

For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

THE MANNED SPACE FLIGHT NETWORK

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Apollo Wings Join Network

Two space tracking stations several miles distant will be acting as one to provide constant support for future lunar mission. In fact, they operate as one with one station director, one M&O, and one communications center.

Receiving their first test and providing limited USB support for the AS-502 Mission will be the wing stations at Madrid, Canberra, and Goldstone. The USB wing sites are situated at the Deep Space Instrumentation Facility (DSIF) within a few miles of the MSFN 85-foot antenna stations. Besides using the DSIF 85-foot polar mount antenna for backup support, a MSFN operations area has been set up at the DSIF station. MSFN equipment in the operations area are dual USB systems, a 1218 computer and a 112A intercom system. DSIF equipment that will be used by the wing station includes, besides the antenna, USB transmitters and masers.

Linking the prime MSFN station with the wing site is a microwave transmission system. The microwave was decided upon rather than cable because

of the distances between the prime and wing stations at all three locations: it is six miles at Madrid; 14 miles between Honeysuckle Creek and Tidbinbilla, Australia; and five miles from the MSFN Apollo station to the DSIF Pioneer station in California. If a cable were used the number of line amplifiers needed would degrade its reliability.

At each of the three locations, a passive repeater is needed with the microwave link because direct line of sight is not available. This, essentially, is two parabolic antennas back-to-back, one facing the wing station, and the other facing the main station, with a waveguide connecting the two.

In general, during lunar missions, the prime and wing stations can, and will, perform the same roles as far as tracking, telemetry and voice support for the lunar module and the command/service module.

Both collocated stations are considered as a single facility of the MSFN for lunar mission support. However, the MSFN deep space stations will

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Station Directors To Meet This Month

MSFN station directors will gather at GSFC this month.

The regular meeting of the station directors has been scheduled tentatively for April 22 through April 26. H. William Wood, Chief, Manned Flight Operations Division, will chair the week-long meeting. All MFOD and MFED branches will participate in the meeting to the extent of their responsibilities within the Network.

Network personnel expected to be on hand for the meeting are: R. J. Augenstein, station director, Ascension Island; J. P. Garvey, station director, Antigua; F. A. Healey, station director, and R. Eaves, assistant station director, Bermuda; C. A. Rouiller, station director, and A. B. Washburn, assistant station director, Grand Canary Island; G. W. Farriss, station director and R. D. Kephart, assistant station director, Goldstone; L. H. Odenthal, station director, Grand Bahama Island; C. T. Force, station director, Guaymas; M. M. Berndt, station director, and W. M. McMillan, assistant station director, Guam; Virgil True, station director, Hawaii; D. S. Hunter, station director and Steve Stompf, assistant station director, Madrid; J. E. Dowling, station director, W. W. White, assistant station director, Chuck Walker, engineering systems, George Jenkins, operations systems, Merritt Island; Hank Schultze, station director, Lynn Woodward, assistant station director, Texas; Lewis Wainwright, station director, Carnarvon; Tom Reed, station director, Honeysuckle Creek.

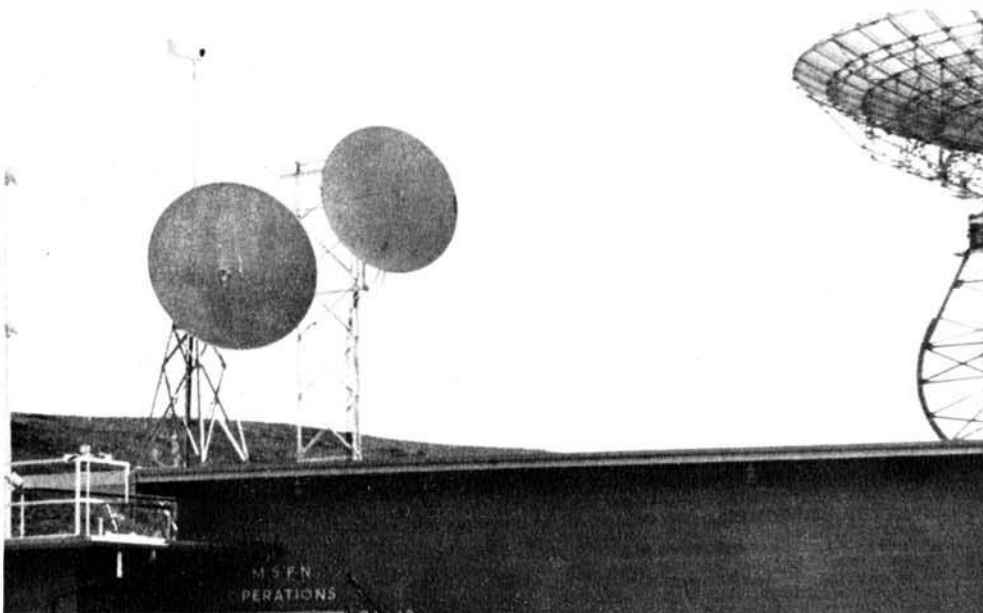
Ships representatives to be present at the meeting are Paul Hansen, Ken Sory, and Otto Thiele.

Ships Representatives

The fourth of five Apollo instrumented ships will receive its operational and engineering evaluation this month as it supports the AS-502 mission. The USNS Mercury is scheduled for passive support to the mission. Two other ships, are part of the MSFN for the mission. The USNS Redstone will serve as the insertion ship while the USNS Watertown will support the mission as the reentry ship.

While the ships are the responsibility of the Department of Defense, the Manned Flight Operations Division has a thoroughly capable representative on each of the Apollo ships. Serving as the Goddard Space Flight Center Apollo Ships representatives are Paul Hansen, Ken Sory, and Otto Thiele. Their func-

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Perched atop the MSFN operations annex at the Pioneer Deep Space station at Goldstone, California are the microwave transmitting and receiving antennas. The Pioneer station is about five miles from the MSFN station.

Wing sites

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take the primary support role for the translunar and transearth phases. The wing site serves as a dynamic standby--that is, capable of assuming the primary support role, identical to that of the GSFC stations, within 30 minutes of being notified, except during mid-course maneuvers.

... During mid-course maneuvers, and for five minutes before and after maneuver burns, the backup station can take over prime support immediately.

... During the lunar stay phase, both stations will track simultaneously. This is necessary because it is not expected that the -3 db beamwidth of either antenna is sufficient to permit coverage of the CSM orbiting the moon, and the entire LM landing area.

Uplink data through the collocated stations originates at the prime station. When the wing station is tracking the spacecraft, updata originated at the prime station is transmitted to the wing station via the microwave and transmitted to the spacecraft through the DSIF antenna. Downlink data to the wing station is relayed over the microwave to the MSFN station for processing and insertion into the normal communications circuits called up for support.



This 85-foot polar mount antenna will provide backup support to the MSFN Apollo USB station at Goldstone, Cal. It is one of three antennas in the Deep Space Network that will serve as dynamic standby stations to the MSFN deep space facilities. The others are at Canberra, Australia and Madrid, Spain.

Downlink telemetry data is demodulated by the MSFN and a spacecraft AGC and static phase error are sent back to the DSIF to be used in spacecraft acquisition. The only signal not sent to the wing station that is needed for tracking is the range code. The DSIF has an existing ranging system.

Ops Doc Status

Operational documentation that has been distributed includes:

AS-503BP Mission Supplements to the NOD (launch scheduled 2nd quarter, 1968)--Distributed March 25. (MSFN supporting stations: ACN, ANG, ANT, ASC, ATF, BDA, CAL, CIF, HSK, HSKX, CNV, CRO, CYI, GBI, GBM, GDS, GDSX, GTK, GYM, HAW, KSC, MAD, MADX, MIL, MLA, PAT, PRE, TAN, TEL-IV, TEX, WHS, ARIA 1-4, Powered Flight Ship, MER, RED, WTN.)

MSFN updated input to NASA-GSFC operations plan for NIMBUS-B--Distributed February 20.

Network Operations Plan (Change 1) for Test and Training Satellite-A--Distributed March 22. (All MSFN USB stations, Apollo instrumented ships, and aircraft will participate as per NCG scheduling.)

Network Operations Plan for OV1-13/14 Mission (launch scheduled 1st quarter, 1968)--Distributed March 14. (MSFN supporting stations: CRO, HAW.)

Network Operations Plan for Re-entry F Mission (launch scheduled April 22)--Distributed March 26. (MSFN sup-

porting station: BDA.)

Network Operations Plan for Javelin 8.40 Mission (launch scheduled April 9)--Teletype NOP transmitted March 27. (MSFN supporting station: BDA.)

Network Operations Plan for Astrobee 16.04 (launch scheduled April 16)--Teletype NOP transmitted April 1. (MSFN supporting station: BDA.)

Network Operations Plan for Solar Explorer B Mission (launch scheduled February 29)--Teletype NOP distributed February 23. (MSFN supporting station: BDA.)

Documentation scheduled for distribution in the near future:

MSFNOC Procedures Manual
MSFN Support Commitment Document.
Post Mission Report for AS-204LM Mission.
AS-205 Supplements to the NOD.

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Training

110 MSFTP-2 PCM Decom	Apr. 22 to June 21
132 Site Network Interface and Data Flow	Apr. 29 to May 3 June 3 to July 26
200 642B Modified Computer	June 10 to July 14
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	Apr. 8 to May 24
340 USB Power Amplifier	Apr. 22 to June 7
350 USB Digital Ranging	Apr. 22 to May 24
360 USB Tracking Data Processor/Antenna Position Programmer	Apr. 22 to June 7
372 USB Systems, Level II	Mar 18 to Apr. 5 June 24 to July 12
400 Teletype Operations	Apr. 8 to Apr. 19 June 24 to July 5
410 Teletype Maintenance	Apr. 22 to May 24
420 112A Key Intercom	Mar. 11 to April 5 May 27 to June 21
430 Apollo Data Modems	Apr. 22 to May 10
510 MSFN Recorders	April 22 to May 24
520 Apollo Timing	May 27 to June 21
600 Apollo Program	Apr. 1 to Apr. 5 June 3 to June 7
610 Digital Devices	Apr. 8 to Apr. 19 May 20 to May 31 June 24 to July 5
620 Apollo M&O Supervisors	May 13 to May 24 June 24 to July 5
640 MSFN Operations Center	May 6 to 10 June 17 to 21

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tion is to represent GSFC on all matters related to NASA responsibilities for the MSFN. They serve as the point of contact for GSFC with the Air Force Western Test Range and the Apollo ships' crews.

The present ships' representatives have wide experience with the space program, especially with the Manned Space program. Hansen and Sory served at Kennedy Space Center as test conductors during the Gemini Program. Thiele was formerly at White Sands.

The USNS Hyntsville, the fifth Apollo ship, is now at Jacksonville, Fla. for C-band radar installation.

Let Us Hear From You

Your comments, criticisms, suggestions are openly solicited. TIB can tell your ideas, or tricks of the trade, on methods being used to get the best performance from your equipment. Because this information might be helpful to all stations, your ideas will be published.