



FOR IMMEDIATE RELEASE

"MULTIPLEXER"

A new device called a "multiplexer" is enabling Explorer VI tracking stations in England and Hawaii to receive and transmit radio signals on a single antenna at the same time.

Installation of multiplexers, (specially built antenna-use separators) at these two tracking stations was necessary because of tracking accuracy requirements.

In operation a standard frequency is continually radioed through the multiplexer unit to the satellite. The frequency is changed and immediately retransmitted by the satellite to the same unit. A continuing comparison of the frequencies establishes velocity of the satellite.

Part of a worldwide network, the ground tracking stations were designed and are operated for NASA and the Air Force by Space Technology Laboratories.

The multiplexer system makes it possible for the antenna to transmit radio waves at 10 kw power and simultaneously receive radio waves with the strength of a billionth of a billionth of a watt.

Application of multiplexer units of this type has never previously been made. The Manchester, England, antenna also is used by the British owners to track "radio stars" by reception of magnetic wave propagation from galaxies in space.

A multiplexer is basically a series of traps and filters which allow simultaneous transmission and reception of two closely repeated frequencies from the same antenna with a minimum of feedback from one circuit to another.

The multiplexer used for simultaneous transmission and reception consists of "spheres and cyleres" -- the latter a coined word pronounced "sleers" meaning a sphere cut in two with a cylinder placed in between.

Basically these components are highly resonant radio circuits made up of special Invar steel, an alloy which changes its physical characteristics very little with changes of temperature. The unit is tuned over a small range by changes of pressure.

Each multiplexer contains six, one and a half foot spheres which resemble halves of a big rubber ball bolted together and painted white.

The 250-foot dish antenna at Manchester is the largest in the free world's net of tracking stations.

It is to a tracking system as a curved reflector is to a giant telescope. Instead of gathering light waves the antenna gathers radio waves from space at various points and brings them to focus at a point outside the dish. At Manchester, the multiplexer is attached to the base of an 85-foot tower which supports the antenna feed unit in the center of the dish. The tower narrows into a pole at the top, which can be adjusted to "focus" the feed assembly.

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TEMPERATURE CONTROL

A new device to maintain temperature control in the instrumentation compartments aboard space vehicles is being tested on Explorer VI as it speeds on its elliptical path around the earth.

Best described as a stubby, four-bladed propeller, toylike against the satellite's shell, the device is designed to regulate the internal temperature of satellites as they are exposed to the heating sunlight and cooling shadows encountered in space travel.

The unit was created by engineers at Space Technology Laboratories, Inc. Relying on the absorption and reflection qualities of black and white surfaces, it operates when preset high and low temperature extremes are reached.

A small patch of black material is attached to the satellite's shell within the rotation diameter of the propeller. Beneath the patch, inside Explorer VI is a wire coil that expands when heated and contracts when cooled.

Exposed, the black patch absorbs sunlight heating the satellite. When a maximum temperature high is reached, expansion of the coil activates the propeller which rotates until its heat reflecting surface covers the patch and cooling begins.

Conversely, when the temperature drops below that desired, the contraction of the coil rotates the propeller exposing the heat absorbing black patch and temperature rises.

Operation of the temperature control unit aboard Explorer VI is radioed to earth through the use of a solar cell in place of the black surface. When exposed it converts sunlight to an electrical impulse that is sent to ground tracking stations.

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