First Gemini Acq Aid System Completed

The first of eight Gemini acquisition aid systems is being shipped today from the subcontractor, Canoga Electronics Corporation, Van Nuys, California, to the staging area for later transshipment to Carnarvon. TELTRAC, which is Canoga’s nomenclature for the new acq aid, has the following new features that will provide smoother and more accurate tracking than the Mercury AGAVE system: antenna polarization selection, improved hybrids, receiver using phase-lock or cross-correlation modes of detection, wide-band crystal-controlled frequency selection, fine tuning control, and manual smoothing of the servo system for pointing the antenna in elevation and azimuth.

In two channels for AZ and EL pointing, IF difference signals are applied to error phase detectors. The servo system scaling factors for the AZ and EL pointing error voltages are set correctly in DC amplifiers. A drive motor positions the antenna towards the direction which produces a null error voltage.

In the third channel, signal frequency is determined with the receiver in the phase-lock mode and bandwidth in the cross-correlation mode. The bandwidth is determined so that the receiver can be adjusted for optimum selectivity. This setting is accomplished by inserting the appropriate IF filter (selected by a panel switch) in the phase-detection loop. The signal frequency is tracked for the purpose of locking the receiver onto carrier frequencies within the 225 to 260-MC band. The same phase detectors are used for either mode of operation, for either a band of frequencies or a single frequency. The reference input for cross-correlation action is the sum signal after it is passed through a limiter, whereas the input for phase-lock action is the 4.5-MC oscillator. Receiver AGC voltage is obtained from a detector and fed back to an earlier stage, and is monitored by an indicator on the front panel. (See picture of receiver panel.)

The antenna, pedestal, and two cabinets (shown in photos) make up the system. The top of the left cabinet contains a panalyzor. Directly under the panalyzor (not shown) will be an acquisition bus control panel. The lowest unit (shown extended) on the left-hand rack is an output converter which furnishes antenna position data in digital form. Additional operating controls are located in the right-hand rack. The top two units contain servo amplifiers and amplidyne controls. The third unit down houses the receiver previously described. Below the receiver are manual antenna controls and antenna position indicators. Plunging or over-the-top elevation operation is possible from -10 to +190 degrees. Four indicators provide coarse and fine EL and AZ information. The fifth panel (shown extended) contains the manual, slave, and auto track buttons. Manual or slave control is provided independently for AZ or EL, and three auto track.
Antenna system outputs: Sum and difference (based on phase sensitive monopulse techniques) for azimuth and elevation errors.

Beamwidth at 3-DB points: approximately 18 degrees AZ, 12 degrees EL.

Side lobes: -16 DB (min) with respect to main lobe in all planes and -18 in principle planes.

Receiver noise figure: 4.5 DB (max).

Acquisition noise bandwidth:
Cross correlation—Switchable 10, 30, 50, 100, 300, 500, and 750 KC.
Phase-lock loop—250 cycles and 500 cycles.

Fine tuning range: 80 KC (min).

Typical acquisition signal-to-noise ratio: Between 3 and 6 DB.

Angular accuracy: ±0.5 degree RMS in azimuth and elevation between elevation angles of 15 and 75 degrees (when the target is not obstructed and when secant correction is employed).

Angular acceleration: 5 degrees/sec/sec.
Angular travel: 700 degrees in azimuth, -10 to +190 degrees in elevation.
Angular rate: 20 degrees/sec (track), 30 degrees/sec (slew).

Timing System Battery Power Increased

It has been suggested that it would be very desirable to have a longer operational capability for the time standard rack when on emergency battery power. To carry out this recommendation, a 12-volt battery with a 200-ampere-hour capacity (increasing the emergency power capability from the present 3 hours to about 20 hours) will be issued when requests for two 6-volt batteries are received. (The 12-volt batteries are not to be ordered unless the 6-volt's require replacement.) A new mounting bracket will be designed and sent out as an EL.

About Documentation

The following new manuals were forwarded to applicable sites during the month of June:
- ME-1033 Slow-Scan Monitors Models CSS-5 and CSS-6
- ME-1034 Slow-Scan TV to Standard TV Scan Converter Model ED602
- ME-1035 RF Spectrum Analyzer Model PTE-3

Part I - RF Spectrum Analyzer Model PTE-3, System
Part II - Spectrum Analyzer Model FSA-2
Part III - Variable Frequency Oscillator Model VOX-5
Part IV - Two Tone Generator Model TTTG-1
Part V - RF Spectrum Analyzer Model PTE-3, Appendix

ME-1036 Sideband Converter Models SBC-1 and SBC-2

Revisions for the following manuals are now in process and will be issued in the near future:
- ME-131 Voice and Telemetry Antenna System and Voice and Command Antenna System
- ME-340 Cardioscope and Cardiophone
- ME-706 Dual-Diversity Receiver Terminal DDR-6E
- MS-104 Timing System