



# Astrobee Status

SPHERES/Astrobee Working Group

March 20, 2019



# Integration Status

- We completed building all flight free flyers by 1/4/19.
- We shipped the first 2 flight free flyers (Honey and Bumble) to JSC on 1/8/19 and the second two on 1/22/19 (Queen and spare).
- We implemented a fix for an issue found with the perching arm gripper. 4 flight grippers will ship to JSC on 3/25/19 and will undergo acoustic testing on 4/2/19.
- We are currently building 2 more ground units (Melissa and Killer).

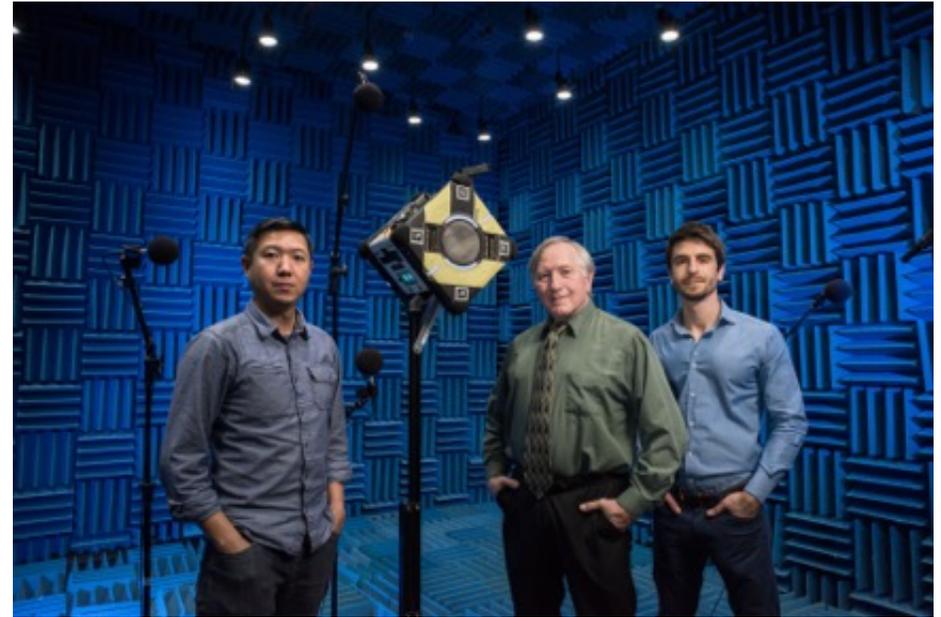


Astrobee family photo



## Testing Status

- Astrobee S/N 003 completed EMI testing on 1/15/19. There were several exceedances in the radiated emissions test (RE02), and we have started the process for obtaining an exception. The free flyer passed the magnetic tests for launch and operations in the USOS.
- On 1/15/19, Astrobee S/N 002 successfully completed a Joint Station LAN (JSL) end-to-end test. The free flyer and the dock flat sat at the JSL Software Development and Integration Laboratory (SDIL) were controlled from the ARC Multi-Mission Operations Center (MMOC), via an Astrobee telemetry server located in the Huntsville Operations Support Center (HOSC).
- Free Flyer acoustic testing completed on 1/30/19 in the Acoustic Test Facility at JSC. All 4 free flyers and the dock flight spare were tested individually. We also tested the dock integrated with 1 and 2 free flyers. We have developed a noise management strategy with the Acoustics Working Group and have started the exception process to allow extended free flyer ops.



Astrobee in the JSC acoustic test facility. Pictured Astrobee team members from left to right: Vinh To, Honey Bee, Ernie Smith, Roberto Carlino.



# Flight Hardware Status

- On 2/26/19, we passed our project Flight Readiness Review for NG-11 (Periodic Technical Review 4B in the Astrobee schedule). We discussed verification status, deviations from design, and open work. The review panel and stakeholders agreed that remaining open work is low risk.
- We have closed all free flyer safety verifications.
- We delivered 2 Astrobee free flyers and the dock spares kit to the Cargo Mission Contract (CMC) on 3/5/19 for launch on Northrup Grumman 11.
- We have closed 57 of 61 ISS requirements verifications. We have filed exceptions for the remaining 4 and hope to close all but one (Astrobee-Exception-0003 Intermittent Noise Limits) by Stage Operations Readiness Review (SORR) on 3/27/19. We expect to close Exception-0003 by 4/19/19.

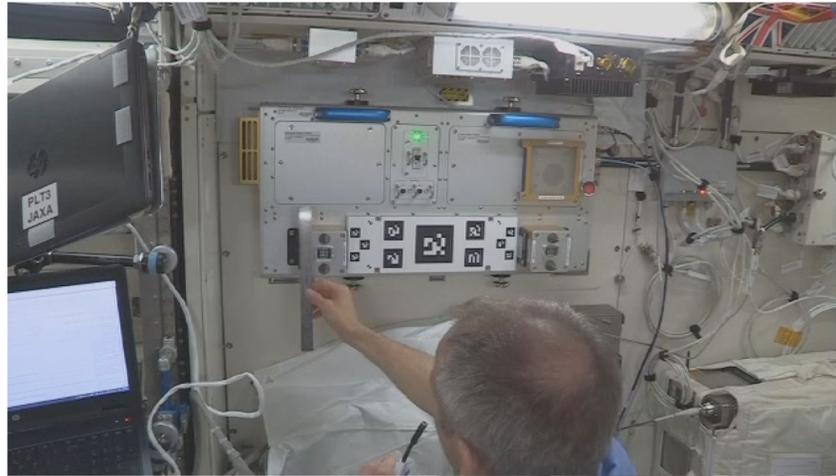


Honey and Bumble Bees delivered to Cargo Mission Contract



## Dock Installation and Checkout

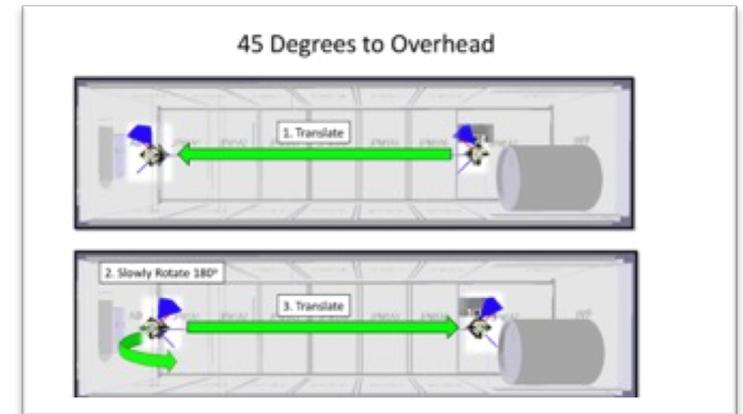
- On February 15, 2019, Canadian astronaut David Saint-Jacques installed and checked out the Astrobee Docking Station (Dock) in the Japanese Experiment Module (JEM).
- Video shows David Saint-Jacques testing the operation of the Astrobee berths.





## Operations

- We are currently working on crew procedures for the first two free flyer activities (Checkout, Calibration & Mapping). We are running paper sims and Operational Readiness Tests (ORT) to work out the bugs.
- We expect Astrobee Checkout to be scheduled on or around April 30, 2019.



Sample diagram from Calibration and Mapping crew procedure