

# **HONEYSUCKLE CREEK**

***TRACKING STATION***





COMMONWEALTH OF AUSTRALIA  
DEPARTMENT OF SUPPLY



UNITED STATES OF AMERICA  
NATIONAL AERONAUTICS  
AND SPACE ADMINISTRATION

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**HONEYSUCKLE CREEK**  
**TRACKING STATION**  
**AUSTRALIAN CAPITAL TERRITORY**  
**INFORMATION BROCHURE**

Issued with the compliments of the Department of Supply  
on the occasion of the official opening by the

Prime Minister, The Right Hon.  
H.E. Holt, M.P.

17th March 1967

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POSTAL ADDRESS: The Secretary, Department of Supply,  
339 Swanston St., Melbourne, C 1  
(or Box No. 2288U, G.P.O. Melbourne C 1, Vic.)



With the opening of Honeysuckle Creek, there are now six major space-tracking stations in Australia, more than in any country other than America.

These stations play a vital part in the manned space flight program, deep space exploration and in the scientific and applied satellite field.

Honeysuckle Creek is one of the Australian stations which operate in support of Project Apollo in which it is planned to land men on the moon and return them to earth before the end of the decade.

Australia is proud to be able to take part in this exciting venture and in the other space programs which will bring better understanding of the universe around us.

The co-operation between my Department, the responsible agency in Australia, and the American National Aeronautics and Space Administration, is close and continuous. I believe that not only those working together on space projects, but also both nations, stand to gain from such friendly co-operation.

It is gratifying to see that Australian industry is continuing to play its part in the space program. This new station is operated and maintained by Standard Telephones and Cables Pty. Ltd. under contract to the Department of Supply, and under the control of a station director from the Department.

I welcome you to Honeysuckle Creek, Australia's latest space-tracking station. This is a further link in the space communications which shrink the earth and at the same time widen man's boundary in space.

A handwritten signature in dark ink, appearing to read 'Denham Henty'. The signature is fluid and cursive, with a large initial 'D'.

(Denham Henty)  
Minister of State for Supply

*Stw*



THE 85FT. ANTENNA AT HONEYSUCKLE CREEK

## **AUSTRALIAN/AMERICAN CO-OPERATION IN SPACE EXPLORATION**

For almost 10 years the Australian Government has participated in the American space program by establishing and operating tracking stations throughout Australia. This co-operative venture started with the installation of the Minitrack system at Woomera in the international geophysical year of 1957 and has grown until today there are six major stations in Western Australia, South Australia, Queensland and the Australian Capital Territory.

An inter-government agreement covers Australian and American co-operation in space flight operations.

The co-operating agencies are the Department of Supply and the United States National Aeronautics and Space Administration (NASA).

The construction and operation of these tracking facilities in Australia is financed by NASA. Design, construction, management and operational effort is provided from Australian resources.

Obviously, in an undertaking of this nature, the co-operative effort of many agencies is required to establish the facilities required. In Australia, the Department of Supply has been ably assisted in this, particularly by the Departments of the Interior and Works, Postmaster-General's Department and Overseas Telecommunications Commission.

State and local governments and private industry have also made important contributions.

### **STATION LOCATION**

The Honeysuckle Creek station, which is part of the world wide Manned Space Flight Network managed by the NASA's Goddard Space Flight Center, is located in the Australian Capital Territory, about 20 air miles south-west of Canberra.

Honeysuckle Creek is about 14 miles south of the Deep Space Station 42, at Tidbinbilla, and about four miles north of the Space Tracking and Data Acquisition Station in the Orroral Valley.

The last two stations have been in operation for some time and, although they are relatively close to Honeysuckle Creek, the nature of the local terrain is such that excellent shielding from mutual radio-frequency interference is easily obtained. This was a major factor in selecting the site.

The final access road to the station will be a considerable improvement on the pilot track which was used initially and over which all the heavy construction materials and equipment were hauled under difficult conditions.

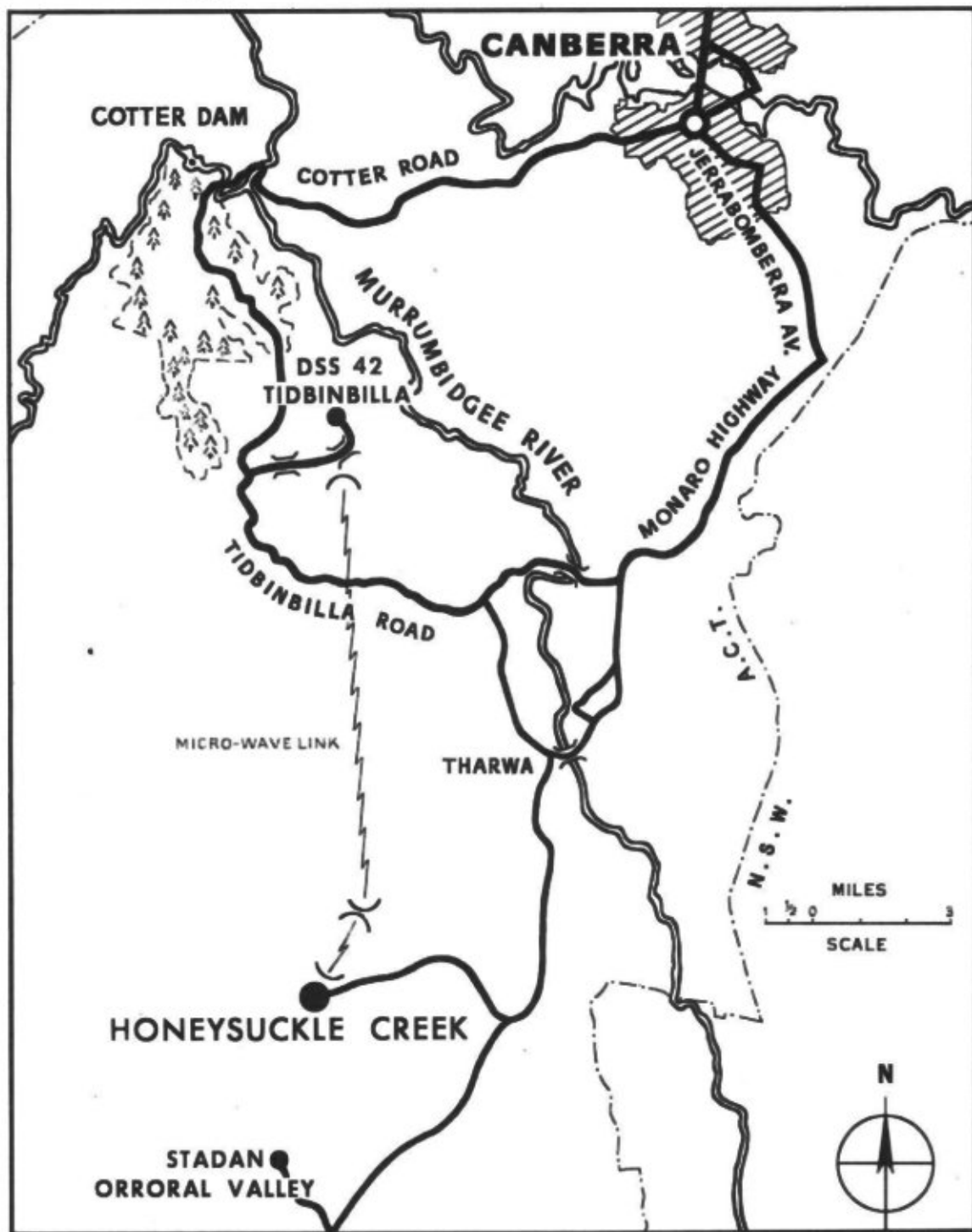


FIGURE 1. STATION LOCATION

## STATION LAYOUT

The station is contained within an area of about 14 acres. All electrical power used is generated on site by a number of diesel generators located in the power house.

Water is drawn from a dammed section of the Honeysuckle Creek; this is suitably treated before being pumped to a static reservoir from where it is gravity-fed throughout the station area.

On the crest of the hill, the 85-ft-diameter antenna dominates the main control and administration building located slightly down the slope. The power house is discreetly screened from this area by a huge outcrop of granite.

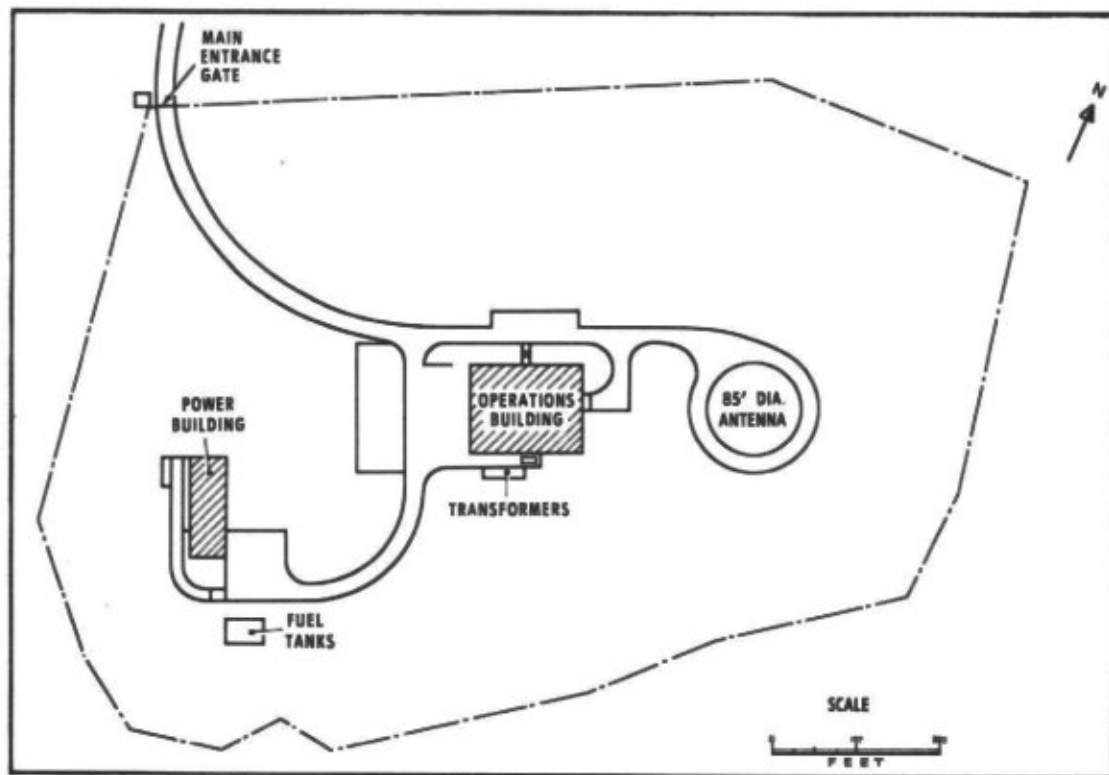


FIGURE 2. STATION LAYOUT

Only twelve months elapsed from the time access to the site was available until the station was occupied. Total cost of the facilities, including roadways but excluding equipment costs, was about \$2 M.



## **SPACE PROGRAM**

The present NASA space program covers three distinct broad fields of investigation: earth satellites, deep space probes and manned space flights.

### **Earth Satellites**

Unmanned vehicles are engaged on scientific investigations of the environment in and beyond the earth's atmosphere. Their orbits are nominally elliptical and their orbital periods may vary from 90 minutes to several hours, depending on the nature of the orbit.

In some applications, particularly those concerning certain aspects of communications, relative movement between the satellite and the earth is undesirable. Consequently, the technique of maintaining a satellite in synchronous orbit with the earth has been developed. This allows the satellite to be located over the equator, virtually stationary over any preselected position.

The satellite then provides a relay station for the transmission of signals from one point on the earth's surface to another located beyond the normal range of direct earth transmissions.

### **Deep Space Probes**

The deep space field is, as the term indicates, concerned with the study of phenomena at lunar distances and beyond into the solar system. Tracking times at the deep space stations extend up to 10 hours a day.

A mission may last many months: Mariner 4 on its journey to Mars was tracked for 11 months during which time it travelled 419 million miles. It was 191 million miles from the earth at the end of the mission.

At these distances, the signal strength from the probe is minute and only the most sensitive ground equipment can detect the signal from the general galactic noise.

### **Manned Space Flight**

The manned Mercury flights of 1962 and 1963 proved that it was possible to place a man in orbital flight around the earth and effect a safe recovery. It also proved man can endure the effects of prolonged high gravity forces at launch and transition stages and zero gravity force (weightlessness) during space travel. In 1965 and 1966 Project Gemini flights proved the technical capability of effecting a rendezvous in space and docking two spacecraft, and the ability of man to endure periods of up to 14 days in space and carry out activities outside spacecraft.



The outstanding success of the Mercury and Gemini programs has warranted the third phase of the manned space flight program - the exploration of the lunar surface by man, known as Project Apollo.

Already a vast amount of information on this environment has been obtained from the successful results achieved by the completed Ranger series of missions and from the currently successful Surveyor and Lunar Orbiter programs.

However, the ultimate goal is for man to land on the moon and explore the environment in detail. It is in support of Project Apollo that the station at Honeysuckle Creek has been established to form part of the extended world-wide Manned Space Flight Network.

## **MANNED SPACE FLIGHT NETWORK**

With Mercury and Gemini, manned space flights were limited to earth orbits. Tracking stations, positioned around the world, have been located to provide continuous overlapping contact with the spacecraft, each station being in contact for about 10 minutes of each orbit as the spacecraft circled the earth at a relatively close range of between 100 and 200 miles.

At such distances, radio signals are relatively strong and communications have not been a major concern.

For Apollo, the stations will have to (1) maintain the existing network for the early and final stages of the lunar mission, when the spacecraft will be in earth orbit, and (2) provide reliable tracking and communications during the lunar voyage, orbits, landing and return, involving distances in excess of 250,000 miles.

The new requirement has necessitated the addition to the Manned Space Flight Network of three new stations, each with a high-gain 85-ft antenna, at Goldstone (U. S. ), Robledo (Spain) and Honeysuckle Creek (Australia).

The three stations, spaced at approximately equal intervals of longitude around the earth, can provide continuous cover of the lunar missions, providing the spacecraft is beyond about 10,000 miles from the earth.

To ensure absolute reliability, each station is supported in the lunar phase of the mission by existing 85-ft antennas and appropriate Manned Space Flight Network receivers and transmitters at nearby Jet Propulsion Laboratory deep space stations. In Australia, the Tidbinbilla station provides this support.

The data and communications are relayed between the two stations by means of a radio-frequency microwave transmission link especially provided for the purpose. Each station can simultaneously track and communicate with the two modules (sections) of the Apollo vehicle in the lunar phase, when the Lunar Excursion Module separates from the Command and Service Module, or, if necessary, each station can concentrate separately on one of the modules.

This flexibility will ensure the maximum possible coverage during the vital lunar phase of the Apollo mission.

The whole network is linked to the Goddard Communications Control Center by means of NASA's world-wide communications system. Mission control is directed from the Manned Space Flight Center at Houston, Texas, U. S. A.

The Manned Space Flight Network of tracking stations is an extensive organization. To provide continuous coverage of the Apollo spacecraft from launch to re-entry, there are a further eleven land-based stations, five instrumented ships and eight instrumented aircraft.

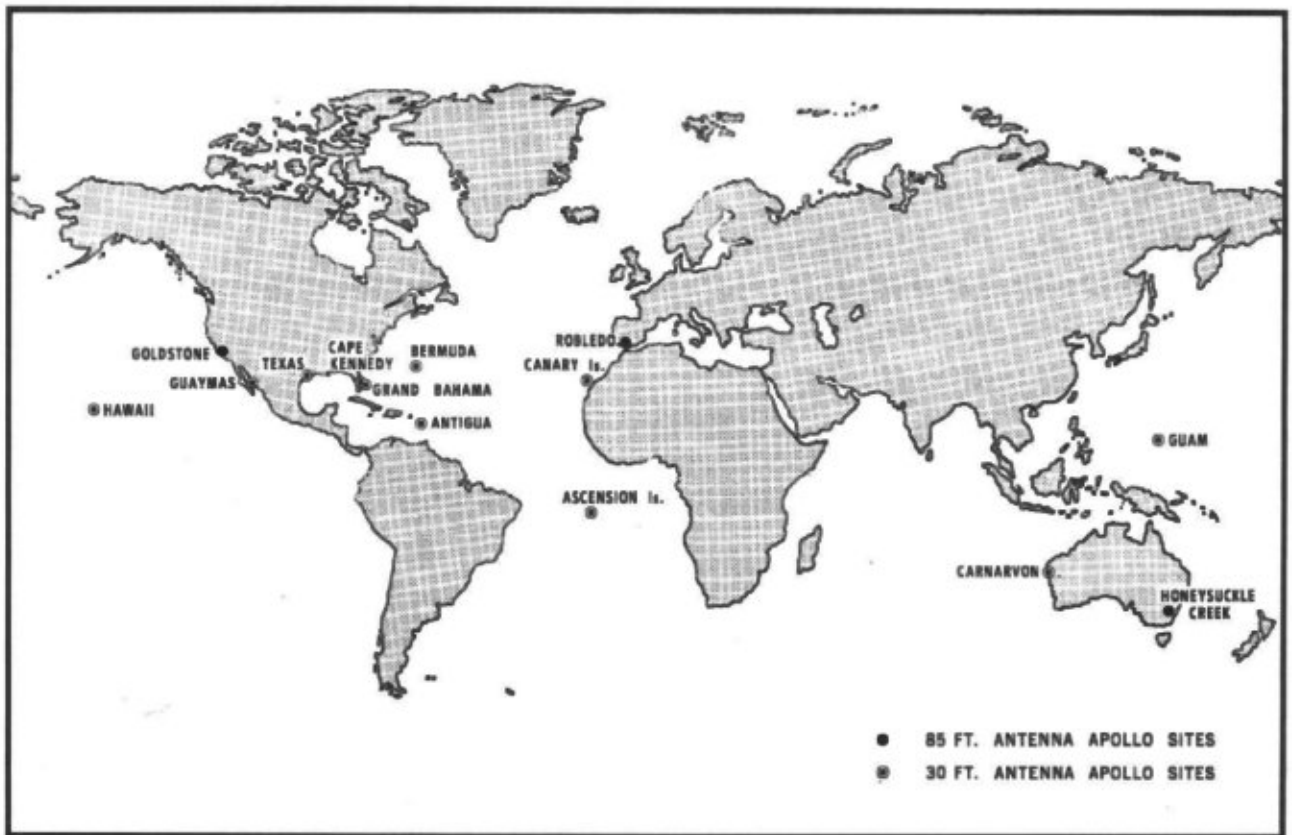


FIGURE 3. MANNED SPACE FLIGHT NETWORK

## STATION APPLICATION

The near-earth phases of the Apollo mission will be adequately covered by existing stations equipped with smaller antenna systems e. g. the Carnarvon station, which was used in the Gemini program has been modified substantially for Apollo. Honeysuckle Creek Station will not be extensively engaged in the Apollo program until the spacecraft is injected into an elliptical orbit, with an apogee of about 12,000 miles, to test the technique of re-entry into the earth's atmosphere from the translunar phase.

From this stage on, the station will be engaged fully on all further Apollo missions. The station will have full capability to meet this commitment by July, 1967.

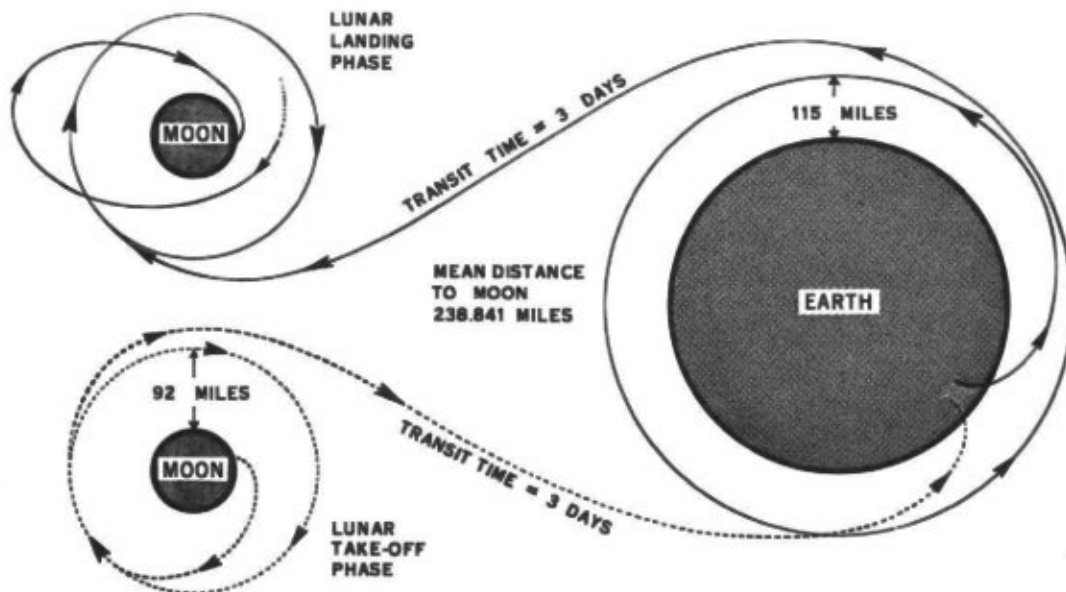


FIGURE 4. APOLLO TRAJECTORY TO THE MOON

## **STATION EQUIPMENT**

### **Instrumentation**

Honeysuckle Creek Station is equipped with the unified S-band system, which has the basic capability handling tracking and communications data for two spacecraft simultaneously, provided they are within the beam width of the single 85-ft antenna. The latter has a beam width of 0.4 deg. at 2,300 megacycles.

Acquisition of the spacecraft, as it appears over the horizon, will normally be obtained on the information provided by the antenna programmer which is continuously upgraded with orbital information obtained throughout the network.

However, each main antenna is fitted with a small wide-beam acquisition antenna, capable of covering a larger area for initial acquisition. To improve the performance of the system, the transmitters and receiver amplifiers are mounted in the antenna structure, as close to the antenna microwave feed as is possible.

From here, signals are relayed to the control room where the multiple receivers and ranging subsystems are installed. Next, the down-link information from the spacecraft is processed to extract voice, scientific and engineering data which is then simultaneously tape-recorded at the station and transmitted back to the Manned Spaceflight Center at Houston in near real time, either by the high-speed data link or by teletype.

Commands or instructions from the center are processed in the reverse direction and finally passed to the dual 20 kW transmitters in the antenna structure.

### **Communications**

Permanent voice/data and teletype circuits connect the station with the Goddard Communications Control Center via the switching centre at Deakin, A. C. T. Multiple circuits allow the direct transmission of information and data in either direction.

The circuits in Australia are provided and maintained by the P. M. G. Department; those between Sydney and the U. S. are the responsibility of the Overseas Telecommunications Commission (Australia).

The whole link is part of NASA's world-wide communications system terminating in the Goddard Communications Control Center.

The local communications link with the station at Tidbinbilla is provided by a microwave data transmission link. The line of sight between the two stations is interrupted by the local terrain, and a passive repeater had to be provided on a nearby mountain top to overcome this.

The microwave link will provide four transmitter frequencies from Tidbinbilla to Honeysuckle Creek and two transmitter frequencies in the reverse direction.

### **Power Supply**

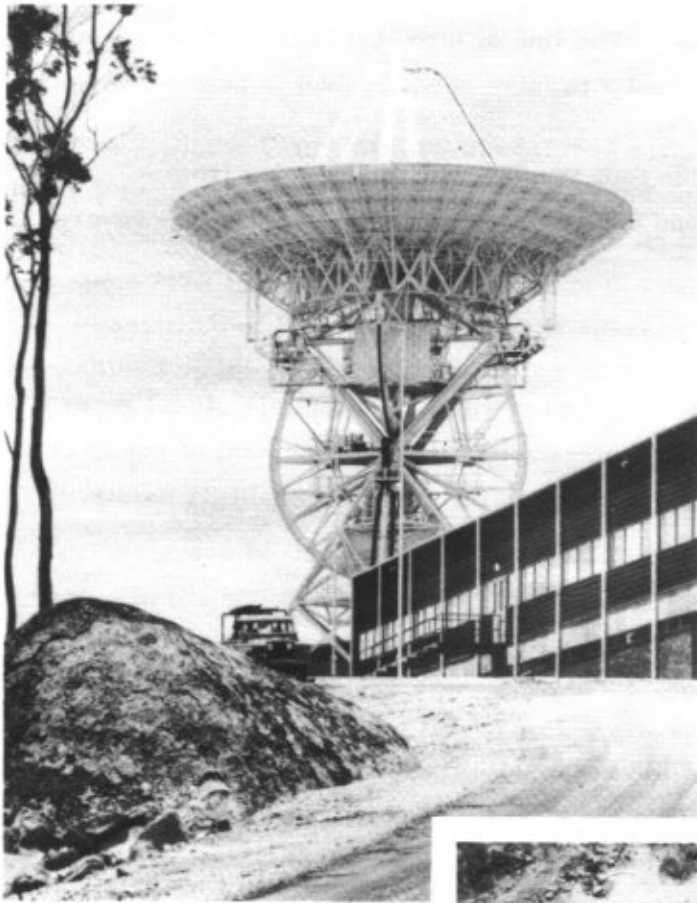
The station operates its own power station which contains six diesel generators with a total output capacity of 2.2 megawatts. As this amount of power is not required for the operation of the station, ample standby capability exists.

### **STAFFING THE STATION**

The Department of Supply has the responsibility for the establishment and operation of NASA stations in Australia. The function is exercised through the Department's Weapons Research Establishment. The Station Director is a senior officer of W. R. E.

The Australian Government policy of using the resources of private industry in this sphere of activity has been extended to Honeysuckle Creek by the award of a contract to Standard Telephones & Cables Pty. Ltd. for the provision of operating and maintenance services.

About 80 professional, technical and administrative people are engaged on this task.



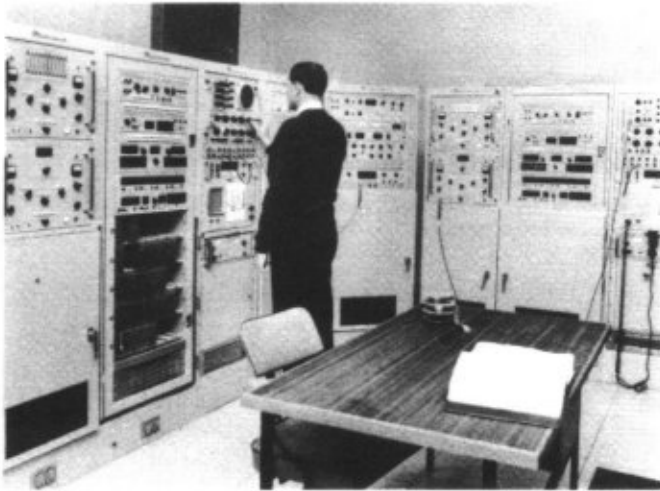
OPERATIONS BUILDING

AERIAL VIEW OF STATION





COMPUTER AREA



TELEMETRY DECOMMUTATION  
EQUIPMENT

(John Crowe)

TAPE RECORDING EQUIPMENT

(Bruce Withey)

