For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

MANNED SPACE MSFN FLIGHT NETWORK

GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND

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About EI's

The following Engineering Instructions have been issued during the past two weeks:

EI 609 PCM Implementation (CYI, HAW, GYM, TEX, WLP)

EI 610 CRO PCM Implementation

EI 611 CRO PCM-FM/FM-Recorder Interface

EI 613 BDA PCM Implementation

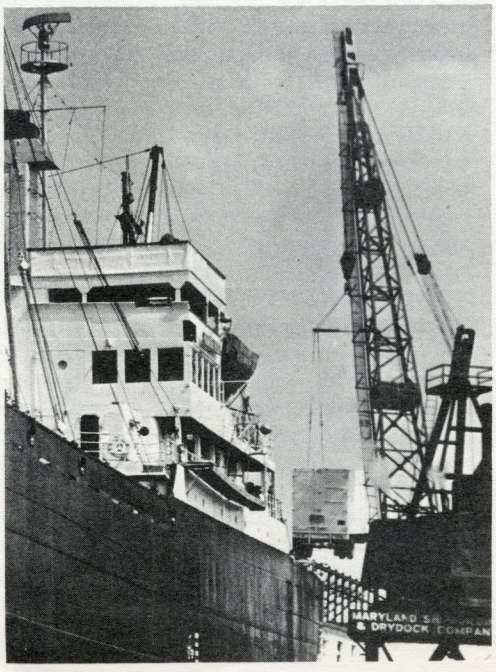
The following EI has been canceled:

EI 606 HAW Intercom Relocation

CRO Equipment Enroute

With 15 tons of electronic equipment for CRO loaded aboard, the United States Lines freighter Pioneer Reef departed the port of Baltimore this week to begin a 54-day journey to the port of Freemantle, Australia, from where the equipment will be trucked overland 600 miles to the Carnarvon site. Included in the cargo are command and communications systems, the FPQ-6 radar, acquisition systems, timing and test equipment, and range & range rate equipment.

The photo shows cargo being loaded aboard the Pioneer Reef at the Baltimore port.



Gemini Equipment to Undergo Extensive Testing

The Gemini program will make many demands on the network organization. None, however, will exceed in importance the demand for proper operation and compatibility of the equipment involved in the mission. To insure this, an elaborate test program has been devised that includes acceptance tests, compatibility tests, on-site tests, integrated site tests, dynamic tests, DST's and BST's, and simulation tests.

Before the equipment leaves the manufacturer, extensive acceptance tests are required to demonstrate that the manufacturer's design and fabrication complies with the equipment specifications. These tests are prepared by the manufacturer and approved by GSFC. NASA engineers or their representatives must witness the tests.

At various stages of manufacturing and site installation, compatibility tests are conducted to demonstrate the compatibility of the system with other systems. As an example, such a test was performed by Collins Radio under the surveillance of NASA engineers on the ground digital command modulator, the FRW-2 command transmitter, and the spacecraft digital command receiver.

Upon completion of installation of each system, manufacturer-originated and NASA-approved on-site test procedures are begun. These procedures are performed by the site M&O personnel under the cognizance of the NASA representative and the manufacturer's representative.

Having passed the on-site tests, the equipment is then submitted to integrated site tests. These test procedures, which demonstrate the compatibility of the various systems operating simultaneously in various modes, are prepared by the Systems Engineering Section of MFEB. Again, site M&O personnel perform the tests.

Dynamic capabilities and any compatibility tests that cannot be made by ground test equipment are checked out by dynamic tests. They are performed on the radar, command, acquisition, and PCM systems individually and in combination using the instrumented aircraft. Preplanned test programs prepared on tapes are used to modulate the spacecraft telemetry transmitter installed in the instrumented aircraft. Signals from the aircraft are observed and recorded in real time on the ground station display equipment for detailed comparison. A programmed teletype tape is inserted into the digital command system and transmitted to the instrumented aircraft. The output of the aircraft receiver is recorded for comparison. The dynamic test procedure is also prepared by the Systems Engineering Section.

DST's and BST's similar to those used for Mercury are performed periodically to indicate subsystem performance. These test procedures are prepared by GSFC and performed by site M&O personnel. The manufacturer's subsystem test procedure provides the basis for the preparation of the DST's and BST's by MFOB. Additional recommendations will be made by representatives of the manufacturer and M&O personnel.

After site integrated tests have been completed, simulation tests are performed to evaluate the network readiness of the M&O personnel and equipment performance. Simulation tests are prepared by MFOB from inputs provided by MFEB, manufacturers, and other NASA centers.

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About Documentation

The following documents were completed and are being shipped to the appropriate sites:

ME-101 Verlort LRT-2 and LRT-3 Radar Systems, Vol. I, II, and III, Revision July 30, 1963

ME-179 WWV Receiver Model 905, Revision August 15, 1963

ME-460 Eight-Channel Power Supply, Model 858-500C, Revision July 26, 1963

ME-1045 Capacitive Voltage Divider Model 454A (new)

ME-1046 Line Matching Transformer Model AC-60A (new)

X-500-63-157 MSF Network Instrumented Aircraft Systems Description (new)

Index of Instruction Manuals, Issue 3, July 31, 1963

NCG Meeting Held at University Building

On August 8, a Network Control Group meeting was held in the University Building. Among the subjects discussed were:

- Tentative schedule for the week of August 12-16
- All MSFN support requirements for Gemini
- Gemini equipment implementation status
- Operational support plans
- Network extended forecast

Attending the meeting were members of GSFC, MSC, and DOD.

GYM Getting "Frequency Shift Reflector"

For some time, Guaymas has experienced a problem in range calibrating its Verlort radar because of the proximity of a corrugated metal building to the boresight target. The addition of a recently installed power line in the vicinity of the building produces a further dispersion of the target. The net result is the radar wanders over the dispersed return without locking firmly on the surveyed point.

In order to eliminate this problem, a "Frequency Shift Reflector" is soon to be installed. This instrument is similar to a corner reflector, but has an additional feature; it shifts the frequency of the radar return. When a radar pulse is received by the Frequency Shift Reflector, a fixed frequency is mixed with the interrogation pulse, and the sum and difference of the two frequencies are reradiated. The radar may then be tuned to receive either of these two frequencies, and a strong point source is achieved with the elimination of ground clutter and undesired targets.

University Building Assigned TTY Routing Indicator

As was reported in the last issue of TIB, MSFSD has become MFOD (Manned Flight Operations Division) and, except for the Division's Data Operations Branch which remains at GSFC, has relocated to a new building—the University Building—about 10 miles from Goddard. To send teletype messages to this new location, the routing indicator UNV plus the appropriate code numbers are to be added to the format; i.e., the MFOD is UNV/Code 550, the MF Operations Branch is UNV/Code 552, and the MF Engineering Branch is UNV/Code 553.

There is no change in mailing addresses.

EI Status Report Procedure Changed

The present procedure of EI status reporting requires that the site, upon completion of an EI requirement, immediately notify Goddard via mail and teletype. In order to reduce the amount of time and effort involved for both the site and Goddard, only notification via teletype will be required in the future. The following format is to be used when making future EI status reports:

FM: M&O SUPERVISOR

TO: UNV/BEGENWALD & (EI Cognizant Engineer)

INFO: BENDIX/MSF ENGINEERING SUPPORT

UNV/NIS

ADM

MOD COMPLETION REPORT

EI (Number) COMPLETED (Date)

A. (Title of EI)

B. (Serial No. of equipment modified)

C. (Describe test procedure followed to check out modifications)

D. TEST WITNESSED BY (Name and title)

E. Describe site action taken—if any was required—in compliance with paragraph 7.3 of the EI)

F. COMMENTS: (Describe difficulties experienced or give comments on any phase of the modification procedure)

Authority for this change is the Interim Network Operations Plan, dated August 7, 1963. Identical instructions will also be included in Network Operations Directive 63-1. All subsequent EI status reporting will use this format. Comments concerning the installation of the EI's are to be included in the teletype message, whereas drawings, schematics, etc., relevant to the EI are to be forwarded to Manned Flight Engineering Branch, Implementation Section, Code 553, Attention: A. J. Begenwald.

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The *Technical Information Bulletin* is published biweekly by the Manned Space Flight Support Division for network personnel only. Since information contained herein may not have been released outside the project organization, it is to be considered privileged. Release of this information to others must be approved by the Public Information Office, GSFC. Address other communications to TIB Editor, NASA, Goddard Space Flight Center, Code 551, Greenbelt, Maryland 20771, or use the MSFN teletype facilities.

Gemini M&O Training Progressing

Training for the maintenance and operation of Gemini equipment has begun. It consists of two phases: Phase I includes conditioning of personnel in the basics of solid-state and digital techniques, and Phase II consists of in-plant training on specific equipments (PCM telemetry and digital command systems).

Phase I was conducted at the MSFN E/T Center at Wallops Station, Va. The Semiconductor Techniques and Applications portion of Phase I was conducted between July 22 and August 2, and the Basic Digital Technique portion was conducted from August 5 through August 16. Phase II, which will run from August 19 through September 20, is being held at Electro-Mechanical Research, Inc., Sarasota, Fla., for PCM telemetry, and at Radiation, Inc., Melbourne, Fla., for digital command. The PCM and the DCS courses are running simultaneously.

Phase I was attended by approximately 40 people. Phase II is being attended by approximately 40 people at each of the two locations. Personnel from BDA, CYI, GYM, WLP, GSC, HAW, TEX, MCC, CRO, MSC, Bendix, and McDonnell are represented.

Similar courses will be offered on Phase II at the E/T Center in the future.

Phase I of the program will continue to be run at the Center.

Construction Under Way at BDA

Construction at the Bermuda site has begun in preparation for support of Gemini and other future space missions. It will include modifications of the existing telemetry and control building, expansion of the existing power building, and the erection of an Acq Aid tower.

Modifications to the telemetry and control building include installation of new interior partitions, relocation of existing interior partitions, and alterations and improvements to the electrical and air conditioning systems in order to accommodate building changes and equipment additions. The planned modifications to this building will adapt existing space for expected Gemini equipment additions and service area requirements.

Expansion of the existing power building includes the construction of wings to the power generator area, and replacing baffles which are inadequate protection from salt water spray corrosive damage. The maintenance shop, which was previously unsheltered, is also being enclosed.

The Acq Aid antenna tower is being erected in conjunction with the new Acq Aid equipment which will give the site the capability of tracking two vehicles simultaneously.