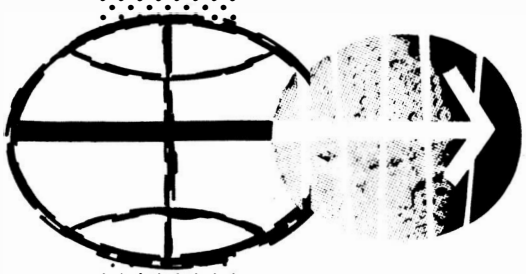
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NETWORK CONTROLLER'S MISSION REPORT

APOLLO 5



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
JANUARY, 1968

1.0 INTRODUCTION AND SUMMARY

GENERAL

The Mission Control Center (MCC) and the Manned Space Flight Network (MSFN) were placed in mission status for Apollo 5 (NCG 722) on January 4, 1968. Official launch of the mission occurred on January 22, 1968 at 22:48:09Z.

Overall quick-look analysis of ground instrumentation support for this mission indicates that the support was highly successful.

The remoted high speed command system functioned extremely well.

The remoted site personnel performed in a most outstanding manner under conditions of near fatigue.

The ARIA personnel are to be congratulated for a job well done for their normal support and in acquiring the spacecraft when nominal pointing data was not available.

The following significant problems occurred:

A. MAJOR PROBLEMS

1. Redstone Telemetry Computer Faulting - Red at Lift Off.

   The problem was isolated post-mission to an EI wiring error made during installation. The EI (EI 2396) concerns the Erasable Memory Unit (EMU). The clock phase timing was wired incorrectly in chassis A7. A wiring connection was made to a terminal with plus 15 volts instead of the minus 4.5 volts required. This caused the problem with the telemetry 642B computer. The problem was corrected post-mission.

2. GWM data not received at MCC on Rev 4.

   The problem was isolated to an operator error in patching the Communications Line Terminal (CLT) at GSFC. CLT's were switched just after the pass and the static data looked good at MCC. GWM did receive, record and transmit data to GSFC, but it was not transmitted to Houston.

3.7 APOLLO RANGE INSTRUMENTATION AIRCRAFT

3.7.1 Performance

AS-204L was the second support mission in which the ARIA fleet participated in manned space flight network operation. Again, as in AS-501, the aircraft were undergoing Category III testing concurrent with the mission support activities.

ARIA supported AS-204L staging from three geographical areas. ARIA 1 and 2 in the Australian Sector, staging from Pearce Royal Australian Air Force Base (RAAFB), provided coverage during the S-IVB passivation exercise on Rev 2 and the first DPS burn on Rev 3. ARIA 3 and 7 staged from Patrick AFB, Florida, into the Atlantic Sector. ARIA 3 provided coverage from launch through insertion and Rev 2 and 3 coverage in the Atlantic, North of Antigua. ARIA 7 launched with ARIA 3 to provide an airborne real time backup in the event ARIA 3 developed problems. ARIA 6, with the ALOTS POD installed, provided photographic coverage of the early launch phase after lift off prior to insertion. ARIA 4 and 5 staged from Ascension Island to the Ascension Sector providing coverage for Rev's 3, 4 and 5 in the broad ocean area of the Atlantic.

ARIA 5 experienced an aircraft engine problem soon after take off. However, the problem was cleared enabling ARIA 5 to proceed to its support area. During Rev 3, ARIA 3 and 4 achieved active USB lock and handover. ARIA 5 failed to achieve 2-way lock during this pass for reasons unknown at this time. However, they had solid track and participated in the handover to ARIA 4 and Ascension USB site.

When the LM failed to achieve a normal DPS BURN over Australia, AOCC was alerted to this contingency situation. AOCC then had to determine new TSP's, look angles and acquisition times for ARIA 4 and 5 in the Ascension Sector. A short time later, the LM did not burn on its' state side pass which further compounded the AOCC problem. AOCC plotted an approximate trajectory from which TSP's, times, and angles

were determined. This information was passed to the aircraft and both ARIA 4 and 5 acquired and tracked during Rev 4. ARIA 4 and 5 were released from further support on Rev 5 because of the extreme range and low elevation angle. Although released, new TSP's were chosen for the return leg to Ascension and ARIA 4 and 5 again acquired and tracked. ARIA 4 tracked for 12 minutes and ARIA 5 tracked for 15 minutes after which they recovered to Ascension. The only preplanned objective not achieved during the mission, was the data transfer to Ascension USB site between Rev 6 and 7, however, this activity has been rescheduled for Antigua USB site on ARIA's return flight to Patrick.

A. F-29, December 17, 1967.

Initial mission briefings for flight crews.

B. January 3, 1968.

Began sterilization of ARIA 1 and 2; final maintenance activity was initiated, and AOCC was placed on mission status.

C. January 6, 1968.

Final mission briefings were conducted for flight crews. Began sterilization of ARIA 4 and 5; final maintenance activity was initiated.

D. January 8, 1968.

MAC C-141 logistics support aircraft arrived at Patrick. Crew briefed on AS-204L mission and their support role in Australia.

E. January 9, 1968.

AOCC manned on a 24-hour basis. ARIA 3 and backup aircraft began sterilization. First simulation with MSFN was conducted. ARIA 1, 2 and C-141 was scheduled to depart. Deployment to staging base was delayed due to mission slippage.

F. January 11, 1968.

AOCC participated in second F-8 day network simulation.

G. January 14, 1968.

ARIA 1, 2 and C-141 departed Patrick AFB for March AFB, California. F-8 through F-4 A/G remoting checks and simulations were conducted while enroute.

H. January 15, 1968.

ARIA 1, 2 and C-141 departed March AFB, California; arrive Hickam AFB, Hawaii.

I. January 16, 1968.

ARIA 1, 2 and C-141 departed Hickam AFB, Hawaii; arrived Townsville, Australia. AOCC participated in third Network Simulations.

J. January 17, 1968.

ARIA 4 and 5 conducted final PMEE calibration checks (comprehensive) prior to deployment.

K. January 18, 1968.

ARIA 1, 2 and C-141 departed Townsville, Australia; arrived Pearce (RAAFB), Perth, Australia. ARIA 4 and 5 departed Patrick AFB; refueled at Ramey AFB. Cape Comm Tech conducted A/G remoting checks to destination at Ascension Island.

L. January 19, 1968.

AOCC conducted a simulation using the Cape 3600 computer to provide real time acquisition messages.

ARIA 4 and 5 arrived at their staging and recovery base, Ascension Island.

M. January 20, 1968.

Final PMEE checks (brief) were conducted by all ARIA at their staging bases; fleet was declared green and can support.

N. January 21, 1968.

Crew rest day.

O. Mission Activities

The delays and holds in the Terminal Count created ARIA's first serious problem on launch day. These holds unfortunately occurred late enough in the count to have occurred after "crew duty day" time had started. The crews for ARIA 3 and 6 were most affected by this delay. The 16 hour crew duty time maximum would become critical late in the evening, however, crew augmentation eliminated the problem and moved the maximum launch delay time to 1230Z on January 23. ARIA 3 and 6 became airborne at 2116Z followed by ARIA 7 at 2117Z. Acquisition occurred at GET 00/02/10. Excellent signal strength was received and solid track was achieved with an LOS at 00/13/09. ARIA 1 and 2 became airborne at 2325Z and proceeded to their TSP's in the Australian Sector. On Rev 2, ARIA 3 acquired at 01/27/35; excellent signal strength was received and solid track was achieved with an LOS at 01/36/28. ARIA 6 proceeded to Bermuda for data pickup from that site which was scheduled for 0130 hours. ARIA 1 in the Australian Sector acquired at 02/21/54 and had LOS at 02/31/54. ARIA 2 acquired at 02/24/01 and had LOS at 02/31/54. ARIA 2 acquired at 02/24/01 and had LOS at 02/34/00. This coverage included the S-IVB passivation exercise.

ARIA 5 became airborne in the Ascension Sector at 0104Z. Shortly after take off, ARIA 5 experienced a fire warning light and low power indication on one engine. The problem diminished and ARIA 5 was able to proceed to it's TSP. On Rev 3, ARIA 3 acquired at 03/10/52 and had carrier on at 03/19/00. ARIA 3 achieved two-way lock and the carrier was turned off at 03/22/00 with a handover to ARIA 4 which had AOS at 03/23/21. ARIA 4 achieved two-way lock and conducted handover to ARIA 5 at 03/28/01. ARIA 5 AOS was 03/28/03 with two-way lock. Carrier was off at 03/21/00 when a handover to Ascension was completed. LOS occurred at 03/39/38.

ARIA 1 in the Australian Sector acquired at 03/54/56, with an LOS at 04/04/55. ARIA 2 acquired at 03/58/53 with an LOS at 04/08/51. At approximately 4 hours in the mission, the first DPS ignition occurred. An automatic shutdown occurred prior to a large thrust build up. This no-burn contingency was passed to ARIA control for information and action. ARIA 3 was released from further support at 0254Z. ARIA Control plotted the approximate trajectory by hand from which the TSP, look angles and times were determined for ARIA 4 and 5. ARIA 4 acquired at 04/56/59 with an LOS at 05/03/54. Two-way lock was achieved even though the maximum elevation angle during the pass was only two degrees above the horizon. ARIA 5 acquired at 05/03/41 with an LOS at 05/11/29. Two-way lock and solid track was achieved.

ARIA Control was given coordinates for Rev 6 which passed over South America with a GET for Antigua LOS as reference. From this plot it was concluded that ARIA 4 and 5 would be over the horizon and normal range for ARIA support. ARIA 4 and 5 were released at 0456Z. Since the upcoming state-side burn would materially increase the altitude of the LM, ARIA Control decided to have ARIA 4 and 5 search for the vehicle even though both had been released. ARIA 4 acquired at 06/28/57 with an LOS at 06/40/54. The signal strength was good with a maximum elevation angle of four degrees. ARIA 5 acquired at 06/34/56 with an LOS at 06/50/38 and good signal strength. Maximum elevation angle was 10 degrees. The planned data transfer to Ascension USB site was cancelled due to conflict with Ascension's pass and the short time remaining for aircraft endurance. ARIA Control was released by network at 0603Z.