For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

THE MANNED SPACE FLIGHT NETWORK

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MSFN, Spacecraft Perform Well For AS-501 Mission

With about a month to go before the next test of the MSFN for an Apollo mission, evaluation is continuing on Network performance during AS-501.

The support of the Network for AS-501 mission generally was considered excellent with only minor problems occuring. Problems encountered generally were attributed to a combination of new systems, hardware and software and procedures.

The Network director placed the MSFN on mission status October 24. Liftoff was at 12:00:01 GMT November 9; second burn was at 15:11:28 GMT; reentry was at 20:18:01 GMT; splashdown was at 20:37:31 GMT, 8 hours, 37 minutes and 30 seconds after launch.

Network Systems Performance:

Unified S-band

The overall support by the USB was very good despite the fact that this was the first orbital mission for most stations. No equipment failures resulted in a loss of data, although several operator and procedural did result in lost data.

Merritt Island - all three passes were nominal. One dropout occurred on the CSM downlink, and four on the IU. These dropouts were expected.

Grand Bahama - System performance was good. GBM had passive track on all three passes. On the first revolution 55 seconds of track were lost on MIL to BDA handover on the IU.

Bermuda - Performance was very good on all passes. Signal levels were excellent on all passes.

U.S.N.S. Vanguard - all passes were nominal and the USB system performance was excellent.

Grand Canary - System performance was good for all passes. A TDP failure during the second revolution did not effect their data.

Madrid - Although Madrid supported only on an engineering evaluation basis, the performance was good.

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Evaluation of Apollo 4 mission data at Manned Spacecraft Center, Houston confirms initial reports that Spacecraft 017 met all flight objectives without problems.

Detailed systems analysis are still in process, but evidence to data indicates that spacecraft systems operated properly and met all specifications.

As planned, the first service propulsion burn was started in a zero-g environment with no reaction control system ullage maneuvers. No adverse affects were noted. The second SPS burn was 13 seconds longer than planned. The longer burn resulted from a switchover to ground control after the burn was started by the onboard guidance and navigation system.

Mission Control Center-Houston took command of SPS on/off after Carnarvon, Australia, tracking site data indicated possible lack of onboard ignition control. The exact history of the burn is still being reviewed. However, it has been determined there was no failure in the onboard systems involved.

Cabin pressure remained between 5.6 and 5.8 psia for the entire mission and cabin air temperature appeared to remain stable at 60 degrees F during orbit, increasing to approximately 70 degrees during reentry.

Instrumentation data available indicates satisfactory structural performance of the spacecraft and Lunar Test Article 10R during the launch and boost phase of the mission.

The Earth Landing System functioned as planned. All parachutes inflated properly, and parachute disconnects operated on landing.

Heat shield performance was good. Maximum char thickness was three-quarters of an inch. The thermal control coating on the hatch and the hatch seal was intact. Maximum indicated seal temperature was less than 200 degrees F. Charring of the crew com-

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Canton Island Ends Service To Network

After more than six years supporting the NASA Manned Space Flight Programs, the Canton Island MSFN station will officially close its doors this month.

The last equipment has been removed from the station and within about a week the last personnel will leave the Pacific Island and return to the United States for reassignment. Phasing out operations have been underway for the past several months and as of December 1, more than 98 percent of the station equipment had been removed. The remaining two percent will leave on the last logistics flight late this month.

Located in the South Pacific Ocean, one of the Phoenix Islands group, Canton Island has supported manned space missions since Project Mercury. The station gave acquisition and air-to-ground communications support throughout Projects Mercury and Gemini. It was decided that the station would not be needed as part of the Apollo Network.

The last M&O personnel will leave the island on two separate flights.

TTS Successful

The Test and Training Satellite was successfully launched on Wednesday, December 13 at 9:08 a.m. It achieved a nominal orbit good USB tracking data is being received.

The basic concept of the TTS is to provide an economical and dynamic medium capable of exercising the USB systems of the MSFN.

The TTS is scheduled for launch about December 13, into an elliptical earth orbit as a secondary payload aboard the second stage of an improved Delta launch vehicle. Pioneer C will be the primary spacecraft for the first TTS launch.

A second TTS will be launched after the decay of the first in approximately seven months.

NOD Changed

Change 3 to Revision 1 of the Network Operations Directive will be distributed to the Manned Space Flight Network.

Distribution is scheduled to begin Monday, December 18 and should be at the stations soon after that. The Change will comprise about 650 pages of the NOD.

Distribution of the AS-502 supplements to the NOD is scheduled for January 2.

Network readiness testing for AS-204 mission is presently being conducted. Network testing for AS-502 mission is scheduled from January 23 to February 7.

MSFN AS-501 Support

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Carnarvon - System performance nominal with no problems.

Guam, Hawaii and Guaymas - all reported system performance as good.

Goldstone - System performance was reported as very good. On revolution one, two way lock was not attempted on IU but on Rev 2, two way lock was achieved on CSM and IU with no problems.

Ascension - Both the MSFN station and the DSN S-band station supported this mission. Performance was nominal with no problem. Excellent results were reported.

Antigua - This station supported on an engineering basis. Very low signal levels indicate that the tracking was on the side lobe of the antenna.

Texas - System performance nominal. On rev 1 the ground receiver was locked on a subcarrier; no problems on rev 2

Canberra - Supported on an engineering evaluation basis. Difficulty was expreienced in acquiring spacecraft.

Radar

Overall network support was excellent throughout the mission. On a few occasions radars simultaneously tracking the CSM and IU beacons lost data due to interference, and several radars tracking the IU beacon reported poor signal reception.

The PAT FPQ-6, BDA FPQ-6, CAL TPQ-18, VAN FPS-16 and the WHS FPS-16 all tracked skin-echo during the second revolution in support of special study to determine the ability to skin track the CSM.

The Ascension TPQ-18 tracked the CSM beacon for more than 3 hours, 45 minutes. The radar performance was excellent.

Spacecraft

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partment heat shield was less than expected based on achieved entry conditions.

During the 4.5-hour cold soak to check the spacecraft and its systems at extremes of temperature, the surface of the heat shield away from the Sun reached a temperature of approximately 100 degrees below zero F. Temperature on the Sun side reached approximately 140 degrees above zero.

Entry velocity was .0058 per cent higher than planned because of the larger-than-planned duration of the second SPS burn. Velocity achieved was 36,545 feet per second (24,913 miles per hour). Planned velocity was 36,333 feet per second (24,772 mph).

Fuel cell and cryogenic subsystems functioned normally during the mission, and the capability to purge the fuel cells subsequent to the cold soak was satisfactorily demonstrated. The fuel cells produced potable sterile water.

Communications system objectives were accomplished. Each Manned Space Flight Network site, the Apollo tracking ship Vanguard, and at least two of the Apollo/Range Instrumentation Aircraft established two-way communications with the spacecraft as scheduled.

Training Schedule

The course schedule at the Network Test and Training Facility, GSFC, for the first six months of 1968 is as follows:

No.	Course	Dates
110	MSFTP-2 PCM Decom	Jan. 29 to March 29 Apr. 22 to June 21
132	Site/Network Interface and Data Flow	Feb. 26 to March 1 Apr. 15 to Apr. 19 June 10 to June 14
200	642B Modified Computer	Feb. 26 to Apr. 19 June 3 to July 26
210	1218 Computer/ Multiplexer	Feb. 26 to April 19
230	RSDP Peripheral Equipment	Apr. 22 to May 31
320	Unified S-Band Land Antenna	Feb. 26 to Apr. 5
330	USB Receiver/Exciter	Jan. 15 to Mar. 1 Apr. 8 to May 24
340	USB Power Amplifier	Jan. 29 to Mar. 15 May 20 to July 5
350	USB Digital Ranging	Jan. 29 to Mar. 1 Apr. 22 to May 24
360	USB Tracking Data Processor/Antenna Position Programmer	Jan. 29 to Mar. 15 Apr. 22 to June 7
372	USB Systems, Level II	Mar. 18 to Apr. 5 June 24 to July 12
400	Teletype Operations	Jan. 22 to Feb. 2 Apr. 8 to Apr. 19 June 24 to July 12
410	Teletype Maintenance	Feb. 5 to Mar. 8 Apr. 22 to May 24
420	112A Key Intercom	Mar. 11 to April 5 May 27 to June 21
430	Apollo Data Modems	Jan. 29 to Feb. 16 Apr. 22 to May 10
510	MSFN Recorders	Jan. 8 to Feb. 9 Mar. 1 to Apr. 3
520	Apollo Timing	Apr. 22 to May 17
600	Apollo Program	Feb. 12 to Feb. 16 Apr. 1 to Apr. 5 May 27 to May 31
610	Digital Devices	Jan. 15 to Jan. 26 Feb. 12 to Feb. 23 Apr. 8 to Apr. 19 May 20 to May 31 June 24 to July 5
620	Apollo M&O Supervisors	Mar. 11 to Mar. 29 May 27 to June 11
640	MSFN Operations Center	Feb. 5 to Feb. 9 Apr. 22 to Apr. 26

Ops Doc Status

The following operations documentation has been published recently or will be published in the next few weeks.

AS-204 Supplements to the NOD (launch scheduled 1st quarter 1968) -- Distributed November 14. (MSFN supporting stations: MLA, CNV, PAT, MIL, GBI, ANT, BDA, CYI, ASC, ANG, ACN, PRE, TAN, CRO, GWM, CAL, HAW, GDS, GYM, WOM, WHS, GBM, TEX, ARIA, RED, RKV, CSQ, GTK and Pwr. Flt. Ship).

AS-502 Supplements to the NOD (launch scheduled 1st quarter 1968) -- Distribution scheduled January 2. (MSFN supporting stations: TEL-IV, CNV, KSC, PAT, CIF, MIL, ATF, MLA, BDA, GBI, GBM, GTK, GTI, ANT, ANG, CYI, MAD, ASC, ACN, SEN, TAN, CRO, CNB, GWM, HAW, CAL, GDS, GYM. WHS, TEX, Instrumented Ships, C-band Ship, Pwr. Flt. Ship, ARIA.)

Network Operations Plan for GEOS-B mission (launch scheduled December 20) -- Distributed December 12. (MSFN supporting stations: BDA, CYI, TAN, CRO, HAW.)

Network Operations Plan for Nimbus-B mission (launch scheduled 1st quarter 1968) -- Distribution scheduled January 15. (MSFN supporting stations: TAN, HAW).

Network Operations Plan for Pioneer C mission (launch scheduled December 13) -- Distributed November 24. (MSFN supporting stations: BDA, TAN, CRO, HAW, GYM, GWM.)

Postmission Report for Surveyor, Mission E (launched September 8). Distributed December 8. (MSFN supporting stations: BDA, TAN, CRO, CYI.)

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Safe Landing

The complex earth-impact subsystem on the Apollo Command Module will safely parachute the spacecraft and crew on land or water, without the use of additional cushioning equipment. This requirement relies on the stability of the spacecraft's structure.

The system has three elements: an efficient and intricate couch suspension and energy-absorption subsystem; optimum use of the parachute suspension angle to gain the most favorable structural response and vehicle dynamics during landing at sinking speeds up to 30 fps and in winds of 30 knots; and maximum utilization of the energy-absorption capabilities of the command module's structure.