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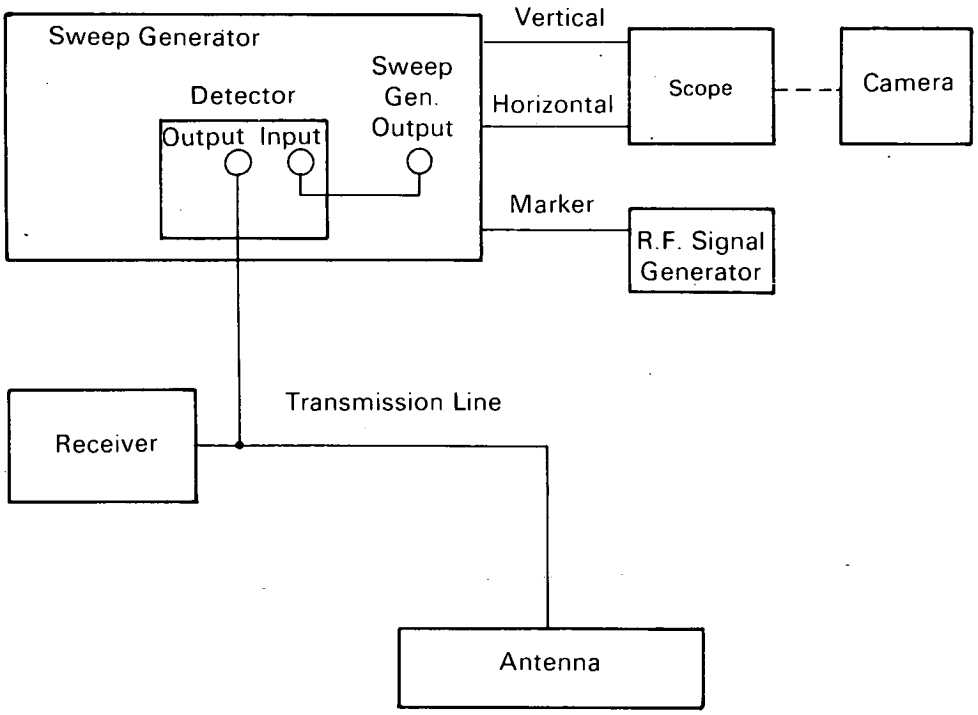
NASA TECH BRIEF

Technique for Tuning Antenna Systems Producing Negligible Signal Radiation



Antenna System Tuning And Matching Test Set-Up

The problem:

How to tune an antenna, in its operational environment, to a transmission line and terminal equipment with negligible signal radiation.

The solution:

With the use of sweep and marker generators, tune and match the antenna system in its operational environment.

How it's done:

The system operates by using an RF sweep generator, connected in a back-to-back configuration (sweep generator output connected to sweep generator detector input) to simulate transmissions over the entire frequency range of the antenna receiving system. The detector output of the sweep generator is connected to the antenna receiving system near the receiver input.

(continued overleaf)

A sweep generator is a signal generator which has the capability of frequency-modulating the signal generated within the unit. Consequently, the frequency of the signal produced is swept above and below the frequency established by the oscillator within the unit.

The induced voltage standing waves of all frequencies sent down the transmission line and reflected back and forth between receiver and antenna are observed on the oscilloscope. The horizontal sweep of the oscilloscope is synchronized with the sweep generator so that the beam is swept across the face of the CRT as the generator sweeps from the lowest to highest frequency. The oscilloscope traces out the induced voltage standing wave pattern characteristics for all frequencies of the antenna receiving system.

A marker generator (single-signal CW type) is used to identify frequency points along the wave form displayed on the oscilloscope.

Injecting this single signal causes a pip to appear on the oscilloscope. By varying the output frequency of the calibrated marker, the relative positions of the pip will indicate the frequency on the waveform.

The antenna tuning device is adjusted for minimum standing waves at the precise operating frequency determined by the marker pip on the displayed waveform.

Notes:

1. The innovation discussed in this NASA Tech Brief should be of interest to personnel working with transmission line systems and antennas.
2. Documentation is available from:
   Clearinghouse for Federal Scientific and Technical Information
   Springfield, Virginia 22151
   Price $3.00
   Reference: TSP69-10215

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: Karl Merz of
The Boeing Company
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