The "Saucer Sled" antenna is being bore-sighted by K6HIJ on a home-brew antenna range. W6DSL and WA6HWV look on.

a low-cost amateur microwave antenna

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One of the major problems with putting an amateur microwave station together is obtaining a suitable antenna. For work above 2300 MHz, amateurs have traditionally used parabolic reflectors which they have either located on the surplus market or built themselves. It takes a fair amount of luck to find a surplus dish at a reasonable price, even if one is fortunate enough to live in an area that has a number of surplus dealers. Making your own dish is anything but easy, especially if you want it to be effective at 10,000 MHz.

raw materials

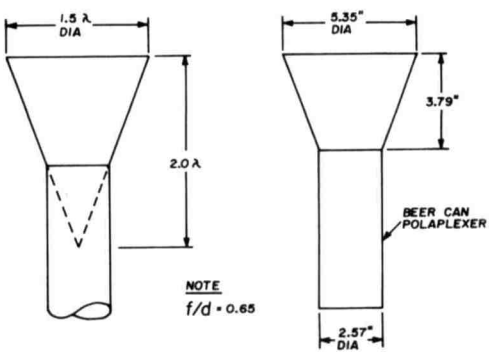
In the 1968 Sears Christmas catalogue I noticed a "Saucer Sled."* It was 26 inches in diameter and made of "sturdy aluminum." It looked like a natural for a dish, and in the interest of science, one was ordered. When it arrived, inspection showed it was spherical, with a usable surface 24 inches in diameter. It was indeed well built, and would make an excellent antenna for amateur microwave work.

The focal length was measured by focusing the sun's rays on a card (**DON'T** try using your hand as a focal plane!) and was approximately 15½ inches. Since this corresponds to a f/d ratio of 0.65, instead of 0.4 for a typical parabolic reflector, a standard open-end waveguide feed such as a polaplexer[1] will not properly illuminate the reflector surface.

construction

A conical horn feed was designed from the literature[2] that would have the proper beamwidths to illuminate the "Saucer Sled"

fig. 1. Feed system dimensions at 3300 MHz for the "Saucer Sled" antenna. The polaplexer is a half-quart empty beer can.



effectively. The feed was constructed with flashing copper attached to a homemade polaplexer (**fig. 1**) for the 3300-MHz band. The horn alone will produce a gain of 12 dB over an isotropic source.

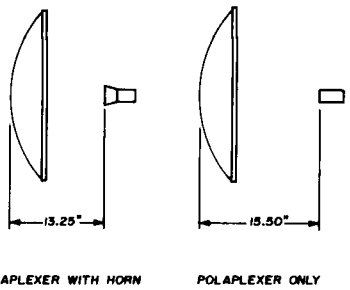


fig. 2. Measured feed locations for best gain.

The gain of the antenna, measured at 3335 MHz, was 24 dB (within the accuracy of measurement). If the reflector is illuminated with a simple polaplexer instead of the horn, the gain will be 1 dB less. These values agree closely with theory and are well within the errors of measurement. **Fig. 2** gives the location of the feed for best focus in both cases.

* This "Saucer Sled' microwave antenna is a simple and effective solution to the antenna problem for microwave work. I hope this will eliminate one stumbling block for the amateur who wants to experiment with microwave communications. I'd like to thank W6DSL and WA6HWV for their help in evaluating the performance of this antenna.

You should check the focal length of your own "Saucer Sled," as my measurements were made with only one sample, and I don't know how closely the dimensions are controlled during manufacture. If you can find a store that stocks these "Saucer Sleds," select one with a minimum of dents. Mine arrived with some dents that probably occured during shipping. Unless the dents are quite severe, however, they should not appreciably affect performance.

the mount

A suggested mounting method is given in **fig. 3,** but feel free to use your own ideas. Bear in mind there should be no relative movement between reflector and feed, nor between antenna and mount. Be sure to allow for focusing adjustments and elevation angle, because this antenna has a narrow beamwidth: about 10 degrees at 3300 MHz. The beamwidth is proportional to frequency (i.e., about 3 degrees at 10,000 MHz.) The feed should have a total of two wavelengths (approximately) of travel around the measured focal point along the antenna axis. This is 6 inches or so at 3300 MHz.

references

1. K. E. Peterson, K3KRU, "Practical Gear for Amateur Microwave Communications," *QST*, June, 1963, pp. 17-20.
2. G. C. Southworth, "Principles and Applications of Waveguide Transmission," Van Nostrand, 1950, pp. 415-9.

fig. 3. A suggested scheme for mounting. Rigidity is important because of the narrow beamwidth.