

210-FT. RADIO TELESCOPE, PARKES

PROGRESS REPORT NO. 1

on

STUDIES UNDER NASA RESEARCH GRANT

NsG - 240 - 62

by

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## 8. SPACE PROBE OBSERVATIONS

To gain experience with space communication techniques in preparation for possible use of the Parkes radio telescope under the Grant (objective 3), a 960 Mc/s phase-lock receiver has been obtained on loan from the Jet Propulsion Laboratory, Pasadena.

The equipment which was shipped to Sydney in mid-November 1962, consists of a somewhat modified Collins search receiver with 20 kc/s telemetry channel (without decoding or recording apparatus). The crystal-mixer input stages produce a nominal threshold sensitivity of  $-15^4$  db below one milliwatt.

The receiver was first put into operation at the Radiophysics Laboratory and then installed on the Parkes telescope for the reception of Mariner II spacecraft transmissions from the vicinity of Venus. Some difficulty was experienced with noisy operation of an experimental varactor multiplier in the equipment and the best measured threshold was  $-150$  dbm.

Search for the Mariner transmissions commenced on December 17 and lock-on was achieved on December 20th with a signal about 4 db above threshold. This was consistent with the known signal strength at the time and the measured parameters of the antenna and receiver. (A penalty of 3 db was incurred because a circularly polarised feed was unavailable).

The signal was too weak to provide a telemetry output above noise level, but Doppler frequency measurements were made on the carrier using a Model HP 524D Hewlett-Packard frequency counter as reference. These results

exhibited the cyclic frequency variation due to the earth's rotation as well as a diurnal shift. Measurements were continued until the spacecraft transmissions ceased on January 3rd, 1963.

Arrangements have now been made to replace the critical varactor multiplier unit and to install a circularly polarised feed. These changes should improve the detectable signal level by up to 7 db.

#### 9. COOPERATION WITH JET PROPULSION LABORATORY, PASADENA

The following activities under the Grant have taken place in connection with the Deep Space Instrumentation Facility of the Jet Propulsion Laboratory, Pasadena.

The Laboratory was visited by H.C. Minnett between February 14 and March 2, 1962, to discuss various aspects of the Parkes telescope applicable to the design of the Advanced Antenna System of the D.S.I.F.

In the latter part of August, C.S.I.R.O. participated in the investigation of sites suitable for a D.S.I.F. station in N.S.W. A number of possible sites between Sydney and Parkes were inspected with the NASA survey team, both from the air and on the ground\*.

A second visit to the Jet Propulsion Laboratory was made by H.C. Minnett between October 4 and October 27 to take part in a review and revision of the design requirements for the A.A.S.<sup>4</sup>, following the rejection of manufacturers' bids at that time.

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\* "Site Investigation Report, Australia; Deep Space Instrumentation Facility", Goddard Space Flight Center Report, October 1, 1962.

<sup>4</sup> "Summary of Review of Requirements and Design Parameters for A.A.S.", D.S.I.F. Group Memorandum, October 25, 1962.