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# NASA TECH BRIEF

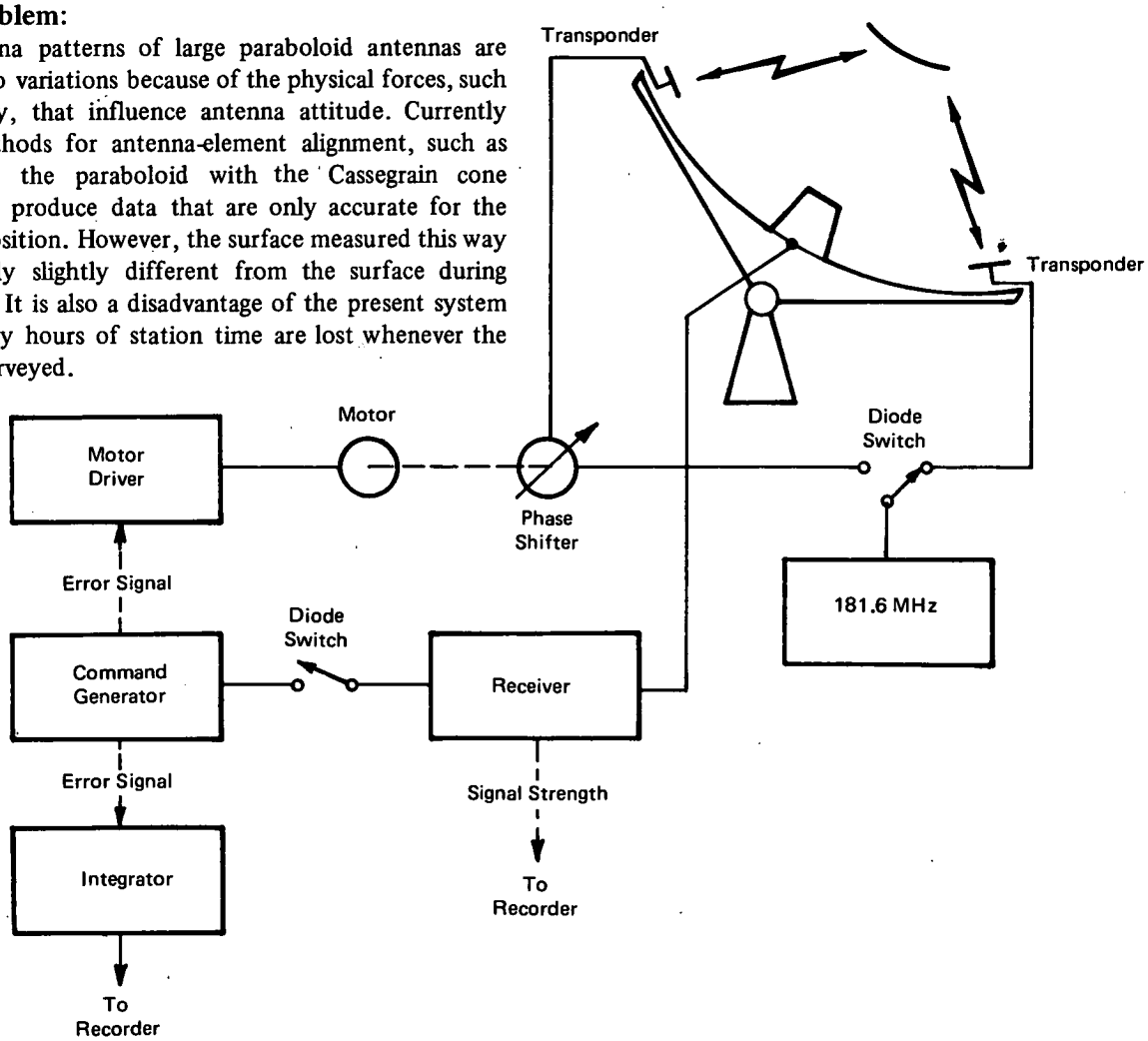
*NASA Pasadena Office*



## Means for Mapping Radiated Fields and for Measuring Differential Movement of Antenna Elements

**The problem:**

Antenna patterns of large paraboloid antennas are subject to variations because of the physical forces, such as gravity, that influence antenna attitude. Currently used methods for antenna-element alignment, such as surveying the paraboloid with the Cassegrain cone removed, produce data that are only accurate for the zenith position. However, the surface measured this way is actually slightly different from the surface during tracking. It is also a disadvantage of the present system that many hours of station time are lost whenever the dish is surveyed.




Block Diagram of the System

(continued overleaf)

## The solution:

A null seeking system has been developed, which uses two transponders located at selected points on the dish (e.g., on the quadripods, on the hyperboloid, or on top of the cone), to detect the phase-front of a received signal.

## How it's done:

The basic system is shown in the block diagram. The box labeled 181.6 MHz is the source of modulating signals to the two transponders and is a part of the antenna station. One signal line has a continuously variable phase shifter (a commercial component) driven by a reversible stepmotor. Each of the two transponders on the dish is a dipole with a mixer crystal between the elements. The crystal is driven, in turn, by the 181.6-MHz signal carried by the miniature (or subminiature) coaxial cable.

The dynamic-phase error signal is sampled in the control room by a second switch, driven synchronously with the one in the electronics cage. (A phasing control, not indicated, is required to establish synchronism.) The command generator senses the polarity and amplitude of the error signal and generates appropriate trains of pulses to null the phase shift. The integrator is an up-down counter, either electronic or mechanical; the input is the same as the command pulses to the reversible stepmotor, and the output is a direct potential proportional to the count. This potential is fed to a strip-chart recorder.

## Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP73-10452

## Patent status:

NASA has decided not to apply for a patent.

Source: Clarence C. Lundy of
Caltech/JPL
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NASA Pasadena Office
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