07 58 08 CC And there is no update to the T<sub>ig</sub>. It's good as given to you earlier.

07 07 58 17 CMP Roger. Understand. T<sub>ig</sub> is good.

07 07 58 30 CC And, Al, stand by to turn the GAMMA RAY, GAINSTEP, SHIELD, on.

07 07 58 38 CMP GAMMA RAY, SHIELD, on.

07 07 58 40 CC Okay, MARK ON, and let's take the MAP CAMERA, ON switch to STANDBY and the MAP CAMERA, IMAGE MOTION, OFF.

07 07 58 53 CMP Okay. MAP CAMERA, STANDBY, IMAGE MOTION, OFF.

07 07 58 56 CC That about cleans us up, Al.

07 07 59 01 CMP Okay, Ed. Thank you much for your help.

07 07 59 09 LMP Oh, Ed, I'm back on comm, over in the Falcon.

07 07 59 13 CC Okay, Jim. Sounds good. Should be in attitude in just a minute. And your angles 205 and 70, as in the Flight Plan, should be good, and we're about 13 minutes from LOS.

07 07 59 32 LMP Okay. Do you have any updates for me before we have LOS?

07 07 59 37 CC Negative. All we wanted to do was just - the guidance systems state vector's okay and configured before LOS, and I don't believe we have an update. I'll check.

07 08 00 16 CC Falcon, Houston. We'd just like to complete down through step 1 or 2 of **configure** AGS before LOS. And, Endeavour, if you can give us an ACCEPT, we'll shoot you an up-link before LOS.

07 08 00 34 CMP Okay, getting ACCEPT.

07 08 00 38 LMP Falcon copies.

07 08 00 48 CMP You got ACCEPT.

07 08 00 49 CC Understand.

07 08 02 40 LMP Ed, can you get for - the P30 load here for me as I go through it?

07 08 02 45 CC Okay, stand by 1. Okay. Go ahead. Got the first one.

07 08 03 04 LMP Okay, how does that look?

07 08 03 10 CC Looks good.

07 08 05 02 CC Looks good here, Jim.

07 08 05 06 LMP Okay, I'll PRO on this one.

07 08 05 46 LMP Okay, I'm going to go to P00, Ed.

07 08 05 47 CC Roger, Jim. That one looks okay, too. I don't see much of it.

07 08 05 54 LMP That's right. Okay, do we have a GO for close-out?

07 08 06 03 CC Give us a 470 readout on the DEDA, please.

07 08 06 09 LMP Okay. You have it.

07 08 06 24 CC Okay. And, Jim, can you verify that you've done all of step 2 on the comm?

07 08 06 31 LMP Yes, I meant SLEW on the TRACK MODE.

07 08 06 51 CC Okay, Jim. You're GO for closeout. The next time we see the LM, you'll all be buttoned up. So suggest you make a very careful check of the items from now on.

07 08 07 03 LMP Okay; thank you, Ed.

07 08 07 08 CC And, Endeavour. It's your computer.

07 08 07 15 CMP Roger, Ed.

07 08 11 23 CC Okay, Endeavour, Houston. We're a minute and 20 seconds from LOS. Your ascent CAPCOM's going off duty, and I'll see you back on Earth. It's been a lot of fun getting you up there.

07 08 11 38 CMP Okay, Ed. You're - thanks a million, pal. You've been a great help, and it was fun talking to you.

07 08 11 43 LMP Hey, Ed; Falcon. Looks like we just about got things cleaned up here.

07 08 11 47 CC Very good, guys. We'll see you in a few days. Thanks a lot.

07 08 11 53 CMP Okay, Ed, thank you.

07 08 35 -- BEGIN LUNAR REV 51

07 08 59 38 CC Apollo 15, Houston. Over.

07 08 59 47 CDR Hello, Houston; 15. How are you?

07 08 59 49 CC Roger. Doing fine down here. Can you fellows confirm LM closed out and ready for jet?

07 08 59 59 CDR Roger. LM's closed out, and we're just now running our pressure integrity check, and we'll be all set in a jiffy.

07 09 00 06 CC Roger.

07 09 04 01 CDR Houston, 15.

07 09 04 03 CC Go ahead, 15.

07 09 04 07 CDR Okay, we are going to be a few minutes here. We got to put some LCG plugs in our suits, and it's going to take probably about 10 or 15 minutes to get all that done.

07 09 04 20 CC Okay, and we'd like a verification from Al that X-RAY is in STANDBY and X-RAY/ALPHA COVERS are CLOSED before jet and SEP burn.

07 09 04 37 CDR Okay. We'll get that for you when we get squared away here.

07 09 04 40 CC Yes.

07 09 10 02 CC Apollo 15, Houston.

07 09 10 09 CDR Houston, Apollo 15. Go.

07 09 10 11 CC Say, Dave, beautiful job there today all the way around. Hey, one quick question - how come you guys need plugs for those suits?

07 09 10 22 CDR Well, because, apparently, the LCG connection on the inside won't hold - an air seal, so we're getting them taken care of with these special - extra little blue plugs we got that are air tight on the inside.

07 09 11 13 CDR At least that's our first guess of - of why we didn't get a good suit integrity check or didn't even get a good buildup in the suit pressure.

07 09 11 22 CC Roger. We - we had a complete misunderstanding on that, so that's the reason I asked the question, because we thought those plugs only were required when the LCG was not on. We're trying to crack that one for you down here, Dave. There's something screwy here.

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07 09 11 41 CDR      Okay. Well, we'll put these plugs in and run  
another pressure integrity check and see how it  
works.

07 09 11 46 CC      Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 09 13 35 CC 15, Houston.

07 09 13 41 CDR Houston, 15. Go.

07 09 13 43 CC Roger, Dave. You guys talking about inside plugs or outside plugs.

07 09 13 50 CDR Inside plugs.

07 09 13 54 CC Roger.

07 09 18 28 CDR Okay, Houston, 15. We've got a good SUIT CIRCUIT now.

07 09 18 33 CC Roger. We've been looking at it; copy, agree.

07 09 19 44 CC And, 15, we're still looking for an X-RAY/ALPHA COVER door, CLOSED.

07 09 19 57 CDR Okay. Stand by 1, Houston.

07 09 19 59 CC Roger.

07 09 20 11 CDR Okay, Houston. The X-RAY/ALPHA door is CLOSED.

07 09 20 15 CC Copy.

07 09 21 33 CMP Houston, 15.

07 09 21 34 CC Go.

07 09 21 39 CMP Okay, we're ready to ARM the LOGIC.

07 09 21 44 CC Roger. We're looking.

07 09 21 48 CMP Okay. LOGIC 1. LOGIC 2.

07 09 22 02 CC Roger. You're GO for PYRO ARM.

07 09 22 06 CMP Roger.

07 09 22 48 CMP 15, LM/CM DELTA-P is 2.5 - 2.0, excuse me.

07 09 22 55 CC Copy, 2.0.

07 09 23 00 CMP Okay.

07 09 23 26 CDR Houston, 15.

07 09 23 28 CC Go.

07 09 23 37 CDR Houston, 15.

07 09 23 39 CC Roger, 15. Go.

07 09 23 44 CDR Okay, the LM/CM DELTA-P doesn't look exactly right to us. What do you think?

07 09 23 49 CC Stand by.

07 09 24 32 CC 15, Houston. We'd like to get another pound out of there. We're showing about 3.5 in there.

07 09 24 42 CDR Okay. We had a suspicion that possibly the LM overhead dump valve was open, and it might be.

07 09 24 54 CC We don't think so down here.

07 09 25 00 CDR Okay. Well, we'll go to TUNNEL VENT for a little longer, must just be slow then; we've been in it for probably about 15 minutes.

07 09 25 12 CC Copy.

07 09 25 27 CC 15, what position are you in when you're reading that out, in VENT or in DELTA-P?

07 09 25 34 CDR DELTA-P.

07 09 25 37 CC Roger.

07 09 25 43 CDR It's up to about 2.3 now, and I've been holding it in TUNNEL VENT.

07 09 25 59 CC 15, we'll take that. It'd take too long to get it down, we believe. So let's press on with JETT at that pressure.

07 09 26 09 CDR Okay, well, the strange thing about it is that we had it up to about - oh 2.7 or 2.8 at one time and then went back to LM/CM DELTA-P, and for some reason it built back up in the tunnel. And, I guess the only conclusion we could come to was - from the LM, because the hatch is pretty simple and secure in here.



07 09 26 47 CC Dave, we think that the increase in the cabin pressure during the suit integrity check could have raised it from - from your side.

07 09 27 04 CDR Well, okay, that's - that's true.

07 09 27 11 CC Bye, Dave; confusion reigns down here.

07 09 27 14 CDR Could you see any ch - Well, I guess it sort of does up here, too. I wonder if you see any difference in the - you can't read the tunnel, though, can you?

07 09 28 24 CC And, 15; this is Houston. We'd like to verify that you did get a good hatch integrity check back there a ways.

07 09 28 36 CDR Yes, that's firm. We got a good hatch integrity check, but - I guess what I'm thinking is there's - you know, there could be something in the seal there. And perhaps the thing to do would be to repressurize the tunnel and pull the hatch down, and take a good close look at the seal and then stick it back in. It shouldn't take too long.

07 09 29 33 CC Apollo 15, Houston. That seems to be about the best conclusion we can come to down here, but we're - kind of like to go into a hold briefly. Another indication is that we would - we are seeing the LM cabin holding steady and not using any oxygen from the ascent tanks, which seems to say that we're not leaking into the tunnel from the LM.

07 09 30 02 CDR Okay, understand.

07 09 30 08 LMP Do we?

07 09 30 44 CC 15, Houston. We'd like to verify that the pressure equalization valve is closed.

07 09 30 54 CDR That's verified; it's closed and on the yellow strips.

07 09 30 58 CC Roger.

07 09 31 32 CC And, 15, we'd like to back out of your PYRO ARM situation right now.

07 09 31 43 CMP Okay, Houston, 15. PYRO ARM is SAFE, LOGIC is OFF, and the PYRO ARM circuit breakers are pulled.

07 09 31 50 CC Copy.

07 09 32 22 CC 15, can you give us a LM/CM DELTA-P reading at this time; please?

07 09 32 31 CDR Okay, right now it's 3.0.

07 09 32 33 CC Copy, 3.0.

07 09 32 38 CDR And, I've had the valve in TUNNEL VENT for the last 5 minutes or so.

07 09 32 42 CC Copy.

07 09 34 40 CC Apollo 15, Houston. Recommendation right now is to stop the - the LM TUNNEL VENT, and then we will sit and monitor the CM/LM DELTA-P for a short while to see what happens to it. And, after that, we're still considering opening up the tunnel to check the seal. Over.

07 09 35 03 CDR Okay, we're in LM/CM DELTA-P right now, and it's reading about 3.1.

07 09 35 09 CC Copy, 3.1.

07 09 36 35 CC 15, we'd like to pull the B/D ROLL jets.

07 09 36 43 LMP Roger. B/D ROLL jets coming off.

07 09 37 44 CC And, 15, if one of you has a chance, would you put X-RAY to STANDBY, please?

07 09 37 54 CDR Roger X-RAY to STANDBY.

07 09 38 41 CDR Okay, Houston; it's in STANDBY.

07 09 38 43 CC Thank you.

07 09 40 40 CC 15, Houston. You give us a reading now on that?

07 09 40 49 CMP Okay, Houston; stand by 1.

07 09 41 00 CMP It's just a little under 3.1, just a - just a hairline.

07 09 40 07 CC Roger; copy. And we're still looking at the possibility of opening the hatch. We're just trying to - right now, trying to understand the situation before we open the hatch and destroy the configuration we're in.

07 09 41 23 CDR Okay, we'll stand by.

07 09 46 38 CC And, 15; Houston. Could we have another reading in 10 minutes?

07 09 46 48 CDR Well, it's reading right now just about the same that it was when I last called you.

07 09 46 54 CC Roger; copy. There's certainly enough uneasiness down here that we think we ought to proceed back through and open both the command module hatch and the LM hatch, check the seals on both and the relief valves on both, proceed back through that doing - doing those checks, because there could be a very slight leak from the LM that the telemeter guys would not see at - for this small volume in the tunnel. Over.

07 09 47 27 CDR Roger. We sort of think that's a good idea, too. We'll proceed.

07 09 47 31 CC Roger. Keep us posted when convenient.

07 09 47 36 CDR Roger. Will do.

07 09 47 55 CC 15, just in case you haven't got the idea, when I said check the seals, I mean clean them, too.

07 09 48 03 CDR Roger. Understand. We'll make sure they're good and clean.

07 09 55 36 CDR Okay, Houston; 15. Both hatch seals are clean, and both hatches are now closed and locked. Do you want to vent the tunnel again?

07 09 55 46 CC Roger. Go ahead, Dave. Thank you.

07 09 56 12 CC And, 15, are you guys all still fully suited?

07 09 56 19 CDR Roger. We did not break down the suits; we're still locked up.

07 09 56 23 CC Roger.

07 09 56 35 CDR And the LM overhead dump valve was verified in auto.

07 09 56 39 CC Copy.

07 09 58 30 CDR Okay, Houston. We're 1.3 on - DELTA-P and coming  
- coming up.

07 09 58 35 CC Copy.

07 10 01 37 CMP Okay, Houston; we're about 2.2.

07 10 01 46 CC Copy.

07 10 01 58 CMP And, Houston, do you want to go to 3 and let it  
stabilize there?

07 10 02 03 CC I guess we'll do per the checklist which is 3.5,  
right?

07 10 02 16 CDR Well, not really. Our checklist says before  
jettison only, LM TUNNEL VENT valve, LM TUNNEL  
VENT at least 10 minutes, period.

07 10 02 27 CC Okay. Stand by.

07 10 02 39 CDR Course that's after the hatch integrity check.  
If we want to go ahead and run through the full  
hatch integrity check, then we'd run up to 3.5  
and then run another 10 minutes, I guess.

07 10 02 48 CC Yes, that's the point, Dave. We want to run a  
complete ha - hatch integrity check; in fact,  
we'll proba - we may ask you to run it longer  
than usual.

07 10 02 59 CDR Okay.

07 10 03 02 CC Obviously, what we're thinking about here is a bad  
hatch seal, so we're particularly interested in  
that.

07 10 03 09 CDR Roger.

07 10 04 09 CC And, 15, a reminder. When you're on the back side,  
LM is still in 5-degree dead band, so play it cool  
with the command module.

07 10 04 22 CDR Roger.

07 10 05 58 CC And, 15, what we'd like to see you do is leave that tunnel at 3.5 for the entire back-side pass, and we'll see what happens to that leak rate. That gives us a nice, long leak check on the hatch. And, we'll be satisfied with that DELTA-P for JETT, if that's the way it works out on the other side.

07 10 06 21 CDR Okay. And, I guess in that case, we'll probably break the suits down and then run another suit check before we see you around the corner. So -

07 10 06 34 CC Okay, we'll buy that.

07 10 06 39 CDR It's about time for dinner.

07 10 06 41 CC I knew there was a reason.

07 10 06 46 CDR Roger. Okay, we're about 3.2 now on the DELTA-P. We'll leave LM in VENT.

07 10 07 03 CC Roger. I understand; 3.2 and still venting.

07 10 07 08 CDR Roger.

07 10 07 54 CC Dave, stand by on taking your suits off; if you haven't taken them off already.

07 10 08 01 CDR Okay. We hadn't planned to take our suits off; we're just going to break off the helmets and gloves so we could get something to eat.

07 10 08 11 CC Roger. But stand by on breaking the suits down; because it's a debate as to whether we want to do another suit integrity check.

07 10 08 19 CDR Okay.

07 10 09 24 CC 15, press on. You may - you are permitted to break the suits down, but do not do the suit integrity check until you come back around the other side; we can take another look at that tunnel. Over.

07 10 09 38 CDR Roger; understand. We'll break them down and hold off until we see you on the other side.

07 10 09 43 CC Okay, good luck.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 10 33 -- BEGIN LUNAR REV 52

07 10 50 38 CT Goldstone COMM TECH, net 1.

07 10 50 41 CT Roger. Houston COMM TECH. Stand by. This is Houston COMM TECH. Testing 1 - 2 - 3 - 4 - 5 - 4 - 3 - 2 - 1 - 12345, 54321, test out.

07 10 51 04 CT Houston, we have 100 percent key, and modulation GO.

07 10 51 06 CT Roger. Thank you.

07 10 56 04 CC Apollo 15, Houston. Over.

07 10 56 26 CC Apollo 15, Houston.

07 10 56 50 CC Apollo 15, Houston. Over.

07 10 57 14 CC Apollo 15, Houston. Over.

07 10 58 13 CC Apollo 15, Houston. Over.

07 10 58 31 CT Goldstone COMM TECH, Houston COMM TECH, Net 1.

07 10 58 36 CT Goddard voice, Houston COMM TECH, Net 1.

07 10 58 41 CC Goddard voice, you're loud and clear.

07 10 58 43 CT Roger.

07 10 58 51 CC Apollo 15, Houston, REACQ and NARROW. Over.

07 10 59 49 CC Apollo 15, Houston. Over.

07 10 59 56 CDR Houston, Apollo 15. Go ahead.

07 10 59 59 CC Roger. Do you - Roger. Do you have any good word for us?

07 11 00 05 CDR I'd say LM CM DELTA-P is off scale high.

07 11 00 13 CC Roger. And how did the hatch integrity check go?

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07 11 00 28 CDR Well, we've just had it in tunnel vent all the - the way around the back side as I think you suggested.

07 11 00 53 CC 15, did you have a look at holding it in DELTA-P to see how the - see how it was holding on that?

07 11 01 01 CDR No, we just left it in TUNNEL VENT all the way around the back side. I - That's what we'd thought you'd said to do. We can check it now.

07 11 01 21 CC 15, why don't you bring it up to 3.5, and let us watch it for a while. I think we garbled some - and you watch it. I think we garbled something there.

07 11 01 33 CDR Okay. Our understanding was to let it go all the way, and then you get a good look out on this side. So we'll bring it up to 3.5.

07 11 03 58 CC 15, Houston. Two items; one, we want to make sure that you're aware that we cannot read the tunnel pressure, and so we're depending upon your read-outs of this DELTA-P to give us the confidence here in the hatch integrity. One other item that we do know, is that during all that period when the tunnel was vented, our O<sub>2</sub> flow was off-scale low, which does give us some confidence in the integrity of the hatch. And, meanwhile, we're waiting for your call on a 3.5 reading so we can begin a hatch integrity check. Over.

07 11 04 36 CDR Roger.

07 11 04 38 CDR Mark. Two minutes and 3.5 plus or minus 0.

07 11 04 44 CC Roger. Copy.

07 11 04 50 CDR And - and I think we had the same confidence, Bob. We noticed the low O<sub>2</sub> flow also. The only question we had was, why did the DELTA-P change?

07 11 05 03 CC That's the same question that was bothering us.

07 11 05 09 CDR But, it's steady at 3.5, and has been now for about 2 and a half minutes.

07 11 05 15 CC Copy.

07 11 05 43 CC Okay, 15. This is Houston. We'd like to run that hatch integrity check to about 5 minutes total, because of what we suspect was the problem before. And, if it passes at that point, we'll press on, per the Flight Plan, for following the normal steps. And you can plan, if we have time for it, we're looking for a jet at 179:30, at the present time. Over.

07 11 06 12 CDR Roger. 179:30, and we'll give you a call at the 5-minute point.

07 11 06 17 CC Thank you.

07 11 07 38 CDR Okay, Houston. There's 5 minutes at 3.5 and it looks solid.

07 11 07 43 CC Roger, Dave. Let's press on with a nominal time line.

07 11 07 49 CDR Roger.

07 11 08 16 CDR And, Houston. Are you happy with 3.5 or would you like to bleed it down a little more?

07 11 08 20 CC Roger, Dave. We're happy with the hatch integrity, and let's open the tunnel vent and bleed down towards 4.0 at - for the nominal setup. And I guess it's on the decal there.

07 11 08 31 CDR Roger. No, the decal says go for 10 minutes in IM tunnel vent.

07 11 08 41 CC Roger. And I guess that means after hatch integrity, which means beginning now.

07 11 08 53 CDR Roger. Step 7, and it's in work.

07 11 17 35 CC 15, Houston. You're suit integrity check looks good as far as we can tell down here.

07 11 17 48 CMP Well, we had it for about 5 seconds there, and then the O<sub>2</sub> flow went back up, so we'll hang on here and see if it comes back down.

07 11 17 58 CC Roger.



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07 11 21 40 CMP Okay, Houston, 15. We got a good pressure integrity check. We're ready to press on.

07 11 21 46 CC Roger, we agree.

07 11 22 32 CC And, 15, we're still aiming for 179:30 for JETT. And be advised, of course, this means we're going to have to retarget P30 to 179:35. And, other than that, all attitudes will be the same. Although, of course, since you'll be local vertical, your inertial attitudes for the burn will be slightly different than what you've seen.

07 11 22 59 CMP Okay, Understand. And your DELTA-P is off-scale high now.

07 11 23 04 CC Roger. And you're 14 minutes past that time.

07 11 23 44 CMP Houston, 15.

07 11 23 45 CC Go. - Go ahead, 15.

07 11 23 54 CMP Roger. Understand. The retargeting on P30 - you want to target that for 179 plus 30 plus 00, and the same DELTA-Vs as before?

07 11 24 05 CC Negative, Al. It's going to be 179 plus 35 plus 00 for the SEP burn.

07 11 24 16 CMP Sorry about that. I meant 179 plus 35. Three zeros JETT, huh?

07 11 24 21 CC That's affirm.

07 11 24 53 CMP Houston, 15.

07 11 24 54 CC Go. 15, go ahead.

07 11 25 05 CMP Roger. We're ready to turn the sequence arm on.

07 11 25 08 CC Roger. You're GO for turning them on.

07 11 25 13 CMP Okay, and LOGIC 1, on; LOGIC 2, on.

07 11 25 26 CC And, 15, you're go for PYRO ARM.

07 11 25 32 CMP Roger.

07 11 25 57 CC And, 15, we need DIRECT RCS ON, please.

07 11 26 09 CMP Okay. DIRECTs are on.

07 11 27 04 CC And, 15, 3 minutes to JETT, and we're wait - we're watching for PYRO ARM.

07 11 27 13 CDR Okay. We're preceding through the pre-JETT check-list at this time, and we'll get right to you.

07 11 30 17 CMP And, it's away clean, Houston.

07 11 30 19 CC Roger, copy. Hope you let her go gently. She was a nice one.

07 11 30 25 CMP Oh, she was at that.

07 11 32 15 CDR Houston, 15. Question on the separation maneuver. Do you want us to burn the residuals in P41, or just make a 1-foot-per-second burn?

07 11 32 27 CC Roger, Dave, Terry. Burn them in P41, please.

07 11 32 32 CDR Roger.

07 11 32 36 CC You understand that's burn the residuals, right?

07 11 32 38 CMP Just - just making - just making sure.

07 11 33 02 CDR Houston, P41 says 7/10ths forward.

07 11 33 19 CDR Yes, 7/10ths forward, 7/10ths up.

07 11 33 25 CC Roger, Dave.

07 11 33 29 CDR And forward takes us right back to the LM.

07 11 33 42 CC Stand by, Dave. We're looking into that, of course.

07 11 33 48 CDR Okay, we got about a minute and 15 seconds or so.

07 11 33 53 CC Roger.

07 11 34 34 CDR Average g is ON.

07 11 34 50 CC Ah, hold the burn, Dave.

07 11 34 54 CDR Okay, we'll hold the burn.

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07 11 36 26 CC 15, this is Houston. We'd like to have visual reference relative to your position to the LM. We'd like you behind the LM. And, we'll give you a burn attitude for 5 minutes from now.

07 11 36 42 CDR Roger. Okay, I guess she's about 150 feet dead ahead.

07 11 36 53 CC Okay. Copy, Dave. Thanks.

07 11 38 14 CC And, Dave. Can you verify, were you behind, in local vertical, or body attitude coordinates?

07 11 38 24 CDR Well, give us a little while to figure that one out.

07 11 38 26 CC Roger. Are you behind it in the orbit, or are you just - is it just sitting there in front of you as you look at it?

07 11 38 34 CDR It's sitting in front of us when we sit there and look at it.

07 11 38 41 CMP Bob, we're almost directly radially inward from the LM right now.

07 11 38 47 CC Copy that.

07 11 39 25 CDR Houston, our attitude is 150 degrees relative to the local horizontal.

07 11 39 33 CC Say that again, please, Dave.

07 11 39 37 CDR Roger. Our attitude according to VERB 83 down there is 150 degrees, relative to the local horizontal. Which means we're - I guess, fairly close to local horizontal, at least within 30 degrees.

07 11 40 28 CC Stand by, guys. Confusion still reigns, I think.

07 11 40 35 CDR Roger. Understand.

07 11 43 22 CC 15, do you have an ORDEAL ball going at the moment?

07 11 43 27 CDR Sure do, and it's on the DSKY; you can see it right down there.

07 11 43 30 CC Thank you.

07 11 44 04 CC Roger, Dave. We would like you to do a VFR burn, which means go - maneuver to a trailing position - and fire 1 foot per second retrograde. Understand?

07 11 44 16 CDR That sounds like a good burn. Roger. We'll do that.

07 11 45 19 CDR Houston, 15. This ought to make for some interesting discussion, but I guess what you want us to do is point at him and burn aft to 1 foot per second; is that correct?

07 11 45 28 CC Roger, Dave. That's probably the best way to keep an eye on him.

07 11 45 34 CDR Well, we're having a tough time doing that, because he's right in the Sun right now.

07 11 45 54 CDR But, Houston, I think at this attitude of 1 foot per second aft will give us sufficient clearance. Don't you?

07 11 46 06 CC As long as you're trailing him, Dave. I guess, right now, we can't give you any sound advice down here.

07 11 46 14 CDR Okay, well, if we burn 1 foot per second on the local horizontal, which we are almost on right now, I think that will put us in an orbit which re - remains clear from it.

07 11 47 01 CDR Okay, Houston. As far as trailing goes, right now as we look over the ground, we're leading him.

07 11 47 06 CC Roger. That's our - -

07 11 47 07 CDR We're about on a horizontal in front of him.

07 11 47 10 CC Roger. We need you behind him, Dave. That - we were gradually coming to that conclusion. That was the only way you could have him in the Sun. We need you behind him, and then a firing of retrograde.

07 11 47 26 CDR Yes, that's going to take an awful lot. Because we're a fair ways out now, and we'll have to maneuver quite a ways to get behind him. It'll take quite a while and a little bit of gas.

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07 11 47 37 CC Roger, Dave. Understand that. Stand by.

07 11 48 07 CC Okay, Dave, how about 2 foot per second posigrade, as long as you're in front of him. Understand? Two foot per second posigrade.

07 11 48 32 CDR Okay, so that'll be a minus X DELTA-V for 2 feet per second at our present attitude, right?

07 11 48 49 CC Roger. That's affirm, Dave.

07 11 48 53 CDR Okay. We're all on the same frequency. We'll do that.

07 11 50 02 CMP Okay, Houston. We put in 2 feet per second aft. And that was done just at local horizontal.

07 11 50 10 CC Roger, copy. Thank you.

07 11 50 45 CC And, 15; if you can anticipate, why don't you give me a call when you get yourself partially powered down from this. Then we'll read you some Flight Plan updates, which are mostly just the deletion of activities so you can get to bed.

07 11 51 03 CDR Okay, Houston. Appreciate that. Thank you, and we'll call you back.

07 11 55 32 CC 15, Houston. You got a moment for this update.

07 11 55 38 CDR Just a minute, Bob.

07 11 56 06 LMP Okay, Bob. What changes do you have for us.

07 11 56 07 CC Okay. These will start out in the Flight Plan, here. And, after LM JETT, we'd like you to proceed with the activities that run on the original Flight Plan from 177:30 through 178:01. So that last entry that we will be doing will be the line that says "X-RAY, ON" at the very top of that next page. After that - during that, though, we will delete at 177:53, the line that says "MAPPING CAMERA/LASER EXPERIMENT COVERS, OPEN, talkback, barber pole, then, OFF, center." It's the second line in the block at the bottom. You got that?

07 11 56 56 LMP Okay, understand. We'll delete that particular line, "MAPPING CAMERA/LASER EXPERIMENT, OFF," and we'll do all the activities up to - through 178 there, the MASS SPEC X-RAY, ON.

07 11 57 11 CC Roger. And at the - on that same page, beginning at 178:20 to 178:30, we will scratch that particular - that whole block of items. And going along with that, at 178:39, it says DAC ON, we will also scratch that. Over.

07 11 57 43 LMP Roger. Understand. We will scratch the activities from 178:20 to 178:30. And, at 178:39, we'll scratch "DAC ON". How about the activity there at 178:31? We - guess we'll do that, huh?

07 11 57 58 CC Roger. 178:31, that "MASS SPEC, MULTIPLE, LOW, DISCRIMINATOR, HIGH: ION SOURCE, ON" will be done 30 minutes - three zero minutes after the MASS SPEC EXPERIMENT, ON; ION SOURCE to STANDBY, which is over there at 178:01. Other words, we need a 30-minute delay between the top item on the left-hand column and the top item on the right-hand column.

07 11 58 27 CDR Okay, we understand.

07 11 58 29 CC Okay, we'll delete the pan camera activities over on 179 hours. There's one at a hundred - 15, if you read - there's one item at 179:16, and another item at 179:21 that pertain to the pan camera. We will delete both of those.

07 11 59 02 LMP Okay, understand. Delete the pan cameras at 179:18, and 179:21.

07 11 59 11 CC Roger. Copy. And when you're ready to sleep, I guess you can start with the systems checklist - presleep checklist at 179:31, there.

07 11 59 22 LMP Okay, thank you, Bob.

07 11 59 24 CC And you noticed we didn't delete the eat period.

07 11 59 32 LMP Thank you.

07 11 59 34 CC And - and, Jim; do you guys want a TEI-58 pad?

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07 11 59 52 LMP Okay. We'll take one.

07 11 59 54 CC Okay. If you got - have you got the pad out?

07 11 59 59 LMP No, stand by.

07 12 00 00 CC Give me a call.

07 12 00 05 LMP Okay.

07 12 00 08 CC Okay, Jim. Understand you have the pad. SPS/G&N; 36363; plus 0.61, plus 0.93; 192:13:33.30; plus 2799.7, plus 0609.5, minus 0098.0; 181, 112, 0.15. Rest of the pad NA. Ullage: 4 jet, 12 seconds. Over.

07 12 01 08 LMP Understand. It's TEI-84 SPS/G&N; 36363; plus 0.61, plus 0.93; 192:13:33.30; plus 2799.7, plus 0609.5, minus 0098.0; 181, 112, 015; 4 jets for 12 seconds.

07 12 01 34 CC Roger, Jim. Except it's TEI-58.

07 12 01 41 LMP Roger. It's 58.

07 12 01 47 MCC Okay, Jim. And, while we got you, - this is Deke. I'd like to have you and Dave, at least, take a Second here before you go to sleep so you can really power down for the night. You guys need it. It's up to Al whether he wants one or not.

07 12 02 04 LMP Okay, thank you, Deke.

07 12 02 06 MCC Roger.

07 12 03 37 CC 15, Houston; we have a correction to that update, if you'd get the Flight Plan back out please.

07 12 03 47 LMP Okay, go ahead.

07 12 03 48 CC Roger. That item 178:30, on the mass spec, the discriminator value there should be LOW. Copy?

07 12 04 04 LMP Roger. Understand, DISCRIMINATOR, LOW.

07 12 04 07 CC Thank you, Jim.

07 12 07 35 MCC

Apollo 15, Houston. You're about 1 minute until  
LOS. Sleep tight.

07 12 07 44 CMP

Right Deke, good night.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 12 31 -- BEGIN LUNAR REV 53

07 12 58 39 CC Apollo 15, this is Houston. Standing by in the blind.

07 13 01 15 CC Apollo 15, this is Houston. Standing by in the blind. Over.

07 13 02 59 CC Apollo 15, Houston. Calling in the blind and standing by. Over.

07 13 03 47 CC Apollo 15, Houston. Calling in the blind. Standing by. Over.

07 13 08 14 CC Apollo 15, Houston, in the blind. Over.

07 13 10 14 CC Apollo 15, Houston, in the Blind. Over.

07 13 15 49 CMP Houston, 15.

07 13 15 51 CC Go ahead, 15.

07 13 15 56 CMP Okay, we're just about getting bedded down here, Bob. I wanted to check and clarify one thing with you before we did.

07 13 16 04 CC Please do.

07 13 16 09 CMP Okay, the Flight Plan updates that you gave to Jim a little while - earlier included MASS SPEC EXPERIMENT, ON and some switching with the discriminator and multiplier. Now, as of yesterday, we had decided not to use the mass spec because of boom deploy problems. Has somebody decided that we now should deploy the boom?

07 13 16 32 CC Roger. My understanding is that we didn't want to do it before the plane change because we might have to jettison it and it's - now that we've got the plane change accomplished, we'll run it. And, if you have to jettison before TEI, we'll do that. Over.

07 13 16 49 CMP Okay, I understand. I guess I didn't understand that yesterday; and, we'll go ahead and deploy it and get the mass - mass spec going now.

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07 13 16 56 CC Roger, Al. And one more thing; we'd like to make sure tonight that Jim is on the EKG for the evening.

07 13 17 08 CMP That's affirm. Jim will stay on the biomed tonight.

07 13 17 15 CC Roger. And, one more thing, Al, we would like to verify high gain antenna angles are pitch 25, yaw 185.

07 13 17 26 CMP Right. That's what they're set on now, Bob.

07 13 17 28 CC Okay. We had a long while picking you up. I guess we were a little worried, there.

07 13 17 35 CMP No, we just got our signals crossed in here. And, we had some different numbers on them before. So I got them. We're fixed up now.

07 13 17 41 CC Okay, and we'll be expecting you to be in VHF bistatic later on, right.

07 13 17 51 CMP I guess - Do you want us to go ahead and do that?

07 13 17 56 CC Yes, please, Al.

07 13 18 02 CMP Okay.

07 13 18 25 CC Okay, one last little check is optics power is on. We'd like it off eventually. I expect you haven't gotten that far yet, Al.

07 13 18 34 CMP That's affirmative. We'll get it.

07 13 18 35 CC Okay, and otherwise you call us; we won't call you.

07 13 18 42 CMP Okay, we'll call you. Thank you, Bob. Good night.

07 13 18 44 CC Good night.

07 13 20 29 CC 15, Houston. Over.

07 13 20 36 CMP Famous last words; go ahead.

07 13 20 37 CC

Yes. How's that for broken promises. Hey, oso [?] just came out of the woodwork and was worried because he doesn't have X-ray and gamma rays and all those on yet either. I'd assume you probably have - just haven't done any of that block, right?

07 13 20 51 CMP

Yes. Hey, Bob, we're still trying to get cleaned up in here and get suits put away and all that sort of stuff. We'll get with it as soon as we can, but it's awfully cramped quarters and there's an awful lot of stuff to move around.

07 13 21 02 CC

Roger. We were afraid you'd get use to the luxury of all that space.

07 13 21 09 CMP

I kind of liked it here by myself.

07 13 21 16 CC

This time I'll keep my promise.

07 13 21 20 CMP

Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 14 29 -- BEGIN LUNAR REV 54

07 14 55 06 CMP Houston, 15.

07 14 55 11 CC 15, go ahead.

07 14 55 16 CMP Is it time to get up yet, Bob?

07 14 55 25 CC Roger. We've got about 15 updates here for you, if you want to get ready in the SIM bay.

07 14 55 34 CMP Thought we'd give you a crew status report and the onboard read-outs before we called it a night. I just wanted to check and make sure we got everything turned on for you.

07 14 55 48 CC Roger. We'll get the guys looking at that - -

07 14 55 50 CMP ... the mass spec out. Okay, Bob, we got the mass spec out, and I think we've cleaned up everything else for you for tonight, and I'll give you the readings here and then we'll call it a night.

07 14 56 07 CC Roger. We're listening, and I hope everybody else down here will be getting with me so we can give it to you at the end, if anybody wants anything. Go ahead.

07 14 56 20 CMP Okay. The PRDs, 25023, 23174, 08029.

07 14 56 32 CC Copy ... - -

07 14 56 33 CMP My read-outs: BAT C, 37; BAT A, 37.5; BAT B, 37.5. RCS quads are 63, 58, 60, 58.

07 14 56 50 CC Copy.

07 14 56 54 CMP And, we are configured for the bistatic radar test.

07 14 57 02 CC Al, that should be bistatic VHF.

07 14 57 09 CMP That's correct, Bob. The bistatic VHF radar test.

07 14 57 25 CMP And, can you think of anything else that needs to be done?

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07 14 57 29 CC Stand by, Al.

07 14 57 33 CMP Okay.

07 14 57 54 CC Okay, three verifies for you, Al. Can you verify the GAMMA RAY's out? The X-RAY is ready? And we need a verify on Jim for his EKG.

07 14 58 07 CMP Okay, Houston. He's not hooked up yet but will be shortly. And, we'll verify the GAMMA RAY, out and ON, and the X-RAY, ON.

07 14 58 13 CC Thank you.

07 14 58 21 CC And, Al, we're working a state vector up-link for you. Stand by a minute, and we'll get a decision on that.

07 14 58 31 CMP Okay, Rob, I guess we didn't have the GAMMA RAY out, so it's going out now.

07 14 58 37 CC Roger. That's a verify, I guess.

07 14 58 39 CMP And the X-RAY is ON.

07 14 58 41 CC Thank you.

07 14 58 49 CMP Okay, the X-RAY is ON. Seems like we had quite a few loose ends tonight.

07 14 59 16 CC And, Al, how about a verify on X-RAY COVERS, OPEN?

07 14 59 40 CMP Roger. That's verified. It's OPEN.

07 14 59 43 CC Thank you. We're still discussing the vector here.

07 14 59 49 CMP Okay.

07 14 59 51 CC If you can give us POO and ACCEPT, we'll have a load in about a minute. Stand by, just ACCEPT - -

07 14 59 58 CMP Okay.

07 14 59 59 CC - - sorry.

07 15 00 00 CMP Do you want POO?

07 15 00 01 CC Negative. ACCEPT only.

07 15 00 05 CMP Okay. I'll leave it P20.

07 15 00 08 CC Swinging.

07 15 02 37 CC Okay, and 15, you can have block back again. Good show. Thanks for the patience this evening, and Karl will wake you when he wakes you and not a moment before. Good night.

07 15 02 55 CMP Okay, that sounds like a winner, Bob. Good night.

07 15 14 52 CC Apollo 15, Houston.

07 15 14 58 CMP Houston, 15. Go ahead.

07 15 15 00 CC Roger. This isn't Karl waking you up; but we don't show the MASS SPEC EXPERIMENT to ON, and if the out - outgassing has been completed, we need the ION SOURCE, ON. Over.

07 15 15 16 CMP Okay. We've got it ON, and it's been ON for about 45 minutes now. And we now have MULTIPLIER, LOW, and DISCRIMINATOR, LOW.

07 15 15 35 CC Beautiful, Al.

07 15 15 40 CMP Stand by on that, Bob, stand by.

07 15 15 42 CC Standing by.

07 15 16 04 CMP Okay, Bob, we got it now.

07 15 16 06 CC Understand you got EXPERIMENT, ON, now - -

07 15 16 08 CMP ... it should be ON now.

07 15 16 11 CC Copy. Thank you.

07 15 16 12 CMP Right.

07 15 16 14 CC We'll try again.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

07 16 27 --	BEGIN LUNAR REV 55
07 18 25 --	BEGIN LUNAR REV 56
07 20 23 --	BEGIN LUNAR REV 57
07 22 22 --	BEGIN LUNAR REV 58

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 00 20 -- BEGIN LUNAR REV 59

08 00 45 11 CMP Hello, Houston; Apollo 15.

08 00 45 16 CC Good morning, Alfredo. This is Houston.

08 00 45 22 CMP Good morning, Dr. Joe. How are you?

08 00 45 29 CC Couldn't be better, Al. How's it going?

08 00 45 32 CMP Just fine, Joe. You all talked out?

08 00 45 34 CC No, sir, just getting ready to start. And, pleased to have a chance to talk to you.

08 00 45 39 CMP Very - -

08 00 45 41 CC I've got all kinds of things for you, Al, when you - -

08 00 45 43 CMP Very good, Joe. Glad to be talking to you.

08 00 45 45 CC Okay, I've got all kinds of things for you, which I can start handing it up to you at your convenience, pretty much. We're going to change the Flight Plan around a little bit - primarily, lifting out things because of our getting a somewhat later start than normal, and a couple of other minor modifications. I also have a lot of news to read to you and some other good things you might be interested in. Over.

08 00 46 15 CMP Okay, Joe. Let's - Why don't you give me a couple of minutes here to get some pens and the Flight Plan out and - and in about 5 or 10 minutes or so, I'll have the guys put the headsets on, and we'll all listen to the news.

08 00 46 30 CC Al, out of curiosity, is everybody awake up there?

08 00 46 37 CMP Yes, man.

08 00 46 39 CC Good morning, Davy - -



08 00 46 40 CMP Yes, Joe, sure are. We're just in the middle of breakfast.

08 00 46 45 CDR Hello, Joe. How are you?

08 00 46 46 CC Well, I'm fine D.R.; how are you today?

08 00 46 50 LMP Morning, Joe.

08 00 46 51 CDR Oh, we're in great shape. Hey, you sure did a fine job for us down there, Joe. Jim and I'd like to really thank you. That was a superfine job of taking care of everything for us.

08 00 47 01 CC I think the superfine job is the two of you; it was just most remarkable. Everybody down here is still floating so high, they're having a hard time getting down to all that data you gave us. And, you'll be interested to know that - that we have sitting in front of us, a preliminary report from each EVA of the geology of the area that I would say is more complete than our 90-day preliminary reports which were issued on some of our other landings. It's just most exciting.

08 00 47 38 CDR Well, it's because you've got the real professional backroom there. Those - those guys really know how to put - put it together. Especially with the way they were coming up with the new ideas, while we were on the surface. That was really neat.

08 00 47 52 CC And, Dave, I do have to ask you one question. Is there a three-unit segment of deep core stems some place in that command module?

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 00 48 02 CDR Joe, we wouldn't lose sight of that for all the tea in China. That's number 1 priority.

08 00 48 09 CC Yes, sir.

08 00 48 37 CDR Oh, as a matter of fact, Joe, we made a good thorough search of the LM before we let it go. We went from top to bottom to make sure we got everything, and I'm sure we got everything we brought up off the surface, and I'm pretty sure we did - did fairly well cleaning up the surface.

08 00 48 55 CC Okay, Dave. Good news; good news. Al, if you're ready, I'll start hitting you with a few things we're interested in knowing from you right away. And then when we get those, I'll give you the general plan for the day. And I think, in some cases, we'll want to just talk you through some of the changes while you're making your front-side pass. There's no need to feed up all the data in detail to you at the beginning here. My first question: we need from you a configuration of panel 230, particularly - in fact, only really the MASS SPEC switches, could you - call out the settings for the MASS SPEC, EXPERIMENT switch, ION SOURCE switch, MULTIPLIER switch, and DISCRIMINATOR switch, please.

08 00 49 48 CDR Okay, Joe, I'm right there. Experiment is up and ON. ION SOURCE is centered. The DISCRIMINATOR is LOW and the MULTIPLIER is LOW.

08 00 50 03 CC Okay, thank you. That's - that's what we'd guessed. And, Al, I - I guess the first thing we want - we're going to want you to do today is to start to get ready to go plus-X forward, P20 option 5. We're going to want you to retract the mass spec boom and close the X-ray and alpha particle cover.

08 00 50 21 CMP Okay, Joe. We'll do all that. How about putting it on a - on a time basis for me so I can write it in the Flight Plan.

08 00 50 44 CC Okay, real fine. You can start that right now at - just put it in at 192:52, I guess. And also, right after that, list fuel cell purge H<sub>2</sub>O dump and LiOH canister change.

08 00 51 30 CMP Okay, Joe. Understand. You want us to go ahead into plus-X P20 SIM bay attitude, and pull in the mass spec and the gamma ray booms, and, I guess, turn off the MASS - turn the MASS SPEC to STANDBY.

08 00 51 46 CC Al, let me hit you with that last statement again. We want you to retract the mass spectrometer boom, but not the gamma ray, and close the X-ray and alpha particle covers. Retract mass spec boom and close two covers. Over.

08 00 52 09 CMP Okay, understand. You want us to pull in - to retract the mass spec boom and close the X-ray alpha covers, then do the fuel cell purge, the water dump and canister change.

08 00 52 22 CC That's affirm.

08 00 52 28 CMP Okay, Joe. I'll get that in work.

08 00 52 36 CC And one more item. You can start to charge BAT B at your convenience.

08 00 52 46 CMP Okay.

08 00 52 56 CC Okay, and looking downstream here, as soon as you get turned around, and these other good things done, we're going to ask you to open the X-ray and alpha particle covers. And for REV 60, the agenda calls for an eat period for you. And gamma ray, X-ray, and alpha particle data being taken during that time. Sounds like you've got your eat period pretty well out of the way.

08 00 53 27 CMP Yes, that's right, Joe.

08 00 56 34 CMP Houston, 15.

08 00 56 37 CC Go ahead, Al.

08 00 56 40 CMP Okay, Joe. While we're maneuvered here to a Plus-X forward, how about reading some news to us?

08 00 56 45 CC Okay. Sure will. Let me - let me begin with just a note on that water dump. It'll take about 15 minutes to run, and they're interested in your dumping it to close to 10 percent onboard reading. Over.

08 00 57 04 CMP

Roger, understand. Probably the same as we've been doing before. We dump down to 10 percent, but not below 10 percent.

08 00 57 12 CC

That's correct. And I've got several things to read to you here. I have the official morning Gold Bugle Zeitung report and - that comes from two rows behind me here. And I've also got a telegram for you, Jim. And I have some history - a little bit of history that's been researched for you by the people at Honeysuckle concerning a small problem with a leak on the Endeavour about 200 years ago. And I'll start with whatever you'd like to hear first.

08 00 58 07 CMP

Okay, Joe. Go ahead.

08 00 58 09 CC

Okay, let me just start with the morning's news. The weather report in Houston-Galveston area calls for showers and thundershowers through Wednesday. Today's temperatures will be in the lower 70s and upper 80s.

08 00 58 24 CC

The United States will support Communist China's admission to the United Nations this fall, Secretary of State William Rogers announced. The U.S. will also fight against expelling the Nationalist Chinese Government on Taiwan. U.S. Steel, the industry pace setter announced a price hike averaging 8 percent on virtually all its products and several other companies followed suit, as an aftermath of a new 3-year labor contract. Trainmen won pay increases of nearly a dollar and a half an hour spread over a 42 months in a nationwide contract settlement, and called off their crippling strike against 10 railroads. The union yielded on the railroad's demands for some work-rule changes, yet to be worked out. Among those viewing Apollo 15 activities, Monday, in the MOCR, was artist Robert McCall, designer of the commemorative stamp for Apollo 15. And just an edited note here: He was also making sketches of the scenes down here as he saw them and he would turn them out almost as fast as the photographer would take pictures. That was most interesting. Turning to the sporting news, Don Wilson pitched a two-hitter and Jesus Alou drove home the winning run and then made a game-saving catch as the Houston Astros downed the Chicago Cubs, 2 to 1.

And, apparently, rain is slowing up the Oilers' preparations for the Giants. The Oilers - Giant exhibition game is scheduled for Monday night in the Astrodome. And I've got the Monday's baseball scoreboard - which I'll run through quickly for you baseball fans. In the American League: Boston 7, Baltimore 4; New York 7, Cleveland 0; Oakland 2, Kansas City 1; Chicago 7, Minnesota 5; Detroit 11, Washington 7; California 3, Milwaukee 1. Read back.

08 00 59 38 CC

Disregard - -

08 00 59 39 CMP

Roger, Joe. Copied all these off.

08 00 59 40 CC

Roger. Okay. In the National League: Philadelphia 4, Atlanta 0; Cincinnati 4, New York 2; St. Louis 3, San Diego 1; and Los Angeles 5, San Francisco 4. And Lee Trevino added another thousand bills to his bank roll, Monday, by taking first place with the number - with a 7 under par, 65, in the Columbus Invitational Pro-Am. Jack Nicklaus and Arnie Palmer teamed last weekend to close in on Trevino in professional golf's money-winning race, though. Nicklaus and Palmer won \$20 thousand each when they won the National Team Championship at - I guess, Ligonier, Pennsylvania. Trevino leads for the year with a total of nearly \$200 thousand.

08 01 01 36 CC

And, I'll go over now to - Jim, a special telegram for you which reads, essentially: Mother, Dad, and your brother Charles are proud of you. We were thinking of our trip together on top of Mount Whitney and we are with you in spirit on the Moon. Love, Mother, Dad, and your crew. And I might add, that there - An occasional piece of mail for all of you that is starting - is starting to come in to the Manned Spacecraft Center, here. In fact, I think a truck pulled up there yesterday to deliver some of the first.

08 01 02 17 CC

I'm going to go on, if you're still listening, to read some history that was sent to us by the Honeysuckle people. And the subject is "A Leak on the Endeavour at 62 hundred GET." Following the above incident and the wonder from the Apollo 15 crew whether Captain Cook's Endeavour had ever sprung a leak, the staff at Honeysuckle Creek Tracking

Station has searched the records and come up with the following incident, which may be of interest. Information has been extracted from an old newspaper article and an entry in Captain Cook's log book. "It was 11 p.m. on June 11, 1770, a clear moonlit night, when his Majesty's ship, Endeavour, under the command of Captain James Cook, sailed serenely under fully furled sail within the waters of the Great Barrier Reef off Australia's northeast coast. Then disaster struck. The ship had got upon the edge of a reef of coral rocks which lay to the northwest of [sic] having come in places [sic] run the ship 3 or 4 fathoms and in others about as many feet." (And I'm quoting James Cook's diary here.) "But about a hundred feet from her starboard side, she, laying with her head to the northeast, were 7, 8, and 10 fathoms." With a grind and a roar, the Endeavour rose in the bow, and came down hard. Empty water. Casks broke their lashings and lay in a tangle with the rigging on the deck. The captain, clad only in drawers (which I guess is a constant wear garment) rushed on deck. He summoned all hands to the pumps, and ordered all unnecessary stores to be thrown overboard. Such items as iron, and stone ballast from deep in the hole, casks, hoops, stays, oil jars, decayed stores, and then six cannons, which fired 4-point shot. (Probably one cannon to fire long, one cannon to fire short and two to fire for effect.) These, in fact, are the cannons discovered in 1969, off the coast of northeastern Australia by a team from the Philadelphia Academy of Natural Science. And, after restoration, one each was presented by the Australian - to - by the Australian government to the U.S., British, and to New Zealand. The remaining three cannons are in Australia. The original Endeavour was finally freed from the reef by means of oakum and wool, wrapped in a sail, being sunk under the ship and plugged into the hole in hope that it would be sucked into the leak and would close the leak. The experiment was entirely successful and, I quote again, from Cook's diary, "In about a quarter of an hour to our great surprise, the ship was pumped dry and upon letting the pumps stand she was found to make very little water." Subsequently, the Endeavour arrived at the Australian mainland (the landing place is now called Cooktown, by the way), and after two months the

damage had been repaired and the ship returned to England. And that's the end of your history lesson for today. Over.

08 01 05 43 CDR That's quite an analogy, isn't it?

08 01 05 48 CC Quite an analogy, Dave. Certainly is. Back to reality. Al, I have a CSM consumables update for you if you're interested in that. And let's see - the other item on my desk - Well, I'll get to it a little later. I'll be standing by for your go ahead on the CSM consumable update.

08 01 06 17 CMP Okay, stand by, Joe. ...

08 01 07 36 CMP Houston, 15. I'm ready to copy the consumables, Joe.

08 01 07 40 CC Okay, Alfredo. GET 191 plus 25; RCS total, 47; quad A: 50, 47, 46, 47; H<sub>2</sub> tank 1: 56, 53, 42; O<sub>2</sub> tank 1: 64, 67, 54.

08 01 08 19 CMP Roger, understand, Joe. At 191:25, RCS total, 47; quad A: 50, 47, 46, 47; H<sub>2</sub> is 56, 53, 42; O<sub>2</sub> is 64, 67, 54.

08 01 08 49 CC Copy, Al. And I'll be right back.

08 01 08 54 CMP Okay, Joe.

08 01 09 37 CC Endeavour, this is Houston again.

08 01 09 42 CMP Go ahead, Houston.

08 01 09 44 CC Okay, Al. Let me lay some more words on you concerning your Flight Plan, when you're - you're ready to talk about that.

08 01 09 55 CMP Roger, Joe. Go ahead.

08 01 09 58 CC Okay. You'll be in the configuration plus-X forward, and will be taking gamma ray, X-ray, and alpha particle data, data during REV 60. We want you to do at 193 plus 45, a P52 option 3. And we're going to add a map and pan camera pass sometime during REV 60. And I'll be coming at you with the necessary data for that. Also -

08 01 10 51 CMP Roger, Joe; understand.

08 01 10 53 CC Okay, Al. Now I guess a - a word about biomed configuration, today. In order to get some very interesting base-line data, medical data on you, Al - and, Jim, for your EVA coming up later - we're requesting that the two of you give us that biomed data today. I think, Dave, you were scheduled for it, but I guess we'd prefer Jim on the line with Al to get base-line data for later. Now, Al, let - let me run through in just some blocks here the next revs as we see them, and the approximate activities. And then I'll come up with specific data concerning those revs later on, perhaps actually during the revs. On REV 61, we're going to have the UV - -

08 01 12 54 CMP ... that.

08 01 12 55 CC Okay. On REV 61 will be UV photography of the lunar mare. We're coming up on, I guess, an hour of light flash experiments, and it's pretty much dealer's choice between Dave and Jim, who - whichever one of you would like to do that. REV 62 will be a crew exercise period, science photos, and science visuals. And we'll be taking the mapping camera and laser altimeter data during REV 62. And it will end with terminator photos. On REV 63, more mapping camera, laser altimeter, and a burst of the pan camera. UV photos and terminator photos again. REV 64 will be eat period, boom photos, LiOH canister change; and that brings us to about 204 hours, and it'll be time to go to bed again. Over.

08 01 13 08 CMP Okay, Joe. Understand in the Flight Plan that the object is going to be to get us back to the printed Flight Plan as much as possible.

08 01 13 18 CC That's exactly right, Al. And you'll be coming on to it kind of as the day progresses. We're just going to pick up a few quick items that we've missed over the past 2 hours and mainly just lift - lift out other sections, as I understand it. But you'll be back on the Flight Plan shortly.

08 01 13 40 CMP Okay, Joe. Fine. Thank you.



08 01 13 41 CC Roger. And - -

08 01 13 42 CDR And, Joe, let me request that Jim be - -

08 01 13 48 CC Go ahead, Dave.

08 01 13 51 CDR I'd like to say that I'd like to have Jim without his sensors on today. That 3, 4 days in a row is pretty tough with those things on. I think probably, if you get him tonight, you could probably get your data, don't you think?

08 01 14 10 CC Stand - stand by, Dave, and I'll - let me double check.

08 01 14 26 CDR Say, as a matter of fact, Joe, why don't you give Jim and Al both a break today on the sensors, and I'll stick mine on, because I've had them off since we got back yesterday. And then if you want us to have some particular data-gathering periods, why don't we take a look at that starting tonight, huh?

08 01 14 46 CC Okay, Dave. That sounds good.

08 01 14 51 CDR Okay. And concerning the light flash things - Jim and I both saw light flashes while we were on the surface, as a matter of fact.

08 01 15 01 CC Okay, copy that, Dave. That's remarkable.

08 01 20 51 CC Good ship Endeavour, this is Houston.

08 01 20 59 CDR Go ahead, Houston.

08 01 21 02 CC Roger. On our down-link data, we see indications of high gain antenna yaw fluctuations. Wonder if you could glance over at your onboard indication and see if you see it there as well. And, also we're standing by for crew status reports, when you're ready to give it.

08 01 21 31 CDR No, we - we see no oscillations up here, Joe.

08 01 21 34 CC Okay, thank you.

08 01 22 38 CC Al, this is Houston. With a TEI-62 pad, when you're ready for that. We also have a question. How did the mass spec boom retraction go? And we've got a switch setting for your MASS SPEC when you're ready.

08 01 22 58 CMP Okay. Jim will be ready to copy a TEI pad here in a minute. And MASS SPEC BOOM retracted without a hitch this time, Joe. Sorry I didn't get the time on it, but it was very close to the nominal time, and apparently it didn't hang up this time.

08 01 23 15 CC Okay, fine, Al. Thank you. We'd like the - I guess the mass spec placed on STANDBY, please. And that's the EXPERIMENT switch.

08 01 23 26 CMP Okay, MASS SPEC on STANDBY. Yes, that's verified on standby, Joe.

08 01 23 38 CC Thank you.

08 01 23 47 LMP And, Joe, I'm ready to copy that TEI pad.

08 01 23 51 CC Okay, Jim, good morning. We need ACCEPT, and we're going to up link a new state vector to you. And here comes the TEI 62 pad. SPS/G&N; 36310; plus 0.61, plus 0.92; 200:10:34.64; plus 2928.4, plus 0190.3, minus 0043.5; 180, 106, 006. The rest is NA. No comment. Ullage: four jets, 12 seconds. Over.

08 01 24 57 LMP Okay, Joe. The read-back on TEI 62. SPS/G&N; 36310; plus 0.61, plus 0.92; 200:10:34.64; plus 2928.4, plus 0190.3, minus 0043.5; 180, 106, 006; four jets, 12 seconds.

08 01 25 28 CC Okay, Jim. Read-back correct. And how are you doing this morning?

08 01 25 37 LMP Fine, Joe. Had a good night's sleep.

08 01 25 42 CC Super.

08 01 25 49 CMP Okay, Joe, I've got a clear status report for you.

08 01 25 52 CC Go ahead.

08 01 25 58 CMP Okay. Longest 9 hours sleep in one period there, Joe, to begin with. And the PRD's are 25024, 08031, and 23175.

08 01 26 19 CC Okay, Al, copy that. And assume there was no medication.

08 01 26 26 CMP That's affirmative.

08 01 26 28 CC Okay, thank you, babe.

08 01 26 43 CC Endeavour, you can go back to BLOCK. You have a new state vector. And we're standing by to watch your water dump.

08 01 27 00 CDR Okay, Joe, crank out the water dump. Want to watch one for a change, huh?

08 01 27 06 CC Roger, lay it on us.

08 01 32 57 CC Hello, Endeavour. This is Houston with a map camera photo pad when you are ready.

08 01 33 06 LMP Stand by one, please, Joe.

08 01 33 07 CC Roger.

08 01 35 44 CMP Houston, 15. Go ahead with your mapping and pan camera photo patchup.

08 01 35 49 CC Okay, Al. And I - I forgot to tell you when you are dumping water, you can also go ahead with the URINE DUMP if you need to do that. I just forgot to mention that. The map camera photo pads for REV - -

08 01 36 03 CMP That's okay, we're doing it.

08 01 36 04 CC Yes. For REV 60. T-start, 194:35:05, T-stop, 195:34:50. Image motion setting at T-start: barber pole plus 4; at 195 plus 20 plus 00: barber pole. And a couple of notes on this. Be sure to retract the gamma ray boom prior to the start of the camera pass. And be sure to go to 5 degrees dead band in P20 - I'm sorry, Al; that's 0.5 of a degree dead band in P20 prior to camera pass. And you want to extend the camera and start the laser altimeter per the system's Checklist, page S/1-38. Over.

08 01 37 41 CMP Roger, Joe. Understand. Mapping camera photo pad: T-start, 194:35:05; T-stop, 195:34:50. Now for the image motion, you want a T-start barber pole plus 4, and at 195:20:00 you want that increased to barber pole. And notes: Retract the gamma ray boom before taking the pictures; go to

half degrees dead band; and extend the mapping camera; and start the laser altimeter as per system's checklist, S 1-38.

08 01 38 15 CC Sounds good, Al. Thank you.

08 01 41 16 CC Endeavour, this is Houston with the new O<sub>2</sub> heater configuration for you.

08 01 41 25 CMP Okay, Houston. Go ahead.

08 01 41 27 CC Roger, Al. We want O<sub>2</sub> HEATER in tank 3 to AUTO and tanks 1 and 2, OFF. Over.

08 01 41 40 CMP Understand, Joe. You want O<sub>2</sub> HEATER in tank 3, AUTO, and the other two, OFF.

08 01 41 46 CC That's right, Al. And we want you to proceed with your O<sub>2</sub> fuel cell purge listed at 193 plus 58 in the Flight Plan.

08 01 41 59 CMP Roger, Joe. We'll get that in work here now.

08 01 44 38 CC Al, this is Houston. You can terminate the DUMP now. And turn the alpha particle experiment OFF, please.

08 01 45 30 CC Endeavour, Houston. Requesting AUTO in the HIGH GAIN. And, troops, you may have to delay the P52 we've called out to you and coming up shortly until about 194 plus 20, to make sure most of the water is out of the way. Over.

08 01 45 56 CMP Roger, Joe. I'll just go take a look here and see - If I can pick up the star okay, I'll go ahead and do the P52.

08 01 46 02 CC Okay, Al. And you got the call about the alpha particle counter, I hope.

08 01 46 11 CMP Right. Roger. We got it turned off.

08 01 46 14 CC Thank you, sir.

08 01 51 13 CMP Houston, 15.

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08 01 51 15 CC Go ahead.

08 01 51 19 CMP Okay, Joe. I got the gyro torquing angles up, and I'll torque them out in a minute.

08 01 51 26 CC Standing by.

08 01 53 39 CC Al, we - we've noted the termination of your fuel cell 3 purge. At your convenience, open the X-ray and the alpha particle experiment covers, please, and turn the alpha particle back on. Over.

08 01 53 54 CMP Okay, Joe. We'll be about another 2 or 3 minutes finishing up all the dumps, and then we'll do that.

08 01 54 00 CC Okay. Fine. We do want you to wait until all the dumps are completed, and then open the doors and turn alpha particle on at your convenience, really.

08 01 54 11 CMP Roger.

08 01 55 20 CC Good ship Endeavour, this is Houston. We'll see you on the other side.

08 01 55 26 CMP Okay, Joe.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 02 18 -- BEGIN LUNAR REV 60

08 02 43 09 CC Hello, Endeavour. This is Houston.

08 02 44 24 CC Hello, Endeavour. This is Houston.

08 02 44 32 CMP Hello, Houston; Endeavour. Loud and clear.

08 02 44 35 CC Roger, Al. I wanted to tell you that except for a couple of minor changes, you'll shortly be back on the nominal Flight Plan. I do have a pan camera photo pad to be copied into your Flight Plan at 195 plus 00 when you're ready.

08 02 44 55 CMP Okay, Joe. Go ahead.

08 02 44 58 CC All righty. At 195 plus 00, PAN CAMERA MODE, STANDBY; POWER, on; STEREO, EXPOSURE, normal. At 195:04:13, PAN CAMERA MODE, OPERATE. At 195:14:30, PAN CAMERA MODE, STANDBY. PAN CAMERA MODE, MONO, at 195:18:23; PAN CAM SELF TEST to SELF TEST. The talkback should be barber pole for 30 seconds and then gray. And after the talkback is gray, PAN CAMERA SELF TEST to HEATER. At about 195 plus 21, PAN CAMERA POWER, OFF, on a cue from MSFN. At - at 195 plus 34 plus 50, LASER ALTIMETER, OFF; RETRACT MAP CAMERA; and CLOSE MAP CAMERA COVER, per steps 7 and 8, page S/1-39 in your checklist. Over.

08 02 47 38 CMP Okay, Houston; understand. And I'll go through the whole thing here for you. At 195, PAN CAMERA MODE, STANDBY, POWER, on, STEREO, and EXPOSURE, normal. At 195:04:13, MODE to OPERATE. At 195:14:30, MODE, STANDBY, and STEREO to MONO. At 195:18:23, SELF TEST to SELF TEST, and barber pole for 30 seconds and then SELF TEST to HEATERS. At 195:21:00, PAN CAMERA POWER to OFF on your cue. At 195:34:50, LASER ALTIMETER, OFF; RETRACT the MAPPING CAMERA, and CLOSE the COVERS per steps in checklist S/1-39.

08 02 48 39 CC Okay, Al. Right on. And could you verify for us, please, that the ALPHA particle spectrometer has been turned ON and that the X-RAY and ALPHA particle COVERS are OPEN. Over.

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08 02 48 55 CMP Okay, Joe. The COVERS are OPEN, X-RAY is ON, and ALPHA particle coming ON now.

08 02 49 02 CC Okay, thank you. And, Endeavour; we need NARROW BEAM on the HIGH GAIN, please.

08 02 49 16 CMP Got it.

08 02 49 27 CC Okay, Al. Thank you.

08 02 49 33 CMP Roger, Joe.

08 02 51 22 CMP Houston, 15.

08 02 51 24 CC Go ahead, Al.

08 02 51 29 CMP Joe, looking ahead a little bit in the Flight Plan, I see we've got gegenschein coming up on this rev. And I guess my question is do you want me to change the film in the - in the camera now? In other words, have we missed any picturetaking with the - the - the Nikon that maybe we want to pick up with that MAG before I offload that MAG?

08 02 51 55 CC Al, I'll have an answer for you in just a minute on that. In the meantime, could you reverify that the COVERS on the X-RAY and ALPHA particle are OPEN, and we're getting some problems on that, and I guess the best thing to do would be - to just go to your checklist, page 1-33, and do that COVER, OPEN, couple of steps - which is listed "Number 1, COVER, OPEN" - -

08 02 52 22 CMP Okay, now, Joe. You're right. I don't know - I don't know where we got - got our wires crossed, but the COVERS were CLOSED and they're now OPEN.

08 02 52 31 CC Okay, no problem. Good.

08 02 53 33 CC Al, on your question on the gegenschein experiment, we want you to go ahead and change the MAG to Victor just per the Flight Plan.

08 02 53 44 CMP Okay, Joe. Thank you.

08 02 57 42 CC Hello, Al. This is Houston.

08 02 57 51 CMP Hello, Houston. This is Al.

08 02 57 54 CC Roger, babe. Requesting you - give us a GAINSTEP on the GAMMA EXPERIMENT up three clicks, please. And, we're also wondering what MAG you've taken of the Nikon to put MAG Victor on. There's some confusion in our minds. I guess we thought Victor was already on there. Over.

08 02 58 18 CMP Negative. MAG U was on there before, Joe, and I had just taken it off.

08 02 58 23 CC Okay, thank you, Al. That helps us. And once again, the GAINSTEP on the GAMMA, up three clicks. And we're showing that now.

08 02 58 33 CMP You've already got it.

08 02 58 34 CC Thank you.

08 03 02 11 CC Endeavour, this is Houston. Requesting AUTO on the HIGH GAIN, please.

08 03 02 18 CMP AUTO it is.

08 03 02 59 CC Endeavour -

08 03 04 00 CC MARK 15 seconds to PAN CAMERA, OFF - ON, PAN CAMERA, ON. Sorry.

08 03 04 06 CMP Roger. Roger. Got you, Joe.

08 03 04 14 CC PAN CAMERA, ON.

08 03 04 20 CMP It's ON.

08 03 14 04 CC PAN CAMERA to STANDBY in 30 seconds.

08 03 14 11 CMP Roger, Joe. Thank you.

08 03 14 31 CC PAN CAMERA to STANDBY.

08 03 14 38 CMP PAN to MONO.

08 03 14 42 CC We copy, and thank you, Al. And, I've got a UV photo pad, a big one-liner, when you're ready to copy that.

08 03 15 01 CMP Okay, Joe. Go ahead.



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08 03 15 02 CC Roger. This is for your pad located at 196 plus 50.  
And it is T-start, 196:56:19.

08 03 15 21 CMP Understand, Joe. UV photo pad, T-start, 196:56:19.

08 03 15 28 CC Right on, Al. Thank you.

08 03 16 01 CC Endeavour, 30 seconds to SELF TEST.

08 03 16 13 CMP Roger.

08 03 16 27 CC Al, I gave a bad call. I was 30 seconds premature  
on that. Stand by.

08 03 16 35 CMP Okay. Looks like you'll get two SELF TESTS, Joe.

08 03 17 06 CC Al, that's no problem. We'll take both of them,  
and I'll cue you for the next.

08 03 17 14 CMP Okay. I'll give you a whole series of them here  
if you want them.

08 03 17 27 CC Negative, Al.

08 03 17 54 CC Thirty seconds to SELF TEST.

08 03 18 00 CMP Roger.

08 03 18 22 CC MARK. SELF TEST.

08 03 18 29 CMP Roger.

08 03 20 00 CMP Houston, 15. PAN CAMERA is in HEATER MODE now.

08 03 20 04 CC Thank you, Al.

08 03 20 19 CC Okay, Al, and on the MAP CAMERA, IMAGE MOTION to  
barber pole, please.

08 03 20 28 CMP Roger.

08 03 29 28 CC Hello, Endeavour, this is Houston.

08 03 29 35 CMP Houston, Endeavour. Go ahead.

08 03 29 41 CC Roger, Al. I've got what they tell me is the last  
change to your Flight Plan to put you back on the  
nominal.

08 03 29 52 CMP Okay, Joe; stand by just 1.

08 03 29 54 CC Okay, no hurry.

08 03 31 00 CMP Okay, Houston; 15. Go ahead with the Flight Plan update.

08 03 31 14 CC Okay, Al. The first change is at 195 plus 36 in your Flight Plan. And it is "GAMMA RAY BOOM, DEPLOY, talkback barber pole for about 2 minutes and 40 seconds, then gray, and then to OFF, center position." Over.

08 03 31 54 CMP Roger, Joe. Understand. At 195:36:00, "GAMMA RAY beam-BOOM, DEPLOY, talkback barber pole about 2 minutes 40 seconds, then gray, and switch OFF."

08 03 32 07 CC Okay, Al. That's good, and the next two items are deletes over at 196 plus 31. And that is, delete - -

08 03 32 22 CMP Okay, go ahead.

08 03 32 23 CC - - delete "MAP CAMERA/LASER EXPERIMENT COVERS," et cetera, and delete "MAP CAM TRACK," et cetera, and at 196 plus 37, delete "LASER ALTIMETER, ON." Over.

08 03 32 51 CMP Roger; understand. At 196:30, delete the two lines dealing with the mapping camera, and at 196:37, delete the laser altimeter function.

08 03 33 12 CC Okay, Al, and you're now back on your Flight Plan except for the additional couple of pan camera bursts and a map camera pass that you already have copied down. And while I've got you on the line here, I'd like for you to think back yesterday, and I've got a question to ask concerning your suit integrity check. We're trying to go through this and reconstruct exactly what had happened. And I guess what we need is a - a comment about your third suit integrity check. And, that one was the one you did just after the first LM JETT had been scrubbed and you went around the back side and did a suit integrity check, and we're wondering if you can recall any of the details of that check for us. Over.

08 03 34 03 CDR Okay, understand you're concerned about the second suit integrity check we did. The third one was

okay. The suits were - held integrity fine, and we had an O<sub>2</sub> flow of about .6 to .7. So, I guess you're talking about the second one, huh?

08 03 34 27 MCC Dave, we're talking about the one you did before the last one, whatever number you call that.

08 03 34 36 CMP Yes, Dick, that - that was the one we recycled quickly on board up here, and it was because we had one of the gloves that wasn't fastened on exactly right.

08 03 34 52 CC Roger, Al. MAP CAMERA and LASER, OFF, please.

08 03 35 02 CMP Okay, MAP CAMERA and LASER, OFF. And, did you understand the comment on the suit integrity check?

08 03 35 10 CC Fine, Al. Thank you. That helps us a lot.

08 03 35 16 CMP Okay.

08 03 39 21 CC PAN CAMERA POWER, OFF, when convenient, please.

08 03 39 29 CMP Okay, it's OFF.

08 03 39 33 CC Roger.

08 03 52 03 CC Endeavour, this is Houston. You're coming up on LOS in about 2 minutes, and everything's looking just as slick as glass.

08 03 52 13 CMP Okay, Joe; and, we're just sitting here in attitude all set to dim the lights and do the gegenschein.

08 03 52 21 CC Okay, Al; sounds like fun. Enjoy the back side, and see you in a few minutes. And if there's anything you need from us down here, just give a call.

08 03 52 35 CMP Certainly, Joe.

08 03 52 38 CC Knew you would.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 04 16 -- BEGIN LUNAR REV 61

08 04 42 34 CMP Houston, 15.

08 04 42 56 CC Endeavour, Houston.

08 04 43 01 CMP Hello, Houston. Endeavour here.

08 04 43 05 CC Roger, Al. Copy. And I've got a TEI-64 pad when you're ready.

08 04 43 19 CMP Okay, just a minute.

08 04 43 39 CMP Okay, go ahead with the pad.

08 04 43 41 CC Roger, Alfredo. SPS/G&N for a TEI-64; 36310; plus 0.61, plus 0.92; 204:08:11.62; plus 3011.0, minus 0019.6, plus 0048.8; 180, 102, 002. All the rest NA. Ullage, four jet, 12 second. Over.

08 04 44 41 CMP Roger, Joe. Understand TEI-64, SPS/G&N; 36310; plus 0.61, plus 0.92; 204:08:11.62; plus 3011.0, minus 0019.6, plus 0048.8; 180, 102, 002. The rest is NA. Four jet, 12 seconds.

08 04 45 11 CC Readback's correct, Al. Thank you.

08 04 58 46 CC Endeavour, Houston.

08 04 58 52 CMP Hello, Houston. Endeavour, go ahead.

08 04 58 54 CC Al, could you give us the MASS SPEC DISCRIMINATOR switch to LOW, please.

08 04 59 03 CMP MASS SPEC DISCRIMINATOR to LOW.

08 04 59 05 CC Okay, thank you. And, did you get a volunteer for eye flash experiment?

08 04 59 15 CMP Yes, I think we have a volunteer for you.

08 04 59 21 CC Okay.

08 04 59 22 LMP Your volunteer's checking in here, Joe.

08 04 59 24 CC Okay, Jim. A quick word on it. Everything per the Flight Plan. We are going to ask you to go ahead and give us your description real-time on the down link and your choice if you want to push to talk or go on to VOX. And then, when you go around the corner, you can put it on the DSE like you did before, in HIGH BIT RATE. And Al, we got a one-time-special good deal for you in the meantime. We're coming up - You're going to be flying over the LM impact point shortly, where your trusty Falcon augered into the Moon, and we're going to ask for a short pan camera burst there. We'll come up with that photo pad to you in a minute. In the meantime, at your convenience, could you go to FREE, load NOUN 79 to .5 dead band, and - then go back, please.

08 05 00 22 CMP Okay, we'll do that, Joe. Stand by. That ought to be good.

08 05 00 40 CC And, Endeavour, you will be interested to know that the impact of Falcon was picked up on three beautiful seismometers on the Moon - a really remarkable record.

08 05 00 53 CMP Which ones were they, Joe?

08 05 00 55 CC Apparently, they were the ones from Apollo 12, Apollo 14, and Apollo 15. We haven't had reports from other seismometers yet.

08 05 01 09 CMP That's very interesting.

08 05 01 14 CMP Tell us, Joe, did they get the LM impact close to where they wanted it?

08 05 01 23 CC Roger. It went in to within about a degree. And in fact, as you know, it doesn't - the exact point isn't all that important. It - it went in just about where we wanted it, though.

08 05 01 45 CC And Al, as soon as you have NOUN 79 and you give us ACCEPT, we'll give you a state vector. Over.

08 05 01 57 CMP Okay, Joe. You have it.

08 05 01 58 CC Roger. We see it. Thank you.

08 05 02 04 LMP Okay, Joe, I'm ready to start the - experiment.

08 05 02 09 CC Okay, Jim, we're copying.

08 05 02 15 LMP Okay.

08 05 03 01 CC Endeavour, AUTO on HIGH GAIN, please.

08 05 03 08 LMP Roger. AUTO.

08 05 04 48 CC Al, this is Houston. You can go back into BLOCK. We still need a half a degree dead band. And you can delete two lines in your FLIGHT PLAN, one at 197:04 and one at 197:09, both the "Pan camera" lines there, delete them. Over.

08 05 05 12 CMP Roger, Joe. Understand. Delete the "Pan camera" lines at 197:04 and 197:09.

08 05 05 19 CC Roger. You can BLOCK the computer but we need a half a degree dead band.

08 05 05 29 CMP Roger, Joe. I've loaded it a couple of times. Let me check it again.

08 05 06 08 CMP Okay, Joe. I've got half a degree and - guess I'm having a hard time counting today.

08 05 06 13 CC Thank you, Al. I'm not doing any better.

08 05 06 18 CMP Roger.

08 05 08 27 LMP Joe, are you still there?

08 05 08 31 CC Go ahead.

08 05 08 36 LMP As long as I'm lying here waiting for a flash, I might comment that Dave and I both observed the flashes while we were - on the surface. While we were in the bunks down there, we observed the flashes with the - oh, about the same frequency as we observed in orbit. One night there was about a 5-, 10-minute period there where I was awake, and I ran a little experiment by just turning over in the bunk. It seemed like the frequency was much less when I was lying on my stomach as opposed to lying on my back. It's just a note of interest.

08 05 09 18 CC           Okay, Jim. That's a most interesting comment. And as you know, with about 10 minutes to go during the experiment today, we'll ask for you to turn over and be oriented with your face away from the Moon, and we might very well get the same sort of information this time. Al, I've got a photo pad for you to copy when you're ready. And then, Jim, you can just go ahead and switch to VOX mode, if you don't want to push your PUSH TO TALK while you transmit to us. Your choice on that, though.

08 05 09 55 LMP           Okay, no problem.

08 05 09 57 CMP           Okay, Joe. Go with the pad.

08 05 10 00 CC           Roger. Pan camera pad at 197 plus 16 plus 22. And you're to go to OPERATE per step 5 in your Checklist, page S 1-38. And at 197 plus 18 plus 22, the PAN CAMERA to STANDBY. And at 197 plus 40, you can delete the P52 scheduled then. Over.

08 05 10 53 CMP           Roger, Joe. Understand. You want the PAN CAMERA to - to OPERATE at 197:16:22 as per the Systems Checklist 1-38 and to STANDBY at 197:18:22. And delete the P52 at 197:44 - or - 40.

08 05 11 13 CC           Right on, Al. Thank you. And, Jim, we're standing by to copy your comments.

08 05 11 23 LMP           Roger, Joe.

08 05 12 01 CC           And, Jim, this is Houston. We'd like for you to transmit your description as well as the mark call, please.

08 05 12 04 LMP           Understand.

08 05 12 39 LMP           MARK. And it was at the left eye; 8 o'clock, and it was a streak, and it seemed to be moving from 8 o'clock to maybe the 1 o'clock position, about - it covered about 20 degrees of arc out to a position - periphery at 8 o'clock into midway on our sphere of reference. An intensity of 3. And -

08 05 13 13 LMP           MARK. I just had a flash at 1 o'clock, moving to the center - the center of - moving toward the 12 o'clock position. It was intensity 3. And that last one was the right eye.

08 05 16 13 LMP MARK. A flash at the 12 o'clock, intensity 4.

08 05 16 25 LMP That was right down the plus-X axis, Joe.

08 05 16 42 CC Roger, Jim. Copy.

08 05 17 07 LMP MARK. A flash at 8 o'clock, left eye, periphery, intensity 2.

08 05 17 38 CC Al, PAN CAMERA STEREO switch to STEREO, please.

08 05 17 46 CMP Okay, STEREO it is.

08 05 18 28 CMP And PAN CAMERA to STANDBY.

08 05 18 37 CC Okay, Al. Thank you. That might be a super picture.

08 05 18 45 CMP Sure hope so, Joe.

08 05 24 11 CC Jim, this is Houston. How are the eye flashes coming?

08 05 24 17 LMP Still waiting, Joe.

08 05 24 20 CC Okay.

08 05 26 54 LMP MARK. A first ray of flash, 10 o'clock, left eye, about three-quarters of the way out to the periphery, intensity 5.

08 05 27 17 LMP MARK. A streak, at 1 o'clock, moving from the bottom to the top of the - our sphere. Moving - moving definitely vertically up, beginning at 1 o'clock about three-quarters of the way up - intensity 2.

08 05 29 58 CC Jim, this is Houston. And we're still listening to you. In the meantime, I've got a map camera pad to give to Al when he's ready. Over.

08 05 30 10 LMP Okay, he'll be with you shortly.

08 05 30 13 CMP Yes. Hold on, Joe. We're going over the Harbinger Mountains and right over the Aristarchus Plateau right now. And Dave and I are looking like mad and taking pictures.



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08 05 30 23 CC

Fine, Alfredo. When you get back to me, I'll give you this other pad. It's got to be within the next 15 minutes though.

08 05 30 34 CMP

Okay, Joe. No problem, we're about done.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 05 32 16 LMP MARK. Flash at, seems like it was in both eyes, at about the 7 o'clock position, one-quarter of the way out the periphery, intensity 5.

08 05 33 23 CMP Houston, 15. Ready to copy the pad.

08 05 33 30 CC Roger, Al. At 198 plus 25, go to narrow DEAD BAND in P20 VERB 22 NOUN 79, plus 000.50. OPEN COVER and EXTEND MAP CAMERA, per steps 3 and 4 in your checklist. 198 plus 31, MAP CAMERA IMAGE MOTION, ON. 198 plus 32 plus 10, MAP CAMERA, ON; IMAGE MOTION, INCREASE, barber pole plus four steps; LASER ALTIMETER, ON. 199 plus 19, IMAGE MOTION, INCREASE, talkback barber pole. 199 plus 31 plus 56, MAP CAMERA, OFF; LASER ALTIMETER, OFF; Wait 30 seconds, then MAP CAMERA, ON - That - that should read, MAP CAMERA, ON, to STANDBY; And then RETRACT and CLOSE COVER, per steps 78 - 7 and 8 in the checklist. And that brings you to 199 plus 31 in your Flight Plan, and you can delete the three lines at that point, "MAP CAMERA IMAGE MOTION, ON; MAP CAMERA, ON; MAP CAMERA IMAGE MOTION, INCREASE." Over.

08 05 36 00 CMP Roger, Houston. Copy. At 198:15, go narrow DEAD BAND at P20. OPEN MAPPING CAMERA COVERS and EXTEND the MAPPING CAMERA. At 198:31 plus 00, MAPPING CAMERA, ON - Oh, I'm sorry, IMAGE MOTION, ON. And 198 plus 32 plus 10, MAPPING CAMERA, ON; IMAGE MOTION to barber pole plus four; and LASER ALTIMETER, ON. At 199:19:00, IMAGE MOTION to barber pole. At 199:31:56, MAPPING CAMERA, OFF; LASER, OFF; wait 30 seconds, MAPPING CAMERA to STANDBY - No, that's RETRACT and CLOSE COVERS.

08 05 36 55 CC That's correct, Al; and, you can delete those three lines at 199 plus 30. And - and there's a note that goes with this. This particular pass will be taken with the GAMMA EXPERIMENT and the MASS SPEC EXPERIMENT BOOMS EXTENDED. So don't worry about the fact they're out. One number you gave to me, the first one, should be 198 plus 25, go to narrow DEAD BAND. Over.

08 05 37 28 CMP Roger. 198:25. That's what I had written. Read it wrong.

08 05 37 32 CC Okay, thank you.

08 05 37 37 LMP Okay, Joe. During that conversation, I saw two - both at 8 o'clock. First one was three-quarters of the way out, intensity 2. The last one was at intensity 3, about halfway out, appeared to be at left eye.

08 05 37 54 CC Thank you, Jim; copied.

08 05 44 15 LMP MARK. Flash at center, plus-X, intensity 2.

08 05 46 33 LMP MARK. Flash, left eye, 9 o'clock, on the periphery, intensity 5.

08 05 46 44 CC Roger.

08 05 47 30 LMP Joe, how is the time going on my 1 hour?

08 05 47 33 CC Okay, Jim. My sand dial shows about 15 minutes remaining. You'll be going around the corner LOS shortly. We don't have any more instructions for you on the experiment or in fact on anything else going on. We would like your present - a description of your present position in the spacecraft. And, we'd like for you to remain in that position for the rest of the 15 minutes in the experiment. Over.

08 05 48 04 LMP Okay, understand you don't want me to turn over. I'm in the left couch and, of course, facing the plus - plus-X and just when we started that conversation; I had a flash at - at 11 o'clock on the periphery, intensity 4, and then just the - at the end of your conversation, I had a streak moving from the 3 o'clock to the 9 o'clock, right to left, right through the plus-X position.

08 05 48 42 CC Okay, Jim, copied that and that's correct. Just - just stay in your present position, and we'll see you on the other side.

08 05 48 52 LMP Okay.

08 06 14 -- BEGIN LUNAR REV 62

08 06 41 15 CC Hello, Endeavour. This is Houston requesting REACQ and NARROW.

08 06 41 50 CC Okay, Al, thank you very much. Some time during this pass, we are going to be requesting an ISA weight which you have in your Lunar Surface Checklist, page 3-2. And we'll have a map camera and a pan camera pad to send up to you.

08 06 42 23 CMP Okay, Joe. That all sounds very good.

08 06 43 53 CC Endeavour, this is Houston. We're showing your mapping camera not on at this time and are requesting it on. It may be just a reverify from your 198 plus 32 plus 10 on the Flight Plan. Over.

08 06 43 15 CMP Roger, Joe.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 07 08 46 CC Endeavour, this is Houston. We copy the GAMMA RAY, GAINSTEP, SHIELD, on. And Al, we have a photo pad to you when you're ready to copy. Over.

08 07 09 00 CMP Okay, Joe. Go ahead.

08 07 09 03 CC Okay. In your Flight Plan, at 199:20, you can strike PCM cable, unless your relativistic speed has managed to lengthen that cable, I guess. At 199:25, you can strike the three lines, "CMC MODE, VERB 22, and CMC MODE." And, then I have a pad for you at 200 plus 20, when you're ready.

08 07 09 50 CMP Roger. Go ahead with the pad at 200:20.

08 07 09 54 CC Okay, Al. At this time, it's camera configuration for terminator photos that we missed a little earlier. And the lines should read "CM4/EL/250/VHBW, IVL, f/5.6 at 1/125th, infinity, six frames, MAG Romeo." Over.

08 07 10 48 CMP Roger, Joe. Understand. Terminator photo pad at 200 plus 20 is CM4/EL/250/VHBW, and that's with the intervalometer, IVL, at f/5.6 1/125th, infinity, six frames and MAG R.

08 07 11 13 CC Readback's correct, Al. And, the next entry is at - 200 plus 25, which is open the map camera covers and extend the camera per page S 1-39. And, at that time, MAP CAMERA, IMAGE MOTION to ON. And then, coming up to the time 200 plus 27 plus 56, EL on; and 200 plus 29 plus 36, EL off. At the time 200 plus 30 plus 36, MAP CAMERA, ON; IMAGE MOTION, INCREASE; talkback to barber pole, plus four steps; LASER ALTIMETER to ON; PAN CAMERA MODE to STANDBY, POWER, on; STEREO, EXPOSURE, normal. Over.

08 07 13 06 CMP Roger, Joe. At 200 plus 25 open mapping camera covers and extend the mapping camera. Turn the IMAGE MOTION ON at 275 - 200:27:56, EL on, and at 29:36, EL off. At 30:36 MAPPING CAMERA, ON; IMAGE MOTION to barber pole, plus four; and LASER ON. And then PAN CAMERA, STANDBY, POWER, ON; STEREO, EXPOSURE, normal.

08 07 13 41 CC

That's correct Al. And continuing on through a few more steps here, and I'll read them all, and then stand by for your readback. 200 plus 33 plus 29, PAN CAMERA, MODE to OPERATE. 200 plus 49 plus 32, PAN CAMERA to MONO. 200 plus 54 plus 27, PAN CAMERA, STEREO. 200 plus 59 plus 22; PAN CAMERA, MODE; STANDBY; PAN CAMERA, POWER to OFF, on MSFN cue. And, moving right along, 201 plus 17 plus 00, PAN CAMERA, IMAGE MOTION, INCREASE. I'm sorry, Al. That was misread. That should be MAP CAMERA, IMAGE MOTION to INCREASE; talkback, barber pole. 201 plus 28 plus 21, EL on. 201 plus 30 plus 01, EL off. 201 plus 30 plus 21, MAP CAMERA, OFF; LASER ALTIMETER, OFF. And the final one, 201 plus 32 plus 00, retract camera and close covers per the page in your checklist. Over.

08 07 16 27 CMP

Roger, Joe. Understand at 201:17:00, MAPPING CAMERA, IMAGE MOTION, INCREASE to barber pole; at 201:28:21, EL on; at 201:30:01, EL off; 201:32:00, off. No, back to 30:01, after EL off, read MAP CAMERA, OFF; LASER, OFF. And, at 201:32:00, RETRACT and close the mapping camera covers.

08 07 17 08 CC

Okay, Al. And read back to me four more lines, beginning with 200 plus 33 plus 29. You didn't go back quite far enough, and that - that one should read PAN CAMERA, MODE to OPERATE.

08 07 17 24 CMP

Oh, okay.

08 07 17 25 CC

And I'm standing by.

08 07 17 26 CMP

Roger. At - at 33 - at 200:33:29, PAN CAMERA to OPERATE. At 49:32, PAN CAMERA to MONO. At 54:27 PAN to STEREO. And, at 59:22 PAN to STANDBY; POWER OFF on MSFN cue.

08 07 18 00 CC

Okay, Al. Sounds real good. But doublecheck for me one line, which I may have goofed. It's the 201 plus 30 plus 21, MAP CAMERA, OFF; LASER ALTIMETER; OFF.

08 07 18 20 CMP

Roger, Joe. Understand. At 201:30:21. That's 20 seconds after EL, off, we get the MAPPING CAMERA, OFF and the LASER, OFF.

08 07 18 33 CC Yes sir, that's affirmative. And, I guess - we're still waiting for an ISA weight. Other than that, we're doing real fine.

08 07 18 47 CMP Okay, Joe.

08 07 19 10 CMP Houston, 15.

08 07 19 11 CC Go. Go ahead, Al. And, we're waiting for a IMAGE MOTION talkback to barber pole.

08 07 19 28 CMP Okay. Dave's going to get the ISA weight out for you and call you.

08 07 19 33 CC Okay. If he's able to weigh it right there, I'd like to know how he's going to do it. I assume he's got it written down, though.

08 07 19 43 CMP He's got it written down. He just has to get it out.

08 07 22 47 LMP Houston. This is 15.

08 07 22 50 CC Go ahead, 15.

08 07 22 56 LMP Yes, Joe. I have weight information on the ISA. The ISA total was 64 pounds, which includes bags 4 and 6, and 8 pounds return items. And the ISA, by itself, without anything loaded in it, was 8 pounds. Over.

08 07 23 19 CC Okay, Jim, copied that. Sounds like there might be a stone or two in there.

08 07 23 29 LMP Yes. Bags 4 and 6, for sure.

08 07 23 38 CC Thank you, Jim.

08 07 28 47 CC Apollo 15. We'd like GAMMA RAY SHIELD, on, please.

08 07 28 58 CDR Roger, Dr. Parker. SHIELD, on.

08 07 29 48 CC And, 15. Time to start the terminator now.

08 07 29 54 CDR Roger.

08 07 32 00 CC MAPPING CAMERA, STANDBY, please.

08 07 32 13 CDR Roger. STANDBY.

08 07 32 49 CC LASER ALTIMETER, OFF, please.

08 07 34 27 CC Apollo 15, Houston. If you have a chance, we'd like to talk to Dave and Jim about this LCG connector problem sometime.

08 07 34 37 CDR Okay, stand by.

08 07 34 41 CC And AUTO on HIGH GAIN, please.

08 07 34 46 CDR AUTO.

08 07 35 02 CDR Houston, 15. Go.

08 07 35 09 CC 15. Two questions we'd like to ask. First one's specific, and that is, if you noticed anything about the connector between the LCG and the suit when you took it out in order to put the plugs in yesterday afternoon. Was it already out? Was it loose? Was it not lock - locked? Or what? And secondly, a general question building up from this. Can you tell us anything - any insights you acquired in taking the suits off and looking at the connector or just, in general, about what this problem may have been caused by?

08 07 35 51 CDR Well, I guess - I guess our first indication was lack of a good integrity check. As a matter of fact, we couldn't get much more than about a pound in the suit. And the first - In thinking it over, we - we thought the only thing it could be would be those connectors, because that was the on - only semiopen port, even though it shouldn't - shouldn't be leaking. And, everybody checked their helmet and gloves and they appeared to be locked, so we broke open the helmet and gloves and Jim reached in through my zipper and pulled out the LCG connector and stuck in the plug. And then we reziped, or I did. Jim reziped me. And we tried another integrity check, and it worked okay. I guess beyond that - I don't have any explanation for it, other than the only possibility is that the LCG connector was leaking, or that somebody's glove or helmet was leaking, because the suits have been, as you know, very tight all the way through.



08 07 36 55 CC Roger. Did Jim notice when you - when Jim took out your connector there, to put the plug in, did he notice it as being loose, unattached, or not lock-locked? Did he have any - could he tell any of that just reaching in with his fingers?

08 07 37 15 LMP Bob, this is Jim. The lock-lock was engaged on that water connector on Dave's suit.

08 07 37 22 CC Okay, copy. And do we understand that Dave's suit was the only one that did not pass the integrity check that first time around?

08 07 37 32 LMP No. You can't isolate it. The whole suit circuit is the integrity check. It's spacecraft plus three suits. So, there's no way to tell.

08 07 37 40 CC Roger. But on - what I mean is that you did not put - did you put plugs in Jim's suit, too, or just in Dave's suit?

08 07 37 50 LMP No, only - only in one suit. But we did go through the operation of taking off helmets and gloves, which also may have been the problem.

08 07 37 57 CC Roger. Copy that.

08 07 38 02 LMP In - in other words, there may have - even though we checked the lock-locks on the helmets and gloves, why, somebody could have had a cocked one and - and missed it. These - es - especially the - the surface equipment was - had an - an awful lot of lunar dust on it, and it was sort of hard to work. We're - we're going to get them cleaned up before the EVA, but after three runs down there, why, the connectors were getting pretty tough to work, even though we did lubricate them.

08 07 38 31 CC Roger. Copy. I don't think we have anything else, Dave. We noticed you did seem to have some trouble getting a suit integrity check the second time around, also. Is that right?

08 07 38 48 CDR Yes. There was a glove that wasn't locked.

08 07 38 51 CC Okay, guess that was on the loop. Thanks.

08 07 39 09 CDR I think the suit circuit's tight. I think that just might have been one of those things, because the last one we ran was real good. It - the flow dropped down to like, 6 or 7/10ths, I guess, and it would have stayed there all day long. I think we've got a good suit loop, but - I'm not worried about that at all. Just a matter of getting all the connectors cleaned up so they all work well. And insuring that everybody gets a good lock-lock.

08 07 39 35 CC Roger, Dave. We agree too. I - it seems to us that that sounds like it was just one of those situations we run a suit integrity check for.

08 07 39 45 CDR Roger. That's exactly right.

08 07 49 49 CC And, 15; Houston. You are GO for LOS.

08 07 49 57 CDR Thank you very much, Houston.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 08 12 -- BEGIN LUNAR REV 63

08 08 46 14 CC Endeavour, this is Houston. Over.

08 08 46 21 CMP Hello, Houston; this is Endeavour.

08 08 46 24 CC Roger. We got the usual Flight Plan updates, if you'll get a Flight Plan out and copy them in, please.

08 08 46 37 CMP Okay; stand by 1.

08 08 46 39 CC Okay; and if someone could give us HIGH GAIN ANTENNA to AUTO, we'd appreciate it.

08 08 46 59 CMP Go ahead with the update.

08 08 47 00 CC Okay. First one is the UV photo plan - pad at 201:05 in the Flight Plan. The T-start for that will be 201:11:19. Over.

08 08 47 17 CMP Understand. UV T-start: 201:11:19.

08 08 47 22 CC Roger. Next, at 201:20, we will delete "PCM cable."

08 08 47 35 CMP Okay; got that.

08 08 47 37 CC Roger. At 202:30, it's DISCRIMINATOR, LOW, in that line on the MASS SPEC.

08 08 47 52 CMP Okay. DISCRIMINATOR, LOW, at 202:30.

08 08 47 56 CC Roger. At 203:21, we will delete "LASER ALTIMETER, OFF."

08 08 48 11 CMP Understand. Delete "LASER ALTIMETER, OFF" at 203:21, and let's hold up on the rest for now.

08 08 48 47 CC And 15, 30 seconds to PAN CAMERA, MONO.

08 08 49 05 CDR Hey, go with the rest of the updates, Bob.

08 08 49 07 CC Okay. At 203:23, we'll delete the "MAPPING CAMERA TRACK, RETRACT, talkback barber pole, 4 minutes, gray then OFF (center)"; that whole line.

08 08 49 37 CDR Okay; that's deleted. Next?

08 08 49 44 CC And we want PAN CAMERA, MONO, please.

08 08 49 55 CDR It's there.

08 08 49 57 CC Roger; sorry.

08 08 49 59 CC Okay; 203:27, we'll delete "MAPPING CAMERA/LASER EXPERIMENT COVERS, CLOSED, talkback barber pole, gray, then OFF (center)"; et cetera. That whole line there. 203:27.

08 08 50 18 CDR Okay. Next?

08 08 50 20 CC Okay; now we have here a little test the guys down here would like to run with the laser to see if we can zap it a little bit and rejuvenate it, perhaps. The first step is back on 201:30. We will delete the "LASER ALTIMETER, OFF" and "MAPPING COVER/LASER ALTIMETER COVER, CLOSE." At 201 plus 30. Over.

08 08 51 00 CDR Are you making an update to the update?

08 08 51 03 CC Stand by here. Stand by a minute.

08 08 51 09 CDR Okay; I didn't exactly find that one.

08 08 51 12 CC Yes, stand by. I got to check with OSO.

08 08 52 29 CC Okay, 15. We got a clarification on that. The "LASER ALTIMETER, OFF" is at 201:30. The "MAPPING CAMERA/LASER ALTIMETER COVER, CLOSE" is called out at 201:32. And we want to delete both of those.

08 08 52 48 CDR Stand by, Bob. We're taking pictures. We'll come back to you.

08 08 52 50 CC Yes, give me a call.

08 08 53 45 CC And 30 seconds to PAN CAMERA, STEREO.

08 08 55 33 CMP Okay, Houston; 15. Go ahead with some updates, if you've got them.

08 08 55 43 CC Okay, Al. Did you copy? What we're doing is we're changing that update, deleting the LASER ALTIMETER, OFF at 201:30. And then, we're also deleting at 201:32, the callout to "CLOSE the MAPPING CAMERA/LASER ALTIMETER COVERS." Over.

08 08 56 10 CMP Okay; I understand. At 201:30, you want the LASER ALTIMETER left ON, and the MAPPING CAMERA left out and the COVERS, OPEN.

08 08 56 20 CC That's affirmative. Okay; now after the MAPPING - -

08 08 56 24 CMP Is that what you want?

08 08 56 25 CC That's affirmative. And now, after the MAPPING CAMERA is OFF at 201:30, we want to cycle the LASER switch OFF for 1 second, then ON for 15 seconds, OFF for 1 second, ON for 15 seconds, et cetera, for 20 cycles. And after 20 cycles, we will leave the LASER ALTIMETER, ON, for MSFN analysis. Over.

08 08 57 08 CMP Okay; understand. You want at 201:30 - you want to cycle the LASER ALTIMETER, OFF for 1 second and ON 15 seconds, for 20 seconds - for 20 cycles, and then leave it turned ON.

08 08 57 23 CC That's Roger. And we'll get back to you at that point.

08 08 57 30 CMP Okay.

08 08 57 38 CC And that's all we have for right now, Al.

08 08 57 45 CMP Roger.

08 08 58 56 CC And, Al, 30 seconds to PAN CAMERA, STANDBY, POWER, OFF.

08 09 01 08 CC And, 15, we verify the pan camera lens is stowed. When convenient, we'd like BATTERY B CHARGE - BATTERY Bravo CHARGE terminated.

08 09 01 21 CMP Understand, B terminated.

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08 09 06 16 CC And, Endeavour; Houston. One more request, please.

08 09 06 20 CDR Go ahead, Bob.

08 09 06 21 CC Roger. Since we don't have the PCM cable, we'd like to - for these UV photos - to have you give us a mark each time you press the shutter button, please, on the air-to-ground.

08 09 06 36 CDR Okay; if you'd like.

08 09 07 29 CMP Houston, 15.

08 09 07 30 CC Go ahead. Go ahead, 15.

08 09 07 42 CMP Okay, Bob. Would you like me to hook up the PCM cable to it?

08 09 07 48 CC Well, the word that I was given down here was that you couldn't reach with the PCM cable.

08 09 07 55 CMP No, we're taking - we're taking the pictures out of window 5, and that's where the scientific instrument outlet is.

08 09 08 03 CC Stand by. 15, if you can do that, that's fine.

08 09 08 14 CMP Okay; I'll tell you what, Bob. I'll go ahead and hook up the PCM cable, and - and you tell me if you're getting a signal down there after I start taking pictures.

08 09 08 23 CC Okay.

08 09 08 31 CMP And the word you got on it was - was correct. It looks like window 5 is about the only window that can be used for the PCM cable.

08 09 08 38 CC Roger.

08 09 10 21 CC And, Endeavour, we won't be able to see that PCM real time, but we'll just assume that it's coming down if you've got the PCM cable hooked up.

08 09 10 30 CMP Okay, Bob. I got it hooked up.

08 09 11 07 CC Thirty seconds to UV photos.

08 09 11 13 CDR Okay; thank you.

08 09 18 11 CMP Houston, 15.

08 09 18 12 CC Go ahead, 15.

08 09 18 16 CMP Okay, Bob. When I took the - the shade out of window 5, window 5 still appears very clean.

08 09 18 21 CC Copy.

08 09 19 16 CC And, Endeavour, two questions if you've got a chance, between now and terminator photo.

08 09 19 24 CMP Say again on the terminator photos, Bob.

08 09 19 28 CC Roger. Do you have time for a couple of questions, between now and the start of the terminator photos?

08 09 19 34 CMP Yes, sure. Go ahead.

08 09 19 36 CC Roger. First, any comments on the mass spec boom retraction you did a half hour ago?

08 09 19 45 CMP No, no comments on it. And - I guess we're back to the position we were in before, that the thing is sort of half barber pole. And when I go back out with it - fiddle with it a little bit, the barber pole goes full up and then comes down about half-way again.

08 09 20 16 CC Okay; we copy.

08 09 20 18 CMP And that's where it stands right now.

08 09 20 20 CC Okay. Second question - -

08 09 20 22 CMP I played with it for a while, and then got busy in other things. But I'll continue - I'll continue working on it.

08 09 20 30 CC Copy, Al. Second question, do you want me to continue giving the - you these real-time marks on air - air-to-ground, just before and after various camera passes?

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08 09 20 49 CMP Yes, I like the reminder, Bob.

08 09 20 52 CC Okay; 30 seconds - -

08 09 20 53 CMP Don't expect an answer, I'll probably be busy doing it.

08 09 20 56 CC Hopefully. Thirty seconds a good time?

08 09 21 00 CMP Roger.

08 09 21 42 CMP And, Houston; 15.

08 09 21 44 CC Go ahead. 15, go ahead.

08 09 21 54 CMP Okay; for your info, the mass spec took about - oh, maybe seven or eight cycles this time, before it came all the way in. And the same operation as before.

08 09 22 07 CC Roger; copy. It took you seven or eight cycles to get it all the way in.

08 09 27 50 CC Thirty seconds; the terminator photo start.

08 09 30 03 CC Terminator photo stop.

08 09 30 13 CMP Roger, Bob.

08 09 30 21 CC MAPPING CAMERA, OFF.

08 09 32 47 CC And, Endeavour; Houston. Be advised, we'd like an accurate 15 seconds, ON; 1 second, OFF. No more than 16 or 17 seconds, ON.

08 09 32 59 CMP Roger; understand.

08 09 38 43 CC And, 15. Roger; thank you. Unfortunately, like everything else, the laser didn't do much good. We'd like now, MAPPING CAMERA to STANDBY; LASER ALTIMETER, OFF. Then, we'll do the RETRACT and DOOR, CLOSE. Over.

08 09 39 03 CMP Okay, Bob. We'll go MAPPING CAMERA, OFF and LASER, OFF.



08 09 39 07 CC We need MAPPING CAMERA, STANDBY, please.

08 09 39 15 CMP Roger; STANDBY, and IMAGE MOTION, OFF, and LASER  
ALTIMETER, OFF. And retracting the - retracting  
the camera, now.

08 09 39 30 CC Copy.

08 09 47 05 CC And, Endeavour; Houston. Over.

08 09 47 11 CMP Go ahead.

08 09 47 12 CC Roger, Al. If you could get us a film-budget  
status on the backside to give us when you come  
around, we'd appreciate it. And except for that,  
you're GO for LOS.

08 09 47 24 CMP All righty. Thank you, sir. And we'll see if we  
can conjure one up for you.

08 09 47 29 CC Good enough.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 10 10 -- BEGIN LUNAR REV 64

08 10 40 00 CC And, Endeavour; Houston. Over.

08 10 40 10 CDR Houston, Endeavour, go.

08 10 40 11 CC Roger, if you ... Roger, if you guys give us an ACCEPT, we'll send you up a state vector and time up-link.

08 10 40 24 CDR Roger, you've got it.

08 10 40 25 CC Copy. And if you fellows will give me a call in the middle of your eating there, when you've got time, we'll do some talking at you.

08 10 40 41 CDR Okay, give us about 5 minutes here.

08 10 40 44 CC Okay.

08 10 43 17 CC And 15, its your computer. Over.

08 10 43 23 CDR Roger.

08 10 43 49 CDR Houston, Endeavour. We're ready to chitty-chat, if you like.

08 10 43 53 CC Okay. While you guys are eating your supper there, it might be a good time to get a report on your food so far. How's it been going?

08 10 44 03 CDR Oh, I think we have consumed every meal as planned and we've made a pretty good cut into the pantry.

08 10 44 11 CC You've made a pretty good cut into the pantry, you say?

08 10 44 17 CDR Roger. That extra little box over there with extra little goodies.

08 10 44 21 CC Okay, and can you guys give us any estimates on the water that you and Jim consumed on the surface, say in the LM and on the EVA, and any differences between this and what Al's been consuming?

08 10 44 39 CDR Not without sitting down and doing some thinking about it. We'll be glad to do that, if you like.

08 10 44 45 CC Roger. If that's not too much trouble, I guess we could start out by some estimate as to how much you guys were drinking in the LM and on the EVA. Was the drink bag adequate, or what?

08 10 44 59 CDR Oh, I think that is probably a good discussion for the debriefing after the flight.

08 10 45 09 CC Okay. Sounds like you are at least eating and drinking a lot so far. We are anxious for you all to continue eating and drinking well, because of the EVA yet to come.

08 10 45 21 CDR Oh, okay. Well, if that's your - your interest, yes, we - we consumed quite a bit of water on the surface, and we were quite satisfied with what we had. We had plenty. And we've been eating and drinking a lot up here. I think everybody is in fine shape and ready to take care of what is on - on the Flight Plan the rest of the way.

08 10 45 42 CC Sounds good. One other specific point we'd like to clear up, Dave, which I guess was a little muddled this morning. Did you and Jim take a Secnal last night or not?

08 10 45 53 CDR No, there's been no medication taken by anybody on the flight.

08 10 45 57 CC Okay. However, I - we down here would like to recommend for all three of you to take one tonight just to make sure we get another good night's sleep.

08 10 46 09 CDR I think that's unnecessary.

08 10 46 12 CC Well, that's our recommendation anyway. And can you tell us who plans to sensor up tonight, Dave.

08 10 46 19 CDR Okay. Roger. I guess as per our agreement this morning, why - you'll get a CMP and an LMP tonight.

08 10 46 29 CC Roger; understand. And then we'll press on with the normal Flight Plan tomorrow. And, Al, we'd like to have you - you wear the lightweight headset tonight, because then, we'd like to wake

just Al up on schedule so he can do us a P20 to - give us some plus-X time on the mass spec. And so we'd like to - arrange it that way, if it's convenient with you guys.

08 10 47 00 CDR No, I don't think that's practical, Bob. You can't have one person awake in here and the other two sleeping. It - just can't do it.

08 10 47 08 CC Okay; understand. And to avoid what we had last night with all those last minute calls again and again and again, why don't you guys give us a final call just before you're ready to go to sleep. We'll get a final status down here, and then we won't - we won't have to keep calling back tonight.

08 10 47 26 CDR Oh, that's a good idea. All right. We'll do that.

08 10 47 29 CC It got a little embarrassing down here after a while.

08 10 47 35 CDR Oh aw, that's okay. Yesterday was a long day.

08 10 47 38 CC Roger that. And we got a TEI 69 pad down here, when Jim's ready to copy. And we're also ready to copy some torquing angles from that P52, if you got them. And we'd like you to leave your HIGH GAIN ANTENNA at plus 25 and 185 on YAW and in NARROW and REACQUIRE as you go around the corner this time.

08 10 48 06 CDR Oh, okay. You want NARROW, REACQUIRE, and plus 25 and 185. We'll do that. If you're ready to copy, I've got the P52.

08 10 48 14 CC Roger. I'll copy that now.

08 10 48 19 CDR Okay. NOUN 05 was .01; NOUN 93 was plus.07, minus .47, minus .05. They were torqued out at 202:00:30.

08 10 48 36 CC Roger. Copy .01, plus .07, minus .47, minus .05, and 202:00:30.

08 10 48 49 CDR Roger. That's cricket.

08 10 49 00 CC And, Dave, we'd like OPTIC, ZERO, at this time, please.

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08 10 49 05 CDR Oh, yes, OPTIC, ZERO. Hey, by the way, I - I should have said .007. Pardon me. I had my decimal point in the wrong spot.

08 10 49 14 CC Understand .007. And was the - -

08 10 49 20 CDR Just - just put a zero in front of all - the three torquing numbers. The - the platform is too good, and the numbers are so small, we - we're not even thinking in three digits anymore.

08 10 49 29 CC Okay. We got 007, 047, and 005. Understand.

08 10 49 36 CDR That's correct.

08 10 49 54 LMP Okay, Bob. I'm ready to copy the pad.

08 10 49 57 CC Okay, Jim. It's TEI 69, SPS/G&N; plus 36245, plus 0.61, plus 0.92; 213:51:51.04; plus 2803.1, minus 0465.4, minus 0099.6; 179, 132, 353. The rest of the pad is NA. Ullage; four jets, 12 seconds. Over.

08 10 50 50 LMP Okay. Readback for TEI is SPS/G&N - -

08 10 51 03 LMP Are you reading me better? Bob, can you read me okay?

08 10 51 08 CC You've got a loud squeal there, Jim, but I can probably read you.

08 10 51 16 LMP Okay, Bob. Here's the readback. SPS/G&N; 36245; plus 0.61, plus 0.92; 213:51:51.04; plus 2803.1, minus 0465.4, minus 0099.6; 179, 132, 353; four jets for 12 seconds. Over.

08 10 51 42 CC Roger, Jim; copy. Good readback. And, Endeavour, that's all we've got for you right now, until you give us a presleep call, except for standing by for a film budget report from Al.

08 10 52 22 CMP Houston, 15.

08 10 52 24 CC Go. Go, 15.

08 10 52 28 CMP Okay, Bob. I got that film thing compiled for you, if you want to copy.

08 10 52 32 CC Copying.

08 10 52 34 CMP Okay. I will read you frames expended, magazine Nectar 76, Oscar 58, Romeo 55, Victor 12. And I haven't used anything out of S or - and L is running right now on the mass spec.

08 10 52 57 CC Roger; copy. 76, 58, 55, and 12. Thank you guys. Give us a call when you're ready for sleep, and we'll tuck you in.

08 10 53 16 CDR Okay, Bobby. Love to have you do that.

08 11 05 58 CC And, Endeavour; Houston. We'd like PAN CAMERA, STANDBY.

08 11 06 10 CDR Okay, Bob. Roger on the STANDBY.

08 11 06 28 CDR Houston, the PAN CAMERA was on STANDBY.

08 11 06 31 CC Say again, 15.

08 11 06 38 CDR I say - the PAN CAMERA already was in STANDBY.

08 11 06 44 CC Okay. We'll have them check again.

08 11 07 10 CC Okay, Dave. What we'd like is POWER, ON, also, PAN CAMERA POWER, ON, for 5 minutes.

08 11 07 24 CDR Okay. POWER, ON.

08 11 11 47 CC And, Endeavour; this is Houston. We can go PAN CAMERA POWER, OFF, now.

08 11 11 54 CDR Roger. POWER, OFF, now.

08 11 11 56 CC Thank you.

08 11 20 03 CDR Houston, Endeavour. Did you get the E-MOD dump?

08 11 20 07 CC Stand by.

08 11 27 31 CC Endeavour, Houston. It's not clear that we got it the first time. Why don't you give us another E-MOD dump again, please?

08 11 27 43 CDR Okay. Coming down.

08 11 27 45 CC Thank you.

08 11 29 03 CC ...

08 11 39 59 CC And, Endeavour; Houston. We ... at the LOS in about 2 minutes. Everything looks in configuration for sleep. We'd like to verify the OXYGEN HEATERS are AUTO, AUTO, OFF. Except for that, you are GO for sleep and GO for LOS.

08 11 40 18 CDR Okay; understand. And we're fixing to give you the presleep checklist, there. And we had a little unscheduled maintenance on our friendly water valve again. So we'll be about 10 more minutes, but it's under control. Same - same problem we had before.

08 11 40 33 CC Roger. And understand it's under control.

08 11 40 38 CDR Yes, it's just - just the same thing worked loose again, and we're fixing it now.

08 11 40 47 CC Roger. We copy. You guys didn't strike a coral reef there, did you?

08 11 40 54 CDR (Laughter) No, I don't think so.

08 11 41 27 CDR Okay. O<sub>2</sub> hea - O<sub>2</sub> - O<sub>2</sub> heaters are going to AUTO, AUTO, OFF.

08 11 41 35 CC Roger. AUTO, AUTO, OFF.

08 11 41 39 CDR Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 12 08 --	BEGIN LUNAR REV 65
08 14 06 --	BEGIN LUNAR REV 66
08 16 04 --	BEGIN LUNAR REV 67
08 18 02 --	BEGIN LUNAR REV 68

REST PERIOD - NO COMMUNICATIONS



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 19 24 15 CC Apollo 15.

08 19 25 05 CC Apollo 15, this is Houston. Good morning. Apollo 15, this is Houston with a message from Richard Strauss, Arthur C. Clarke, and Stanley Kubrick.

08 19 25 17 Music - (Theme from "2001: A Space Odyssey")

08 19 26 58 CC Good morning, fellows. We have only about 10 minutes of comm left, and we'd like to start out the morning with an ACCEPT, so we can send you up a state vector. Are you up there?

08 19 27 23 CC And, after giving us ACCEPT, we'd like to have you manually roll clockwise 40 degrees. And then we'd like to get the sharp end forward. I'll give you the P20 when you're ready to copy.

08 19 28 15 CMP Hello, Houston, 15.

08 19 28 18 CC Good morning, Al. How are you doing?

08 19 28 24 CMP Good morning, Karl. I'm doing just fine.

08 19 28 27 CC Righto. If you didn't hear what I said before, I'd like to repeat that we'd like to have ACCEPT, and we'll send you up a state vector. And then we need to manually roll clockwise - -

08 19 28 38 CMP Roger. You've got ACCEPT.

08 19 28 40 CC - - Righto. Then we need to manually roll clockwise 40 degrees, and I have here P20 data for you to get the sharp end forward.

08 19 28 57 CMP Okay; we're rolling, and stand by 1 until I get a pen.

08 19 29 09 CMP Okay, go ahead with the P20.

08 19 29 11 CC Roger; P20, option 5; plus-X forward, SIM attitude. The time is 211 plus 40. VERB 23 NOUN 78, plus 180.00. The attitude is 141, 000/177, 000.

08 19 29 51 CMP Roger, Karl. Understand. You want that P20 turn-around done at 211 plus 40, instead of 212:00.

08 19 30 15 CC Al, we'd like to have you start the maneuver as soon as we finish the up-link, and that time is the time we should be completing the maneuver.

08 19 30 26 CMP Okay. Fine, Karl. I'll just move that whole thing up. We're doing the roll maneuver now.

08 19 30 32 CC Roger. And, while you've got the Flight Plan there, the only update that concerns us for the next hour and a half - is to - Over there at 21:54, delete manual - "manually roll clockwise." You got that one?

08 19 30 56 CMP Yes. Roger.

08 19 30 57 CC And everything after that, all the way down to 212 plus 20. And then we'll be in contact with you again for further updates.

08 19 31 14 CMP Okay. Understand. That block between 21:54 - or 2 - 211 plus 54 and 212 plus 20, that - that all goes as - as scheduled.

08 19 31 30 CC Entire thing deleted. Roger.

08 19 31 40 CMP Roger. Then we'll be in P20 attitude and standing by for your word when we get contact again then.

08 19 31 57 CC Okay, Al. The computer's yours.

08 19 32 05 CMP Roger. Understand.

08 19 32 16 CC Al, would you do a VERB 66 for us?

08 19 32 25 CMP Roger. You got it.

08 19 34 49 CC Al, we need the - the TLM switch in BLOCK, please.

08 19 34 58 CMP Roger, Karl.

08 19 35 34 CC 15, if you'd like a quick consumables update, I can give it to you now or I could wait until the next rev.

08 19 35 48 CMP Go ahead, Karl. If there's time, I'll copy it now.

08 19 35 52 CC Roger. The time is 211 plus 00; RCS total, 46;  
quads: Alfa, 48; Baker, 45; Charlie, 44; Delta,  
46; hydrogen tanks: 49, 47, 39; oxygen tanks:  
61, 64, 48.

08 19 36 33 CC 15, this is Houston. Are you still reading?

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 20 00 -- BEGIN LUNAR REV 69

08 20 28 05 CC Apollo 15, this is Houston. How do you read?

08 20 28 14 CDR Hi, Houston; 15. Loud and clear. How - us?

08 20 28 17 CC Hi, Dave. You're coming through loud and clear. How did our consumables update get to you, okay?

08 20 28 30 CDR Okay. We got everything but the oxygen.

08 20 28 35 CC Okay. Want me to read those three up?

08 20 28 46 CDR Okay. Go ahead.

08 20 28 51 CC Roger. Oxygen tanks at that same time that I gave you originally were 61, 64, 48.

08 20 29 12 CDR Okay. 61, 64, and 48. And I have a P52 for you and a crew status report.

08 20 29 20 CC Fire away with them.

08 20 29 26 CDR Okay. The P52: NOUN 05 was .01; NOUN 93 was plus .029, minus .025, plus .018; was torqued out at 211:52:00.

08 20 29 48 CC Roger.

08 20 29 55 CDR And if you still have your pencil handy, why, the sleep came out to 7, 7 and a quarter, and 7. And the PRDs: 25026, 23182, and 08033. And go ahead with your updates.

08 20 30 18 CC Roger. Okay. Flight Plan updates for the coming rev and - There's several of them here. And just to keep you feeling a little bit more optimistic, on the following revs, there are very few updates. Okay. At 212:40, we want to delete MAP CAMERA IMAGE MOTION, INCREASE. At 2 - -

08 20 30 57 CDR Roger. Got the deletion at 212:40. Go.

08 20 30 59 CC Roger. At 213 plus 24, we want to delete the GAMMA RAY, BOOM, DEPLOY. And at that - there are 3 - -

08 20 31 11 CDR 213:24. Have the deletion.

08 20 31 15 CC Roger. And just below that, the MSFN verify lens - lens tuck in and also the PAN CAMERA POWER, OFF, delete both of those.

08 20 31 27 CDR Roger. Copy the next two deletions also. Go.

08 20 31 30 CC At 214 plus 02. We want to change that camera configuration to the 250-millimeter lens, 250. The f-stop should be 5.6; the exposure time should be 1 over 125.

08 20 32 00 CDR Roger. 214:02. Camera configuration: 250 millimeter lens, f/5.6 at 11 22 [?]. Go.

08 20 32 08 CC Correct. At 214 plus 06, and MASS SPECTROMETER, ION SOURCE, OFF; EXPERIMENT, STANDBY. And at the same time, add LOGIC POWER to DEPLOY/RETRACT.

08 20 32 42 CDR Roger. At 214:06, MASS SPEC, ION, OFF; EXPERIMENT STANDBY; LOGIC POWER to DEPLOY/RETRACT. Go.

08 20 32 49 CC Roger. At 214 plus 11, if ION SOURCE, OFF, 5 minutes; MASS SPECTROMETER, BOOM, RETRACT.

08 20 33 13 CC 15, we'd like HIGH GAIN, AUTO.

08 20 33 17 CDR Okay. At 214:11, if ION, OFF, for 5 minutes; MASS SPEC, BOOM, RETRACT. Go.

08 20 33 26 CC At 214 plus 12, we add MAPPING CAMERA/LASER, EXPERIMENT COVERS, OPEN; MAPPING CAMERA, TRACK EXTEND; MAPPING CAMERA, IMAGE MOTION, ON.

08 20 34 00 CDR Okay. 214:12, MAP/LASER EXPERIMENT, OPEN; MAP TRACK, EXTEND; and IMAGE MOTION, ON.

08 20 34 09 CC Roger. At 214 plus 16, we change the EL on to T-stop minus 140 to T-start 140. Simply change stop to start.

08 20 34 29 CDR Roger. Stop to start. Go.

08 20 34 31 CC And at 214 plus 17, again change stop to start. And at that time, also, add LASER ALTIMETER, ON.

08 20 34 53 CDR Okay. 214:17, stop to start and LASER ALTIMETER, ON. Go.

08 20 34 58 CC And at 214 plus 18, change MAPPING CAMERA on OFF to MAPPING CAMER on ON. In other words, change OFF to ON; add parenthesis T-start. Delete the next line, MAPPING CAMERA - delete MAPPING CAMERA, ON to STANDBY. And the third line, change MAPPING CAMERA, IMAGE MOTION, OFF, to MAPPING CAMERA, IMAGE MOTION, INCREASE. Barber pole plus four steps/ON.

08 20 35 42 CDR Okay. 214:18, MAP CAMERA, IMAGE MOTION, INCREASE; barber pole plus four steps/ON.

08 20 35 57 CC Roger. And did you get the MAPPING CAMERA - MAPPING CAMERA, ON, on T-start?

08 20 36 09 CDR Oh, Roger. MAP CAMERA, ON, on T-start, and scratch the MAP CAMERA, ON to STANDBY.

08 20 36 14 CC Roger. That takes care of all the - all the updates required for the next rev.

08 20 36 24 CDR Roger. Understand. Thank you.

08 20 39 26 CC 15, this is Houston. A couple of comments, and then a - one change in your G&C checklist. The comments are as follows. As you will note from the consumables update, we now have single-tank capability at the 40-amp level. And, concerning the mass spectrometer boom problem, it appears to us that this is temperature-associated problem. And the next time you retract the mass spectrometer boom, we suggest that you retract it only once for 4 minutes, and if it hasn't gone gray, just leave it there. There is no need to go in and out until it turns gray. That won't be a critical problem until we come closer to a burn.

08 20 40 15 CDR Okay. I understand. Just retract it for 4 minutes and leave it there. Okay?

08 20 40 20 CC That's right. And has somebody got a G&C checklist there on page 9-4?

08 20 40 32 CDR Okay. Stand by. We'll pull it out.

08 20 41 07 CDR All right. I've got page 9-4. Go ahead.

08 20 41 10 CC All right. We'd like to correct one of the short burn constants, and it's in column D, row 5. The number should be changed from 1 - 01605 - it should be changed to 01614.

08 20 41 36 CDR Say again the location.

08 20 41 39 CC It's column Delta, row 5.

08 20 41 52 CDR Okay. I've got it now. I'm sorry. I thought you said B, Bravo. How about reading the number again, please.

08 20 41 59 CC Roger. The correct number is 01614.

08 20 42 13 CDR Okay. 01614 by 01605.

08 20 42 18 CC That's correct.

08 20 42 33 CC And whenever somebody tells me he's ready to stop breakfast and copy a pad, I have TEI-71 and also a mapping camera photo pad.

08 20 42 48 CDR All right. Stand by 1, please. Probably be a couple minutes.

08 20 42 52 CC Righto.

08 20 44 04 LMP Okay, Karl. I'm ready to copy the TEI pad.

08 20 44 11 CC Roger, Jim. Good morning. TEI-71, SPS/G&N. The weight is not applicable. P trim: NOUN 48 is plus 0.64, plus 0.98; 217:49:18.04; plus 2838.6, minus 0581.0, minus 0027.7; 178, 129, 351; the rest is NA. Four jet ullage for 12 seconds. And that's all.

08 20 45 16 LMP Okay. TEI-71 readback. SPS/G&N. Weight is NA; plus 064, plus 0.98; 217:49:18.04; plus 2838.6, minus 0581.0, minus 0027.7; 178, 129, 351; four jets for 12 seconds. Over.

08 20 45 44 CC Roger, J - Roger, Jim. And would you repeat the - the yaw trim.

08 20 45 54 LMP Yaw trim was plus 0.98.

08 20 45 56 CC That's all correct. Thank you. And the last bit of information I have down here is a mapping camera photo pad. At 214 plus - -

08 20 46 14 LMP Okay. Go ahead.

08 20 46 15 CC Roger. It's at 214 plus 20 in your Flight Plan, and there is no slot for it. You'll just have to stick it in. MAPPING CAMERA, start, 214:20:03; stop, 215:19:49.

08 20 46 43 LMP Copy 214:20:03 and 215:19:49.

08 20 46 48 CC That's correct.

08 20 48 29 CC 15, this is Houston with just a passing comment to Dave. We have Lee Silvers and Jim Head in the back room - available for any questions or comments concerning the lunar surface activities that you'd like to make. Is there anything on your mind you'd like to discuss with them?

08 20 48 54 CDR Well, it shouldn't take more than about a couple of weeks, I guess, if we started now. I guess we got a lot to discuss with them. We've talked it over a little bit, and we've come to some conclusions about rilles and mountains and those sort of things. And I - I guess, rather than get into the details now, we probably ought to wait until the debriefing. If they have any questions for us, we'd be happy to answer.

08 20 49 21 CC Okay. It's my understanding that they didn't - you - you gave them so much data they didn't really have any questions left. But stand by, I'll see if they - if they come up with some after you've invited them to. Joe says, hey, they just might have - -

08 20 49 37 CDR Okay.

08 20 49 38 CC - - something. So stand by.

08 20 49 42 CDR Yes. That's right. I've never seen the day yet when those two didn't have some questions.

08 20 49 47 CC You opened yourself up there, Dave.



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08 20 49 53 CDR Yes, that's good. We're ready.

08 20 53 35 CC 15, this is Houston.

08 20 53 43 CDR Go ahead, Karl.

08 20 53 46 CC Lee and Jim are sitting right beside me here; and their comment is they - they don't really want to ask very many questions and perturb the debriefing a week from now. But they do just have a couple. And the first one - the first one concerns a unique crater close to Scarp that you described as having about a 40-meter diameter, with a very soft rim. And the texture of the material in it was - instead of being fine angular fragments, was more in the form of clods. They'd like to know a little bit more, if - if possible, about its location relative to Scarp, and any other comments you can make about the unique - the particular uniqueness of this crater.

08 20 54 34 CDR Okay. Stand by 1.

08 20 56 25 CDR Okay, Houston. I guess our answer to that is that we had interpreted that particular crater as being Scarp. Perhaps it wasn't. Perhaps we were near Scarp and that was a somewhat smaller crater. But, I guess, as we remember it, that was the one we had called Scarp, and it was, I believe, the only crater we really sampled as we approached Rim Crater in the terrace there. And that particular crater had very soft rims - extremely soft, and all the fragments - the apparent fragments were very frangible. They just fell apart like dirt clods. And we did sample some, and we had a discussion I think at the time, and - and I guess we still don't exactly agree relative to the amount of glass that was present in the fragments. Jim seems to think there was a fair amount, and I - I don't remember any in particular. But it was a fairly uniform crater. And all the debris around the crater - as I remember, there was something like 20 percent or so of angular frags - all of it apparently would break apart very easy. And there were no solid fragments that we could see or distinguish. Of course, everything is covered by dust. And we did sample some. And I guess that's about the size - the size of it. Is there anything more specific you'd be interested in?

08 20 58 20 CC Dave, this particular crater sounds more and more interesting to the people down here. And I guess the next question is what - Was there anything about the crater, its shape or anything else, that would lead you to think it had a different origin than most of the other impact craters?

08 20 58 44 CDR No, It - its depth-to-diameter ratio was about par for the - for the course up there. And it had a slightly raised rim, and the rim may have been somewhat higher than - than others. But I wouldn't be able to distinguish that specifically. It - it was a rather standard-appearing crater, until we walked up onto the rim, and it was extremely soft. And, of course, we only sampled one edge of the rim there. We didn't get any circumferential sampling on it. So it might have been a - a unique part. But it looked pretty uniform all the way around.

08 20 59 21 CC Roger.

08 20 59 25 CDR And we did get the appropriate photographs plus a pan at that site, which, I think, when we go over during the debriefing - perhaps we can extract some more of what we saw. As you remember, at that particular time, we were pretty well hustling, and we didn't have a chance to do much looking at the maps as we got there.

08 20 59 47 CC They say that's great. Thanks a lot.

08 20 59 52 CDR Okay. Anything else?

08 21 00 00 MCC Hey, Dave. You've done a lovely job. You just don't know how we're jumping up and down, down here.

08 21 00 10 CDR Well, that's because I happened to have had a very good professor.

08 21 00 16 MCC A whole bunch of them, Dave.

08 21 00 22 CDR That's right. As a matter of fact, so many of them, it's just hard to - hard to remember it all. But we sure appreciate all you all did for us in getting us ready for this thing. And I 'll tell

you, I think Jim and I both felt quite comfortable when we got there, about looking around and - and seeing things. I just wish we had had more time, because, believe me, there is an awful lot to be seen and done up there.

08 21 00 48 MCC

Yes. We think you defined the first site to be revisited on the Moon.

08 21 00 57 CDR

Well, as we go around in lunar orbit here, I can look down - and I could just spend weeks and weeks looking. And I can pick out any number of superb sites down there which would take you several weeks to analyze on the surface. There is just so much here. To coin a phrase, it's mind boggling.

08 21 01 18 MCC

Beautiful, Dave. Thank you so much.

08 21 01 24 CDR

Yes, sir. And I hope someday we can get you all up here too. I - I think we really need to have some good professional geologists up here. As a matter of fact, good professional scientists of all disciplines, not only in lunar orbit, but right on the surface, because you all would just really have a field day, where - with your backgrounds and what you know. There's just so much to be gained up here.

08 21 01 55 CC

Great, Dave. Thanks a lot.

08 21 02 03 CDR

Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 21 30 33 CC 15, this is Houston. Just a point of curiosity, are you guys seeing Aristarchus and Schroter's Valley in daylight yet?

08 21 34 31 CC 15, this is Houston; 3 minutes to LOS, and all your systems are go.

08 21 35 19 CC 15, this is Houston. How do you read?

08 21 36 29 CC 15, this is Houston. Could you give us a comm check, please.

08 21 58 -- BEGIN LUNAR REV 70

08 22 26 03 CC 15, this is Houston. How do you read?

08 22 26 10 CDR Houston, 15. Loud and clear.

08 22 26 14 CC Roger, 15. We're reading you loud and clear. We have Flight Plan updates available anytime you're interested in copying it.

08 22 26 27 CDR Okay. Stand by 1.

08 22 28 01 CDR Okay, Houston. Go ahead with your updates.

08 22 28 08 CC Roger, Dave. We'd like to have you start the battery A charge first.

08 22 28 15 CDR Roger. We just started right now.

08 22 28 19 CC Okay. Flight Plan updates, 214 plus 41. The - we delete the pan - -

08 22 28 33 CDR Go ahead.

08 22 28 34 CC - - we delete several lines there. "PAN CAMERA MODE, STANDBY; POWER, on; STEREO; EXPOSURE, normal; and PAN CAMERA MODE to OPERATE," all deleted.

08 22 28 50 CDR Roger; understand. Three lines deleted. Deleted at 214:41. Go.

08 22 28 55 CC Roger. At 214 plus 50, we delete "PAN CAMERA MODE, STANDBY, and MSFN: veri - verify lens tuck in."

08 22 29 11 CDR Roger; 214:50; delete 2 lines. Go ahead.

08 22 29 15 CC Roger. At 214:53, delete "PAN CAMERA POWER, OFF," and at 55 delete "GAMMA RAY BOOM, DEPLOY."

08 22 29 27 CDR Roger. At 53 and 55 delete one line each. Go.

08 22 29 33 CC At 215:17, we add "MAP CAMERA, ON, switch OFF, parenthesis T-stop; LASER ALTIMETER, OFF; MAP CAMERA, ON, STANDBY, T-stop plus 30 seconds. MAP CAMERA IMAGE MOTION, OFF."

08 22 30 00 CDR Stop - break - break, Karl. Try it again - a little slower so I can write it.

08 22 30 05 CC Roger; 215 plus 17. First line, "MAP CAMERA, ON, OFF, parenthesis T-stop." Second line, "LASER ALTIMETER, OFF." Third line, "MAPPING CAMERA, ON to STANDBY, T-stop plus 30 - 30 seconds." Fourth line, "MAPPING CAMERA IMAGE MOTION, OFF."

08 22 31 05 CDR Okay. Copy. At 215:17, MAP CAMERA, ON to OFF at T-stop. LASER ALTIMETER, OFF, MAP CAMERA, ON to STANDBY, at T-stop plus 30 seconds, and MAP CAMERA IMAGE MOTION to OFF.

08 22 31 20 CC Roger. At 215 plus 19, add "GAMMA RAY BOOM, DEPLOY."

08 22 31 39 CDR Okay; 215:19, GAMMA RAY BOOM, DEPLOY. Go.

08 22 31 45 CC 215 plus 25, delete "LASER ALTIMETER, OFF."

08 22 31 55 CDR Roger; 215:15 [sic], delete "LASER ALTIMETER, OFF." Go.

08 22 31 59 CC Over at 216:01, that "LASER ALTIMETER, ON," is moved down to 216 plus 15.

08 22 32 24 CDR Okay; 216:01 "LASER ALTIMETER, ON," deleted; at 216:15 "LASER ALTIMETER, ON" added. Go ahead.

08 22 32 32 CC Correct. 217 plus 14, add "LASER ALTIMETER to OFF."

08 22 32 49 CDR Okay; 217:14, "LASER ALTIMETER, OFF." Go.

08 22 32 54 CC At 217 plus 20, we delete - three lines. "MAPPING CAMERA IMAGE MOTION, MAPPING CAMERA, ON, and MAPPING CAMERA IMAGE MOTION" - steps, all three.

08 22 33 12 CDR Okay; 217:21 delete three lines. Got them. Go ahead.

08 22 33 18 CC Right. And, in that place at 217:20, put the line down below at 217:25, "GAMMA RAY BOOM, DEPLOY."

08 22 33 38 CDR Okay. At 217:20, we should have "GAMMA RAY BOOM, DEPLOY," vice 217:25.

08 22 33 46 CC Roger. At 218:02, we change the camera configuration there. We're going to use window 5, CM-5. We need the 80-millimeter lens - 80-millimeter lens, and the setting should be stop 2.8; exposure time, 1 over 250.

08 22 34 19 CDR Okay; 218:02, use CM-5/EL/80 millimeter, 2.8, 1/250th. Go.

08 22 34 25 CC And the note there is - use the - use the Lexan shield on CM-5; in other words, leave it on the window.

08 22 34 37 CDR Okay. Lexan shield; got it.

08 22 34 40 CC At 218:10, delete "MAPPING CAMERA IMAGE MOTION, INCREASE."

08 22 34 52 CDR Okay. One line deleted at 218:10. Go.

08 22 34 56 CC At 218 plus 14, we add "LASER ALTIMETER, ON." We have four lines here. "MAPPING CAMERA IMAGE MOTION, ON; MAPPING CAMERA ON to ON at T-start; MAPPING CAMERA IMAGE MOTION, INCREASE; talkback barber pole plus 4/ON."

08 22 35 42 CDR Okay; 218:14. "LASER ALTIMETER, ON; MAPPING CAMERA IMAGE MOTION to ON; MAPPING CAMERA ON to ON at T-start; and MAPPING CAMERA IMAGE MOTION, INCREASE; and talkback barber pole plus 4 seconds/ON."

08 22 35 56 CC Roger. At 220 plus 07, we add "PAN CAMERA MODE, STANDBY; POWER on." And that will be "MONO and EXPOSURE, normal."

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08 22 36 32 CDR Okay; 220:07, "PAN CAMERA to STANDBY; POWER, on; MONO; EXPOSURE, normal." Go.

08 22 36 40 CC At 220 plus 13 we add "PAN CAMERA MODE, OPERATE at T-start."

08 22 37 00 CDR 220:13, PAN CAMERA to OPERATE at T-start.

08 22 37 05 CC Roger. And about 220:18, expect the talkback showing you film depletion, the film finished. At that time, go MODE, STANDBY; and wait for a MSFN cue to go POWER, OFF.

08 22 37 43 CC And 15, we'd like to have HIGH GAIN, AUTO.

08 22 37 46 CDR Okay; 220:18, PAN CAMERA - 220:18, we should have film depletion; PAN CAMERA to barber pole, then go STANDBY and wait for MSFN cue for POWER, OFF. Go.

08 22 38 03 CC And that's the end of the update.

08 22 38 09 CDR Okay. I guess when you run out of film, you run out of updates.

08 22 38 13 CC That's about the size of the situation.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 22 47 09 CC 15, Houston. If you're willing to listen, I have about a 3-minute update on the morning news.

08 22 47 22 CMP Stand by 1, Karl.

08 22 53 17 CMP Okay, Houston; 15. We're ready for the news.

08 22 53 22 CC Roger, 15. The flight of Apollo 15 is still front-page news around the world. Even yesterday's relatively quiet activities were noted by most news media. The rail strike with the United Transportation Union has ended, and 10 railroads that were out of operation for 18 days are back on the tracks. Growers in California were hardest hit by the strike, losing an estimated 45 million dollars in sales and related industries. President Nixon has asked Congress not to allow the use of federal funds to pay for busing school children. The administration also announced that it is appealing a bench mark court ruling against massive busing in the public - in the public schools of Austin, Texas. Treasury Secretary John B. Connally is attempting to stop a rumored increase in bank interest rates. Connally said he is distressed to hear reports that bank prime lending rates are to be raised again. Rates were increased only last month. New York Stock Exchange prices fell yesterday in the second largest decline of the year, with the Dow Jones industrial average dropping almost 15 points. Analysts say that the decline may have been caused by the rumored increase in interest rates. You got up too early to hear much news of last night's baseball games, but we can report that the Astros lost to the Cubs 5 to nothing. They did better Monday night, when they beat the Cubs 2 to 1. The weather report from the Houston area is one word: soggy. Rain has fallen off and on for more than 24 hours, and there was a long steady rain most of yesterday afternoon. Going to be a lot of grass cutting to do when you get back down here, guys.

08 22 55 19 CMP Oh, yes; but we sure got nice sunny weather up here.

08 22 55 23 CC No clouds up there, huh? That's amazing.



08 22 55 28 CMP No. It's just clear as crystal.

08 22 55 35 CC Thinking about all that sunshine up there reminds me that we're in a bind down here about your exposure to UV, and we recommend that, on the several times on the next couple of orbits when you're requested to take the - the Lexan cover off of window 5, that you alternate handling that photography to keep under the legal doses.

08 22 56 03 CMP All right; we'll do that.

08 22 56 36 CC 15, Houston. The doctors down here with their - with their electrocardiograms see that the CMP - or at least they think the CMP - is on the - the biomed apparatus; and, according to the Flight Plan, they'd like to have the LMP on.

08 22 56 55 CMP Okay. We thought we'd give you both, since you were sort of interested in that yesterday.

08 22 56 59 CC Okay; that would be great.

08 22 58 58 CC 15, Houston. We have a couple of camera pads when you have time to copy.

08 22 59 08 CMP Okay; stand by a couple of minutes, will you please, Karl?

08 22 59 13 CC Roger.

08 22 59 48 LMP Okay, Karl. I'll copy those pads for you.

08 22 59 52 CC Roger. They're in the Flight Plan at 216. The first one is the solar corona photo pad. T-start is 216:03:55. Down below, the mapping camera photo pad: start, 216:18:30, stop 217:18:15.

08 23 00 31 IMP Copied 216:03:55, 216:18:30, and 217:18:5 - 15.

08 23 00 39 CC That's correct.

08 23 13 29 CC 15, Houston. If you'll give us ACCEPT, we'll send up a new state vector.

08 23 13 37 CDR Roger.

08 23 16 12 CC 15, Houston; the computer is yours.

08 23 16 20 CDR Roger.

08 23 19 10 CC Hey, Al. I've sort of got an itch to hear what the Aristarchus region looks like in daylight. You got any comments?

08 23 19 21 CMP Well, I'll tell you, Karl; we've all been setting here kind of looking at Aristarchus a little bit in awe. It looks like probably the most volcanic area that I've seen anywhere on the surface. And certainly it's just very covered with rilles, very - quite deep rilles, too, some of them. Schroter's Valley, for instance, is a magnificent big rille, which looks like it's worked - been worked twice; of course, the large rille and then a smaller rille inside.

08 23 19 54 CC What about the source of Schroter's Valley?

08 23 19 56 CMP Several cones - Say again?

08 23 20 00 CC What about the source of Schroter's Valley. Does it look volcanic?

08 23 20 08 CMP Well, that whole area in there looks volcanic. Yes. And that certainly comes from - from up on the plateau, there. I would guess that the Cobra Head is the source for Schroter's Valley. The elevation is - is a little subtle from this - from this vantage point, but I - I guess that would be my guess. And as far as where the - think we've found something interesting anyway about the - the ends of the rilles, particularly around the Schroter's Valley area. It looks quite distinctly like the rilles - the - the mouths of the rilles - or the deltas have been covered with rising maria - mare materials - from the lower - from the - from the lower elevation. Almost as if there was a - a - a rille with a deltalike deposit at one time, but then the mare - the elevation of the mare - or the height of the mare came up into the rille far enough to - to cover all that delta area. So all you see now is what would look like a - a - a river into a lake whose elevation has increased.

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08 23 21 23 CC Ah, ha! Very interesting thought.

08 23 23 23 CC 15, this is Houston. I'm turning you over to Joe, now. I'll see you on the way home tomorrow.

08 23 23 31 CDR Okay, Karl. Talk to you tomorrow. Thanks for coming out so early for us.

08 23 23 38 CC It was a pleasure, believe me.

08 23 24 43 CC Good morning, Yankee Clipper; this is Houston.

08 23 25 10 CC Good morning, Endeavour; this is Houston.

08 23 25 16 CDR Good morning, Houston; this is Endeavour. How are you today?

08 23 25 19 CC Just fine, Dave.

08 23 25 27 CC The devil in the backup commander made me do the other.

08 23 25 36 CDR Well, we're not surprised.

08 23 26 02 CDR Seems like that other fellow is hung up on that other flight for some reason or another.

08 23 31 38 CC Endeavour, this is Houston. We're about 4 minutes from LOS. You look to be in good shape to go around the corner.

08 23 31 48 CDR Roger. Thank you, Houston.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

08 23 56 -- BEGIN LUNAR REV 71

09 00 26 21 CC Hello, Endeavour, this is Houston requesting REACQ and NARROW on the HIGH GAIN.

09 00 26 43 CC Apollo 15, Apollo 15. Houston requesting REACQ and NARROW on the HIGH GAIN.

09 00 28 40 CMP Hello, Houston; 15.

09 00 28 42 CC Hello, 15; this is Houston.

09 00 28 47 CMP Okay, Joe, we're reading you. And we were in REACQ and NARROW and couldn't seem to pick you up, so we're back in MANUAL and MEDIUM, now.

09 00 28 58 CC Okay, Al; we copy that. Thank you. While we're thinking about that one, we've got a couple of requests for you here. We'd like for you to turn on your RCS PROPELLANT, SECONDARY. We're expecting a crossover in the D and C quads during the shape ullage, and we can, I guess, use those on now. And I've got some small changes to your Flight Plan when you are ready to copy.

09 00 29 34 LMP Okay, Joe, I'm ready to copy the changes in the Flight Plan.

09 00 29 40 CC Okay, Jim. I assume you're reading me loud and clear. You're still a little bit - have a little noise in the background. If you have your Flight Plan in front of you, the first entry is at 217 plus 17. And it is an addition: "Retract map camera." The next one is at 217 plus 21. Addition: "Close map camera and laser experiment covers." The third is at 217 plus 58; delete those two lines: "O<sub>2</sub> heaters, three, AUTO; O<sub>2</sub> heaters 1 and 2, OFF." Those are two deletions. Another deletion - -

09 00 30 53 CMP Okay. Let me read that back to you, Joe.

09 00 30 54 CC Okay, fine, Jim.

09 00 31 00 CMP You have 217:17, retract the mapping camera. At 217:21, close map camera and laser covers. And then the deletion at 217:58 of the O<sub>2</sub> heaters, three and O<sub>2</sub> heaters 1 and 2.

09 00 31 24 CC That's correct, Jim. And the next change is - it's a deletion at 218:02, and that is delete the "PCM cable" line, there. And down a couple of inches, at 218:08, an addition: "MAP CAMERA and LASER EXPERIMENT COVERS to OPEN, and extend map camera." Read back.

09 00 32 11 CMP Okay. I understand to delete the PCM cable at 218:02, and then at 218:08 MAP CAMERA and LASER COVERS OPEN, and extend mapping camera.

09 00 32 23 CC The readback is correct and the next - next change is at 219:07; and once again delete the "PCM cable" line. And at 219:17 add, "LASER ALTIMETER, OFF; close MAP CAMERA and LASER EXPERIMENT COVERS." And delete MAP CAMERA extension. And the last addition, that is to say the last change, is at 220 plus 05, delete the "PCM cable" line. Over.

09 00 32 33 CMP Okay. I copied 220:05 delete the PCM cable, and go on back to page 4 before we deleted the PCM cable there at 219:07. And at 219:17, a new item, LASER ALTIMETER, OFF. Close MAPPING CAMERA and LASER EXPERIMENT COVERS, and then delete the next line - the "MAP CAMERA TRACK to EXTEND."

09 00 34 05 CC Sounds good, Jim, and that's all I have for the moment. We do want a verification that all four propellant secondaries are opened on your RCS, please.

09 00 34 26 CMP Okay. That's verified. Just opened them.

09 00 34 29 CC Okay. Thank you.

09 00 37 00 CC Endeavour, this is Houston. We'd like AUTO on the HIGH GAIN, please, and we show your OPTICS in the CMC MODE. We'd like that zeroed at your convenience, please.

09 00 37 19 CMP AUTO, and zeroed.

09 00 49 12 CC Endeavour, PAN CAMERA POWER off, please.

09 00 49 20 CMP Roger. PAN CAMERA off.

09 00 49 23 CC Thank you.

09 00 51 29 CC Hello, Endeavour. This is Houston with photography pads, and a TEI-73 pad, when you're ready.

09 00 51 43 LMP Okay, Joe. I'm ready to copy the photo pads.

09 00 51 50 CC Okay, Jim. I've got a map camera photo pad, a pan camera pad, and a terminator photo pad for you. And before I start, just a word of explanation. Because of your change of trajectory from what we considered a nominal one, we've got some details to add to the pad that involve image-motion setting changes and exposure changes. And I'll read those in detail, in a moment. I just wanted to give you a word of explanation on it. The first pad is the map camera photo pad copied at 217 plus 10; and at 217 plus 10 it is T-start: 218 plus 16 plus 59; T-stop: 219 plus 16 plus 44. Over.

09 00 53 01 LMP Roger. Copy. 218:16:59; 219:16:44.

09 00 53 11 CC That's correct, Jim. And if you'll turn the page now, I want you to delete two lines, one at 218 plus 35 and that is, "MAP CAMERA IMAGE MOTION - INCREASE, talkback barber pole, on." Delete that, and delete the line at 218 plus 55, which reads, "MAP CAMERA IMAGE MOTION - INCREASE, talkback barber pole plus four steps" et cetera. And, instead, put in the instructions: At T-start - it should be barber pole plus four. At 218 plus 39 plus 00, barber pole plus three; and at 218:49 plus 00, barber pole plus four. Read back, please.

09 00 54 49 LMP Okay, the instructions are that at T-start, it should be barber pole plus 4; at 218 plus 39 plus 00, barber pole plus three; at 218 plus 49 plus 00, barber pole plus four.

09 00 55 08 CC That's correct, Jim. And those are your image-motion settings, and you're to delete the other two image-motion instructions in the Flight Plan. One at 218:35 and the other at 218:55, and I know you got that. The second - -

09 00 55 29 LMP Yes, I made those two deletions.

09 00 55 31 CC Okay, the second is the terminator photo pad to copy at 218 plus 07. And it is T-start: 218 plus 15 plus 19. Over.

09 00 55 54 LMP 218:15:19.

09 00 55 55 CC Roger. And finally, the pan camera photo pad. Copy at 218 plus 39. T-start: 218 plus 52 plus 55. T-stop: 219 plus 16 plus 44. And delete the two pan camera exposure lines. The first one at 218 plus 57. Delete that. And the second one at 219 plus 03. Delete that. And instead, use these exposure instructions. At 219 plus 00 plus 13, decrease. At 219 plus 00 plus 50, normal. At 219 plus 06 plus 35, decrease. At 219 plus 07 plus 28, normal. Read back, please.

09 00 57 55 LMP Okay. I understand the instructions on the pan camera. Exposure at 219 plus 00 plus 13, it's decrease; 219 plus 00 plus 50, it's normal; 219 plus 06 plus 35, it's decrease; 219 plus 07 plus 28, it goes back to normal.

09 00 58 15 CC That's right, Jim. And give me the T-start, and T-stop times, please.

09 00 58 24 LMP Okay, T-start was 218:52:55; and 219:16:44.

09 00 58 32 CC Sounds fine, and I'm holding a TEI-73 pad when you're ready for that.

09 00 58 44 LMP Stand by 1, Joe.

09 01 00 01 LMP Okay, Joe. I'm ready here for the TEI pad.

09 01 00 15 CC Roger, Jim. It's TEI-73, SPS/G&N: 36188; plus 0.63, plus 0.98; 221, 47, 42.81; plus 2883.3, minus 0661.3, minus 0195.5; 179, 128, 350. All the rest is NA. Ullage, four jets, 12 seconds. Other: the pad assumes no shape maneuver, and it assumes the lift-off REFSMMAT. Over.

09 01 01 38 CMP Okay, Joe. TEI-73 pad readback. SPS/G&N: 36188; plus 0.63, plus 0.98; 221, 47, 42.81; plus 2883.3, minus 0661.3, minus 0195.5; 179, 128, 350. Four-jet, 12 seconds; pad assumes no shape burn, and lift-off REFSMMAT. Over.

09 01 02 11 CC Okay, Jim. Right on. Thank you.

09 01 04 09 CC Endeavour, this is Houston.

09 01 04 17 LMP Go ahead, Joe.

09 01 04 19 CC Roger, Jim. Just for your own thinking, we'd like to advise you that we have reviewed the cue card F-K1 for the plane-change burn that Al copied, and its update is still valid for your shape burn later on. We're in the process of going over your SPS thrusting procedures on G5-1 in the checklist, and we see very - only very minor changes that we'll be coming up to you with regarding your burn later on today, so I think things are pretty well in hand down here. Over.

09 01 05 07 CMP Okay, we copy. Thank you, Joe.

09 01 05 13 CC Another item regarding that, FAO wants me to urge you again just to follow the Flight Plan items regarding SIM bay operation before and after these burns coming up, and we'll get no - we'll get into no problems at all. Over.

09 01 05 35 CMP Roger. Understand.

09 01 28 53 CC Endeavour, this is Houston. We have no problems at all as you come up on 5 minutes before LOS. Al, we do have a question for you, if this is a good time to ask it. Over.

09 01 29 09 CMP Yes; go ahead, Joe.

09 01 29 11 CC Roger. Alfredo, we're sitting down here wondering if, perhaps, at sometime over the past few days you've gotten a visual on the mass spectrometer boom and unit, and if so, has it been possible at all to determine which direction the mass spec might be twisting as you move through the orbit over the Moon? Over.

09 01 29 37 CMP Yes. I have seen that, Joe, and I've - haven't watched a great deal of twisting and, as a matter of fact, I was rather surprised that there wasn't more twist than what I observed. I may not have picked up the maximum deflection, but I only observed about a - maybe a 5- or 10-degree rotation



on the end of the boom; and, as I recall, as I was looking at it from inside the spacecraft, the rotation was counterclockwise.

09 01 30 07 CC Okay, Al. That's interesting information. We don't necessarily expect it to have rotated more, but just wondering if you had some good visual data for us, and that's excellent. Another comment, and it's more in the way of a reminder; during your EVA, we're going to ask you to look very closely at the V over H sensor, and the symptoms we've had concerning that sensor down here is as though it has a small crack in the lens, or perhaps there's foreign contamination of some kind down in the barrel. And we're going to ask you to look particularly for either a crack or contamination in the barrel during the EVA. Just wanted to lay that one on you now, in case we forgot it later on. We'll most likely remind you of it later on.

09 01 31 01 CMP Roger, Joe. I understand that one.

09 01 31 34 CC Endeavour, we'd like a PRO on the P20 now, please.

09 01 31 48 CMP Okay, that's in work, Joe.

09 01 31 51 CC Roger; Jim. Thanks.

09 01 31 58 CMP Yes.

09 01 31 59 CC And, Endeavour, requesting you configure DSE now, please.

09 01 32 15 CMP Okay.

09 01 32 17 CC Endeavour. Recall the 5018 and get the attitude, please.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 01 54 -- BEGIN LUNAR REV 72

09 02 25 06 CC Hello, Endeavour; this is Houston.

09 02 25 14 CDR Hello, Houston; this is Endeavour.

09 02 25 19 CC Roger, Dave. Looking downstream a little bit here, I know you'll be interested to know that both the shape burn and the satellite JETT will be coming up very close to the nominal times in your Flight Plan. And we've got the photo pads here when you're ready to copy, and there are only a few lines. Over.

09 02 25 47 CDR Okay, Joe; go ahead.

09 02 25 50 CC Roger. The first is a terminator photo pad to go in at 220 plus 05; and it reads T-start, 220 plus 13 plus 45. Over.

09 02 26 21 LMP Roger, Joe. T-start, 220:13:45.

09 02 26 25 CC Thank you, Jim. And I've got a milestone for you to add here - a pan camera photo pad with a T-start of 220 plus 15 plus 25. And the instructions on that are: "Run the pan camera to film depletion." And your indication is talkback barber pole. That's a lot of feet of film. And finally, an entry at 221 plus 59 - it's an addition which reads "circuit breaker O<sub>2</sub> TANK 100 W HEATERS, three, MAIN B, closed. Over.

09 02 27 45 LMP Okay; on the last one, it was 221:59, circuit breaker O<sub>2</sub> HEATERS - 100 WATT HEATERS, three, MAIN B, closed. And then going back to the entry for a - a T-start time of the pan camera of 220:15:25, and run the camera to film depletion, talkback barber pole.

09 02 28 08 CC Right on, Jim. Thank you.

09 02 39 12 CC Endeavour, this is Houston requesting IMAGE MOTION to talkback plus 3.

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09 02 39 22 LMP It's in work right now, Joe.

09 02 39 24 CC Okay; thank you. And if you give us ACCEPT, we'll update a REFSMMAT to you.

09 02 40 19 CC And, Endeavour; Houston again with a couple more items.

09 02 40 32 LMP Go ahead, Joe.

09 02 40 33 CC Roger, Jim. Coming up on our TEC partial gamma ray extension, and looking downstream towards that, we are requesting that you time the gamma ray boom extension, which you're going to do at 219 plus 19 - and we'll be standing by for that time. And also requesting - that you get on the biomed via the Flight Plan, please.

09 02 41 10 LMP Okay.

09 02 41 30 CC And, Endeavour, it's your computer.

09 03 02 36 CC Endeavour, please terminate battery Bravo charge.

09 03 02 44 LMP Roger. Battery Bravo terminating.

09 03 02 54 CDR Except we were charging battery Alfa.

09 03 03 22 CC We copy that, Dave, and agree with it. Thank you.

09 03 03 29 CDR Roger. It's terminated.

09 03 03 32 CC And you have - you've got a gotcha on the gentleman sitting next to me.

09 03 03 41 LMP Ought to hit one once in awhile.

09 03 12 56 CC Endeavour, Houston. Turn the MAP CAMERA back ON, please. And it's not necessary to extend it.

09 03 13 12 CMP MAP's ON.

09 03 17 21 CC Hello, Endeavour. This is Houston.

09 03 17 28 LMP Go ahead.

09 03 17 30 CC Roger, Troops. We'd like to tag up with you on the recommended TEI procedures. And, Al, I guess maybe you'll be doing this. And we - we're interested in reverifying the entries which you've made in your P40 SPS Thrusting Checklist, pages G 5-1 through to the end. And we've got, I guess, two new entries to put in, but we want to reverify the entries that you've already got in there. Your choice, if you want to read those entries to us, or if you'd like to have us to read them to you. Over.

09 03 19 14 LMP Okay, let's get Al up on the headsets. Stand by 1, please.

09 03 19 18 CC Roger.

09 03 19 23 CC Endeavour, Houston. Requesting PAN CAMERA POWER, OFF, please.

09 03 19 30 CMP Roger. Doing it right now.

09 03 19 51 CMP Okay, Houston. We had a continuous barber pole on that pan camera there.

09 03 19 59 CC Roger. Copy that. That's a lot of film across those rollers.

09 03 20 06 CMP Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 03 23 13 CC Endeavour, Houston.

09 03 23 21 CDR Go ahead.

09 03 23 23 CC Roger. A question on your pan camera. When you turned the power off, was it already barber pole or was it gray and then went to barber pole as you threw the switch? Over.

09 03 23 36 CDR It was already barber pole.

09 03 23 38 CC Okay, thank you. And we're standing by for Al on the headset.

09 03 23 46 CDR Okay; let's - let us get all this SIM Bay stuff cleaned up first.

09 03 23 49 CC Roger.

09 03 24 13 CC And, Endeavour; this is Houston. You're coming up on 8 minutes to LOS. And we'll just go over the TEI procedures on the next rev. No hurry on that at all.

09 03 24 30 CMP Okay, that sounds like a good idea.

09 03 24 49 CMP And, Houston, GAMMA RAY BOOM DEPLOY was 2 plus 33.

09 03 24 56 CC Say again that time, please?

09 03 25 02 CMP 2 minutes and 33 seconds.

09 03 25 05 CC Copy. Thank you.

09 03 25 59 CC And, Endeavour, this is Houston with instructions on the pan camera. You can start the pan camera power using the normal procedures at T-start. And, if you get an incorrect indication, namely continuous barber pole, just leave it in the normal configuration until AOS. Over.

09 03 26 27 CMP Roger. Understand. Start it normally at T-start, and if it is in barber pole, just leave it until AOS.

09 03 26 34 CC That's right; thank you.

09 03 27 39 CC And we have the torquing angle, thank you.

09 03 27 45 CMP Roger.

09 03 31 17 CC Endeavour, you're looking good at LOS minus 60 seconds. Configure the DSE for us, please. And we see you've done that; thank you.

09 03 31 28 CMP Roger. Just did it.

09 03 53 -- BEGIN LUNAR REV 73

09 04 22 06 CC Endeavour, this is Houston.

09 04 22 12 CMP Go ahead, Houston. Endeavour.

09 04 22 14 CC Roger. Could you tell us, please, the status of the PAN CAMERA switch?

09 04 22 23 CMP Roger. Right now, it's in STANDBY and POWER, and it's been barber pole.

09 04 22 31 CC Okay, we copy that, Endeavour. You can go ahead and power it down. We've run through to the last of the pan camera film.

09 04 22 41 CMP Roger.

09 04 23 03 CC And, 15, we've powered up the drugstore to receive the film when you get home.

09 04 23 12 CMP Roger. Better get a couple.

09 04 23 32 CC Endeavour, a last request on that pan camera. Requesting POWER on and OPERATE, please.

09 04 23 43 CMP Roger. POWER on and OPERATE.

09 04 23 55 CC Endeavour, requesting ACCEPT for your new state vector and a shaping target load.

09 04 24 04 CMP Roger. You've got it.

09 04 24 06 CC Thank you.

09 04 25 03 CC Endeavour, this is Houston. We've reverified that your pan camera is out of film, and you can power it down for us, please, for the final - final time. Over.

09 04 25 21 LMP Joe, you'll have to give us that transmission again. We were off ... temporarily.

09 04 25 28 CC Roger, Jim. Just said that we'd reverified that the pan camera is out of film, and you can power it down for the final time at your convenience.

09 04 25 43 LMP Understand.

09 04 26 33 CC Endeavour, we have a preliminary TEI-74 pad, if you're ready to copy.

09 04 26 45 LMP Stand by 1, Joe.

09 04 26 47 CC Roger, Jim. No hurry.

09 04 27 15 LMP Okay, Joe. Ready to copy.

09 04 27 18 CC Roger. TEI-74 preliminary, SPS/G&N; 35852; plus 0.62, plus 0.96; 223:48:43.63; plus 2945.0, minus 0769.6, minus 0152.8; 000, 000, 000; NA, plus 0022.3; 3047.7, 2:22, 3029.4; 37, 224.3, 30.5; NA, NA, NA; plus 26.12, minus 157.98; 1083.8, 36179; 294:58:40. GDC aline, Vega and Deneb; roll aline, 102; 178; 028. Ullage: four jet, 12 seconds. Standing by for readback. Over. And the computer is yours, Endeavour.

09 04 29 36 LMP Roger, Joe. Would you start with DELTA-V<sub>T</sub>, again? I missed that.

09 04 29 44 CC Roger. DELTA-V<sub>T</sub> is 3047.7; BT, 2:22; and DELTA-V<sub>C</sub>, 3029.4. Over.

09 04 30 06 LMP Roger. Read on down the rest of that pad, from there on down.

09 04 30 10 CC Oh, okay; coming at you, Jim. The sextant is 37, 224.3, 30.5; NA, NA, NA; latitude, plus 26.12; longitude, minus 157.98; 1083.8, 36179; and GET 294:58:40. Vega and Deneb; 102; 178; 028; four jet, 12 seconds. Over.

09 04 31 21 LMP Okay, Joe. Readback for TEL-74 preliminary. SPS/G&N; 35852; plus 0.62, plus 0.96; 223:48:43.64; plus 2945.0, minus 0769.6, minus 0152.8; zero for roll, pitch, and yaw; DELTA-V<sub>T</sub> 3047.7, 2.22, 3029.4, 37, 224.3, 30.5; latitude plus 26.12, minus 157.98; 1083.8, 36179; 294:58:40. Vega and Deneb; 102; 178; 028; four jet for 12 seconds.

09 04 32 36 CC That's correct, Jim, and your NOUN 44 is NA and plus 0022.3; and readback's correct.

09 04 32 40 LMP Roger; copied. H<sub>p</sub> is plus 0022.3.

09 04 33 06 CC And, Jim; this is Houston. Could you adjust your S-band volume for us, please? You have a side tone squeal when you transmit and the - the volume is - is fairly weak for us. Give us a count before you do it and after you do it. And would you reverify the DELTA-V<sub>Y</sub> for us? Over.

09 04 33 33 LMP Okay, DELTA-V<sub>Y</sub> was minus 0769.6.

09 04 33 44 CC Okay, Jim. Thank you. And the volume is better. Thank you.

09 04 33 54 LMP And, Houston; Endeavour. We're just finishing up final stowage right now, and we'll be with you in a couple of minutes on the procedures.

09 04 34 03 CC Okay, we're standing by.

09 04 34 33 CC Endeavour, at your convenience, GAINSTEP switch to center, please. And I have the shape SPS/G&N pad, when you're ready for that.

09 04 34 50 LMP Okay, Joe. GAINSTEP is center, and I'm ready on the shape pad.

09 04 34 55 CC Roger, Jim. Shape, SPS/G&N; weight, 36171; plus 0.63, plus 0.98; 221:20:47.23; plus 0017.0, minus all zips, minus 0064.2; 355, 198, 010; 0076.1, plus 0054.3; and, Jim, why don't you read back from there, and I'll pick up again. Over.

09 04 36 23 LMP Okay. It's shape, SPS/G&N; 36171; plus 0.63, plus 0.98; 221:20:47.23; plus 0017.0; minus all zips, minus 0064.2; 355, 198, 010; 0076.1, plus 0054.3.



09 04 36 51 CC Right on, Jim. DELTA-V<sub>T</sub> is 0066.4, 0:03, 0054.8; sextant, 13, 164.3, 12.6; 001, down 09.1, left 4.6. The rest is NA. GDC aline, Vega and Deneb; roll aline, 102; 178; 028. Four jet, 12 seconds. Other is subsat launch GET 222 plus 39 plus 27; roll, 266; pitch, 141; yaw, 038. HIGH GAIN: PITCH, minus 70; YAW, plus 113. Standing by for readback starting with DELTA-V<sub>T</sub>. Over.

09 04 38 54 LMP Okay, Joe. 0066.4, 0:03, 0054.8; 13, 164.3, 12.6; 001, down 09.1, left 4.6; Vega and Deneb; 102; 178; 028. Four jet, 12 seconds; subsatellite launch GET, 222:39:27; roll, 266; pitch, 141; yaw, 038. HIGH GAIN is PITCH, minus 70; YAW, plus 113. Over.

09 04 39 40 CC Right on the money. Thank you, sir.

09 04 39 48 CC And, Jim, I guess those high gain angles are to be applied to the shaping maneuver, not the subsat launch.

09 04 40 02 LMP Okay.

09 04 40 09 CDR And, Houston, we're ready to talk over the procedures anytime you are, now.

09 04 40 14 CC Okay, Endeavour, I guess we're ready to start. I want to put one final note on the subsat launch. We'd like for you to reverify for us the talkbacks on the RCS after the launch.

09 04 40 38 CDR Okay. Understand. Check the RCS talkbacks after the launch. We'll do that.

09 04 40 46 CC Okay, Dave, and I guess you might cast an eye up at the - the few - fuel cell - talkbacks as well. Over.

09 04 41 01 CDR Roger.

09 04 41 16 CC Endeavour, this is Houston. Ready to tag up with you on the TEI procedures. And, Dave, I guess we're standing by for your recommendation. Do you want to read through the additions you now have in your P40 SPS Thrusting Checklist, or do you want us to go through the changes we want you to have there? It looks pretty much exactly like your TLI maneuver. There're just two changes; there're two differences from that, I guess. Over.

09 04 41 53 CDR        Okay, why don't you give us the two differences, and then we'll read it all back to you to make sure we've got it straight.

09 04 41 59 CC         Okay, Dave. That sounds like a good way. Turn to page G/5-4. And right down at the bottom of the page - -

09 04 42 12 CDR        5-4. Go.

09 04 42 13 CC         Roger. Right at the bottom of the page after the two lines, "SPS FUEL/OXIDIZE PRESSURE" and "PUGS balanced," add the step "Cut-off minus 10 seconds, circuit breaker SPS PILOT VALVE, MAIN A to open."

09 04 42 44 CDR        Okay; bottom line on page 5-4. Cut-off minus 10 seconds, "circuit breaker SPS PILOT VALVE, MAIN A, open."

09 04 42 54 CC         That's correct. And turning over a page to 5-5, you have an addition underneath the normal step which reads, "Circuit breaker SPS PITCH 1 and YAW 1 to open." Your addition reads, "Circuit breaker SPS PILOT VALVE, MAIN B, open." And we have still another step to add in there, which is, "Circuit breaker EMS, two of them, MAIN A and MAIN B, to open." And, also, we would like to delete, one step below that, the three lines "MAP CAMERA, ON, to OFF," "PAN CAMERA POWER to OFF," and "SM/AC POWER to OFF." Over.

09 04 43 50 CDR        Okay; on page 5-5, beneath the addition of "CB/SP - S - SPS PILOT VALVE, MAIN B, open," add "CB EMS, two, open," and then delete the three lines on map camera, pan camera, and SM/AC power below that.

09 04 44 07 CC         That's correct, Dave, and we're standing by for the other additions you've made, now.

09 04 44 16 CDR        Okay, we'll go back to the beginning, here. Okay; our initial configuration has the addition of both PILOT VALVE circuit breakers open, and to verify that both EPS GROUP 5 circuit breakers are closed, and also on page 5-1, beneath the caution/warning test, EMS FUNCTION, OFF, to verify, and the CB EMS A and B both closed. That's what we have on 5-1.

09 04 44 53 CC Okay; that's good. Turn the page.

09 04 44 59 CDR Okay, on 5-2, under "TVC Check and Prep," second line, "CB SPS(10), closed." That's all on 5-2.

09 04 45 07 CC Roger.

09 04 45 11 CDR Page 5-3, at minus 2 minutes, "CB SPS PILOT VALVE, MAIN B, closed," instead of DELTA-3 - DELTA-V THRUST A and B, NORMAL."

09 04 45 22 CC That is correct.

09 04 45 28 CDR Okay. And on page 5-4, at 5 minutes prior to ignition, when we get - 5 seconds prior to ignition when we get the flashing 99, we DELTA-V THRUST A and B to NORMAL after the PRO. And then, on down at ignition, if we have a flashing 97, the SPS thrust fail, "CB SPS PILOT VALVE A, closed." And, if everything goes according to Hoyle, why, at 5 seconds, we'll close the C - CB SPS PILOT VALVE MI - MAIN A. And then, of course, the step you just answered - just added - at the bottom of the page, at cut-off minus 10 seconds, to close the PILOT VALVE - or to open the PILOT VALVE MAIN A.

09 04 46 21 CC Okay, Dave. That's right on the money.

09 04 46 26 CDR Okay. And then on 5-5, we just discussed those two, which were a CB SPS PILOT VALVE, MAIN B, open, and the EMS circuit breakers, open.

09 04 46 36 CC Roger, Dave. That sounds good to us.

09 04 46 44 CDR Okay; and I think we've practiced one of those once before. I think we'll be able to handle that.

09 04 47 05 CC Dave, just out of curiosity, we know you or Al - -

09 04 47 08 CDR Yes.

09 04 47 09 CC - - marked up the cue card for the plane change maneuver, and we wonder if you're going to use that marked-up card for the shape burn. Over.

09 04 47 20 CDR No, no. We won't. We'll use the checklist straight through on the rest of the burns.

09 04 47 29 CC Okay, Dave. That's fine with us as we know you're aware it's a single bank B burn, which has been makred correctly onto that cue card.

09 04 47 43 CDR Roger. Yes, I guess all - all our burns in orbit are just a straight single bank B.

09 04 47 49 CC Right on. Thank you.

09 04 48 06 CDR And, coming out, we'll have all the ball valves open and all the eyeballs watching.

09 04 48 15 CC Sounds like a good idea.

09 04 52 10 CDR And, Houston; Endeavour.

09 04 52 15 CC Go ahead.

09 04 52 20 CDR We were just getting the hoses set up here for the burn and noticed that there's a little bit of water coming out of the - the blue hose in the suit loop. Thought you might be interested.

09 04 52 40 CC Okay, Dave. We copy that. Thank you.

09 04 52 46 CDR Roger.

09 04 52 54 CDR Not much. It's just, if you put your hand around the nozzle there, why, you can get some water on it.

09 04 53 03 CC Okay; we copy that. We think it's probably normal, but we'll look into it real closely. Sounds to me like the Endeavour has a few plumbers aboard as well as experts in other things.

09 04 53 24 CDR Well, by the time this is over, I guess we will be plumbers.

09 04 53 29 CC We'll all be plumbers, Davy.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 05 15 52 CC Endeavour, you're looking good. You're GO for the shaping burn.

09 05 15 59 CDR Roger. GO for the shape.

09 05 21 52 CDR Okay, Houston. Endeavour with a burn status report.

09 05 21 56 CC Go ahead, Endeavour.

09 05 22 07 CDR Okay. Burn was on time, and it was a 3-second burn. We had about 1.0 or 1.1 residual, and that was trimmed to 0.1, minus 0.2, minus 0.2. DELTA-V<sub>C</sub> was minus 11.0; fuel, 26.50; oxidizer, 26.25.

09 05 22 32 CC Roger, Dave. We copy that.

09 05 22 40 CDR And it has us in an orbit of 76.0 by 54.3.

09 05 22 48 CC Sounds just right.

09 05 22 54 CDR And very smooth burn.

09 05 22 56 CC Okay, Dave. Great. And you just gained about 240 more days for our subsatellite, something like that.

09 05 23 08 CDR Very good.

09 05 25 37 CC Endeavour, this is Houston. You're looking good at LOS minus 5. And I have a reminder on your water dump. We'd like you to monitor it down to 10 percent. And we'll see you on the other side. Over.

09 05 25 54 CDR Roger. Understand. Will do.

09 05 28 04 CC Endeavour, this is Houston. And we've copied your torquing angles.

09 05 28 12 CDR Roger. Thank you, Houston.

09 05 51 -- BEGIN LUNAR REV 74

09 06 18 05 CC Hello, Endeavour. This is Houston.

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09 06 18 11 CDR Houston, Endeavour. Go.

09 06 18 14 CC Roger, Endeavour. We're requesting you verify your systems - DATA SYSTEMS, ON, and the S-BAND AUX switch to SCIENCE, please.

09 06 18 42 CDR Okay; that's verified now, the data systems are on now.

09 06 18 48 CC Okay, Dave; we copy that. I've got a map update, REV 75, when you're ready to copy. And I have a message for Al from the king, when he's ready to copy.

09 06 19 05 CMP Go ahead, Joe.

09 06 19 07 CC Roger, Al. The message to you is to stand by to copy your final-exam grade in orbital science and observation. It's an Alfa plus, with a subnote of "Well done." Over.

09 06 19 23 CMP Tell the king thank you very much, Joe.

09 06 19 25 CC Roger, Al. And I've got the map update - -

09 06 19 27 CMP And I expect to see him back in Houston soon.

09 06 19 29 CC Oh! Oh, no - no problem there.

09 06 19 31 CMP Go ahead, Joe.

09 06 19 32 CC Roger. The map update, REV 75. Copy at 223 plus 20. And it is: LOS, 223 plus 29 plus 45; 180, 223 plus 52 plus 57; AOS with TEI, 224 plus 03 plus 03; AOS without TEI, 224 plus 15 plus 30. Over.

09 06 20 30 CMP Okay, the map update readback for REV 75: 223:29:45, 223:52:57, 224:03:03, and 224:15:30.

09 06 20 46 CC Readback's correct, Jim; thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 06 31 28 CC Endeavour, we verify your SIM pyro bus - -

09 06 31 30 CDR This is Endeavour, can you verify the -

09 06 31 31 CC - - arm, and - your rates look good to us down here. Over.

09 06 31 41 CDR Okay. You had us all figured out. We'll go FREE.

09 06 31 45 CC Roger, Dave.

09 06 31 59 CC And we know one of you will be watching out the window. We're particularly interested if the spin of the satellite is sweeping out a cone or if it seems to be a fairly flat spin as it comes out. Over.

09 06 32 15 CDR Roger.

09 06 33 55 CC Endeavour, we're requesting you go back to AUTO and do another VERB 49, please. We see you've drifted off about a degree.

09 06 34 06 CMP In work.

09 06 35 22 CC Okay, Endeavour. We're recommending that you go back to FREE at launch minus 1 minute.

09 06 35 32 IMP Okay; FREE at launch minus 1 minute.

09 06 36 39 CC Endeavour, we've got a new update for the last instructions. Go FREE at launch, please.

09 06 36 50 CDR Roger; FREE at launch.

09 06 39 17 CDR 3, 2, 1 -

09 06 39 20 CDR LAUNCH. We have a barber pole.

09 06 39 31 CDR And a gray.

09 06 39 35 CC We confirm that.

09 06 39 43 CDR Tallyho!

09 06 40 05 CC Okay, Dave; copied that. Sounds great.

09 06 40 15 CC Can you see much?

09 06 40 28 CDR Oh, it looks like it might be oscillating maybe 10 degrees at the most.

09 06 40 47 CC Roger, Dave; copy.

09 06 41 02 CC And, Endeavour, when you're ready, I've got a coming-home pad to read to you.

09 06 41 10 LMP Stand by 1, Joe.

09 06 41 11 CC Okay, Jim. And we would like ACCEPT, please, on the computer.

09 06 41 21 LMP Stand by 1.

09 06 42 25 CDR A very pretty satellite out there. We get about two flashes per rev off of each boom, and it seems to be rotating quite well. Very stable.

09 06 42 37 CC Very good, Dave. Thank you.

09 06 42 50 LMP And, Joe, I'm ready to copy that coming-home pad.

09 06 42 54 CC Okay, Jim. I'm ready to read it to you. It's TEI-74, SPS/G&N; the weight, 35768; plus 0.57, plus 0.88; 223:48:45.05; plus 2945.2, minus 0761.3, minus 0171.4; all zips on roll, pitch, and yaw; NOUN 44 is NA, and plus 0022.1; 3046.8, 2:21, 3028.5; 37, 224.3, 30.5; 053, down 10.3, right 3.1; plus 26.11, minus 157.97; 1084.1, 36179; and the GET, 294:58:34. GDC aline, Vega and Deneb; 102; 178; 028. Four jets, 12-second ullage. And, we'd like ACCEPT, please. And I'm standing by for the readback. Over.

09 06 45 44 LMP Okay; you have ACCEPT, and here's the readback, Joe. TEI-74, SPS/G&N; 35768; plus 0.57, plus 0.88; 223:48:45.05; plus 2945.2, minus 0761.3, minus 0171.4; all zips for roll, pitch, and yaw; H<sub>p</sub>, plus 0022.1; 3046.8, 2:21, 3028.5; 37, 224.3, 30.5; 053, down 10.3, right 3.1; plus 26.11, minus 157.97; 1084.1, 36179; 294:58:34. Vega and Deneb; 102; 178; 028. Four jet for 12 seconds.



09 06 46 54 CC Okay, Jim. The readback is right on. I've got a TEI-75 preliminary pad and a Flight Plan update pad, when you're ready.

09 06 47 11 LMP Okay, I'll take TEI-75.

09 06 47 13 CC Okay. SPS/G&N, TEI-75; 35768; plus 0.57, plus 0.88; 225:48:44.08; plus 2981.4, minus 0807.2, minus 0145.1; 000, 002, 001; all the rest, NA. Ullage, four jet, 12 seconds. Over.

09 06 48 20 LMP Roger. TEI-75, SPS/G&N; 35768; plus 0.57, plus 0.88; 225:48:44.08; plus 2981.4, minus 0807.2, minus 0145.1; 000, 002, 001. Four jets for 12 seconds.

09 06 48 47 CC Sounds good, Jim. Thank you. And I'm standing by for your call for the Flight Plan update.

09 06 48 56 LMP Go ahead, Joe; I'll take that.

09 06 48 58 CC Okay, Jim. And it's your computer. The Flight Plan update begins at 223 plus 51. And change the "VERB 49 maneuver" from the numbers listed to the numbers "127, 270, 030." Over.

09 06 49 35 LMP Read you. For the VERB 49 that occurs at 223:51, change the numbers to "127, 270, and 030."

09 06 49 49 CC That's correct. And the next entry is at 224 plus 00. Change the line "OMNI Delta" to read "OMNI Charlie." And I have a map camera photo pad to be copied at 224 plus 10. The T-start, 224 plus 03 plus 00. T-stop, MSFN cue. The next entry is listed at 224 plus 15. And change the map camera image motion requirement to read talk - "Talkback to barber pole plus two steps/OFF." And then I have three deletions. At 224 plus 21, delete the "VERB 49." At 224 plus 23, delete "Map camera track, retract." And 224 plus 27, delete "Map camera/laser experiment covers, closed." And the last item is an addition. At 224 plus 40, add "VERB 49 maneuver, 127, 295, and yaw is 030, and the high gain antenna angles, pitch, 23; yaw, 229." Over.

09 06 52 17 LMP Okay, Joe. Going back to 224:00, that'll be "OMNI Charlie" instead of "OMNI Dog." Then, on that map camera photo pad, it's 224:03:00 and stop on MSFN cue.

Then down to 224:15, on the "Map camera image motion" will - it'll be "barber pole plus two" instead of "three." At 224:21, we'll delete the "VERB 49 maneuver." At 224:23, we'll delete the "Map camera track." At 224:27, delete "Map camera/laser experiment covers, closed." And at 224:40, do a "VERB 49 maneuver to 127, 295, 030; high gain, pitch, 23; yaw, 229."

09 06 53 08 CC Right on, Jim. Thank you.

09 06 56 47 CC Good ship, Endeavour, be advised that our tracking stations have acquired the satellite.

09 06 56 54 CDR Oh, very good.

09 07 01 02 CC Apollo 15, Houston.

09 07 01 07 LMP Go ahead.

09 07 01 09 CC Roger. Jim, this is a comment for you. When I was reading the Flight Plan update to you, we noticed that you might be coming up on something not too clear in the Flight Plan, and it involves the long list of steps between 224 plus 00 and 224 plus about 15. And there are a number of steps in there that have to be accomplished before the T-start time on the map camera photo pad. It may be, you - you'll want to start on a few of them, I guess, a little early. Over.

09 07 01 51 LMP Okay, thank you, Joe.

09 07 02 29 CC Endeavour, this is Houston. We'll be requesting OMNI Delta when you lose the up-link.

09 07 02 42 LMP Roger; OMNI Delta. ... to go.

09 07 16 53 CC Hello, Endeavour; this is Houston.

09 07 16 59 LMP Houston, Endeavour. Go.

09 07 17 05 CC Roger, Endeavour. I have three requests for you. The first, the OPTICS is in the CMC MODE, and we've noticed it drifting off. We'd like you to drive it manually back to a value less than 10 degrees in TRUNNION and then ZERO it. We're also waiting for a DAP load and a P40. And I have a guaranteed last correction to your Flight Plan, when you're ready.

09 07 17 40 LMP Okay, number 1, we've still got to make the star check. We'll take care of that, and I hope - I hope you've already seen the DAP load and the P40, but we'll take a look at it again for you.

09 07 18 12 LMP Okay, Joe. We - I'm ready to take that last change to the Flight Plan.

09 07 18 16 CC Okay, Jim; stand by 1.

09 07 18 31 CC Okay, Jimmy, this is an easy one. At 224 plus 14, we want you to delete the line that reads "Map camera image motion to ON, talkback barber pole in 3 to 5 seconds, then gray." Delete that line, please. Over.

09 07 18 55 LMP Okay, that's an easy one. I'll delete that line that says "Map camera image motion, ON, talkback barber pole in 3 to 5 seconds, then gray."

09 07 19 03 CC Roger, Jim. Thank you.

09 07 23 05 CC Hello, Endeavour; this is Houston.

09 07 23 12 CDR Okay, Houston, Endeavour. Go.

09 07 23 14 CC Roger. Dave, Al, and Jim, be advised you're GO for transearth injection. Set your sails for home. We're predicting good weather, a strong tailwind, and we'll be waiting on the dock. Over.

09 07 23 32 CDR Okay. Thank you very much, Houston. We'll see you around the corner.

09 07 23 37 CC Roger. We'll be watching.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 08 04 05 CC Apollo 15, Houston. Over.

09 08 04 10 CDR Hello, Houston. Endeavour's on the way home with a burn status report for you.

09 08 04 15 CC Roger. Sounds good; standing by.

09 08 04 20 CDR Roger. Ignition was on time. Burn time was 2 plus 21. No trim. Our residuals were minus 0.2, plus 0.6, and plus 0.2. Delta-V<sub>C</sub> was minus 16.7; fuel 2.35; oxidizer, 2.2; the unbalance was about minus 25. And what a smooth burn that one was.

09 08 04 49 CC Roger. Sounds very good to us, Dave.

09 08 05 01 CDR Just can't beat these rocket engines for traveling.

09 08 05 05 CC I should hope not.

09 08 20 10 CC Apollo 15, Houston. Over.

09 08 20 11 CDR Houston, 15. Go.

09 08 20 18 CC Roger. Two questions. One, we notice you have A/C ROLL jets selected. I guess we aren't sure whether you have B - A/C ROLL jets selected on DAP, we aren't sure whether you have A/C or B/D selected on the panel.

09 08 20 41 CMP Okay, I'll check it ... Okay, A/C, you're selected.

09 08 20 57 CC Okay, and could we pry out of you guys any comments on the Moon as you leave?

09 08 21 06 CMP Well, we're almost speechless looking at the thing. It's amazing. Looks like we're going straight up. And we're leaving; there's no doubt about that. And we're right on the terminator. It shows very distinctly all the topography - all the topographic highs and lows. And we can see some major rilles. And we noticed one large lava filling within a depression with domes very prominent within the lava fill. Oh, it's just really pretty spectacular. We have one crater almost below us that has a flat

floor with radial rilles and circumferential rilles extending from the central peaks. I think we saw that as we flew over.

- 09 08 22 05 CC Roger; copy. Sounds beautiful.
- 09 08 22 10 CMP It's really spectacular. The elevation - the topography on the ridge line is quite clear, and, of course, all the features near the terminator stand out quite well because of the shadows. And we're busily taking pictures so maybe we can bring some of it back for you to see.
- 09 08 22 29 CC Be looking for it in 3 or 4 days.
- 09 08 22 34 CMP Roger. It's really spectacular though, and there's no question that we're leaving. As a matter of fact, the first glimpse we got, it was quite obvious that we're on the way.
- 09 08 22 51 CC That's a pretty good view after all those days of going around and around, isn't it, Dave?
- 09 08 22 57 CMP Yes, boy.
- 09 08 23 02 CDR Looks like we're going straight out, Dick.
- 09 08 23 04 CC Yes. Reminiscing for me. Thank you.
- 09 08 23 10 CDR Although, I'll tell you, we never got to see half of what we passed over, I'm sure. There's just so much up there.
- 09 08 23 21 CC Well, I'll tell you, Dave, I'm not so sure you guys didn't get at least your share, or maybe a little more. Spectacular.
- 09 08 23 28 CDR Roger.
- 09 08 23 57 CMP Well, I guess our orbital geologist up here just figured out which way we were. I guess we were sort of momentarily disoriented there, because south is up, and we're looking right up and down the terminator. So I guess we're upside down looking at new territory that we haven't seen during the flight.

09 08 24 49 CMP Jim just said, "Gee, maybe I ought to look out my window." And, by golly, out his window, he's looking up - he's looking up to the north. As a matter of fact, out window number 5 now, you can get a full half - half-Moon view. And you can see it all in one big gulp, and boy, what a gulp.

09 08 25 34 CC We'll look at Tycho, now, before too long.

09 08 25 44 CMP That's a good point; we can't see it yet.

09 08 26 27 CMP Houston, 15.

09 08 26 29 CC Go ahead, 15.

09 08 26 33 CMP Okay, Bob, I'm looking from Humboldt straight south now, and, in fact, you can draw a line between Humboldt and the - and a great ditch or scarp to the south. And there's quite a change in the light level or the intensity of the albedo in - between those two areas. And it looks like there's some - you know - very smooth fresh lava flows throughout that area. And, in fact, we noticed that while we were in orbit also, that in several of those areas around Humboldt there, to the north of Humboldt, and to the east of Humboldt, that the flows in some of the craters there - (And they're quite distinct flows, you can see where they've lapped up against the sides, and you can also see where they've come - where they've spilled down over the sides, sort of reminiscent of the Coso Hills flow) - You can - we looked at these flows and realized that they looked fresh. And yet they had a lot more - the crater count was a lot higher on them than it was on the surrounding terrain. And this flow we're - kind of looking at now looks - it's a very large area, and it looks like it's just filled - seeped into some craters down there, some of the large craters. It looks much fresher in color. It hasn't - it doesn't look like it has been worked up as much. The craters that pit the lava flow are much sharper than they are, say farther to the east. But the count seems to be much higher; the crater count seems to be much higher, even here.

09 08 28 17 CC Copy Al. Very interesting.

09 08 30 47 CDR And, Houston; 15. As we leave and look back, why, I guess we still have the impression the Moon is

mostly gray. However, when you're up-Sun, as we were just prior to TEI - when you're looking up-Sun, it does definitely take on a chocolate-brown color. We came around prior to TPI on the dayside - or TEI on the dayside, looking backwards into the Sun across Schröter's Valley, and that was a pretty spectacular sight. And it did start turning a chocolate brown, but now everything is a variation of gray, from very light to a gun-metal gray near the terminator.

09 08 31 28 CC Well, is that a unanimous vote in the spacecraft, Dave?

09 08 31 35 CDR Roger. I got three ayes on that one.

09 08 31 44 CC Roger. We'll add that, and continue to keep the score.

09 08 31 51 CDR Good.

09 08 31 53 CC Someday I'll get up there.

09 08 31 54 CDR Hey, Bob, we don't report to you the other kind.

09 08 31 58 CC Someday I'll get up there and make my report.

09 08 32 03 CDR I hope so.

09 08 32 20 CDR We can see a point on the terminator now where we mentioned we saw a lava filling and some domes in a depression which is not the circular craterlike depression; it's a big cavity. And now, I guess, as the Sun angle has changed some, we can see where the lava has apparently spilled over a scarp into a deeper cavity, which is in - in shadow. And it's very clearly a filling of the cavity with two levels.

09 08 32 50 CC Roger, Dave. We call that a polye, don't we?

09 08 32 59 CDR Well, I guess if we were in Hawaii.

09 08 33 05 CC You guys don't see any motion of that stuff, do you?

09 08 33 12 CDR Stand by. We'll watch it.

09 08 34 31 CDR And, Houston; 15. We got another unanimous vote up here. That was really a great trip.

09 08 34 41 CC Roger. I think that's unanimous on everyone, isn't it?

09 08 34 46 CDR Roger.

09 08 39 10 CC And, 15, if you'll give us ACCEPT, we'll up-link a REFSMMAT for desired orientation PTC.

09 08 39 22 CDR Roger. You've got it.

09 08 41 11 CC And, 15, it's your computer again.

09 08 41 17 CDR Roger, Houston.

09 08 44 47 CC And, Apollo 15; Houston. We'd like that VERB 49 maneuver, so we can pick up high gain, please.

09 08 44 58 CDR Roger. We just did it, Bob.

09 08 45 01 CC Thank you.

09 08 45 16 CMP Hey, Houston, take a look at the DSKY. I think those are the numbers you gave us.

09 08 45 26 CC Roger, 15. Those are the numbers. Look good, thank you.

09 08 57 29 CC And, 15; Houston. We'd like GAMMA RAY GAINSTEP, on, up, three clicks. Over.

09 08 57 40 CMP Okay. GAINSTEP, on, up, three clicks.

09 09 04 07 CC Apollo 15, Houston.

09 09 04 14 CMP Go ahead, Bob.

09 09 04 15 CC Roger. We'd like to move that "VERB 49 maneuver to lunar surface photo attitude" that you'll find at 225:30 in the Flight Plan. We'd like to move that up to 225:24. Over.

09 09 04 31 CMP Roger. Understand; move the "VERB 49 maneuver" to 225:24.

09 09 04 36 CC Roger.

09 09 25 26 CC Apollo 15, Houston.

09 09 25 31 CMP Houston, 15. Go.



09 09 25 32 CC Roger. Be advised we'll be monitoring your maneuver here in case you get in your gimbal lock. And the high gain angles in case you lose antenna lock in the new attitude will be pitch of minus 45 and yaw of 024. Over.

09 09 25 54 CMP Roger. Understand pitch minus 45 and yaw 024 if we lose it.

09 09 26 00 CC Roger.

09 09 26 01 CMP And thanks for watching it for us, Bobby.

09 09 26 21 CC And, 15, if one of you has time, I have a few more Flight Plan updates for you.

09 09 26 34 CMP Okay, Houston. Stand by 1. Go ahead, Bob.

09 09 26 42 CC Okay, the pitch and yaw angles for the P20 - P52 attitude at 226:00 is: pitch is minus 37; yaw of 322.

09 09 27 02 CMP Understand at the P52 attitude, it's pitch minus 37, yaw 322.

09 09 27 08 CC Roger. At 226:15, we're changing that VERB 49 maneuver attitude to the following coordinates: 327, 143, 055.

09 09 27 37 CMP Roger. Copy the change to the VERB 49 maneuver that occurs at 226:15 to 327, 143, and 055.

09 09 27 47 CC Roger. And the high gain angles will be pitch 13, yaw 212.

09 09 27 58 CMP Roger. Pitch 13, yaw 212.

09 09 28 03 CC Roger. Stand by.

09 09 28 15 CC And, 15, we're observing yaw of 61 degrees right now.

09 09 28 40 CC 15, Houston. We have 65 degrees yaw.

09 09 28 46 CMP Roger, Bob; we're watching.

09 09 28 50 CC Okay, three more Flight Plan updates, Jim, if you're ready.

09 09 29 05 CDR Go ahead, Bob.

09 09 29 06 CC Okay, at 226:22, on - It will be a line above the line that says "X-RAY, ON." The new line that will be added will be "X-RAY, OFF, for 1 second; then." Over.

09 09 29 35 CDR Understand. The new line added above "X-RAY, ON," and it'll read "X-RAY, OFF, 1 second; then."

09 09 29 42 CC Roger, that's good. At 227:32, we'll add a line on top of the "VERB 48" line that says "X-RAY, STANDBY."

09 09 30 01 CDR Roger. Understand. At 227:32, "X-RAY to STANDBY."

09 09 30 06 CC Roger. And at 227:57, on a line with the mass spec on it, we'll change that "DISCRIMINATOR, HIGH," to "DISCRIMINATOR, LOW."

09 09 30 23 CDR Understand. "DISCRIMINATOR, LOW" instead of "DISCRIMINATOR, HIGH."

09 09 30 25 CC Now that completes the update for now.

09 09 30 31 CDR Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 09 44 43 CDR Houston, Apollo 15.

09 09 44 46 CC Roger, 15. Go.

09 09 44 50 CDR Roger. Do you have any best guess on MCC-5 yet - whether or not we'll have one?

09 09 44 58 CC Stand by. It's not going to be very large.

09 09 45 03 CDR Well, the question is whether or not we have to prepare for it. And we have another request. We'd like to reschedule the UV photos presently scheduled for 239:10 to some other time, primarily because of the stowage in here. We've got most of the UV equipment already stowed beneath the rocks in prep for the EVA, and - to go in and go out of the stowage container takes a fair amount of time. And we'd like to reschedule that if it's possible.

09 09 45 39 CC Roger. Assume you mean after the EVA?

09 09 45 44 CDR Roger.

09 09 45 46 CC Okay. Stand by.

09 09 45 50 CDR Okay. This is a - this is a crowded fellow up here.

09 09 45 55 CC You guys shouldn't have brought so many rocks back.

09 09 46 01 CDR Well, I guess every once in a while we wonder.

09 09 46 15 CDR But we don't wonder very long.

09 09 46 52 CC Okay, Dave. First of all, no problem, we can delay those UV photos until after the EVA. Second, right now midcourse 5 looks like 2 feet per second, and we do want to do it. Over.

09 09 47 11 CDR Okay, thank you. That's a couple of quick answers; appreciate it. That - that will help us in our planning.

09 09 47 17 CC Okay, that is only a preliminary estimate on that midcourse 5 though.

09 09 47 24 CDR That's okay; that tells us the difference between SPS and RCS kind of burns.

09 09 47 30 CC Oh; Roger.

09 09 47 58 CC And, 15; Houston. One more thing if it's convenient.

09 09 48 04 CDR Go ahead.

09 09 48 18 CDR Go ahead, Bob.

09 09 48 19 CC Okay. At your convenience, we'd like to verify or check the PRIMARY ACCUMULATOR fill valve on until the primary accumulator quantity - that's for the glycol loop - is up to 50 to 55 percent. This is the result of a review of the EVA checklist for tomorrow. It assumes that this has already been checked and that we're at the 50 to 55 percent level so we'd like this check - you could do it tonight when you're getting ready for sleep or something.

09 09 48 52 CDR Okay, we'll do it right now. That's planning ahead.

09 09 48 57 CC Copy.

09 09 50 28 CMP Okay, Houston. Our PRIM ACCUMULATOR quantity is now about at 51 percent.

09 09 50 34 CC Roger. We copy; thank you.

09 09 50 40 CMP And we filled it from about 45.

09 09 50 43 CC Thank you.

09 09 50 56 CDR And if you have any other goodies you think we ought to check over, might as well do it this evening.

09 09 51 03 CC Roger, Dave. That's the only goody we came upon -

09 09 51 52 CC Stan - Stand by. Okay, 15. That's the only goody we've had from the review of the EVA checklist for tomorrow. That - that's the only one we could find. An extra goody that we'd like this

evening sometime. If you fellows intend to use the vacuum cleaner - is for you to give us a - a cue when you turn it on, so we can check and watch the currents. They saw a - funny on a AC bus - or an extra current load on an AC bus, and they think you were using the vacuum cleaner then. They'd like to verify that by watching it again when you use the vacuum cleaner.

09 09 52 27 CDR Okay. Well, we've been using it quite often on and off.

09 09 52 32 CC Okay. Just sometime when you use it, if you give us a cue as you turn it on, that would help.

09 09 52 44 CDR Okay, I - I guess we don't see any need for it this evening. And we could check it out if you'd like - -

09 09 52 50 CC No, no.

09 09 52 51 CDR - - ... pretty well. The cabin's nice and clean and I -

09 09 52 56 CC Roger, Dave. No, that's just a callout. The next time you happen to get around to feeling dirty and want to use the vacuum cleaner, give us a call if you would please.

09 09 53 10 CDR Okay. We'll do it.

09 10 14 16 CMP Houston, 15. Did you get the P52 numbers?

09 10 14 20 CC Roger. We have all your P52 numbers, Al.

09 10 14 34 CC Al, we know that one of them wasn't five balls.

09 10 14 43 CMP Say again.

09 10 14 44 CC Roger. We noticed one of those didn't have five balls on it.

09 10 14 50 CMP Roger. Did you get the torquing angles on both the P52s?

09 10 14 55 CC Roger. Yes, we got them.

09 10 15 00 CMP Okay, thank you.

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09 10 15 55 CC And, Endeavour; Houston. Over.

09 10 17 18 CC Endeavour, Houston. Over.

09 10 17 24 CDR Go ahead, Houston; Endeavour.

09 10 17 26 CC Roger. If one of you guys has time, we have what may or may not be the last iteration on trouble-shooting the pan camera this afternoon. Over.

09 10 17 38 CDR Okay, have at it.

09 10 17 40 CC Okay, step 1, we'd like to know - you - you can give us these afterwards, but the first step is to determine the status of the SERVICE MODULE SECTOR 1 AC 2 circuit breakers on panel 181. Those are three circuit breakers. Number 2 is to determine the status of the PAN CAMERA MODE switch. Number 3, after these have been done, PAN CAMERA MODE, STANDBY; POWER, on, talkback barber pole for 2 seconds, then gray, and then STEREO. Number 4, PAN CAMERA MODE, OPERATE, talkback barber pole for 2 seconds, then gray. Number 5, OPERATE PAN CAMERA until MSFN cues, or until beginning of the sleep period. And number 6, on MSFN cue, PAN CAMERA MODE to STANDBY; and, after 1 minute, PAN CAMERA POWER, OFF. Over.

09 10 19 07 CDR Okay, Bob. You clipped the first part of number 5. Say again, please.

09 10 19 12 CC Roger. Number 5 says OPERATE the PAN CAMERA until the ground gives you a cue or until the beginning of the sleep period. Then we'll give you a cue.

09 10 19 27 CDR Okeydoke, stand by a minute.

09 10 19 55 CDR Okay, Houston. SIM SEC AC 2 circuit breakers, three, closed, verified. And the PAN CAMERA MODE switch's in STANDBY. So would you like us to go to step 3?

09 10 20 08 CC Endeavour, Endeavour, this is Houston. Roger. That appears to be the problem. Stand by and I'll see what we want to do. Do we -

09 10 20 23 CDR Okay.

09 10 20 24 CC Apollo 15, Apollo 15, this is Houston. Roger. Press on with step 3 from that point when convenient.

09 10 20 35 CDR Okay. Going POWER, on, 2 seconds, gray, and then STEREO.

09 10 20 55 CDR Okay. POWER, on, and we have a continuous barber pole.

09 10 21 00 CC Apollo 15, Apollo 15. Roger. Understand, continuous barber pole.

09 10 21 08 CDR Why don't you just tell us what next? You want to go to STEREO or not?

09 10 21 14 CC Apollo 15, Apollo 15, stand by.

09 10 21 19 CDR Okay.

09 10 21 23 CC Apollo 15, Apollo 15, press on with STEREO, please.

09 10 21 30 CMP Roger. It's STEREO now, still barber pole.

09 10 21 49 CDR And I guess we'll go to step 4 now. Okay?

09 10 21 52 CC Apollo 15, Apollo 15. Roger.

09 10 21 58 CMP Okay. OPERATE, still barber pole.

09 10 22 09 CC Apollo 15, Apollo 15, Houston. Roger. We understand; still barber pole, and we'll give you a cue when to turn it off. Okay? Thank you.

09 10 22 17 CDR Roger. Be standing by.

09 10 25 37 CC Apollo 15, Apollo 15, Houston. Over.

09 10 25 46 CDR Go ahead.

09 10 25 47 CC Apollo 15, Apollo 15. We've succeeded in using up the last of the film in the pan camera. You may now go to PAN CAMERA MODE, STANDBY; and, after 1 minute, PAN CAMERA POWER, OFF, per step 6. Over.

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09 10 26 02 CDR      Okay, understand. PAN CAMERA to STANDBY, and  
1 minute, OFF.

09 10 26 11 CC      Apollo 15, Apollo 15. Roger.

09 10 26 53 CC      Apollo 15, Apollo 15, Houston. We're going to  
take down the network line here for 20 seconds.  
We'll be back up with you after that.

09 10 27 05 CDR      All righty.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 11 36 36 CC Apollo 15, Houston. Over.

09 11 37 00 CC Apollo 15, Apollo 15; Houston. Over.

09 11 37 12 CDR Houston, 15. Go ahead.

09 11 37 14 CC Roger, 15. We see you maneuvering to PTC, and we're requesting that you not maneuver to PTC until the SIM bay covers are closed. I don't know whether they're closed at the moment or not.

09 11 37 33 CDR Roger. They're closed up.

09 11 37 39 CC Understand. And if you fellows - -

09 11 37 41 CDR We're just following down through the Flight Plan.

09 11 37 44 CC Good. We weren't sure where you were. If you fellows are through eating, we have two or three calls to send up to you, when it's convenient.

09 11 38 34 CC Apollo 15, Apollo 15; Houston. You can go to T-stop for the mapping camera now. And that would be - to follow the checklist from pages 1-39, steps - sections 6, 7, and 8; first one being MAPPING CAMERA, ON, to OFF, 30 seconds, and then STANDBY. Over.

09 11 39 23 CMP Houston, 15.

09 11 39 25 CC Apollo 15, Apollo 15; Houston. Go.

09 11 39 28 CMP Houston, 15. Okay - -

09 11 39 31 CC Apollo - -

09 11 39 32 CMP - - Listen, Bob. Is this the T-stop on the mapping camera photo pad at 224:10?

09 11 39 37 CC Apollo 15, Apollo 15, that's a Roger.

09 11 40 31 CDR Okay, Houston. Go with the rest of the updates to the Flight Plan.

09 11 40 36 CC Apollo 15, Apollo 15; Houston. Roger. We - want to remind you, when you go into PC - TC, to follow the block in the Flight Plan for the usage of quads, rather than the section in - in the checklist where it calls out to disable all jets on two adjacent quads. This is to avoid contamination of the mass spec. It's just to remind you to follow that little box in the Flight Plan. Over.

09 11 41 07 CDR You mean that little box on page 3-343?

09 11 41 12 CC Apollo 15, Apollo 15, that's a Roger.

09 11 41 17 CDR Okay. We'll follow that little box just like it's in the Flight Plan. Go ahead with your - the rest of your updates.

09 11 41 23 CC Apollo 15, Apollo 15; Roger. On - one discussion here on the UV photos which we're delaying until after the EVA, it looks like the last chance to get these photos is at 246:15, which is about 3 or 4 hours after the nominal end of the EVA. We'd like to propose that for your consideration. Over.

09 11 41 51 CDR That's just fine. We'll do it, 246:15. Thank you.

09 11 42 29 CDR Okay, Bob. Do you have anything else to add to the Flight Plan?

09 11 42 34 CC Apollo 15, Apollo 15; Houston. Roger. One more item we just got is a request that now that the covers on the X-ray are closed, we're requesting X-RAY, ON, for 10 minutes and then OFF. Over.

09 11 42 51 CDR Okay. X-RAY, ON, for 10 minutes and then OFF.

09 11 42 57 CC Apollo 15, Apollo 15, the posit - the last position should be STANDBY rather than OFF. Over.

09 11 43 07 CDR Roger. STANDBY.

09 11 43 52 CDR Okay, Houston. The X-RAY is ON, and we'll turn it OFF in 10 minutes. Anything else?

09 11 44 00 CC Apollo 15, Apollo 15; Houston. That's a STANDBY in 10 minutes. I believe you understand that, Dave, anyway. And I believe that the next - -

09 11 44 11 CDR Roger.

09 11 44 12 CC - - thing we will want from you is a call when you're ready to go to sleep. And we will verify all systems at that time so we can get a solid goodnight, rather than tagging on again like last night.

09 11 44 27 CDR Roger that.

09 11 46 29 CC Apollo 15, Apollo 15; Houston. We see you cycling through the DAP. We suggest you need a zero in  $R_2$  to get B/D roll. Over.

09 11 57 08 CMP Houston, 15.

09 11 57 11 CC Apollo 15, Apollo 15, go.

09 11 57 16 CMP Hey, Bob, you didn't update the - arrange the load in the P20 for PTC. Was that meant to be updated to .375, or shall we leave it at .35?

09 11 57 33 CC Apollo 15, Apollo 15, let's keep it at .375.

09 11 57 40 CMP Understand you want the Flight Plan updated to .375.

09 11 57 46 CC Apollo 15, Apollo 15, that's a Roger.

09 11 57 53 CMP Roger. Thank you. We got the update.

09 11 58 46 CMP Houston, Apollo 15.

09 11 58 48 CC Apollo 15, Apollo 15; Houston. Go ahead.

09 11 58 54 CMP Yes, Bob. We're trying to retract the mapping camera. But the time has been well exceeded, and we still have the barber pole indication.

09 11 59 06 CC Apollo 15, Apollo 15, stand by.

09 11 59 59 CC Apollo 15, Apollo 15, we'd just as soon you didn't spin up quite yet. We still think the rates are a little high. Over.

09 12 00 14 CMP Okay, Houston. We'll wait on your cue then.

09 12 01 34 CC Apollo 15, Apollo 15; Houston. Concerning the mapping camera retraction problem, the question is, did you get a barber pole during the Alpha/X-ray cover procedure? Over.

09 12 02 03 LMP You ought to amplify your question there a little bit, Bob. You mean when we are - operating the covers?

09 12 02 35 CC Apollo 15, Apollo 15; Houston. Jim, the question basically is, did the barber pole - did the talk-back function properly when you just closed the Alpha/X-ray covers? Over.

09 12 02 52 LMP Yes, Dave said it works fine.

09 12 03 43 CC Apollo 15, Apollo 15; Houston. Jim, stand by on that. We got your last answer, and they're working on it.

09 12 03 53 LMP Okay. I think I'll take the - go out of the RETRACT position on the switch and just wait for your word.

09 12 04 01 CC Apollo 15, Apollo 15, that sounds good to me, Jim.

09 12 09 45 CC Apollo 15, Apollo 15; Houston. We'd like to hold off on PTC a little bit longer until we get this mapping camera business straightened out. And, Jim, for some troubleshooting on this, we'd like to have you check on panel 181 the MAIN A circuit breaker, closed, and the DEPLOY/RETRACT switch in the RETRACT position. And on panel 278, the DEPLOY MAIN A circuit breaker, closed. Over.

09 12 10 26 LMP Those two circuit breakers and the switches are verified, Bob, closed.

09 12 10 32 CC Apollo 15, Apollo 15, copy.

09 12 10 40 LMP And on the presleep checklist: Been no medication today. Onboard readouts are BAT C, 37; pyro BAT A, 37.3; pyro BAT B, 37.3. On the RCS, it's 56, 55, 54, and 55. And I guess, after we get PTC squared away, we'll give you E-memory dump.

09 12 11 12 CC Apollo 15, Apollo 15; Houston. Copy the crew status and the onboard readout. And stand by on the E-MOD; we may ask you for that before PTC, but we'll be back with you on that in a minute.

09 12 12 48 CDR Houston, 15.

09 12 12 56 CC Apollo 15, Apollo 15; Houston. Go.

09 12 13 02 CDR Roger. Un - unless you got a solution for the camera now, why don't we troubleshoot it in the morning and get on with our evening powerdown. Okay?

09 12 13 13 CC Apollo 15, Apollo 15; Houston. That's a Roger. We've just come to that conclusion ourselves down here. We're ready for an E-MOD dump before the start of PTC, please.

09 12 13 29 CDR Okay. It's on the way.

09 12 14 18 CC Apollo 15, Apollo 15; Houston. One last attempt on the mapping camera. We suggest you try MAPPING CAMERA doors, OPEN, then RETRACT, and then doors, CLOSE, if successful on the retract. And you can do that while - after you start up PTC, if you like.

09 12 14 38 CDR Roger. We've already attempted to do that, Bob.

09 12 14 43 CC Apollo 15, Apollo 15; Houston. Roger. You're ahead of Building 45. And, Apollo 15, Apollo 15, we have a good E-MOD dump.

09 12 15 11 CDR Houston, 15. How do the rates look now?

09 12 15 16 CC Apollo 15, Apollo 15; Houston. Your rates look good. You're GO for PTC.

09 12 15 23 CDR Okay. We'll try.

09 12 15 46 CC Apollo 15, Apollo 15; Houston. As soon as you configure the MASS SPEC — MULTIPLIER, LOW; DISCRIMINATOR, LOW; EXPERIMENT, ON; ION SOURCE, ON; et cetera — you're GO for sleep. Then, no more comments from the ground until morning.

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09 12 16 08 CDR Roger.

09 12 16 16 CC Apollo 15, Apollo 15, Houston is out for the evening.

09 12 16 25 CDR Don't go too far out, though.

09 12 16 31 CC Apollo 15, Apollo 15, our ever watchful eye will be on you while you sleep.

09 12 16 39 CDR Very good.

09 12 16 43 CMP Houston, 15. ... initial rates ...

09 12 17 12 CC Apollo 15, Apollo 15; Houston. You called just as we lost and locked onto the heigh - onto the OMNI.

09 12 17 24 CMP Okay, Bob. Just wanted to know how the initial rates of PTC looked?

09 12 17 31 CC Apollo 15, Apollo 15, initial rates look good. We'll be keeping an eye on it though for you, Al.

09 12 17 40 CMP Okay, Bob. It just didn't look like I got quite as much rate when I entered on that as I expected.

END OF TAPE

## APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 12 41 49 CC Apollo 15, Houston. Over.

09 12 42 28 CC Apollo 15, Houston. Over.

09 12 43 03 CMP Houston, 15. Go.

09 12 43 06 CC Roger, 15. Would you believe that we have one more call on the pan camera? We - do not show PAN CAMERA POWER to off, please, and unfortunately, that means that we might heat up the film too much. So we would like PAN CAMERA POWER to off. And, guys, as long as you're down there, would you mind trying MAPPING CAMERA, RETRACT, once more? 15, we see a certain rise in temperature there which may mean that it was frozen; it'll improve. And we do not see any - the mass spec configuration yet. And a progress report on your PTC says it's about 60 40, but - but it'll - it will last the night.

09 12 48 17 CMP Houston, it doesn't look like the mapping camera is going to come back in. What's the problem if it's left out?

09 12 48 24 CC 15, Houston. Would you believe we've just determined that it doesn't seem to be a problem if it stays out overnight.

09 12 48 35 CMP Great. Then I guess we can call it quits for tonight. Okay?

09 12 48 40 CC I sure hope so.

09 12 48 44 CDR (Laughter) Okay. . . . - -

09 12 48 46 CC 15, we don't have TM on you right now. Is the mass spec taken care of?

09 12 48 54 CDR Roger. The mass spec's taken care of. There's one switch out of position. And the MAPPING CAMERA is going to go to OFF.

09 12 49 11 CC Roger. Copied, Dave. We'll try again.

09 12 49 19 CDR Okay.

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09 12 58 50 CC

Apollo 15, Houston. In the blind, no need to reply. Our PAN CAMERA data still shows POWER, on. This is the middle switch in the bottom row. The POWER BOOST switch should be in the center off position. No need to reply. Over.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 19 45 46 CC Good morning, Endeavour. This is Apollo Control in Houston, Texas, tuning the band. Over.

09 19 46 21 CDR Good morning, tuning the band. This is Endeavour. Go.

09 19 46 30 CC Roger. Good morning, Endeavour. This is Houston with CSM consumables and a few good words about your Flight Plan, when you're ready.

09 19 46 46 CDR Just stand by 1

09 19 46 48 CC Okay, Dave. And you troops sure start the day early up there, I must say.

09 19 46 59 CDR Yes, seems that way, doesn't it?

09 19 51 01 CDR Okay, Houston. We've located the Flight Plan. Go ahead with your updates.

09 19 51 13 CC Endeavour, this is Houston. Were you calling?

09 19 51 21 CDR Roger, Joe. We've located the Flight Plan. Go ahead with your updates.

09 19 51 27 CC Okay, Dave. I guess, let me start with the CSM consumables. At 235 plus 30, RCS total, 41; quad A: 43, 40, 38, 41; H<sub>2</sub> tank 1, 41; 40, 36; O<sub>2</sub> tank 1, 56; 58, 45. And the only immediate other thing I have for you, Dave, is a comment on the maneuver at 236 hours - about the gamma ray boom retract. We'd like for you to confirm - I'll be back when ...

09 19 53 31 CC 15, this is Houston. How do you read?

09 19 53 38 CDR Last I heard was gamma ray. Go ahead.

09 19 53 42 CC Okay. The rest of that mysterious transmission is essentially the following, Dave. We've got a funny in that gamma ray experiment, and - so we're going to - to want to modify the use of it a little bit today. It should be no major imposition, but

the Flight Plan calls out for the gamma ray boom to be retracted at 236 hours. We'd like to modify that by saying, turn the GAINSTEP, SHIELD OFF, at that time, and we'll want you to retract it about 10 minutes later. We'll give you a cue for that. Over.

- 09 19 54 27 CDR Okay. GAINSTEP, SHIELD OFF, at 236 and stand by for your cue for retraction.
- 09 19 54 36 CC That's correct, Dave. I've got a few other good things here, but there's no hurry on any of them. Be willing to stand by, if you wanted to get squared away and give me a call later, or whatever you'd like to do. It's your preference.
- 09 19 54 54 CDR Well, let's go ahead, Joe. We're getting squared away up here.
- 09 19 54 58 CC Okay. If you have the Flight Plan then, let me add the following. At 236 plus 45, add the step, "X-RAY to ON." And then turning over several pages - -
- 09 19 55 25 CDR Roger. 236:45; X-RAY, ON.
- 09 19 55 27 CC Okay. And turning over several pages to 241 plus 25.
- 09 19 55 43 CDR Go.
- 09 19 55 44 CC Roger. After the step, "O<sub>2</sub> HEATERS 1, 2, and 3 to AUTO," add "O<sub>2</sub> TANKS 1 and 2, 50 WATT HEATERS, MAIN B, 2, to open."
- 09 19 56 31 CDR Okay. 241:25; O<sub>2</sub> HEATER - or O<sub>2</sub> TANK 1 and 2, 50 WATT HEATERS, MAIN B to open, and O<sub>2</sub> TANK HEATER - They're 50 WATT also? MAIN A, 1, open?
- 09 19 56 54 CC Stand by, Dave. I'm sorry about this one. Stand by.
- 09 19 57 01 CDR Okay.
- 09 19 57 26 CC Okay, Endeavour. Let me try that again. Had a typographical error down here. It should read

"O<sub>2</sub> TANK 1, 50 WATT HEATER, MAIN B, 1, open;"  
and "O<sub>2</sub> TANKS 2 and 3, 50 WATT HEATERS, MAIN A, 2,  
open." Over.

09 19 57 53 CDR Okay. O<sub>2</sub> TANK 1, 50 WATT HEATER, MAIN B, 1, open;  
and TANKS 2 and 3, 50 WATT HEATERS, MAIN A, 2,  
open.

09 19 58 04 CC That's correct, Dave. I apologize for the slow  
start there. Now I've got some DAP load changes  
that cover the times from about 247 hours to  
252 hours. And - the change is apparently because  
of a mis - of a mistake in the Flight Plan you  
have on board that we, in the meantime, have caught  
down here. And - so there are several deletions  
and additions during that time. The first one  
starts at 247 plus 28.

09 19 58 44 CDR Go ahead. I've got it.

09 19 58 48 CC Okay. Delete your VERB 48, 11111 and X1111, and  
add - Stand by a second.

09 19 59 09 CDR That's twice.

09 19 59 14 CC I'll be very careful from here on. Stand by.

09 19 59 59 CC Okay, D.R. I'm ready to try it again. You've  
deleted at 247:28 the line with all the funny  
number ones, and you're suppose to delete in the  
DAP load column also that same entry. It's in the  
time column, I guess. And then turn the page.

09 20 00 14 CDR Yes. Roger.

09 20 00 15 CC Okay. Go to 248 hours, on the next page, and  
in the note column, change the DAP load status to  
read 11101. And the rest is the same. And this  
DAP load status continues through the PTC until  
251 hours. And the next change is at 251 hours and  
4 minutes.

09 20 01 10 CDR Okay. 251:04, and I got the other three changes.  
Go ahead.

09 20 01 17 CC Okay. Delete the VERB 48 line and the DAP load  
over in the time column there.

09 20 01 37 CDR Okay.

09 20 01 38 CC And the next change is at 251:47. Delete the VERB 48 line and the DAP load in its corresponding time column.

09 20 01 58 CDR Okay. And I guess over in the notes column, we're still carrying 11101. Right?

09 20 02 06 CC That's affirmative, Dave. And starting at 252 hours, your DAP load status should read 111 - Stand by.

09 20 02 29 CC Okay. Let me try again. Starting - -

09 20 02 57 CC Okay. Starting at 252 plus 00 hours, in the notes column, the DAP load status should read 11101 times 1111. And this should be carried through the rest period until 261 hours. Over.

09 20 03 31 CDR Okay, Joe. You were saying something there about 252:30, as we lost comm. I got the entry at 252:00. Was there any change at 252:30?

09 20 03 43 CC Negative, Dave. The change at 252:00 should just be continued through until 261 hours. And that's just the DAP - DAP load status - should be changed correspondingly through until that time.

09 20 04 05 CDR Okay. I see. And then we're - we're just 11101 all the way.

09 20 04 10 CC That's correct.

09 20 04 29 CDR Okay. Go ahead on your next.

09 20 04 37 CC Dave, that's all I've got for the time being. And I think I'd be afraid to go ahead much further, if you're really counting those times. Maybe I should start keeping score on you as well.

09 20 04 52 CDR (Laughter) Okay.

09 20 05 00 CC We're happy for the time being. We're - we're standing by for a crew status report at your convenience. And we'll be watching for the GAINSTEP SHIELD to come OFF.

09 20 05 15 CDR Okay. We'll get right back with you in about 5 or 10.

09 20 05 18 CC Thank you.

09 20 18 01 CC Endeavour, this is Houston. We'd like for you to retract the gamma ray boom for us, please, and we'll be watching for your torquing angles. Also, if you'd like some news reporting in the background, I have the morning news here, if you're interested in that at all. Over.

09 20 18 27 CDR Roger. GAMMA RAY going to RETRACT now, and stand by on the news.

09 20 18 39 CC Okay. Roger. You can use that as background for the P52, I guess. President Nixon in effect declared U.S. responsibility for offensive ground-combat operations in Vietnam at an end. With the draft still in limbo, Selective Service went ahead today with the lottery to determine the order in which next year's 19-year-olds will face military service. Secretary of State William P. Rogers plans to go to the United Nat - Nations to push for a more energetic international relief effort for East Pakistan today. The Senate Armed Services Committee completed action on a 21 billion dollar military buying bill that meets most Nixon Administration weapons requests. President Nixon and his family will fly to Manchester, New Hampshire, and then to a private island in Maine this weekend, when visits to New Hampshire also are planned by four Democratic presidential hopefuls and Republican challenger Rep - Paul N. McClosky, Jr. Predicted weather for recovery day is 2000 feet scattered, 10 miles vis, and waves approaching 6 feet. Wind is north by northeast, 18 knots. I have a long list of baseball scores here, which I think I'll just glance over. In the American League, New York beat Cleveland 7 to 3. I've had a local request for the Dodgers, who lost to the Astros 2 to 0. The American Classic Golf Tournament starts today at the Firestone Country Club in Akron, Ohio. And the winner will get \$30 000 dollars. Sounds to me like the pay's pretty good, and I expect the hours are short. The U.S. Pan American Team went on a fantastic Gold Medal spree yesterday, winning 17 - rather 16 of the

17 medals at stake. The only one the Americans escaped getting was a Gold Medal in weight lifting. And the total in the games, which are being held in Colombia, is 78 for the United States, 36 of them gold, and 51 for Cuba, 12 of them are gold. And I'll end with a story comparable only to that incredible contest between the Apollo 15 All Stars and the North American Rockets. Last night in the Texas League, 21-year-old right-hander Tom Walker, pitching for Dallas-Fort Worth team, pitched a 15-inning, no-run, no-hit game against Albuquerque. He retired the last 21 men in a row. Only four Albuquerque players got on base, and all of them were on walks. Walker got the first 18 batters out before he walked the first one. He threw 153 pitches in the game, and the no-hitter is an all-time record in the Texas League and may very well be an alltime record in Major League Baseball. Walker's manager told him that if he did not win the game by the end of 15th inning, he was going to have to pull him out. Walker said his arm felt a little tired, but he felt okay, understandably. Like doing three EVAs I expect. And that's all the news for - for this morning.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 20 22 42 CDR Boy! It sounds like he's as good as our very own Blinky.

09 20 22 49 CC That may well be, Dave. I - That never occurred to me.

09 20 22 57 CC At least the equal thereof.

09 20 23 02 CDR Roger. At least almost.

09 20 25 17 CC Endeavour, we've copied the torquing angles. Thank you. And, Dave, if you can get a volunteer to work on the mapping camera for us, we'd like to try to pull that mapping camera in and get the covers closed in preparation for the EVA. We're not quite sure the position that the camera's in right now and the procedure I'll - can read up step by step, but it's basically to open the covers, try to extend the camera, we'll confirm the extension, and then we'll have you retract the camera and ultimately retract the covers. And I'll be standing by for your advice on this. Over.

09 20 26 08 CDR Okay, Joe. We'll see if we have time to work on that. But it's my understanding we do not have to have it retracted for the EVA.

09 20 26 28 CC Dave, that's my understanding, too. I think - the main reason - for wanting to do this if time is available and it's o - and it's only - would be a nicety - would be it - gives us a warm feeling regarding the film.

09 20 27 41 CC Dave, just to complete that last statement, you're correct. We don't have to have that device retracted for the EVA. But, apparently, it - it gives the film people a nice feeling regarding their film not getting too cold or too hot. That's the reason for that.

09 20 28 02 CDR Okay. Well, let us see if we can get to it.

09 20 28 05 CC Roger. Just give a whistle.



09 20 28 10 CDR Okay. And we sort of flip-flopped that P23 and eat period so that we could take advantage of our setup for eating and all. And we'll get on with P23 as soon as we finish breakfast.

09 20 28 23 CC Sounds good.

09 20 29 43 CC Apollo 15, this is Houston. All other things being equal, Troops, we'd prefer that you do the P23 before you begin the eat period, because it gives us an hour of pointed X-ray data during your eat period.

09 20 30 06 CDR Okay, Joe; but I guess the inequality is the stowage situation in here and assuring that we can get properly prepared for the EVA. So - we'll start the P23 in probably about - oh - 5 minutes or so, because we're almost through eating. But we sort of have to take advantage of our configuration here in order to stay with the time line later on.

09 20 30 29 CC That's fine, Dave. We understand. Thank you.

09 20 43 20 CC Endeavour, this is Houston.

09 20 43 29 CDR Go ahead.

09 20 43 31 CC Roger, I've got some information about your mid-course 5, which is scheduled to come up here. We have a firm decision that there will not be a mid-course 5 maneuver required, and the numbers behind that are a Gamma of minus 6.69; your vacuum perigee is 18.4, and the midcourse 5 correction that we're showing now would be 3/10ths of a foot per second. The corresponding midcourse 7 correction runs at about 1.8 feet per second. And, based on that new information, we're wondering if you're still interested in doing the UV photography at its scheduled time or waiting until after the - the EVA. And we're also wondering what your choice will be on the solar corona photography. Over.

09 20 44 39 CDR Okay. That's pretty fantastic guidance, isn't it? Let us - take another look at the Flight Plan here and come right back at you.

09 20 44 47 CC Okay, Dave; fine. And no hurry on - on the - on that decision. We would like the GAMMA RAY STEP SHIELD, on, now, please.

09 20 45 06 CMP Okay. GAMMA RAY GAINSTEP, on.

09 20 45 10 CC Thank you.

09 20 45 15 CDR And, Joe, I guess on the corona photography mag R has been ex - expended. And as far as the UV, it's not so much a problem of time. It's a problem of stowage. It's stowed way down deep in one of Endeavour's lockers here; and to get at it requires quite a bit of manipulation of bags. And that's the reason we wanted to delay that if it was possible.

09 20 45 41 CC Okay, Dave. We understand that. And that - that sounds like it's a far more reason - reasonable to delay that. The timing's not critical as far as we're concerned. We just wanted to give you a balanced workday.

09 20 45 58 CDR Okay; fine. We don't mind loading up a little after the EVA, because it really saves us a lot of work in the long run. And you might wonder why we didn't put - the UV stuff somewhere else, but there's just nowhere else to put it but in its - in its own proper little spot.

09 20 46 44 CC No, we understand. Thank you.

09 20 57 46 CDR Houston, 15.

09 20 57 49 CC Go ahead, 15.

09 20 57 53 CDR Okay. Have a crew status report for you, and you can have the doctor take a look at the LMP BIO and see if that's acceptable.

09 20 58 00 CC Okay.

09 20 58 08 CDR Ready to copy?

09 20 58 09 CC Go ahead.

09 20 58 14 CDR Okay. Seven hours sleep apiece, and PRDs 25028, 23193, 08031.

09 20 58 29 CC Okay, Dave; thank you. And we see that we've got the X-ray going. We'd like for you to change the setting on the gainstep. Give us a one-click increase, which will move us from - the position 7 back to position 1. Over.

09 20 58 50 CDR Okay. You've got a one-click increase.

09 20 58 56 CC Okay. We see it, Dave, and Jim's BIO looks clean to us down here. Thank you.

09 20 59 05 CDR Okay.

09 21 15 05 CC Endeavour, give us six clicks on the GAMMA RAY GAIN switch, please.

09 21 15 14 CMP Okay. Six clicks.

09 21 35 59 CC Endeavour, this is Houston.

09 21 36 04 CDR Houston, Endeavour. Go.

09 21 36 06 CC Roger, Dave. A couple of miscellaneous items I'd like to ask you about. First of all, the trench sends their congratulations to whoever's doing the P23 for us. The errors are less than 7 Sigma - and they're awarding the honorary Vasco da Gama Navigation Award for excellence in this. Secondly, we're puzzling over your remark about magazine Romeo, which you reported to us was exhausted. And we're wondering if you just read - the frame number from the MAG and, if so, what it read. Over.

09 21 36 57 CMP Yes. Joe, this is Al. The last reading on Romeo, I think, was 110.

09 21 37 10 CC Okay, Al. Thank you. And were you doing the P23's for us?

09 21 37 17 CMP Si.

09 21 37 23 CC Okay. I'll tell you a little something about Vasco da Gama later on. Another easy item here, you're going to come up on a BAT charge - I guess BAT B charge - starting at 239 hours, and we'd like to delay that to 244 hours, please.

09 21 37 46 CDR Okay. Delay the BAT B charge to 244. And be advised - you've got to know that we've got the best navigator in transearth lunar space up here.

09 21 38 00 CC At least one of them, I'm sure.

09 21 38 01 CDR In fact, the only one.

09 21 38 03 CC Roger. We copy. And, finally, I'd like to get a volunteer to take a whack at this - configuring the map camera properly. And it's going to be a few short steps, and if it works, great; we'll have a lot of good engineering data regarding the thermal properties of that beauty. And if it doesn't work, we're just going to turn it off and leave it. And - when somebody's ready to do that, I'll go through the steps. There're not too many.

09 21 38 36 CDR Okay, Joe; somebody'll be ready in just a few minutes.

09 21 38 40 CC Roger. Thank you, Dave.

09 21 46 42 CDR Okay, Houston; Endeavour. If you want to try your camera techniques again, let's give it a whirl.

09 21 46 49 CC Okay, Endeavour. I've got five steps here, and I think it's easiest for me just to read them to you and have you carry them out rather than copying them down. And the first one - first two steps - -

09 21 47 01 CDR Roger.

09 21 47 02 CC - - on panel 181, verify LOGIC POWER MAIN A circuit breaker, closed.

09 21 47 16 CDR Okay, verified.

09 21 47 17 CC And same panel, verify LOGIC POWER switches, two of them, to DEPLOY/RETRACT.

09 21 47 26 CDR Verified.

09 21 47 28 CC Step 3 on panel 278, the EXPERIMENT COVERS DEPLOY circuit breaker MAIN A to closed.

09 21 47 44 CDR Verified. Closed.

09 21 47 47 CC Step 4, on panel 230, the MAP CAMERA, verify STANDBY.

09 21 47 56 CDR Verified to STANDBY.

09 21 47 59 CC Okay, and coming up on step 5 and let me read through this - and - I'll stand by for questions then, if there are some. We want the MAP CAMERA TRACK to EXTEND; and, simultaneously, we want the EXPERIMENT COVER MAP CAMERA/LASER ALTIMETER to OPEN, and we want those two things done simultaneously.

09 21 48 33 CDR Okay. Understand. Go to EXTEND and open the COVERS, MAP CAMERA/LASER simultaneously.

09 21 48 37 CC Roger. And a note on that - I guess - on the MAP CAMERA TRACK to EXTEND, we'll be watching that for about between 4 and 5 minutes or until you get a gray talkback on there. And - we think this is going to clear up our problem and if it doesn't, we're just going to turn the whole ball of wax off and go ahead and do the EVA as normally planned. Over.

09 21 49 13 CDR Okay, Joe. In 3 seconds, we'll execute.

09 21 49 18 CC Roger, Dave. We're watching.

09 21 49 32 CDR Well, I got a gray on the mapping camera. How about that?

09 21 49 43 CC Okay; stand by.

09 21 49 53 CC Dave, do you have a gray on the door as well?

09 21 49 59 CDR That's affirmative, but I did not get a barber pole on the door. It just stayed gray.

09 21 50 06 CC Okay; that's good. That just means that it was open already.

09 21 50 13 CDR Right.

09 21 50 15 CC

Okay. Then that - that's worked out fine. Apparently we were having a temperatue problem with that thing before, and we're back in business just like normal. We'd like now the MAPPING CAMERA TRACK to RETRACT, and that'll take I guess about 4 and a half minutes.

09 21 50 38 CDR

Okay. MAP CAMERA TRACK going to RETRACT now.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 21 56 57 CC Endeavour, this is Houston. Be advised that because we're not going to do a midcourse 5, we'll continue the X-ray pointing to about 238 plus 30, and we'll be coming at you with a list of the steps at 238 hours that you can delete because we're not doing the midcourse.

09 21 57 23 CDR Okay, fine.

09 21 57 44 CC And, Dave, could - could you have someone check the barber pole on our MAP CAMERA, TRACK, to see if you have the gray-RETRACT indication, please?

09 21 58 01 CDR Roger, Joe, I been watching it. You got about 7 minutes and 20 - 20 seconds now and it's still barber pole.

09 21 58 10 CC Okay, that's what we're showing down here. And stand by.

09 21 58 28 CC Okay, Endeavour, we're satisfied with that mapping camera exercise. Two more requests on that. Go to OFF with the EXTEND/RETRACT switch, and to OFF with the MAPPING CAMERA/LASER ALTIMETER COVER switch, please. And we're finished with that.

09 21 58 54 CDR Okay; EXTEND/RETRACT to OFF; and a MAP CAMERA/LASER ALTIMETER's going to OFF.

09 21 59 03 CC That's right, Dave. And a note for Al. We think that the magazine Romeo, based on the frame count you gave us, still has enough frames left to take the solar corona pictures. And we'll have some special words for Al on how he's to take those pictures. I guess, we'll delete a few of the solar corona requirements. Also, word about the PRD configuration for the EVA. Apparently, we'll want the CMP to have the PRD, whose number reads 25028. And, I guess, that's the one you've been carrying, Dave. And, Jim, we'll - we'll use the one that reads 08031, but we would like to have him reconfirm this number before he starts the EVA. Over.

09 22 00 13 CDR Okay. Let me get that in the Checklist here, Joe; stand by. The CMP is 250 - say again.

09 22 00 22 CC Roger. We want A1 to wear the PRD that's now reading 25028. That will distinguish it from the other two with no ambiguity. And Jim to take the one that begins 080, and we want him to give us the full reading off of that before he starts the EVA, though.

09 22 00 46 CDR Well, we'll have to give it to you now, because it will be in the suit and we won't be able to get to it.

09 22 00 50 CC That's fine. Any time. Any time.

09 22 01 28 CDR Okay. The one Jim will wear will be 08037.

09 22 01 37 CC Okay, Dave. Thank you. And if you'll give us P00 and ACCEPT, we'll let you have a new state vector.

09 22 01 49 CMP Roger. You've got it.

09 22 04 33 CC Endeavour, it's your computer.

09 22 04 37 LMP Roger.

09 22 06 06 CDR And, Houston; Endeavour. You want to go through the change in the Flight Plan at 238 hours, if you haven't?

09 22 06 13 CC Standby.

09 22 06 34 CC Okay, Dave. This involves delaying the SIM bay turnoff until 238 hours and 30 minutes. And in detail, at 238 plus 05, delete the P30 external DELTA-V, and the VERB 49 maneuver. Lines: at 238 plus 20, delete sextant star check; at 238 plus 28, delete all the steps from there starting with circuit breaker SCS, et cetera, up to 238 plus 55, ending with RHC POWER DIRECT (2) - OFF, et cetera. Over.

09 22 07 41 CDR All right. I got all that. Thank you.

09 22 14 37 CC Hello, Endeavour, this is Houston.



09 22 14 43 CDR Houston, Endeavour. Go.

09 22 14 45 CC Be advised at my mark, you are leaving the sphere of lunar influence; and it's downhill from here on in.

09 22 14 54 CC MARK.

09 22 14 59 CDR Roger. Thank you, Joe. That's nice to know.

09 22 15 07 CC Did you notice anything there, Dave? Discontinuity in velocity or anything like that?

09 22 15 17 CDR Well, Joe. That's one of the mysteries that we'll probably have to keep to ourselves.

09 22 15 22 CC I was afraid of that.

09 22 21 56 CC Endeavour, this is Houston.

09 22 22 02 CDR Go ahead.

09 22 22 03 CC Roger, Dave. We're looking down the line here towards the EVA. And the Surgeon's getting good biomed data on Al now, except one of the three EKG sensors is apparently marginal, and there's some noise creeping in. We're just wondering what your standard procedure is regarding sensoring before the EVA exercise. If he's going to resensor, it's probably no problem; if he's not planning to, maybe we ought to talk it over a little. Over.

09 22 22 37 CDR Okay. We're all three all sensed, ready to go. If they have a problem, let's get it squared away right now.

09 22 22 45 CC Okay. Do you have - Maybe Al could try pressing down on the three EKG leads, one at a time, for us; that may help us out.

09 22 23 01 CDR Okay. Here we go. The upper right.

09 22 23 17 CC Okay.

09 22 23 22 CDR Okay. The upper center is being pressed.

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09 22 23 36 CC Okay.

09 22 23 41 CDR Okay, and the lower left.

09 22 23 57 CC Okay. Stand by.

09 22 24 02 CDR Okay.

09 22 24 56 CC Dave, it looks to us like it's one of the two top sensors, and we were wondering how difficult it would be to reseal both of them now.

09 22 25 11 CDR Okay. I'll tell you what we'll do. A little further down the line here, we'll take care of both of those. We'll ... them and reseal them and everything.

09 22 25 24 CC Okay, fine. Thank you.

09 22 25 29 CDR And thank you for thinking ahead on that one.

09 22 43 21 CC Endeavour, Houston.

09 22 43 28 CDR Houston, Endeavour. Go.

09 22 43 30 CC Roger. I've got an update to your corona - window calibration photography and the UV photographs, when you're ready.

09 22 43 45 CDR Okay. Stand by 1.

09 22 46 24 CDR Houston, Endeavour. Can't seem to get the mass spec boom all the way in and I guess Al's had a little trouble with it - now and again with the barber pole being half - the talkback being half barber pole. And seems to flutter there, close to the gray position, and doesn't really come all the way in.

09 22 46 47 CC Okay, Dave. We copy. Let us think about that.

09 22 46 53 CDR Okay. And we're going to go ahead with the dumps, if that's okay?

09 22 47 05 CC Okay.

09 22 47 17 CDR And if you'd like a visual check of just exactly where that's hanging up, why we can give it to you in a couple of hours. We'll have Al go out and take a look.

09 22 47 26 CC That's not a bad idea. Does he know about this plan yet?

09 22 47 32 CDR Well, I don't know. We'll check with him. Yes, he nods his head like he'd probably be obliged to do it.

09 22 47 40 CC Okay. Break it to him gently, though.

09 22 47 44 CDR Okay.

09 22 47 46 CC And, Dave. While I got you here, I do want to comment that the first change in the Flight Plan is to delete the step at 238 plus 23 that says "enable all jets." We think that there is a - a certain chance that map camera may be stuck out, and we particularly don't want RCS jets A4, A2, B1, and B4 to be enabled, because they may give us trouble with that camera.

09 22 48 30 CDR Okay. Understand, Joe. We'll scratch that step and make sure A4, A2, B1, and B4 stay off.

09 22 48 38 CC Okay. And I'll - Standing by to read you some more photo pads, just at your convenience.

09 22 48 48 CDR Go ahead. I've got the Flight Plan out.

09 22 48 55 CC Okay. If you'll turn to page 3-352, which is the Corona Window Calibration and UV photos procedures page.

09 22 49 11 CDR I've got it.

09 22 49 15 CC Okay. The attitude involved in the corona photographs should read 057, 005, 025. And the time on that, 239 plus 08. And the high gain numbers, pitch, minus 48; yaw, 238.

09 22 50 03 CDR Okay, Joe. 057, 005, and 025 at 239:08. Minus 48 and 238 for the high gain.

09 22 50 13 CC That's correct, and moving down a couple of lines, the shutter speed should be changed from "1/500th" to 1/125th. And change the inhibit jets line to read "damp rates for 5 minutes." CMC MODE to FREE.

09 22 50 58 CDR Okay. Understand. Scratch inhibit jets, and substitute damp rates for 5 minutes, and then CMC, FREE, and the 1/125th replaces the 1/500th on the camera.

09 22 51 11 CC That's correct, Dave. And moving down a little further, delete the line, cycle 1 frame, change shutter; and delete the line, "cycle 1 frame." And finally, change the last line, enable all jets to read, "CMC MODE, AUTO."

09 22 52 44 CDR Okay, delete line, "cycle 1 frame" and "cycle 1 frame;" and CMC AUTO, replaces "Enable all jets."

09 22 52 52 CC That's correct and assuming you're going to take the UV photographs after the EVA, I have a photo pad for that, if that assumption is correct.

09 22 53 06 CDR Looks like that assumption is probably correct, Joe, and we'll take the photo pad later on. Let us get on with corona, or we won't make it.

09 22 53 14 CC Okay, sounds good.

09 22 57 25 CC Apollo 15, Houston.

09 22 57 34 CDR Houston, 15. Go.

09 22 57 36 CC Roger, Jim. We understand you are going to delete the UV photograph, but after you complete the corona window calibration, you will have to do the first step in the UV photos Transearth Coast Procedures, there. And that first step is VERB 49 maneuver to Earth UV photo attitude, and it lists the attitude there. We need this for thermal reasons.

09 22 58 08 CDR Roger. We'll do that.

09 23 05 41 CMP Houston, 15.

09 23 05 45 CC Go ahead, 15.

09 23 05 50 CMP

Hey, Joe. Just a point of clarification on the backing to be used for the corona. I don't know whether you are aware or not, but the backing that fits into window 4, which is the right-hand rendezvous window, has two different mounting pads for the camera, one is 250 and the other is 80. And the 80 is pointing 12 degrees below the X-axis, and I just wanted to check and see if you wanted us - if that's the proper pad or if you wanted us to use the 80 on the 250 pad.

09 23 06 23 CC

A1, use the 80. The one pointing 12 degrees above the X-axis.

09 23 06 30 CDR

Okay, Joe. Thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

09 23 46 00 CC 15, this is Houston.

09 23 50 45 CC Apollo 15, this is Houston.

09 23 51 47 CC 15, this is Houston, broadcasting in the blind, with a request that, if possible, we bring back Dave's LCG. If it's already stowed in too inaccessible a place in the - in the jettison bag, don't bother. But if you can possibly save it, please bring it back.

09 23 52 08 CDR Okay. Sorry, Houston, we were getting suited here, and didn't realize we were off comm; but we copied your request. Let us think about it some for a minute.

09 23 52 19 CC Roger.

09 23 52 45 CDR Well, Houston, I guess that it's a good reason we're about an hour ahead. So we'll go ahead and dig it out.

09 23 52 58 CC That's your choice, Dave.

09 23 53 04 CDR Well, we're sort of ahead, and expecting little things like that to pop up.

09 23 53 08 CC Fine.

09 23 54 11 CDR Say, Houston, by the way, the LCG you'll get back is the one I wore on the third EVA only.

09 23 54 30 CC Roger; Dave. That's fine. That's the one we'd like.

09 23 54 35 CDR Okay. Okay.

09 23 54 56 CC And 15, whenever Al has a quiet moment, I have several prebriefing questions to send up to him about what to look for on the V over H sensor.

09 23 55 08 CDR Okay, give us about an hour for that, then we'll be able to talk to you.

09 23 55 12 CC Very good.

10 00 01 48 CC 15, this is Houston. We'd like to have MANUAL on the HIGH GAIN whenever one of you has a chance to get there. No need to answer.

10 00 01 58 CMP Let me do it.

10 00 01 59 CDR Okay. Go to MANUAL.

10 00 59 59 CDR Okay, Houston. Apollo 15.

10 01 00 04 CC 15, this is Houston. Go ahead.

10 01 00 11 CDR We're all suited up and down to the comm check portion of the EVA prep, and we're ready to talk to you about whatever you'd like to talk about.

10 01 00 21 CC Roger. Stand by.

10 01 00 34 CC I guess the main thing we have to talk about is the inspection of the V over H sensor of the pan camera. Are you ready to listen, Al?

10 01 00 48 CDR Okay. He can read you, but he's got to reconfigure his panel in order to talk to you, so we'll do that.

10 01 00 56 CMP Okay, Karl, how do you read me now?

10 01 00 57 CC Loud and clear, Al. Hey, on this V over H sensor, I have a set of five steps or five questions that we'd like to have for you to have in your mind.

10 01 01 09 CMP Okay. Go ahead.

10 01 01 11 CC Okay. Number 1 is, inspect the general area — this is sort of a general point of view — inspect the general area around the V over H sensor and comment on any evidence of thermal or mechanical degradation. And 2, 3, 4, and 5 are sort of more specifically. Number 2. Is there any evidence of V over H sensor lens cracking, or debris on the lens? In other words, have a good check of the lens itself. Number 3. Is any large amount of the black paint around the V over H sensor opening missing? Number 4. Is the plume shield in place around the V over H sensor opening? And the plume shield is what I'd generally call the - or - the - it's the guard around the lens sticking out about 3 inches there. And, number 5. Is anything obviously obstructing the V over H sensor field of view?

10 01 02 25 CMP Okay, Karl. We got all those.

10 01 02 29 CC Okeydoke. No other special questions at the moment. Stand by.

10 01 02 40 CMP Okay.

10 01 02 42 CDR Okay. We'll proceed on here then.

10 01 02 46 CC Incidentally, I guess we're - we both understand each other on the status of the mapping camera? So far as you know, it hasn't retracted? Is that correct?

10 01 02 58 CMP That is our understanding at this point. I'll let you know when I get out.

10 01 03 02 CC Roger.

10 01 03 11 CC Oh, Al. One more point that I overlooked down here, and that is, the people here would like to have you look at the mass spec boom, Al, if it's at all feasible. If it's not convenient to look down at the base of that boom and look at the coils, forget it; but if you can get a look in there, we would expect to find a coil crossover jamming down in the base there, and we'd like to have your visual confirmation of that.

10 01 03 39 CMP Roger, Karl. I had intended to do that.

10 01 03 41 CC Very good.

10 01 04 02 CMP Roger. That's on.

10 01 04 04 CDR Net comm, OFF.

10 01 04 05 CMP Net comm, OFF.

10 01 04 06 CDR S-BAND T/R.

10 01 04 07 CMP S-BAND T/R.

10 01 04 08 CDR ...

10 01 04 09 CMP NORMAL.

10 01 04 10 CDR INTERCOM T/R.



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10 01 04 11 CMP T/R.  
10 01 04 12 CDR ...  
10 01 04 13 CDR OFF.  
10 01 04 53 CMP Roger.  
10 01 04 55 CDR Houston, Endeavour. I guess the comm's acceptable  
to you down there on - with Al on VOX. Is that  
correct?  
10 01 05 02 CC Roger. We're reading him loud and clear.  
10 01 05 07 CDR Roger.  
10 01 05 14 CMP Press ALARM, ON; tone on.  
10 01 05 17 CDR ... OFF?  
10 01 05 18 CMP OFF.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 01 05 38 CMP ON.  
10 01 06 13 CDR Go ahead.  
10 01 06 22 CMP 900.  
10 01 06 42 CDR Roger.  
10 01 06 43 CMP REPRESS to OFF.  
10 01 06 51 CDR Flashlight. Flashlight. Yes, got it. It's okay.  
It's off. Panel 600.1. Go.  
10 01 07 16 CMP EMERGENCY O<sub>2</sub> VALVE, CLOSED.  
10 01 07 20 CDR CLOSED.  
10 01 07 49 CMP No, I'm negative. ... panel 8, front.  
10 01 08 09 CMP ...  
10 01 08 23 CMP Just -  
10 01 08 30 CC 15, we'd like to have OMNI Charlie.  
10 01 08 43 CDR Roger. OMNI Charlie.  
10 01 09 52 CMP Left to counterclockwise.  
10 01 09 53 CDR It's on.  
10 01 09 57 CDR It's on.  
10 01 10 42 CDR Good.  
10 01 20 55 CC 15, this is Houston. We'd like to get the high  
gain antenna up, if that's possible.  
10 01 21 05 CDR Oh, Roger. We'll do that.  
10 01 21 08 CMP Okay. Stand by. I'll get the HIGH GAIN.  
10 01 21 38 CMP Okay. HIGH GAIN.

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10 01 21 40 CC Roger; and thank you.

10 01 21 41 CDR You should have it.

10 01 21 50 CMP Negative. Coming unstowed.

10 01 21 58 CMP They're installed.

10 01 21 59 SC ...

10 01 22 03 CMP ...

10 01 22 05 SC ...

10 01 22 09 CMP It's attached.

10 01 22 10 CDR Don OPS. Connect straps to adapter bracket.

10 01 22 13 CMP In work.

10 01 22 58 CMP Okay. Wait.

10 01 23 11 CMP Wait a minute. Let's get the straps up.

10 01 23 45 CMP Okay.

10 01 23 47 CDR Okay. Snap all the flaps.

10 01 24 01 CMP Now, I'm on SCU whenever - whenever you're ready.

10 01 25 16 CMP Yes, I'm disconnected.

10 01 25 31 CMP All verified. Roger. Got you.

10 01 25 44 CMP Okay.

10 01 25 55 CDR You can leave them off.

10 01 26 52 CDR Down in the left-hand LEB, Jim. Bring it up with gloves and helmet, gloves inside.

10 01 27 35 CDR Cabin pressure, 5.2.

10 01 27 40 CMP Yes.

10 01 29 24 CDR Cabin pressure, 5.5.

10 01 31 53 CDR Cabin pressure is approaching 6, and I'll crack the side hatch valve just a bit.

10 01 31 59 LMP Yes.

10 01 33 02 CDR ... valve is on there now. Keep an eye on it.

10 01 33 08 LMP Roger.

10 01 33 26 CMP All locks.

10 01 33 28 CDR Okay.

10 01 33 33 CMP You guys do your integrity check before I put my helmet and gloves on.

10 01 33 49 CMP In case I'd have something else closed.

10 01 33 51 CDR Cabin pressure, 5.4.

10 01 34 13 CDR Okay. O<sub>2</sub> FLOW HIGH, pegged.

10 01 34 17 LMP Your light's on.

10 01 34 30 CMP O<sub>2</sub> FLOW HIGH, pegged.

10 01 36 20 CDR Vents.

10 01 36 22 LMP Vents all closed.

10 01 37 19 LMP It's ready.

10 01 37 22 CMP Side hatch valve coming on pull.

10 01 37 56 CDR Roger. That and my SCM. Okay. That'll hold steady.

10 01 39 53 CDR ... pressure and temperature ...?

10 01 39 54 CMP Yes.

10 01 39 55 CDR ... suit pressure reading?

10 01 39 58 CMP Suit pressure's reading about - pound and a half above cabin.

10 01 40 28 CMP Cabin pressure's running about 5.9.

10 01 40 37 LMP I'll pump it down a little bit.

10 01 41 00 CMP Jim, stand by 1. Get the cabin pressure down.

10 01 41 10 CDR Okay. ... valves, closed. SCS, closed.

10 01 41 58 CDR Houston, 15. The suit circuit looks pretty good up here. How does it look to you?

10 01 42 05 CC Roger, 15. It looks good to us down here.

10 01 42 11 CDR Okay. Thank you.

10 01 43 06 LMP SCU is on. 603 is ON. Verified.

10 01 43 39 CMP Okay. Let's get the helmet on first.

10 01 43 49 LMP Okay. PURGE valve.

10 01 43 55 CMP Got it. It's activated.

10 01 44 07 LMP Roger.

10 01 44 10 CDR Pull the OPS down there, would you, Jim?

10 01 44 18 CMP Hold it. Hold it up in front.

10 01 44 29 CMP Okay.

10 01 44 53 CDR Can you ...?

10 01 46 20 CMP Got it.

10 01 46 55 CDR Okay. Down and locked.

10 01 47 05 CDR O<sub>2</sub> coming off.

10 01 47 40 LMP Locked.

10 01 47 48 CDR Okay. I'll be pressurizing.

10 01 48 16 CDR ...

10 01 48 51 CMP ... 3.

10 01 49 10 CDR Okay.

10 01 49 28 CDR Okay. Stable at 39.

10 01 49 36 CMP Turn it off.

10 01 49 40 LMP ... Verified, off.

10 01 49 43 CDR Yes, it's okay.

10 01 50 05 CDR 6.

10 01 50 14 CDR Got it? Okay. It's off.

10 01 50 23 LMP Locked.

10 01 50 26 CDR High. You've got the temp. Can you reach it?  
Hook that strap in for me, too, would you, please?  
No.

10 01 50 52 CC 15, Houston. We note that your cabin pressure's  
up to 6. You might consider dumping it down.

10 01 51 01 CDR Roger, Houston.

10 01 51 20 LMP Hooked.

10 01 51 38 CMP Tell me when my temp ... anymore.

10 01 51 51 LMP Yes.

10 01 52 43 CDR Okay.

10 01 52 50 LMP Reading 4.0.

10 01 52 55 CDR Okay.

10 01 53 11 CMP It's off. Warning tone is on.

10 01 54 18 CMP Decay was about .1. It's on. O<sub>2</sub> ... is on.

10 01 54 30 CDR Reading 4 on stable.

10 01 54 32 CMP Off.

10 01 54 43 LMP Reading 300.

10 01 55 04 CDR Okay, Houston; 15. We've got a good integrity  
check on the CMP, and standing by for a GO for  
depress from ....

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10 01 55 23 CMP Dave, would you turn my ... valve, please?

10 01 55 31 CC We copy, 15. And you have a GO for depress.

10 01 55 37 CDR Roger.

10 01 55 38 CMP Are they vertical now?

10 01 55 50 CMP Other side too. Two of them.

10 01 55 52 CDR Yes.

10 01 56 02 CDR Okay. You guys ready? Okay, Houston; 15. The side hatch dump valve is coming open.

10 01 56 14 CC 15, Houston copies.

10 01 56 47 CMP Roger.

10 01 56 54 CDR Want to stop there?

10 01 56 58 CMP Well, okay. Think ... probably easier than I can.

10 01 57 37 CDR Reading 4.0. Go to them.

10 01 58 51 CDR Yes, it does.

10 01 59 21 CMP Reading 3.8 on mine.

10 02 00 16 CMP Roger. Fine.

10 02 00 35 CDR Okay.

10 02 01 38 CMP Yes, it makes a difference. It's still flowing into the cabin.

10 02 01 42 CDR How can you read me? You read me okay? Good.

10 02 01 51 CMP You hear my VOX cut in and out? Good.

10 02 02 15 CDR Yes. Okay. You ready?

10 02 02 28 CDR I suspect that SCU is forward enough to keep it there.

10 02 03 01 CMP It'll hold. Now.

10 02 03 12 CMP It's released. It's in the yellow?

10 02 03 18 CMP No. We've missed it.

10 02 03 20 CDR Yes, I can't see it. Jim, can you see the indicator?

10 02 03 23 LMP I can't either, can you?

10 02 03 27 CDR Stand by 1.

10 02 03 30 CMP Roger. ...

10 02 03 39 CDR Houston, 15. We're getting ready to open the hatch. How does everything look to you down there?

10 02 03 49 CC Roger, Al. Everything's looking good to us here.

10 02 03 53 CMP ... out, Dave.

10 02 03 56 CDR Okay? Unlatch. Unlatch. Ready? Roger.

10 02 04 19 CMP No.

10 02 04 23 CC 15, Houston. We don't see the TV camera on yet.

10 02 04 25 CMP The hatch is open.

10 02 04 29 CDR Huh. Oh, we haven't got it out yet. We'll have it out there in a minute. It should be on though.

10 02 04 33 CMP-EVA Okay. I got the latch - the handle and latch.

10 02 04 39 CDR Roger. Roger.

10 02 04 46 CMP-EVA Okay.

10 02 05 09 CMP-EVA Okay. ...

10 02 05 16 CMP-EVA ... zero. Clips.

10 02 05 32 CMP-EVA Jettison bag is gone. And jettison bag number 2.

10 02 05 50 CMP-EVA Okay.

10 02 06 16 CDR Okay, Houston. You should be getting a picture about now.



10 02 06 21 CC Roger, 15. We're getting a signal.

10 02 07 04 CMP-EVA Okay.

10 02 07 12 CMP-EVA Okay, fine. First thing is that the map - the mapping camera is all the way out.

10 02 07 27 CDR Okay.

10 02 07 34 CDR Okay.

10 02 07 52 CC 15, this is Houston. We're getting a clear picture now, but the aiming of the TV camera is poor. Is it possible to open the hatch wider?

10 02 08 10 CDR Yes, that's what - we're - we're looking at that, too. Stand by 1, and we'll do that.

10 02 08 44 CMP-EVA Yes, I can see the TV is pointed right at the command module there. Right at the interface.

10 02 08 51 CC That's affirm.

10 02 08 57 CDR Push it back a little there, Jim. Okay.

10 02 09 11 CC That's excellent.

10 02 09 13 CDR You should have a picture of a man in space.

10 02 09 15 CC Very good.

10 02 09 20 CMP-EVA Okay; you ready, Jim? I'll work my way down. Okay, it's reading 4. Okay.

10 02 09 50 CDR We'll have your picture back in a minute, Houston. We're turning on the 16 millimeter.

10 02 09 58 CC We copy.

10 02 09 59 CDR Yes.

10 02 10 07 CDR Okay.

10 02 10 40 CMP-EVA Okay, I'm in the front restraint.

10 02 10 45 CC Yes, that's good work up there, Al.

10 02 11 37 CMP-EVA Okay. The pan camera cassette is tethered. There's the pip pin.

10 02 12 32 CDR Good.

10 02 13 43 CDR Get it inside there, if you can, Jim. Get it inside.

10 02 14 26 LMP Okay.

10 02 14 30 CMP-EVA Roger. Would you like to exchange - would you like to get a hold of it? (Laughter)

10 02 14 42 CMP-EVA That's the pan camera, right. Okay, Houston, the pan camera is safely inside. Over.

10 02 14 46 CDR Jim, hold this.

10 02 14 53 CC Beautiful job, Al baby. Remember - remember, there's no hurry up there at all.

10 02 15 02 CMP-EVA Roger, Karl. I'm enjoying it.

10 02 15 35 CMP-EVA Okay, Houston. Rest break. We'll take a look at the V over H sensor.

10 02 15 41 CC Very good.

10 02 15 48 CMP-EVA Uh, hum, I see nothing on the V over H sensor. There's no back - black paint missing. There's nothing obscuring the field of view. The glass is not cracked.

10 02 16 13 CMP-EVA The shield is not obstructing the field of view. There's nothing in the way, Karl.

10 02 16 21 CC We - -

10 02 16 22 CMP-EVA It's perfectly clear.

10 02 16 23 CC We copy your report, Al. Thank you.

10 02 16 29 CMP-EVA Okay. And as I look around, the mass spec is - oh, it looks like about - not quite in - the cover. It looks like maybe it's the cover that's jammed. Yes, in fact, it is the cover that's jammed. See?

10 02 16 57 CC Roger, Al. We copy. That was most unexpected news.

10 02 16 59 CMP-EVA No, I can't tell from here. I can't really - I can't really tell from here, Karl, whether it's the cover or not. I thought the cover was jammed. One corner of the cover is overlapping a - side section of insulation which I wasn't expecting it to. But it doesn't seem to be - it doesn't put any force on it - on the mass spec. If I could get around and take a look at it. The mass spec is in the guide pins, and the mass spec looks like as it is fully retracted. The mass spec is fully retracted, Karl.

10 02 17 57 CC Roger, Al. We're reading you loud and clear.

10 02 17 59 CMP-EVA Any - any diffi - any difficulties with the talk-back has to be associated with that cover, because the cover is not closed. How far through the slot should the guide pin come on the - on the reel?

10 02 18 18 CC Stand by, Al.

10 02 18 21 CMP-EVA Okay. Because I can see the guide pin coming through. You do that, and I'll get the map - mapping camera.

10 02 19 39 CMP-EVA Okay, Jim. I'm ready to bring the other one back.

10 02 20 03 CC Hey, Al. It looks like you're running a pass up there. That's beautiful.

10 02 20 27 CMP-EVA Okay.

10 02 21 10 CMP-EVA Jim, you look absolutely fantastic against that Moon back there. That is really a most unbelievable remarkable thing.

10 02 21 25 CDR Okay, Houston. The mapping camera cassette is inside.

10 02 21 30 CC We copy.

10 02 21 42 CMP-EVA Houston, is there anything else you want me to check in the SIM bay before we go back in?

10 02 21 52 CC Al, we'd be - -

10 02 21 53 CMP-EVA Is there anything on the mapping camera I can check?

10 02 21 55 CC Al, we'd be pleased to have any general comments you had about the SIM bay experiments, otherwise than what we've specifically asked you. Did everything look in order?

10 02 22 05 CMP-EVA Okay. Well, everything looked good, as far as I could tell, all except for the cover on the mass spec and the fact that the mapping camera is up. Maybe I could make another quick check back here and see if I can see anything on the mapping camera.

10 02 22 23 CC Roger.

10 02 23 11 CMP Okay. You ready, you guys?

10 02 23 16 CDR All right.

10 02 23 40 CMP Oh, just a second. I've got to get the mask and get the TV.

10 02 23 54 CMP Okay. TV coming in. Got it, Dave? Okay.

10 02 24 03 CDR Okay, take your time.

10 02 24 05 CMP I - I'm doing fine.

10 02 24 20 CMP Okay.

10 02 24 33 CMP Hung up - on something.

10 02 24 58 CDR Ah, yes, it's about the same place it was when we opened the hatch.

10 02 25 15 CMP Okay. Hatch is locked.

10 02 25 21 CDR Neutral. Gear box is in latch.

10 02 25 35 CMP Can you do it, Dave? Okay.

10 02 25 40 CC 15, Houston. You can turn off the TV anytime you like.

10 02 25 47 CDR Let us get depr - pressurized first, Karl.

10 02 25 52 LMP Okay.

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10 02 25 59 CDR Can you get it there?

10 02 26 00 CMP Okay.

10 02 26 01 CDR Very good.

10 02 26 10 CMP Okay.

10 02 26 41 LMP Tell me when to close it. That's it.

10 02 26 47 CMP ... Take it down here before it's too - okay, okay.

10 02 27 09 CDR Okay?

10 02 27 11 CMP I said, I wish I were back outside. It's hell in here. Okay.

10 02 27 18 LMP Closed.

10 02 27 24 CMP I can't. No. ...

10 02 27 43 LMP How's that? There we go. Now we should get our positions straight. You see it now, Dave? Okay. Make sure we got a good seal.

10 02 28 22 CDR Okay, Houston; 15. It looks like we got a good seal. How's it look down there?

10 02 28 38 CC 15, Houston. Your seal looks good to us.

10 02 28 44 CDR Okay. Thank you. Is 601 open?

10 02 28 52 LMP It's OPEN.

10 02 29 03 LMP And it looks zero now, Dave?

10 02 29 10 CDR Roger.

10 02 29 58 CDR You should have stayed longer.

10 02 33 00 CC 15 - 15, Houston. As long as we have the TV camera on, go - go to AVERAGE, and we should get a better picture down here.

10 02 33 11 CDR Well, it's just down in the LEB sort of stowed away, but we'll do that.

10 02 33 26 CDR We're just not in a position to get the panel 3  
switch right now.

10 02 33 31 CC We - we copy, and that's fine.

10 02 33 50 CDR You may have something on your picture, now. I'll  
check.

10 02 37 18 CMP Cabin pressure rate is coming up.

10 02 37 22 LMP They're out of lockup.

10 02 39 18 SC ...

10 02 39 33 SC (Heavy breathing)

10 02 40 37 LMP I'll get it.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 02 41 02 CDR Got it.

10 02 41 03 CMP PGA pressure.

10 02 41 23 CMP ... - -

10 02 41 25 CDR Yes.

10 02 41 26 CMP - - ...

10 02 41 31 CDR On.

10 02 41 35 CDR Why don't you do it so I don't get my gloves dirty. Get my helmet. Get that stuff off and leave them.

10 02 45 59 CC 15, Houston. We see your cabin at 6.1. You might want to keep a close eye on that.

10 02 46 09 CDR Okay; we'll do that. Thank you.

10 02 52 38 CDR Houston, 15. We're prepared to maneuver to the thermal attitude a little early if you'd like us to go over there.

10 02 52 47 CC 15, this is Houston. That would be fine with us.

10 02 52 53 CDR Roger.

10 02 58 10 CC 15, Houston. We'd like to have AUTO on the HIGH GAIN and go from REACQ to AUTO quickly.

10 02 58 18 CDR Roger. Going AUTO -

10 03 25 57 CC 15, this is Houston.

10 03 26 07 CDR Go ahead, Houston; 15.

10 03 26 10 CC After some discussion down here, we'd like to disable your jets A2, Alfa 2 and Bravo 1, mainly because the mapping camera's still out and our concern is that the plume will be deflected down into the SIM bay and possibly damage some of our electrical wiring or some of the - the N2 plumbing, which may give us other problems.

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10 03 26 36 CDR Roger. That sounds like a good idea. If there's any other particular configuration you want, just let us know.

10 03 26 42 CC Roger.

10 03 26 47 CDR And A2 and Bravo 1 are disabled.

10 03 26 51 CC Thank you.

10 04 01 39 CDR Houston, 15.

10 04 01 42 CC 15, go ahead.

10 04 01 47 CDR Roger. The OPS pressure is 2000 and we'll be off comm for about 5 or 10 minutes here while we reconfigure the suits and everything.

10 04 01 57 CC We copy.

10 04 01 59 CDR Go.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 04 34 13 CC 15, this is Houston.

10 04 34 31 CC 15, this is Houston. How do you read?

10 04 36 43 CC Apollo 15, this is Houston. How do you read?

10 04 38 25 CC Apollo 15, this is Houston. How do you read?

10 04 39 41 CDR Houston, Apollo 15. We'll start to charge on battery B now, if you're ready.

10 04 39 46 CC Roger, 15; we're ready for the battery charge; and, while we're about it, the experimenters are getting a little fidgety about the waste water dump because that will impact their mass spectrograph work, so we would like to get the dump and the O<sub>2</sub> fuel cell purge started also.

10 04 40 04 CDR Roger; we'll get on it right away.

10 04 40 56 CC And, 15, whenever Al has a couple of minutes, we have a few questions about the SIM bay that we'd like to debrief on.

10 04 41 09 CDR Okay, give - give him another 15 to 20 minutes here.

10 04 41 13 CC Roger.

10 05 04 19 CC 15, this is Houston.

10 05 04 25 CDR Houston, 15. Go ahead.

10 05 04 28 CC We need to make a small change in the Flight Plan, because there's a need now to turn the X-ray experiment on. If you'll go down to that group of steps at 245:30, we'd like to do four of them. We'd like to get the "DATA SYSTEMS - ON - switch to ON." We'd like to "Disable the jets." We'd like to get "S-BAND AUX, TV - SCIENCE" -

10 05 04 48 CMP Hey, stand by 1.

10 05 04 50 CC Roger.

10 05 05 12 CMP Okay; go ahead.

10 05 05 14 CC Roger. Four of those steps down at 245:30 we want to do right away, if possible. We want to get the "S-BAND AUX, TV to SCIENCE." We want the "DATA SYSTEM ON switch to ON." We want to "Disable all jets except - " and we want "X-RAY experiment, ON."

10 05 05 39 CMP Okay. Understand at 45:30 - 245:30, you want "S-BAND AUX, TV to SCIENCE, DATA SYSTEMS ON to ON, disable all jets, and X-RAY experiment, ON" immediately.

10 05 05 54 CC That's correct.

10 05 16 49 CC Apollo 15, this is Houston. We're having some ground problems in communications networks, and we'd like to have a comm check.

10 05 17 29 CC Apollo 15, this is Houston. How do you read?

10 05 17 39 CMP Hello, Houston; this is 15. Loud and clear, and I got your first message, Karl. I'm sorry.

10 05 17 44 CC Hi, Al. Yes, we've got some sort of problem on ground circuits here. Just wanted to make sure we were in contact with you.

10 05 17 54 CMP No, we're here.

10 05 17 55 CC Roger; very good.

10 05 18 53 CC Al, we have some questions for you on the SIM bay experiments, whenever you have some time to answer them.

10 05 19 04 CMP Okay, Karl. Tell you what, I'll give you a call back in about 10 minutes when I'm ready.

10 05 19 10 CC Very good.

10 05 33 23 CC 15, this is Houston.

10 05 33 29 CDR Houston, 15. Go ahead.

10 05 33 31 CC Roger. Just sending up a reminder about the X-ray pointing attitude, which is due very soon now, and the activation of the SIM bay experiment.

10 05 33 43 CDR Okay Karl, thanks.

10 05 38 22 CC Apollo 15, we'd like to have OMNI Alfa.

10 05 38 31 LMP Roger; OMNI Alfa.

10 05 38 43 CMP Houston, 15.

10 05 38 47 CC Go ahead, 15.

10 05 38 50 CMP Okay, Karl. I'm ready to talk SIM bay; but first, a couple of questions.

10 05 38 53 CC Fire away.

10 05 40 00 CMP Okay. What attitude do you want us to do the UV photo - photography at?

10 05 40 32 CC Roger, Al. The information on UV photos is to follow the procedures - Okay - you want the attitudes - the procedure's on page 3-352, and the attitude to be used is 210, 242, 322.

10 05 40 57 CMP Say the attitudes again, please.

10 05 41 00 CC 210, 242, 322. Also, note use of magazine P, and also the time - the time that we start the maneuver - the time that we finish the maneuver is 247 plus 45.

10 05 41 35 CC And let me clarify that magazine. That is the magazine for the UV color for photographs. That is magazine P instead of magazine M.

10 05 42 01 CMP Okay. Understand. Use the procedures on page 3-352, except change the attitude to 210, 242, and 322, and this whole thing is to be done at 247:45.

10 05 42 19 CC Roger. That's the time for completing the maneuver.

10 05 42 29 CMP Well, what time would you like us to maneuver to that attitude then?

10 05 42 53 CC Roger. The time to start the maneuver is 24 - 247 plus 36.

10 05 43 03 CMP I understand. 247 plus 36. Roger. Thank you, Karl.

10 05 43 33 CC Okay, Al. Are you ready for the SIM bay questions?

10 05 43 43 CMP Roger, Karl. Sure am.

10 05 43 47 CC Okay. First of all, the guys down here would like to send up their warmest congratulations on such an ex - successful EVA. You sure made it look easy up there. And the questions. The questions we got are about the mapping camera, and they're directed at the general problem of is there - was there anything you could see which might indicate why it jammed? And there are three - three particular items that you might have looked at. First of all, it was the main camera cover at the bottom of the camera. Was it touching or scraping the camera in any way that you noticed?

10 05 44 29 CMP The answer to that is negative. In fact, I checked it. I checked the mapping camera cover, laser altimeter cover quite carefully to make sure, because I do know that there have been some interference problems with that before, particularly with the pan camera, so I was looking at that in particular to see that it was maybe adjusted too close or - or interfering along the side of the pan camera, and it was not. There was about half an inch clearance between the upper edge of the cover and the body of the mapping camera, so that I - I don't see that that was responsible for the thing jamming.

10 05 45 07 CC Roger. I think you've very clearly put that suspicion to rest. There are also two covers to the solar camera in the upper left side of the mapping camera. And did you notice any - any distortion or any scraping in - in these covers? There's one possibility. The one that stuck out to the left - it - it might have jammed and the screwjack that controls it might have twisted it or distorted it. Was there anything you noticed like that?

- 10 05 45 37 CMP Negative, Karl. I noticed nothing out of place with the mapping camera, nothing interfering. I checked all the way around it, down into the cavity, nothing interfering. I saw no evidence of anything interfering, and it looked clean underneath, so I don't think there was anything blocking it from underneath. I don't know. My distinct impression after surveying the mapping camera and looking around the cavity where the mapping camera fits was that there is a problem with the drive.
- 10 05 46 08 CC Roger. You didn't see anything inhibiting its motion, not even the electrical cables up on the top, huh?
- 10 05 46 14 CMP Negative, and I guess I can ask a question along that line. Has anyone noticed any high current when we've gone to RETRACT on the mapping camera to indicate that it was hanging up?
- 10 05 46 28 CC We didn't see any, Al, although there had been a long controversy down here about the long amount of time required to extend and retract. It was, even though it was about the 4 minutes predicted several months ago, it was somewhat longer than what we'd observed at the Cape. People had been worrying about that for some time.
- 10 05 46 48 CMP Yes, I realize that. And I also, as I re - as I go back to what we saw at the Cape, there were some problems with that thing hanging up in the drive itself at the Cape.
- 10 05 46 59 CC Roger. Okay, a couple of questions on the mass spectrometer. You gave us some good information there, but when you said the mass spectrometer cover wasn't completely closed, could you give us some idea at - as - to - to what degree it had closed, to what angle, and was - was there any pos - any cocking, any - any twisting in - in that cover?
- 10 05 47 28 CMP Well, I couldn't tell whether there was any warpage in the cover or not particularly because that kind of a cover is a little - looks like it's warped anyway. It looked to me, I could - I pulled the cover out of the way enough to look at the mass spec inside, and I could see the guide pin and along the sides of the carriage coming through the

holes all the way up, so that they were plainly visible from the outside which - which meant to me that the - the mass spec was either very close to being seated on the carriage or it was seated. I - I guess I don't really know how far those guide pins extend out beyond the - the carriage. The other thing was that the - that the cover - the Inconel cover was - it - was rotated about 30 degrees on its - on its hinge point from a full close position. And I thought at first, as I indicated when I was there, that there - there looked like there was some interference in one of the outer covers or one of the outer edges, but after playing with that and pulling it a little bit when I was out there, it was quite obvious to me that that wasn't the problem either. And - and beyond that, I couldn't see down around beside the cover enough to tell whether there was something internal between the cover and the mass spec that was - that was binding the cover.

10 05 48 52 CC

Roger, Al. We copy that. And would you OPEN the X-RAY and ALPHA COVERS right now, please?

10 05 49 00 CMP

Okay, X-RAY/ALPHA COVERS coming OPEN.

10 05 49 05 CC

Okay, I guess you've answered most of our questions on the mass spec, and you've approached one that we might get a little more out of, and that is those guide rails sticking through the guides. There is a tapered portion, and when it's completely seated, you actually see the - the - the cylindrical portion beyond the tapered portion. Did you actually see the cylindrical portion, or was it all tapered area that you looked at on the guide rail?

10 05 49 32 CMP

Okay, that's good scoop. All I saw was the tapered area.

10 05 49 37 CC

Roger. You probably - If it was fully seated, you would have seen about a half inch of - of the cylinder there, and this is a good indication that it was not all the way seated even though it was close.

10 05 49 57 CC

Here's a couple of other questions. Give me a  
second to look at them.

10 05 50 04 CMP

Okay.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 05 50 40 CC Okay, Al. Mostly questions here about the contamination status and things in the SIM bay. First of all, how about the - the - the door edges - the door edges? Did they blow off smoothly and cleanly?

10 05 50 58 CMP Yes, very cleanly. I saw no rough edges at all.

10 05 51 22 CC Stand by a moment, Al.

10 05 51 26 CMP Okay.

10 05 51 41 CC Al, we're anxious to bring up the HIGH GAIN ANTENNA. I've got a couple of angles here if they'll help.

10 05 51 48 CMP Okay.

10 05 51 49 CC Minus 76 and 117.

10 05 52 03 CMP Okay, minus 76 and 117.

10 05 52 12 CC Okay. We copied your comment on the SIM bay door jettison, and further questions go as follows. The white coatings in the SIM bay were - Did you notice that any of them why - were obviously discolored or - or coated from contamination or overheating?

10 05 52 37 CMP I saw no evidence of heating in the SIM bay. I saw no evidence of discoloration of the white surfaces. There were - (cough) - as - as best I could tell, no particulate matter that had come to rest on any of the surfaces in the SIM bay. It looked very very clean. And - even across the top of the mapping camera where there was a - such a heating problem expected, I saw no indications of heating whatsoever, particularly on things like the cover over the mapping camera cassette, which was supposedly a very hot spot, and it was just as clean as a whistle. There wasn't - there wasn't any evidence of scorching or contamination anywhere that I could see.



10 05 53 23 CC Roger. And, on the insulation and foils, I guess there's a question here - Were any of them burned or discolored? You probably already told us that. Were any of them torn, or were there any attachment failures?

10 05 53 46 CMP No, I couldn't see any evidence of - of any burning or tearing or anything else back there, Karl.

10 05 53 59 CC Okay, we got one more general question there. And our Flights Dynamics Officer who is vitally concerned about our reentry weight would like to know whether we jettisoned more or less than a nominal 32 pounds; and, if so, by how much?

10 05 54 18 CMP Okay. Stand by 1.

10 05 55 29 CMP Say, Houston, we've talked it over and I guess we'd say it was pretty close to a nominal - as far as weight. We have no idea of - of determining exactly what the weight was, but we're going to try and work our reentry stowage over this afternoon and tomorrow morning, and we hope to give you a - a plan by - somewhere around noon tomorrow, of where all the rocks are stowed and where everything is stowed and what we have on board. So you can start - so Mr. FDO can work up his entry plan.

10 05 56 03 CC Roger. And, if somebody has the time to copy it, I've got a small Flight Plan update available now.

10 05 56 14 LMP Okay, Karl. I'll take that.

10 05 56 17 CC Hi, Jim. How're you doing?

10 05 56 22 LMP Just fine.

10 05 56 23 CC Okay; 246 hours 20 minutes, we have "HIGH GAIN angles of PITCH, 00; YAW, 240." At - -

10 05 56 41 LMP ... 00 and 240.

10 05 56 44 CC Roger. And at 246 plus 46 we want to add "Change DISCRIMINATOR to LOW."

10 05 57 03 LMP Understand. Scratch "DISCRIMINATOR, HIGH," and make it "DISCRIMINATOR, LOW."

10 05 57 08 CC That's correct. And, on 247 plus 28, delete that DAP load.

10 05 57 20 LMP Okay. We already have that change.

10 05 57 23 CC Sorry about that. On 247 plus 30, we'd like to have the "ALPHA X-RAY COVERS, CLOSED; then off," and delete the note on the COVER, OPEN, CLOSE.

10 05 57 49 LMP Okay, understand. At 247:30, you'd like "ALPHA X-RAY DOORS, CLOSED," and to just delete the note here.

10 05 58 00 CC Roger. And stand by 1 second.

10 05 58 10 CC 247 plus 30. Also, we would like to add "MASS SPECTROMETER MULTIPLIER, HIGH; DISCRIMINATOR, LOW."

10 05 58 34 LMP Understand. At 247:30, you want to add "MASS SPEC MULTIPLIER, HIGH, and DISCRIMINATOR, LOW."

10 05 58 40 CC Roger. And, at 247 plus 32, we'd like to have "MASS SPEC MULTIPLIER, HIGH; DISCRIMINATOR, HIGH."

10 05 59 07 LMP Okay, 247:32, "MASS SPEC MULTIPLIER, HIGH, and DISCRIMINATOR, HIGH."

10 05 59 15 CC Roger. And I guess you need to save room, if there's any left there, because at 34 and at 36, we want to change these two switches again. At 34, we want "MASS SPEC MULTIPLIER, LOW; DISCRIMINATOR, HIGH."

10 05 59 40 LMP Understand. At 34, you want "MULTIPLIER, LOW; and DISCRIMINATOR, HIGH."

10 05 59 45 CC Affirmative and at 36, we want "MULTIPLIER, LOW; DISCRIMINATOR, LOW."

10 06 00 01 LMP Okay. At 247:36, it's "MULTIPLIER, LOW; and DISCRIMINATOR, LOW."

10 06 00 05 CC Affirmative. Also at 247:36 is "Add the UV photos," and we've already sent up the changes required for that; the changes over and above what's on page 3-352. And there's one reminder there, and that is to verify that when you use filter 2, that you take one frame for 20 seconds and one frame for 2 seconds.

10 06 00 31 LMP Roger. We remember that.

10 06 00 33 CC Okay. The next step is 247 plus 45, "X-RAY to STANDBY."

10 06 00 52 LMP Okay. At 247:45, "X-RAY to STANDBY."

10 06 00 57 CC And, at 247 plus 50, we want to move the PTC initiation steps from 247:30 to 247:50.

10 06 01 24 LMP Okay, understand. The initiation of PTC to be delayed from 247:30 to 247:50.

10 06 01 32 CC That's affirmative. At 248 hours and 0 minutes, we'd like the following: We'd like the mass spectrometer boom retraction sequence. Each retraction step will last 20 minutes, instead of 12. And terminate this test at 249 plus 30.

10 06 02 13 LMP Go back to 248, Karl, on that mass spectrometer boom retraction sequence.

10 06 02 18 CC Roger. I - -

10 06 02 20 LMP I have that in there.

10 06 02 22 CC I - I guess all - all we're doing there is changing - The - the retraction step will be 20 minutes instead of 12 minutes. Down at the end of the writing there, it says "Each sample period will last 12 minutes." We'd like to have that at 20 minutes.

10 06 02 42 LMP Okay. I'll change the note there then. It occurs about 248:20; the 12 will be 20.

10 06 02 50 CC That's correct. At 249:05, we'd like to move the mass spec boom deploy from 05 to 30 - from 249:05 to 249:30.

10 06 03 16 LMP Understand. Move the mass spec boom deploy from 249:05 to 249:30.

10 06 03 30 CC Roger. And one final one at 251:48, which you may already have, is delete the DAP load there.

10 06 03 40 LMP I do; we have that one, Karl.

10 06 03 42 CC Okay; that completes the update. Thank you.

10 06 03 47 LMP Thank you.

10 06 04 25 CC 15, Houston. We'd like to have GAMMA RAY GAINSTEP up four clicks.

10 06 04 34 LMP Okay. That's GAMMA RAY GAINSTEP up four clicks.

10 06 37 35 CC 15, this is Houston. We trust you'll be pleased to hear the news that the high voltage has been turned on to the subsatellite, and that they find that all systems are operational.

10 06 37 50 CDR Oh, that's very good. Glad to hear it.

10 07 04 46 CC 15, Houston. We have a couple of more comments on the UV photo procedures, if somebody can copy.

10 07 04 56 LMP Go ahead, Karl.

10 07 04 59 CC Roger. We overlooked the fact that you are taking these photos in the midst of SIM bay operation, so a couple of little things change. Going back to page 3-352, you can first of all delete, below the damp rates notation, in - you can delete "Inhibit all jets," except the jets that are there, and just keep the jet configuration you got right now.

10 07 05 43 LMP Okay. I copy that. Do you have any other comments?

10 07 05 46 CC Roger. Under "Remove the CM 5 window," put in there "CMC, FREE," and likewise, about four lines up from the bottom, just above "note," put in "CMC, AUTO." And the final comment, "Enable all jets"; you can delete that. And that's all.

10 07 06 18 LMP Okay; understand. Just below "Remove CM 5 window cover." put "CMC, FREE," and then down at the - the bottom there, just above the note, put "CMC, AUTO," and scratch "Enable all jets."

10 07 06 35 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 07 35 29 CMP Houston, 15.

10 07 35 31 CC 15, go ahead; Houston.

10 07 35 39 CMP Dr. Parker, I presume. Listen, Bob, we've got to pull the gamma ray to 15 feet at 50, and wonder if you've got an updated retraction time for us.

10 07 35 49 CC That's affirm, Al. We have a retract time of 247 plus 50 for 72 seconds. Over.

10 07 36 00 CMP Understand, 72 seconds.

10 07 36 03 CC That's affirm. And, 15, if you've got your Flight Plan out, we can update a couple more times in that same general vicinity for you.

10 07 36 19 CMP Okay, the Flight Plan is out and the door is open.

10 07 36 23 CC Okay. At 248:02, the mass spec boomer track time - that should be 33 seconds. And that time will apply to the first retraction. The second, third, fourth, and fifth retractions will be 32 seconds. Over.

10 07 36 51 CMP Okay, Bob. Understand that the first retraction is 33 seconds and the succeeding retractions will be 32 seconds. Is that 4 or 5?

10 07 37 04 CC Stand by.

10 07 37 33 CC Apollo 15, Houston. That will be 32 seconds for all succeeding ones, and we are going to do that up to 249:30. And so all succeeding ones you get will be at 32 seconds. And we will finish that test at 249:30, no matter where we are. And I believe I see that Karl has sent up comment that the sample period would be 20 minutes instead of 12. Is that right?

10 07 38 02 CMP That's Roger; we have that.

10 07 38 04 CC Okay. And another change: at 249:36, the gamma ray deploy. That time will be 63 seconds. Over.

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10 07 38 19 CMP Copy, 63 seconds.

10 07 38 21 CC Okay, that's all we have for right now.

10 07 38 27 CMP Okay, thank you, Bob.

10 07 43 13 CC Apollo 15, Houston. Request OMNI Delta, please.

10 07 43 20 CMP Roger. OMNI Delta.

10 08 00 27 CC Apollo 15, Houston. Over.

10 08 00 35 CMP Go ahead.

10 08 00 42 CMP Houston, 15. Go ahead.

10 08 00 43 CC Roger, 15. If you guys will give us a hack when you start the first mass spec retraction, we'll keep an eye on those 20-minute periods for you.

10 08 00 54 CMP Okay, good deal.

10 08 01 01 CMP Bob, we just completed one retraction for 33 seconds.

10 08 01 13 CC Okay, we're starting our time.

10 08 06 27 CC Apollo 15, Houston. Over.

10 08 06 32 CMP Go ahead. Go ahead, Houston.

10 08 06 37 CC Roger, 15. We'd like to get a PITCH of minus 4.0 and YAW of 90 for the HIGH GAIN ANTENNA. And then, if you'd change your antenna switch to HIGH GAIN without hitting the COMMAND RESET switch, we'll maintain COMM that way, please.

10 08 08 28 CC Apollo 15, Houston. Over.

10 08 08 38 CMP Go ahead, Houston.

10 08 08 39 CC Negative, you did the right thing without us calling you. Thank you.

10 08 08 47 CMP Whatever that was, okay.

10 08 14 17 CC 15, Houston. Your rates look good to us for a spin up.

10 08 14 23 CMP Okay, Bobby.

10 08 21 39 CC And, 15, time for the next cycle on the mass spec:  
32 seconds.

10 08 21 50 CMP Okay. We were a little ahead of you that time.

10 08 21 53 CC Roger.

10 08 24 13 CC Apollo 15, Houston. Over.

10 08 24 18 CMP Go ahead, Bob.

10 08 24 20 CC Roger. If you guys are - have a moment free, we'll  
pass up three comments to you preparatory to some  
stuff you want to do later on.

10 08 24 35 CMP Yes, go ahead.

10 08 24 37 CC Okay, first is a reminder that we're counting on  
using the OPS to pump up the cabin for sleep  
tonight - another way of bleeding off the OPS.  
Guess we'll remind you now so you don't stow it  
away down underneath something where it's incon-  
venient. And we'd like a read-out on the OPS  
after you finish pumping up the cabin tonight.  
Second comment is a reminder that we'd like a cue  
on the vacuum cleaner, if you intend to use it  
for this contamination control period coming up  
in a half hour or so. And third one is that as  
far as the medics are concerned, it's dealer's  
choice on who wears the biomed tonight. Over.

10 08 25 23 CMP Okay. We copied, Bob.

10 08 29 32 CC Apollo 15, Houston. Over.

10 08 29 38 CMP Go ahead, Houston.

10 08 29 39 CC Roger. We'd like to confirm AUTO, AUTO, OFF on  
the O<sub>2</sub> HEATERS. It looks like we've gone beyond  
the point where they should have come on.

10 08 29 53 CC They're all OFF right now, Bob.

10 08 29 56 CC Roger. That explains what we are seeing. Roger; we'd like AUTO, AUTO, OFF, please.

10 08 30 07 CMP Understand; AUTO, AUTO, OFF.

10 08 30 09 CC Thank you.

10 08 30 44 CMP Houston, 15.

10 08 30 46 CC Go ahead, 15.

10 08 30 48 CMP Okay, just wanted to clear up the O<sub>2</sub> heaters with you. Are you aware that the last instruction that we had of the Flight Plan was at 243:30 that said, "O<sub>2</sub> HEATERS, three OFF?"

10 08 30 59 CC Stand by. That wasn't on my shift.

10 08 31 05 CMP You're not the regular crew chief, huh?

10 08 31 12 CC 15 - Apollo 15, Houston. That callout at 243:30 is the O<sub>2</sub> heaters for tank 3, only.

10 08 31 36 CMP Okay, Robert. I stand corrected.

10 08 31 55 CMP That's one I owe you.

10 08 31 58 CC 15, you called?

10 08 32 04 CMP Negative, negative.

10 08 40 55 CC Apollo 15, Houston. It's retract time.

10 08 41 04 CMP Thank you, Bob.

10 09 01 03 CC And, Apollo 15; Houston. It's time to retract again.

END OF TAPE



APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 09 01 07 LMP Okay, thank you.

10 09 01 09 CC And, 15, be advised that this is the last retract we'll do. We will not do the fifth retract in order to ensure that we don't damage the filament by getting it in too close. We'll sit in this retracted position for 30 minutes, and then deploy the mass spec boom as per the Flight Plan at 249:30. Over.

10 09 01 33 LMP Okay, understand.

10 09 28 24 CC Apollo 15, Houston. About 2 minutes to mass spec boom deploy. And we'd like a DELTA-T on the length of time it takes to deploy it, please.

10 09 28 37 LMP Roger, Bob.

10 09 33 43 LMP Bob, the flight time on the mass spec was 3 and 25.

10 09 33 50 CC Roger. Copied 3 plus 25, Jim.

10 09 33 53 LMP Roger.

10 09 56 47 CC Apollo 15, Houston. While you're eating your supper there, thought you might be interested in knowing how the vectors are going. Your vector and the ground's vector are extremely close, and - at least at the moment. We'll see what happens when we take the next P23. Right now, we're looking at no midcourse 6 and about 1.8 foot per second for midcourse 7.

10 09 57 22 CMP Houston, 15. That sounds pretty good, and it looks like we'll see what happens on the P23. One - You say 1.7 on midcourse 7 is what it looks like right now?

10 09 57 32 CC Roger; 1.8. The vectors, I guess right now, are about 4000 feet apart and about a couple of feet per second in velocity and no more.

10 09 57 44 CMP Sounds great.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 10 45 04 CC Apollo 15, Houston. We can terminate battery  
Bravo charge now.

10 10 45 16 LMP Houston, 15. Roger; will do.

10 10 45 32 CC And, 15; Houston. A reminder that when we exit  
PTC in about 15 minutes, we'd like to do it using  
the SIM bay RCS configuration.

10 10 45 56 LMP Roger, Houston; understand.

10 11 01 22 CC And, 15, this is Houston. We have your torquing  
angles. That's some platform, isn't it?

10 11 01 31 CDR Yes, sir, Bob. You bet you; it sure is beautiful.

10 11 17 37 CC Apollo 15, Houston. Over.

10 11 17 45 CMP Houston, 15. Go.

10 11 17 46 CC Roger. Mr. Lightning Fingers, we'd appreciate it  
if you'd keep your NOUN 49 on for about 5 seconds  
on this P23, so we get a nice chance to look at  
it here on the ground (laughter).

10 11 18 01 CMP I will do my best, sir.

10 11 42 53 CC Apollo 15, Houston. Over.

10 11 42 59 CMP Go ahead, Houston; 15.

10 11 43 01 CC Super marks, Al. You can do my P23s any day.

10 11 43 09 CMP They looking okay down there, now?

10 11 43 10 CC Roger. We caught all of them. Hey, when you go  
back into PTC now, we'd like to change NOUN 79,  
the rate one anyway, to a minus .42. Over.

10 11 43 25 CMP Going to try a little higher one, now. Okay,  
minus .42.

10 11 43 29 CC Roger.

10 11 43 46 CC And, 15; Houston. If you've got a minute, we've got a couple more comments for you.

10 11 43 52 CMP Okay, anything I need to write down?

10 11 43 55 CC Negative. Number - -

10 11 43 59 CMP Okay, go ahead.

10 11 44 00 CC - - number one, we'd like to know the film status of magazine Victor. And number two, if you're planning on being on the loop tonight, Al, for the biomed, your harness needs some attention. The heart rate that we're getting down is getting a little noisy. Over.

10 11 44 23 CMP Well, in the first place, my heart rate's always noisy; and, in the second place, I guess Jim's going to be on tonight.

10 11 44 29 CC Understand.

10 11 45 41 CMP Houston, 15.

10 11 45 45 CC 15, Houston. Go.

10 11 45 48 CMP Okay, Bob, MAG Victor is 12 frames expended.

10 11 45 54 CC Copy, 12 frames expended. Thank you.

10 11 57 26 CC 15, Houston. We suggest that you go ahead with your gamma ray deployment while you're doing your rate damping.

10 11 57 38 CDR Roger, Houston.

10 11 59 19 CC And, 15; Houston. If you feel like it, we can take your E-MOD now.

10 11 59 26 CDR Okay. Coming your way.

10 12 01 05 CC And, 15, we have your E-memory dump.

10 12 01 11 CDR Okay, good.

10 12 04 37 CC 15, Houston. We're GO for spinup - for PTC.

10 12 04 43 CDR Okay, good.

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 12 19 41 CDR Houston, Apollo 15.

10 12 19 45 CC Apollo 15, go.

10 12 19 50 CDR Hi, Bob; got a presleep checklist for you.

10 12 19 55 CC Shoot; we're ready. Dave, hold on. We got a - -

10 12 19 59 CDR Okay.

10 12 20 16 CC Okay, 15, we're back with you. We just had a site changeover.

10 12 20 23 CDR Okay. Crew status is all good, no medications. And I've got the onboard read-outs if you've got a pencil.

10 12 20 31 CC I've got a pencil.

10 12 20 34 CDR All righty. Starting with BAT C, 37.0; 37.0, 37.0; RCS A is 56, B is 50, 48, and 52. And I guess everything else has been done, and I guess you got your E-memory dump. We pressurized the cabin with the OPS, and, when we got up to about 57 or 58, the OPS was down to 800. And I reckon that's the size of it.

10 12 21 10 CC Roger, Dave. That sounds like the size of it to us. We copy all that, and there will be no vector update. Ground says your vector is just as good as theirs right now.

10 12 21 22 CDR How about that? Oh, that's pretty good. We got a good navigator.

10 12 21 27 CC And, 15, let's hold a couple of minutes while we check some data on SIM bay and while we go around the MOCR one more time. And we'll be back with you in final status, I hope.

10 12 21 42 CDR (Laughter) Okay, we got - we got time. We're not quite ready to go to bed yet.

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10 12 25 15 CC

Apollo 15, Houston. The only thing we show lacking  
at the moment is GAMMA RAY GAINSTEP, SHIELD on.  
Other than that, you're GO for sleep.

10 12 25 27 CDR

Okay, understand. GAINSTEP, SHIELD on.

END OF TAPE

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APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 21 30 07 (Music - "Anchors Aweigh")  
10 21 30 20 CC Good morning, Endeavour. This is Houston.  
10 21 31 34 CMP Hello, you guys.  
10 21 31 35 CDR Good morning.  
10 21 31 37 CC Good morning, Dave. A little something special  
for your LMP from your lunar lift-off Flight  
Director with young Ed Fendell on the cymbal.  
10 21 31 50 CMP Oh, man; he's standing at attention right now.  
10 21 32 00 CC Roger. We copy that.  
10 21 33 00 CC Endeavour, this is Houston, with our first request  
of the day. We'd like the X-ray spectrometer, on,  
please.  
10 21 33 08 CDR Roger. Coming on.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 21 33 12 CC Okay, Dave. And I've got HIGH GAIN ANTENNA angles for you, when you exit PTC.

10 21 33 25 CDR Okay. Stand by 1, Joe.

10 21 34 25 CDR Okay. Go with your high gain angles.

10 21 34 31 CC Roger. HIGH GAIN PITCH, plus 24; YAW 264. And, Dave, I've got CSM consumables if you're interested in copying those.

10 21 34 53 CDR Okay. Go, Joe.

10 21 34 55 CC Roger. GET 261 plus 00. RCS total, 38. Quad A, 42; 39, 32, 38. H<sub>2</sub> tanks: 34, 32, 33. O<sub>2</sub> tanks: 49, 50, 40. And there's a note on that which reads, "Fat City." Over.

10 21 35 42 CDR Yes, man. I guess so. That's pretty even, isn't it?

10 21 35 45 CC Yes, sir. And, Dave, a comment - -

10 21 35 52 CDR What a machine.

10 21 35 54 CC Roger. A comment: you're being served now by the MOCR shift that witnessed a new endurance record for Apollo flights, being set during the night.

10 21 36 10 CDR Ohhh, that's interesting. We'd forgotten about that.

10 21 36 32 CC And, Endeavour, I'll be standing by for when you're ready to copy down the few changes in your Flight Plan for today. I can bring you up to date over the next 7 hours or so and get all that out of the way. I'm also curious to know if you've had time to listen to any sea chanties from the HMS Endeavour up there. Over.

10 21 37 02 CDR No. We haven't had a chance to, Joe. Stand by and I'll get my trusty pen out, after we get through with this - coming out of PTC, and we'll do the Flight Plan.



10 21 37 13 CC Okay, fine. You should ask your trusty record librarian Al where the sea chanties are, if you have time today.

10 21 37 25 CDR Okay. We were talking about that last night, and came to the realization that we brought all these neat things along, and we hadn't had time to listen to a single one of them.

10 21 37 35 CC Not at all surprised to hear it.

10 21 37 41 CDR I'll tell you, yesterday, we finally got to catch our breath.

10 21 37 53 CC You always said the hours are long.

10 21 38 01 CDR Roger.

10 21 38 16 CDR The hours are long but the accommodations are palatial.

10 21 38 23 CC Was that the way it went, Dave?

10 21 38 33 CDR Sounds like you've recovered from all that - the other - couple of last few days, too.

10 21 38 40 CC Very nearly.

10 21 49 00 LMP Houston, this is 15. Standing by to copy Flight Plan update.

10 21 49 06 CC Roger, Jim. Good morning. The first - -

10 21 49 10 LMP Good morning, Joe.

10 21 49 11 CC - - entry should be at 261:42. And it is a - a change in the first register of the DAP load - the time column. We want that to read, 11101. Over.

10 21 49 44 LMP Give me the time again on that, Joe.

10 21 49 49 CC Roger; 261 plus 42.

10 21 50 04 LMP Okay. At 261:42, I don't see any DAP information. I see one on 261:35.

10 21 50 15 CC I may have done it again, Jim. Let me see.

10 21 50 29 CC Stand by on that. Let's - let's continue on with some of the easier steps. At 262 - -

10 21 50 36 LMP Roger. (Laughter)

10 21 50 37 CC - - plus 05, it should - that - that - that's 262 plus 05 add "GAMMA RAY GAINSTEP, two steps."

10 21 51 08 LMP Understand. At 262:05, GAMMA RAY, two steps.

10 21 51 13 CC Roger. And at 263:55, under the line "NOUN 70," et cetera, add "X-RAY to STANDBY." And at 263:59, delete the VERB 48 line and the DAP load over in the time column.

10 21 51 55 LMP Okay at 263:55, we'll add a step there after NOUN 70, X-RAY to STANDBY; and then, at 263:59, we'll delete the VERB 48 and also delete the DAP load that's in the time column.

10 21 52 18 CC Roger. Turning the page to 264:02, the DAP - load in the time column should read 11101. And at 265 - -

10 21 52 44 LMP Okay. Understand.

10 21 52 45 CC - - the DAP load status in the notes column should read 11101, X1111, and this continues through for 2 hours. Over.

10 21 53 16 LMP Okay. Understand that 264:00, in time column, changed the DAP load there from all ones to 11101; and then, at 265, the DAP load will be changed the same way to continue for 2 hours.

10 21 53 43 CC That's correct, Jim. And moving on to 266:30, delete the "GAMMA RAY GAINSTEP to SHIELD, on" line.

10 21 54 02 LMP Okay. 266:30, to - eliminate the GAMMA RAY GAINSTEP.

10 21 54 10 CC Roger. Moving to 267 plus 20, add the two steps: "GAMMA RAY BOOM RETRACT, talkback barber pole for about two and a half minutes, then gray, and then OFF." And the second step, "GAMMA RAY GAINSTEP to SHIELD, on."

10 21 55 01 LMP Okay. Understand, there are two steps there. The first one is GAMMA RAY RETRACT, barber pole for about two and a half minutes, then gray, and then turn it OFF. The second one is GAMMA RAY GAINSTEP to SHIELD, on.

10 21 55 17 CC That's correct. Moving to 267 plus 42, change the DAP load in the time column to read 11101, X1111. Over.

10 21 55 38 LMP Understand, from all ones to 11101.

10 21 55 43 CC That's correct. Turning the page to 268:02, the DAP load in the time column, the same change.

10 21 56 02 LMP Okay. I copy.

10 21 56 15 CC Okay. On the same page, 268:30, GAMMA RAY GAINSTEP, five steps.

10 21 56 35 LMP Understand, GAMMA RAY GAINSTEP to five steps.

10 21 56 46 CC That's correct, Jim. Now looking at page 3-378, the "UV Photos - Transearth Coast," a couple of changes there. About halfway down the page where it reads "two frames, filter 2, exposure time 20 seconds," delete that line, and add the line - the two lines, "one frame, filter 2, exposure time 20 seconds; one frame, filter 2, exposure time 2 seconds."

10 21 57 45 LMP Okay. I have that. Joe. It's kind of our standard change in the UV procedures.

10 21 57 49 CC That's correct, Jim. And the MAG - Metro under the "Configure Camera" section should be changed to read MAG Papa.

10 21 58 13 LMP Okay. Understand MAG Papa.

10 21 58 18 CC Okay, Jim. And the last one for you, a biggie, turning over 4 pages to the "Sextant Photo Test," strike the line "PCM Cable."

10 21 58 39 LMP Okay. Eliminate PCM Cable on - on the Sextant Photo Test.

10 21 58 43 CC Roger.

10 21 58 52 LMP Can we go back now to the very first one?

10 21 58 58 CC Jim, I knew you were going to ask that. The first one, I guess, was a small typographical error, and there's no change required there. And, please don't tell Dave about it. He's keeping score against me.

10 21 59 17 LMP Okay (laughter).

10 22 05 21 CC Endeavour, this is Houston with a forecast weather report for your landing area. They're calling for high scattered - 2000 scattered, 10 miles vis, winds about 15 knots out of the east-northeast, waves going to 4 feet, and we're predicting no midcourse 6 correction for trajectory reasons. And from the weather report none is required for weather reasons. Over.

10 22 06 04 CDR Gee, that sounds pretty good, Joe. Except we saw a movie about that weather stuff once.

10 22 06 22 CC Roger. We copy that. And, Dave, we do have one question. Is it true that nothing can stop the Army Air Corps?

10 22 06 35 CDR That's true, Joe. That's true.

10 22 06 41 CC I'm beginning to believe it.

10 22 06 49 CDR Well, that means you're just about qualified.

10 22 06 58 CC I'm glad you still have reservations, though. Your Gamma, by the way, is right on 6.5 as close as we can tell right now.

10 22 07 12 CDR Well, that's pretty good. Must be compensating errors along the way somewhere.

10 22 09 33 CDR Say, Houston; 15.

10 22 09 37 CC Go ahead.

10 22 09 41 CDR We reviewed our entry stowage last night. We're going to do the stowing this morning. And in the process, why, we came up with one extra little bag up here, which we're labeling LM return items, which is essentially the same thing as 14 brought back. And I wonder if you might check with our good FIDO and see if he wants the details of that, or whether maybe Ed Mitchell can give you the - the general kind of items, and that would be acceptable. But we have one - one bag, which I'm sure you're aware of, and we'll stow it and tell him exactly where we stowed it. And if he wants the details, well, we'll give it to him.

10 22 10 22 CC Okay, fine, Dave. We copy that, and pass that information along. I have the morning news report, if you're interested in listening.

10 22 10 33 CDR Roger. Everybody's hooked up and listening. Go.

10 22 10 38 CC Roger. This is the news for 6 August 1971. In the first round in the American Classic at Firestone Country Club, Akron, Ohio, the leaders are Jerry Heard and Mike Hill, both with three-under-par 67's. Arnie Palmer shot a 70 and Nicklaus a 73. The U.S. built its gold medal total to 50 in the Pan Am Games, and they're entering their second week now. Cuba is a distant second with 17 gold medals, but a Cuban set a world record yesterday in the hop, skip, and jump. The record was 57 feet 1 inch. We're coming up on the first full weekend of national football exhibition games, and New Orleans Saints play the Buffalo Bills; Dallas Cowboys play the L.A. Rams. And these two games are the beginning of an 11-game weekend. I've got the baseball scores. American League East: Yankees beat Baltimore, 5 to 0; Boston over Detroit, 5 to 4, American League West; Kansas City over Minnesota, 7 to 4; and Oakland edged out Milwaukee, 2 to 1. The National League: Chicago over San Diego, 3 to 0; Pittsburg beat Montreal, 7 to 2; and Houston, 0, the Dodgers 3. The Government reports today the latest figures in the nation's unemployment problem, and one private economist predicts the jobless rates

probably will show still another rise. Five days after the steel industry and union agreed on a new contract without a strike, tens of thousands of steel workers have been laid off, and the hearths are cold as users consume steel-strike-preparedness stock piles. William Martin, Jr., who reorganized the New York Stock Exchange 33 years ago, proposes an overhaul of the entire securities industry.

10 22 13 00 CC

We want to interrupt here. If we could have ACCEPT, please, we'll provide you with a new state vector. The Senate shelves until September 13 that compromise draft-extension bill, which Nix - President Nixon wants now, and when it comes up, it will, quite possibly, face a filibuster. The U.S. Middle East expert Joseph Sisco concludes "practical and concrete," and those are in quotes, talks in Israel. He says no decisive breakthrough was achieved, and he didn't expect any. The Middle East cease-fire, which went into effect last August 7, hasn't ushered in peace, but it has suspended Israeli-Arab fighting. The last 12 months have been the best year for Israel since 1967 and the euphoria induced by results of the 6-day war. A Government study says Americans will spend more than 105 billion for medical care in 1974, and even the most ambitious Federal health insurance proposal would add less than 12 billion to the tab. Congress is set to embark on a month-long summer vacation after the Senate completes action on a measure keeping Federal agencies in business until October 15. That's good news. And - a - an added word which could be a science update, you may have heard yesterday, but let me repeat it anyway. We've had very clean laser returns off the LR cubed, which is located at Hadley Base; in fact, very good and immediate returns from that. Also, as you know, we have a good subsatellite orbiting the Moon and are getting data from all the experiments onboard that. Over.

10 22 15 06 CDR

Oh, that's very good news, Joe. Thank you. We hadn't heard about the LR cubed, but we were hoping it was superclean.

10 22 15 19 CC

Roger; and it's your computer.

10 22 15 25 CDR

Roger.

10 22 15 27 CC And an added note for Al. Alfredo, I'm not sure if you got a report on your bistatic radar experiment. Taylor Howard got very, very clean echos on both the S-band and the VHF frequencies, and he's busy analyzing that data right now.

10 22 15 51 CMP Very good, Joe.

10 22 16 48 CC Endeavour, this is Houston with a final update concerning the trusty LCRU on the lunar surface. We turned it on yesterday, and it worked beautifully for about 13 minutes. We w - we were panning around, zooming in and out, got a few more good pictures of the - the surrounding mountains, and suddenly we lost the TM down-link. In fact, we lost everything in a very short time, about 1/60th of a second, almost as though someone had turned it off. We tried - We waited awhile and tried to reactivate it, and did such things as send signals back to it to pan around, while we looked carefully on the passive seismometer for evidence of motion. Apparently it was not responding to the signals. The temperatures were completely normal right before it went off the air. We're not exactly sure what happened. Over.

10 22 17 59 CDR Gee, that's interesting, Joe. It's - you sh - I guess it completely went off, and just didn't get hung up somewhere, huh?

10 22 18 06 CC That's right, Dave. It wasn't a mechanical problem. We most likely popped a circuit breaker or something like that. It's a little difficult to sort out.

10 22 18 18 CDR Would you like us to go back up and check it for you?

10 22 18 23 CC Knew you were going to ask. Stand - stand by.

10 22 18 51 CDR Joe, I'm - I'm in - I'm interested in hearing you say that the temperatures were normal. One of the things that - Of course, we'll debrief them on it when we get back, but Jim and I both noticed that each successive day was warmer than the preceding day. And, on the last day, if you held your hand or something in 1 position for any period of time, it would really - the suit would really heat up on

that particular surface. And I'm surprised that the system ran this long with that temperature up there, because I suspect it really got pretty hot.

10 22 19 30 CC

Dave, that's interesting comment. By normal, I guess I mean within limits. It apparently was about 90 degrees on the LCRU and about 90 de - 92 degrees on the camera when it gave up the ghost. However, that's well within its limits, and we don't think that circuit breakers, or whatever, let go because of the temperature. The one thing we did not have sensed, as I understand it, were the - the BAT temperatures of the Rover that was - that was feeding the power into the TV, however.

10 22 20 11 CDR

Gee, 92 sounds pretty cool to us. I - I would have guessed much - much hotter than that. That's a pretty good thermal system on it, if it kept the temperatures down that low.

10 22 20 23 CC

That's correct.

10 22 20 27 CDR

Or maybe (laughter) Jim mentioned maybe that's centigrade, huh?

10 22 20 36 CC

Negative on the centigrade, Dave. However, when we turned the camera off at the end of EVA 3, the temperature was up around 122 degrees.

10 22 20 52 CDR

Yes, I'd believe that, easily.

10 22 26 02 CC

Endeavour, this is Houston. The Surgeon reports that we have good respiratory data from your biomed volunteer, but we have evidence that one of the three EKG leads is open-circuited, either not attached or broken somewhere. And, sometime over the next few hours, we'd like - we'd like you to troubleshoot this for us, please; and, if need be, there is an extra biomed harness in the medicine kit. Over.

10 22 26 37 CDR

Roger. Okay. We'll check into that.

10 22 56 52 CC

Endeavour, we have the angles.

10 22 56 58 CDR

Roger, Houston.



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10 23 05 39 CC Good Ship Endeavour, this is Houston. We'd like a crew status report at your convenience, please.

10 23 05 48 LMP Roger. Stand by.

10 23 08 27 LMP Okay, Joe, I have the crew status. We all got 8 hours sleep. PRD readings were - A1 was 25031, and mine was 08042. Consumables at 261:00; RCS total, 38. Quads: 42, 32, 39, and 38. H<sub>2</sub>: 34, 32, and 33. O<sub>2</sub>: 49, 50, and 40. Over.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

10 23 09 07 CC Okay, Jim. Thank you.

10 23 25 58 CMP Houston, 15.

10 23 26 04 CC Go ahead, 15.

10 23 26 09 CMP Roger. We've resensored the EKG and appreciate a checkout from the docs down there.

10 23 26 16 CC Roger. Stand by.

10 23 26 22 CMP Good morning, Karl.

10 23 26 24 CC Good morning, Al. How are you doing?

10 23 26 29 CMP Just fine.

10 23 26 32 CC Says the EKG looks good down here. Hold 1.

10 23 26 38 CMP Okay.

10 23 29 27 CC Al, your new CAP COMM is just coming up to speed this morning. I understand that there has been a problem with the biomed harness, and they want to know if the one you have on right now is the one that gave trouble shortly before.

10 23 29 41 CMP That's affirmative. And I did find the loose one.

10 23 29 47 CC Okay; we're getting a good signal on you, and I guess that information makes everybody happy down here. Thank you.

10 23 29 55 CMP Okay.

10 23 58 43 CC 15, this is Houston. We still have a concern about your OPS pressure and would appreciate it, if it's at all accessible, to have a reading at the present time.

10 23 59 01 CMP Okay; it's - it's pretty well buried right now, Karl. What's your concern on it?

10 23 59 07 CC Well, first of all, they're anxious that the OPS pressure be down close to zero at - at entry, and

they'd like to figure out how much they're going to use tonight and how much tomorrow night in order to bring that down. I guess we don't have it tomorrow night. They're - they're anxious to know whether or not it's - we're going to be able to bring down its pressure in using it tonight.

10 23 59 34 CMP Okay. I guess it came down to 800 from 2000 last night, but probably came back up. As soon as we get a chance to do some shuffling around here, why, we'll check it and give you a call.

10 23 59 46 CC Good enough. Thank you.

10 23 59 51 CMP Roger. It's sort of down in the bottom of the pile right now; and we're getting ready to start reentry stowage, so we'll be able to - to get to it in a little while.

11 00 00 01 CC We understand.

11 00 02 48 CC Al, the way people talk down here, they're going to give you a medal for good sightings up - up there. They say that the - the Gamma from this last series of sightings was 6.55, whereas the value we have down here is 6.50.

11 00 03 09 CMP Roger, Karl.

11 00 04 33 CMP Houston, 15. You may have seen an - an excursion there as we started the VERB 49 maneuver to PTC, and we're trying to figure it out, too.

11 00 04 43 CC We copy.

11 00 04 46 MCC What was that?

11 00 05 49 CC 15, Houston. We didn't see any obvious glitches down here, but we're going to go back and look at the data.

11 00 05 58 CMP Okay. What happened was, we were loading NOUN 22 to the VERB 49; and, apparently on the - the last entry, on the third register, we got about a 1-degree-per-second pitchdown pitch rate, and went to SCS, and then back to ch - to CMC, and tried it again, and it worked just fine.

11 00 06 25 CC Roger.

11 00 07 03 CMP Houston, it looks like we might have got that old 22-degree glitch in the CDU.

11 00 07 16 CC We copy.

11 00 08 15 CMP And, Houston, right now, we're reading about 93, 93, and 334 on the ball.

11 00 08 38 CC Roger.

11 00 09 27 CC 15, this is Houston. We feel that we can get rid of that discrepancy if you'll do a VERB 40, NOUN 20.

11 00 09 36 CDR Okay; we'll do one of those.

11 00 10 13 CDR Yes. Looks like that's what it was.

11 00 11 18 CC Dave, we suspect the cause of that glitch back there was possibly due to the fact that you might have loaded a NOUN 20 instead of the NOUN 22. Is that possible?

11 00 11 35 CDR We're thinking. Stand by.

11 00 12 17 CDR Karl, I guess it's a possibility, but we were both looking at it, and I guess we don't think so. But that's a distinct possibility.

11 00 12 52 CC 15, Houston. About all we can say is that everything's looking fine at the moment, and we'll go back and look over the data. We haven't had a chance to do that yet.

11 00 13 01 CDR Okay. Yes. Roger. Understand. It - it looks fine up here and that - that could have been the problem.

11 00 14 19 CDR Houston, 15. Talking it over, I guess that must have been a - a NOUN 20 load because, I guess as I remember it, the CDU glitches occur in increments of 11. And 11 plus 11 doesn't equal 26, I don't think.

11 00 15 06 CC Okay; we copy.

11 00 16 11 CDR And, Houston, in our present attitude, a yaw CDU change would be converted to a pitch rate, so that sort of all adds up.

11 00 16 22 CC Very good.

11 00 18 04 CC 15, Houston. When you have some time to listen, I have a couple of sentences of comments on the procedure for the - the light-flash experiment.

11 00 18 17 CDR Okay. Why don't you stand by until we get our trusty crew all lined up and ready to go.

11 00 18 23 CC Very good.

11 00 18 44 CC Incidentally, Dave, as we line them up, one of the changes is that we'd like to keep the cabin lights bright this time.

11 00 18 53 CDR Oh, you like the lights bright. Okay.

11 00 21 04 CC 15, Houston. We see indications that the optics aren't zeroed, and we'd recommend that you zero them, with the reminder, of course, to bring the angles down to 10 degrees - less than 10 degrees before you zero them.

11 00 21 18 CDR Okay; that's - that's standard procedure. We'll get it. Thank you. It's even been written up on the panel for about 8 days now, or so.

11 00 21 32 CC Very good.

11 00 26 11 CDR Okay, Houston. Go ahead with your procedure on the light-flash.

11 00 26 15 CC Roger. We'd like to have you put the window shades on, as usual, but leave the cabin lights bright. And what we're going to do is to sort of calibrate one crewman in terms of the degree of a dark adaption required to see the flashes. That would be interesting to know. After you don the eyeshades and give us a mark and go ahead and count things, after a while, you - one of you - and we prefer you, Dave, just to be specific - can expect for us to call up to you to take off the eyeshade for 1 minute. And after a minute we'll do the timing for you, if you like. We'll tell you to put it back on and, in this minute time,

look around at the lights, get back to sort of - your eyes normally adjusted, then put on the eye-shade again, and - and give us marks as you start seeing things. And that's - that's the only difference from the normal procedure. We would - we would prefer to have all - all the data on the voice down link, if possible.

11 00 27 25 CDR

Okay. Understand the - open the eyes, and - Stand by 1.

11 00 27 40 CDR

And, Houston, we've talked over the - the down link bit, and it's just impractical if we're all going to try and keep up with the comments on where and what we see. It would just be too confusing for you. And I think - if - if you cannot get your data from the tape, we'll do that; but I think it's much more practical to go ahead and put it on the tape and just inform you of when we get the marks.

11 00 28 05 CC

Okay, we've had - we've had - we've had some trouble with the tape in the last couple of times around, is the reason the people are sort of saying, "Hey, if we could possibly get it down in real time, we'd feel happier."

11 00 28 24 CDR

Oh, you - you mean you - you cannot get the data off the tape, huh?

11 00 28 43 CC

I guess we've been having trouble with voice quality on the DSE, and Gerry just now says, "Hey, let's check it right now; see how it's doing." And we'll let you know in the next few minutes as to what's pref - preferable.

11 00 28 58 CDR

Okay. That's a good idea.

11 00 29 57 CC

15 this is Houston. It looks as though the DSE voice down link is acceptable, now; and we'll do it your way.

11 00 30 11 CDR

Okay. Let us get squared away here and make sure we get all the shades up and all.

11 00 30 42 CC

15, one more comment on that DSE voice problem. This is, to some extent, dependent on how well your mikes are adjusted. So make sure that they're in a good position.

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11 00 30 54 CDR Roger. I guess a down link would probably be the same problem. We'll get them all squared away.

11 00 32 19 CDR Houston, 15.

11 00 32 21 CC Go ahead, 15.

11 00 32 25 CDR How do the rates look for PTC now?

11 00 32 28 CC Just got the word that they look good for spinup.

11 00 32 33 CDR Okay.

11 00 32 37 CC I think that's another great example of ESP at work.

11 00 35 28 CMP Okay, Houston; 15. We're experimenting.

11 00 35 37 CC Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 00 46 19 CDR Houston, 15. We're still here; it just looks like a quiet morning.

11 00 46 24 CC Roger. Glad to know that you're still awake. Keep on looking for the cosmic rays.

11 00 46 33 CDR Looking as hard as we can.

11 00 52 44 CDR MARK CDR.

11 01 01 33 LMP MARK LMP.

11 01 04 02 CDR MARK CDR.

11 01 04 27 CDR MARK CDR.

11 01 05 49 CMP MARK CMP.

11 01 08 02 CMP MARK CMP.

11 01 09 06 CMP MARK CMP.

11 01 10 34 LMP MARK LMP. Flash. One at 4 o'clock halfway out, another one at 2 o'clock on the periphery. Intensity 3.

11 01 11 18 CMP MARK CMP.

11 01 11 53 CMP MARK CMP.

11 01 13 53 LMP MARK LMP.

11 01 20 30 CMP MARK CMP.

11 01 22 04 LMP MARK LMP.

11 01 22 28 LMP MARK LMP.

11 01 23 29 CMP MARK CMP.

11 01 26 08 CMP MARK CMP.

11 01 28 50 LMP MARK LMP.

11 01 29 00 LMP MARK LMP.



11 01 29 54 CC 15, Houston. Be advised the DSE just ran out of tape. If there's anything significant to be said from here on in, say it on the air to ground, please.

11 01 30 04 CDR Okay. Will do.

11 01 31 19 LMP MARK LMP. Flash. Four o'clock, about a quarter of the way out. Intensity 3.

11 01 31 48 CDR MARK CDR. Right eye; a streak about 3 o'clock to 6 o'clock. Intensity 2.

11 01 32 31 CDR MARK CDR. Point source; right eye, 12 o'clock, halfway out. Intensity 2.

11 01 33 31 CDR MARK CDR. Right eye; point source; 7 o'clock, about halfway out. Intensity 2.

11 01 36 48 CC 15, this is Houston. We find an hour's passed now, and we thank you very much for the data, and there's a general question. Since the counting rate was less than previously, is there - - is there any impression that you have that the intensity may have been less than previously; also, the intensity of the individual flashes.

11 01 37 13 CDR Roger. I think that'd be a general comment that all three of us experienced.

11 01 37 35 CDR And, Houston, also, you might note that we all saw flashes last night when we went to sleep - just before we went to sleep, and I guess - we feel like there's a surprising decrease in number and intensity today.

11 01 37 53 CC Roger. We copy that you feel today's frequency is less than last night's and also that the intensity is less today.

11 01 38 09 CDR. Roger. That's correct.

11 01 38 17 CC Thank you very much for the free information.

11 01 38 24 CDR Okay.

11 01 40 46 CDR Houston, this is 15.

11 01 40 49 CC Go ahead, 15.

11 01 40 53 CDR Looking back at 264:16, there's a callout there to close the mapping camera cover. We did not do that because the extension of the mapping camera.

11 01 41 16 CC Roger. We concur with you that that was the right action; the one that you took.

11 01 41 27 CDR Okay.

11 01 55 36 CC 15, this is Houston. We'd like to set your mind at ease about that attitude glitch. It was indeed due to loading a NOUN 20 in place of a NOUN 22.

11 01 55 48 CDR Okay. Thank you.

11 02 04 13 CDR Houston, Apollo 15. The OPS pressure is 1000.

11 02 04 18 CC Roger, 15. We copy 1000 on the OPS pressure. And we have a suggestion down here that may make the OPS - simpler to handle. We'd like to put the hose over its connector there and simply turn the OPS on to bleed down gradually and simply replenish the cabin pressure and then you don't have to bother with you - operating it tonight.

11 02 04 48 CDR Roger. That sounds like a pretty good idea. Okay; we'll do that.

11 02 04 51 CC Roger. And then everybody will be completely satisfied that it's bled out by the time you reenter.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 03 08 33 CC 15, this is Houston with a couple of comments about the SIM bay experiments, if you're willing to listen.

11 03 08 46 CDR Roger Houston. Go ahead.

11 03 08 50 CC First of all, on the gamma ray experiment, Dr. Arnold reports that Al Worden probably performed the first recorded repair of a scientific instrument in space, because earlier in that day he'd begun to experience some problem with excess noise in the gamma ray experiment. And when Al went out in the EVA - we don't know what happened there - but at the end of the EVA, the gamma ray cleared up and has been doing beautifully ever since. You must have given it a pretty good kick there, Al.

11 03 09 29 LMP Well, not - not only is he a plumber, he's an electrician as well.

11 03 09 31 CC Roger. On the X-ray spectrometer, the work you've been doing on the galactic sources of X-radiation has - is already showing considerable interest. And, in particular, the Scorpius X-ray I data gives us a longer continuous observation of - of this source than we've ever had before and shows a fairly long-period variation, whi - which - I - with - I should put in a word of caution - which still might be instrumental, but looks real, and was previously unrecorded and has the - has Dr. Adler rather excited. And I'm sure the other as - astronomers will be much interested also. Indeed, we may go back to that source later today, although I don't think that's clearly decided yet.

11 03 10 32 CDR Roger. That sounds interesting.

11 03 10 34 CC And otherwise, I guess - that - that's about the most exciting news from the SIM bay.

11 03 10 46 CDR Okay. Very good. We're ready to talk about entry stowage, if you'll get out your - your map and your little legend there - -

11 03 10 55 CC Okay.

11 03 10 56 CDR - - ... and we'll run down the line here.

11 03 10 59 CC Okay. We've - incidentally - one more comment, the mass spectrometer, on the retraction sequence yesterday, showed us no increase in contamination, which was something of a surprise. And it's probable that we might try that once more today to make sure that there wasn't some sort of instrumental difficulty there. Maybe we just have a cleaner spacecraft atmosphere than we thought, though.

11 03 11 25 CDR Yes, from what A1 said when he was looking around out there, it sounded to me like things were pretty clean.

11 03 11 30 CC Roger.

11 03 11 51 CC Okay, 15. If you will turn off your squelch it will help, because we may occasionally have periods in - when comm is rather weak. And, otherwise, go ahead.

11 03 12 04 CDR Okay. What - what we use as a reference is the entry stowage map, spacecraft 112, 26 July 71, which is in the front of our Flight Plan. And, if you have that in front of you, why, I'll just go through that and give you the additions, deletions, and changes, of which there are very few.

11 03 12 30 CC Okay. We're - Stand by one moment.

11 03 12 40 CDR Okay.

11 03 13 16 CC Okay. Go ahead.

11 03 13 23 CDR Okay. A-1 is stowed as prescribed there. Top of A-1 has a bag - a decontam bag in which we have sample container number 2, for 23 pounds, and the LM return items.

11 03 13 50 CC Roger.

11 03 13 53 CDR A-2 is as you have listed.

11 03 14 10 CC Roger.

11 03 14 13 CDR And, on top of A-2, we have the ISA decontam bag, for 64 pounds.

11 03 14 22 CC We copy.

11 03 14 27 CDR Okay. A-3, A-4, A-5, and A-6 are as you have on your list right now.

11 03 14 33 CC We copy.

11 03 14 37 CDR A-7 is as you have on your list, with the addition of the LM DAC and the LM - 70-millimeter camera that failed on the surface, which we thought you might like to take a look at.

11 03 14 51 CC Right. Both of those are - are added items, I take it?

11 03 14 56 CDR That's correct.

11 03 15 04 CC We copy.

11 03 15 08 CDR Side of A-7 is the EVA umbilical and bag, as per - perscribed [sic].

11 03 15 13 CC Roger.

11 03 15 16 CDR Top of A-7 is sample collection bag - Oh, stand by.

11 03 15 39 CDR Okay. Let me - let me go back and make a correction here, Karl. Look over in the left-hand column where it says top of A-1, and scratch "Sample collection bag number 2."

11 03 15 53 CC Okay.

11 03 15 56 CDR And then go back to your right-hand column there. On top of A-7, we have decontam bag with sample collection bag number 2 and the BSLSS bag, for a total of 48 pounds.

11 03 16 16 CC We copy.

11 03 16 21 CDR Okay.

11 03 16 24 CC Could I clarify that - both of those bags together were 48 pounds, or do I also put over the 20 - the 23 pounds we had on A-1?

11 03 16 35 CDR No, the total of collection bag number 2 plus the BSLSS is 48 pounds.

11 03 16 40 CC I understand.

11 03 16 45 CDR And you can scratch the collection bag number 2 for 23 off of A-1.

11 03 16 49 CC Roger.

11 03 16 58 CDR Okay. And then, in A-8, it's stowed as perscribed [sic], with the exception of one less lightweight headset, which is some - somewhere on the Moon.

11 03 17 18 CC Roger.

11 03 17 24 CDR Okay. On the side of the next page in the left column, on the side of A-8 in the bag, as you have there, with the addition of the core tube pole.

11 03 17 43 CC Say again.

11 03 17 48 CDR Okay. I - I figured that would be a strange one. On the side of A-8 in bag, there are four items there, and one additional item has been added. The drill core-stem, which we just labelled as a core tube pole, because it looks like a pole.

11 03 18 05 CC Roger. That's the 3-foot core stem.

11 03 18 09 CDR That's correct.

11 03 18 15 CC Okay.

11 03 18 18 CDR And A-9 is collection bag number 3, for 30 pounds.

11 03 18 27 CC We copy.

11 03 18 31 CDR B-1, B-2, and B-3 are as you have them listed.

11 03 18 38 CC Okay.

11 03 18 41 CDR B-5 is rockbox number 1, for 36 pounds; and B-6 is rockbox number 2, for 40 pounds.

11 03 18 51 CC Okay. We copy.

11 03 18 57 CDR And then B-5 and 6, B-8, L-2, and L-3 are as you had them listed.

11 03 19 06 CC Okay.

11 03 19 11 CDR And R-1 is the Flight Data File and LM PPK.

11 03 19 21 CC We copy.

11 03 19 26 CDR And then, on the next column, they are all as you have listed. For the top R-2, R-3, and in R-3, we have the entire IM Data File. And we've taken R-12 out of R-3 and put it in another spot.

11 03 19 47 CC Okay.

11 03 19 51 CDR R - far - R-4 is as you have it, as is R-5, R-6, R-8, R-11, R-13.

11 03 20 02 CC We copy.

11 03 20 06 CDR Okay. U-1 will only have one temporary stowage bag in it.

11 03 20 12 CC We copy.

11 03 20 16 CDR U-2 will have the items listed, plus the accessory bag, in which we have - the contaminated gloves. And I'll read you a list of those items, if you are ready to copy.

11 03 20 29 CC Okay. Go ahead.

11 03 20 33 CDR Have one set of EV gloves and one set of IV gloves, the tethers - the - the waist tethers, paper towels. And I guess that's about it.

11 03 20 47 CC Roger.

11 03 20 51 CDR U-3, it's as you have prescribed there.

11 03 20 56 CC Roger.

11 03 21 02 CDR Stand by 1, Karl.

11 03 21 46 CDR        Okay, Houston. Ready to go with the right-hand column. U-4 is as perscribed [sic], and R-2 is as perscribed [sic].

11 03 21 54 CC         Roger.

11 03 21 59 CDR        Okay. The PGA bag is as perscribed [sic] with the following additions. First we have - in - in the bag where we'll put the lunar sample - we'll have R-12, with the CSM Malfunctions Procedures and Systems Book.

11 03 22 26 CC         We copy.

11 03 22 29 CDR        And the lunar sample is bag number 7, for 24 pounds.

11 03 22 40 CC         Roger.

11 03 22 47 CDR        Okay. And then, everything else is as perscribed [sic]. And the CMP PGA will be in the sleep restraint under the right-hand couch with two TSBs, which are now acting as waste containers.

11 03 23 10 CC         Roger. And that - that location was where again?

11 03 23 17 CDR        Underneath the right-hand couch, strapped down as - as it's perscribed [sic]. We just wanted to note that, within that sleep restraint with the PGA, will also be two TSBs.

11 03 23 29 CC         Roger. We copy.

11 03 23 34 CDR        And that's just light waste material in those TSBs. And I guess that pretty much takes care of it, unless you have any questions.

11 03 23 54 CC         Thank you, Dave. We copy all of that.

11 03 23 59 CDR        Okay. And, as you go through it and look it over, if you have any questions or anything you'd like us to shuffle around, why, let us know.

11 03 24 09 CC         Okay. We sure will. Thanks.

11 03 35 44 CC         15, we have your torquing angles.

11 03 35 54 CDR        Ro - Roger.

END OF TAPE



## APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 03 53 48 CC 15, this is Houston. The next several attitudes are going to require us to use OMNI Delta, and we suggest that you go MANUAL and WIDE and stow the high gain antenna.

11 03 54 03 CMP Okay. We'll do that and go to OMNI Delta.

11 04 13 49 CC Apollo 15, this is Houston. We'd like to have you retract the mass spectrometer boom for 85 seconds.

11 04 14 00 CMP Understand. Retract the mass spec for 85 seconds.

11 04 14 11 CC That's affirm, and then we'll leave it there for about 5 minutes. We'll cue you when to extend it again.

11 04 14 18 CMP Okay.

11 04 24 02 CC 15, this is Houston. Would you please extend the mass spec boom all the way out again.

11 04 24 11 CMP Roger. In work.

11 04 24 13 CC And I have a T-start for the lunar eclipse photo's when you're ready to copy.

11 04 24 20 CMP Okay. Go ahead with the T-start.

11 04 24 31 CC T-start for lunar eclipse photo's. 268:59:47.

11 04 24 43 CMP Understand, 268:59:47.

11 04 24 48 CC That's correct, Al.

11 04 25 13 CC Al, we had a question on the mass spectrometer and it may be too late. Was it possible to confirm by visual look through the window that it was retracted?

11 04 25 27 CMP Negative, Karl. You can't determine that it's retracted. All you can determine is that it's full out.

11 04 25 33 CC Roger. Well, when it was retracted, you wouldn't be able to see it. That's what I'm asking. Is it possible for you to take a look now and see if it slowly comes in to view?

11 04 25 50 CMP Roger. In other words, you're asking to a confirm that it does come full out.

11 04 25 54 CC That's correct.

11 04 25 58 CMP Okay.

11 04 27 02 CC Just to clarify our question, Al, the main question was just to confirm whether or not it did go out of your field of view. Did it actually move from the full - from the full-extended position? Since we saw no change in the data when we retracted it during the test yesterday, there is a suspicion that, even though you actuated the switch, that for some reason it didn't retract.

11 04 27 26 CMP Understand. Okay. It's fully extended now, Karl. But it may be too late. It may have already been out by the time we looked.

11 04 27 43 CC Roger.

11 04 36 53 CC 15, this is Houston. We have a rather extensive update to the Flight Plan. And also, a change to the procedure for the contamination of photos, which we can read up to you at your convenience.

11 04 37 09 CMP Okay. Does it involve the things going on here in the next couple hours?

11 04 37 17 CC It - it's pertinent beginning at 271. We probably ought to get it in before the press conference at 270.

11 04 37 35 CMP Okay. Stand by 1.

11 04 37 56 CMP Okay. Go ahead, Karl.

11 04 38 02 CC Okay. If you've got the Flight Plan out, we go over to 271 hours. And at 271:20, just under S-band OX TV Science, we add VERB 49, maneuver to contamination photo attitude. The attitude is 014, 195, 016; HIGH GAIN, PITCH, minus 23; YAW 252.

11 04 38 53 CMP Okay. At 171:20 [sic] just after S-band OX TV Science, VERB 49 to 014, 195, 016, HIGH GAIN, PITCH, minus 25 - 23; and the YAW, 252.

11 04 39 09 CC Roger. Just after that, we delete MASS SPECTROMETER, ION SOURCE, OFF, and in the space there add configure for urine dump.

11 04 39 25 CMP Roger. Delete the MASS SPEC and ION SOURCE, OFF, and configure for urine dump.

11 04 39 32 CC Okay. Delete the next one, two, three, four lines, but we - and that brings us to GAMMA - GAMMA RAY, GAINSTEP, SHIELD OFF, which we leave in.

11 04 39 44 CMP Roger. Delete four and leave in the GAMMA RAY, GAINSTEP, SHIELD OFF. Go.

11 04 39 48 CC Delete all of the rest of that page. And add at 271:40, VERB 48, 11101, 01111, and P52, option 3.

11 04 40 22 CMP Okay. 271:40, VERB 48, 11101, 01111, and at P52, option 3.

11 04 40 32 CC Roger. And at 271:45, we add GAMMA RAY BOOM DEPLOY, 41 seconds, then off. GAMMA RAY, GAINSTEP, center, and start contamination photos.

11 04 41 16 CC Okay. 271:45, GAMMA RAY, BOOM DEPLOY, 41 seconds, then off. GAMMA RAY GAINSTEP to center. Start the contamination photos.

11 04 41 26 CC And there's a note on the photos that you begin to dump according to the photo procedures, which are - I have an update to that I'll give you later. And that we dump the water to 40 percent, in order to have the right weight at entry. Roger. It's important that we don't go below 40 percent on the water dump.

11 04 42 01 CMP Okay. Understand. Dump according to photo procedures and the water dump to no less than 40 percent for entry.

11 04 42 08 CC That's affirmative. On the next page, 272 hours and 00 minutes, we - I - I presume you know that we're not doing the midcourse correction 6. We

cancelled the P52 there. And we keep the H<sub>2</sub> purge line heater on, but we cancel the P30 external DELTA-V. We cancel the VERB 49 maneuver, we cancel the next one, two, three, four, five, all the way down to the H<sub>2</sub> and O<sub>2</sub> fuel cell purge, which we keep.

- 11 04 42 48 CMP Okay. Understand. Keep the H<sub>2</sub> purge line heater, cancel the P52, and the set of lines below H<sub>2</sub> line heater on, and keep the H<sub>2</sub>/O<sub>2</sub> fuel cell purge.
- 11 04 43 03 CC Roger. And at 272:28, a note that you should be ending the contamination photos at that point.
- 11 04 43 13 CMP Say again.
- 11 04 43 14 CC 2 - 272:38.
- 11 04 43 31 CMP Okay. 272:38, end contamination photos. Go ahead.
- 11 04 43 35 CC Right. At 42 we cancel - we delete the waste-water dump, since we've already done it. And at 42 we add: "Start the mass spec boom test," and the procedures are to be read up in real time. At 58 we cancel the midcourse 6.
- 11 04 44 09 CC At 273:01 we - -
- 11 04 44 11 CMP Okay. At 272:47, that's the - Hold on. Let me read it back. 272:42 the mass spec boom test procedures in real time, and cancel MCC-6. Go ahead.
- 11 04 44 25 CC Roger. At 273:01, we cancel the burn status report and we add: "X-RAY experiment ON. ALPHA X-RAY COVERS, OPEN, and record the GET."
- 11 04 44 58 CMP Okay. 273:01 X-RAY experiment ON, ALPHA X-RAY COVERS, OPEN, and record the GET. Go ahead.
- 11 04 45 05 CC Roger. At :03 we delete the gamma ray, X-ray, alpha particle, MSO, on. And down at 273:47, we add GAMMA RAY, BOOM, DEPLOY.
- 11 04 45 34 CMP Okay. A deletion at 273:00 - or :03, the four items there and then GAMMA RAY, BOOM DEPLOY at 273:47. Go ahead.

11 04 45 47 CC Roger. And one final item on 274:05, in the MASS SPECTROMETER instructions there, the DISCRIMINATOR should be LOW instead of HIGH.

11 04 46 03 CMP Okay. 272:04 [sic] MASS SPEC, DISCRIMINATOR, LOW vice HIGH.

11 04 46 09 CC Roger. And if you have the time, I can give you the update on the contamination photography, which is on photo 25 and 26 in the back of Volume 1 of the Flight Plan.

11 04 46 21 CMP Stand by 1, please.

11 04 46 54 CMP Okay, Houston. Let's hold off on the updates of those other photos, so we can get squared away for the eclipse photos.

11 04 47 00 CC Roger.

11 05 13 08 CC 15, this is Houston. Your astronomer CAP COMM is getting curious to know whether you are seeing anything of the lunar eclipse. Anything visible?

11 05 13 20 LMP Oh, sure, we've seen it come down to about half to about 1/5th illumination at the present time, relative to the Sun's illumination.

11 05 13 29 CC Roger. And what percent of the disk is covered now?

11 05 13 35 LMP Stand by.

11 05 15 47 LMP Okay, Karl. Looks like about 9/10ths of the disk is covered at the present time, and we've been taking the pictures all along. It's a very pretty sight out there.

11 05 16 00 CC Roger. Sounds like you are getting close to total eclipse there. Hey, we note down here that in your free mode you are drifting somewhat in pitch and you are about 5 degrees off now. The recommendation is to go auto and stop the drift if you can and cycle back to free before you take your next photo. If there is anything you can do to correct the pointing it might be a good idea.

- 11 05 16 25 LMP Okay. Right now the photos are handheld, so we'll get to it when we get to the Nikon.
- 11 05 16 29 CC Okay.
- 11 05 22 04 LMP Houston, 15. The Moon's in the shadow now and we have a variation in color from a almost a light gray to a burnt orange from one side of the Moon to the other. Almost like the old harvest Moon, except that I'm not sure there's any atmosphere up here yet.
- 11 05 22 23 CC Roger. We copy.
- 11 05 25 17 LMP Houston, 15. We've finished the photos, and Al had the Moon in the reflex part of the Nikon all the way, so I'm sure the pointing was okay.
- 11 05 25 25 CC Very good.
- 11 05 25 26 LMP Right now the Moon is sort of - varies from sort of a very pale orange to a good deep burnt orange on one side and a very gradual change. And I hope the - the photos come out because it - it certainly is pretty.
- 11 05 25 45 CC Very good. It sounds like a beautiful view from up there. You've seen a lunar eclipse of the Moon twice as big as anyone else has ever seen such an eclipse.
- 11 05 25 56 LMP That was very interesting, and it certainly is a - a pretty view. It'd be a - a great place for somebody like you to come up and use your trained eye to interpret all this and understand it.
- 11 05 26 09 CC Sounds like it would be fun, someday.
- 11 05 26 29 CC I see you have your EMS entry check coming up. If there is any chance of my slipping in this change of procedure on contamination cloud photography I'd be pleased to - at this point.
- 11 05 26 42 LMP Okay, give us a couple of minutes to reconfigure here. We'll have time to do that.
- 11 05 26 45 CC Okay, fine. I'll stand by for your word.

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 05 31 08 CDR Okay, Houston. Go with the contamination cloud photography update.

11 05 31 13 CC Roger, Dave. Are we on photo 25?

11 05 31 19 CDR Photo 25. Go.

11 05 31 23 CC Okay, the reason for this change is that we have to use the DAC, instead of the Nikon, since we've run out of Nikon film. The first change is under procedure - 1, configure camera; we go down to the second line in the CM 4, et cetera, we - we X that out, and we substitute - CM 4 - -

11 05 31 48 CDR Stand by 1, Karl. We want to find out if we have any more Nikon film. We may have some.

11 05 31 58 CC Okay.

11 05 32 15 CC 15, Houston. Our records show that you will be out of Nikon film when you finish the lunar eclipse photography, and we'd prefer that you use it for the lunar eclipse.

11 05 32 32 CDR Does that include MAG W?

11 05 32 37 CC Stand by.

11 05 32 43 CDR Oh, disregard that. We just found a - a little note on MAG W, it says "Do not load in camera." I guess that takes care of that. Go ahead with your update.

11 05 32 55 CC Okay, fine. The basic specs there in - are - We're using window 4/DAC - D-A-C/18/VHBW-bracket, M-I-R for mirror, PCM pic cable. (T1, 1/1000, infinity), 24 feet per second.

11 05 33 43 CDR Okay. DAC/18/VHBW-bracket, mirror, PCM cable, T1 1/1000, infinity, and 24 frames per second. Go.

11 05 33 53 CC Correct. The next line, it's magazine H, magazine Hotel, and magazine - and instead of frame number, it's magazine percent to be filled in there.

11 05 34 06 CDR Roger. Hotel and percent. Go.

11 05 34 08 CC Okay. Completely delete number 2, and substitute instead the following: "UTILITY POWER, on; cover lens; DAC, on 2 seconds." Change shutter to "1/60;" Change frame rate to "Time."

11 05 34 45 CDR Okay. "UTILITY POWER, on; cover lens; DAC, on 2 seconds," change shutter to "1/60th," and frame rate to "Time," in place of the number 2 you have. Go ahead.

11 05 34 54 CC Roger. In step 3, we delete "Inhibit all jets," and, at the end, we add "CMC MODE, FREE."

11 05 35 08 CDR Roger. Delete "Inhibit all jets," and add "CMC MODE, FREE" at the end. Go ahead.

11 05 35 14 CC Roger. At the - at the end of step 4, before "Repeat 4-frame sequence," we write "CMC MODE, AUTO." And we delete "Repeat 4-frame" - -

11 05 35 33 CDR ...

11 05 35 35 CC We - we - we - we delete the "Repeat 4-frame sequence."

11 05 35 42 CDR Okay, step 4. Add "CMC AUTO" and delete "Repeat 4-frame sequence." Go ahead.

11 05 35 47 CC Roger. Step 5. Instead of T plus 6 plus 6:30, we - It's T plus 3:30, 3 plus 30. Dump waste water - -

11 05 36 02 CDR Roger. T plus 3:30 vice T plus 6:30.

11 05 36 06 CC Roger. And it says "Waste water or urine," it's really "Waste water and urine." The - and we dump - -

11 05 36 16 CDR And vice or.

11 05 36 18 CC Go ahead, and - Okay, and we dump to 40 percent as you've been previously advised. Also a part of 5, add "Repeat step 4 (damp rates)."



11 05 36 42 CDR Okay. In step 5, add "Repeat step 4 and damp rates." Go.

11 05 36 48 CC Step 6, the time there is not 26 plus 30, but it's 28 plus 30. Also - -

11 05 36 57 CDR Roger; 28 plus 30 vice 26 plus 30.

11 05 37 00 CC Roger. At the bottom, we delete "Repeat 4-frame sequence," and we add the following: "T plus 32 plus 0; CMC MODE, AUTO"; and below that "Repeat step 4 (damp rates)."

11 05 37 29 CDR Okay. At the end of step 6, can - cancel "Repeat 4-frame sequence," and add "T plus 32 plus 0; CMC, AUTO;" and then "Repeat step 4 and damp rates."

11 05 37 42 CC Roger. On step 7, it's "T plus 43" instead of 48; and, at the end, delete "Repeat 4-frame sequence," and add "CMC MODE, AUTO."

11 05 38 01 CDR Okay. Step 7 is "T plus 43," and delete the "Repeat 4-frame" and add "CMC, AUTO." Go.

11 05 38 08 CC Roger. Step 8. We delete "Enable all jets," and what we record is the magazine percent. And that's the end of the correction.

11 05 38 18 CDR Okay. Step 8, delete "Enable all jets," and add percent instead of frames.

11 05 38 23 CC Roger. That's got it.

11 05 38 27 CDR All righty; we'll do all those.

11 05 40 35 CC 15, this is Houston. Sorry to tell you, but I made a couple of errors in that read-up. Can we make it two corrections?

11 05 40 46 CDR Okay. Stand by 1, please, Karl.

11 05 41 07 CMP Okay, Karl; where are the corrections?

11 05 41 10 CC It's photo 25.

11 05 41 40 CMP Okay, I'm on photo 25.

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11 05 41 42 CC Right. At the end of step 5 and step 6, I put in a little statement saying "Repeat step 4, damp rates." That's really meant to say, "Repeat step 3," which is "damp rates," in both cases.

11 05 42 00 CMP Okay, understand.

11 05 45 43 CC 15, Houston.

11 05 45 50 CMP Go ahead, Karl.

11 05 45 53 CC Guys, at the end of photo 26, when you get through with this sequence, requesting 2 seconds of protect frame also.

11 05 46 05 CMP Okay. I - -

11 05 46 06 CDR Okay, got you.

11 05 48 34 CC 15, Houston. Have a lunar eclipse photo pad on your Flight Plan, page 384, when you're ready.

11 05 48 47 CMP Stand by, Dick.

11 05 49 17 CMP Okay. I'm ready to copy the photo pad on the lunar eclipse.

11 05 49 21 CC Okay. 270:49:53.

11 05 49 32 CMP Roger. 270:49:53.

11 05 49 36 CC Roger.

11 05 58 37 CC 15, we'd like to have OMNI Charlie.

11 05 58 42 CMP OMNI Charlie.

11 06 09 09 CC 15, Houston. We'd like to get the HIGH GAIN up, PITCH, 22; YAW, 261.

11 06 09 22 CDR Stand by; we're maneuvering.

11 06 10 05 CDR Okay, Houston. Are your high gain angles for the sextant photos or for the lunar eclipse photo attitudes?

11 06 10 13 CC Sorry about that, Dave. When you complete this maneuver, they're in your Flight Plan, PITCH, minus 22; YAW, 227.

11 06 10 22 CDR Roger.

11 06 12 18 CC 15, we'd like to have OMNI Bravo.

11 06 12 28 CDR OMNI Bravo.

11 06 16 39 CC 15, Houston. Give us AUTO and NARROW on the HIGH GAIN, please.

11 06 16 46 CDR Roger. AUTO and NARROW.

11 06 21 42 CDR Houston, 15. You ready down there?

11 06 21 53 CC Roger, 15. We're close to ready. Are you ready for the big press conference?

11 06 21 59 CDR Roger. We're ready. Anytime you want to go to transmit, let us know.

11 06 22 05 CC Okay, you can go ahead to transmit.

11 06 22 10 LMP Roger.

11 06 22 31 CC Hey, 15, we're getting a beautiful picture coming through.

11 06 22 37 CDR Roger. Go ahead with your questions.

11 06 22 46 CC Roger. We'll - we'll admire the beautiful picture for - for a few minutes here. Deke just passed out from the shock, incidentally.

11 06 23 15 CC Okay, fellows, I have a preliminary statement to make here. The questions you will be asked in this news conference have been submitted by newsmen here at the Manned Spacecraft Center who've been covering the flight. Some of the questions they raised have been answered in your communications with - with Mission Control, but the public at large has not necessarily heard them. The questions are being read to you exactly as submitted by the newsmen and in an order of priority specified by them. Question number 1. Since last week, we have shared scores of exciting moments with you. Which single moment would you most like to live again, and is there any moment which you would never like to repeat?

- 11 06 24 04 CDR Well, I guess we all probably have a different idea on which would be the single most exciting moment of the flight, and maybe we'll just run through it one at a time. I guess the most impressive moment I can remember is standing up on Hadley Mountain, Hadley Delta, and looking back at the plain and seeing the IM and the rille and Mount Hadley, and the whole big picture in one - one swoop. And I think we've got some pictures for you from up there, and I believe the TV was running at the same time, and I think that was probably the most impressive sight that I've ever seen. Al.
- 11 06 24 40 CMP I guess I'd have to say - sort of, two events occurred which were exciting for different reasons, and I guess they were really kind of the highlights of - of the flight for me. One was, right after LOI, when we got our first look at the Moon, and it was a fantastic, spectacular sight. And the other, I guess, was when TEI burned so beautifully, and right after TEI, that was an awfully good feeling.
- 11 06 25 12 LMP Okay. Well, I guess there were a great many new thrills for me, and the one that was most impressive though was the lift-off. It began the flight, and I knew that I was going into space after a few years of waiting and training. And then, as far as the event that I would not like to - to repeat again, was probably the time when I fell down in front of the TV when we were deploying the Rover.
- 11 06 25 45 CC Question number 2. Near Spur Crater, you found what may be genesis rock, the oldest yet collected on the Moon. Tell us more about it.
- 11 06 25 59 CDR Well, I think the one you're referring to was what we felt was almost entirely plagioclase or perhaps anorthosite. And it was a small fragment sitting on top of a - a dark brown larger fragment, almost like on a pedestal. And Jim and I were both quite impressed with the fact that it - it was there, apparently waiting for us. And we had hoped to find more of it, and, I'm sure, had we more time at that site, that we would have been able to find more. But I think this one rock, if

it is, in fact, the beginning of the Moon, will tell us an awful lot. And we'll leave it up to the experts to analyze it when we get back, to determine its origin.

11 06 26 48 CC

Question number 3. Apollo 15 is already being described as one of the great events in the history of science. Aside from the crystalline rock, what other findings at Hadley-Apennine seem most important to you?

11 06 27 06 LMP

I guess, immediately, I think of the orientation or organization that was revealed in the side of Mount Hadley. There's 14,000 feet vertical relief of vast mountain face exposed to us. And there was layering in there that was most impressive for the total 14,000 feet, and we commented on the number of beds we could see. That really impressed me, that you could have that much organization in - on a large mountain on the Moon.

11 06 27 45 CC

Question number 4. This is the toughest landing area we have attempted to - to reach on the Moon. Describe what it was like, flying into it.

11 06 27 59 CDR

Well, I think, to begin with, we had every confidence that we could get to the landing site. The trajectory had been modified such that we had adequate clearance over the mountains. And the first sight I had out the window was somewhere around probably 9 or 10,000 feet as we passed down below the upper elevations of Mount Hadley. And I could see Mount Hadley to my left before we pitch - pitched over and saw the - the plain at Hadley, and that was probably as impressive sight - a sight as I've seen. The landing itself, once we pitched over, was somewhat of a surprise in that the - the cratering was much more subtle than we had expected. There was a great lack of any large fragments or boulders on the surface. It was apparently quite smooth, and those rather deep craters which we had anticipated using as landmarks because of their subtlety did not appear quite as readily as we had hoped. I think we did recognize our relative position east-west of the rille because of the size of the rille itself. I think we were a little off on the north-south, but close

enough to handle the traverses in the Rover. I think that having a vehicle such as that - as that enables us to go into more complicated, difficult landing areas because it's not necessary to land on an exact point. We can take advantage of our mobility and land anywhere within a certain prescribed area which was initially our goal on this flight.

11 06 29 39 CC

Question number 5 for Al Worden. In lunar orbit, you too carried out geologic observations; for example, you reported cinder cones. Could you discuss this and other observations from 60 miles up?

11 06 29 56 CMP

Yes. The comment on the cinder cones was one of color, but we noticed particularly on - on some of the lighter part of the back side that many many of the craters that we flew over were filled with what appeared to be lava. There seemed to be a great number of lava flows in the - in the mare area, particularly Mare Imbrium. Mare Imbrium seems to be a - just a - countless numbers of - of lava flows, which were all apparently very thin and very fluid. And you can see - you can just count number - numbers of flow fronts covering Mare Imbrium. So we got, I think, quite a distinct impression of a - of a - of a great deal of volcanism around the Moon. And, in some particular isolated area such as the Littrow area and such as areas like probably the Aristarchus Plateau, there's a great deal of volcanism and some cinder cones and - and certainly a lot of lava flows.

11 06 31 06 CC

Question number 6. Do you feel that the workload during your three lunar-surface excursions was too demanding? You appeared at times to be reaching the limit of your endurance. Any recommendations for Apollo 16?

11 06 31 24 CDR

I think anytime you set out on a task such as the one we had, you're bound to, at certain times, get a little tired, which I think we probably did. However, I think we came back and I don't think we ever reached anywhere near the limit of our physical endurance. I think Apollo 16 probably has everything in hand; it's just a matter of

conditioning yourself. Jim and I have discussed it since we got back onboard the Endeavour and concluded that our training is what really prepared us, and the many hours we spent during geology field trips and in simulations at the Cape in our suits, we feel, was the factor which really contributed to being able to proceed with those duration EVAs. I see no problem in the future with conducting three successive 7-hour EVAs. Neither one of us were particularly physically tired. I think the fatigue is really in the - the mental regime, in which you're concentrating very intensely for 7 hours, and you're pressing to do your best all the way through and - and keep your eyes open to make the appropriate observations and gather the samples. And I think it's really more of a mental factor than a physical factor.

11 06 32 50 CC

Question number 7. You described the Lunar Rover as a bucking bronco on the Moon. Would you elaborate and assess the Rover's performance and tell us what changes you recommend for the 1972 model?

11 06 33 13 LMP

Well, there were several times there when we were riding along where we'd hit on a sizable bump and you could - you could see the - the wheels come off the ground and then float through the air and - But Dave should comment more as far as the - the driving. And it was really like a bucking bronco, that's true, because I was strapped in. As you know, Dave had to strap me in because I had some trouble with my seatbelt, but I - I really did feel like I was on a - a bucking bronco.

11 06 33 42 CDR

I think I might add that it's a - it's a very stable machine, but because of the - the 1/6th gravity, it tends to float. In - in the simulations we ran in Houston, we saw the same amplitude or the same degree of bouncing but a different damping. In other words, the - the vehicle would come off the ground, or one wheel normally would come off the ground, and it would take it somewhat longer to return to the ground than in one g. And I think it's just a matter of being - becoming accustomed to the to - driving. It's a very stable

vehicle; the suspension system - system is excellent. We had to make some rather sharp avoidance turns periodically, and in - in these turns, we could tell the vehicle was quite stable. No tendency to turn over whatsoever. I think the only recommendation we'd really have would be to come up with a new idea on the seatbelt-type arrangement, and we - we've discussed that also. I think we have some suggestions we could make when we get back to ensure that you can have both crewmen securely in their seats in a short period of time. Other than that, I think the vehicle is about as optimum as you can build.

11 06 35 02 CC

Question number 8 for Dave Scott. The drill seemed to drive you up the crater walls. What was the problem, and was it worth the time?

11 06 35 14 CDR

I guess I'd anticipated that question. I think the problem was a - a striking discovery. When we went to Hadley Rille, we expected to find a regolith, or the soil, about 5 meters thick. And with that in mind, like 25 feet, I expected to have no trouble putting the heat flow probes in or drilling the - the core stem because of the expected soft soil. After about 1 meter, I ran into hard rock, and my first thought was it was an isolated rock somewhere within the - the soil. But that was not the case. Apparently, what we have is a very thin regolith or a thin soil layer above solid rock. And with this in mind, I think we brought back a core stem or a deep drill-core of the Moon of basic bedrock or foundation rock on Hadley Plain. I think that's a very significant find. I think it will be very meaningful to the scientists when they analyze it. The perplexing problem was doing the actual drilling and extracting the core stem. If you put a drill into solid rock, it's very difficult to get it out. And there at the end, it took both Jim and I with our shoulders pushing, as hard as we could, up - to extract the drill stem. But in the final analysis, as I look back on it, I think it is indeed worthwhile. At the - at the time it occurred, we were both interested in moving out to the - the Northern Complex and further geology, which Jim and I are both quite interested in. And the mechanical task of doing the drill at that time seemed what - somewhat less important



than seeking new - new finds in a new geological area. But, in retrospect, I think we have, in fact, brought back one of the most significant samples of the whole trip.

11 06 37 14 CC

Question number 9 for Dave Scott. In view of your comment to geologist Leon Silver about the need for trained scientists on the Moon, do you think that scientist-Astronaut Jack Schmitt should be included in the crew of Apollo 17, the last of the Apollos?

11 06 37 34 CDR

Well, since I really have very little say-so as to which - which people get selected for which crews, I might sort of bypass it with a - with one comment that I think the more qualified a man is on the Moon, the more results you're going to get. And I think that's one of the reasons that we put as much time as we did into the geological aspects, in hopes of - of learning enough to bring back some significant data. I think that in any situation such as this, in any scientific endeavour, that you want the most qualified people possible. You must also remember that this is a - a highly complex operational mission. It requires a great deal of - of training and skill in order to fly these machines. I think, in particular, Jack Schmitt is a very highly qualified individual in both aspects. And I believe it's up to the - the management, that when they select the crews, to select the best people for the flight.

11 06 38 40 CC

Question number 10 for Al Worden. What runs through the mind of a man orbiting the Moon alone?

11 06 38 52 CMP

Well, I guess - I guess the - the thing foremost in my mind during those 3 days was how I was going to keep up with the time line and the Flight Plan, and how I was going to keep track of all the experiments we had going and where they were, and - and whether they were operating or not. And I guess that was a very, very fast 3 days for me. When I wasn't looking at the SIM bay experiments, I was looking out a window and taking pictures, and it was a pretty cramped 3 days. As a matter of fact, I - I guess I didn't really have - have much time to give any thoughts to being alone up there.

11 06 39 30 CC Question number 11, again for Al. You said, after your spacewalk, you wish you'd stayed out longer. What was it like out there between the Earth and the Moon, and why did you come in so soon?

11 06 39 46 CMP Well, let me answer the last one first. I - I guess I didn't come in soon; I came in when the job was done. And, as a matter of fact, I made an extra trip back out to take a look at the mapping camera. Now as - as far as what I felt like when I went out there, we talked a little bit about if after - after the EVA and decided it was sort of like walking on stage at your high school - dinner dance or something. We opened the hatch and it was pitch black, and as soon as we got out, the Sun was beating down on everything, and it looked like a very large floodlight on a stage. And then putting the TV camera out on the door just added a little bit more to that sort of unreal feeling that it was time to get out on the stage and do something. I think, as far as the EVA went, we did it just almost exactly as we'd practiced it. It took almost exactly the same amount of time; we did it the same way. And, of course, we had practiced that with pan - with the mapping camera in the extended position, and so that - that really posed no difficulty to us.

11 06 40 55 CC Question number 12 for Dave and Jim. You - you didn't have time to get to North Complex, craters which may have been formed volcanically and where you thought some surprises might be found. Was this a significant loss?

11 06 41 15 CDR Well, I'll start out and - and throw an answer there. I think if you look back at the original requirements for the landing at the Hadley-Apennines, they were primarily to inspect the front and the rille. It was only after a - a considerable amount of study had been done and some re-arrangement in the Flight Plan - the timing on the surface, that we found we had enough time to plan to go to the Northern Complex. So the Northern Complex was, in fact, an addition to the original requirement; it was bonus. And I think because Jim and I have spent so much time with volcanics in our terrestrial geology work, that we were quite interested in getting to the Northern Complex to

see if, in fact, it was a volcanic area. But I don't believe we lost anything from the lunar surface by not going there; only we would have had an extra bonus had we been able to reach that point. And, with that in mind, I hope that some day somebody gets a chance to go back and take a look at the Northern Complex. Jim, do you want to answer?

11 06 42 19 LMP

No, I agree with everything you said. It was just a little personal disappointment that we couldn't get up there, because we - we thought we'd have another beautiful view of the - the plains there and the LM, a view almost as beautiful as it - as it was from the side of Hadley Delta.

11 06 42 37 CC

Question number 13 for each of you. Would you, please, in your own words, tell us what you gave the American taxpayers besides a few hours of good television?

11 06 42 53 CDR

Well, I think - the magnitude of the scientific data we return will speak for the taxpayers' money. The small amount of time they had for television, I think, is rather insignificant relative to the amount of return we've gathered in the SIM bay and in the lunar samples we have aboard right now. I think these data will not only enhance the progress of science, but it will reach the common man on the street directly by the - the byproducts of what we learn. I think man must extend himself, the new frontiers must be open in order for us to - to propagate mankind, and I think this is one way in which we do it. I - I feel that the taxpayers got, probably - as a matter of fact, I hope they got more than their money's worth out of the flight. And, if you could see the size of the film magazines that Al brought in yesterday from those cameras, why, you'd see that we have indeed at least a great deal of data on film alone.

11 06 44 00 CMP

Well, I really guess that there's not much to add to what Dave said. He - he expressed my sentiments exactly, in that the - the knowledge that, hopefully, we've - we've added to our store of information about the Moon and about ourselves will be increased in an extent which is greater than - than the - than the capital that was - spent on the flight itself. And I would certainly think that - that

the full theory adds significantly to - to man's knowledge about himself primarily and about himself in those areas where it will help future generations maybe.

11 06 44 46 LMP

I can only add that we're bringing back just a lot of - lot of data and a lot of material, and it's going to take many years for people to really appreciate how much was gained from - from this flight.

11 06 45 05 CC

Question number 14. It seemed this flight has as many problems as some of the old Gemini missions. Which of these gave you the most concern; and, for Dave, did you ever feel you were back on Gemini VIII?

11 06 45 23 CDR

Well, I guess we weren't aware we had that many problems. I thought this was a rather trouble-free flight, myself. We went a long way, we spent a long time doing the job, and I think, relative to the number of systems we have in all the spacecraft, that we had very few problems. I can think of none that were significant that would enable me to compare it with Gemini VIII at all. We had a - I guess the first little problem we had was a - a leak in our water system, which was cleared up rather rapidly by somebody having already done some investigation and having a procedure at hand. I believe our system is such that people have all the anticipated problems understood, and, when they have them understood, they come up with solutions which are quite meaningful and successful. And I feel like the spacecraft and the life-support systems on the Moon and everything worked exceedingly well. I - I guess really I couldn't ask for much more. How about you?

11 06 46 40 CMP

You know really, we had very few problems. It seemed like a very tame simulation, as far as I was concerned. Certainly, there were - there were - there were irritating things that happened like some circuit breakers in the spacecraft here that gave us some trouble, and some lights that aren't working exactly right. But certainly none of the important aspects of the flight or - or none of the essential pieces of equipment have malfunctioned, and I think it's been just great.

- 11 06 47 18 CC      Gentlemen, we'd like to continue the press conference in a few minutes. But, in the meantime, we'd be anxious to get - start - get one of you started on the lunar eclipse photos. We have three more questions. Question - -
- 11 06 47 34 CDR      Okay -
- 11 06 47 40 CC      Question number 15 - for Dave and Jim. How many times did each of you fall down on the lunar surface? Did any of these falls hurt you or give you any problems?
- 11 06 47 57 LMP      Well, I fell down twice, and it was never any real problem. Actually, I could have got up very well by myself without any help.
- 11 06 48 06 CDR      Yes, I guess I fell down twice, too, and, as Jim said, it was never any real problem. It's a matter of if you start to go - and, of course, the terrain there, I guess you could see in the television, was quite rough and irregular with occasionally rocks around, and we were pressing to try and get things done. And it was just a matter if you just start losing your balance, to go ahead and go easy, and accept somewhat of a - a light fall. Because of the 1/6th gravity, there was never any impact when we hit. Take it easy and get up slow. And I don't think either one of us ever came anywhere near the point of being hurt, in that sense of the matter, it's just a matter of slowing you up for a minute, enabling you to regain your balance, and go ahead. And I - I have a question. Do you want to have the photos of lunar eclipse with the television now, or do you want us to get on with the - the camera photos? Because if that's the case, we have to turn the lights out in here.
- 11 06 49 13 CC      Roger. We're going to skip down to the last question, Dave, which says your cabin must be jammed with Moon rocks, core samples, suits, and assorted hardware. Can you show us what it's like in there? And, as you show us around, you can get set up for the Moon photos and dim the lights when you like.

11 06 49 31 CDR      Okay. I guess to show you around, we have to unstow everything. We're - we're pretty well stowed for reentry right now. We have all the samples stowed, the suits are all stowed, and I guess, in order to show you around, we'd have to do some unstowing because under - beneath the couches right now, it's jammed full. And I guess we'd like to do that for you, but it's some - somewhat impractical, in that all you can see would be some edges of some white bags, and that's why we have the room in the cabin here. Every - everything's pretty well squared away. But, when we get back, I'm sure you'll have an opportunity to see the many things we have, and there's really a lot of it.

11 06 50 12 CC      O - okay, Dave. That's fine. And I guess one last request is when you get over to that window to - and before you take the photos, could you give us a quick picture of the Moon with the TV camera?

11 06 50 25 CDR      Sure will.

11 06 50 56 CC      15, the word here is to proceed; give your photography first priority there, and maybe we can see the - the Moon out of the other window.

11 06 51 11 CDR      Okay. We're working on it.

11 06 51 56 CC      15, Houston. We hear that your attitude is very good right now; there's no need to trim the maneuver.

11 06 52 03 CDR      Okay, thank you.

11 06 53 16 CDR      Okay, Houston. I think you have a picture of her now. There she is.

11 06 53 31 CC      15, so far we have a blank screen down here.

11 06 53 37 CDR      Oh, really? I've got a good picture on the monitor.

11 06 53 42 CC      Hang on for a moment, please.

11 06 53 55 CC      It's coming through now.

11 06 54 07 CC      That's a beautiful picture with just an edge of the Moon coming out of eclipse.

11 06 54 14 CDR Roger; that's right.

11 06 55 18 CC 15, Houston. We'd like to ask if you've got full zoom there?

11 06 55 26 CDR Roger. It's all the way out.

11 06 55 38 CC Could you please give us ALC to PEAK?

11 06 55 43 CDR I think we are; just stand by 1.

11 06 56 43 CDR ...

11 06 59 51 MCC Hello, Endeavour; this is Yankee Clipper. Over.

11 06 59 57 CDR Hello, Yankee Clipper. How are you?

11 06 59 59 MCC Roger. I've got a naval tradition to pass on to you.

11 07 00 03 CDR Go ahead.

11 07 00 05 MCC Roger. When ships of the line have completed a mission such as yours and they return to home port, they always have a broom flying from the yardarm. Over.

11 07 00 19 CDR Roger. Well, we'll do that.

11 07 00 22 MCC Thank you.

11 07 00 25 CDR We wouldn't want to break any traditions, Dicky.

11 07 00 33 MCC Dave, I'm watching you; I wouldn't let you.

11 07 00 37 CDR That a boy, and I'm glad.

11 07 00 54 CDR Okay, Houston. We're going to switch windows here with the TV camera, so we can switch windows with the camera cameras.

11 07 01 08 CC Roger, Dave.

11 07 01 49 CC 15, Houston. When somebody gets a free hand up there, could we start the charge on battery A? We're afraid that might keep us from going to bed if we don't get it started soon.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 07 03 40 CDR Houston, the Moon is an orange ball, now - a dull orange ball with a sort of a gray area in the center on - on one side opposing the side that's slowly coming into illumination at the present time, and you'll possibly get more and more of the lunar surface exposed to sunlight as we go along here. The picture you have is really pretty good for what we see, because there's very little illumination on the Moon. And only when we get the cockpit lights down reasonably low and get our face up in the window can we see the definition. So it's really not a bad picture.

11 07 04 23 CC Roger, 15. Thanks for the description, and the picture we're getting down here is quite good also.

11 07 04 31 CDR Okay, I'm sure you'll have a much better one here in a few minutes.

11 07 12 02 CC Apollo 15, Houston. Over

11 07 12 07 CDR Houston, 15. Go.

11 07 12 09 CC Roger. It looks like you've had enough of the pho - photography for right now. It's beginning to get pretty bright on the tube. I guess we can go ahead and power it down.

11 07 12 22 CDR Okay.

11 07 12 33 CDR That's interesting, Houston, because it looks like only about - oh, maybe 1/20th or so, maybe, of the Moon is illuminated at this time; just a thin sliver, but very bright.

11 07 12 46 CC Roger. Copy, Dave.

11 07 15 49 CMP Roger.

11 07 17 32 CC Apollo 15, Houston. Request S-BAND AUX to SCIENCE, please.

11 07 17 41 CDR Roger.



11 07 39 11 CDR Houston, Apollo 15.

11 07 39 16 CC Roger, Apollo 15; go ahead.

11 07 39 19 CDR In getting ready for the contamination photography, we find that we've got a - a certain number of exposures left in the Nikon. Namely, we're on exposure number 29 in MAG Victor, and we think we have 45 total, which would enable us to complete the contamination photography with the Nikon, if you desire, rather than with the DAC, as you changed.

11 07 39 52 CC 15, they plan on using those last 15 frames or so on Victor for postmission calibration, so we still intend to press on with the DAC, please, Dave.

11 07 40 04 CDR All right, understand. Thank you.

11 07 40 08 CC And, Dave, if you give us a start time on that, I'll give you a call at the end, because we want you to cycle some extra film through the DAC to give them a little leader there at the end to protect their film or something.

11 07 40 22 CDR Okay, we'll do that. Stand by.

11 07 47 23 CC Apollo 15, Houston. Over.

11 07 47 28 CDR Go ahead, Bob.

11 07 47 29 CC Roger. We were seeing the OPTICS tripped around against the hard stops. We'd like to have you bring them back and then zero them in, per the usual procedure. We kind of guess you're getting ready for 52 anyway, aren't you?

11 07 47 42 LMP Pretty soon.

11 07 54 22 CC And, 15, we have your torquing angles. You go to torque.

11 07 54 27 CDR Roger; in 30 seconds.

11 08 07 49 CC Apollo 15, Houston. If one of you guys is free, we've got some updates we could read to you.

11 08 08 06 CDR Okay, Houston; 15. Stand by 1.

11 08 08 12 CC Okay, understand you're ready. What - The first thing is an entry pad, so you might whip out your Entry Checklist.

11 08 09 26 CMP Okay, Houston; 15. Go ahead and ... from that.

11 08 09 30 CC Roger. Would you believe it, we're going to land in the mid-Pacific? And after that, it's 000, 153, 000; 294:41:37, 267, plus 26.12, minus 158.10; 06.2; 36097, 6.50; 1084.8, 36179; 294:58:37; 00:29; NOUN 69s are NA; 4.00, 02:13; 00:18, 03:38, 07:44; 04, 140.3, 37.5; 213, down, 09.6, right, 4.7; lift vector, up. Comments: (1) use nonexit EMS pattern, (2) RET of 90 K, 6 plus 06; RET of mains, 8 plus 32; landing, 13 plus 29; constant g, roll right; moonset time, 294:56:20. Over.

11 08 12 11 CMP Okay, Houston. Understand. Entry pad, mid-Pac; 000, 153, 000; 294:41:37, 267; plus 26.12, minus 158.10; 06.2; 36097, 6.50; 1084.8, 36179; 294:58:37; 00:29; 4.00, 02:13; 00:18, 03:38, 07:44; 04, 140.3, 37.5; 213, down, 09.6, right, 4.7; lift vector, up. Comments: nonex - use nonexit EMS pattern; RET 90 K is 6 plus 06; RET mains, 8 plus 32; RET landing, 13 plus 29; constant g is roll right, moonset at 294:56:20.

11 08 13 27 CC Roger, Al. Good readback. And we'd be interested in knowing the status of the EMS check you ran 2 or 3 hours ago, if you have it.

11 08 13 36 CMP Yes, sir. The EMS check was just fine.

11 08 13 39 CC Okay, that's good to know. At the end of your contamination experiment here, we'll be going into this mass spec boom test. And, if you guys let me know when you're ready, we've got a procedure to read up to you for that - that we'll read up to you at that time. I assume you've been told that we aren't going to a midcourse 6, and right now midcourse 7 is looking like .09 which is - makes it kind of problematical as to whether we burn it or not. Weather in the recovery area is currently predicted to be, for your splashdown, 15-knot winds, 4-foot seas, 2000 scattered, 10 miles - In other words, looking better and better all the time.

11 08 14 24 CMP Roger, Bob; that sounds great.

11 08 26 56 CC Apollo 15, Houston. If you'll give us ACCEPT, we'll give you a very slight clock update to sync you for entry. And be advised we will not be sending a state vector up-link at this time; your vector is still just as good as the one on the ground.

11 08 27 14 CDR Roger; understand, and you've got ACCEPT.

11 08 28 18 CC 15, your computer.

11 08 28 22 CDR Roger. Thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 08 37 33 CC 15, Houston. Request you trim back to the original attitude now.

11 08 37 40 CDR Okay.

11 08 37 46 CC And again, if one of you has a couple of minutes, we can tell you a couple of other things.

11 08 37 53 CDR Okay, in - in other words, you want us to maneuver back to the original attitude, rather than just damp rates, huh?

11 08 38 01 CC Roger; yes. We'd like to use the same star backgrounds; so that means going back to the original attitude in the Flight Plan around 271:20 or so -

11 08 38 15 CDR Okay.

11 08 38 16 CC Which is what you got called up.

11 08 38 20 CDR No, we don't have that called up. All we have is damp rates, but we'll do that. Oh, what we have called up here? Yes, okay.

11 08 40 31 CC And, 15; Houston. If one of you has some time, we'd like to talk about some stowage, please.

11 08 40 39 CDR Okay, go ahead.

11 08 40 41 CC Okay, we've gone over the stowage which you read down this morning, and everything's shipshape, except we have one question on one item and that concerns the stowage of the core stems. The core stems should be stowed in the sleep restraint that has the CMP's PGA in it. We understand that it's now stowed in the bag on the side of A-8. I guess our first question is, how many - How long is the core stem at the present time? Did you break it down, or is it still three sections long, which we think it is on the ground?

11 08 41 16 CDR No, it's still three sections long, and we could put it in the sleep restraint. It just seemed like a convenient place to stick it in the bag over there to keep it tied down well.

11 08 41 24 CC Okay. Next question is, how'd you get it in the A-8 bag, which according to our measurements on the ground is only 36 inches long and, therefore, apparently not long enough to hold the three lengths of core stem?

11 08 41 37 CDR Well, it's sticking out a little bit, I guess we have to admit, but it's pretty well cinched down.

11 08 41 42 CC Okay, stand by.

11 08 41 47 CDR But it's no problem; we can put it anyplace you like.

11 08 42 05 CC Okay, Dave, I guess we - I don't think it makes an awful lot of difference, but it'd probably make a lot of other people happy if we ended up putting it in the sleep restraint. They wouldn't worry about that loose end hanging out there - if it's not too much trouble.

11 08 42 20 CDR Oh, it's no problem at all; be glad to do that.

11 08 42 23 CC Thank you.

11 08 42 24 CDR You know, we know what number one priority on this spacecraft is.

11 08 42 34 CDR We wouldn't - we wouldn't lose that or misplace it or get it rattled around for anything, Bob.

11 08 42 44 CC No comment.

11 08 42 51 CDR And you say everything else is okay, huh?

11 08 42 53 CC Roger; everything else is A-okay.

11 08 42 58 CDR Oh, boy.

11 08 46 21 CC And, 15, reminder or a question, did you guys get the word that they like a pad of about 2 seconds worth of 24 frames per second at the end of those photos to protect these things?

11 08 46 25 CDR Roger; we got that, Bob. Thank you.

11 08 46 47 CC And if you guys'll give me a call when you're ready to do the mass spec boom test, I'll read it up to you.

11 08 46 54 CDR All righty, Houston; stand by.

11 08 47 36 CMP Houston, 15.

11 08 47 37 CC Go ahead, 15.

11 08 47 41 CMP Okay, you going to read up the procedures real time on the mass spec boom?

11 08 47 44 CC Roger.

11 08 47 47 CMP Okay, why don't we go ahead and do that, then, while we're finishing up the contamination photos?

11 08 47 52 CC Okay, stand by. Okay, 15, the first step is MASS SPEC BOOM to RETRACT, talkback barber pole for 4 minutes or until gray. If talkback fully gray within 4 minutes, deploy boom and return to Flight Plan. Over.

11 08 48 22 CMP Roger. Understand you want RETRACT on the MASS SPEC BOOM for 4 minutes, and, if it goes gray before then, go back to DEPLOY and return to the Flight Plan.

11 08 48 32 CC That's affirmative. And give - give us a call when you get done.

11 08 48 39 CMP Roger.

11 08 52 38 CMP Come in, Houston; 15.

11 08 52 41 CC Go ahead, 15.

11 08 52 43 CMP Okay, there's 4 minutes of RETRACT, and it's still barber pole.

11 08 52 47 CC Okay, if the talkback is not fully gray in 4 minutes, let's go to MASS SPEC BOOM, off, center, for 1 minute. That's just to let the motor cool down.

11 08 52 57 CMP Okay, it's off now.

11 08 52 59 CC Okay.

11 08 53 06 CMP And what at the end of the 1 minute?

11 08 53 08 CC Okay, at the end of the 1 minute, we will deploy it for 20 seconds and then off, center, and then

we will retract for 40 seconds or until the talk-back is 1/2 barber pole or fully gray and then off. Over.

11 08 53 25 CMP Okay, got you.

11 08 53 37 CMP Okay, going to extend.

11 08 53 39 CC Okay.

11 08 53 49 CMP And do you want to pause it off between extend and RETRACT?

11 08 53 53 CC Stand by. Not necessary to pause between DEPLOY and RETRACT on this.

11 08 54 03 CMP Okay, it's in RETRACT now.

11 08 54 05 CC Copy.

11 08 54 43 CMP Okay, Houston, that's the 40 seconds of RETRACT, and it's at half barber pole, and I turned it off.

11 08 54 49 CC Okay. In that case, we'd like you to repeat the 20-second DEPLOY, 40-second RETRACT sequence twice more and, if gray talkback is still not obtained, we'll turn it off and wait until 275 hours, at which point we'll give you a call and we'll replay - we'll repeat that. Over.

11 08 55 08 CMP Okay, fine. We'll cycle that whole thing twice more.

11 08 55 12 CC Roger.

11 08 57 16 CC 15, Houston. We'd like to proceed with the fuel cell purges now to get those out of the way before the P23s.

11 08 57 25 CMP Roger, Houston.

11 08 58 19 CMP Houston, mass spec boom has been cycled three times. All I can get out of it is a half barber pole, and I've got it turned off right now.

11 08 58 28 CC Roger; copy, Al. We'll call you at 275 hours to repeat that. The reason for that is that presently we're sort of sitting in a cold-soak

attitude. We're going to repeat it at 275 hours when we're sort of in a hot-soak attitude.

11 08 58 43 CMP Okay.

11 09 09 41 CC Apollo 15, Houston. We'd like to go to ION SOURCE, OFF, and MASS SPEC EXPERIMENT to STANDBY.

11 09 09 52 CMP ION SOURCE, OFF, and MASS SPEC to STANDBY.

11 09 09 55 CC Roger.

11 09 28 48 CC 15, Houston. Al, we missed your last NOUN 49.

11 09 29 08 CMP Okay, I'll show you this one.

11 09 29 10 CC Thanks.

11 09 39 30 CC 15, Houston. Looks like a good set of P23s again, Al. And your Gamma, right now, on your vector, is 6.5.

11 09 39 48 CMP It sounds like, after a while, we might get along without you, huh, Bob?

11 09 39 55 CC No comment.

11 09 39 59 CMP As a matter of fact, if you guys keep working on your ground vectors, they might even converge to the onboard vectors pretty soon.

11 10 05 15 CC Apollo 15, Houston. Over.

11 10 05 19 CMP Go ahead, Houston; 15.

11 10 05 21 CC Roger; 274:05, we'd like to delete the mass spec line, where you turn on MULTIPLIER, LOW, et cetera. We'll delete that.

11 10 05 32 CMP Okay, we'll delete that line, Robert. Thank you, sir.

11 10 05 35 CC Thank you.

11 10 06 12 CMP And, Houston; 15.

11 10 06 14 CC Go ahead, 15.



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11 10 06 16 CMP Roger; want us to - delete the LOGIC POWER, two,  
if we're going to do the mass spec at 275?

11 10 06 28 CC 15, that's affirmative.

11 10 06 33 CMP Okay.

11 10 06 44 CC And, 15; Houston. You got any more updates to our  
Flight Plan?

11 10 06 51 CMP No, but I'll scan it over; and, if I find any, I'll  
let you know.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 10 37 29 CC Apollo 15, Houston. Over.

11 10 37 33 CDR Houston, 15. Go.

11 10 37 35 CC Roger; we have an update to the Flight Plan, if you guys are ready to copy.

11 10 37 41 CDR Roger. We're ready to copy.

11 10 37 43 CC Okay. The attitude that we maneuver to at 274:46 there, for the second set of X-rays should be changed - that VERB 49 maneuver, should be changed to 196, 346, 012. Over.

11 10 38 14 CDR Roger. Understand the VERB 49 maneuver to X-ray pointing attitude should be changed to 196, 346, 012.

11 10 38 25 CC Roger. And, before we start that VERB 49 maneuver at 274:45 or thereabouts, we'd like to cover the ex - We'd like to close the EXPERIMENT COVERS, ALPHA/X-RAY, to CLOSE. That's the one on panel 278. And then after we get to attitude at about 275:00, we'll go ahead and open those covers again, the Alpha/X-rays.

11 10 39 03 CDR Roger. Understand, you want the Alpha/X-ray covers closed before the maneuver and opened after the maneuver.

11 10 39 09 CC Roger. These - The new position I sent you up on that - Those two steps there in the procedure are to keep from getting sunlight right in on some of the stuff to protect it. And - -

11 10 39 19 CDR Okay.

11 10 39 20 CC - - and, also at this time, you may terminate the battery A charge.

11 10 39 26 CDR Okay, terminating battery A charge.

11 10 40 16 CDR Houston, 15.

11 10 40 18 CC Go ahead, 15.

11 10 40 21 CDR Roger, Bob. Do you want us to go to STANDBY on X-RAY while the door is closed, or is it okay to leave it on?

11 10 40 29 CC Roger. You can leave it on - Dave.

11 10 40 34 CDR Okay.

11 10 45 29 CC Apollo 15, Houston. Request OMNI Charlie, please.

11 10 45 39 LMP OMNI Charlie.

11 10 49 33 CC Apollo 15, OMNI Delta, please.

11 10 49 38 LMP OMNI Delta.

11 11 11 53 CC Apollo 15, Houston. Over.

11 11 11 57 CDR Houston, 15. Go ahead.

11 11 11 59 CC Roger. Remember back a ways, we were talking about doing some more mass spec boom tests at 275 hours, which has gone by. We're right now talking about delaying that until 276 hours, approximately, or at least until before you start your VERB 49 maneuvers for the next set of P23s. Over.

11 11 12 23 CDR Okay, fine.

11 11 12 25 CC We're just letting it heat soak a little bit longer.

11 11 12 39 CDR And, Houston; 15. I have some command module RCS injector temperatures for you.

11 11 12 45 CC Ready to copy.

11 11 12 48 CDR Okay, these are readings off the SYSTEMS TEST meter. 5-A is 4. - or 5-C is 4.2; 5-D is 3.9; 6-A is 4.1; B is 4.2; C is greater than 5; and D is 4.5.

11 11 13 08 CC Roger. Copy 4.2, 3.9, 4.1, 4.2, greater than - and 4.5.

11 11 13 16 CDR Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 11 55 08 CC Apollo 15, Houston. Over.

11 11 55 13 LMP Go ahead, Bob.

11 11 55 14 CC Roger. If one of you fellows has the time, we might like to continue on with the MASS SPEC BOOM RETRACT test.

11 11 55 23 LMP Okay. Is it something I should write down, or can I just do it real time?

11 11 55 27 CC I'll give it to you real time. It's not that complicated, Jim.

11 11 55 32 LMP Okay. Go ahead.

11 11 55 34 CC Okay. We need the EXPERIMENT switch to ON down there in the ALPHA - Excuse me, the MASS SPEC EXPERIMENT switch to ON; and the ION SOURCE, ON. Over.

11 11 55 49 LMP Okay. Understand MASS SPEC EXPERIMENT, ON; and ION SOURCE, ON. Stand by.

11 11 56 10 LMP Okay, Bob. They're both ON.

11 11 56 13 CC Okay. And then next, you go down to the other panel, and we go DEPLOY for 20 seconds on the MASS SPEC BOOM, and then RETRACT for 40 seconds, or until we get a gray indication. Over.

11 11 56 34 LMP Understand you want DEPLOY for 20 seconds and then - on the MASS SPEC BOOM, and then RETRACT until we get gray for 40 seconds.

11 11 56 44 CC Roger. Whichever occurs first.

11 11 56 49 LMP Okay.

11 11 58 17 LMP Okay, Bob. It went gray after 30 seconds.

11 11 58 20 CC Roger; copy. Stand by.

11 11 58 46 CC Okay, 15. Looks like it's a cold soak problem, then, Jim. We'll just deploy it all the way out and leave it there.

11 11 58 56 LMP Okay. You want us to deploy it all the way now, huh?

11 11 58 59 CC Right. After we did all that work and succeeded in retracting it, now we'll deploy it.

11 11 59 05 LMP Okay. We'll deploy it.

11 12 13 04 CC Apollo 15, Houston. Over.

11 12 13 09 LMP Go ahead, Bob.

11 12 13 10 CC Roger, Al. Recommendation from the ground here. They'd like to see - maybe as many as five optics calibration marks the next time, instead of the two. It's just to give them some data.

11 12 13 26 LMP Okay, I'll relay that information to our navigator.

11 12 13 29 CC Sorry about that, Jim. You sound like Al these days.

11 12 13 33 LMP Oh, we're getting so we all sound alike up here.

11 12 21 08 CC Apollo 15, Houston. We're standing by ready to copy your NOUN 49s.

11 12 24 16 CC 15, Houston. We'd like HIGH GAIN, PITCH at minus 30, YAW of 150.

11 12 24 29 CMP Okay. PITCH, minus 30; and YAW, plus 5 - 150.

11 12 24 34 CC Roger.

11 12 24 37 CMP And do you want us to go ahead and try and lock it up?

11 12 24 40 CC Please do.

11 12 41 51 CC Thank you, Al.

11 12 42 39 CC Apollo 15, Houston. Over.

11 12 43 53 CC Apollo 15, Houston. Over.

11 12 43 58 CMP Go ahead, Houston.

11 12 43 59 CC Roger. Guidance says thank you to Al. And if - a couple other things here, if one of you guys has a chance, we'd like a mag - magazine status read-out tonight, and we're seeing some noise on Dave's biosensors. He might want to check them or push them down a little bit or something.

11 12 44 23 CDR Okay, I'll do that. And you want a magazine status read-out. What do - What do you mean by that exactly?

11 12 44 29 CC Roger. That means how many picture's been taken in some of the magazines there. I think Al's been doing it. He probably knows what's going on, if he can tell you.

11 12 44 56 CDR Okay. I - I guess we don't have a good answer for you on that, Bob. They're all stowed away. And they've all been recorded as we've gone along. Is there any particular need for them before tomorrow sometime?

11 12 45 13 CC Negative, Dave. That's a good answer, it turns out.

11 12 45 18 CDR Okay. I think you'll find them all neatly tucked away and recorded when - when you get them on the ship.

11 12 45 38 CMP If you're wondering how many pictures we took, at last count night before last, it was something like 1840 some.

11 12 45 49 CC Understand, 1847.

11 12 45 53 CMP Or somewhere around the ball park.

11 12 45 56 CC Is that plus or minus one?

11 12 45 59 CDR I think that was IM though, maybe yes. Then you have to add to that the command module.

11 12 46 05 CC You mean like a mile of pan camera film, huh?

11 12 46 09 CMP      Something like that. It looks like it ought to hold a mile by the size of the thing.

11 12 48 11 CMP      Houston, 15.

11 12 48 13 CC        Go ahead, 15.

11 12 48 17 CMP      Well, I had - had the log out here, and I took a look at it, and at last count last night, we were 2631 on Hasselblad pictures, total.

11 12 48 29 CC        Copy.

11 12 51 06 CC        Apollo 15, Houston. Over.

11 12 51 11 CDR      Go ahead, Houston; 15.

11 12 51 12 CC        Roger, Dave. The interest in the MAGs was with reference to UV - the MAGs for the UV photography tomorrow. So the interest was in the number of frames remaining on magazine Mike and magazine Papa, try - trying to determine which of those would be usable for tomorrow's UV photography.

11 12 51 35 CDR      Okay. I think we've got that log in the Flight Plan. Stand by until Al finishes his P23s, and we'll take a look.

11 12 51 41 CC        Roger; understand. No big rush.

11 12 51 49 CDR      Think we'll use a MAG that has some film in it.

11 12 51 53 CC        Say again, Dave.

11 12 51 56 CDR      I said, at - at any rate, we'll use a MAG that has some film in it tomorrow.

11 12 52 00 CC        That's a good idea.

11 12 57 06 CC        Apollo 15, Houston. Requesting GAMMA RAY GAINSTEP, SHIELD OFF, now, please.

11 12 57 14 CDR      Roger. SHIELD OFF, now.

11 12 58 08 CC        That was a good mark, Al.

11 12 58 17 CMP      Yes, and it didn't update the state vector very much.

11 13 15 49 CC Apollo 15, Houston.

11 13 15 53 CMP Go ahead.

11 13 15 55 CC Roger. Congratulations, Al. You've just been voted to receive a second Vasco da Gama award for that. We were afraid you were going to do them all the way through the rest period.

11 13 16 07 CMP Well, they're fun enough. I wouldn't mind.

11 13 16 10 LMP So were we.

11 13 16 12 CC (Laughter) Okay; and - -

11 13 16 19 CMP It wouldn't have taken nearly so long if you hadn't wanted five marks per each star.

11 13 16 31 CC Roger, Al. I'll tell you about that some time. And, 15, we're configured for the E-mod dump, if you fellows want to give it to us.

11 13 16 45 CDR Okay, it's coming. Does our bio data look any better?

11 13 16 48 CC Roger. Yes, it does.

11 13 16 52 CDR Okay.

11 13 16 56 CC And, as you get ready for the PTC, we'd like to do the PTC at 0.42 there again tonight as last night, although it's changing the NOUN 79 value there at 277:14.

11 13 17 16 CMP Roger, Bob. I guess we use that as standard procedure now, the 4200.

11 13 17 21 CC Roger. You don't have to do it tomorrow night that way, though.

11 13 17 25 CDR Okay. Use a different number tomorrow night?

11 13 18 34 CC And, Apollo 15, be advised that tomorrow when you're taking your P23 marks, five marks on the CAL and then three marks on the stars for the P23 itself will be sufficient.



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11 13 18 48 CMP Okay, understand. Five marks on the CAL and three on each star.

11 13 18 52 CC Roger. Roger.

11 13 19 26 CDR Hey, Houston, 15. We've got the presleep checklist ready, too.

11 13 19 30 CC Roger. We're standing by.

11 13 19 34 CDR Okay. The crew's all ready for bed, no medication, and the onboard read-out: battery C, 37; pyro BAT A, 37.1; B, 37.1; RCS A, 55; B, 50; C is 48; D, 52. And I guess everything else is done. You've got your E-memory dump, and we're ready to power down as soon as we get the PTC going.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 13 20 06 CC Roger, Dave. As far as we're concerned, we're all finished also. We will not be up-linking a state vector to you. We might have to do that some time just for practice, but so far we haven't needed to up-link one to you. You guys are doing pretty super on those P23s.

11 13 20 24 CDR Compensating errors.

11 13 20 35 CC I can't believe that was a unanimous vote, Dave.

11 13 20 41 CDR No, it was only two to one.

11 13 28 52 CC Apollo 15, Houston. You're GO to start to spinup for PTC.

11 13 28 57 CDR Okay, Bobby. Thank you.

11 13 29 30 CC And, Apollo 15, we'd like you to check that the POTABLE TANK INLET valve is OPEN, please.

11 13 29 37 CDR Roger; understand. POTABLE TANK INLET valve, OPEN.

11 13 30 26 CDR Houston, 15.

11 13 30 28 CC All right, go ahead, 15.

11 13 30 31 CDR Okay. Listen, potable tank inlet valve is open and has been the whole flight. What prompted the question?

11 13 30 39 CC Stand by.

11 13 30 44 CDR We're just curious.

11 13 30 56 CC 15, we saw a drop in the potable at the same time that the waste tank was staying stable, and we were - just concerned that it might have gotten out of configuration. We certainly expected it to be open; we just wanted to check it before you went to sleep, so we didn't have to wake you up.

11 13 31 11 CDR Okay. Understand. Yes - we're reading potable at 90 percent.

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11 13 31 17 CC

Roger. We're reading 94.

11 13 43 52 CC

Apollo 15, Houston. No need to acknowledge, but we'd like to put the DSKY to sleep before you guys go to sleep.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 22 30 15 MCC (Music - Hawaiian War Chant by Al Kealoha Perry)

11 22 32 26 CC Tu sois [?], good Endeavour crew. Tu sois. Rise and shine. It's splashdown day.

11 22 32 35 CDR Oh, my, yes!

11 22 32 43 CC Good morning, Dave.

11 22 32 46 CDR Good morning, Joe. That got everybody up.

11 22 32 55 CMP Morning, J.P.

11 22 32 57 CC Morning, Alfredo.

11 22 33 03 LMP Joe, sounds like you're really in harmony this morning.

11 22 33 08 CC That's one.

11 22 39 03 CDR Okay, Houston; Endeavour. We got a postsleep checklist for you.

11 22 39 13 CC Okay, Dave. Go ahead.

11 22 39 17 CDR Okay. About 8 hours apiece on the sleep, and ready for your consumables.

11 22 39 26 CC Roger. At 286 plus 30; RCS total, 36 percent; quad A, 41, 36, 30, 37; H<sub>2</sub> tank, 27, 24, and 29; O<sub>2</sub> tank, 43, 44, and 37. I've got the world's smallest list of updates for your Flight Plan, and I've got the news summary when you're ready.

11 22 40 07 CDR Okay. Give us a couple of minutes on those. Thank you.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

11 22 51 46 CDR Houston, Endeavour.

11 22 51 52 CC Go ahead.

11 22 51 57 CDR Well, we just got our first view of the Earth this morning, and, can you believe it's getting larger and it's getting smaller? We see just a very, very thin sliver of a very large round ball.

11 22 52 20 CC Roger, Dave. I believe that.

11 22 52 31 CDR And, go ahead on the updates, Joe.

11 22 52 44 CC Roger, Dave. These are the Flight Plan updates for today. And - would you believe - I don't have any DAP load changes to give you, which is fortunate. The first addition is at 288 plus 18. And it reads "X-RAY to OFF, ALPHA PARTICLE to OFF."

11 22 53 24 CDR Okay, 288:18, X-RAY, OFF, and ALPHA, OFF. Go.

11 22 53 29 CC Roger. And all the rest are just reminders, really. The first one at - on - at 290, on the UV photos page, you've already changed the two frames line to read one frame at 20 seconds and the second frame at 2 seconds. A reminder to use MAG Papa instead of MAG Metro. And, finally, we'd like to remind you to enable all jets before beginning the maneuvers today. And we're - we're thinking now we'll likely do a midcourse 7 correction of about - probably around 5 feet per second. Over.

11 22 54 24 CDR Okay. I got the UV on the change, and the ...; enable all jets prior to maneuvers; and you're looking at midcourse 7 of 5. That's very interesting.

11 22 54 36 CC It's also not certain, but we'll keep you posted on that. And that's all the official updates I have for you. I have a news summary, if you'd like to listen.

11 22 54 46 CDR Okay. Everybody's in ...; go ahead.

11 22 54 51 CC

Roger. And this will be a short one. The rest of it you can read for yourselves today in the papers. Congress has started a month-long summer recess, setting the pattern for a Government-wide exodus, likely to make Washington a virtual ghost town for the rest of August. The Senate finally quit at 7:30 Friday night, more than 6 hours after the House had adjourned at about 1 in the afternoon. And after passing an \$18 billion higher education bill and three key appropriations measures. Besides the Labor-HEW appropriations, the Senate approved, Friday, a \$1 billion measure to provide public service jobs mainly for Vietnam veterans and a continuing resolution to fund agencies still without regular appropriations until the 15th of October. In Chile, four [sic] government ministers presented their resignations to President Salvador Allende on Friday, causing the first cabinet crisis since the President took office last November. I have a long list of baseball scores which I think I'll skip over here. In exhibition football, the Buffalo Bills downed the New Orleans Saints, 14 to 10, and the Cowboys won over the L.A. Rams, 45 to 21. In the American Golf Classic at the Firestone Country Club in Akron, Ohio, Jerry Heard is still leading with 7 under par, 133, at the halfway mark. And Bob Lunn is next with a 4 under par, 136. The United States basketball team was eliminated yesterday in the Pan-American games in Colombia, and the U.S. baseball team was upset by the Dominican Republic, 5 to 4. In tennis, Stan Smith is the last seeded player still in competition at the Western Championships in Cincinnati. And today in Chestnut Hills, Massachusetts, Marty Riessen meets Australian Ken Rosewall, and South African Cliff Drysdale meets John Newcombe in the semi-finals of the U.S. professional tennis tournament. And that's all I have from here. Over.

11 22 58 20 CDR

Okay. Thank you, Joe. That's interesting.

11 22 58 24 CDR

Hey, Houston, 15. By the way, where did the 5 feet per second come from? Should we get our trusty navigator up there to navigate some more for you?

11 22 58 39 CC Dave, it probably came for - from the uncoupled - thrusting we were doing yesterday. Other than that, I'm not really sure. It's - it's by no means certain. Anyway we're just I guess - we'll be watching it today and get back with you, with the final bit of information on it.

11 22 59 01 CDR Okay. Very good. Just thought maybe we'd get our navigator to navigate again, and it would probably go away, as most of them have done so far.

11 23 00 13 CC Endeavour, the Saturday morning weather report for the landing area reads, "High scattered, 2000 scattered, 15-knot winds out of the east-northeast, 10 miles vis, and waves going to 4 feet." It should be well above your personal minimum.

11 23 00 35 CDR Looks very good. We appreciate that.

11 23 00 46 CDR Sounds like the recovery troops have things in hand as usual.

11 23 00 51 CC Yes, indeed.

11 23 32 05 CC Endeavour, this is Houston. Requesting GAMMA RAY, GAINSTEP, switch to center, please.

11 23 32 13 CDR Roger. GAMMA RAY, GAINSTEP, to center.

11 23 33 19 CC And, Endeavour, this is Houston. SIC over and out.

11 23 33 29 CDR Hey, Mr. SIC! Congratulations on a super job all the way. Sure appreciate it.

11 23 33 40 CC Roger, Dave. Likewise in every way. See you at Ellington.

11 23 33 45 CDR Okay, very good.

11 23 55 26 LMP Houston, this is 15.

11 23 55 54 LMP Houston, this is 15 with the PRDs - readings.

11 23 55 59 CC Roger, 15. Go ahead.

11 23 56 03 LMP Good morning, Bob. Okay, for Al, it's 2503<sup>4</sup> and mine is 0804<sup>1</sup>.



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11 23 56 12 CC Roger. You got one for Dave?  
11 23 56 16 LMP Okay. His is not working any longer.  
11 23 56 19 CC Okay. Copy.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

12 00 33 08 CC Apollo 15, Houston.

12 00 33 12 LMP Go ahead, Bob.

12 00 33 13 CC Roger. Correction of the Flight Plan. We'd like to have all crewmembers on the biomed harness for entry. I suspect that means that Dave won't be doffing his about now.

12 00 33 34 LMP Okay, I guess we could give you two. The - our trusty CMP has his off and stowed for entry.

12 00 33 44 CC Roger. Copy.

12 00 34 12 CC Okay, 15. Looks like the surgeons can live with that without too much trouble.

12 00 34 18 LMP Roger.

12 00 37 49 CC Apollo 15, Houston. Over.

12 00 37 54 LMP Go ahead, Houston.

12 00 37 56 CC Okay. If you guys have a moment or two, we have some Flight Plan updates concerning entry - entry cue cards and Entry Checklist. Over.

12 00 38 08 LMP Stand by.

12 00 41 19 LMP Well, Bob, it'll be about a half an hour before we're ready to talk about those changes.

12 00 41 24 CC Okay, Jim. Give me a call when you're ready.

12 00 41 29 LMP Okay.

12 00 46 34 CMP Houston, 15, I have some valve temps for you.

12 00 46 38 CC Roger, 15. We're ready to copy.

12 00 46 42 CMP Okay, 5-C is 4.5; 5-D is 4.4; 6-A, 4.4; 4.4; 4.6; and 4.5.

12 00 46 57 CC Roger; copy.

12 00 48 21 CC Apollo 15, Houston. Be advised, we are looking, at the present time, at a midcourse 7 burn of 5.6 feet per second retrograde. Over.

12 00 48 34 LMP Okay. We copy.

12 00 58 05 CC 15, Houston. We have your torquing angles.

12 00 58 10 CDR Roger; thank you.

12 01 01 31 CC Apollo 15. Request OMNI Charlie, please.

12 01 01 37 CMP Roger. OMNI Charlie.

12 01 32 04 CDR Houston, Apollo 15. We're ready for your entry updates now if you like.

12 01 32 11 CC Roger, 15. Understand you're ready for the update. Tell Al that was another super set of arcs, certainly.

12 01 32 17 CDR Yes, that one came out pretty fair, didn't it?

12 01 32 24 CC Okay, 15. The first change is in the Entry Checklist, second page; and, on page 1-2, we wish to delete step 21, which is the "DSKY Condition Light Test."

12 01 32 46 CDR Okay. Step 21 deleted.

12 01 32 48 CC You may remember that one from the SIM; that's the one with the - gives us the P35 and turns the PIPAs off momentarily.

12 01 32 55 CDR Yes, I guess we don't want to do that today. ... - -

12 01 32 57 CC That's - that's a Roger. Okay, the next one, Dave, is on page 6, when we're checking the circuit breaker configuration on panel 8; and we're going to add "SPS PILOT VALVE A MAIN A and B MAIN B, open. Verify." Over.

12 01 33 29 CDR Okay. SPS PILOT VALVES MAIN A and B both open, and - Configuration of the circuit breakers on panel 8. Go ahead.

12 01 33 36 CC Okay. Then if we go down to the entry cue card, down to the P67 section.

12 01 33 44 CDR Okay. Go.

12 01 33 45 CC Okay. Down there near the middle where it says "Steering commands downrange error minus 6 to 0," that should be changed to "Downrange error minus 24 to 0." Over.

12 01 34 01 CDR Roger. Just like it is in the checklist. Right? And I think we noticed that last night looking it over.

12 01 34 06 CC Okay. And next, on the second line under the NOUN 68, there's a comment that says "negative (if plus: EMS)." And there's a certain amount of unhappiness with that statement down here. They say that you can have a positive H-dot in P67 nominally and, therefore, the statement on the cue card that this is a fail indication is not a good idea. I understand Vance discussed this with Al beforehand.

12 01 34 39 CDR Okay. We'll scratch that. I don't think we'll get to a P66 - 67 turnover anyway, but we'll scratch that one out. Thank you, Bob.

12 01 34 48 CC Roger. We hope not. And we have a question here, Dave, that we need an answer for, apparently concerning stowage. People are concerned about the hooks on the back of the R-12, the Flight Data File container, which is now stowed in one of the PGA bags. And they are concerned that those hooks be placed in such a way that they will not be in any danger of piercing the aft bulkhead - the pressure bulkhead. So I guess you can tell how they're placed or what's underneath them to prevent such occurrences.

12 01 35 22 CDR Okay. We'll make sure of that. And I guess the problem with R-12 was that, once we got all the LM data onboard, we didn't have any place to put it, or else we didn't have any place to put the LM data. And if you have any better suggestions on where to put them, we'll be glad to do it.

12 01 35 39 CDR I don't think we have any right now, Dave. I guess the quickest thing would have been to just put it in the PGA bag with the hooks pointing up.

12 01 35 48 CDR Okay. We'll do that.

12 01 35 50 CC And one reminder, Dave. You guys undoubtedly know it. Just a reminder that you will not have any back lighting for the scroll and no lighting on the roll bug today.

12 01 36 03 CDR Okay. No back lighting for the scroll and no lighting on the roll bug. Thank you.

12 01 36 28 CDR Have anything else, Bob?

12 01 36 30 CC No, Dave. That's all I have for the moment.

12 01 36 33 CDR Okay. That's pretty easy.

12 01 38 18 LMP Houston, we're standing by for a VHF comm check.

12 01 38 23 CC Stand by, Jim. We'll see if they're ready.

12 01 38 46 CC 15, Houston. We'll have to stand by for another few hours to get you close enough to do that VHF comm check.

12 01 38 54 LMP All right. Roger. We understand.

12 01 39 53 CC Apollo 15, Houston.

12 01 39 57 LMP Houston, 15. Go.

12 01 39 59 CC Roger. Could we have a reading of the - an onboard reading of the potable tank quantity, please?

12 01 40 09 LMP Eighty-two percent.

12 01 40 11 CC Copy; 82 percent.

12 01 42 07 CC Apollo 15, Houston. Over.

12 01 42 11 CDR Houston, 15. Go.

12 01 42 13 CC Roger. Could you guys check the POTABLE TANK INLET valve again for us, and find out whether it is in the CLOSED or OPEN position? Once again, what we're seeing is the waste tank increase and the potable tank has been staying constant all morning.

12 01 42 30 CDR Okay; last night when you called, I even went down and recycled that valve and made sure it was in the detent in the OPEN position, which it was.

12 01 42 38 CC Okay. In that case, could you go down and cycle it from CLOSED to OPEN again for us, please?

12 01 42 45 CDR Roger. We're doing that right now.

12 01 43 08 CDR Okay, it was still OPEN, and Al cycled it from OPEN to CLOSED and back to OPEN.

12 01 43 15 CC Okay. Thank you. It's no big deal, Dave, nothing to worry about.

12 01 43 20 CDR Might as well get everything all trimmed up.

12 01 43 22 CC That's what we're trying to do.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

12 02 00 24 CC Apollo 15, Houston. Requesting OMNI Delta.

12 02 00 28 CMP OMNI Delta.

12 02 08 21 CC Apollo 15. Requesting OMNI Charlie.

12 02 08 24 CMP OMNI Charlie.

12 02 15 10 CC 15, Houston. If you'll give us HIGH GAIN and PITCH of plus 7, YAW of 250, then we'll be able to keep high gain for the next 2 or 3 hours, and I won't have to keep calling you for OMNIs. Over.

12 02 15 23 LMP Okay; understand plus 7 and 250 on the HIGH GAIN.

12 02 15 27 CC Roger.

12 02 25 30 CC 15, Houston. We're noticing some drift in roll. If you're not through with the UV photos, we'd like you to retrim back to attitude, please.

12 02 25 39 CMP Okay, and we are finished with the UV photos.

12 02 25 42 CC Okay; takes care of that one.

12 02 27 37 CC Apollo 15, Houston. Over.

12 02 27 41 CDR Go ahead, Bob.

12 02 27 42 CC Okay; if you guys got a minute, we can do a few things here. Number 1, if you give us ACCEPT, we'll send you some state vector and target loads; and, number 2, we have a couple comments to read to you.

12 02 27 58 CDR Okay; you have ACCEPT, and stand by.

12 02 28 01 CC Roger; you're getting the up-link, and we're standing by.

12 02 31 54 CC 15, the computer's yours. You have state target and REFSMMAT.

12 02 32 01 CDR Roger. Thank you.

- 12 02 32 13 CDR And, Houston, we're all on. You can go with your comments.
- 12 02 32 17 CC Okay; first one, news concerning the water business. We've been having you check that valve. It looks to us now as though there's a blockage into the potable tank. You got obviously - a - far more water than you need to survive the rest of the mission, but it does mean that the waste tank will be filling up, and there is a possibility that it will start to vent about an hour or 2 before EI. It's been discussed down here and decided that the best way to do this is - far as not perturbing the vector too much - is to let it relieve overboard and not to do a dump ahead of time or turn the water boiler on ahead of time. In line with this, we might just verify that the PRESSURE RELIEF valves down on panel 352 - the water control panel, is in the RELIEF position. It certainly should be there; it's just a - a little verification to make sure we're - we're not going wrong there. Second, I - -
- 12 02 33 11 CDR Okay. That's verified.
- 12 02 33 12 CC Okay; thank you. Second item is, we suggest that it might be reasonable to put some tape over the SPS light on the EMS to keep you from confusing with the .05g light, in case you have a problem there, Al. That's your option, obviously. It just a suggestion.
- 12 02 33 32 CDR Oh, I don't think he'll have any confusion with that.
- 12 02 33 35 CC Okay.
- 12 02 33 36 CDR ... make sure we watch it.
- 12 02 33 38 CC And the third question is, from your comments when we were talking about R-12, some people believe you may be asking us a question that you have a problem with stowage of some of the extra LM Data File, or have you found a place for that already?
- 12 02 33 53 SC Oh, no; that's all tucked away in R-3 very - very neatly. We have no - no problem at all with the stowage. We just wanted to locate R-12 in a nice soft spot and secure it down, which it is.



12 02 34 04 CC Okay. We - we were - crank up Building 45 to find you a location if you needed it.

12 02 34 20 CC And, 15; Houston. We've got an entry pad and a midcourse 7 pad if you're ready to copy.

12 02 34 28 CDR Stand by 1, Bob. Let our pad leader get out his pencil.

12 02 35 00 LMP Okay, Bob. I'm ready for midcourse 7.

12 02 35 02 CC Okay. Purpose, midcourse 7, RCS/G&N; 26363; NOUN 48's are NA and NA; 291:56:47.90; minus 0005.6, minus all balls, plus 0000.2; roll, 180, 311, 000; H<sub>A</sub>, NA; H<sub>P</sub>, plus 0022.3; 0005.6, 0:24, 0005.6; 31, 347.9, 35.3. The rest of the pad is NA. GDC aline stars are Vega and Deneb; roll, pitch, and yaw for the alinement are 100, 137, 316. Burn recommendation is two jets, plus-X, quads Bravo and Delta. And the H<sub>P</sub> in the pad on NOUN 44 there is based on a MSFN trajectory after midcourse 7. Over.

12 02 37 17 LMP Okay. The readback for the midcourse. It's RCS/G&N; 26363; NA, NA; 291:56:47.90; minus 0005.6, minus all zeros, plus 0000.2; 180, 311, 000; NA, plus 0022.3; 0005.6, 0:24, 0005.6; 31, 347.9, 35.3; Vega and Deneb; 100, 137, 316. Recommendation for the burn configuration, two jet, plus-X, quads Baker and Dog; and the H<sub>P</sub> of the pad is based on a MSFN trajectory after midcourse 7.

12 02 38 12 CC Roger. Good readback, Jim; and I'll give you entry when you're ready.

12 02 38 18 LMP Okay. Stand by.

12 02 38 34 LMP Okay. I'm ready for entry, Bob.

12 02 38 36 CC Okay. Entry, area, MIDPAC; 000, 153, 000; 294:41:55, 267; plus 26.13, minus 158.13; 06.1; 36096, 6.49; 1082.4, 36178; 294:58:55; 00:28; NOUN 69s are NA; 4.00, 02:13; 00:18, 03:37, 07:42; 04, 140.3, 37.5; 213, down 09.5, right 4.7; lift vector, up. Comments: one, use nonexit EMS pattern; two, RET for 9OK, 6 plus 04; three, RET

for mains, 8 plus 30; four, RET for landing, 13 plus 27; five, constant g, roll right; six, moonset, 294:56:37. Over.

12 02 39 15 LMP Okay, Bob. Readback for the entry pad. It's MIDPAC; 000, 153, 000; 294:41:55, 267; plus 26.13, minus 158.13; 06.1; 36096, 6.49; 1082.4, 36178; 294:58:55; 00:28; NOUN 69 is NA; 4.00, 02:13; 00:18, 03:37, 07:42; 04, 140.3, 37.5; 213, down 09.5, right 4.7; up. Comments: Use nonexit EMS pattern; RET for 90K, 6 plus 04; for mains, 8 plus 30; landing, 13 plus 27; constant g, roll right; moonset, 294 plus 56 plus 37. Over.

12 02 42 37 CC Roger. Good readback, Jim.

12 02 43 12 CC And, 15, we'd like ACCEPT again. It looks like we found some errors in the load that we sent up.

12 02 43 20 LMP Okay; stand by.

12 02 43 25 LMP Okay; you have ACCEPT.

12 02 43 27 CC Thank you.

12 02 43 44 LMP Houston, 15. Picked off the VERB key zero - on top of you. Sorry about that. It's all yours.

12 02 43 50 CC Okay.

12 02 44 11 CC 15, we'll clear it. Don't worry.

12 02 44 16 LMP Okay.

12 02 48 50 CC 15, Houston. The computer's yours again.

12 02 48 57 LMP Roger, Bob.

12 02 49 49 CC Apollo 15, Houston. We would like the VHF turned on even though it's too early to do the comm check. Like it turned on in SIMPLEX Alfa to warm it up, and so we can watch it.

12 02 50 12 LMP Okay, we're turning on SIMPLEX Alfa.

12 02 50 39 CC Thank you, 15.

12 03 00 33 CC And, 15, we have your torquing angles.

12 03 00 39 CDR Roger.  
12 03 03 47 CDR Houston, 12. You have the torquing angles.  
12 03 03 53 CC Roger, 12. We have the torquing angles.  
12 03 03 56 CDR Okay. That's through.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

12 03 40 02 CC Apollo 15, request OMNI Alfa, please.

12 03 51 50 CC 15, at 5 minutes to go, you're looking good.

12 03 51 55 CDR Roger. Thank you. We're all set.

12 03 54 46 CC 15, Houston. Requesting KEY RELEASE and ENTER to complete the integration and get us down for the burn.

12 03 55 04 CDR Houston, the integration should all be done.

12 03 55 08 CC Roger. Somebody on the ground here hasn't seen it, apparently.

12 03 55 12 CDR Okay, we've been sitting here for about 5, 6 minutes.

12 03 55 17 CC Roger. We couldn't tell. Sorry about that, Dave.

12 03 58 00 CDR Okay, Houston; 15 with the burn status report.

12 03 58 02 CC Roger that.

12 03 58 04 CDR Okay, T<sub>ig</sub> was on time. Burn time was 21 and came right out on the money, and it clicked up a couple seconds after the shutdown to minus .1, 0, and minus .1. DELTA-V<sub>c</sub> was plus .8.

12 03 58 21 CC Roger. Copy that, Dave. It looked good to us.

12 03 58 29 CDR Good.

12 04 00 07 CC 15, OMNI Bravo, please.

12 04 00 12 CDR Roger. OMNI Bravo.

12 04 02 31 CC Apollo 15, Houston. If you'll give us ACCEPT after you get maneuvered to attitude before you go into P23 to start the optics CAL, we'll up-link you your new state vector, and then you can press on with the P23s as soon as that's up.

12 04 02 47 CDR Roger.

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12 04 03 01 CDR You've got it.

12 04 03 03 CC Roger.

12 04 04 17 CC 15, Houston. The computer's yours.

12 04 04 23 CDR Roger.

12 04 08 27 CC And, 15, requesting OMNI Charlie.

12 04 08 31 CDR Roger. OMNI Charlie.

12 04 56 48 CDR Houston, 15.

12 04 56 51 CC 15, Go ahead.

12 04 56 53 CDR Roger. We're ready for a logic sequence check.

12 04 57 00 CC And, 15, we're ready for a logic sequence check also.

12 04 57 03 CDR Okay. SEQUENTIAL LOGIC coming on now - number 1, number 2.

12 04 57 19 CC And, 15, you're GO for PYRO ARM.

12 04 57 23 CDR 15; Roger.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

12 05 07 10 CC Apollo 15, Houston. Over.

12 05 07 14 CDR Houston, 15. Go.

12 05 07 16 CC Roger. I thought we'd let you know, from our preliminary tracking, you're sitting right in the center of the corridor now.

12 05 07 23 CDR Great. That's a nice place to be.

12 05 07 25 CC The best.

12 05 20 50 CC And, 15, we copy your torquing angles.

12 05 20 53 CDR Roger. Thank you.

12 05 34 42 CMP Houston, 15.

12 05 34 46 CC Roger, 15. Go ahead.

12 05 34 48 CMP Okay. EMS check worked fine.

12 05 34 51 CC That sounds good.

12 05 47 42 CC Apollo 15, Houston. If you'll give us ACCEPT, we'll send you up a final state vector.

12 05 47 49 CDR Roger, Houston. You've got it.

12 05 47 54 CC And, Roger; you're getting it.

12 05 49 49 CC And, 15, it's your computer again.

12 05 49 53 CDR Roger.

12 05 55 09 CC Apollo 15, Houston. We have another entry pad for you, if you're ready to copy.

12 05 55 16 LMP Okay. Go ahead, Bob.

12 05 55 20 CC Roger, Jim. It's still mid-Pacific; 000, 153, 000; 294:41:54; 267; plus 26.13, minus 158.13; 06.2; 36096, 6.51; 1084.9, 36178; 294:58:54; 00:29; NOUN 69s are NA; 4.00, 02:12; 00:18, 03:37, 07:44. Boresight and sextant stars are NA, since you've

done them; lift vector is up. Comments: one, use nonexit EMS pattern; two, RET of 90K, 6 plus 06; mains, 8 plus 32; landing, 13 plus 29; constant g is roll right; moonset, 294:56:37. Over.

12 05 57 29 LMP

Okay. The readback on the entry pad, Bob, it's MIDPAC; 000, 153, 000; 294:41:54; 267; plus 26.13, minus 158.13; 06.2; 36096, 6.51; 1084.9, 36178; 294:58:54; 00:29; 4.00, 02:12; 00:18, 03:37, 07:44; lift vector, up; use nonexit EMS pattern; RET for 90, 6 plus 06; mains at 8 plus 32; landing, 13 plus 29; constant g will be roll right; moonset, 294 plus 56 plus 37.

12 05 58 28 CC

Roger, Jim. Good readback. And I have some information on landing area and weather and recovery forces, if you're ready to copy that.

12 05 58 40 CDR

Roger. Go ahead.

12 05 58 41 CC

Roger. Conditions in the recovery area continue to be good. Two thousand scattered, high scattered, visibility 10 miles. Winds are 10 knots, out of the east, and wave heights have come down to 3 feet. Altimeter at 3006. The recovery forces: the aircraft carrier is Okinawa. We have three helos: Swim 2, Swim 1, and Recovery. And Swim 2 is estimating to be on station, after splashdown, within 5 minutes. The two 130s in the area will be Hawaii Rescue 1 and Hawaii Rescue 2. Over.

12 05 59 32 LMP

Okay. Understand the weather is generally good. It's 2000 scattered; 10; 10 knots from the east; 3-foot waves; altimeter, 3006. The Okinawa's there. The helos are Swim 2, 1, and Recovery; C-130s are Hawaii Rescue 1 and 2.

12 05 59 49 CC

Roger, Jim. That's right. And noting on the altimeter, that means your DELTA-H is minus 128.

12 05 59 57 LMP

Roger.

12 06 06 27 CMP

Houston, 15.

12 06 06 30 CC

Roger, 15. Go.

12 06 06 32 CMP

Roger. We're getting ready to activate the command module RCS and turning LOGICS and ARMS on.

12 06 06 41 CC And, 15, we're ready to watch that.

12 06 06 44 CMP Okay. LOGIC 1 coming on now. LOGIC 2 on - now.

12 06 06 55 CC Roger. You're GO for pyro arm.

12 06 06 58 CMP Roger. GO for pyro arm. Okay.

12 06 08 03 CC 15, your CM RCS PRESS looks good to us.

12 06 08 08 CDR Roger, Houston.

12 06 10 58 CMP Houston, 15. Testing command module thrusters.

12 06 11 03 CC Roger. We're watching.

12 06 11 46 CMP Okay, Houston; 15. Ring 1, test now.

12 06 11 50 CC Roger. Ring 2 looks good.

12 06 12 37 CC And, 15, ring 1 looks good to us also.

12 06 12 41 CDR Roger, Houston.

12 06 12 45 CMP Houston, 15.

12 06 12 46 CC Go.

12 06 12 47 CMP Can you see the solenoids operating down there?  
We can't hear them up here.

12 06 12 57 CC Roger, 15. That's what we're watching, and we  
verified them all.

12 06 13 01 CDR Okay; thank you, sir.

12 06 13 03 CC You're welcome.

12 06 18 01 CC Apollo 15, Houston. Over.

12 06 18 05 CMP Houston, 15. Go ahead.

12 06 18 07 CC Roger. We were unable to monitor rates down here  
because we weren't set up for it. And we'd like to  
suggest that you might go back and repeat that  
check again. We suggest ACCEL COMMAND in SCS; and  
you might try to monitor rates on board, and we'll  
try to monitor them down here. What we're looking



at is only the solenoids down here and I guess, if you're really push, that isn't a verification.

12 06 18 33 CMP Okay. We'll do that.

12 06 19 07 CMP Okay, Houston; 15. We're ready to test them now.

12 06 19 13 CC All right. We're ready to watch.

12 06 19 26 CMP Okay. They're loud and clear up here.

12 06 19 28 CC 15, we're monitoring good rates.

12 06 19 54 CC 15, Houston. You copy? We monitor good rates down here also.

12 06 19 58 CMP Okay, Houston. We copied, and we're testing ring 1 thrusters now.

12 06 20 46 CC And, 15, ring 1 looks okay to us again.

12 06 20 50 CDR Okay, Houston. Thank you.

12 06 25 05 CC Apollo 15, Houston. We can try a VHF check now, if you will.

12 06 26 06 CC Apollo 15, Houston. Over.

12 06 26 44 CC Apollo 15, Houston. Over.

12 06 26 47 CDR Go ahead, Houston.

12 06 26 49 CC Roger. We're ready to try a VHF check, if you will. We'd like you to go to VHF ANTENNA, LEFT, and all of you turn off your S-bands and turn on your VHF T/Rs.

12 06 27 03 LMP Okay.

12 06 27 05 CC 15 - -

12 06 27 06 LMP Did that once - -

12 06 27 18 LMP Did that once, Bob. And I read you loud and clear, but apparently you were not reading us.

12 06 27 23 CC That's apparently the case. And, Jim, I guess all we need is one of you to go to VHF T/R and S-band T/R, OFF.

12 06 27 32 LMP           Okay, I'll do that.  
12 06 27 42 LMP           Houston, this is Apollo 15 on SIMPLEX A.  
12 06 27 45 CC            Roger. 15 on SIMPLEX A; read you 5 by.  
12 06 27 49 LMP           Roger. I read you the same.  
12 06 27 51 CC            Okay. And I guess that finishes it.

END OF TAPE

APOLLO 15 AIR-TO-GROUND VOICE TRANSCRIPTION

12 06 44 55 CC Apollo 15, Houston. Comm check. Over.

12 06 45 00 CMP Houston, 15. Loud and clear.

12 06 45 02 CC Roger; same with you.

12 06 45 06 CMP And, Houston; 15. We got a good SEP.

12 06 45 09 CC Roger. Looks good down here. Thank you.

12 06 47 05 CDR Okay, Houston. The horizon check was good, and the CMC guidance needles look good.

12 06 47 14 CC 15, Houston. Say again.

12 06 47 17 CDR Roger. The horizon check was good and the CMC guidance needles look good.

12 06 47 22 CC Roger; copy. Very good.

12 06 51 40 CC Apollo 15, Houston. You're looking good, about a minute and a half until hand over to ARIA.

12 06 51 46 CDR Roger.

12 06 54 28 CC Apollo 15, Houston through ARIA 2. How do you read?

12 06 57 41 CC Apollo 15, Houston, through ARIA 2. You're - We're getting good data. You look GO.

12 07 02 02 CT 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2.

12 07 02 38 CT 1, 2, 1, 2, 1, 2, 1, 2.

12 07 02 43 CC Apollo 15, Houston. How do you read? - -

12 07 02 45 CDR Roger.

12 07 03 11 CC Apollo 15, Houston. How do you read?

12 07 03 13 CDR 15, your ... in agreement in about 10 miles. Everybody's in fine shape.

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12 07 03 22 CC Very good, Dave. Good to hear you again.

12 07 04 44 CDR Houston, 15; in the blind. EMS and G&N agree within about 10 miles.

12 07 04 53 CC Roger, 15; this is Houston. Read you loud and clear, and copy.

12 07 05 49 CDR Blind latitude plus 2612, longitude minus 15817. And about a 2.2 off the deck.

12 07 05 59 CC Roger, Dave; we copy. Very good.

12 07 06 17 CMP Hey, Houston; 15. Out of 42 and we're short about a .7. - -

12 07 07 01 R This is .... Have visual contact. Bearing 120 from the ship, sir.

12 07 07 11 OKI Contact.

12 07 07 29 P Photo, I lost contact.

12 07 07 54 P This is photo, I have visual contact again. I have 140 from the ship, 1/2 mile. Bearing is 130 to - Three main chutes. I have visual contact three main chutes.

12 07 08 10 OKI Okinawa, Roger. Out.

12 07 08 14 CDR ..., Apollo 15. We're showing about a minus 0.6 on the miss distance, and everybody's in good shape.

12 07 08 22 CC Roger, 15. We got a visual on you on the screen in here.

12 07 08 29 OKI Okinawa Recovery has a recovery beacon contact. Bearing 175 magnetic on station. ...

12 07 08 35 OKI Okinawa ...

12 07 08 38 S-2 Okinawa, this is Swim 2. I have a visual contact. The bearing is 010, at approximately 1 mile. My position, 134, Okinawa 8.5 miles. Attitude is about 6000 feet for the command module.

12 07 08 53 OKI Roger.

12 07 08 59 S-1 Okinawa, this is Swim 1. I have recovery beacon 115 degrees magnetic, at 2704 ... 47. Over. ...

12 07 09 12 OKI Roger.

12 07 09 22 P This is Photo. I have - some - something falling beside the command module, I could not tell - tell what it was.

12 07 09 34 R Apollo 15, Apollo 15, this is Recovery. Over.

12 07 09 39 CDR Recovery, Apollo 15. Everybody's in good shape, and we're looking at about 3500 feet.

12 07 09 44 R This is Recovery. I have a visual of 165 from me, about 8 miles.

12 07 09 54 R This is ... parachute is streaming. I can only see two main chutes and one appears to be streaming. ...

12 07 10 12 P Okinawa, this Photo 1. The extra fuel has been jettisoned and burned off.

12 07 10 20 R Apollo 15, Apollo 15, this is Recovery. Over.

12 07 10 55 P This is Photo. Lost contact due to cloud cover.

12 07 10 58 R Apollo 15, Apollo 15, this is Recovery. Over.

12 07 11 03 CDR Roger, Recovery; 15. You're 5 square. Everybody's in good shape.

12 07 11 06 R Roger, Apollo 15. If you hear, all units have you in sight, and we are in bound now?

12 07 11 12 CDR Roger.

12 07 11 18 OKI Apollo 15, this is Okinawa. Request your splash-down read-out. Over.

12 07 11 24 CMP MAIN BUS TIES coming OFF.

12 07 11 25 CDR Roger. Plus 2613, minus 15812.

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12 07 11 28 R This is Recovery. I have visual ... dead ahead.  
12 07 11 36 OKI Apollo 15, this is Okinawa. You have a streamed  
chute. Stand by for a hard impact. Okinawa, over.  
12 07 11 43 CDR Roger.  
12 07 11 54 CDR SPLASHDOWN. Mark splashdown.

END OF TAPE