National Radio Astronomy Observatory
Green Bank, West Virginia

Quarterly Report

January 1 - March 31, 1964

RESEARCH PROGRAMS

85-ft. Telescope

	Hours
Scheduled	1508
Equipment installation	22
Time lost due to equipment failure, interference and weather	151
Scheduled maintenance	43

During this quarter, D. Hogg and I. Pauliny-Toth observed for 1143 hours, completing their observations of background polarization at a frequency of 750 MHz.

S. von Hoerner utilized the 750 MHz polarization equipment for six hours for some preliminary moon occultation observations. (Von Hoerner will be using some of the observing time with the new 85-ft. telescope and specifically packaged equipment for his occultation program.)

P. Mezger and P. Stumpff also made moon observations with the 750 MHz polarization equipment for a period of eight hours.

A 1400 MHz system was installed and used for 68 hours by J. Findlay and H. Hvatum to map the areas of sky in the vicinity of Cas A. These observations are to be used in the reduction of data from the "Little Big Horn".

Using a 2 cm receiver and feed from the US Naval Research Laboratory, P. Mezger has spent 130 hours in measuring dish characteristics and the temperatures of strong radio sources. Mezger measured an antenna efficiency on the order of 20-30%, and a beam of 3.2 minutes of arc. This work continues.

Y. Terzian used the 2 cm receiver for two hours to make measurements of M 16.

300-ft. Telescope

	Hours
Scheduled	2066
Equipment installation	32
Time lost due to equipment failure, interference and weather	268
Scheduled maintenance	80

During this quarter, B. Höglund observed strips of sky for 1231 hours with three 1400 MHz parametric systems and one 750 MHz low-noise system, simultaneously.

M. DeJong and Y. Terzian used these systems, and 234 and 405 MHz systems a total of 567 hours for necessary observations for their doctorate theses.

Six systems were available for simultaneous use on the telescope. A total of 80% of the lost observing time is attributed to receiver trouble. Seventeen percent of the observing time lost is attributed to snow and wind, and 3% of the time lost attributed to interference.

The Millimeter Wave Program

The 12-ft. spun-cast reflector was found to have serious departures from parabolic geometry and suffered large temperature changes. The narrowest beam width obtained was four times the expected value.

Radiometer development at 1.2 mm has proceeded and, despite the inefficiency of the 12-ft. dish, an r.m.s. temperature fluctuation of 0.1°K was obtained, with an integration time of 10 seconds.

A dual-beam radiometer was tested and showed an order of magnitude reduction in sky brightness fluctuations. This indicates that millidegree sensitivities are possible in the 1.2 mm wavelength window.

EQUIPMENT DEVELOPMENT

The construction of three radiometers for the observations of lunar occultations has been completed. The feed, manufactured by Jasik Laboratories, has been received, tested, and accepted. The systems are being tested in the laboratory. A digital output system has been designed and will be built by the middle of April.

The maser dewar was opened at the factory (Sulfrian) and serious leaks were found in the wall between the nitrogen and vacuum chambers. The dewar will be repaired and improved at the manufacturer's cost. Delivery is expected in April.

The autocorrelation receiver has been completed and is now being tested in the laboratory.

Preliminary design of a 128-filter hydrogen-line receiver has been started.

Two low-frequency (234 MHz and 405 MHz) radiometers were built and installed on the 300-ft. telescope. The 300-ft. telescope now operates with six receivers simultaneously.

Construction of a 6 cm radiometer has been started. A parametric amplifier for this receiver has been ordered.

The two parametric amplifiers intended to be used as second stage amplifiers (noise temperature 180°K) for the interferometer have been delivered and accepted. The two low-noise (noise temperature 65°K) preamplifiers are reported to be on schedule and are expected to be delivered by May 11, 1964. The coaxial cables for the interferometer, which should have been shipped before the end of January, have not yet been completely delivered. The remaining reels are scheduled for shipment on or about April 15. No other major electronic equipment delivery delays are known at this time.

Construction of a digital position indicator for the new 85-ft. telescope is completed. A remote position readout at the old 85-ft. is under construction.

An adaptor providing magnetic tape input to the IBM 1620 computer has been designed and built.

A magnetic tape output system has been designed for the 20-channel hydrogen-line receiver.

A solid-state interference monitoring receiver has been designed and built.

Work on the 3.2 mm receiver has been started.

The following internal reports have been issued during the reporting period:

No.	Title	Author	Date (1964)
24	Power Detector	C. Bare	February
27	400 cps Solid-State Switch Driver	H. von Hoerner	February
28	A Broadband Amplifier (1-161 MHz)	H. von Hoerner	February
29	A Digital Receiver Tester	N. Keen	March

CONSTRUCTION

Interferometer

Blaw-Knox has completed their work and their engineer, Mr. Schaltenbrand, left Green Bank on February 27. NRAO work on controls, encoders, feed, etc., will be completed by April 1, at which time the telescope can be used as an independent unit. Work is progressing on the underground electronic cable, so that by June 1 it should be operable as an interferometer.

Airstrip

An engineering report, recommending paving a strip 2500' x 50' where the present turf airstrip is located, was approved and accepted on March 16. Engineering work has started in preparation for going out for bids. The work will be done during June and July.

With improvement of the weather, it is expected to have the turf airstrip in usable condition during April and May.

PERSONNEL

Dr. Morton S. Roberts, of Harvard College, accepted an appointment as Scientist and began work on February 1.

Mr. Heinrich J. Wendker, a graduate student from the Astronomisches Institut der Universitat, Munster, Germany, working toward his doctorate, accepted a one year appointment as research assistant. He is working with P. Mezger on a survey of the galactic radiation at 6 cm, 11 cm and 21 cm wavelengths.

During this quarter, two electronic engineers and two electronic technicians were employed for the Electronics Division.

We now have a total of 13 co-op students. During this quarter we had in residence two students from Georgia Institute of Technology, three from Virginia Polytechnic Institute, and one from Drexel Institute of Technology.