Radio Astronomy Supplies

APPLICATION NOTE 8
METHODS OF DETERMINING THE ANTENNA FOCAL POINT

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Abstract

With the abundance of satellite antennas being discarded or given away at little or no cost, you may find yourself with one or more different models.

These satellite antennas are perfect for Radio Astronomy use and are easily converted from C (3.7 – 4.2 GHz) or Ku (12 GHz range) band to L band (example - 1.4 GHz 21cm) or lower (406 MHz or 612 MHz).

Mathematical Method

If the antenna you have is missing the feed support arms, you may find yourself having to fabricate these from electrical conduit tubing etc. To figure out the *focal point* of the antenna mathematically, you will have to use one of the following formulas:

$F = D^2 / 16 x$

D = Antenna Diameter in inches
X = Antenna Depth in inches

Or

Radius squared/4x Antenna depth = F

(The above formulas are found in many of the standard antenna books)

When the above is solved, this will give you a fairly accurate point of focus. For example, if the formula states that the focal point is 26 inches from the *vertex* (absolute bottom or center of the parabolic), you would position your receiving element (dipole, helix feed or feedhorn at that point. In the case of a feedhorn, the focal point will be within ¼", inside the lip of the horn.

The Paraclipse Company, manufacturer of sturdy, well built antennas, has a useful chart on their website. Note, this is only for those of you who might have the Paraclipse antenna. http://www.paraclipse.com/techsup9503.htm

For those of you using the Kaul-Tronics type antennas, you may view a similar chart on their website. http://www.orbitsat.com/Cyberstore/Cband/dishes.asp Click on the antenna model of your choice.

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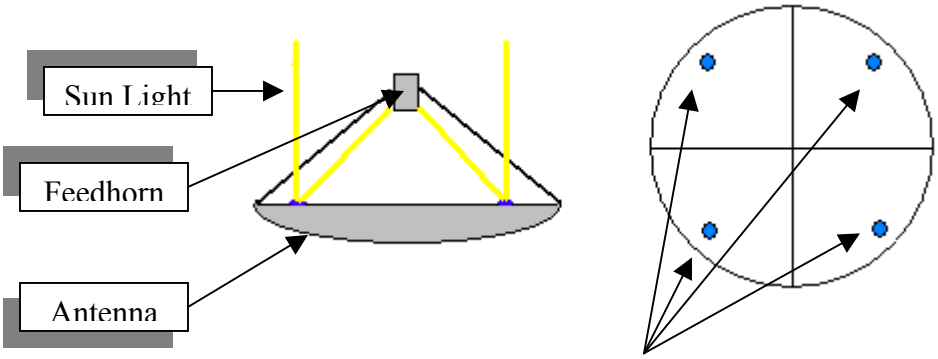
Visual Method

The visual method is for those who like to do things in a simple, non-mathematical manner.

The use of the visual method works very well, especially if you are in the field and not equipped with a calculator. The use of mirrors will also determine the proximity of an antenna focal point. Refer to the following figure:



When the antenna is pointed at the sun, the mirrors will reflect the beams of sunlight at a point on the feedhorn. Thus, you have an idea of were to position your feedhorn. In the event that you are using something other than a feedhorn, you may construct a white cardboard cylinder and position that at the place were you believe the beams will land. See figure below: