Mariner Venus/Mercury 1973 Mission Support

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During November and December 1972, DSN activities have concentrated on finalizing ground system test planning, spacecraft/DSN compatibility test planning, and on continuing implementation. This article summarizes the major accomplishments in the areas of planning, implementation, and testing.

I. Planning Activities

A. NASA Support Plan

NASA Headquarters review of the NASA Support Plan continued during this period. Approval is expected prior to January 1, 1973. Upon receipt of the completed approval page, the DSN will publish and distribute the final plan.

B. Project Master Test Plan

The Mariner Venus/Mercury 1973 (MVM 73) Mission Operations Master Test Plan (JPL internal document 615-97, Sept. 8, 1972) was not published by the Project in final form in November as planned. However, on December 1, 1972, the Project Manager reviewed and approved final Mission Control and Computing Center System (MCCCS), DSN, and Ground Data System test plans, which form the basis for the master document. Material presented in this review does not alter the DSN basic test plan described in the preceding volume of this series.

C. DSN Support Plan

In December 1972, the DSN Support Plan for MVM 73 (JPL internal document 615-15, Oct. 15, 1972) was updated to reflect test requirements and schedules resulting from the test planning activity (Section B). Included in the appendix are schedules and a flow diagram containing guidelines, objectives, and criteria for use by the DSN operations organization in preparing detailed test procedures and schedules for each Deep Space Station. The

update included changing the document title to "DSN Support Requirements for MVM 73" in accordance with revised DSN documentation standard practices.

D. DSN Preparation Plan

The DSN Preparation Plan for MVM 73 contains the technical response to the DSN Support Requirements Document. It communicates detailed information regarding Deep Space Station and Ground Communications Facility configurations, capabilities, and schedules for new implementation. A draft version of this plan was produced and reviewed during this reporting period. The final version is in publication, and approval is planned for early January 1973. Detailed test/training plans and procedures have been excluded from this document. In accordance with revised documentation standard practices, these activities shall be included in the DSN Operations Plan.

E. DSN Operations Plan

The DSN Operations Plan for MVM 73 contains the operational response to the DSN Support Requirements Document, based on existing operational capabilities and on implementation plans described in the DSN Preparation Plan. It communicates detailed plans and procedures for DSN operations, control, data handling, training/testing, performance analysis, and reporting. A draft of the network-level portion of the Operations Plan is under review. Deep Space Station and Ground Communications portions will follow in January 1973.

II. Implementation Activities

A. Ground Communications

Voice, high-speed, and wideband circuits required between Boeing-Kent spacecraft test facilities and the JPL Mission Control and Computing Center have been implemented as required. Goddard Space Flight Center/NASA Communication System-provided terminal and commercial carrier equipment was installed and completed acceptance testing on December 1, 1972. The DSN has provided operational procedures for use in circuit initialization checkout and operations.

Project experimenters at the University of Chicago have requested that data be transmitted to their remote information center in standard ground communication block format instead of the asynchronous word format previously required. Additional terminal equipment is needed to support this mode. The NASA Communications System will provide terminal equipment required at the user end. Existing DSN–JPL terminal equipment will support this requirement subject to use limitations occurring during peak periods of higher-priority operational data traffic.

Procurement and fabrication of terminal equipment for DSN wideband circuit implementation remains on schedule.

B. Deep Space Stations

Implementation for new capabilities required at Deep Space Stations (DSSs) continues on schedule. Following is a status summary of DSS subsystems involved for MVM 73.

1. ***Telemetry and Command Subsystem.*** The basic command software module for MVM 73 support is completed and being checked out in Compatibility Test Area (CTA) 21. Rearrangement of tables may continue to improve core utilization, but no major problems have been encountered. The new executive for command processing is in work. Software development for the telemetry processor and data decoder assembly is progressing satisfactorily. Medium-rate telemetry block decoding functions have been checked out. Coding for telemetry data formatting for transmission/recording is in work, and initial checks indicate no problems. Data recall processing work has been initiated. Progress is still being made in support of the February 1973 verification test and March 1973 acceptance test schedules. Simulation Conversion Assembly software documents have been completed, and verification testing is under way. Hardware modification kits have been shipped.

2. ***Monitor and Control/Digital Instrumentation Subsystem.*** The Software Requirements Document has been completed. Coding and checkout to meet baseline requirements are on schedule toward a January 1973 completion date. Additional new requirements for radio metric data handling and telemetry/command initialization changes will be incorporated by February 1973. Station manager console hardware, including silent printers, has been shipped.

3. ***Receiver/Exciter Subsystem.*** Twenty-four 10-MHz notch filters and alignment procedures have been provided to the assigned stations for Subcarrier Demodulator Assembly interplex mode modifications.

4. ***S/X-Band Experiment.*** The S-band megawatt transmit (SMT) and S/X-band cones have been removed from DSS 14 and are undergoing metal fabrication work for installation of S/X reflector/feed modifications. Reinstallation is planned in late January 1973 during the

Pioneer 10 low activity period associated with superior conjunction. Re-installation and tests must be completed prior to DSS 14 antenna down time for regrouting beginning February 4, 1973.

5. ***Planetary Ranging.*** Procurement action has been initiated. Responses to the request for bids are due December 21, 1972. This implementation appears to be on a critical schedule since projected delivery dates are very close to committed operational dates. A detailed review will be made in an effort to improve delivery dates.

III. Test Activities

DSN/spacecraft compatibility test planning has been reviewed and revised. The DSN/Spacecraft Compatibility Test Plan was written and is being coordinated. Preparations for Flight Spacecraft 2 subsystem tests in December 1972/January 1973 have been completed. The plan includes spacecraft component–CTA 21 telemetry compatibility tests in April/May 1973, flight spacecraft–CTA 21 tests in July 1973 during thermal-vacuum chamber tests, S/X-band tests at DSS 14 in June 1973 using proof-test model radio and X-band transponder components, and flight spacecraft compatibility verification with DSS 71 during the launch preparation phase.