CRPL report Aug 1947

The solar radio noise work begun under the guidance of Mr. G. Reber, has been designated by the project title UHF Radiometer. Repairs, sand-blasting, and painting on the first captured German Wurzburg radar antenna and a 70-ton concrete foundation has been completed. A second Wurzburg antenna received from the Signal Corps, will soon be put into service on this project.

Field Operations (Section 7). - Recent information received from the Communication Measurements Laboratory regarding the manufacture of the Model C automatic ionosphere recorders is encouraging. The circuit designs have been completed and work started on the preproduction model. The time required to build the remainder of the units will be very small compared to that involved in the preliminary design work.

During the past month Mr. H. P. Hutchinson visited the Radio Propagation Field Stations at Hawaii, Palmyra, Guam, and Manila, and is at the present time in Anchorage, Alaska. He traveled by Northwest Airlines via Tokyo from Manila.

The latter part of the month Mr. A. H. Morgan began a class for one officer and six enlisted men of the Signal Corps, who will eventually operate the Adak, Alaska station. Mr. E. E. Ferguson, new assistant chief of the Hawaiian Radio Propagation Field Station, was also a member.

Mr. A. P. Stansbury has arrived at the White Sands field station to relieve Mr. E. J. Wiewara on temporary duty there as engineer-in-charge, who has returned to the Sterling Laboratory.

Mr. W. J. Christian is enroute to the Palmyra Radio Propagation Field Station.

High-Frequency Standards (Section 8). - A bridge-type temperature control circuit arrangement for use with a new unit of the primary frequency standard was investigated theoretically and design work started. In temperature controlling the small working space (about 15 cu. in.) of a standard quartz-crystal unit, it is desirable to limit short-time variations (up to one day) to less than 0.001°C and long-time variations (up to 10 years or more) to less than 0.01° C. Thermostats, such as mercury-in-glass contact thermometers, bi-metallic arrangements operating contacts, and relays associated with such devices, were found by experience to be unsuitable. The bridge thermostat is similar to the self-balancing thermistor bridge now widely used in r-f measurements. It consists of a wheatstone bridge with a high-gain selective regenerative audio amplifier. One pair of bridge arms is made of advance

inversely proportional to frequency while the ground-to-air distance range would be only slightly less at the higher frequencies.

Experimental results indicated that the air-to-air distance range was about 200 miles at 328 Mc. In the VHF band the reception was satisfactory up to 400 miles but no flight checks were made at greater distances. For the tests, one plane flew at 17,000 feet and the other at 30,000 feet. Thus the air-to-air tests may be considered consistent with expected results.

The air-to-ground distance range was about 220 miles on 139 Mc but only about 100 miles on 328 Mc and discussion at the conference brought out the fact that the lobe structure was the probable explanation of the latter's reduced range. In fact, calculations indicated that, on 328 Mc/s at about 100 miles, an aircraft flying at 30,000 feet would be in a null of the 60-foot ground transmitting antenna pattern. A suggestion was made that a lower ground transmitting antenna be used in future trials. Thus, with a transmitting antenna at only 20 feet above the ground the null would be expected at a shorter range and might not prove troublesome. It was agreed that CRPL would prepare a chart showing the expected lobe structure for several transmitting antenna heights over the terrain in the vicinity of Wright Field for future tests that will be made.

Experimental Ionospheric Research (Section 5). - Work is progressing on the analysis of the Brazil eclipse records, with Mr. J. M. Watts working with Mr. A. H. Shapley of Section 1.

The high-power pulse transmitter on 13660 kc was operated continuously on Mondays, Wednesdays and Fridays from 1700 to 1900 GCT with a pulse repetition rate of 25 cycles/s and a pulse width of 40 microseconds. This schedule has recently been changed to 1700 to 2000 GCT on the same days until further notice.

The three equipped vans, constituting the end points and mid point of a base line in the project for measuring differential phase variation at low frequency, were taken to a field location near Beltsville, Maryland. Two 100-foot masts were erected and tests were begun.

The project on radar detection of meteors is progressing. A spark-type recorder to record the range and duration of meteoric echoes on four different frequencies, simultaneously, has been built and work begun on a keyer to key four separate transmitters in sequence.

Several quonset huts were erected at the Sterling Radio Propagation Laboratory and are being made ready for use as storerooms and workshops.