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TECHNICAL INFORMATION BULLETIN

... THE MANNED SPACE FLIGHT NETWORK

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GODDARD SPACE FLIGHT CENTER

Manned Space Flight Network Passes First Test In Lunar Support

From the standpoint of the Manned Space Flight Network, the AS-503 Mission achieved the purpose for which the network was designed--effective support of a lunar mission.

As Project Apollo and the United States Space Program made its most significant achievement, the MSFN performed, according to plan to provide tracking and communications with the spacecraft through earth orbit, translunar injection, translunar coast, lunar orbit, transearth coast, and reentry.

According to the Network Operations Manager's Report, issued this week, comparatively minor problems were encountered by MSFN stations during this mission.

During the launch phase, all tracking commanding, telemetry, and air-to-ground voice remoting were accomplished successfully. The NOM report pointed out that air-to-ground voice remoting showed considerable improvement over the last mission, acquisition was nominal for stations covering the launch phase.

The coverage of the translunar injection of the spacecraft was provided by those land-based stations, Apollo Range Instrumented Aircraft, and instrumented ships scheduled without incident.

Communication testing was performed by the network and the spacecraft crew during the translunar coast phase. Uplink and downlink modes were checked and the spacecraft high-gain antenna was checked through its modes. It was found that the high-gain antenna emitted sufficient signal strength for 30-foot antennas to command and process 51.2 kbps telemetry data.

Both 30- and 85-foot antenna systems were able to track during the lunar orbital phase of the mission, however dumps of television, voice, and telemetry data as well as most command functions were performed through the 85-foot stations. The 85-foot stations were prime for the lunar orbital phase of the mission and were able to track, receive voice, command, and process 51.2 kbps telemetry data when either the omni-antenna or the high-gain antenna was in use. It was noted though that when the spacecraft used the high-gain antenna, the 30-foot stations had sufficient loop gain to support the mission and process the 51.2 kbps telemetry data.

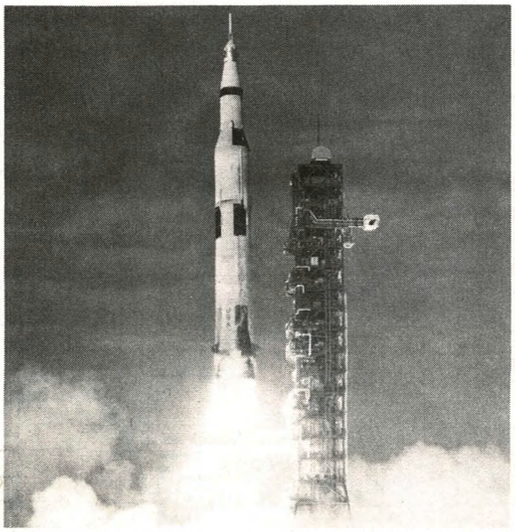
The 85-foot stations supported the portions of the transearth coast nearer the moon. The 30-foot antenna stations at Carnarvon, Ascension, Guam, and Hawaii, were able to achieve two-way lock on the spacecraft during a large portion of the translunar and transearth coast.

Guam, the Redstone, and ARIA provided coverage during the reentry.

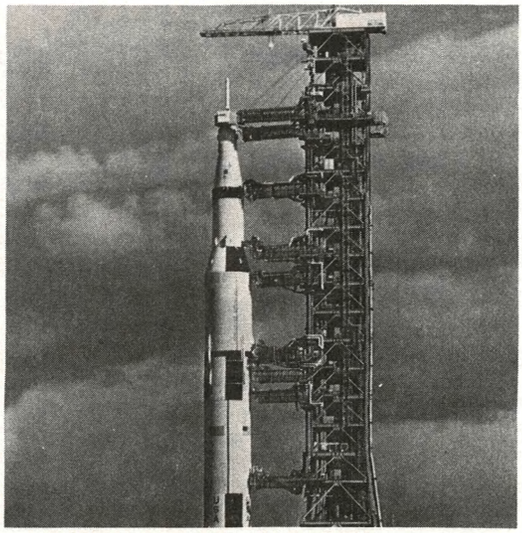
The following is a brief review of network system performance during the AS-503 Mission:

Unified S-Band--The USB performance for the mission was close to that predicted. No major data losses were experienced at any station. Antenna switching and mode changing by the spacecraft resulted in a maximum amount of usable data during the mission. Momentary data dropouts just before antenna switching were minimal. Only two known data losses were attributable to equipment malfunction. Other

Continued on Page 2



AS-503, generating a thrust of 7.5 million pounds, leaves launch complex 39A December 21 on its way to the moon and a historical achievement for the Apollo Space program.



AS-504 leaves the vehicle assembly building and begins its journey to the launch area on January 3 for the mission that will first test the Lunar Module.

Next Two Missions To Checkout Lunar Module

The next planned Apollo mission, scheduled for early 1969, is projected as a combined CSM and LM operation. It has been designed as the first thorough inflight checks of the manned Lunar Module. The mission will also demonstrate the compatibility of the CSM and the LM to perform combined operations typical of a lunar mission.

During the planned 10-day low earth-orbit flight the astronauts will perform several unique experiments, including:

...Transfer of two astronauts from the CSM to the LM in space; conduct a six-hour evaluation of the LM systems during flight.

...Extravehicular activity of one astronaut who will exit the Lunar Module, walk along both spacecraft, collect samples from the skin of the Command Module, enter the Command Module, and then return to the Lunar Module.

...Undock the Command Module and the Lunar Module, perform several rendezvous maneuvers, test the Ascent Propulsion System and the Descent Propulsion System of the Lunar Module, and then redock.

...Perform nine separate Service Propulsion burns to change both perigee and apogee altitudes.

Present plans call for the MSFN to begin Network Readiness Testing for AS-504 on January 20 and continue through February 5 when the MSFN is scheduled to go on mission status. The launch is tentatively scheduled for February 20. The AS-505 mission,

Continued on Page 2

Ops Doc Status

Operations Documentation distributed recently includes:

Network Operations Manager's Report for the AS-503 mission - distributed January 3, 1969.

Network Operations Plan for Mariner Mars 69 - distributed December 10.

Revision 1 to Software Catalog for Apollo Network - distributed January 3.

Revision 3 to MSFN Mission Support Commitment - distributed December 31.

Documentation scheduled for distribution:

Premission Briefing Report for AS-504 Mission

Network Operations Plan for Titan III-C, Vehicle 17

Network Operations Plan for OV-17/18/19

AS-504 Mission Supplements to the NOD.

Lunar Module

Continued From Page 1

scheduled for the second quarter of 1969, is planned as the second manned flight of the lunar module. The mission possibilities for AS-505 range from Earth orbital operations to a lunar orbit flight.

AS-505 will be launched by a Saturn V into low Earth orbit. As in the case of the AS-503 mission, at the end of the second or third orbit the third stage of the Saturn V will be reignited to place the space vehicle on a trajectory to the Moon. The command and service module will separate from the third stage and the spacecraft lunar module adapter panels will be jettisoned.

The command and service module will then dock with the lunar module and extract it from the rocket stage.

Lunar Test

Continued From Page 1

data losses resulted from spacecraft aspect angle, low elevation passes, handover, and antenna keyhole limitations.

Radar--The C-band radar systems performed well for the entire mission. Only about three percent of all data lost was attributable to equipment failure or operator error. The remaining data losses were caused by equipment limitations or spacecraft attitude. The last C-band radar contact with S-IVB/IU was 05:55:18 GET. Except for the White Sands, C-band radars supporting translunar injection and translunar coast could not process IRV because of program limitations of the C-band radar computers. This limitation resulted in late acquisition at California, Patrick and Grand Turk. Bermuda was able to acquire by remoting to the USB.

Telemetry--During this mission the Network Telemetry Systems provided excellent support. Many small problems brought about by the lunar mission and station responded to real-time procedural changes very well.

UHF Command--UHF command support was provided during the launch phase for range safety only. No orbital support was required. Stations supporting the launch phase included CNV, GBI, GTK, ANT, and BDA. During the prelaunch and launch phases, all systems were Green and provided uninterrupted support. Because of nominal launch, the only command transmission required was the S-IVB "safety command" which was transmitted from BDA at 13:02:48 GMT.

RSDP (Hardware)--The overall performance of the RSDP system was excellent. This performance can be attributed to the facts that the operational programs had undergone extensive checkout and testing, and that station personnel were thoroughly familiar with their operation. It was pointed out that this type of performance can be expected in the future, since the operational programs have been standardized and only minor changes are anticipated for future missions.

RSDP (Software)--The Command and Telemetry Programs for AS-503 Remote Site Data Processing performed extremely well during the mission. Before launch, some minor telemetry problems were reported in GMT processing and AMQ lock. Although errata were generated to correct these problems, they were not implemented because of the minor nature of the problems. In addition, an IC problem was reported and subsequently corrected by deletion of two errata.

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NT & TF RESIDENT TRAINING SCHEDULE
JAN - JUNE 1969

COURSE	LENGTH WKS	JANUARY	FEBUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST
110 MSFTP-2	9							(SEE NOTE 1)	
132 NETWORK DATA FLOW	1								
200 642 B COMPUTER	8							(SEE NOTE 1)	
205 COMP. PROGRAMMING	6							(SEE NOTE 2)	
210 1218 COMPUTER	8							(SEE NOTE 1)	
230 RSDP PERIPHERAL	6								
320 LAND ANTENNA	6								
330 RECEIVER/EXCITER	7								
340 POWER AMP	7								
350 DIGITAL RANGING	5								
360 TDP/APP	7								
372 USB LEVEL II	3								
400 TELETYPE OPERATION	2								
410 TELETYPE MAINT	5								
510 RECORDERS	5								
520 TIMING	4								
600 APOLLO PROGRAM	1								
610 DIGITAL COMP FUNDAMENTALS	4								
620 M&O SUPERVISION	2								
640 MSFNOC	1								

NOTES:

1. LEVEL II CONCEPTS OF MSFTP-2, 642 B MOD COMPUTER, AND 1218 COMPUTER WILL CONSIST OF THE FIRST TWO (2) WEEKS OF THE SCHEDULED COURSE.
2. CONVENING DATE FOR THE FIRST SYSTEMS PROGRAMMING COURSE (205) IS TENTATIVE. ANY CHANGE FOR THIS COURSE WILL BE PUBLISHED.

REFERENCES:

1. GETC 008A 16/1715 OCTOBER
2. GETC 006A 4/1755 NOVEMBER