X-Band Antenna Feed Cone Assembly

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A new X-band feed cone assembly has been designed for the DSN 64-meter-diameter antenna stations. Unique features of the cone assembly are described and progress to date is reported.

In support of Viking and future projects, the DSN must provide for X-band signal reception at the three existing 64-meter antenna stations. Currently a research and development X-band cone assembly is in operation at DSS 14, but the overseas stations have no X-band capability.

To meet this requirement, a new X-band cone assembly, shown in Fig. 1, has been designed. It utilizes the standard cone shell with the addition of an extension at the top to support the X-band horn and provide a weather seal.

Because of the much smaller size of X-band components as compared to S-band, several new features have been incorporated in this design. The cone shell has been converted to a two-story design with the addition of a new floor at the intermediate level. The traveling wave maser rests upon a stand which attaches to this new floor.

The feed assembly includes the horn, a polarizer for right circular polarization (RCP) reception, a transition to rectangular waveguide, spacing waveguides for mode

control, and a waveguide switch to select either the feed or a calibrated ambient load for system performance measurements. The entire feed assembly is structurally one piece and can be removed and replaced without affecting its precision alignment. Only the output waveguide, the switch control cable, and the mounting bolts on the top plate need be removed to effect a complete replacement. This innovation will permit the retrofit of more advanced X-band feed systems as the requirements develop. Examples of future changes that may be desired are higher illumination efficiency feed horns, polarization diversity, and uplink (higher power) capability.

At this time the cone shells for three assemblies are on hand and fabrication of the microwave components is nearly complete. Waveguide switches have been procured (Ref. 1). Work remaining includes the fabrication of bracketry and the assembly of the complete cones.

Reference

1. Hartop, R. W., "X-Band Waveguide Switches," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. XV, pp. 48–50, Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1973.

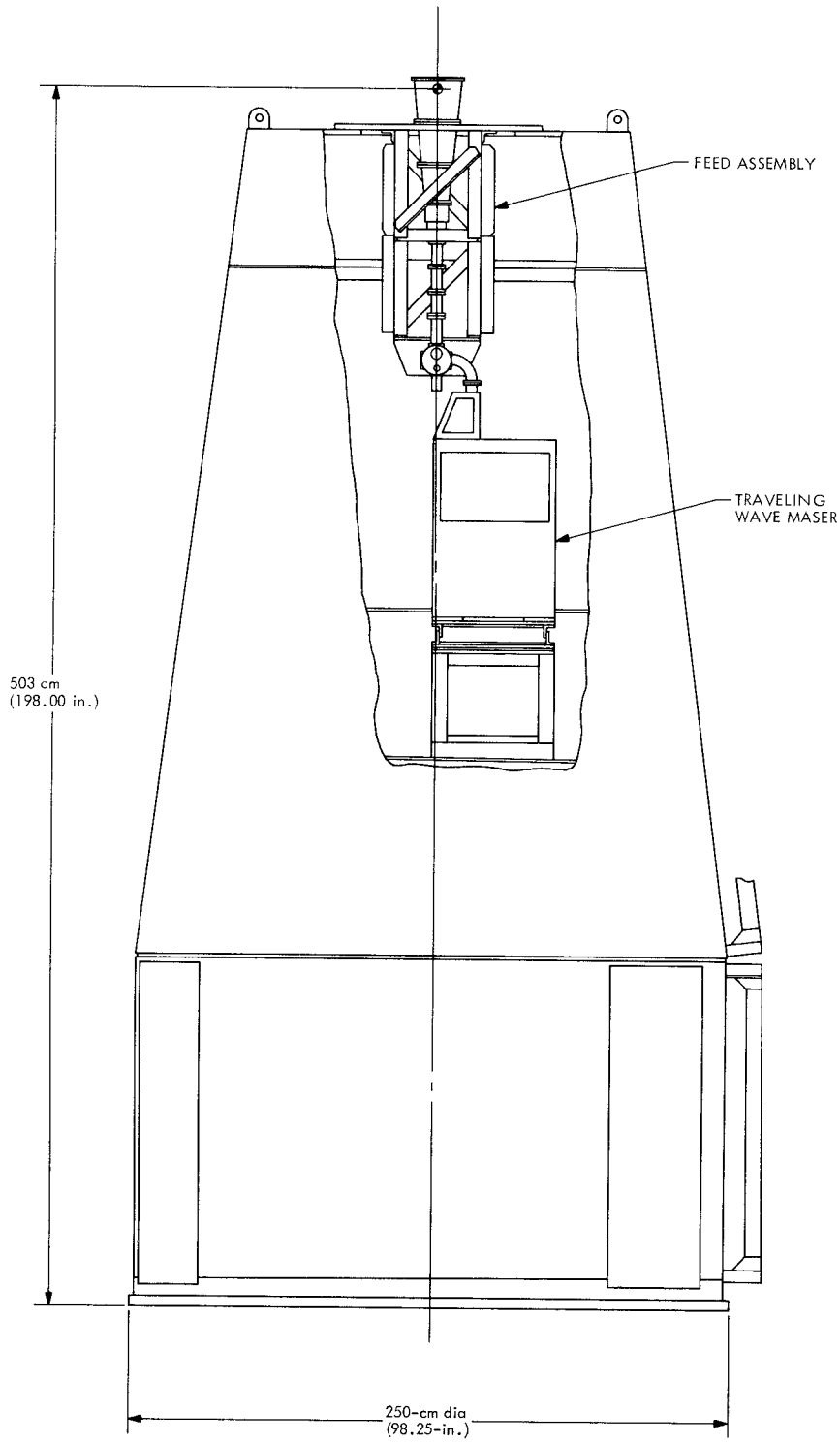

Fig. 1. X-band receive only (XRO) cone assembly