

For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

MANNED SPACE  FLIGHT NETWORK

GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND

Vol. 1 No. 18

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

November 1, 1963

Goddard Computing Center Being Readied For Gemini



A view of Goddard Computing Center

Stations To Receive CADFISS Test Results Quicker

During the early part of next year, stations participating in CADFISS tests can expect to receive their test results much quicker than they are now receiving them.

The Goddard computers will be so programmed that test scores will automatically be sent to the stations immediately upon completion of tests. The programs are presently being modified by the Goddard Data Support Office for this purpose.

CADFISS tests will be little affected by the installation of new equipment throughout the network. The tests and

procedures now used have proven effective when fully utilized and will merely be extended to encompass the new equipment.

A Goddard representative who attended the Mercury Summary Conference (see TIB No. 16) reported that L. Gordon Cooper made the following comments. . . "It would be difficult to single out any one group or organization for special praise because they were all a wonderful team and a smooth blending of extraordinarily competent technical skills. However, I do think that if one could be mentioned organizationally, certainly I would have mentioned the worldwide network. It is certainly comforting to know, when you are out there, that the world's finest communications network and the finest electronics facilities that man can devise are functioning with a fantastic computer complex that will allow the on-board systems specialists to break out their diagrams and tell you immediately what your situation is in the event of trouble; and this is indeed what happened on several different occasions. Without this marvelous organization, it might have been a little more than difficult to get back home. . ."

11/6 B.S.T.

Documentation For NCG-700

One DST/BST is being reissued and a new Network Countdown and Data Acquisition Plan are being published for NCG-700. All three are scheduled to be mailed during the week of November 4.

DST/BST-105(C), FPS-16 Digital Data is being reissued to pick up ISI No. 4 from MA-9 and a number of minor corrections. Upon its receipt on station, all former copies of this document—including its associated data sheets—should be destroyed.

The Network Countdown will integrate the prelaunch activities of all of the participating tracking networks. The Data Acquisition Plan will include instructions for on-site data reduction and details to be followed in preparation of the PLIM's.

The Goddard Computing Center is the workshop of the Data Operations Branch. This complex of computers has supported all the manned missions to date. (All CADFISS tests are also run from these computers.) Currently, the Data Operations Branch is preparing the operational computing programs for nonrendezvous Gemini and unmanned Apollo missions.

Some of the interesting new problems encountered in the Gemini nonrendezvous mission from the trajectory point of view are the following:

- Computations must be tailored to a new booster, the Titan II which consists of two stages, the second stage of which is ignited in flight.
- The spacecraft escape tower is replaced with an ejection seat; which requires revision of the launch abort modes.
- The spacecraft has an on-board propulsion system that permits inflight maneuvers; this requires the computation of new propulsion parameters to control the spacecraft maneuvers.
- The spacecraft has an on-board computer to permit the astronaut greater inflight control of the spacecraft and mission; this requires the computation of parameters to update the on-board computer via the digital command system.
- Mercury had a zero lift or ballistic reentry trajectory, which simplified retrofire and impact point computations. Gemini will use lift during reentry which will permit the astronaut some control over selecting the landing point. Instead of an impact point, the Gemini spacecraft will have a landing footprint of 500 miles by 100 miles. To compute the spacecraft landing point the computers must know the lift the spacecraft is experiencing at all times during the reentry.
- Since the Gemini spacecraft can maneuver in flight, the task of selecting an optimum recovery area becomes more difficult.

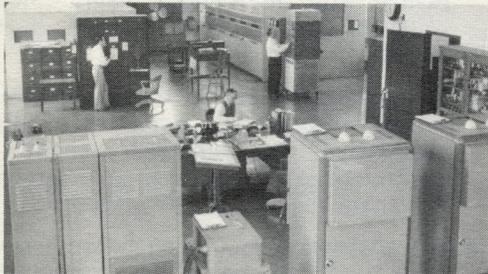
In the coming months, the Goddard computers will be providing computing support for Centaur, IMP, Ranger, and for the Saturn booster qualification flights, some of which will have a lifetime of a year or more.

WWV, "Big Ben" Of Network

Situated on a small-hill overlooking the GSFC is a large brick building surrounded by antenna and transmission line supports resembling telephone poles. This is WWV, one of the National Bureau of Standards' two HF radio stations. (The other station is WWVH at Maui, Hawaii.)

Although not a part of Goddard or the MSF Network, WWV plays a significant role in the network operation. Generated here are the pulses designating standard time intervals used by the Beckman receivers in the Mercury time standard racks as reference points for the locally-generated 1-MC signals.

Station WWV, in operation since 1923, broadcasts on standard radio frequencies of 2.5, 5, 10, 15, 20, and 25 MC with power outputs of 1, 8, 9, 9, 1, and 0.1 KW, respectively. All carrier and modulation frequencies are derived from a common 2.5-MC quartz oscillator, the stability of which is normally held to 1 part in 10^{10} . Since December 1, 1957, the standard radio transmissions from WWV have been held as nearly constant as possible with respect to the atomic frequency standards which constitute the U. S. Frequency Standard.

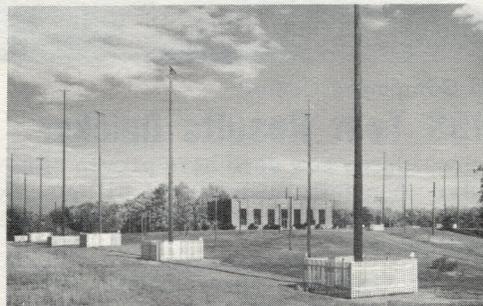


Transmitting area at WWV

The one-second pulses designating standard time intervals are derived from the same oscillator which controls the radio carrier frequencies. They are given by means of double-sideband amplitude-modulation on each RF carrier. Intervals of one minute are designated by commencing each minute with two pulses (the first pulse marks the beginning of the minute) spaced by 0.1-second and omitting the last pulse of each minute. The pulse duration is .005 second, and each pulse consists of five cycles of a 1-KC frequency.

In addition to broadcasting standard radio frequencies and standard time interval pulses, WWV broadcasts standard audio frequencies (440 CPS and 600 CPS), a standard musical pitch (440 CPS for the note A), time signals, and radio propagation forecasts.

The 2.5-MC broadcast is from a vertical quarter-wave antenna, and the broadcasts on all other frequencies are from vertical half-wave dipoles. The antennas are omnidirectional.



Exterior of WWV. Poles with white fences are antenna supports. Other poles support transmission lines.

About Documentation

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

- ME-1058 Microwave Amplifier Model 493A/495A Serials Prefixed: 304 (new)
- ME-1059 Sweep Oscillator Model 684C Serials Prefixed: 225 (new)
- ME-1060 Operating Notes, Waveguide Slotted Sections Model 810B (new)
- ME-1061 Operating Notes, D.C. Divider Model 459A (new)
- ME-1062 Operating Notes, Direct-Reading Frequency Meter Model 532A/B (new)
- ME-1063 Automatic Noise-Figure Indicator (Serial No. 600 and above only) AIL Type 74 (new)
- ME-1064 Instruction Book, R.F. Voltmeter Model 91CA (new)
- ME-1065 Instruction Book, Psychron Models 566-2 and 566-3 (new)
- ME-1066 Pulse Generator Model B7B (new)
- ME-1067 Microwave Spectrum Analyzers Models TSA and TSA-F (new)
- ME-1068 Operating Instructions F.M. Signal Generator Type TF 1066B/2 and 1066B/3 (new)
- ME-1069 VHF Signal Generator 608D (new)

About EI's

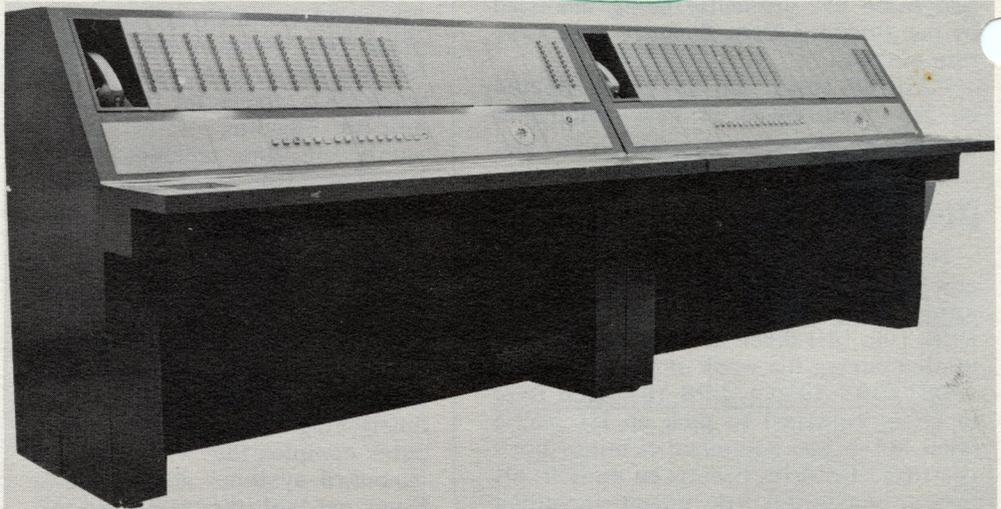
The following Engineering Instructions were issued during the past two weeks:

EI 625 A/G Installation at CRO

Addendum to EI's 598 and 610, MSFTP-1 PCM Systems (CRO, CNV)

Addendum to EI 601, Gemini Intercom Implementation (CRO)

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The new SCAMA 304 switchboard features pushbutton operation, two duplicate consoles in parallel, 220 line capacity, and built-in ash trays. The two-console arrangement allows either console operator to answer incoming calls and during mission time allows one console to handle traffic pertinent to the mission while the other handles routine traffic. Another feature of the "304" is a device that allows immediate identification by color of up to four conference bridges.