Overview.

Your antenna is the most important part of the reception system - you have to be able to efficiently collect the signals in order to feed them to your preamp or directly to your scanner. UHF-Satcom transmissions tend to be right hand circular in polarity, and as such the most efficient antenna is a helical. It is possible to use linearly polarised antennas and suffer the 3dB loss in signal. Typically, DAB antennas are freely available and operate in the 220MHz - 240MHz so just under the band we are interested in. They do however work reasonably well.

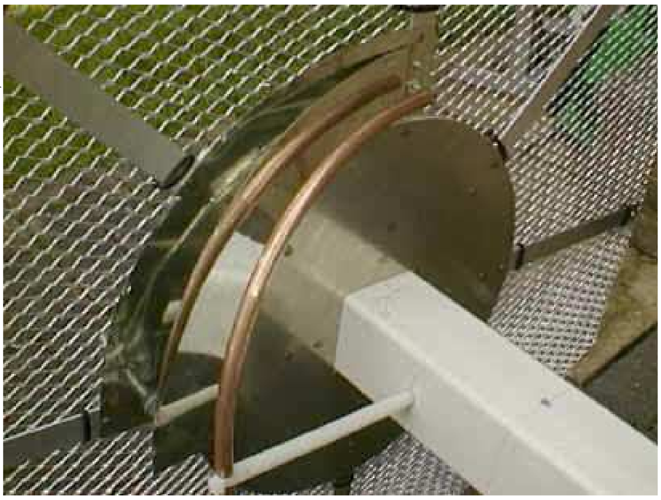
UHF-Satcom helical antenna.

The picture to the left shows the second version of the satcom helical. The boom is made from 65mm square plastic drainpipe, the helix supports are made from 10mm diameter plastic rod, all easily obtainable from your local DIY store. The plastic rod is drilled in one end at the centre, and at the other end drilled across the diameter. This rod is used to support the helical element. The helix element is held in place with a cable tie.

(right) close up of reflector mounting scheme.

As depicted in the picture to the right, the plastic boom goes through a square hole cut in a 300mm diameter aluminium disc which has 8 sets of holes drilled to support the radials.

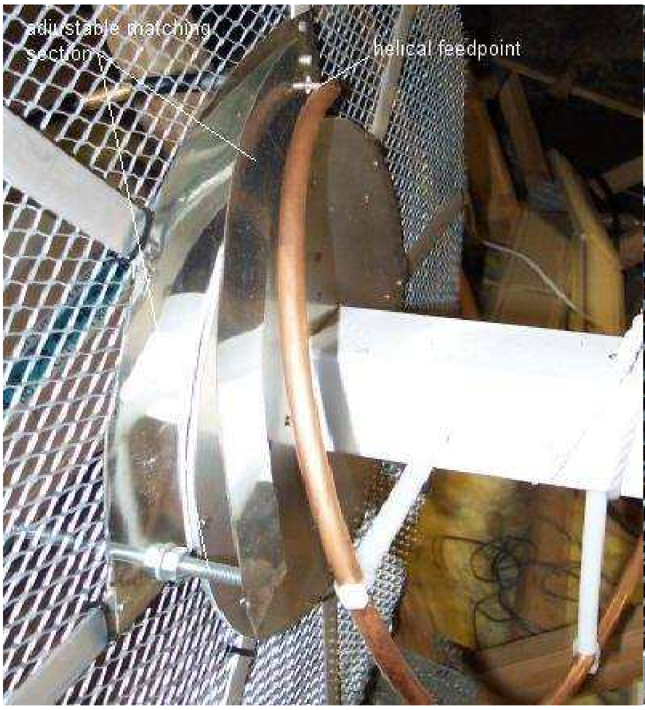
The disc is mounted on the boom with four right-angle brackets. The wire mesh is attached to the back of the radials with cable ties. The matching section is the usual 1/4 wave transformer, which in this case has been made adjustable in order to get the lowest SWR. The diameter of the back plane should be in the order of 1 wavelength.

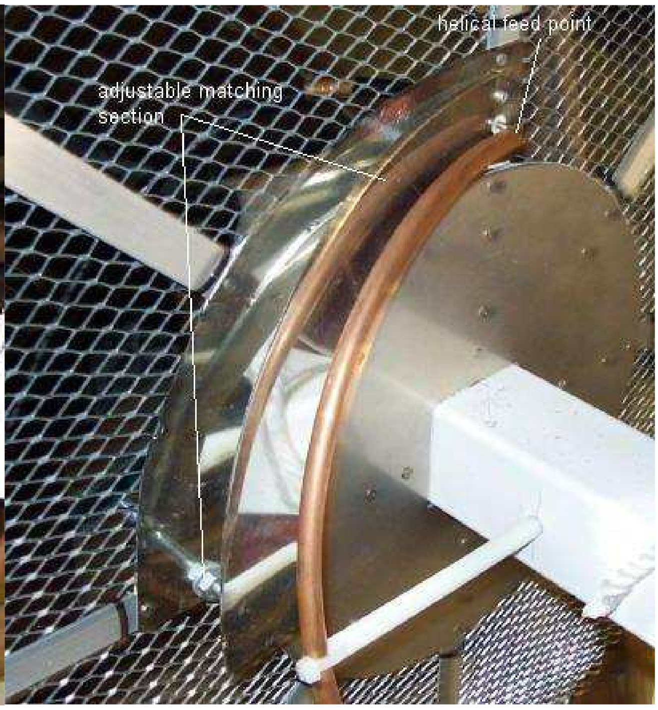


The pictures to the right, and below, are close-ups of the backplane, but concentrating on the matching section. The end of the helical is soldered to the centre pin of an N or other suitable connector. The outer / ground of the connector should be connected directly to the backplane.

The matching section is made from tin-plate and is cut to be a quarter of a turn, about 60mm wide. It's soldered or bolted to the ground plane at the connector end, and supported by an adjustment screw at the other end. Other matching methods are possible, including bending the first 1/4 turn of the helical such that it runs parallel to the backplane, or using an external coaxial matching transformer. Note: When looking at the pictures, please take note that the matching section is extremely reflective, and as such may deceive you!

Using an antenna analyser, it's possible to get the match very close to 50ohms, thus presenting a good match to your preamplifier.





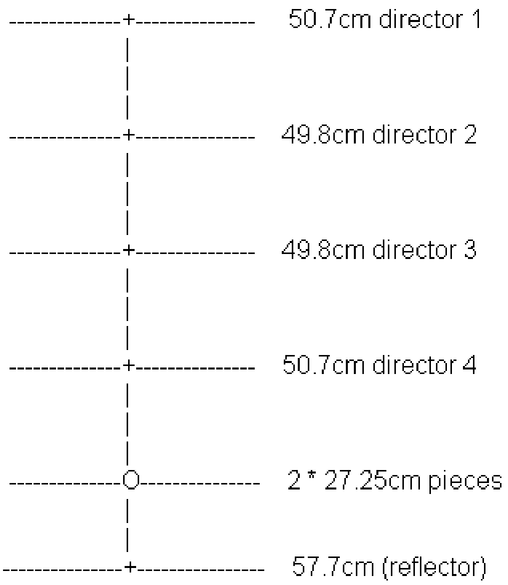
Dimensions.

Frequency	260 MHz
Circumference (C lamda)	1 Wavelength
Number of turns	5
Pitch Angle	15 Degrees
Antenna Gain	13.5 dB
Beam Width (half power)	44 Degrees
Beam Width (1st null)	99 Degrees
Input Impedance	140 Ohms

	CMS	feet	inches
Wavelength, lambda	115.3846	3.785538	45.42646
Axial Length	154.5861	5.071659	60.85991
Turn Spacing, S	30.91721	1.014332	12.17198
Helix Diameter, D	36.72806	1.204974	14.45969
Length of Turn, L	119.4549	3.919077	47.02893
Wire length reqd	5.97274	7 meters	19.59539 feet

Yagi antenna design for 260MHz.

I designed this antenna for 260MHz by scaling a common NBS yagi. The design is based on the NBS standard 6 element yagi, and if built correctly will provide good results. The diagram below shows the dimensions for the antenna. The boom is made from 20mm UPVC plastic tubing. The elements are made from 8mm micro bore copper tubing. When the elements have been cut to length, mark them at the centre and also 10mm either side of the centre - This will help when fixing the elements to the boom and aligning them to the centre. Drill holes in the boom for the elements, and insert the elements. Once in position, use 2 pairs of pliers either side of the boom to crimp the copper tube into an oval shape, thus keeping it tightly fixed in the boom hole.



All element spacing are taken from the reflector to the element in question.

Reflector Datum.
Driven element 23.5cm from reflector
Director 4 52.9cm from reflector
Director 3 82.3cm from reflector
Director 2 111.7cm from reflector
Director 1 141.1cm from reflector