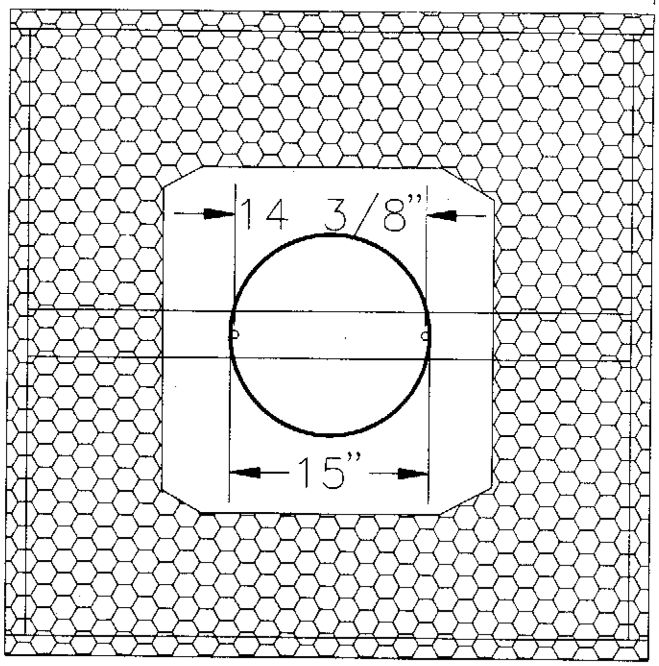
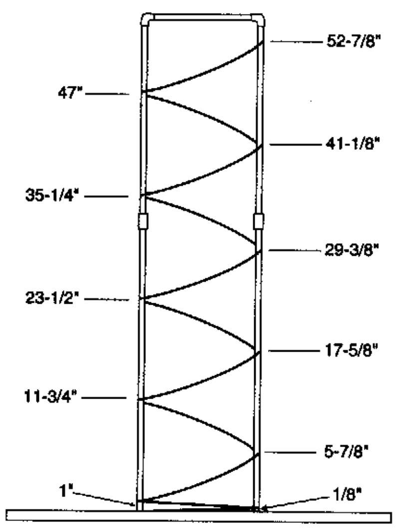
FIGURE 1



I used number 12 copperweld wire that I obtained at a hamfest for the radiator. The wire type should not be too critical, however, the stiff copperweld wire, already coiled into a circular roll, made keeping a circular coil shape easier. For right-hand circular polarization, the helix must spiral away from the ground plane in a clockwise direction. This is very important, as cross polarization can result in a signal loss of over 30 dB. I wound the wire around the form, and secured it at each notch on the dowel rods with a staple.

Underneath the first half turn of the helix, I placed a piece of sheet brass. I secured the brass to the chicken wire ground screen by cutting tabs from the brass sheet and bending them through the chicken wire mesh. At the feed end of the helix, I mounted a BNC connector through the brass sheet, and soldered the center pin to the copperweld wire. The first half turn of the helix was nearly touching the ground screen and shorting, so I wrapped the first half turn with tape. The capacitance between the first half turn of the helix and the ground plane would adjust the VSWR, so I drilled two sets of holes through the sheet brass straddling the first half turn. I would adjust the capacitance by running cable ties through these holes and adjusting the spacing between the wire and the ground plane.

FIGURE 2



Performance

I measured the antenna VSWR with a Hewlett-Packard vector network analyzer. By tightening the cable ties fully, I could obtain a VSWR better than 2:1 from 220 to 280 MHz. Most people do not have access to such test equipment, but for receiving, VSWR is not that important. Adjusting the spacing between the first half turn and the ground plane to less than 1/8-inch should yield an adequate impedance match.

Using an Icom R-7100 receiver, I connected the antenna and began searching the sky with the receiver tuned to 250.45, 250.55, and 250.65 MHz. I found two distinct directions which each yielded signal maximums. Later calculations and measurements with a compass verified that these directions were the headings for the FLTSATCOM satellites at 23° W and 100° W longitude.

Signals received from the 100° W satellite were stronger, probably due to the higher elevation angle of this satellite from my location in North Carolina. With the antenna peaked on the 100° W satellite, I tuned the receiver across the 250 to 270 MHz band. At least ten signals were readable, with S meter readings from S1.5 to S2. I then went back inside and connected the receiver to the omnidirectional antenna on the roof of Grove Enterprises. The same frequencies that had S1.5 to S2 signals with the helical antenna were just above the noise floor, with the S meter barely moving at all. The helical antenna clearly has substantial gain over our omnidirectional antenna.

Conclusions

There is plenty of room for improvement with this antenna. If more antenna gain is desired, more turns may be simply added to the helix. There is no provision for mounting it for remote rotation; I rotated it by hand until a peak was found and then propped it up with a board in that position. It should be fairly easy to build a frame to point the antenna in one direction; configuring it for remote azimuth and elevation selection may be a lot more difficult.

For satellite monitoring, ground-mounting the antenna is fine. If it is used for other applications, height above ground may be important. Also, if the antenna is to remain outside for an extended period, it probably should be ruggedized and painted to protect it from the weather. But for approximately ten dollars worth of materials and an afternoon's construction time, the performance is quite good. It certainly provides a cheap and dirty way to listen to the FLTSATCOMs. ST