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TECHNICAL INFORMATION BULLETIN

THE MANNED SPACE FLIGHT NETWORK

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MSFN TRACKING MM 71

GEODETIC POSITIONING OF 30-FOOT STATIONS OBJECTIVE

The MSFN, in order to geodetically calibrate the MSFN-USB network, will intensively track the two Mariner-Mars 1971 spacecraft. At present the geodetic misposition of the MSFN 30-foot sites is a major source of error in trajectories determined from MSFN-USB tracking data.

The prime objective of the Mariner-Mars 1971 MSFN tracking and Calibration Experiment will be to obtain multiple-mode range-rate data from the two spacecraft. The goal will be to reduce the errors in distance off spin axis and relative longitude to less than five meters.

The two Mariner spacecraft will be launched ten days apart in May and will be tracked by the DSN. They will be operating in interplanetary space, and therefore, subject only to simple well-known external accelerations. Furthermore they will be stabilized in inertial space and not thrusting except for mid-course maneuvers.

A second objective of this experiment will be to exercise the MSFN 85-foot sites in the deep space and planetary tracking modes, and, thereby, to prove their capacity to track effectively in deep space. It will also exercise the MSFN data reduction facility and prove its capacity to correctly process deep space metric tracking data. The data acquired while the spacecraft are in Mars-centered orbit will be used solely to achieve this second objective. No attempt will be made to correct the coordinates of the 85-foot sites, which have been sufficiently coordinated by previous Mariner flights.

The tracking will be accomplished in three phases:

a. Near-Earth Phase. Prime 85-foot sites and all land based 30-foot sites (including ETC) will be expected to track the A mission (spacecraft H) every opportunity from launch to launch plus eight days. The same sites will be expected to track the B Mission (Spacecraft I) every opportunity from launch to launch plus ten days. From day five to day eight of the A mission, the 30-foot sites without supercooled parametric amplifiers may not be able to track because of the low signal level. If that is the case, then the requirement for those sites to track at that time will be cancelled. MSFN sites will be required only to obtain multiple metric tracking data, and there will be no requirement for any processing of telemetry portions of the received signals.

b. Cruise Phase. During the Cruise Phase (which will last from the first mid-course maneuver of both flights to Mars encounter), four five-day MSFN tracking periods will be scheduled.

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YOUNG TO COMMAND APOLLO 16 MISSION

NASA has announced the prime and backup crews for the Apollo 16 mission, scheduled for launch in March 1972.

Prime crewmen are John W. Young, Commander; Thomas K. Mattingly II, Command Module Pilot; and Charles M. Duke, Jr., Lunar Module Pilot. Backup crewmen, respectively, are Fred W. Haise, Jr., Stuart A. Roosa, and Edgar D. Mitchell.

The lunar landing site for Apollo 16 has not yet been selected; however, it will not be in a mare area. Mission duration will be approximately 12 days, including a lunar surface stay time of about 67 hours. Young and Duke will have three extravehicular activity periods on the lunar surface, totaling about 20 hours. They will use a Lunar Rover Vehicle (LRV).

An Apollo lunar surface experiment package (ALSEP) will be deployed and an extensive lunar orbital science program will be conducted. Mattingly will leave the command module during the trans-earth coast to retrieve a lunar orbital science film package from the service module.

Young, 40, is a Navy captain who will be making his fourth space flight. He has flown on Geminis 3 and 10 and Apollo 10. Apollo 16 will be his first lunar landing mission.

Mattingly, 34, a Navy lieutenant commander, has not yet flown in space. He was replaced as the prime command

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LUNAR ROVING VEHICLE. The first LRV will be used on the Apollo 15 mission this summer. The vehicle will transport a two-man crew three to five miles from the Lunar Module at speeds up to 10 miles per hour. In addition to the crew, the battery-powered Rover will carry up to 170 pounds of equipment and lunar samples.

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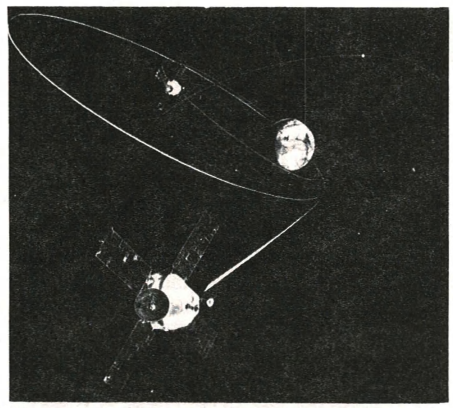
HSK Prime and GDS Prime will be scheduled to track only the first opportunity of each period. For the first tracking period, the MSFN 30-foot sites with supercooled parametric amplifiers and MAD Prime will be scheduled to track the B mission from launch plus 30 days through launch plus 34 days. All MSFN 30-foot sites, MAD and ETC will be scheduled to track the B mission for the second tracking period which covers the time from launch plus 51 days to launch plus 55 days. The third and fourth tracking periods occur during the latter portion of the cruise phase, from launch plus 149 days through launch plus 153 days and from launch plus 163 days through launch plus 167 days of the B mission. All MSFN 30-foot sites, MAD, and ETC will be scheduled to track throughout these periods, with each MSFN USB site tracking whichever spacecraft is in two-way lock with the DSN.

c. Mars - Orbit Phase. After each spacecraft has entered Mars orbit, the USB 85-foot sites will be able to track effectively for a period of two months. During this interval, the 85-foot prime sites will be scheduled to track two five-day periods. During these periods, the sites will track whichever spacecraft is in two-way lock with the DSN. When the DSN is in two-way lock with both spacecraft, each MSFN site will track both spacecraft in the Dual Mode. There will be no requirement in any phase of this experiment for tracking by the MSFN wing sites. Also, the VAN, having no fixed geodetic position, will not be required to track.



MSFN SUPPORTED EIGHTH IMP LAUNCH

The MSFN successfully supported the launch from Cape Kennedy by a three-stage Delta M-6 rocket, of the eighth spacecraft in NASA's Interplanetary Monitoring Platform (IMP) program on March 12, 1971.

The 635-pound automated space physics laboratory, renamed Explorer 43 is the largest and most advanced spacecraft in the NASA 1 Explorer series. Its major engineering innovations include the most advanced encoder-digital data processor system ever flown on an unmanned NASA satellite. It is also the largest and most complex spacecraft ever built at GSFC.

The Explorer 43 scientific mission is continuing the pioneering investigations of the seven earlier spacecraft in the series which began with the launching of Explorer 18, Nov. 18, 1963. Scientific results from the program to date include a definition of the nature and extent of the earth's magnetosphere and a vastly increased knowledge of the turbulent interplanetary space environment. In addition, other Explorer spacecraft have provided warnings of possible solar flare radiation hazards to astronauts during Apollo flights to the moon.

This was the most demanding mission the Delta rocket has been given during its 11-year history. It was launched on a very precise trajectory so that the scientific instruments aboard the spacecraft could make measurements with the sun at a specific angle to the IMP's orbit. This required a launch window of only 10 minutes for each 24 hours in the firing times of the three-stage rocket and six strap-on motors at various altitudes and locations around earth.

The Explorer 43 orbit is highly elliptical, ranging initially from a high point (apogee) of 121,000 statute miles to a low point (perigee) of 145 miles with an inclination of about 29 degrees.

Projected orbital period is just under four days. Eventually the orbit will change because of the gravitational influences of the earth, moon, and sun to an apogee of about 113,000 miles and a perigee of 8,000 miles. The spacecraft is expected to be fully operational about 30 days after launch.

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module pilot on Apollo 13 a few days before launch after being exposed to the German measles.

Duke, 35, an Air Force lieutenant colonel, also will be making his first space flight. He was backup lunar module pilot for Apollo 13.

Tricks of the Trade

TOUCHDOWN, LIFTOFF DISPLAY

The NOM at GSFC has a GMT display of lunar touchdown and liftoff.

This modification now provides an interface between the MSFTP-2 PCM decom and the NOM's "Liftoff Clock," thereby providing a path for data to be used to stop the liftoff clock upon the occurrence of preprogrammed bi-level events.

By taking advantage of the stored program capabilities of the MSFTP-2 and further making use of N^x of the mechanical relays in the output circuits of the decommutator, the contact closures of the relays are used to provide a discrete to the "Liftoff Clock" upon the occurrence of the event. When the selected relay contact has completed the circuit, the clock stops and remains in lock until it is manually reset.
CRR Number NST-04B-07
Field Engineer H. B. Berman

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TIMING DISTRIBUTION SYSTEM

GSFC has installed a new timing distribution system at the MSFNOC which now provides the necessary buffering and distribution of the timing signal inputs from the recently interfaced Time Standard Facility in Building 3/14.

The design, fabrication, and installation of the timing decoder driver and the timing distribution buffer were necessary to meet the increased demands for timing for mission support equipment and to drive clock displays throughout the MSFNOC operations area.

With the installation of the driver and the buffer, timing signals of 1 p/sec, 100 p/sec, 100 kp/sec, SDT, BTC, and GMT are provided in sufficient capacity to drive the clock displays and satisfy timing input requirements for the support instrumentation equipment throughout the MSFNOC area.
CRR Number NST-04B-06
M&O Engineering Tech. P. J. McAdams

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