

DSN Research and Technology Support

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R. F. Systems Development Section

Major activities of the Development Support Group at both DSS 13 (Venus Deep Space Station) and the Microwave Test Facility are presented, and accomplishments and progress for each are described. Activities include radio metric observations (20–25 GHz), pulsar observations and planetary radar, precision antenna gain measurement (RASCAL), weak source observations, 100-kW operational clock synchronization transmitter implementation, clock synchronization transmissions, and DSIF klystron testing.

The Development Support Group, Section 335, is currently engaged in the following activities at DSS 13 (Venus Deep Space Station) and the Microwave Test Facility (MTF) at GDSCC.

I. DSS 13 Activities

A. In Support of Section 325

Section 325 personnel continue to make extensive use of the 9-meter antenna using their 20–25 GHz radiometer. However, their observations are being concentrated on the planet Mars as it comes toward closest approach.

B. In Support of Section 331

1. Pulsars. The 20 pulsars tabulated in Ref. 1, page 158, continue to be regularly observed and data on pulse-to-pulse spacing, power density spectra, and pulse arrival time continue to be collected.

2. Planetary radar. The program continues with the emphasis having switched to the planet Mars, with precision ranging (to a resolution of better than 1500 meters) being accomplished thrice weekly in support of the *Viking* Project. Weekly ranging of the planet Venus to the same

resolution also continues. The 2388-MHz 400-kW transmitter at DSS 14 has been reinstalled and ranging is now being done utilizing the DSS 14 64-meter antenna for both transmitting and receiving as well as continuing the bistatic ranging which utilizes the DSS 13 26-meter antenna for transmitting and the DSS 14 64-meter antenna for receiving.

C. In Support of Section 333

1. Precision antenna gain measurement. This effort has been named Radio Source CALibration (RASCAL) and data are being taken utilizing the computer program described in Ref. 1, page 155, which has been titled SAMPLE and aVerAGE (SAVAGE).

2. Weak source observation. Data are being collected utilizing the Noise Adding Radiometer (NAR) technique. Radio sources regularly observed (weekly) include 3C218, 3C348, 3C353, 3C461, the planet Jupiter, and the Sun.

D. In Support of Section 335

The major support to this section is implementation of the 100-kW Operational Clock Synchronization Master

Transmitting Station. The high-voltage power supply, associated water and oil circulation systems, and the 450-kW heat exchanger have all been tested with four- and eight-hour heat runs at dc power levels up to 490 kW.

The power amplifier klystron has been received and installation of the amplifier, exciter, feed system, and waveguide will commence on July 1, 1971.

E. In Support of Section 337

Clock synchronization transmissions will continue to be made until July 1, 1971. At that time the system will be shut down to convert to the 100-kW configuration at the operational frequency of 7149.9 MHz. Stations to which

transmissions are routinely being made include DSSs 14, 41, 42, 51, 62, and a station located at JPL in Pasadena.

II. Microwave Test Facility

A. In Support of Section 335

Utilizing the prototype construction capabilities of the facility, the driver amplifier for the 100-kW X-band clock synchronization amplifier klystron is being constructed and tested. Additionally, other support (machining, wiring, etc.) is being given to the project as needed.

B. In Support of Section 337

Testing of DSIF amplifier (10 and 20 kW) klystrons continues on an as-needed basis.

Reference

1. Jackson, E. B., "DSN Research and Technology Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. III, pp. 154-158. Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1971.