

December 1967

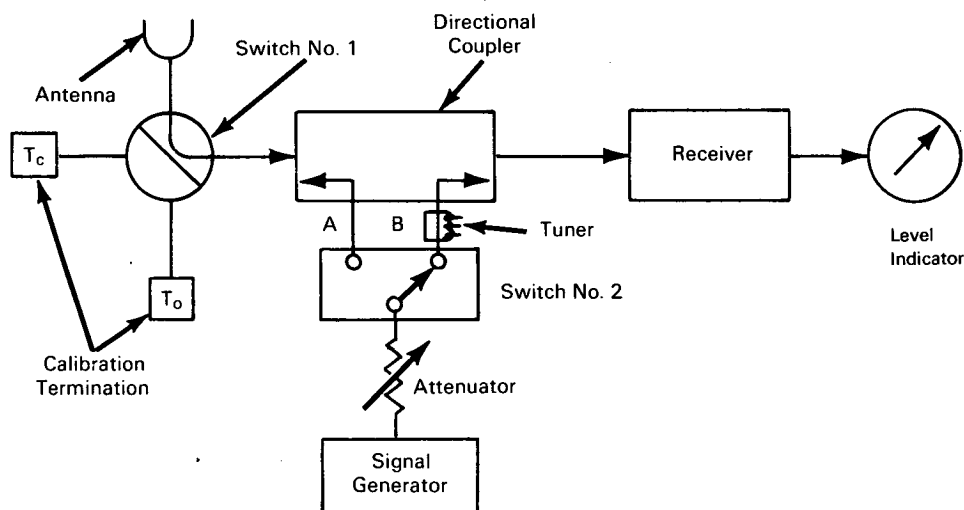
Brief 67-10657

NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Reflectometer for Receiver Input System



MODIFIED SYSTEM WITH BUILT-IN REFLECTOMETER

The problem:

The application of precision microwave measurement techniques, as in checking the VSWR of devices in a waveguide system, results in time-consuming point-by-point measurements often requiring dismantling of the assembly. Engineering development and calibration of low noise tracking receivers demand a faster, more thorough, and more automatic method of measurement.

The solution:

A reflectometer, normally used as test instrumentation for match measurements, was built into a microwave input system and periodic measurements of match were made a part of the station calibration routine.

How it's done:

The measure of a termination match is given by the signal power reflected from the termination or the degree of match of the antenna or the loads seen by the maser input termination. A perfectly matched termination will reflect no signal while a short will reflect essentially all of the signal. By injecting the signal from the signal generator and attenuator through switch No. 2 and port A of the directional coupler, the signal power is dissipated in one of the three load devices or reflected into the receiver due to improper match. The level of the reflection is indicated by the level indicator. The signal generator attenuator and output level meter are read to obtain the equivalent power of the reflected signal after switch No. 2 connects the signal to the receiver through port B and the level is adjusted to the reference value obtained with the reflection signal.

(continued overleaf)

For highest accuracy it is necessary to tune the reflectometer with the tuner while switch No. 1 is connected into a termination with a known match.

Notes:

1. This invention is presently in use in the JPL Mars Station. It was installed in the S-band receiving system in the feed cone of the 210-ft antenna.
2. This development offers the following advantages:
 - a. The impedance match measurements can be made without disconnecting elements of the receiver input system.
 - b. Down-time for match measurements is essentially eliminated effecting a substantial savings in receiver maintenance cost.
 - c. Match measurements can be made on a routine calibration basis.
 - d. The reflectometer acts as a trouble-shooting instrument before and after replacement of components (e.g., waveguide switches).

3. Inquiries concerning this development may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B67-10657

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: C. T. Stelzried
Jet Propulsion Laboratory
(XNP-10843)