For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

MANNED SPACE FLIGHT NETWORK

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New Display Consoles To Support Gemini

During the first half of the coming year, the Gemini display systems are due to be installed at the Gemini stations. They are being supplied by the Bendix-Pacific Division of The Bendix Corporation and are now passing from the design stage into the manufacturing stage. Each system includes five display consoles: Gemini system monitor console; Agena system monitor console; command communicator console; aeromedical monitor console; and M&O console.

Gemini and Agena System Monitor Consoles

At each station, two flight controllers will observe the performance of the vehicles in orbit from two system monitor consoles. Identical in design, the two consoles—one for the Agena and the other for the Gemini vehicle—will display telemetered information and permit command of vehicle events. The Agena and Gemini system flight controllers will have at their disposal at the respective console a method which selects binary coded words originating in the appropriate PCM telemetry system and converts the information for readout in both binary and decimal form. A method is provided for automatically recording the selected information, the Greenwich mean time (GMT) of printout, and the telemetry channel of the selected parameter.

During a mission, the flight controllers will read the physical parameters of each vehicle, such as attitude, fuel consumption, temperature, pressures, radar range, battery current, gas supply, and scores of other pertinent measurements, in the form of DC voltages on 45 meters at the respective console.

Meter alarm circuits will generate audible signals to warn the monitor when a meter indication exceeds the predetermined limits. To provide distinct signals for each console, the audible tones can be varied by adjusting the oscillators. The system monitors may find it necessary to assume control of certain spacecraft functions as it passes over any one of the stations. This purpose will be served by 36 illuminated switches permitting preconditioning, display, and execution of real-time commands. A panel of six mode select switches at each system monitor console will allow control of alarm and real-time command enable functions.

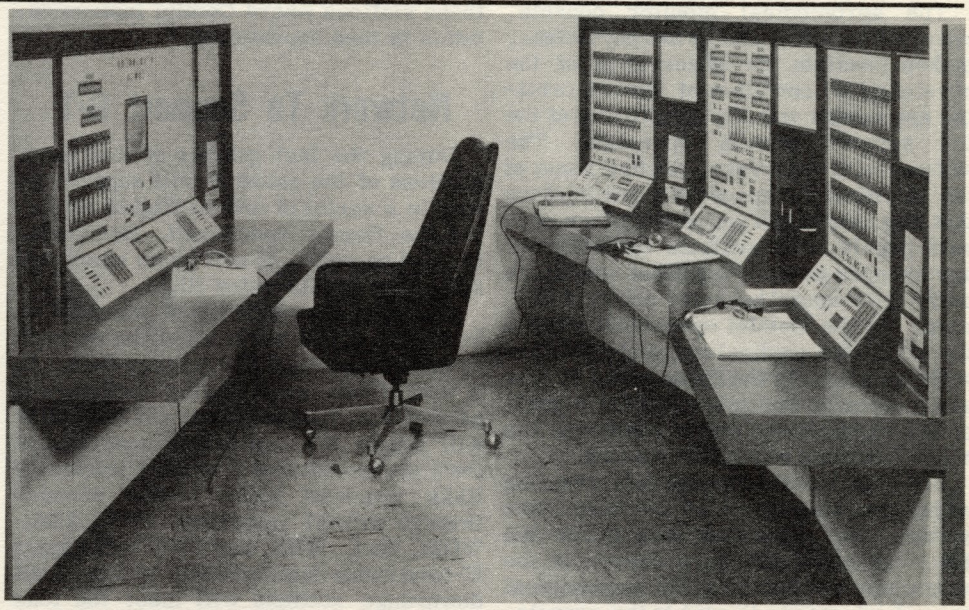

Photo shows mockups of the aeromed console at the left and the command communicator console flanked on either side by the system monitor consoles at the right

Command Communicator Console

The command communicator console, operated by the director of the flight control team, is located between the two system monitor consoles. The console will provide command capabilities for spacecraft events. In addition to the events displays, meters, status indicators, and selector switches with which the other consoles are furnished, the command communicator displays include nine digital clocks indicating three types of time: ground-based time, ground determined time, and telemetered time.

GMT coincidence circuitry in the CCC allows presetting a future time at which the time-to-retrofire (TR) and the time-to-fix (TF) clocks at the digital command system console will automatically update the associated time registers at the rate of one pulse per second. Upon command, the time registers will be transferred to the Gemini spacecraft. Two of four alternate-action switches may be used separately or simultaneously for automatic updating of the TR and TF registers at coincidence. Various computer status conditions are indicated by seven front panel lights. For the conversion of received telemetry information into teletype format, a teletype summary select device is provided for the console operator to instruct the on-site data processing computer as to which sum-

Final Mercury Conference Held

Today ended the two-day Project Mercury Summary Conference that was held at MSC to summarize the results of Project Mercury before technical representatives from throughout U. S. Industry and the free world. Special emphasis was placed on the technical results achieved from the MA-9.

Representatives from many areas of Project Mercury participated. Mr. N.R. Heller, Chief of the Manned Flight Operations Division, reported on the development and performance of the Mercury worldwide network.

In addition to the various presentations and displays at the conference, the final "Blue Book" summarizing Project Mercury and emphasizing MA-9 was distributed.

mary message will be punched on paper tape for transmission when teletype channels are available. The flight control director can select, by depressing the appropriate pushbutton, initiation of a data summary concerning the Agena, Gemini, or computer system as needed.

Aeromedical Monitor Console

The aeromedical monitor console, operated by either one or two physicians, makes possible the observation of the physiological condition of the two orbiting astronauts and the monitoring of the life support system operation. The aeromedical observers, reading some of the telemetered spacecraft parameters that are also displayed on the other console panels, will evaluate the effect of any changes in environmental conditions on the astronauts' behavior and performance. As the Gemini spacecraft circles the earth, the medical console operators will watch closely the fluctuations of four electronically multiplexed EKG signals of the cardioscope which represent the heart functions of both astronauts.

As long as the spacecraft remains within tracking range of the respective station, the observers will follow the EKG and blood pressure curves of the astronauts as charted on the aeromedical recorder located adjacent to the console, will keep a check on the cabin pressure and oxygen consumption indicated on the DC meters, and will monitor the respiration and pulse rate carefully noting normal as well as abnormal reactions to any event.

M&O Console

The M&O console was discussed in the past issue of TIB, No. 15.

The Gemini display systems will be installed by the station M&O personnel and/or special NASA installation teams. In addition, one contractor engineer will be at each station to assist in the system installation, checkout, and training.

The following stations are due to receive the display system: RKV, CRO, CYI, TEX, HAW, GYM, CSQ, WLP, and IMCC.

NCG Meeting Held At MSC

Operational plans for Network Support of Gemini launches G-1, -1A, and -2, Saturn launch SA-6, and two Gemini simulations were discussed by the Network Control Group meeting at Houston on September 26th. G-1 and -1A will be unmanned orbital shots calling for C-band radar tracking for a minimum of one orbit. G-2 will be a sub-orbital mission. Plans for SA-6 call for use of a C-band beacon to aid radar tracking for up to 1-1/2 orbits. The Gemini simulations—designated NS-1 and NS-2—are scheduled for next summer and will involve Flight Controller participation at those stations where Gemini instrumentation is then operational.

Network To Support G-1

During the last quarter of this year, portions of the network will support the first in a series of orbital flights involving the Gemini spacecraft. Designated the G-1 mission, it will be an unmanned structural qualification flight.

One primary objective of the mission is to evaluate the accuracy of the network in providing Gemini trajectory data. As it now stands the following stations will participate in the mission: CNV and BDA will supply the continuous coverage of the 3 spacecraft and 2 booster telemetry links required from T—240 seconds through orbital insertion; CNV, BDA, WOM, CAL, WHS, and HAW will supply C-band radar data; and CNV and the AMR downrange stations will meet the tone command requirements during the launch phase.

The booster inserting the spacecraft into orbit will be a modified Titan II, which will be launched from pad 19 at Cape Canaveral. After insertion, the spacecraft, adapter, and launch vehicle second stage will orbit together and will be tracked for up to 2 orbits. The telemetry carrier will remain on during the orbital flight for acquisition purposes, but no usable data will be transmitted. No recovery from orbit is planned since the vehicle is incapable of surviving reentry.

About EI's

The following EI was issued during the past two weeks:

EI 621 Plate Capacitor in HF/UHF Signal Generator (all stations except WOM, WHS, and EGL)

Whenever possible, future EI's issued will include an estimated number of man hours necessary to perform the modification. This should aid the stations in arranging their work load.

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Computer To Simulate Radar Station Inputs

A computer replacing radar stations? No, not really; only in the Gemini simulation complex that will be used for Gemini training.

The computer in question is the digital data processor being provided at Goddard by the Computer Control Company, Inc., for the purpose of simulating data inputs from radar stations. About the first of next year, it will become an integral part of the Gemini simulation complex and will be an interface between the simulation complex at MCC and the IBM 7094 triplex computing system at GSFC.

The complex at MCC will transmit a set of time-tagged position and velocity vectors once every six seconds to Goddard. The simulator will accept these vectors and test to see if one or more remote radar stations would see the spacecraft in this position. If any could, the simulator will generate time, range, azimuth, and elevation data and transmit it via teletype circuit to the computer system. Although the 7094's will be only perhaps 75 yards away from the generation of the information, they will accept it as actual radar data and then mathematically define the precise spacecraft orbital position and the look angles for use by the next station.

Upon installation and checkout, the computer will be used for simulation and training procedures, and to check out and test the real-time computer systems and programs.

About Documentation

The following documents were completed and distributed to the appropriate stations:

ME-101 Verlort LRT2 and LRT3 Radar Systems, Revision July 30, 1963

ME-149 Magnecord Tape Recorder Model 728, Revision September 20, 1963

On September 28, one year ago, CAL, CSQ, and GSFC supported the launch of the Alouette. Designed and constructed by the Canadian government and launched by a U. S. built Thor-Agena B rocket, the Alouette's primary purpose is measuring electron densities of the ionosphere. After one year of orbital flight, it is still transmitting data to the 13 telemetry stations around the world.

TIB Bits