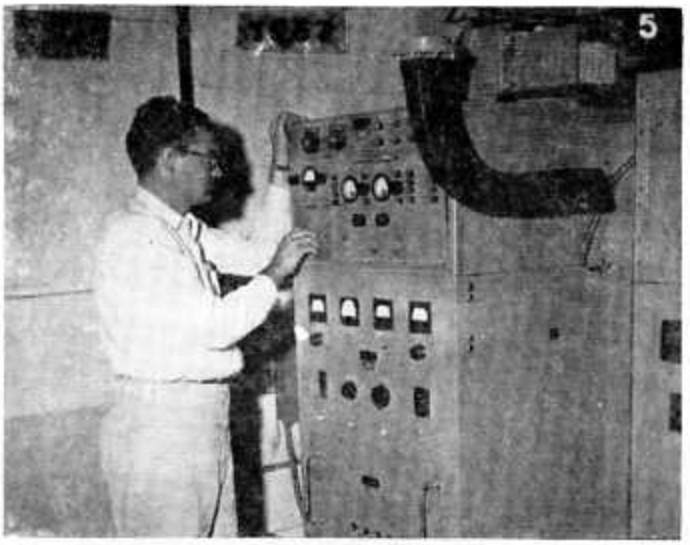
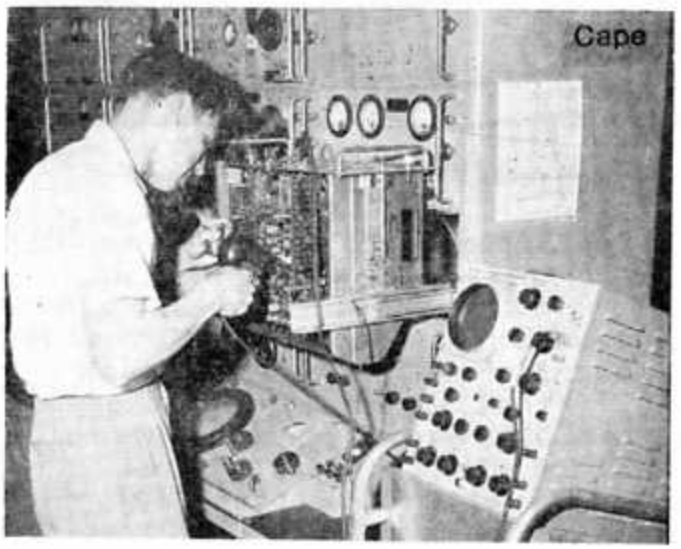


Mod. II Radar is readied for use by operator W. P. Lanham.

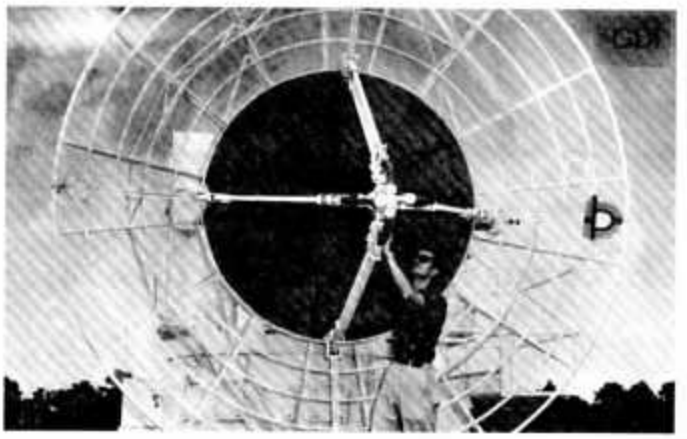


Technician A. J. Hessel trouble shoots a Mod. II Radar.

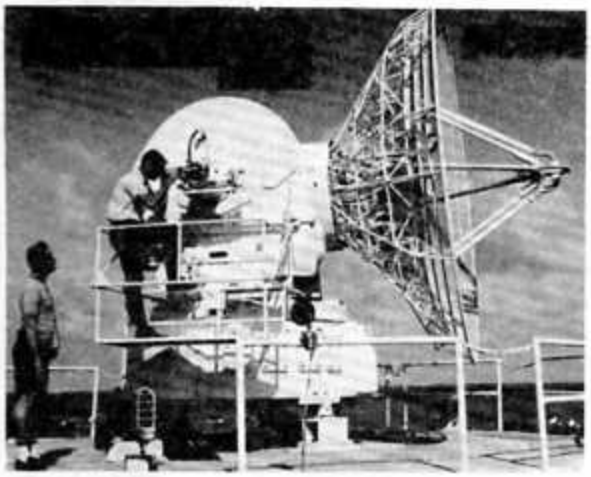
MTP's Pete Bray at the FPS-16 console, standing by to complete a radar check-out prior to a test.

MTP Technicians Jeff Torrez and Burt Zater, backgrounded by the sparkling sea, check Eleuthera's Mod II radar.

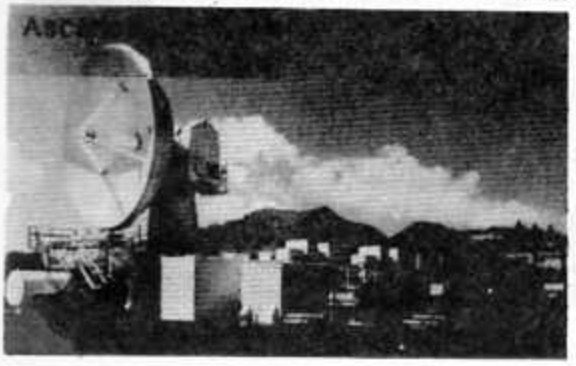
Jim Hobkirk adjusts Station 13's MPS-25 antenna.



Leo Hoffman inspects the FPS-16 feed horn. The monopulse radar is a product of RCA Moorestown.



Ken Young (left) and Dick Roberts at the FPS-16 radar.



Charles Griffin, Dick Small, Bert Odom at the Mod II radar console.

A year in the making, a new C-Band Radar Console, designed and fabricated by RCA MTP personnel, is being installed on the USNS Gen. H. S. Vandenberg in Honolulu, Hawaii. Playing a key role in the design and coordination effort were (l-r) Engineers Vernon Miles, Special Projects, and Chuck Deming and Al Lepper, Ships Pulse Radar Engineering. The console, shown here prior to its being shipped to the West Coast, was built through the combined efforts of the MTP Radar, Sheet Metal and Machine Shops. It was designed to keep pace with other improvements being made to the C-Band Radar Equipment. Miles was responsible for the overall design and Deming and Lepper provided detailed engineering design for the project. Another console, similar to this one, is currently under construction by the Shops and will be installed on the USNS Gen. H. H. Arnold.

Telemetry On The Range

Telemetry is the method of sending information on a missile's performance by radio signal from air to ground. This is done by means of missile borne transmitters, instruments that are pre-arranged to report specific factors such as acceleration, temperature, rate of climb, fuel consumption, speed, engine performance, oil and hydraulic pressures, spin movements and the like.

Early flight information, such as in space attitude and principal internal device functioning flow continuously at intervals of 2 to 48 times a second into central control, where the men of Range Safety are faced with the decision whether to press the "destruct" button.

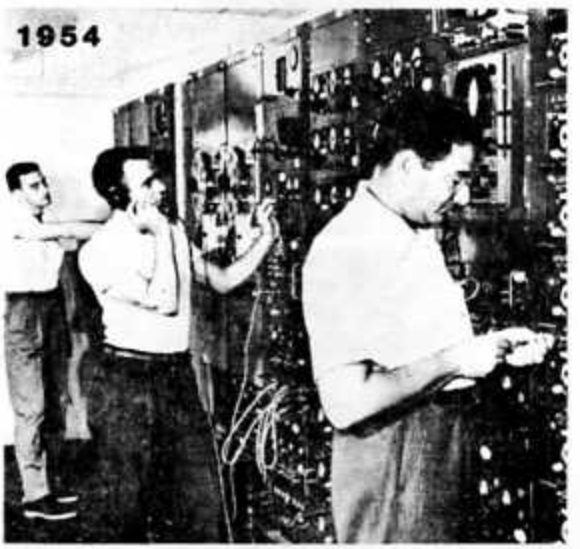
Telemetry at the Cape, the downrange stations and the ships also obtains and records all of the missile functions upon which engineers depend for post flight analysis and evaluation.

The Cape Canaveral of 1953 and the first downrange station at GBI had telemetry, but the capability was limited. Installations at Cape, Tel-2 and GBI consisted of four dual-type recorders. During the first missile test of the one-hour flight of a Matador Missile telemetry information was obtained by recording 15 minutes of data on each of the four FM-FM links using two-track recorders with a frequency response of 60 kilocycles. In the late 1950's, the equipment became inadequate for Range user requirements and new seven-track recorders with a frequency response of 120 kilocycles came into use. Today 14-track recorders are used with a frequency response to 4 megacycles.

In 1966, Tel-4, a new and highly advanced telemetry facility that would fulfill the ever increasing complex requirements of Range Users on the Range, was opened on the west bank of the Banana River on Merritt Island. Equipment packed into its 25,000 square feet represented the ultimate in telemetry systems and instrumentation at that time.

There were 450 racks of state-of-the-art instrumentation (compared to 175 racks at Tel-2), 500,000 remotely-controlled switching points and a capability of receiving and processing 1,000,000 bits of information per second. Five antennas covering a range of 100-2300 microseconds comprised the antenna system.

COMPLEX TELEMETRY ANTENNA receives FM signals from the missile.



TELEMETERED SIGNALS are interpreted and recorded

Every rise and dip on the recording paper is meaningful. More than 300 traces, as few as 6 or as many as 23 on each roll of paper, translate into electronically measured data. Information on performance data on instrumentation, guidance and control systems, propulsion and in manned space flights, water and waste management, cabin pressure and temperature and even astronaut cardiograms. The data gathered enables planners to report guidance and control for the next mission.

TAA-8, an 80-foot diameter autotracking antenna was installed at Antigua in 1968 and a 24-foot diameter TAA-24 was installed at TEL-4 in 1978. All autotracking antennas uprange and downrange are equipped with computers capable of target acquisition and antenna management functions.

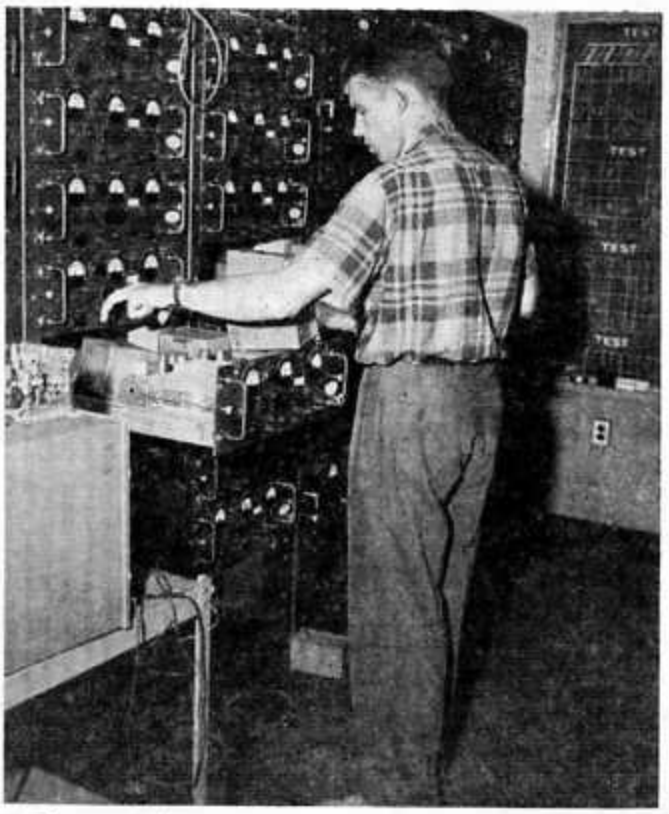
The Range telemetry has the flexibility to serve all Range users. Providing a vast array of ground-based telemetry systems uprange and downrange and augmented by the instrumentation laden USNS Redstone, it provides operation and maintenance of AFETR and NASA/KSC timing, firing and countdown, the missile impact location system (MILS) and the Flight Test Support Systems (FTSS).

Today after a long period of Range modernization, telemetry on the range has advanced and changed to a high degree of sophistication.

1954

ERECTING A TELEMETERING ANTENNA
on a mobile van

1957



Telemetry Technician J. B. McDonald changes a discriminator pack. Telemetry is a major source of missile test data.

Cape Canaveral Timing is synchronized with signals transmitted by WWV. Leader A. A. Terek is shown at the Central Timing Distribution Console as he prepares to synchronize the time base generator.

National Geographic

60-foot antenna shows its bizarre profile on Antigua, Station 9.1

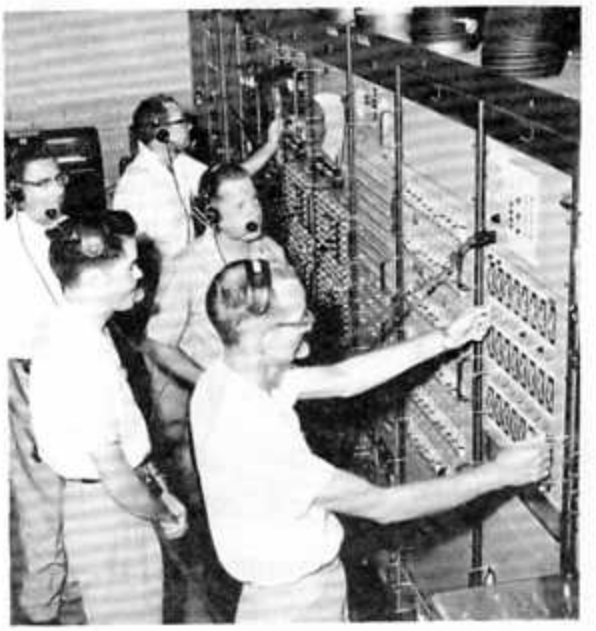
Majestic seascape off Fernando de Noronha fails to distract range employees preparing telemetry equipment to track a missile.

Technician Fred Teague examines the antenna's helical coils, and RCA engineer John Anderson telephones to men at a near-by post.

National Geographic

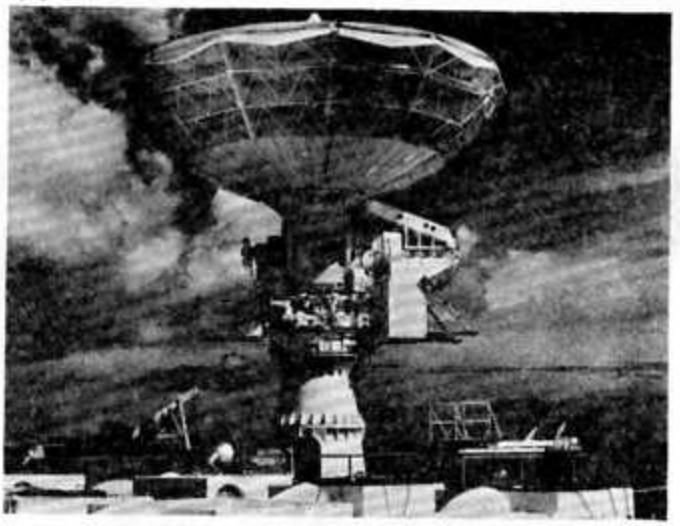
Technician Richard Maniag.

At the telemetry site, located near Antigua's temporary TPQ-18 radar, Joe Barcheski of MTP prepares to check out a Data Insertion Converter rack.



Walter Goodman, William Saunders, Edward Crolteau, James Hay and Robert Porter.

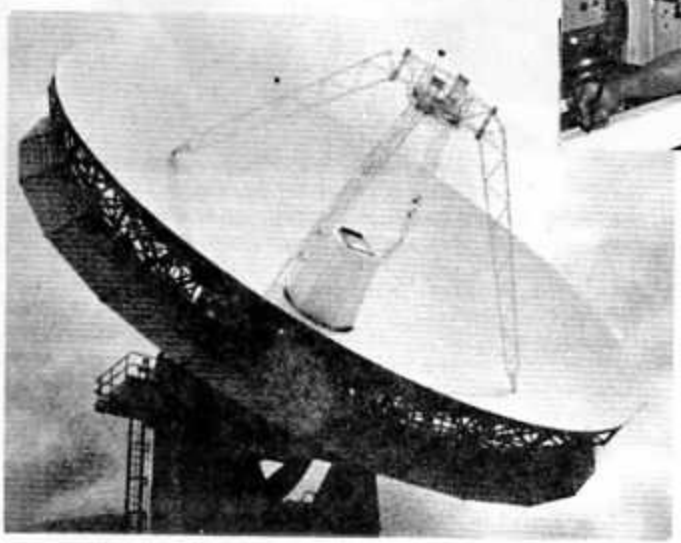
Range Station Electronics Technician B. J. Papatrefon checks the operation of a quad helix antenna at Grand Bahama.



The 29 foot-in-diameter TPQ-18 radar antenna at Antigua. In the foreground are air conditioning units atop some of the 10-foot high and 20-foot long mobile shelters that house the antenna's electronic equipment.

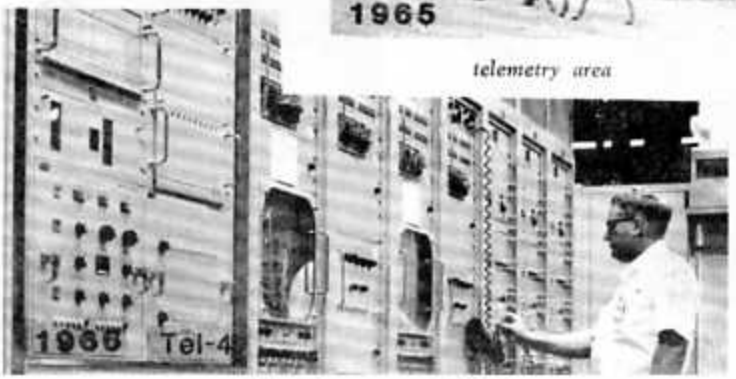
Technicians George Beasley (left) and Charles Carter

Below: Telemetry Technicians C. W. Carter, W. B. Karnopp and M. W. Block align Sanborn recorders



TAA-2 is located at Grand Bahama Island

telemetry area

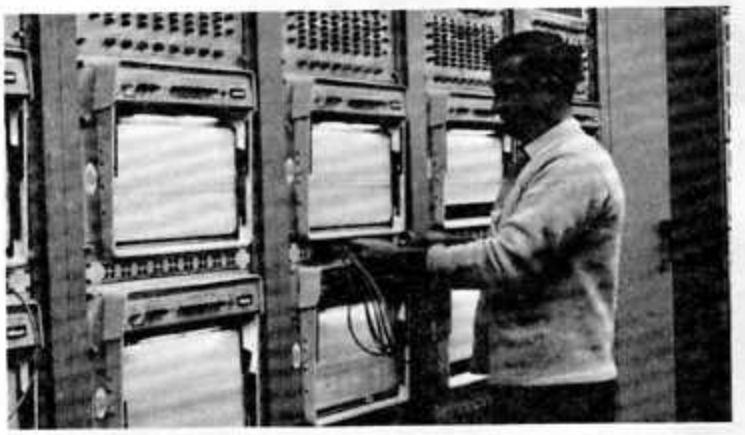


Bill Thompson at TDM-3.

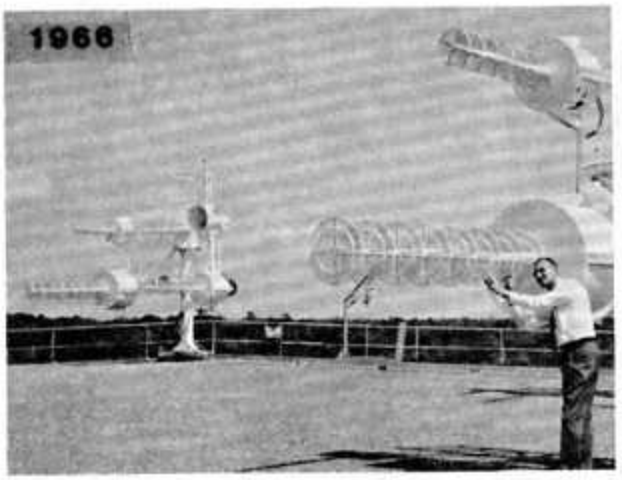
TEL IV

Woody Bozardt and Art Tirro check display.

1966



Ed Yenhaw patches a recorder in the contractors' real time display room.



Lloyd Terwilliger checks TAM-1 antenna.

Manning console in Central Timing are E.L. Nelson and W.R. Ivey. Time maintained by MTP is accurate to one-millionth of a second.

Preparing for Titan IIIC launch, MTP technicians monitor sequencer in VIB.

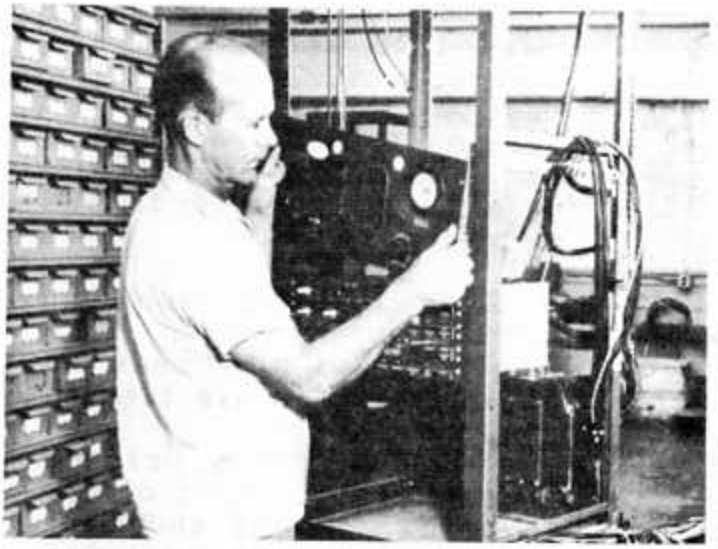
Jim Chase

Fabrication, Repair and Maintenance on the Range

The fledgling RCA Missile Test Project of 1954 was faced with the monumentous task of installation and fabrication of all new instrumentation that would add six new stations to the missile range and expand it to Ascension by 1957. There also was the never ending job of repair of existing equipment and instrumentation to support the ever-increasing test schedule. To deal with this overwhelming task an installation and maintenance organization was formed that would include the optics shop, machine shop, electronics shop and the test equipment and standards laboratory.

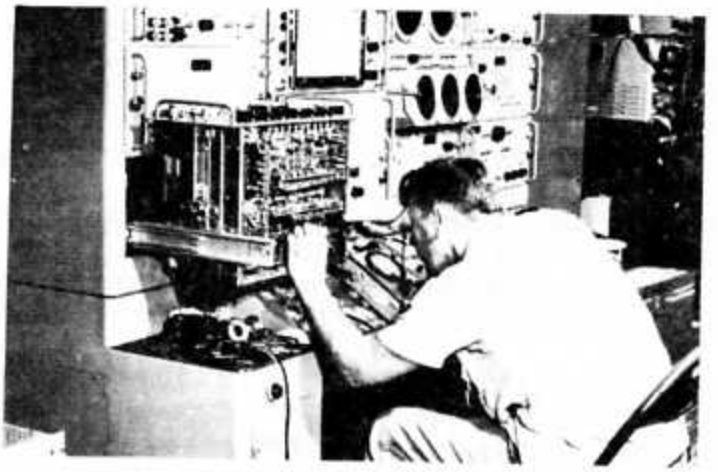
The unique (one-of-a-kind) equipment being brought to the range required highly skilled technical training instructors who could assemble information from engineers notes, drawings, and technical manuals, make training aids and teach hardware in almost any location. They were successful as evidenced by our long tenure.

The machine and sheet metal craftsman of today, as those 35 years ago, are not affected by the enormity of a job. They tackle jobs ranging from the fabrication and installation of huge 16 foot radar dishes and mounts to the repair of minuscule machinery no larger than your thumbnail. These globe trotting specialists span the world doing their job, traveling up range, downrange and to any place in the world where one of the ships has come into port. The skilled shops craftsman, specialists and technicians working as a team with the drafting and engineering organizations get the job done.



ASSEMBLING OF INSTRUMENTATION equipment in fabrication shop

1954



Preventive Maintenance Programs.

Faced with the constant problem of equipment breakdown after installation, in the late 1950's and early 1960's two separate maintenance oriented organizations were formed. The first group, Maintenance Control, established and set up controls for periodic maintenance procedures and schedules that would keep instrumentation equipment at a high standard of accuracy and reliability. Individual equipment manuals were written and illustrated showing step by step procedures for periodic maintenance. Controls where set up for these procedures to be performed at set intervals on each piece of radar, communications and telemetry equipment. The second group formed, Maintenance Engineering, was set up to improve and streamline maintenance activities and procedures after maintenance control's. Disbanding a few years earlier.