

DISPLAYS AND CONTROLS

There are hundreds of controls and displays located in the cabin of the Apollo command module. A majority of these are on the main display console, which faces the three crew couches and extends on both sides of them. The console is nearly seven feet long and three feet high, with the two wings each about three feet wide and two feet deep.

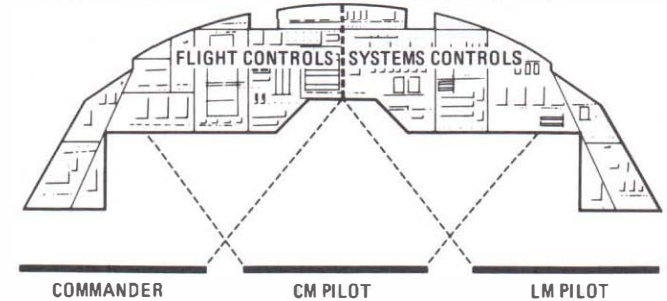
The console is the heart of the command module: on it are the switches, dials, meters, circuit breakers, and other controls and displays through which the three-man crew will control the spacecraft and monitor its performance. Crew members can see and operate controls on the console while in their restraint harnesses.

Other displays and controls are placed throughout the cabin in the various equipment bays and on the crew couches. In general, these are controls and displays that do not need frequent attention or are used during parts of the mission when crewmen can be out of the couches. Most of the guidance and navigation equipment is in the lower equipment bay, at the foot of the center couch. This equipment, including the sextant and telescope, is operated by an astronaut standing and using a simple restraint system. The non-time-critical controls of the environmental control system are located in the left-hand equipment bays, while all the controls of the waste management system are on a panel in the right-hand equipment bay. The rotation and translation controllers used for attitude, thrust vector, and translation maneuvers are located on the arms of two crew couches. In addition, a rotation controller can be mounted at the navigation position in the lower equipment bay.

The main display console has been arranged to provide for the expected duties of crew members. These duties fall into the categories of commander, CM pilot, and LM pilot, occupying the left, center, and right couches, respectively. The CM pilot, in the center couch, also acts as the principal navigator.

While each astronaut has a primary responsibility, each Apollo crewman also must know all the controls and displays in the spacecraft. During a mission each might at some time take over the duties of the other crewmen: during sleep or rest periods, while other crewmen are occupied with

- LAUNCH VEHICLE EMERGENCY DETECTION
- FLIGHT ATTITUDE
- MISSION SEQUENCE
- VELOCITY CHANGE MONITOR
- ENTRY MONITOR
- PROPELLANT GAUGING
- ENVIRONMENT CONTROL
- COMMUNICATIONS CONTROL
- POWER DISTRIBUTION
- CAUTION & WARNING



P-98

Main display console

experiments, and, of course, during an emergency.

Flight controls are located on the left-center and left side of the main display console, opposite the commander. These include controls for such subsystems as stabilization and control, propulsion, crew safety, earth landing, and emergency detection. One of two guidance and navigation computer panels also is located here, as are velocity, attitude, and altitude indicators.

The astronaut in the center couch (CM pilot) faces the center of the console, and thus can reach many of the flight controls, as well as the system controls on the right side of the console. Displays and controls directly opposite him include reaction control propellant management, caution and warning, environmental control and cryogenic storage subsystems.

The right-hand (LM pilot's) couch faces the right-center and right side of the console. Communications, electrical control, data storage, and fuel cell subsystem components are located here, as well as service propulsion of subsystem propellant management.

All controls have been designed so they can be operated by astronauts wearing gloves. The controls are predominantly of four basic types: toggle switches, rotary switches with click-stops (detents), thumbwheels, and push buttons. Critical switches are guarded so that they cannot be thrown inadvertently. In addition, some critical controls have locks that must be released before they can be operated.

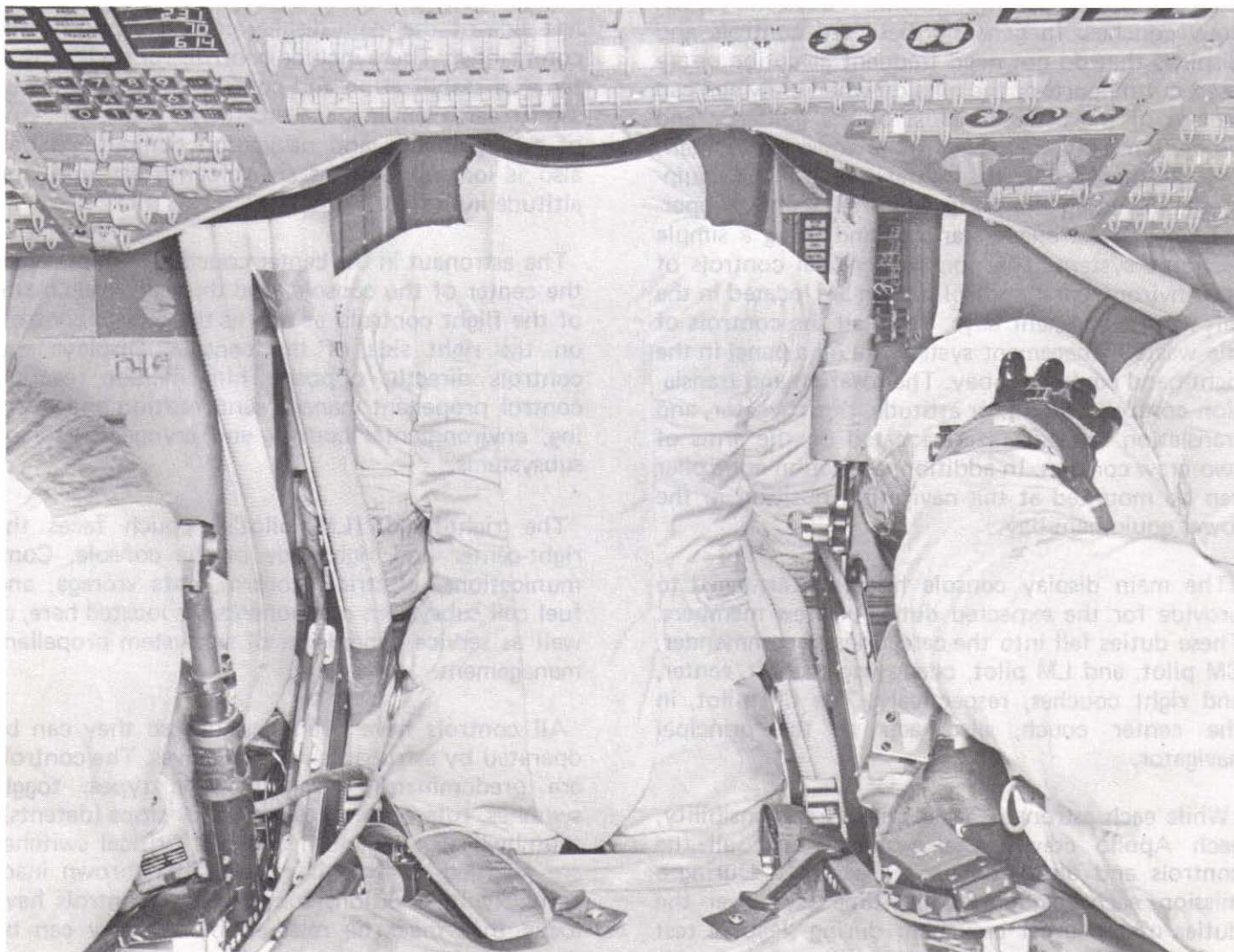
In any mission, the Apollo crewmen will spend a great deal of their time manipulating controls and monitoring displays on the main display console. Crew duties, broken down by mission phase, are determined by NASA and compiled into a checklist for each astronaut. These checklists are part of the flight data file for the mission. This file consists of ten documents divided among three packages. The two smaller packages, called data file bags, each contain two documents and are attached to the outer sides of the left and right couches at about shoulder height. The other six documents are kept in a fiberglass container stowed in the lower equipment bay.

The data file bag on the left couch contains the commander's checklist and the mission flight plan. The bag on the right couch contains the LM pilot's checklist and the mission log, which is used as a backup to the voice recorder log. The data file

container includes the CM pilot's checklist, landmark maps, star charts, orbital maps, an experiment checklist, and spacecraft subsystem data.

Despite the man-hours spent in mission simulators, it would be difficult if not impossible for the astronauts to remember all the procedures required for long-duration mission. The checklists contain the detailed procedures for each phase of the mission.

Among the checklists carried by the astronauts are those for subsystem management. These are compilations of procedures that are common to more than one phase of a mission. These procedures involve system monitoring, periodic checks, and unique functions of the service propulsion, reaction control, electrical power, environmental control, and caution and warning subsystems.



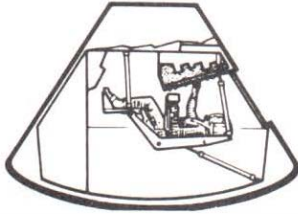
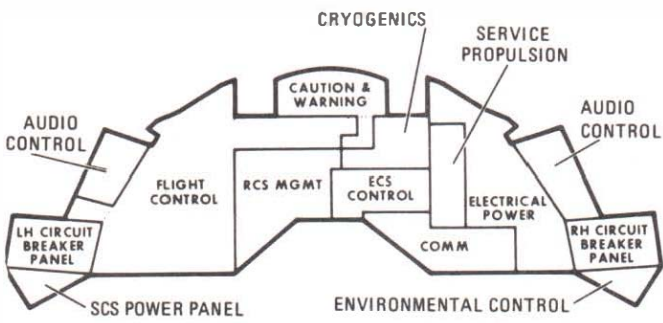
P-99

Astronaut stands at navigation station in lower equipment bay

tests are performed at specific times or events, such as the service propulsion subsystem tests before and after every velocity change.

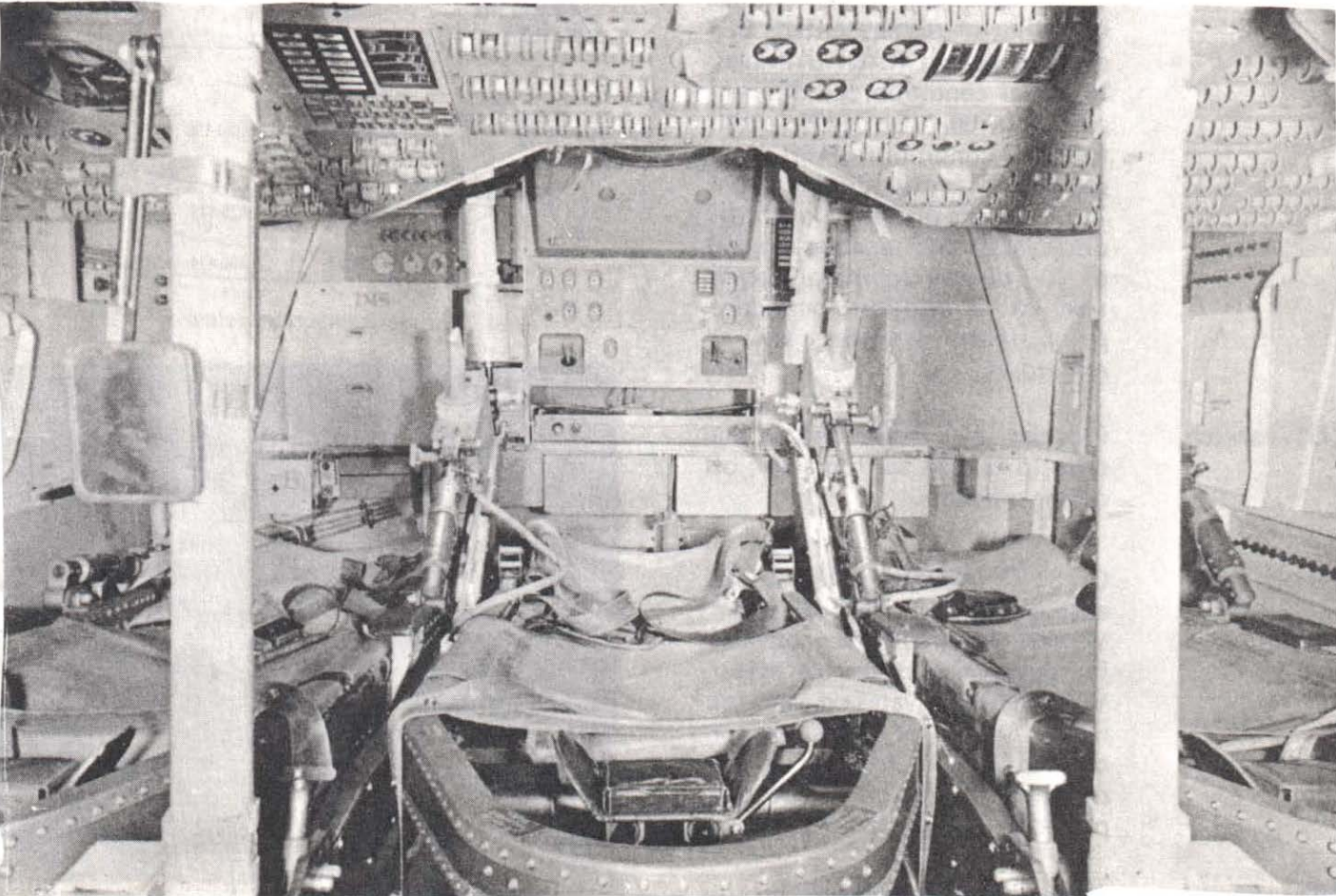
CAUTION AND WARNING SYSTEM

Critical conditions of most spacecraft systems are monitored by a caution and warning system. A malfunction or out-of-tolerance condition results in illumination of a status light that identifies the abnormality. It also activates the master alarm circuit, which illuminates two master alarm lights on the main display console and one in the lower equipment bay and sends an alarm tone to the astronauts' headsets. The master alarm lights and tone continue until a crewman resets the master alarm circuit. This can be done before the crewmen deal with the problem indicated. The caution and warning system also contains equipment to sense its own malfunctions.



P-100 *Grouping of controls and displays*

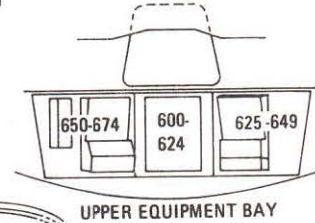
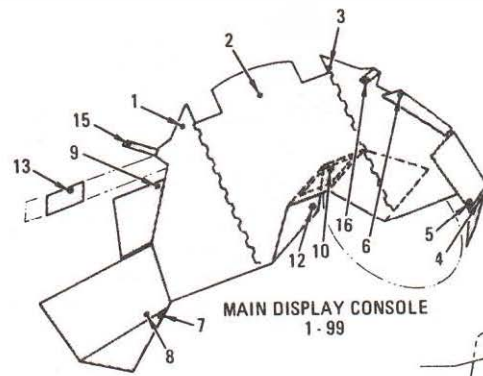
Periodic checks are performed from every hour to every 24 hours, depending on the subsystem, throughout a mission. In addition, other checks or



P-101 *Panels and crew couches viewed through command module hatch*

DETAILED DESCRIPTION

The major portion of the main display console is composed of nine panels, three in the center section and three in each of its two wings. These panels are numbered 1 through 9. Because of the multitude and complexity of the displays and controls on the three center panels, they have been arbitrarily divided into zones for easier reference. The zone markings do not appear on the actual console.



Panel 1A

Contains entry displays.

Altimeter Indicates altitude of CM to 60,000 feet.

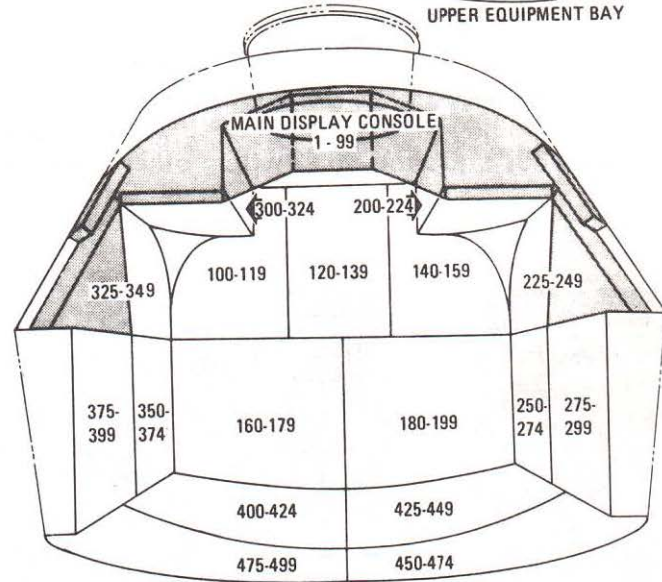
Entry monitor panel displays ΔV /EMS SET switch Increases or decreases ΔV /RANGE display; also used to move velocity scroll.

FUNCTION switch Used to select operation: EMS TEST positions check proper operation of displays; RNG SET enables moving RANGE display to initial condition; V_o SET enables moving VELOCITY scroll to initial condition; ENTRY sets panel for entry displays; ΔV TEST checks operation of thrust displays; ΔV SET enables moving of ΔV display to initial condition; ΔV is position for service propulsion engine thrust monitoring.

GTA switch Provides bias signal in ground tests to nullify earth gravity; off during mission.

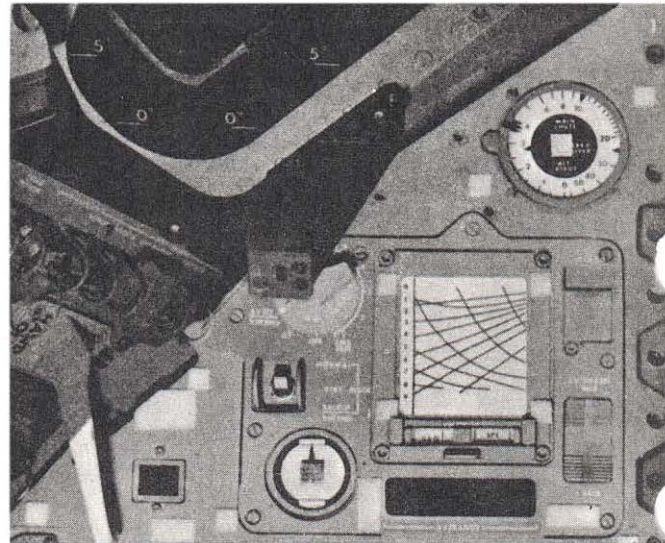
MODE switch On STBY, inhibits all operations except ΔV SET, RNG SET and V_o SET; on NORMAL, activates function selected; on BACKUP/VHF RNG, activates displays for manual entry or thrust vector control, and enables VHF ranging information to be displayed on ΔV /ranging display.

RANGE/ ΔV display Shows either range to go (in nautical miles) or ΔV remaining



P-101a

Panel numbering system



P-102

Panel 1A

(in feet per second), depending on position of FUNCTION switch; signals automatic cutoff of service propulsion engine in stabilization and control configuration; provides readout of LM-CSM ranging during rendezvous.

SPS
THRUST light

When lit, indicates thrust-on command to service propulsion engine (operation depends on MODE and FUNCTION switches).

0.05G light

When lit, indicates deceleration greater than 0.05G.

VELOCITY
indicator

Shows acceleration (G scribe) versus velocity (velocity scroll) during entry.

Roll
Attitude
Indicator

Pointer shows stability axis roll attitude (lift vector orientation) and should be directed toward lamp that is lit; top lamp lights 10 seconds after 0.05G light to indicate deceleration equal to or greater than 0.262G; bottom lamp lights 10 seconds after 0.05G light to indicate deceleration equal to or less than 0.262G.

MASTER
ALARM light

Glows red to alert crewmen to malfunction or out-of-tolerance condition; at the same time, an alarm tone is sent to headsets of each crewman and a light is illuminated on caution and warning panel to indicate the malfunction; pushing MASTER ALARM button extinguishes light and resets alarm circuit. The light may be inhibited during boost.

Panel 1B

Contains displays and manual controls for boost, entry, and abort.

ABORT light

Glows red to alert crew that abort has been requested by the ground; backup to voice communications.

Digital
event timer

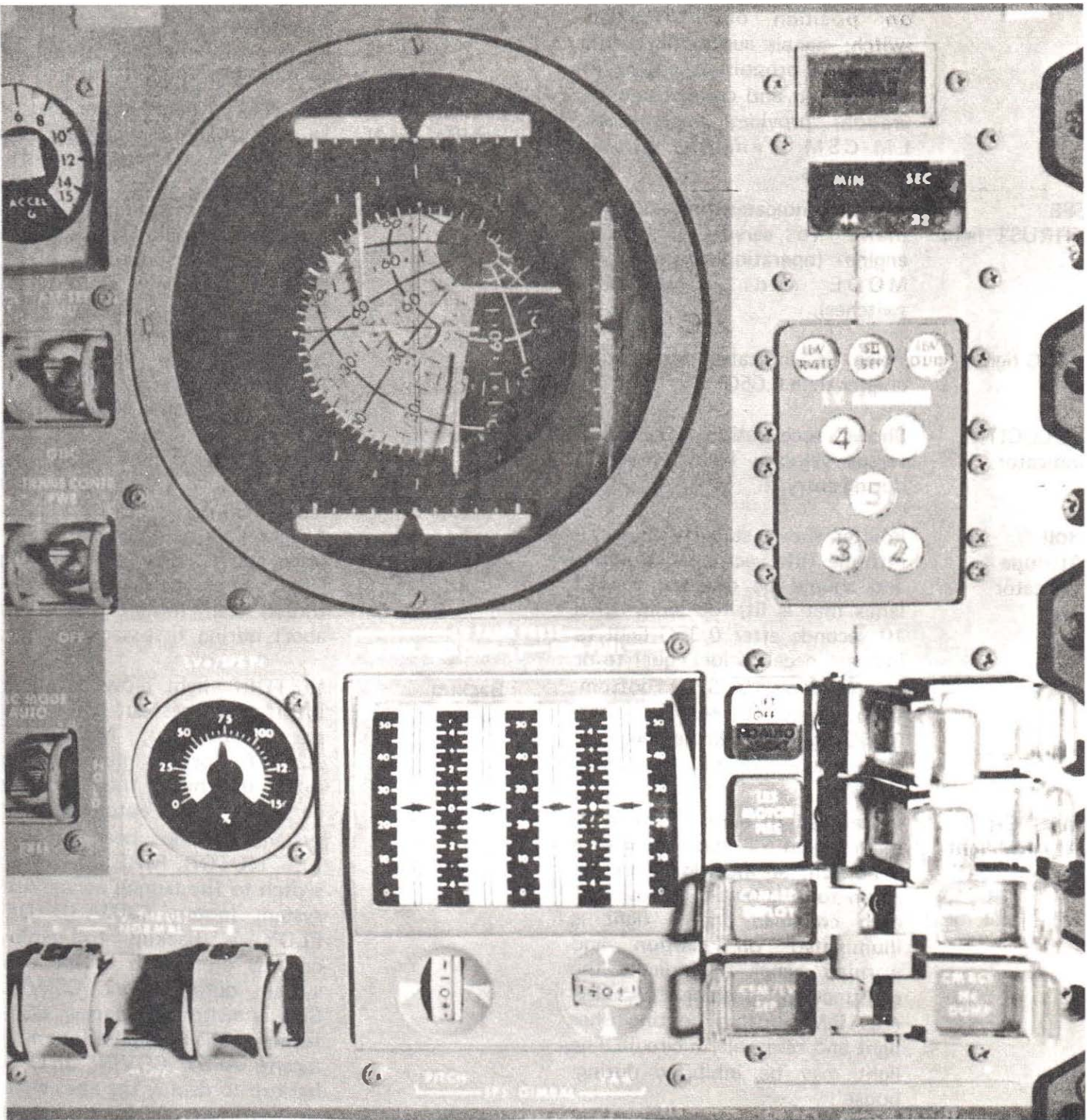
Starts automatically at liftoff and is automatically reset to zero if abort is initiated; controlled by switches on Panel 1D.

Launch
Vehicle lights

LV RATE light glows red if launch vehicle angular rates are excessive, which can automatically initiate abort; LV GUID light glows red to indicate failure in launch vehicle guidance system, which can result in abort; SII SEP light glows white when staging is initiated and goes out when interstage skirt drops away from S-II after ignition; LV ENGINES lights (arranged in same pattern as on vehicle—1, 2, 3, and 4 are outboard and 5 is inboard) glow yellow before ignition and go out when an engine reaches 90 percent of thrust; No. 1 light also operated for third-stage engine; two lights glowing (two engines below 90 percent thrust) can initiate automatic abort during first-stage burning.

Backup
switches

LIFTOFF light glows white at liftoff and goes out before first stage separation; NO AUTO ABORT portion glows red at liftoff if either of the emergency detection system automatic abort systems has not been enabled. LES MOTOR FIRE is backup switch to fire launch escape subsystem motor; CANARD DEPLOY is backup to deploy canards on launch escape subsystem during abort; CSM/LV SEP is switch for normal CSM-launch vehicle separation after ascent; APEX COVER JETT is backup to deploy the apex cover (forward heat shield) during descent; DROGUE DEPLOY and MAIN DEPLOY are backup switches to deploy drogue and main parachutes during descent; CM RCS He DUMP is backup for starting reaction control subsystem helium purge. The backup switches are all guarded to prevent inadvertent operation.



P-103

Panel 1B

LV TANK PRESS indicators

Shows pressure in the fuel tank of the second stage (S-II) and pressure in oxidizer and fuel tanks of the third stage (S-IVB) on left, center, and right scales. Display is controlled by switch on Panel 1D;

SPS GIMBAL thumbwheels

LV/SPS Pc

tank pressures are monitored during boost, gimbal position during rest of mission.

Used to set position of service propulsion engine pitch and yaw gimbals in SCS mode.

Shows either off-axis pressure

measured by Q-ball atop launch escape subsystem or service propulsion engine combustion chamber pressure, depending on position of switch on Panel 1D; switch is in former position only during early phases of boost.

Panel 1D

Consists of switches and indicators for flight control of the spacecraft.

ACCEL G Meter shows G forces along spacecraft's X axis.

CMC ATT On IMU (inertial measurement unit), allows attitude transformations in gyro display coupler and motor excitation to either or both attitude balls. GDC (gyro display coupler) was planned as backup but is not used.

FDAI switches SCALE switch selects scale (degrees of error and degrees per second of rate) on three attitude indicators. SELECT switch selects sources for attitude balls: 1/2 sends signals to both balls, 2 sends signals just to FDAI No. 2, and 1 sends signals just to No. 1. SOURCE switch selects source of signals to balls (if SELECT switch is on either 1 or 2 position); CMC is computer, ATT SET is based on position of ATT SET switch, GDC is gyro display coupler.

ATT SET On IMU (inertial measurement unit), signals from unit are sent to attitude set panel; on GDC, signals from gyro display coupler are sent to panel.

MANUAL ATTITUDE switches ACCEL CMD position for all three switches disables automatic control of reaction control engines and prepares for manual control; RATE CMD is normal position for automatic control; MIN IMP position prepared electronics for minimum-impulse engine firing.

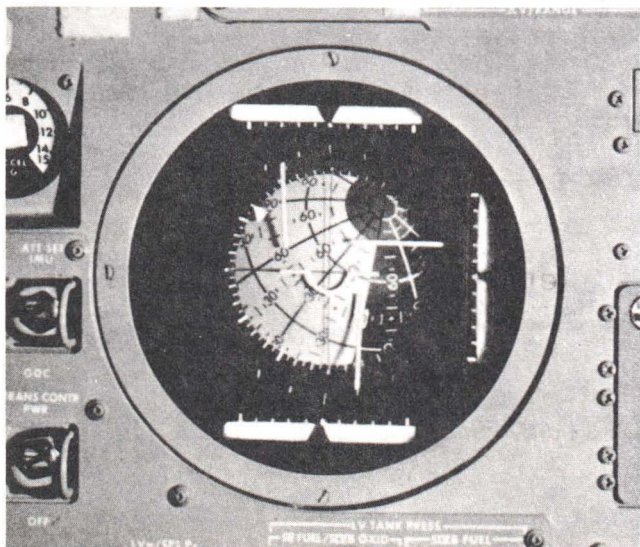
Panel 1C

Contains flight director attitude indicator No. 1.

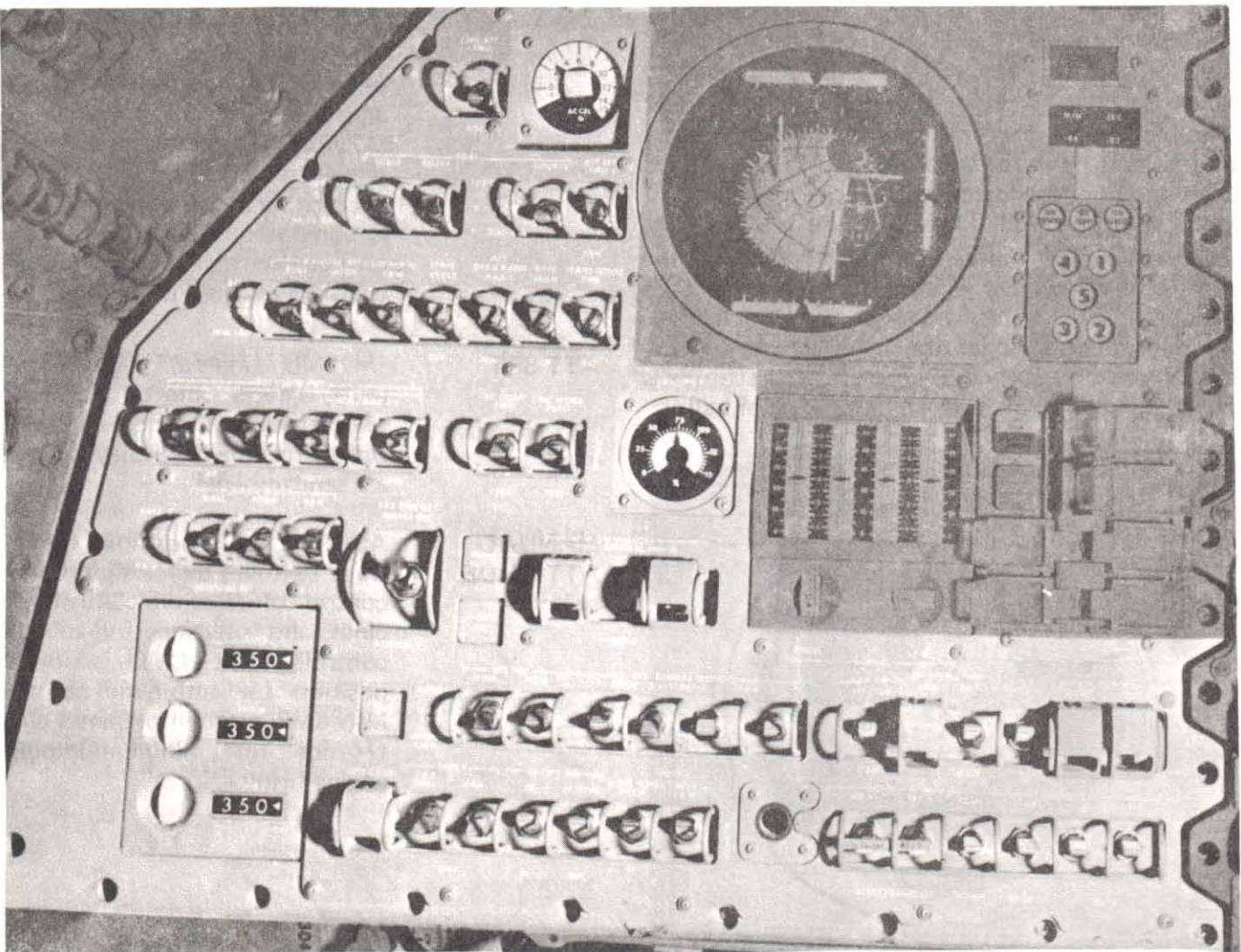
Rate indicators are at top (roll), right (pitch), and bottom (yaw). Spacecraft body rates are indicated by the displacement of the arrows from the center and correspond to the direction the rotation control must be moved to correct the displacement.

The attitude error needles (on the outside rim of the ball adjacent to the rate indicators) show the difference between the actual and the desired spacecraft attitude. These also correspond to the direction the rotation control must be moved to reduce the error to zero.

The ball shows spacecraft orientation with respect to a selected inertial reference. The ball rotates about three independent axes which correspond to pitch, yaw, and roll. Pitch attitude is shown by great semicircles; the semicircle shown under the inverted wing symbol is inertial pitch at time of readout. Yaw attitude is shown by minor circles; the minor circle under the inverted wing is the inertial yaw at the time of readout. Roll attitude is shown by small arrowhead on outer scale of ball.



LIMIT CYCLE switch	When OFF inhibits pseudo-rate feedback in electronic control assembly.	TRANS CONTR switch	When on PWR, applies power to translational hand controller.
ATT BEADBAND switch	Selects additional 4 degrees of deadband in attitude control electronics (deadband is the area in which no response will be provoked, like the play in a car steering wheel).	ROT CONT PWR switches	NORMAL switches apply power to rotational hand controllers for normal operation; DIRECT switches apply power to rotational hand controllers for direct mode of operation.
RATE switch	Selects high or low rate and attitude deadbands and proportional rate command capability in electronic control assembly.	SC CONT switch	ON CMC, provides computer control; on SCS, provides stabilization and control subsystem control.
		CMC MODE switch	Selects computer mode of operation.



P-105

Panel 1D

BMAGMODE switches	Routes signals from body-mounted attitude gyros to electronics from gyro assembly No. 1 (RATE 1) or No. 2 (RATE 2), or uses signals from both assemblies for different functions (ATT 1/RATE 2).	ΔV CG switch	motors move service propulsion engine direction of thrust; position can be set manually by thumbwheels on Panel 1B.
SPS THRUST DIRECT ON switch	On DIRECT ON, energizes circuitry which permits service propulsion engine firing; on NORMAL, de-energizes circuits.	ELS switches	On LM/CSM when lunar module is attached; on CSM when lunar module no longer attached.
DIRECT ULLAGE pushbutton	Backup switch for ullage maneuver before service propulsion engine firing; translation control normally provides for ullage maneuver.		On LOGIC, provides power to arm earth landing subsystem circuitry; switch is guarded until entry or abort. Second switch is normally on AUTO for automatic control of landing subsystem; set to MAN only after drogue parachute deployment during an abort in first minute of boost.
THRUST ON pushbutton	Signals circuitry to fire service propulsion engine.	CM PROPELLANT JETT switches	These control dumping of CM reaction control subsystem propellant. LOGIC switch activates DUMP switch and prepares circuits for automatic dumping of propellant. Guarded DUMP switch starts process of burning propellant during descent. PURGE switch sends helium through CM lines and reaction control engines after propellant has been burned.
ΔV THRUST switches	On NORMAL, applies power to injector pre-valves A or B, signals computer that engine is ready to fire, and supplies power to permit thrusting. Two switches are guarded to the OFF position.		
ATTITUDE SET panel	Thumbwheels and indicators allow crewman to insert a desired attitude reference into stabilization and control subsystem.	IMU CAGE switch	Guarded switch which when up cages the inertial measurement unit platform with all three gyros at 0 degrees.
GDC ALIGN pushbutton	When pressed, sends attitude information dialed on ATTITUDE SET panel to gyro display coupler.	ENTRY switches	EMS ROLL switch sends signal to gyro display coupler to drive roll attitude indicator on entry monitor display. 0.05G switch provides signals which couple roll and yaw rates and sum them for display on roll stability indicator and attitude ball.
SCS TVC switches	On AUTO, provides automatic control of thrust vector; on RATE CMD, provides for manual control of thrust vector; on ACCEL CMD, inhibits body-mounted attitude gyro signals.		
SPS GIMBAL MOTORS switches	Switches for primary (1) and secondary (2) gimbal motors; normally down (off), they are moved up to start the motors and switch is spring-loaded to return to center (on) position. Gimbal	LV/SPS IND switches	Controls what is displayed on indicators on Panel 1B. Left switch connects Q ball () or service propulsion engine sensor (Pc) to LV/SPS Pc indicator. Right switch provides for display of launch vehicle tank pressures (SII/SIVB) or gimbal position

(GPI) on the LV FUEL TANK PRESS indicator.

position of RESET/DOWN switch.

TVC GMBL DRIVE switches

Allows crew to select a specific channel or automatic control for thrust vector control. AUTO is automatic; 1 applies commands only to primary channel of gimbal actuator; 2 applies commands to secondary channel.

EVENT TIMER switches

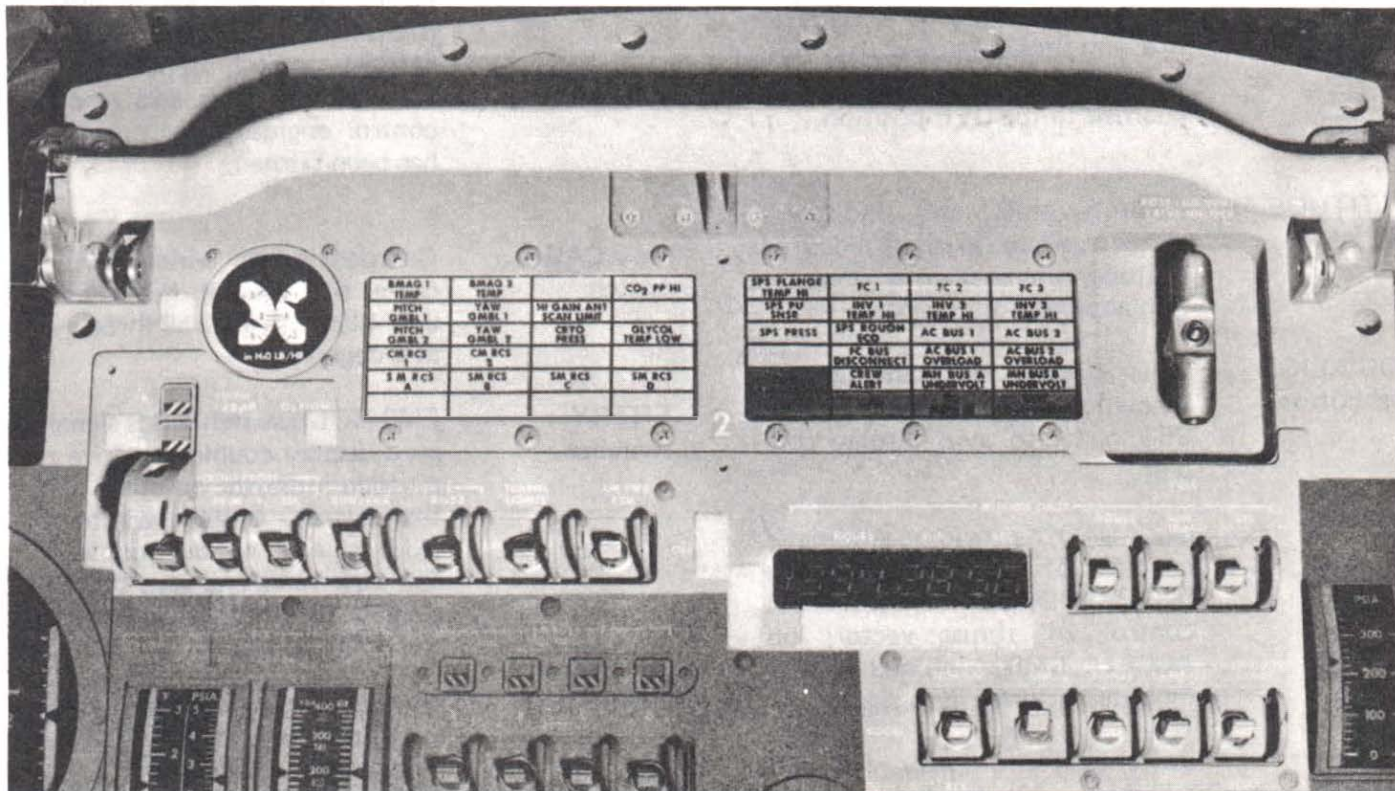
These control digital event timer on Panel 1B. RESET position sets timer to zero; center position causes counter to count up; DOWN position causes it to count down. START switch starts timer, STOP halts it, center position has no function. MIN and SEC switches turn counter by tens or ones (units) and can be turned up or down depending on

Panel 2A

Contains caution and warning system controls and displays, docking switches, and mission timer switches and display.

Caution & Warning lights

These lights illuminate to indicate a malfunction or out-of-tolerance condition in a system or component. The MASTER ALARM lights and audio signal are activated when one of these caution and warning lights come on. Most of the 37 lights are yellow; five are red. The lights and what they indicate are: BMAG 1 and BMAG 2 (temperature too high in gyro assembly 1 or 1); PITCH GMBL 1 or 2 and YAW GMBL 1 or 2 (overcurrent in drive motor of



gimbal actuator); CM RCS 1 or 2 (over- or under-pressure in CM reaction control subsystem propellant tanks); SM RCS A, B, C, or D (pressure or temperature too high or too low in SM reaction control subsystem quad); HI GAIN ANT SCAN LIMIT (scan limit exceeded on S-band high-gain antenna); CRYO PRESS (under- or over-pressure in cryogenic hydrogen or oxygen tanks of electrical power subsystem); CO₂ PP HI (carbon dioxide partial pressure is high); GLYCOL TEMP LOW (temperature of water glycol from radiator is low); SPS FLANGE TEMP HI (temperature too high in service propulsion engine combustion chamber flange); CMC (red) (loss of power or failure of any one of a number of components in computer); ISS (red) (failure in one of key units in inertial subsystem); FC 1, 2, or 3 (any one of a number of temperature, pressure, or flow conditions in a fuel cell); INV 1 (2 or 3) TEMP HI (temperature too high in an inverter); AC BUS 1 or 2 (under- or over-voltage in ac electrical bus); FC BUS DISCONNECT (a fuel cell has automatically disconnected from dc main bus); AC BUS 1 (or 2) OVERLOAD (ac bus overloaded); CREW ALERT (activated by ground and can only be extinguished by ground); MN BUS A (or B) UNDERVOLT (dc bus undervoltage); C/W (red) (power supply voltage to caution and warning system is out of range); O₂ FLOW HI (red) (oxygen flow rate too high);

SUIT COMPRESSOR (red) (suit compressor differential pressure low).

PROBE
EXTD/RETR
indicators

Striped lines indicate probe is in motion; gray indicates movement has stopped.

DOCKING
PROBE
switches

Guarded left-hand switch on EXTD/REL extends probe and releases latches. Two RETRACT switches (primary and secondary) retract probe.

LIGHTS
switches

EXTERIOR switches for RUN/EVA and rendezvous or spot-lights. TUNNEL switch turns on CM tunnel lights.

LM PWR
switch

Connects CM power to heater circuits in LM; on RESET, disconnects CM power and connects heater circuits to LM power.

MISSION
TIMER
indicator

Shows time in hours, minutes, and seconds.

MISSION
TIMER
switches

Sets timer in hours, minutes, and seconds; switches can change timer display by tens or units (ones) but only counts up (it is necessary to go all the way to zero to get lower numbers).

MSN
TIMER
switch

Starts, stops, and resets the timer.

CAUTION/
WARNING
switches

Left-hand switch is set to NORMAL for most of mission; on BOOST, Master Alarm light on Panel 1A is disabled to prevent confusion with Abort red light near it; on ACK, caution and warning lights on panel 2 only are disabled. CSM/CM switch selects

systems to be monitored; CSM is normal, CM is used after separation so that only CM systems are monitored. POWER switch selects power source for caution and warning system; LAMP TEST tests lamps of system; 1 position tests left-hand lamps, 2 position tests right-hand lamps.

The displays include COMP ACTY light (computer is calculating); PROG, NOUN, and VERB lights, which show the program, noun, and verb being used; and Registers 1, 2, and 3, which provide information to the crew.

The keyboard (at bottom) is the means by which the crew operates the computer. VERB key sets computer to accept next two digits as verb code. NOUN key sets computer to accept next two digits as noun code. CLR key blanks the register being loaded. STBY key puts computer in standby; when pressed again computer resumes normal operation. KEY RLSE releases the displays from keyboard control so computer can display internal program information. ENTR key informs the computer that the data has all been loaded and tells it to execute the desired function. RSET key extinguishes the status lamps controlled by the computer.

Panel 2B

Contains flight director attitude indicator No. 2. Identical in operation to No. 1. See Panel 1C for description of displays.

Panel 2C

Contains display and keyboard for command module computer. Group of status lights at top left include UPLINK ACTY (computer is receiving data from ground); TEMP (temperature of stable platform is out of tolerance); NO ATT (inertial subsystem is not in a mode to provide attitude reference); GIMBAL LOCK (middle gimbal angle exceeds 70 degrees); STBY (computer subsystem is on standby); PROG (computer requests additional information to complete program); KEY REL (internal program needs keyboard circuits to continue program); RESTART (computer has gone into restart program); OPR ERR (error has been made on keyboard); TRACKER (failure of one of the optical coupling data units).

Panel 2D

Contains key switches for abort, boost, and entry.

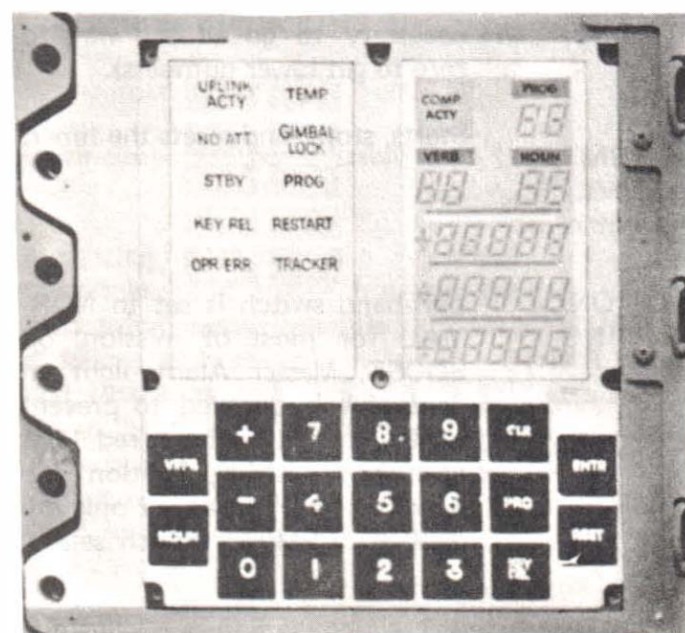
EDS switch On AUTO, prepares the emergency detection system for automatic abort; the system is part of the launch vehicle and operates only during boost.

CSM/LM FINAL SEP switches Guarded switches spring-loaded to the down position. Pushing up jettisons the docking ring and probe; this also jettisons the LM ascent stage in lunar orbit.

CM/SM SEP switches Guarded redundant switches spring-loaded to the down position. When pushed up, send signal to master events sequence controller to start CM-SM separation procedure.

S-IVB/LM SEP switch Guarded switch used to separate LM from S-IVB after transposition and docking.

ABORT SYSTEM switches PRPLNT DUMP switch is placed on AUTO during first minute of boost to enable rapid dumping of reaction control subsystem propellant in case of an abort; RCS CMD position used afterwards to enable dumping sequence by firing unused propellant through reaction control engines. 2 ENG OUT switch on AUTO activates



P-107

Panel 2C

the emergency detection system for an automatic abort if two booster engines fail; operates only during boost. LV RATES on AUTO activates the emergency detection system for automatic abort if launch vehicle rates are excessive; operates only during boost. Guarded redundant TWR JETT switches start jettisoning of launch escape tower; tower normally is jettisoned automatically shortly after first stage separation.

MAIN
RELEASE
switch

Guarded switch which is electrically activated when CM descends to 10,000 feet and main parachutes are deployed. Spring-loaded to down position, it is used only after splashdown, to release main parachutes from command module.

Panel 2E

Contains displays and controls for managing reaction control subsystem, plus two switches of telecommunications subsystem.

SM RCS,
CM RCS
indicators

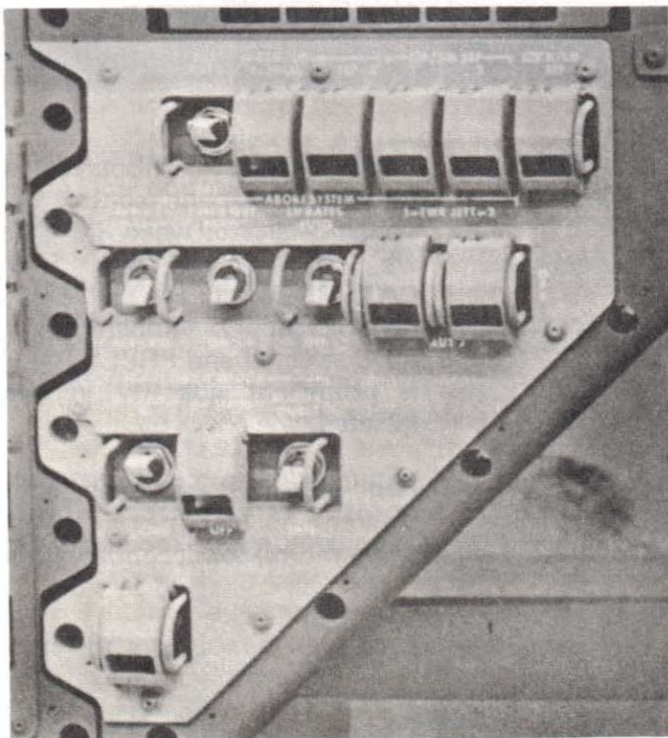
Four meters show various conditions in SM and CM reaction control subsystems; display is controlled by RCS INDICATORS switch. For SM subsystem, indicators show TMP PKG (temperature of the SM quad selected), He PRESS (helium tank pressure in quad selected), SEC FUEL (secondary tank pressure in quad selected), and PRPLNT QTY (propellant quantity in quad selected) or He TK TEMP (helium supply temperature of quad selected). CM subsystem indicators show He TEMP (helium tank temperature of system selected), He PRESS (helium tank pressure of system selected), MANF PRESS (regulated helium pressure in the manifold of the system selected).

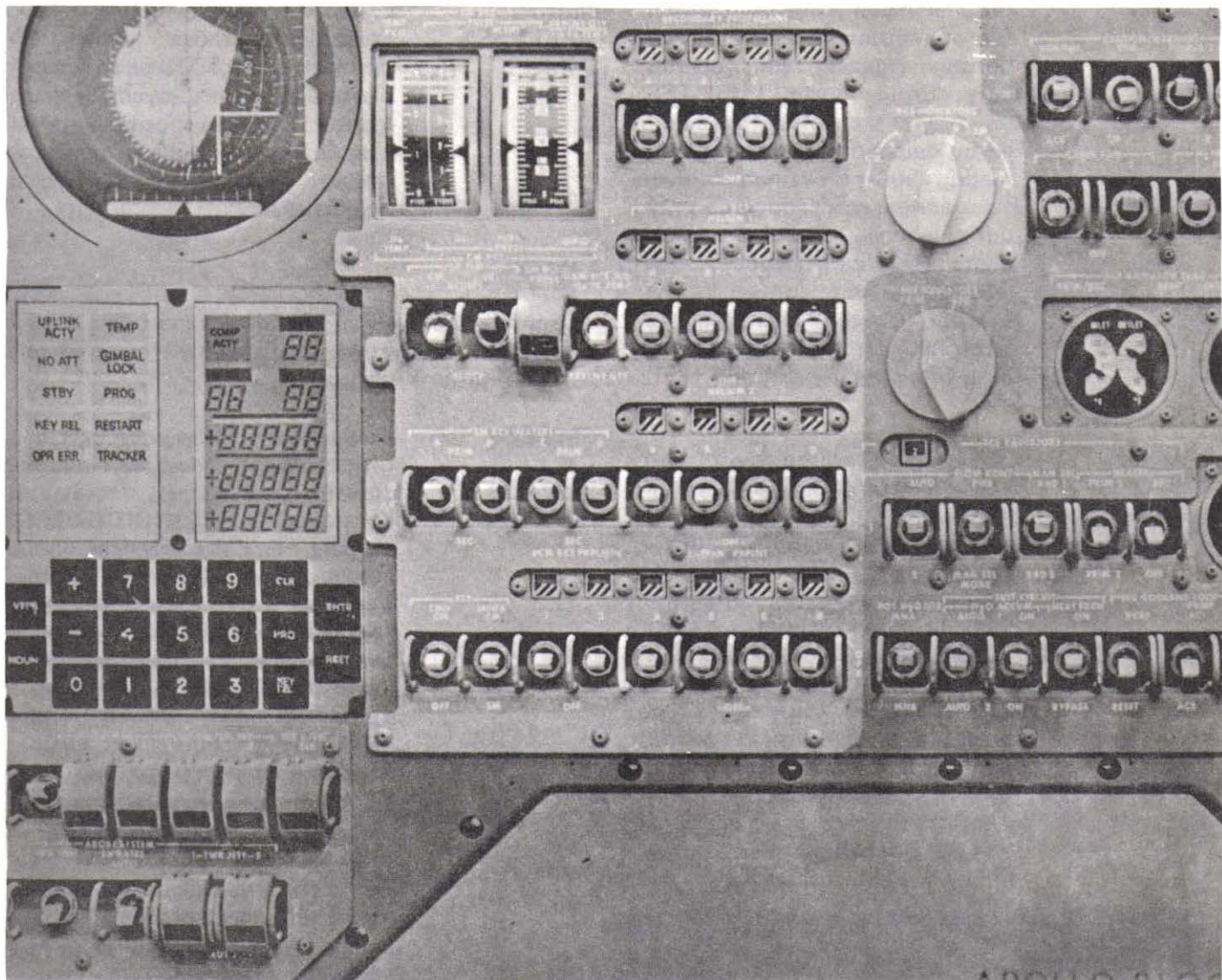
LAUNCH
VEHICLE
switches

GUIDANCE switch selects means of guidance during boost; this is normally on IU (instrument unit), allowing Saturn guidance system to control boost; CMC (command module computer) position will disconnect Saturn guidance and CM computer will control flight. S-II/S-IVB guarded switch initiates separation of the Saturn V second stage (S-II) from the third stage (S-IVB); this is backup to jettison second stage in emergency. XLUNAR switch will allow or inhibit translunar injection.

SM RCS
HELIUM
switches and
indicators

Two groups each with four switches, with each switch having an indicator window above it. Switches are identical, spring-loaded to return to center position. OPEN position opens isolation valve in helium pressure system, CLOSE position closes valve. HELIUM 1 switches control valves in one of redundant systems, HELIUM 2 switches control valves in other redundant system. Striped-line display on indicators means valve is closed; gray display means valve is open.





Panel 2E

RCS INDICATORS switch

Selects portion of reaction control subsystem to be displayed on indicators. CM1 and 2 are command module Systems 1 and 2; SM A, B, C, and D are service module quads.

UPTLM switches

On ACCEPT, enables telemetry from the ground to go to the instrument unit (IU) or CM computer (CM) the up-data link equipment. On BLOCK, blocks the message.

CM RCS PRESS switch

Guarded switch which when pushed up activates the two helium isolation valves in CM reaction control Systems 1 and 2.

SM RCS IND switch

Controls what is displayed on right-hand reaction control subsystem indicator when SM quads are selected by RCS INDICATORS switch. He TK TEMP is helium supply temperature of quad selected and PRPLNT QTY is propellant quantity in quad selected.

SM RCS HEATERS switches

Four identical switches apply power to primary (high-temperature) or secondary (low-

temperature) thermostiches in SM reaction control subsystem quads. Thermostiches automatically turn heaters on and off.

SM RCS
PRPLNT
switches and
indicators

Two groups of four identical switches each, with each switch having an indicator above it. Each switch controls two isolation valves (one fuel and one oxidizer) in each SM reaction control subsystem quad. Switches are spring-loaded to center position. Indicators show whether valves are closed (striped lines) or open (gray).

CM RCS
PRPLNT
switches and
indicators

Two identical switches which control fuel and oxidizer isolation valves in CM reaction control System 1 and 2. Pushing switch up opens valves, down closes them; switch is spring-loaded to return to center position. Indicators show whether valve is closed (striped lines) or open (gray).

RCS
switches

CMD switch, when on, enables automatic operation of reaction jet engine control assembly (electronics used by the stabilization and control subsystem to fire reaction engines for attitude control). OFF position disables the assembly. Switch is spring-loaded to the center position. TRNFR switch is backup for automatic transfer of reaction control between SM and CM subsystems.

Panel 2F

Contains displays and controls for management of the environmental control subsystem.

CRYOGENIC
TANKS
indicators

Four meters which show pressure and quantity in the cryogenic (ultra low-temperature) oxygen and hydrogen tanks in the SM. PRESSURE indicators show pressure in each of the two hydrogen and each of the two oxygen tanks; QUANTITY indicators

CABIN
FAN switches

shows percentage of fluid remaining. O₂ (oxygen) pressure indicator also can be used to show pressure in environmental control subsystem surge tank; display is controlled by O₂ PRESS IND switch below indicator.

Used to turn on cabin air fans for cooling; both normally are used at same time.

H₂
HEATERS
switches

Used to control redundant heaters in two cryogenic hydrogen tanks. AUTO position enables automatic operation of heaters by pressure switches in tanks; ON position bypasses automatic switches. Center position is off.

O₂
HEATERS
switches

Identical to H₂ HEATERS switches, except for redundant heaters in cryogenic oxygen tanks.

O₂ PRESS
IND switch

Controls what is shown on O₂ 1 indicator above it. TANK 1 position shows pressure in cryogenic oxygen tank 1 on indicator; SURGE TANK shows pressure in oxygen surge tank on indicator.

H₂ FANS
switches

Used to control redundant fan motors in two cryogenic hydrogen tanks. AUTO position enables automatic operation of fan motors by pressure switches in tanks; ON position bypasses automatic switches. Center position is off.

O₂ FANS
switches

Identical to H₂ FANS switches except for redundant fan motors in cryogenic oxygen tanks.

ECS
INDICATORS
switch

Selects primary or secondary glycol loop data for display on four indicators. The four are the three circular indicators immediately to the right of the switch, and the right-hand circular indicator below them.

ECS
RADIATOR
TEMP
indicators

PRIM/SEC display shows temperature of water glycol entering primary or secondary loop sections of space radiators (depending on position of ECS INDICATORS switch). PRIM display shows temperature of water glycol leaving primary loop space radiators. SEC display shows temperature of water glycol leaving secondary loop space radiators.

GLY EVAP
indicator

TEMP (right-hand side of center indicator) shows temperature of water glycol at outlet of water glycol evaporator. STEAM

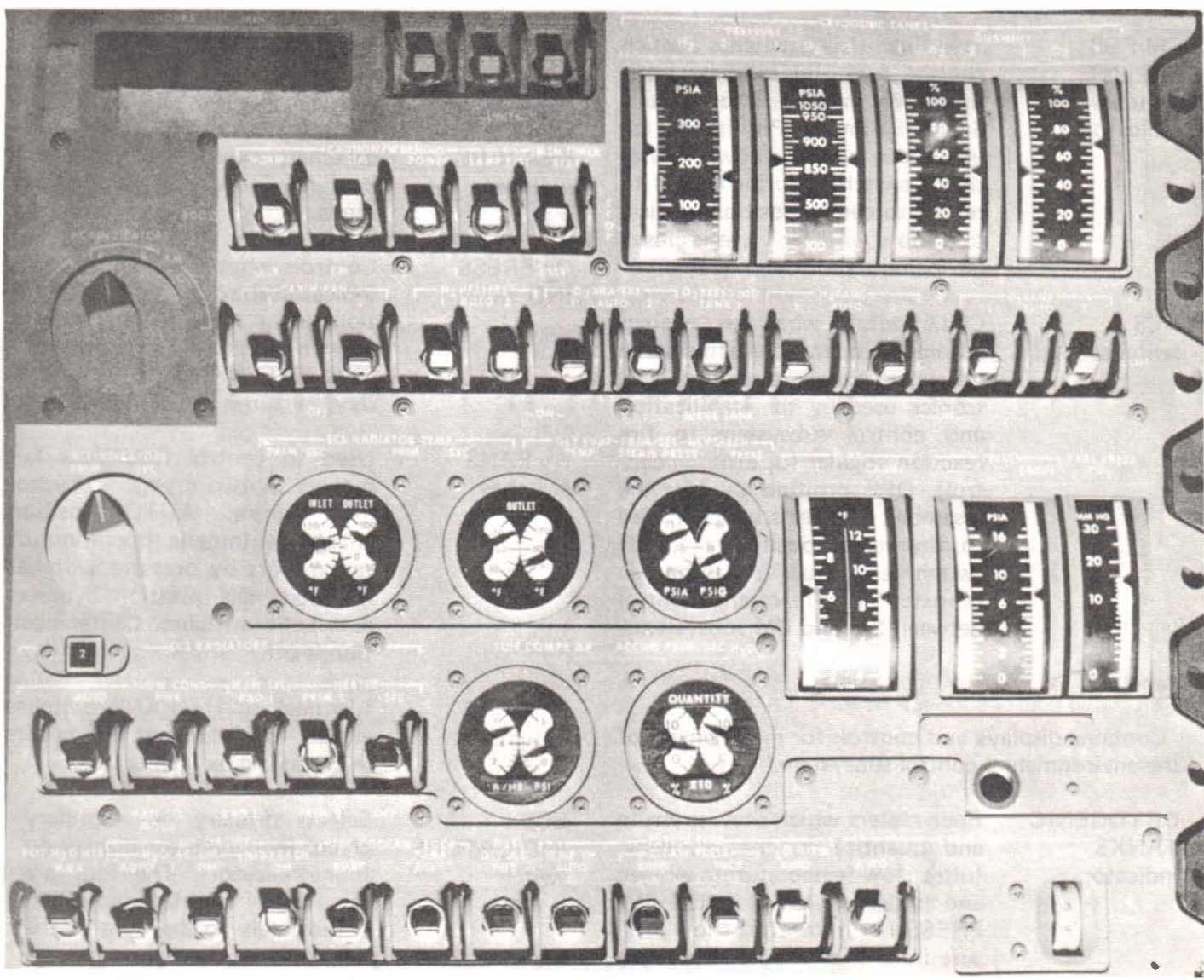
PRESS (left-hand side of third indicator) shows pressure of steam discharge from evaporators. Either primary or secondary glycol loop can be selected by ECS INDICATORS switch.

GLY
DISCH
PRESS

Display (right-hand side of third indicator) shows output pressure of either primary or secondary loop water glycol pumps depending on ECS INDICATORS switch.

TEMP
indicators

SUIT indicator shows temperature of suit circuit atmosphere; CABIN shows temperature of cabin atmosphere.

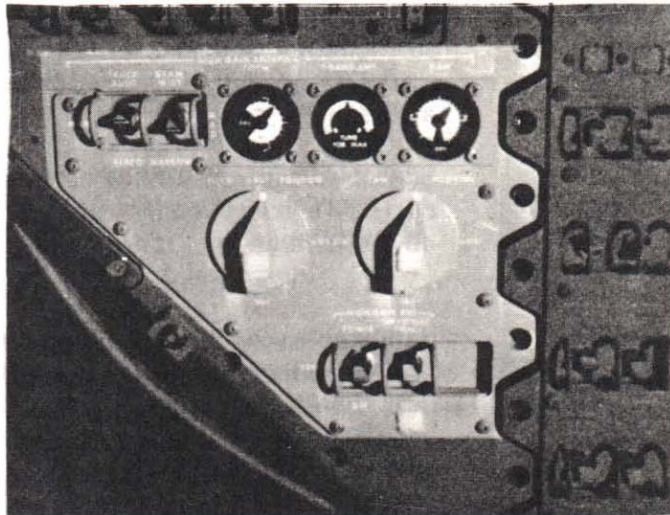


PRESS indicators	SUIT indicator shows pressure of suit circuit atmosphere; CABIN shows pressure of cabin atmosphere.	POT H ₂ O HTR	Selects either dc Main Bus A or dc Main Bus B to supply power to the heater in the potable water tank. Center position cuts off power to the heater.
PART PRESS CO ₂ indicator	Shows partial pressure of carbon dioxide in suit circuit atmosphere.	SUIT CIRCUIT switches	H ₂ O ACCUM switches control cycling of water accumulator valve. AUTO 1 and 2 positions on left-hand switch enables automatic operation of No. 1 and No. 2 accumulator valves; center position activates right-hand switch for manual control of valves (ON 1 is accumulator valve 1, ON 2 is accumulator valve 2, center position is off). HEAT EXCH switch controls flow of water-glycol through heat suit exchanger (ON) or around it (BYPASS); the center position is off.
ECS RADIATORS	Indicator shows gray, indicating flow proportioning control no. 1 is in operation, or the figure 2, indicating flow proportioning control No. 2 is in operation. The FLOW CONTROL switches are used to select flow proportioning control to space radiators; AUTO is automatic control, 1 is No. 1 control, and 2 is No. 2 control. PWR applies power to the AUTO switch, MAN SEL MODE applies power to the MAN SEL switch. MAN SEL switch selects radiator No. 1 (closes radiator No. 2 isolation valves), radiator No. 2 (closes radiator No. 1 isolation valves), or closes isolation valves to both radiators (center position). HEATER switches select No. 1 or No. 2 heater controllers or the secondary glycol loop heater controller, or turns them off.	SEC COOLANT LOOP switches	EVAP switch enables activation of the secondary water-glycol evaporator temperature control. PUMP switch supplies power to the secondary water-glycol loop pump from either ac Bus 1 or ac Bus 2, or turns off the pump (center position).
O ₂ FLOW indicator	Shows total oxygen flow rate from main pressure regulator.	H ₂ O QTY IND switch	Controls what is displayed on H ₂ O indicator; POT shows quantity in potable water tank on indicator, WASTE shows quantity in waste water tank on indicator.
ΔP indicator	Shows pressure differential between suit and cabin.	GLYCOL EVAP switches	TEMP IN provides either automatic or manual control of temperature of coolant entering evaporator by mixing hot and cold water-glycol. (Manual control is achieved by operating a valve in the left-hand equipment bay.) The STEAM PRESS switches provide automatic or manual regulation of pressure in the evaporator steam duct; MAN position of left-hand activates right-hand switch, which is used to increase
ACCUM indicator	Shows quantity of water-glycol in either primary or secondary glycol loop accumulators, depending on ECS INDICATORS switch.		
H ₂ O indicator	Shows quantity of water in potable water tank or waste water tank, depending on H ₂ O QTY IND switch.		

or decrease steam duct pressure. H₂O FLOW switch provides automatic or manual control of valve which regulates flow of water into evaporator; Auto is automatic control, ON is manual control (valve is opened only while switch is held down), and center position is off.

CABIN TEMP switch and thumbwheel

The switch provides for either automatic or manual control of cabin temperature. AUTO position activates temperature control unit which regulates temperature by controlling flow of water-glycol through cabin heat exchanger. Manual control (used only if automatic control fails) is achieved through operation of valve in left-hand forward equipment bay. Thumbwheel is used to increase (up) or decrease the cabin temperature maintained by the automatic control unit.



P-111

Panel 2G

PITCH POSITION switch

Allows manual positioning of the antenna in the pitch plane.

S-BAND ANT indicator

Shows strength of S-band signal after lock-up with ground. Display is related to decibels so that full scale would be about -60 db.

YAW indicator

Shows position in degrees of the antenna in the yaw plane.

YAW POSITION switch

Allows manual positioning of the antenna in the yaw plane.

POWER switch

On POWER, provides electrical power to antenna equipment; on STBY, provides heater power to boom components only; on OFF, cuts off all power to antenna.

SERVO ELEC switch

Selects one of two redundant electronic servoassemblies in high-gain antenna.

Panel 3A

Contains displays and control for management of the service propulsion subsystem and a VHF antenna control.

VHF ANTENNA

Connects one of three VHF antennas into telecommunications subsystem. SM LEFT is the left

Panel 2G

Contains displays and controls for operation of the S-band high-gain antenna.

TRACK switch

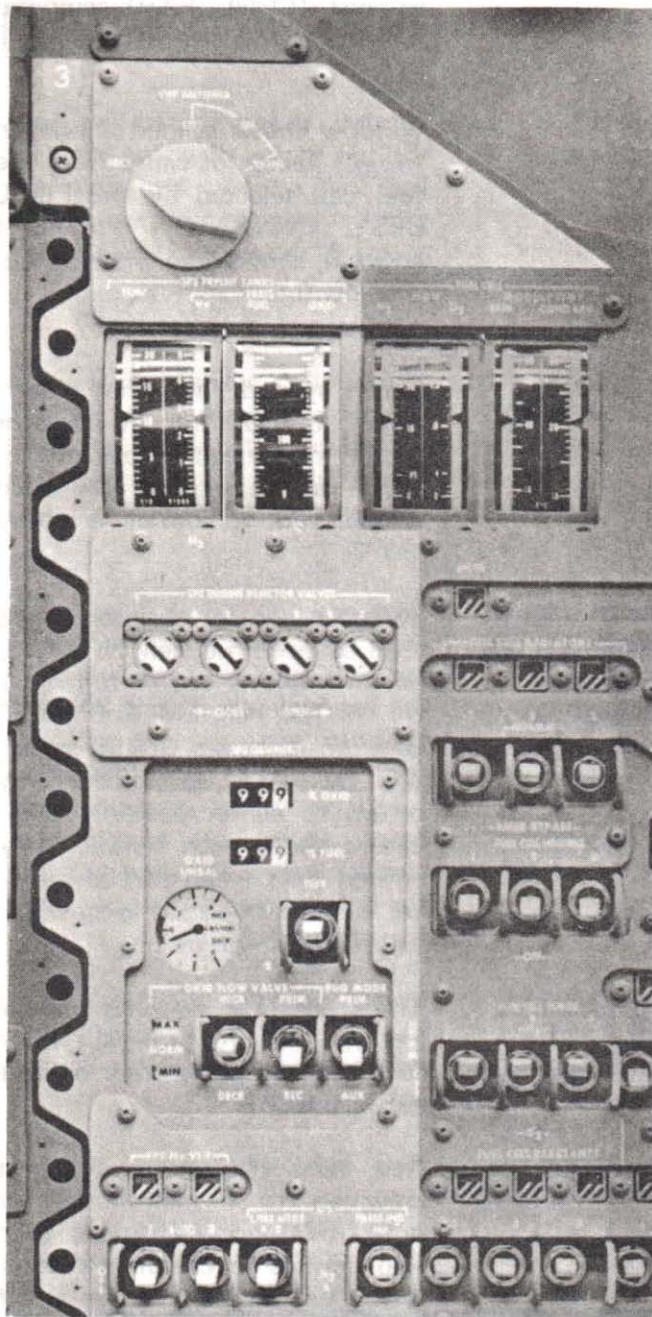
On AUTO, the antenna automatically points toward a ground station; on MAN, the antenna points in the direction set by the PITCH and YAW POSITION dials; on REACQ, the antenna automatically scans (moves) to acquire a ground station.

BEAM-WIDTH switch

Sets the antenna for wide, medium or narrow beamwidth.

PITCH indicator

Shows position in degrees of the antenna in the pitch plane.



Panel 3A

scimitar VHF antenna on the service module; SM RIGHT is the right scimitar antenna. RECY is the VHF recovery antenna on the command module.

SPS PRPLNT TANKS indicators

Shows temperature and pressure of service propulsion subsystem tanks. TEMP provides constant monitoring of temperature in propellant tanks. PRESS indicators show pressure in the helium

(He), fuel (FUEL), and oxidizer (OXID) tanks. The helium tank pressure indicator also can be used to show pressure in the nitrogen storage tank of either of the redundant engine pneumatic valve control system, depending on the position of the PRESS IND switch at the bottom of panel.

SPS ENGINE INJECTOR VALVES indicators

Four identical indicators which show whether service propulsion engine main propellant valves are open or closed. Each indicator shows status of pair of valves (one fuel and one oxidizer); pointer to left is closed, to right is open.

SPS QUANTITY indicator

Two digital counters which show percentage of oxidizer (% OXID) remaining in the oxidizer tanks and percentage of fuel (% FUEL) remaining in the fuel tanks.

OXID UNBAL indicator

Shows unbalance of remaining propellant. Each of six graduations on scale represent 100 pounds of propellant unbalance. Upper half of scale shows increased oxidizer flow required to achieve proper balance; lower half shows decreased flow required.

TEST SWITCH

Used to check proper functioning of SPS QUANTITY and OXID UNBAL indicators. Spring-loaded to center position; pushing up sends simulated signal to sensing system, causing indicators to function; pushing down sends simulated signal in reverse polarity.

OXID FLOW VALVE SWITCHES AND indicators

Upper indicator shows word MAX when propellant utilization valve is in increased oxidizer flow rate position, gray when it is not. Lower indicator shows word MIN when valve is in decreased oxidizer flow rate position, gray when it is not. Switches control

increase (INCR), decrease (DECR), or normal (center position) oxidizer flow by positioning propellant utilization valve. PRIM means signal is applied to primary servo amplifier and SEC is secondary servo amplifier. Switches are used to bring fuel and oxidizer into proper ratio (1.6 oxidizer to 1 fuel) by controlling flow of oxidizer.

PUG MODE switch

Controls source of propellant quantity indicating and warning displays; PRIM is primary propellant quantity sensing system, AUX is auxiliary sensing system, and NORM is both sensing systems together for warning but only primary being displayed.

SPS He VLV switches and indicators

Two identical switches used to apply power to helium isolation valve solenoid; on AUTO, valve opening and closing is controlled automatically; on ON, valves are opened; center position is off. Indicators show striped lines when valves are closed, gray when valves are open.

SPS switches

LINE HTRS switch applies power to heating systems in engine feed lines and bipropellant valves; center position is off. PRESS IND switch determines whether pressure in helium tank (He) or in one of nitrogen storage tank engine control valve systems (N₂A or N₂B) is displayed on indicator at top of panel.

Panel 3B

Contains displays and controls for management of the electrical power subsystem and a second master alarm light.

FUEL CELL indicators

FLOW meters show flow rate of hydrogen (H₂) and oxygen (O₂) into a fuel cell selected by the FUEL CELL INDICATOR switch. MODULE TEMP meters shows skin (SKIN) or condenser

exhaust (COND EXH) temperature of the fuel cell selected.

pH HI indicator

Window shows striped line when the pH factor of water from the fuel cell selected by the FUEL CELL INDICATOR switch is above 9, shows gray when factor is below 9.

FC RAD TEMP LOW indicator

Shows striped lines when water-glycol temperature at radiator outlet of selected fuel cell is -30°F or below; shows gray when temperature at outlet is above -30°F.

FUEL CELL RADIATORS switches and indicators

Switches control radiator panels used by each fuel cell; NORMAL position allows use of full radiator for fuel cell, EMER BYPASS position bypasses 3/8 of radiator. Switch is springloaded to return to center position. Indicators above each switch show striped lines when part of radiator is being bypassed, gray when full radiator is in use.

FUEL CELL HEATERS switches

Three identical switches control heaters in fuel cells; when switches are up heaters operate automatically.

MASTER ALARM light

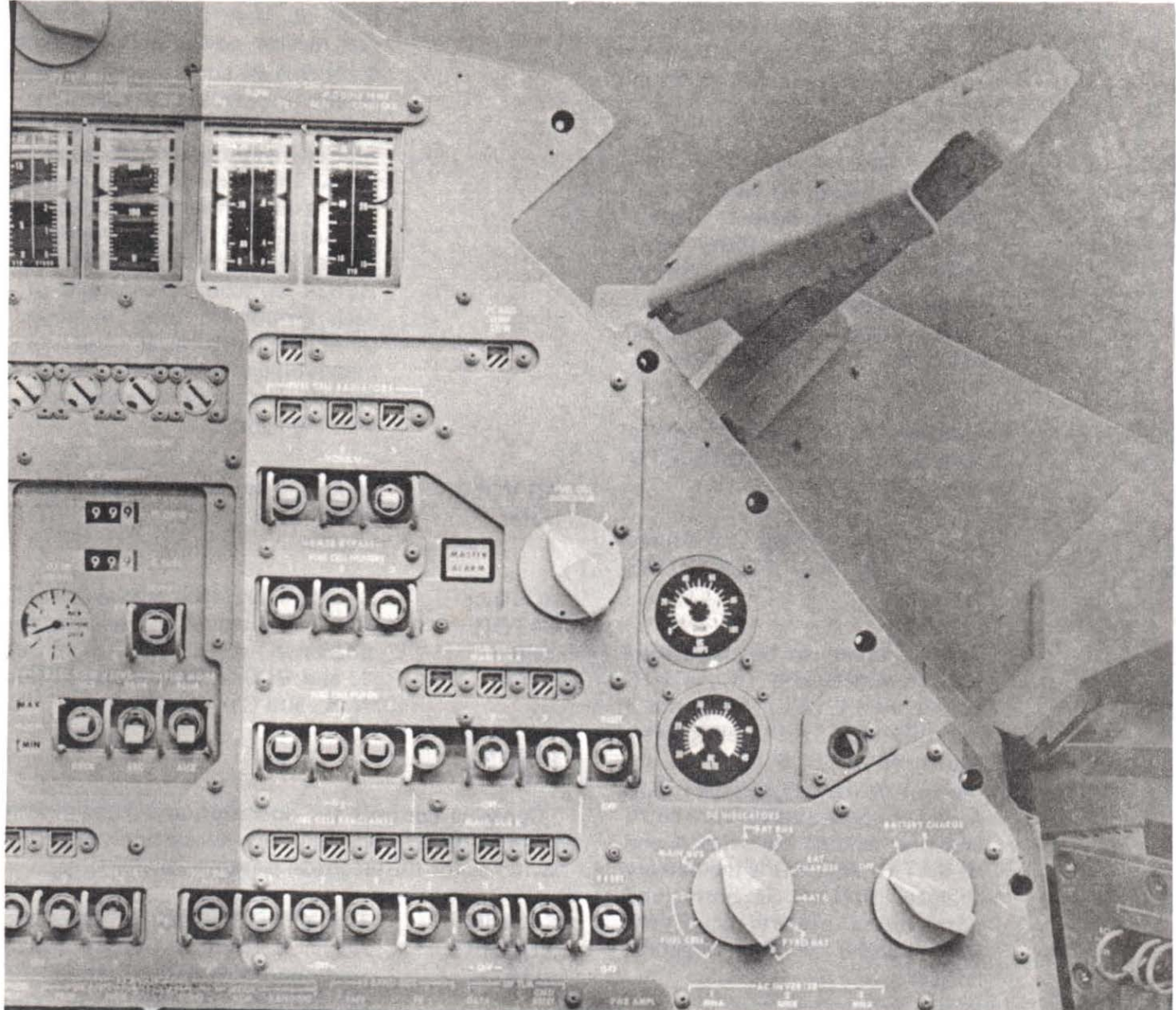
Red light illuminates to alert crewmen to a malfunction or out-of-tolerance condition; tone also sounds in crewmen's headsets. Pushing button shuts off light and audio tone and resets caution and warning system. A second Master Alarm light is on Panel 1A.

FUEL CELL INDICATOR switch

Controls which fuel cell will be connected to indicators.

FUEL CELL MAIN BUS A and MAIN BUS B switches and indicators

Two groups of four switches and three indicators each, one group for Main Bus A and one for Main Bus B. Switches for each fuel cell are pushed up to connect cell

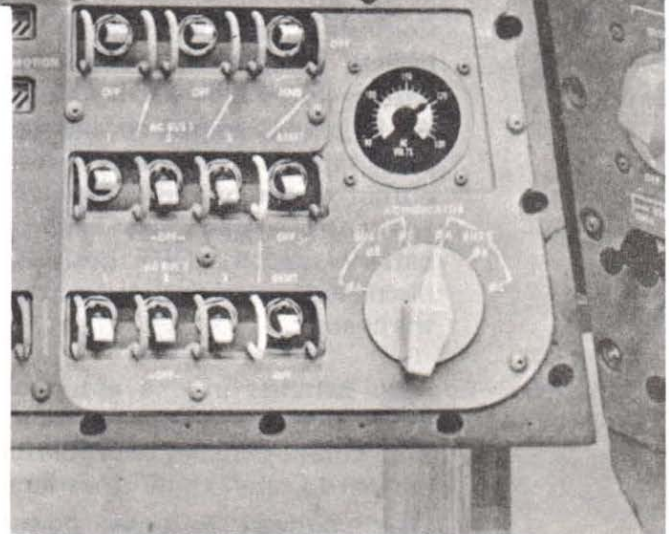


P-113

output to main bus and automatically return to center position; bottom position disconnects electrical output from that bus. Indicators above each switch show striped lines when fuel cell is not connected to that bus and gray when it is connected. RESET switches are used to reset under-voltage sensing circuits in each main bus after a voltage drop (below 26.25 volts) that has illuminated the caution light.

FUEL CELL PURGE switches

These control purging of the fuel cells. H₂ position (up) opens valve on hydrogen side of



Panel 3B

selected fuel cell to purge impurities from hydrogen electrodes; O₂ position acts in same manner for oxygen side. Center position is off.

FUEL CELL REACTANTS switches and indicators

Control flow of reactants (hydrogen and oxygen) to selected fuel cell. ON opens valve to permit hydrogen and oxygen flow; switch automatically returns to center position. Indicators show striped lines if reactant flow has been cut off, gray if flow is normal.

DC AMPS meter

Indicates dc current of source selected by DC INDICATORS switch.

DC VOLTS meter

Indicates dc voltage of source selected by DC INDICATORS switch.

DC INDICATORS switch

Selects source to be monitored on DC AMPS and DC VOLTS meters. FUEL CELL 1, 2, and 3 are the three fuel cell powerplants; MAIN BUS A and B are the two dc main buses; BAT BUS A and B are the buses from entry and post-landing batteries A and B; BAT CHARGER is the battery charger; BAT C is entry and post-landing battery C; PYRO BAT A and B are the pyrotechnic batteries.

BATTERY CHARGE switch

Controls ac and dc power to the battery charger and selects the battery to be charged. Positions A, B, and C routes ac and dc power to the charger and routes output power of the charger to the entry and post-landing battery selected. OFF position disconnects electrical power to the charger.

AC INVERTER switches

Nine switches in one group of three and two groups of four. Top three switches control dc power to the three inverters, which convert dc to ac power.

Inverter 1 can receive power only from dc Main Bus A, Inverter 2 can receive power only from dc Main Bus B, and Inverter 3 can receive power from either dc main bus. The two groups of four switches control the output of the inverters; in upper group applies each inverter's output to ac Bus 1 and the lower group applies the output to ac Bus 2. RESET switches at the right of each group are used to reset sensing circuits after over- or undervoltage has been sensed (which activates caution and warning lights).

AC VOLTS meter

Indicates ac voltage of source selected by AC INDICATOR switch.

AC INDICATOR switch

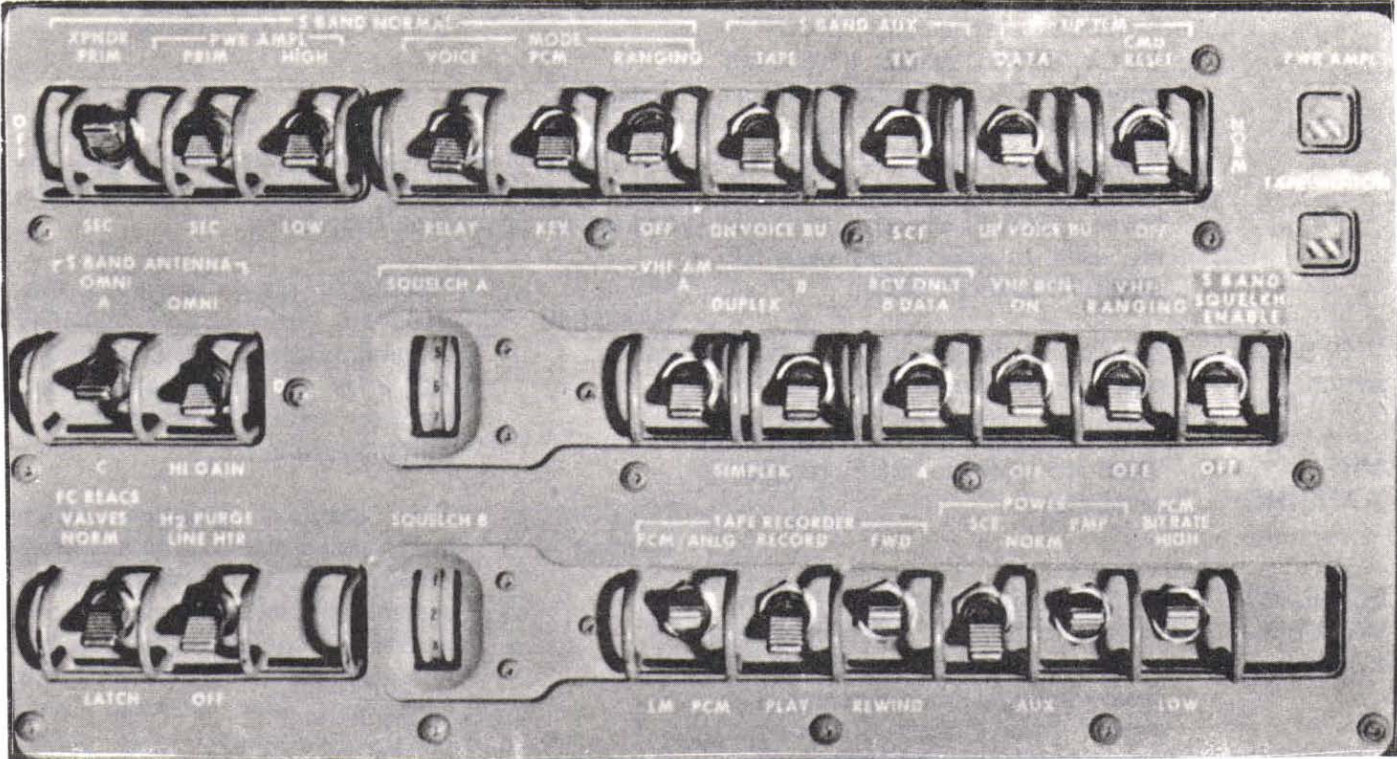
Selects source for display on AC VOLTS meter. BUS 1 sources are phases (ϕ) A, B, and C of ac Bus 1, and BUS 2 sources are Phases A, B, and C of Bus 2.

Panel 3C

Contains controls for operation and management of the telecommunications subsystem and two switches for the electrical power subsystem.

S-BAND NORMAL switches

The XPNDR switch activates the No. 1 (PRIM) or No. 2 (SEC) transponder of the unified S-band equipment, or switches both transponders off (center position). The PWR AMPL switches select either the No. 1 (PRIM) or No. 2 (SEC) S-band power amplifier (left switch) and the high-level (HIGH) or low-level (LOW) mode of operation; the center position selects the bypass mode for the transponder selected by the XPNDR switch. The MODE switches select what will be transmitted on the S-band equipment: VOICE, RELAY (relays VHF-AM voice from LM or voice and data from an extravehicular astronaut) PCM (pulse-code modulation



P-114

Panel 3C

<p>S-BAND AUX switches</p>	<p>data), KEY (emergency key), and RANGING (retransmits ranging signals).</p> <p>These activate FM transmitter and the power amplifier not selected by the PWR AMPL switch and connect equipment to the transmitter: tape playback function selected by left-hand TAPE RECORDER switch, TV is television camera, SCI is scientific instruments. DWN VOICE BU position selects pulse-modulated baseband voice mode of transponder selected by XPNDR switch.</p>	<p>PWR AMPL indicator</p>	<p>off power to the up-data link equipment.</p> <p>Shows striped lines when either S-band power amplifier is activated, gray when both are off.</p>
<p>UP TLM switches</p>	<p>These control mode of telemetry from ground. DATA is normal position for receiving voice and data from ground; UP VOICE BU (backup) switches voice transmission from the ground to another carrier; NORM applies power to the up-data link equipment CSM RESET resets all of the real-time command relays except one (switch is spring-loaded to return to the NORM position); OFF cuts</p>	<p>TAPE MOTION indicator</p>	<p>Shows striped lines when data storage equipment tape is in motion, gray when inactive.</p>
		<p>S-BAND ANTENNA switches</p>	<p>These select one of four flush-mounted S-band antennas on command module for transmission and reception. Left-hand switch is for selection of omni-directional antennas A, B, or C; right-hand switch in up (OMNI) position activates the left-hand switch and in down position selects omni-directional antenna D. In HIGH-GAIN selects high-gain antenna on service module and disables A, B, C or D omni-directional antennas.</p>
		<p>VHF-AM switches and thumbwheels</p>	<p>The A and B switches select either the DUPLEX (different frequencies for transmission and re-</p>

ception) or SIMPLEX modes; the B modes are backup. The RCV ONLY switch selects a received only; DATA B position selects receiver for low-bit-rate PCM data; A position is used to select receiver for monitoring during recovery. SQUELCH thumbwheels are used to adjust minimum RF (radio frequency) levels.

VHF BCN switch Used to activate the VHF beacon equipment for recovery.

VHF RANGING Used to activate VHF ranging generator.

FC REACS VALVES switch Latch position applies holding voltage to fuel cell reactant valves to prevent inadvertent closing of them during launch, ascent, and orbital insertion. NORM switch disconnects the holding voltage.

H₂ PURGE LINE HTR switch Applies power to redundant heater system in fuel cell hydrogen purge line to prevent freezing during hydrogen purge.

TAPE RECORDER switches These control operation of data storage (tape recorder) equipment. Center switch turns the recorder on (RECORD), sets it to play back (PLAY), or turns it off (center position). The right-hand switch controls the direction of the tape: forward (TWD) or backward (REWIND); the center position is off. The left-hand switch selects what will be played back: PCM/ANLG is CSM pulse-code modulated data, CSM and LM voice, and three analog channels of scientific information; LM/PCM is LM pulse-code modulated data recorded by the CSM data storage equipment.

TLM INPUTS These control what is transmitted to ground. The PCM switch on HIGH selects the normal pulse-code modulation data mode and the normal recording speed; LOW selects the narrow-bit-rate mode and a slow recording speed.

pilot (center couch), and RIGHT the LM pilot (right couch).

Panel 4

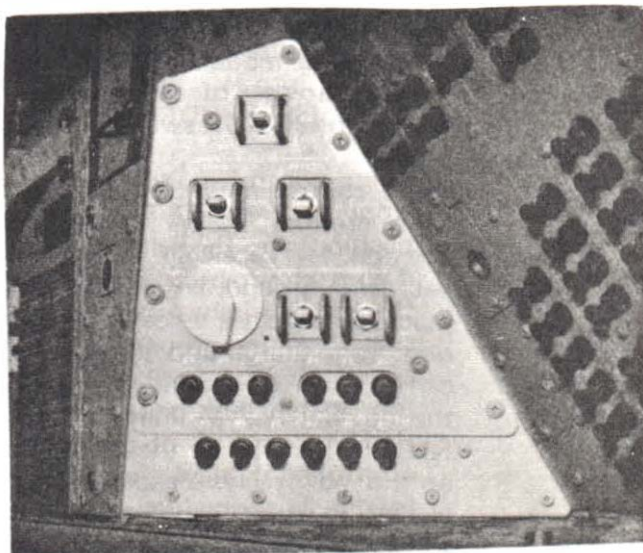
Contains ac power switches and circuit breakers for the environmental control, telecommunications, and service propulsion subsystems.

SPS GAUGING switch Applies ac power to service propulsion subsystem quantity gauging system. AC1 is ac Bus 1, AC 2 is ac Bus 2, and center position cuts off all power to gauging system.

TELCOM switches Two identical switches which apply power from ac Bus 1 or ac Bus 2 to telecommunications subsystem circuit breakers. Group 1 is essential equipment; Group 2 is non-essential telecommunications equipment (for example, data storage equipment, and voice recorder).

ECS GLYCOL PUMPS switch Selects source of ac power for environmental control subsystem primary loop water-glycol pump. Only one pump can be operated at a time; the other is a backup.

SUIT COMPRESSOR switches These select source of ac power to motors in suit compressors No. 1 and No. 2. They may be operated simultaneously.



P-115

Panel 4

CIRCUIT BREAKERS

Circuit breakers are for the suit compressors and water-glycol pumps of the environmental control subsystem. The circuit breakers are the push-pull reset type.

Panel 5

Contains controls for the electrical power subsystem and interior CM lighting and circuit breakers for instruments and the electrical power and environmental control subsystems.

FUEL CELL PUMP switches

These select source of ac power to parallel pump motors in each of the three fuel cell powerplants; one pump drives the hydrogen circulating pump and water separation centrifuge, the other drives the water-glycol circulating pump.

G/N PWR switch

Selects source of ac power for guidance and navigation lighting.

MAIN BUS TIE switches

These control connection of batteries to main dc buses. BAT A/C position connects battery bus A to dc Main Bus A and battery bus

C to dc Main Bus B and disconnects BATTERY CHARGER switch on Panel 3B from battery bus A. BAT B/C position connects battery bus B to dc main bus B and battery bus C to Main Bus A and disconnects BATTERY CHARGER switch from battery bus B and battery C. OFF positions disconnect batteries and main buses and connect the respective batteries to the BATTERY CHARGE switch. AUTO positions connects respective batteries to main buses automatically at CM-SM separation.

BAT CHGR switch

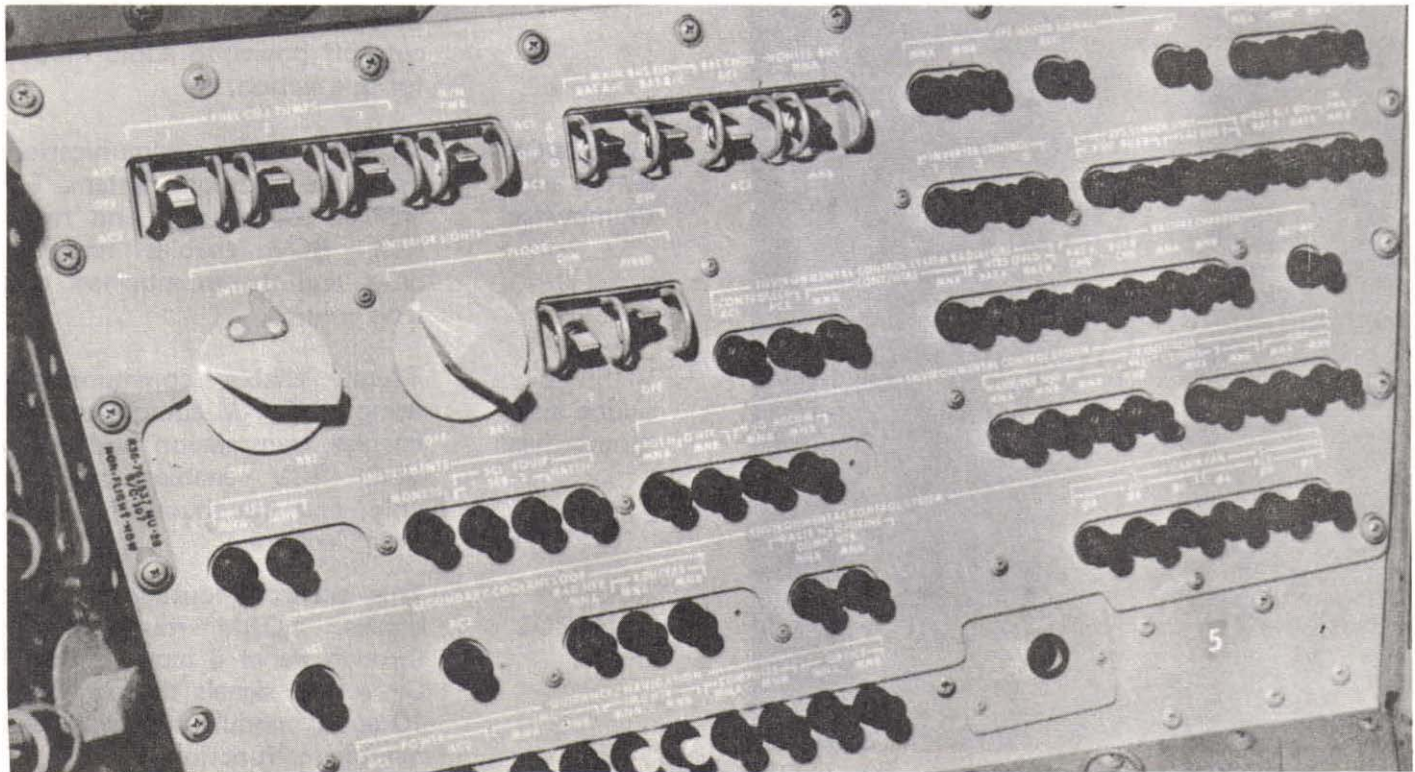
Selects source of ac power for the battery charger.

NONESSENTIAL BUS switch

Selects source of dc power (MNA is dc Main Bus A and MNB is dc Main Bus B) to non-essential equipment bus, or cuts off power to non-essential equipment.

INTERIOR LIGHTS

These control lights in CM cabin. INTEGRAL rheostat controls



P-116

Panel 5

brightness or turns off electro-luminescent or turns off floodlights in pilot's area. DIM switch selects primary (1) or secondary (2) floodlights. FIXED switch turns on lights not controlled by rheostat.

transmission; VOX position provides voice-operated relay operation only for intercom and RF transmission. Thumbwheel adjusts sensitivity of voice-operated relay.

Panel 6

Contains audio center controls for the LM pilot (right couch). Identical controls are located on Panel 9 for the commander (left couch) and Panel 10 for the CM pilot (center couch). Panel 10 is mounted at right angles to the bottom of Panel 2.

PAD COMM switch and thumbwheel

On T/R, enables headsets to receive and transmit over hard lines (cable) with ground. On RCV, crewman can receive only over the circuits. The thumbwheel adjusts the volume of the reception.

S-BAND switch and thumbwheel

These enable communications using S-band equipment. T/R is transmit and receive, RCV is receive only, and the thumbwheel controls volume.

MASTER VOLUME thumbwheel

Adjusts volume from the ear-phone amplifier to the earphone.

POWER switch

On AUDIO/TONE, provides primary power to the audio center module and enables the crew alarm to be heard in LM pilot's headset. On AUDIO, the crew alarm tone will not sound in the LM pilot's headset. Off position cuts off power to audio module for this station.

INTERCOM switch and thumbwheel

These enable communications using the intercom system. T/R enables transmission and reception, RCV enables reception only, and the thumbwheel controls volume.

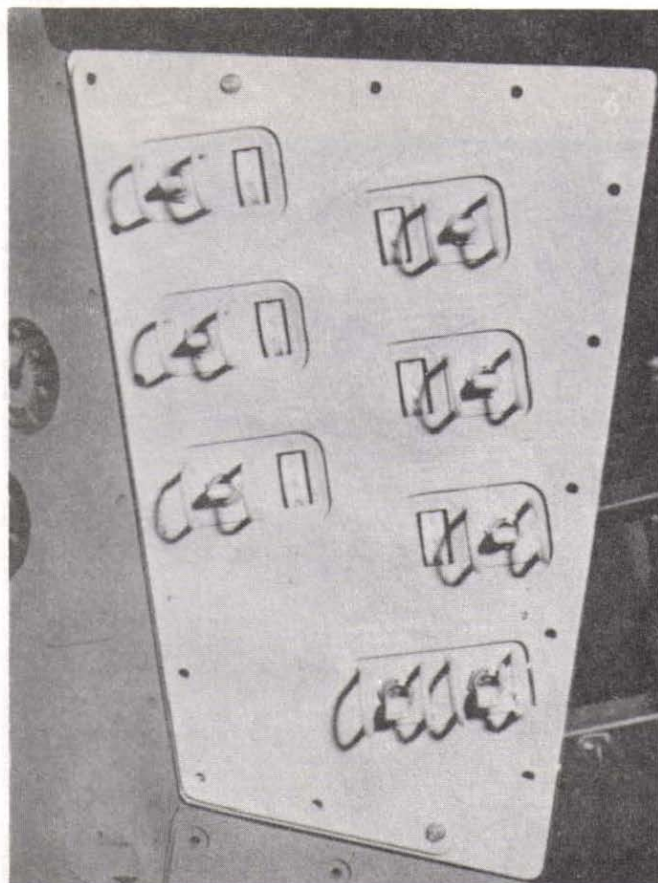
VHF AM switch and thumbwheel

These enable communication using VHF AM equipment. T/R enables transmission and reception, RCV enables reception only, and the thumbwheel controls volume.

AUDIO CONTROL switch

This controls routing of audio signals. NORM routes signals through Panel 6 module; BACK UP routes signals through Panel 10 audio module in case Panel 6 module malfunctions.

MODE INTER-COM and thumbwheel The switch selects the method of communications. INTERCOM/PTT position provides hot mike and VOX (voice-operated relay) operation for the intercom and push-to-talk (PTT) operation for RF (radio frequency) transmission; PTT position provides push-to-talk operation only for intercom and RF



Panel 6

SUIT
POWER
switch

When up, applies power to the two microphones and the bio-medical preamplifiers worn by the pilot.

FDAI
POWER
switch

Supplies power that drives electronics for flight director attitude indicator No. 1 (1 position) or No. 2 (2 position), or both at the same time (BOTH).

Panel 7

Contains controls to supply power for elements of the stabilization and control subsystem.

EDS
POWER
switch

Supplies power from all three entry batteries to the emergency detection system; system operates only during boost and is turned off at all other times.

TVC
SERVO
POWER
switches

These control ac power source to servo channels in thrust vector position servo amplifier and dc power source to servo clutches through the amplifier. Switch 1 controls the primary channels and clutches and Switch 2 the secondary channels and clutches. AC1/MNA is ac Bus 1 and dc Main Bus A, and AC2/MNB is ac Bus 2 and dc Main Bus B.

SCS HAND
CONTROL
switch

Supplies power for operation of rotation and translation controls. Position 1 is for Rotation control No. 1, position 2 for rotation control No. 2, and BOTH for both at the same time. All three positions supply power for operation of translation control.

SCS ELEC-
TRONICS
switch

Supplies power to electronics control assembly (ECA) or to gyro display couplers and electronics control assembly (GDC/ECA).

BMAG
POWER
switches

Supplies power to gyro assemblies which contain body-mounted attitude gyros. Switch 1 is for Gyro Assembly No. 1 and Switch 2 for Gyro Assembly No. 2. WARN UP position supplies power to electronics and heaters in assemblies, ON position is for operation of assemblies.

DIRECT
O₂ valve

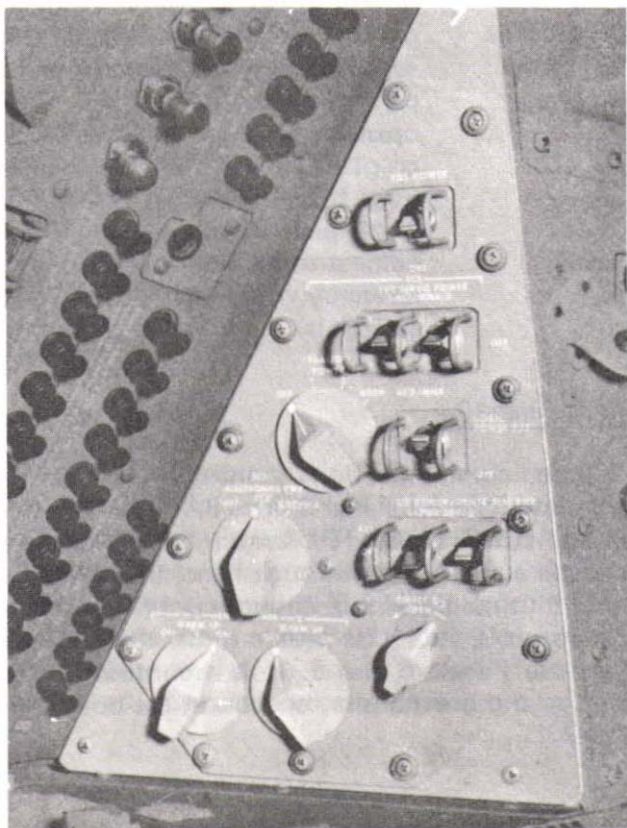
Turned counterclockwise (to left) to open valve for flow of oxygen directly into the suit circuit.

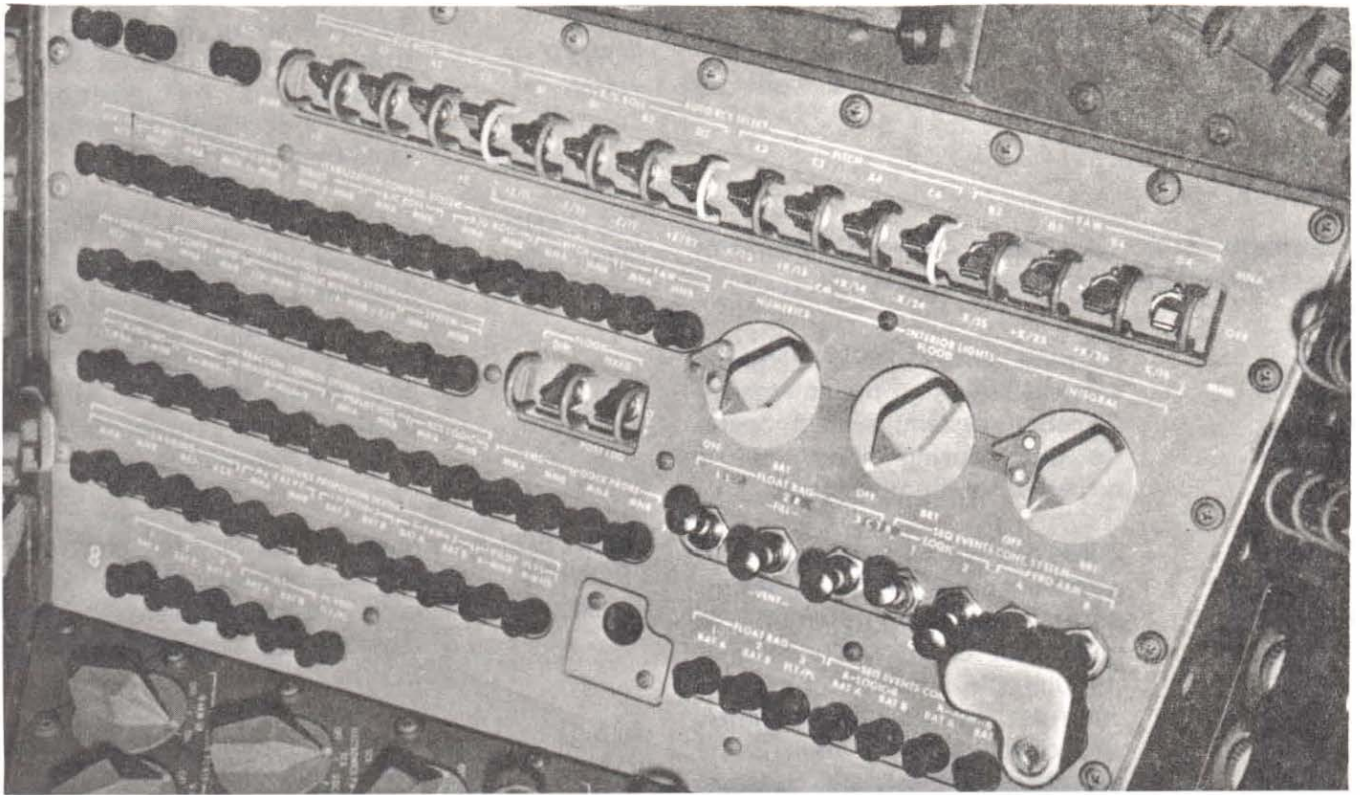
Panel 8

Contains CM lighting, float bag, and sequential events control switches and circuit breakers for stabilization and control, reaction control, service propulsion, and other subsystems.

INTERIOR
LIGHTS
switches

These control lights in CM cabin. NUMERICS rheostat controls brightness and turns off the numerics (flashing numbers) on the two computer keyboards, the entry monitor system, and the timers. The FLOOD rheostat controls brightness and turns off floodlights in the commander's (left-hand) area. INTEGRAL





P-119

Panel 8

theostat controls brightness and turns off electroluminescent lights on panels in commander's area (Panels 1, 7, 8, 9, and part of Panel 2).

FLOOD switches

DIM switch selects the primary (1) or secondary (2) floodlights in commander's area. FIXED position of right-hand switch turns on lamps not controlled by FLOOD rheostat; POST LDG position connects post-landing battery bus to lights on commander's couch and left-hand area.

FLOAT BAG switches

Three identical switches, one for each of three float bags of CM uprighting system. FILL positions start compressors which inflate bags, and VENT positions turn off compressors and open vent lines to bags. These lever lock-type switches remain in the VENT position until splashdown.

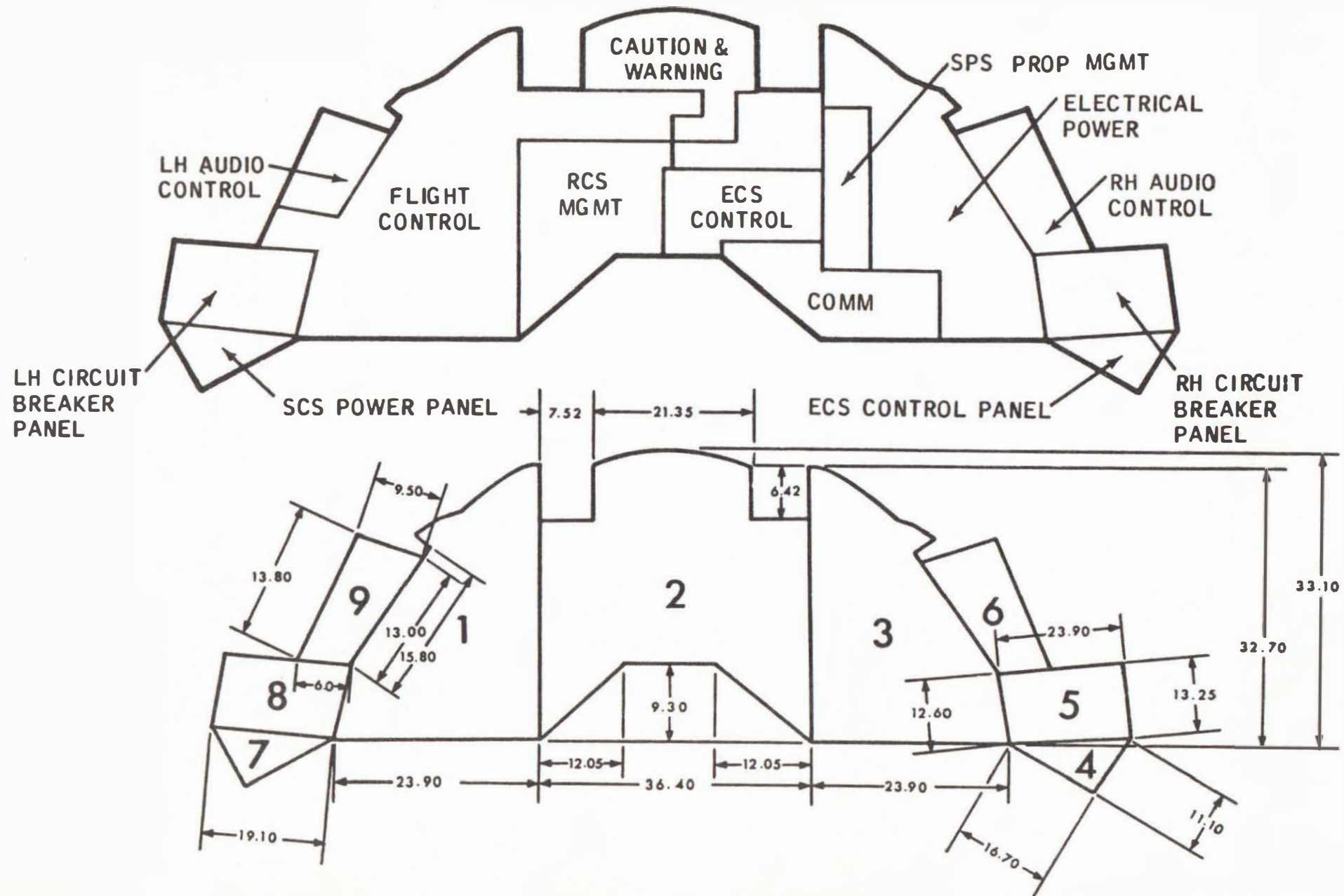
SEQ EVENTS CONTROL SYSTEM switches

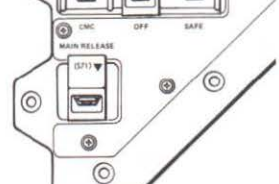
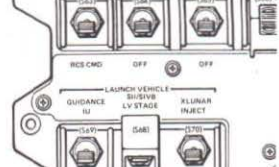
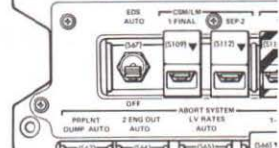
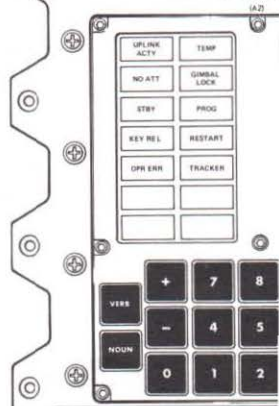
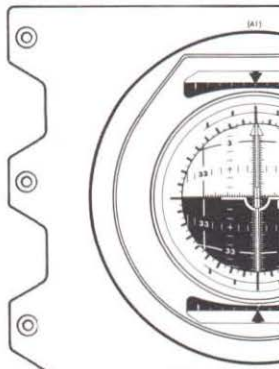
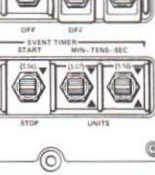
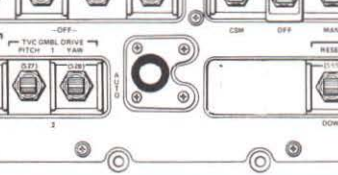
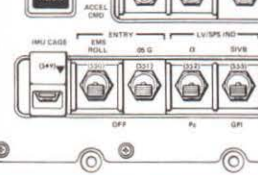
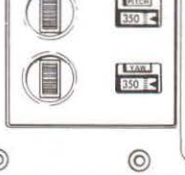
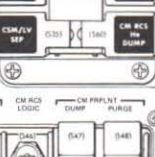
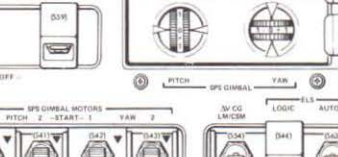
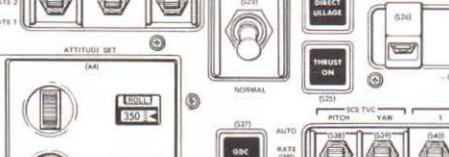
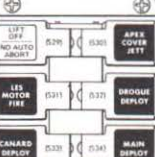
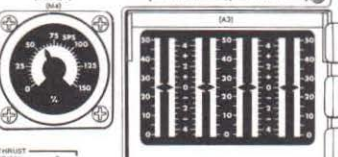
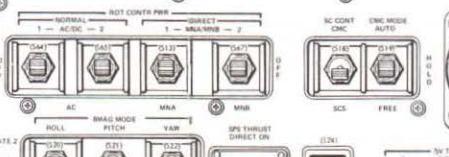
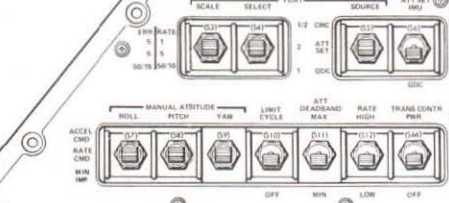
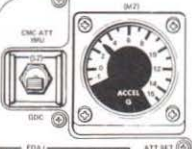
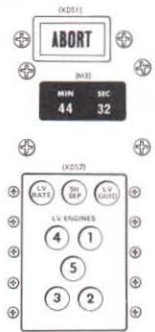
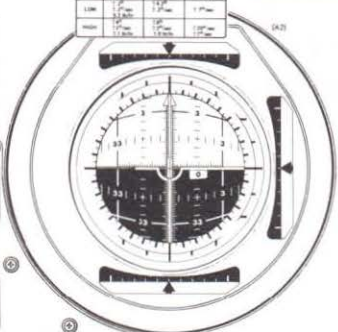
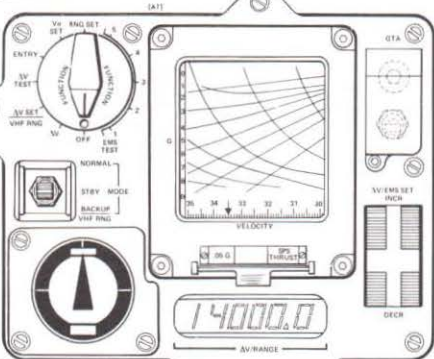
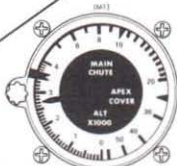
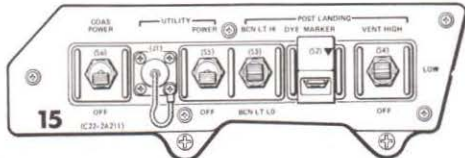
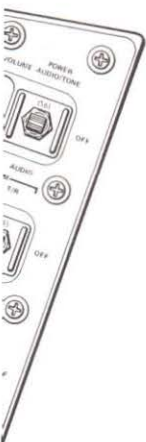
Two LOGIC switches supply power to master events sequence controllers. PYRO ARM switches supply power to controllers for pyrotechnic devices; a key-operated lock and guard assembly is placed over the switches to hold them in the SAFE position until just before launch, when commander unlocks and removes assembly. All four SEQ EVENTS switches are lever lock-type.

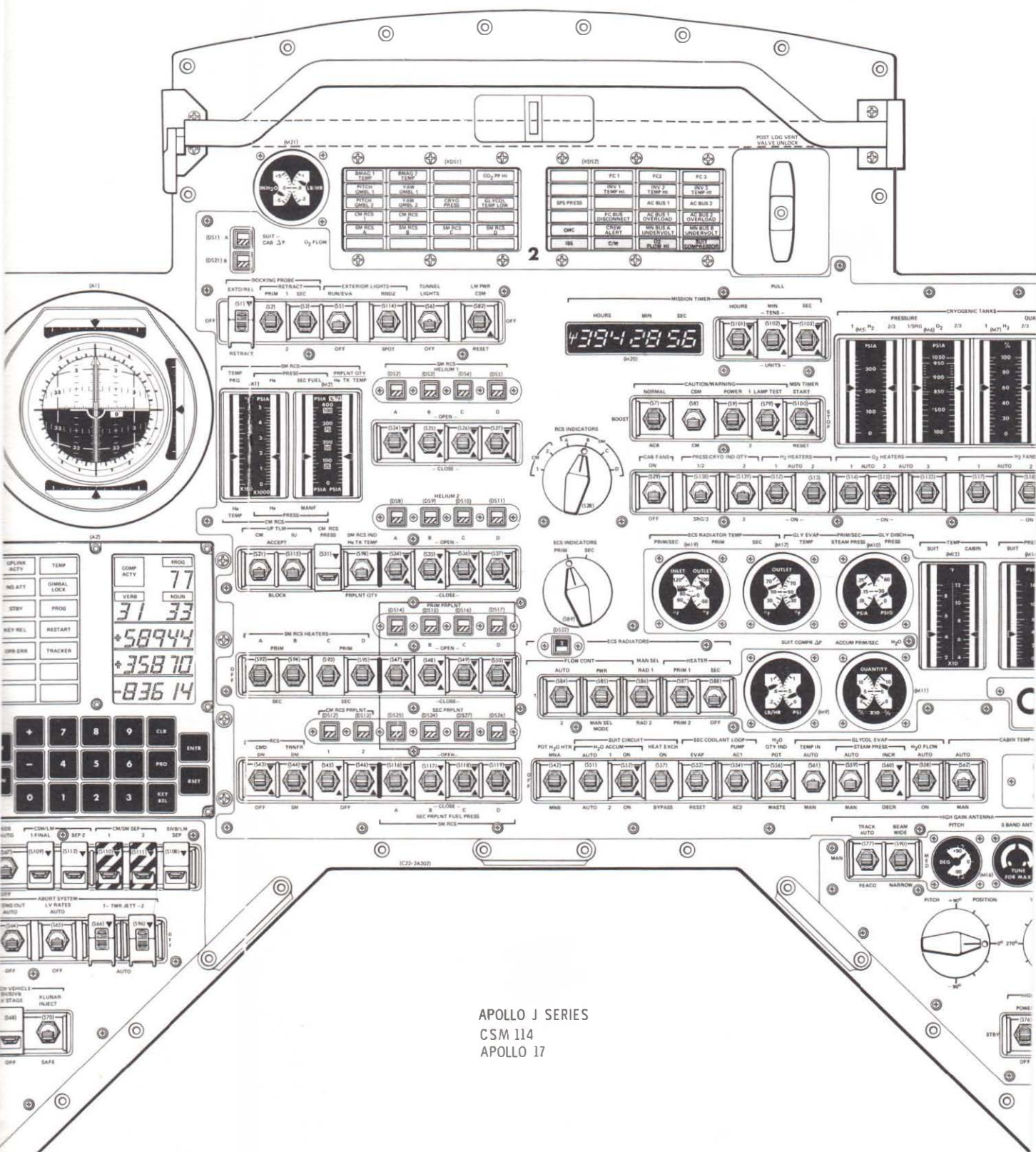
Panels 9 and 10

Contain communications controls identical to those described for Panel 6. The BACKUP position of the AUDIO CONTROL switch routes the commander's audio signals through Panel 6 and the CM pilot's through Panel 9. Although containing identical controls, Panel 10 is square rather than triangular as are Panels 6 and 9. It is mounted at right angles to the main display console at the bottom of Panel 2.

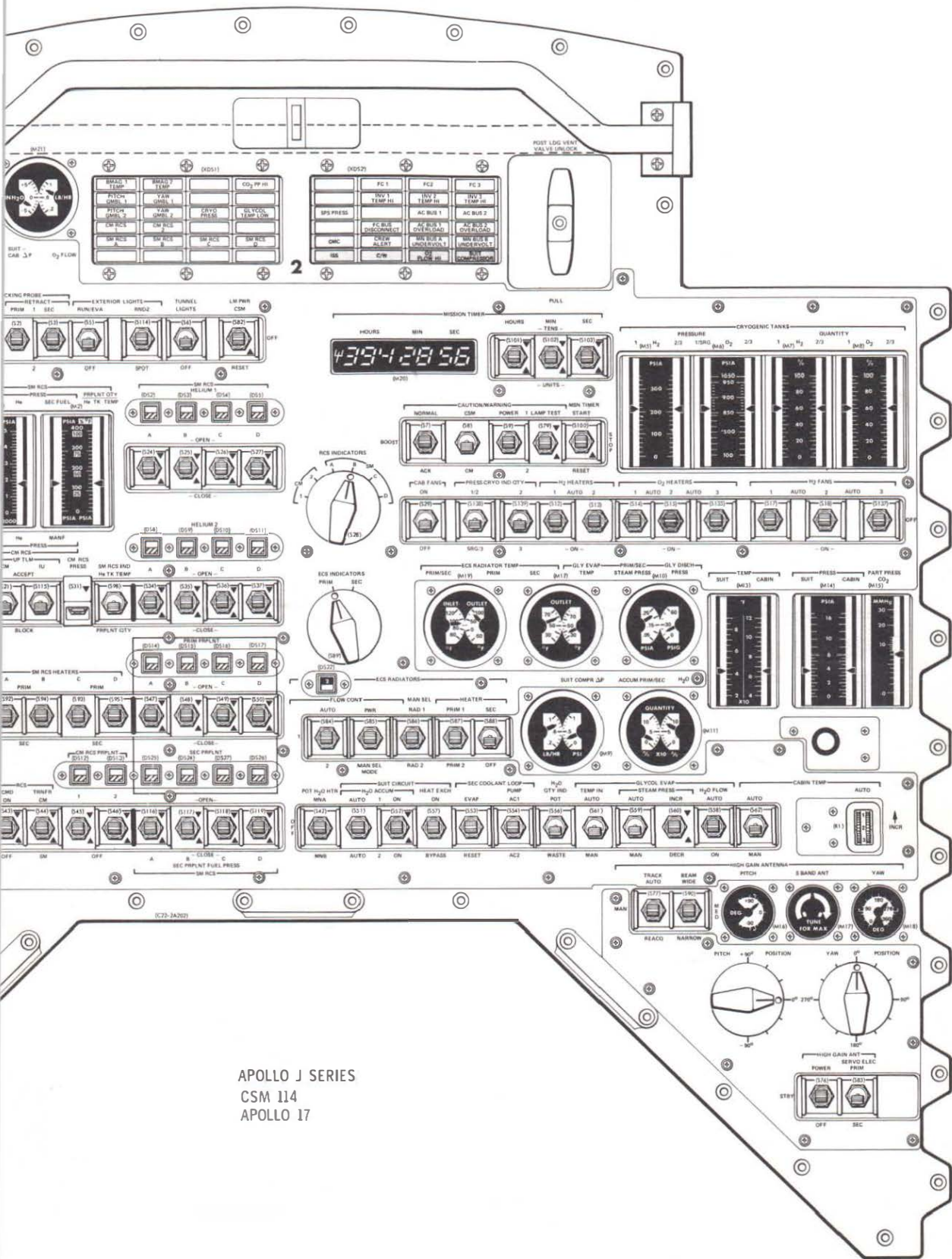
COMMAND MODULE MAIN DISPLAY CONSOLE



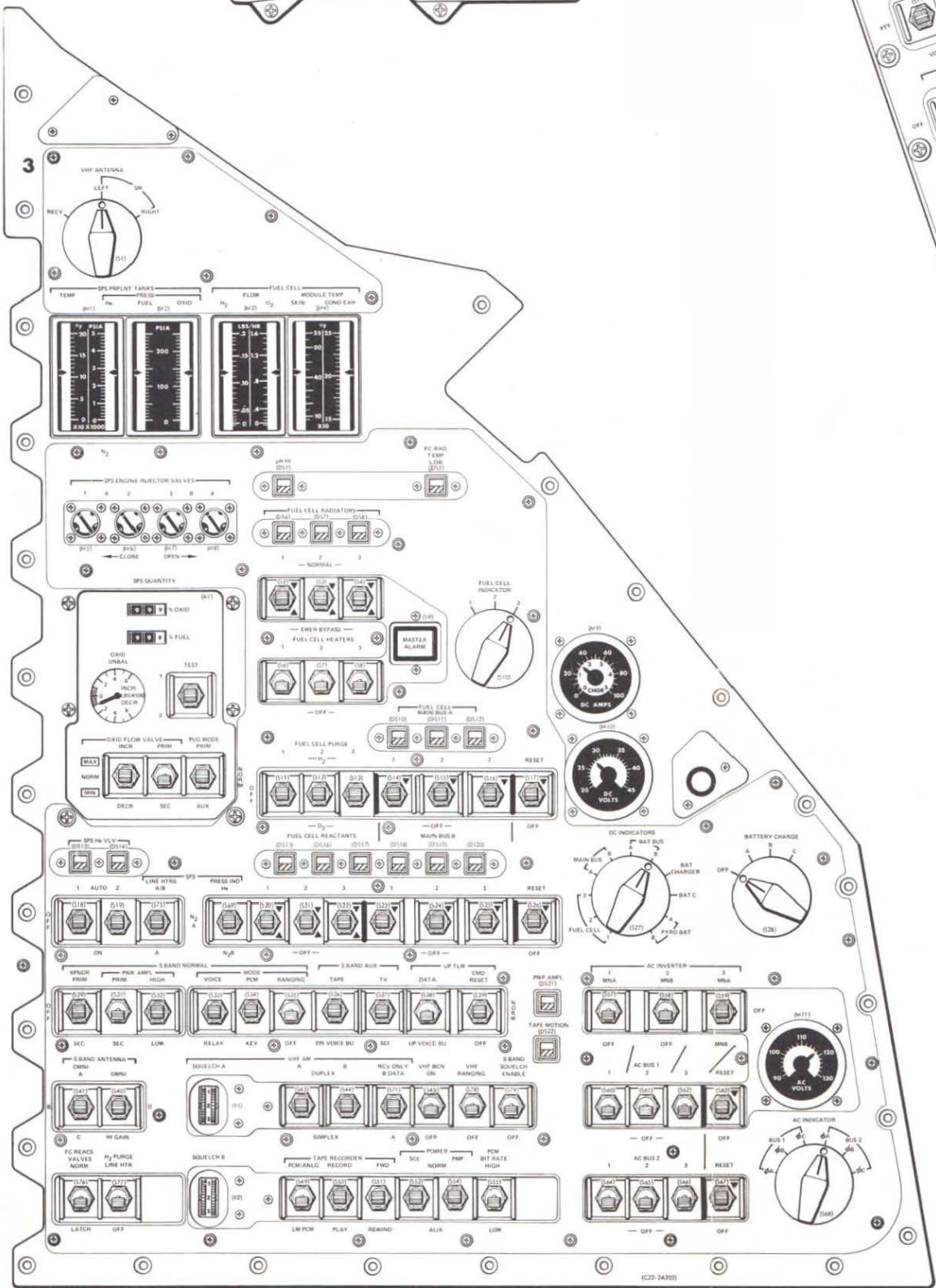
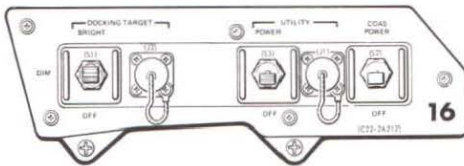


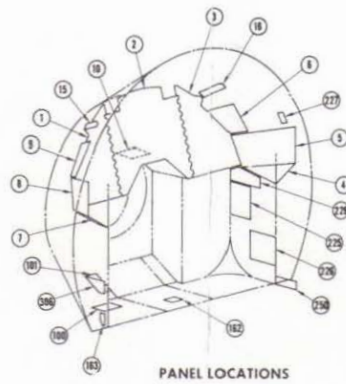
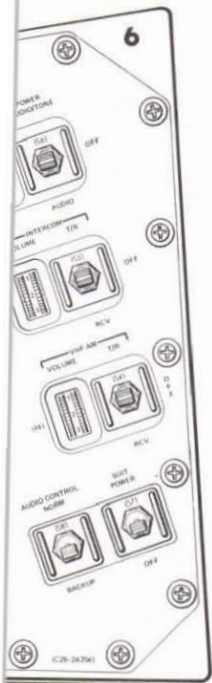


APOLLO J SERIES
 CSM 114
 APOLLO 17

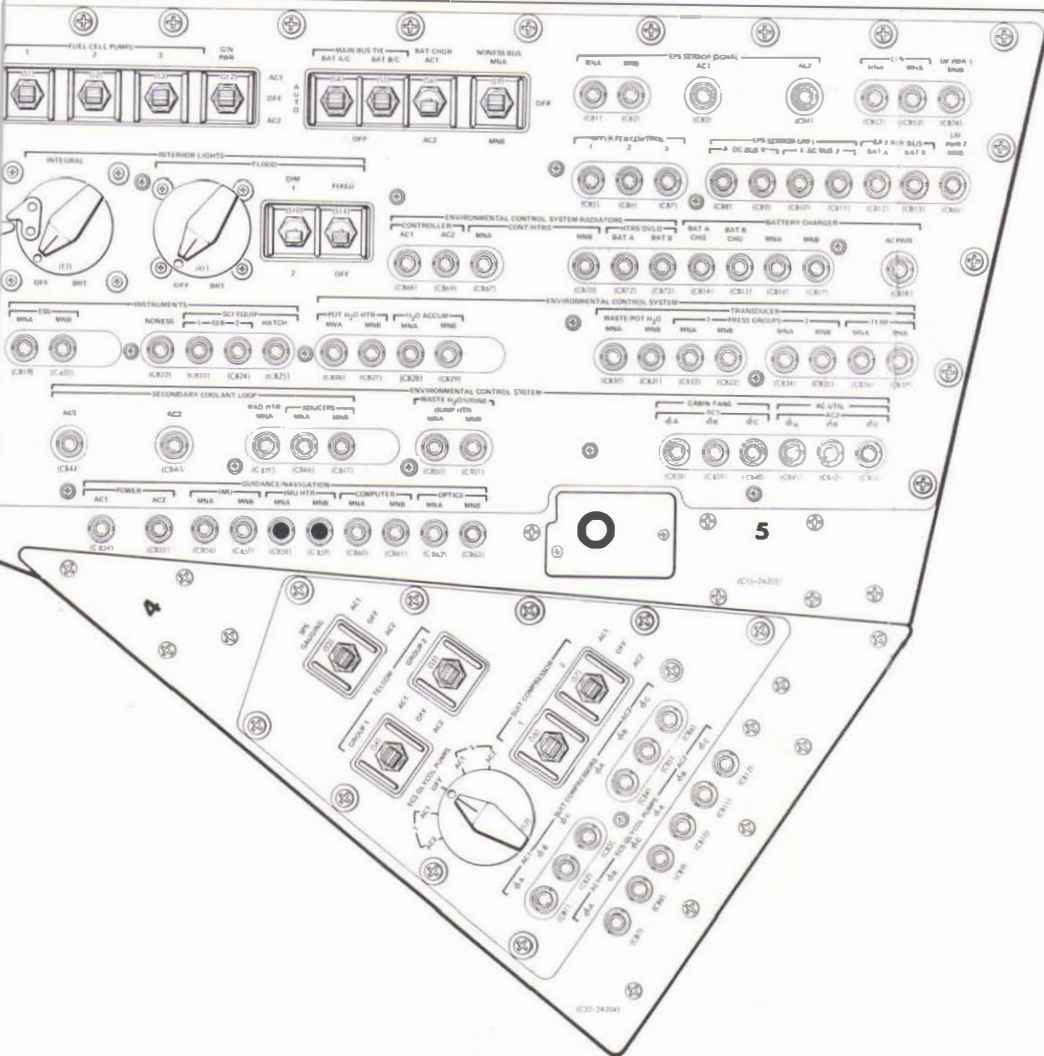


APOLLO J SERIES
 CSM 114
 APOLLO 17



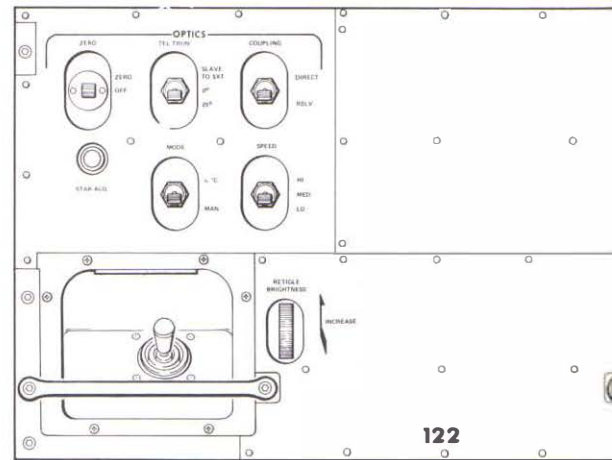
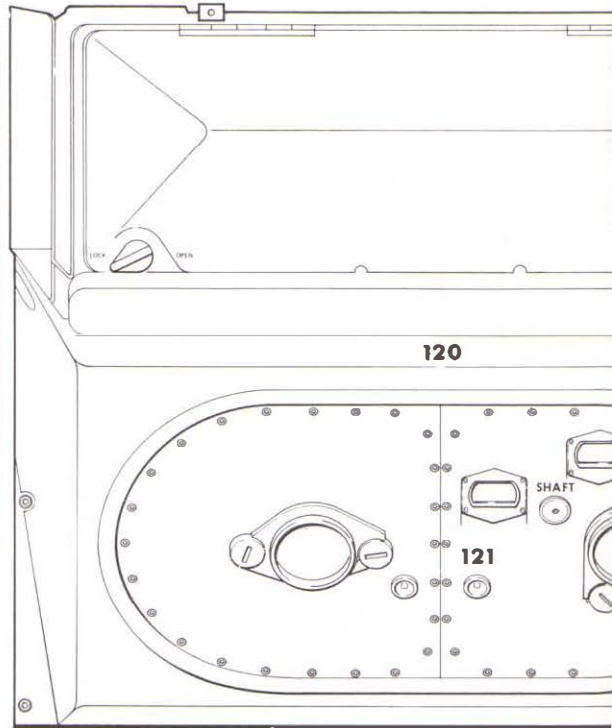
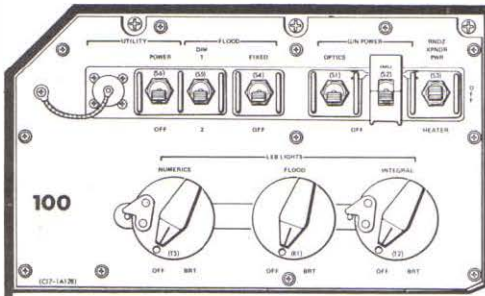
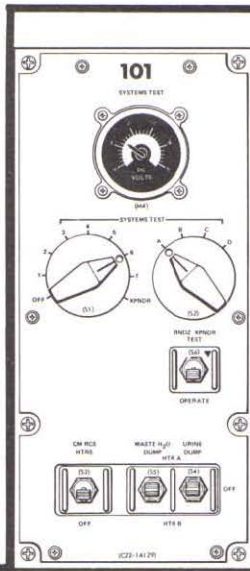


PANEL LOCATIONS



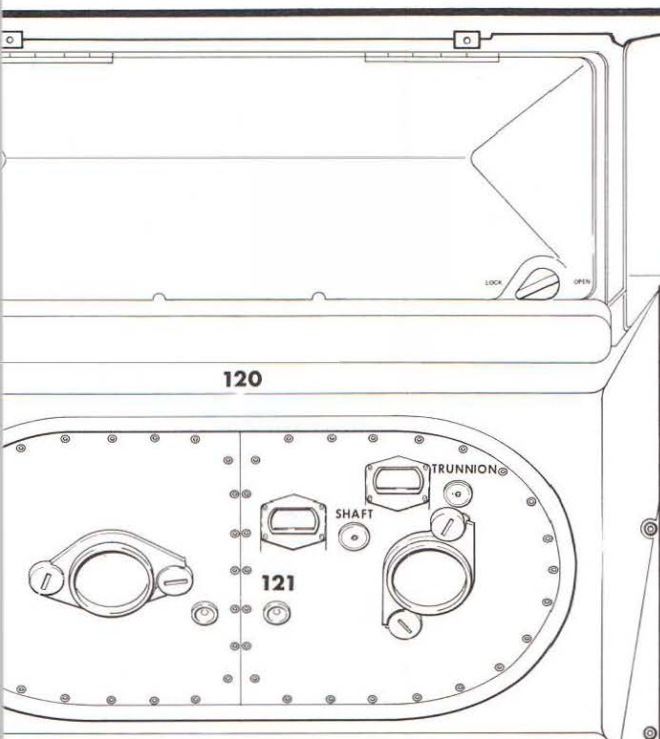
5. ALL NUMBERS AND LETTERS ENCLOSED WITH PARENTHESES DO NOT APPEAR ON PANELS.
4. ▼ SYMBOL DENOTES MOMENTARY SWITCH POSITION AND DOES NOT APPEAR ON PANELS.
3. SWITCH POSITIONS ARE SHOWN FOR CONVENIENCE ONLY AND DO NOT NECESSARILY REFLECT OPERATING MODES AND/OR MISSION PHASES. TWO POSITION SWITCHES ARE SHOWN IN THE DOWN POSITION. THREE POSITION SWITCHES ARE SHOWN IN CENTER POSITION.
2. THIS IS AN ARRANGEMENT AND NOMENCLATURE CONTROL DWG FOR DESIGN REQUIREMENTS AND FOR USE BY OTHER DEPTS AS A GUIDE. ONLY RELEASED DESIGN DRAWINGS AND DOCUMENTS SHALL BE USED FOR MFG, MOCK-UP, SIMULATOR, EVALUATOR, TRAINER OR CENTRIFUGE PANELS WHICH ARE INTENDED TO REFLECT CURRENT DESIGN.
1. THIS DWG REFLECTS A CONFIGURATION AS DEFINED BY APPLICABLE SCD'S, ASSEMBLY DWGS AND MARKING DWGS AS OF THE DATE OF RELEASE WITH RESPECT TO THE AFFECTED VEHICLES.

NOTES:

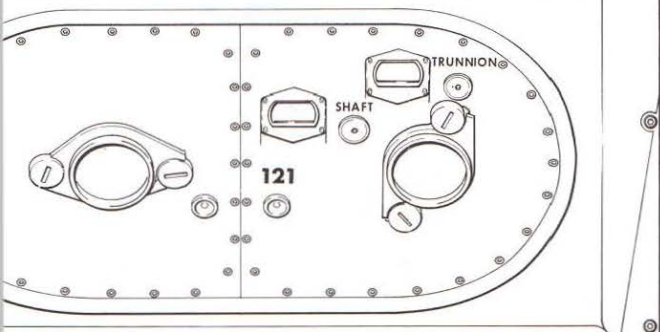


LOWER EQUIPMENT BAY (LEB)

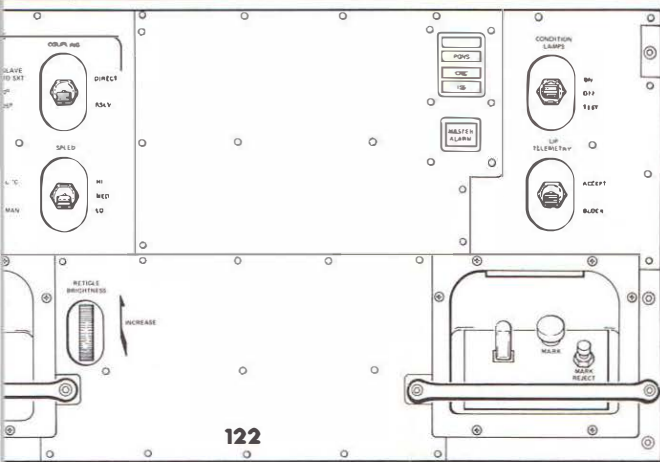
PANEL 164 IS LOCATED BEHIND VOLUME B6.



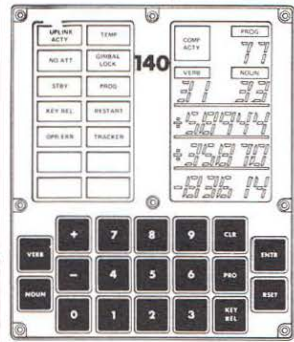
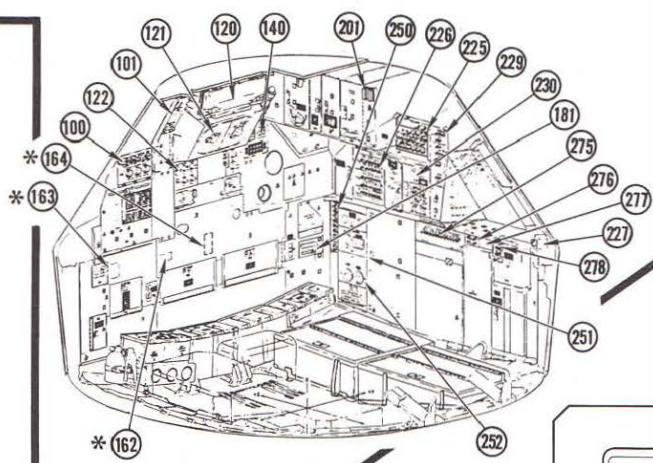
120



121

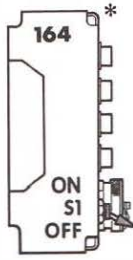


122

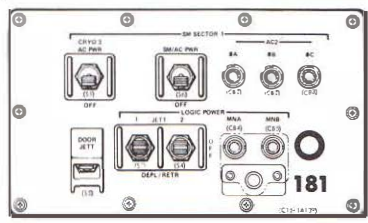


140

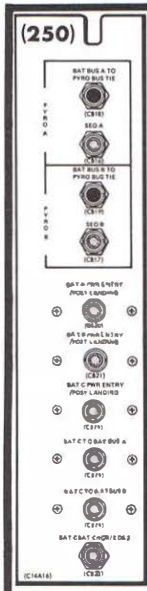
LOWER EQUIPMENT BAY (LEB)



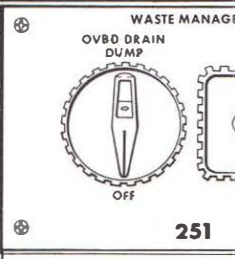
PANEL 164 IS LOCATED BEHIND VOLUME B6.



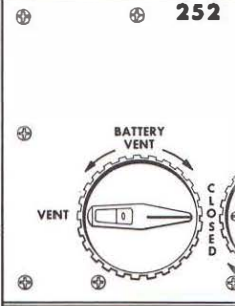
181



(250)

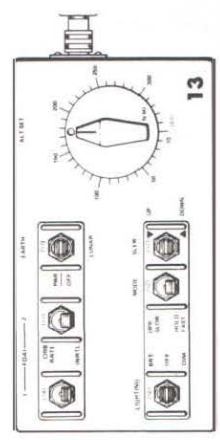
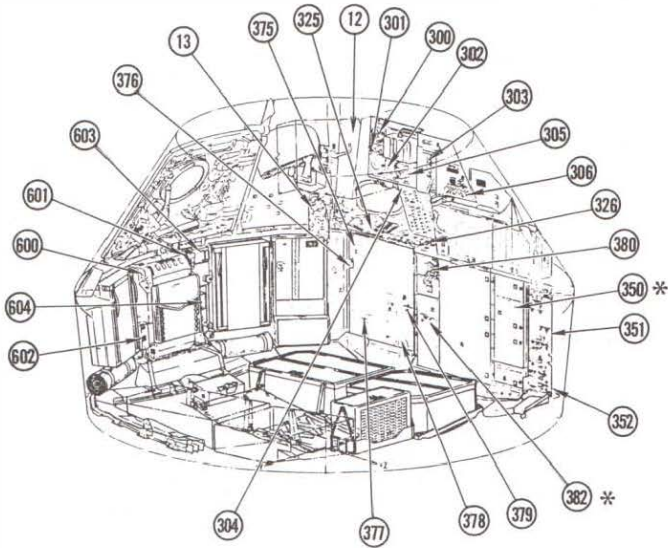


251



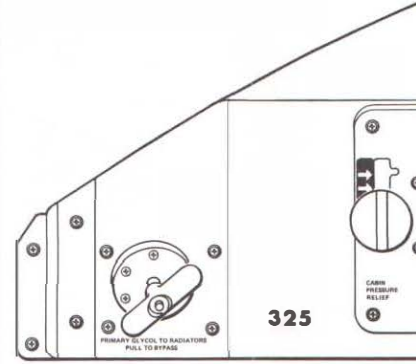
252

WASTE MANAGEMENT WATER SYS EMERG INTERCONNECTION OVERBOARD DUMP

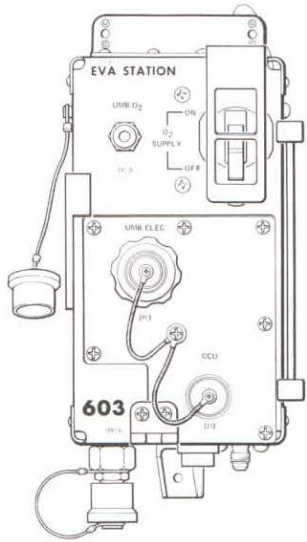
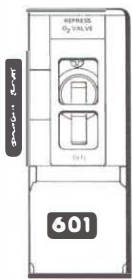
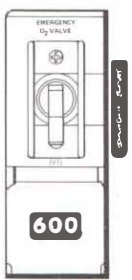


MDC (REAR TUNNEL)

LEFT HAND INTERMEDIATE EQUIPMENT BAY (LHIEB)



(GIRTH SHELF)

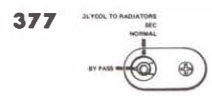


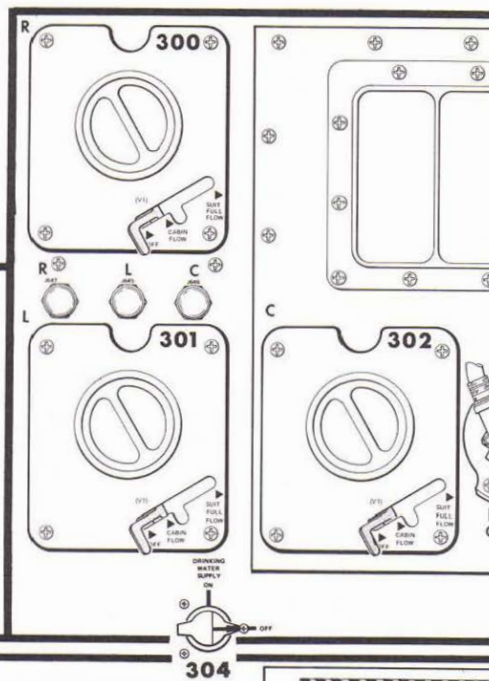
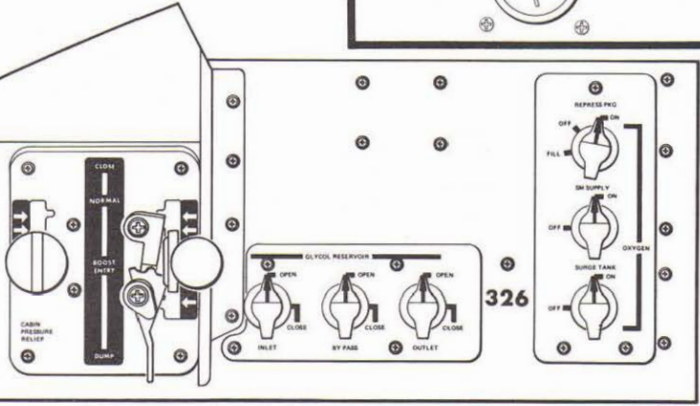
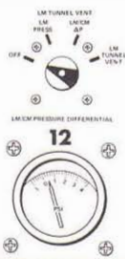
UPPER EQUIPMENT BAY (UEB)



NOTES:

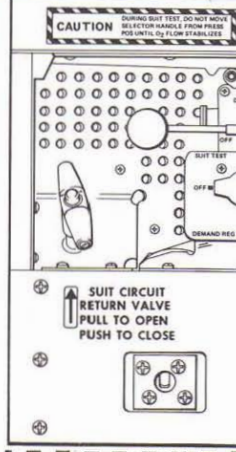
1. ALL NUMBERS AND LETTERS ENCLOSED WITH PARENTHESIS DO NOT APPEAR ON PANELS.
2. ▼ SYMBOL DENOTES MOMENTARY SWITCH POSITION AND DOES NOT APPEAR ON PANELS.
3. SWITCH POSITIONS ARE SHOWN FOR CONVENIENCE ONLY AND DO NOT NECESSARILY REFLECT OPERATING MODES AND/OR MISSION PHASES. TWO POSITION SWITCHES ARE SHOWN IN THE DOWN POSITION. THREE POSITION SWITCHES ARE SHOWN IN CENTER POSITION.





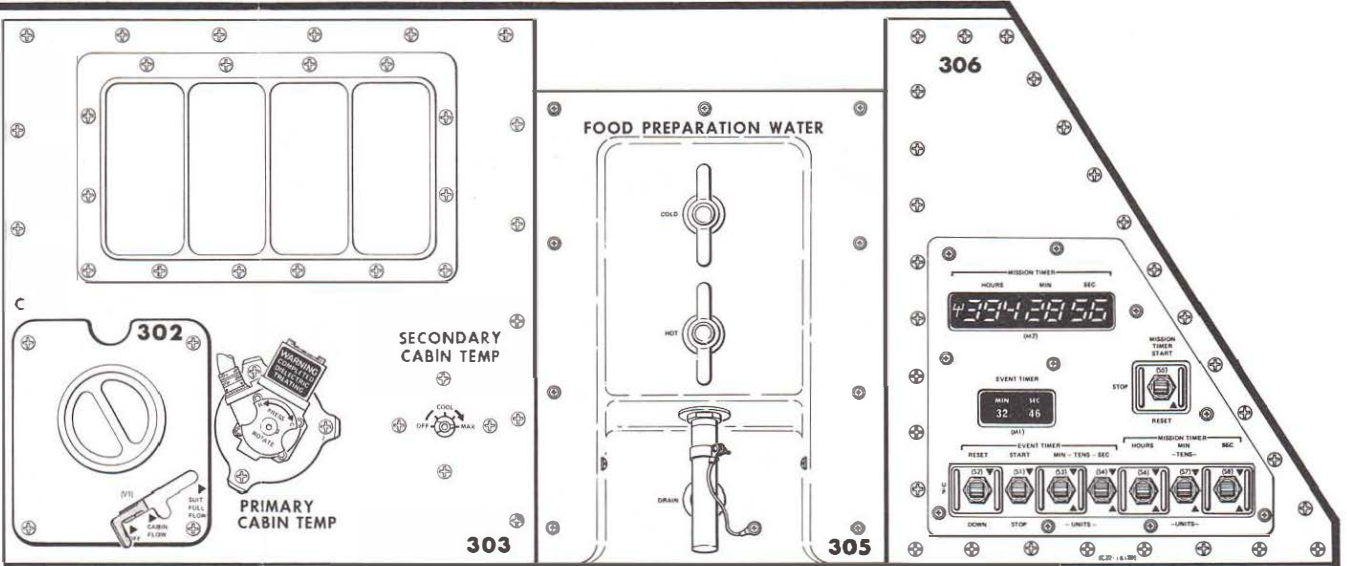
LEFT HAND EQUIPMENT BAY (LHEB)

APOLLO CONTROLS AND DISPLAYS
PANELS 300 TO 645
LHEB, LHIEB, LHFEB, UEB
CSM 114
APOLLO 17



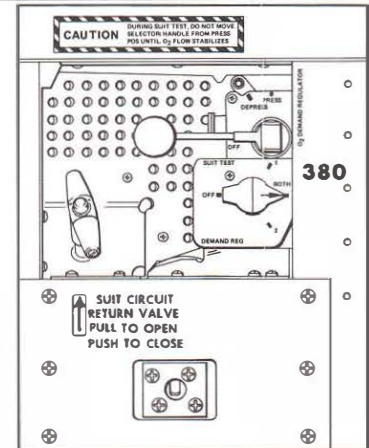
ACCESS TO:
*
COOLANT CONTROL
PANEL (382)



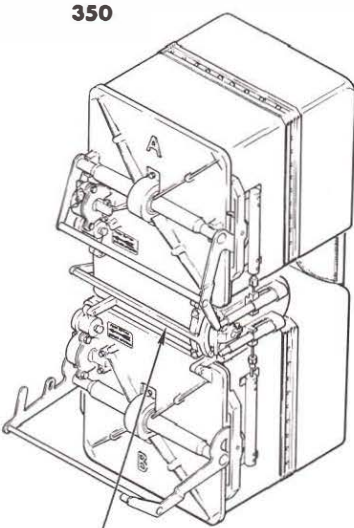


LEFT HAND FORWARD EQUIPMENT BAY (LHFEB)

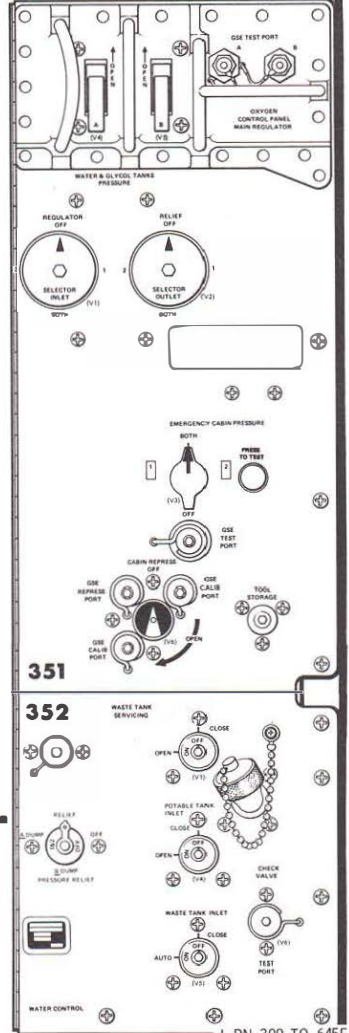
(GIRTH SHELF)



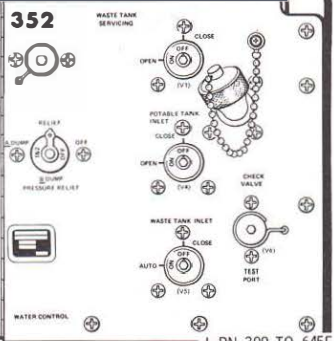
CO2 ABSORBER ACCESS PANEL



CO2 CANISTER DIVERTER VALVE



351



352

ACCESS TO:
COOLANT CONTROL
PANEL (382)

ACCESS TO ECU
ELECTRONICS PACKAGE

* CO2 CANISTER DIVERTER VALVE ASSEMBLY (350)
AND COOLANT CONTROL PANEL (382) LOCATED BEHIND
ATTENUATION PANELS.