Rotatable Flag

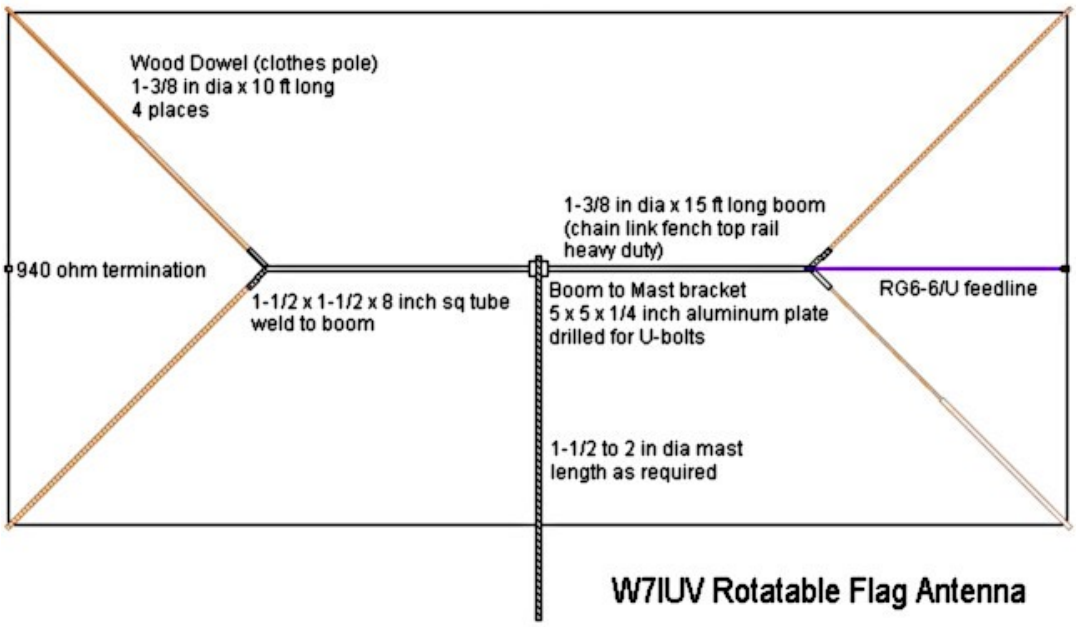
by Larry - W7IUV

The "FLAG" and "PENNANT" antennas optimized and publicized by K6SE on the topband reflector show great promise for those of us who live on less than full section farms. While the Pennant is easier to build, the Flag is symmetrical and therefor adaptable to a rotatable configuration.

This design is presented only as a suggestion; one form of construction of many possible choices. This design, like most of this writers designs, was an iterative process. (I broke a lot of stuff before this one stayed up!) Most of the design compromises centered around free or cheap material. If cost was no object, this thing would look a lot different.

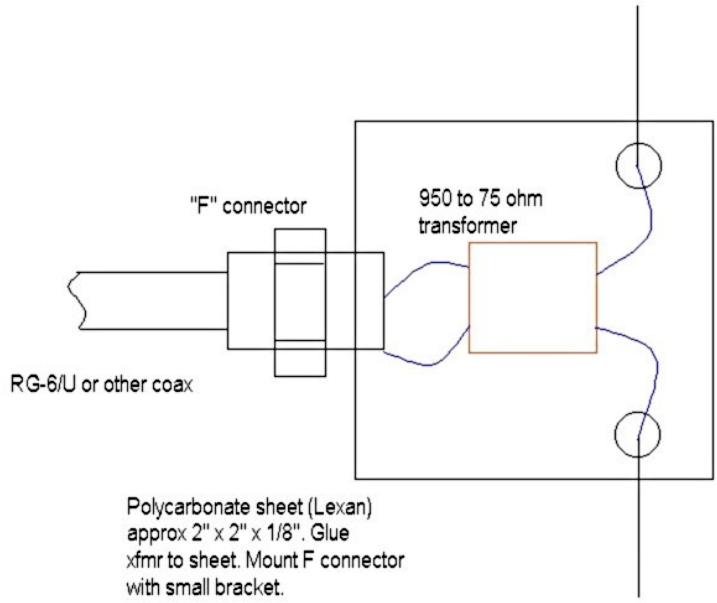
The choice of boom material was easy; a friend had some chain link fence top rail laying in his horse pasture. I volunteered to clean it up for him. I wanted to use bamboo for the spreaders, but none could be found for free or even cheap. Several materials were experimented with before settling on wooden clothes poles. This material is almost as light as bamboo and is readily available in most lumber yards and home improvement stores. It's also pretty sturdy; I dropped the thing trying to put it up by myself and nothing broke!

The spreaders were attached to the boom with square steel tubing welded to the ends of the boom. The tubing formed nice "sockets" for the wood poles to slip into. One through bolt holds it in place. See drawing for details.



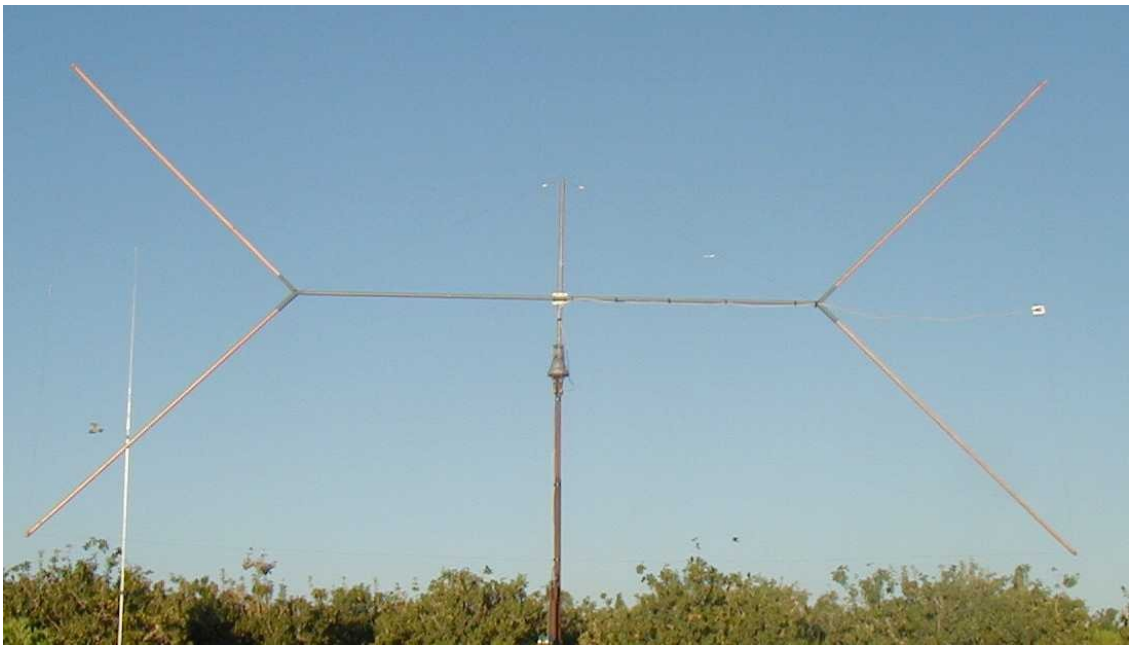
If welding is not your thing, consider making a spreader mounting plate from a square piece of aluminum about 12x12x1/4 inch. Drill for U-bolts in appropriate places.

The insulator for the feed point is fabricated from polycarbonate sheet (Lexan). Acrylic could be substituted. See drawing for details.



The transformer is just glued on. Mount a TV type F connector on a small bracket. F connectors are real cheap and great when using RG-59/U or RG-6/U 75 ohm coax. If you need to weatherproof it, paint the whole business with PVC pipe cement, several coats, and spray with black Krylon paint. The insulator for the termination resistor is made the same way.

As you may recall, the top and bottom wires are exactly **29 feet** long. The two vertical sections are exactly **14 feet** long, with the insulators at the 7 foot points. Cut the two wires to length, each 43 feet long plus what you need to attach to the insulators at each end. Mark the points where the bends are made. Attach the marked points to the poles while pulling taught. You may have to juggle the attachment points to get it all to line up correctly. I used a staple gun to make temporary attachments, and went back after it was all square and made permanent attachments.



Here is a photo of the finished antenna installed in the yard.

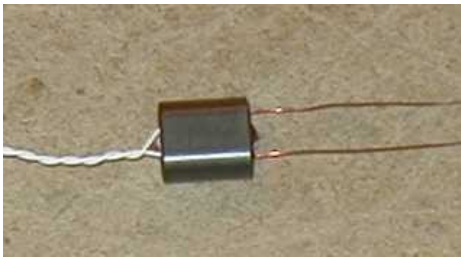
TRANSFORMER:

The transformer is a topic requiring a whole paper by itself. It is necessary to use an "isolation" type transformer rather than the more familiar bifilar wound un-un or auto-transformer type. I started with a FT50-43 core with 7 turns of #29 AWG for the primary, and 28 turns of #29 AWG for the secondary. The primary and secondary windings are separated as much as possible on the core. Although that worked OK, I wanted to experiment a bit and wound up with a Amidon BN73-202 binocular core with three turns for a primary and 12 turns for a secondary winding. This transformer was patterned after a W8JI suggested design.

I suggest that you wind the transformer with the low impedance winding first, and put the high impedance over it. This will allow you to wind an extra turn or so, and using an impedance bridge, pull off turns until you get the exact impedance ratio you need. Here are some photos of the transformer construction:

a single turn through the core

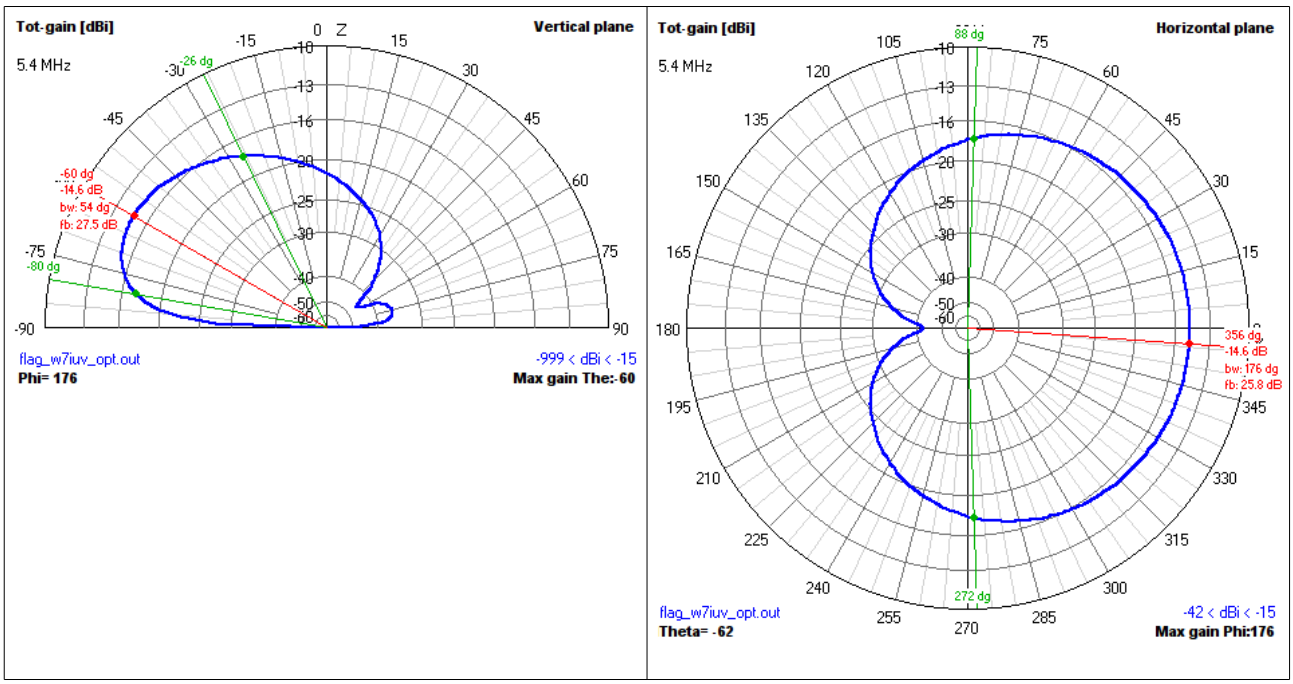
the primary winding

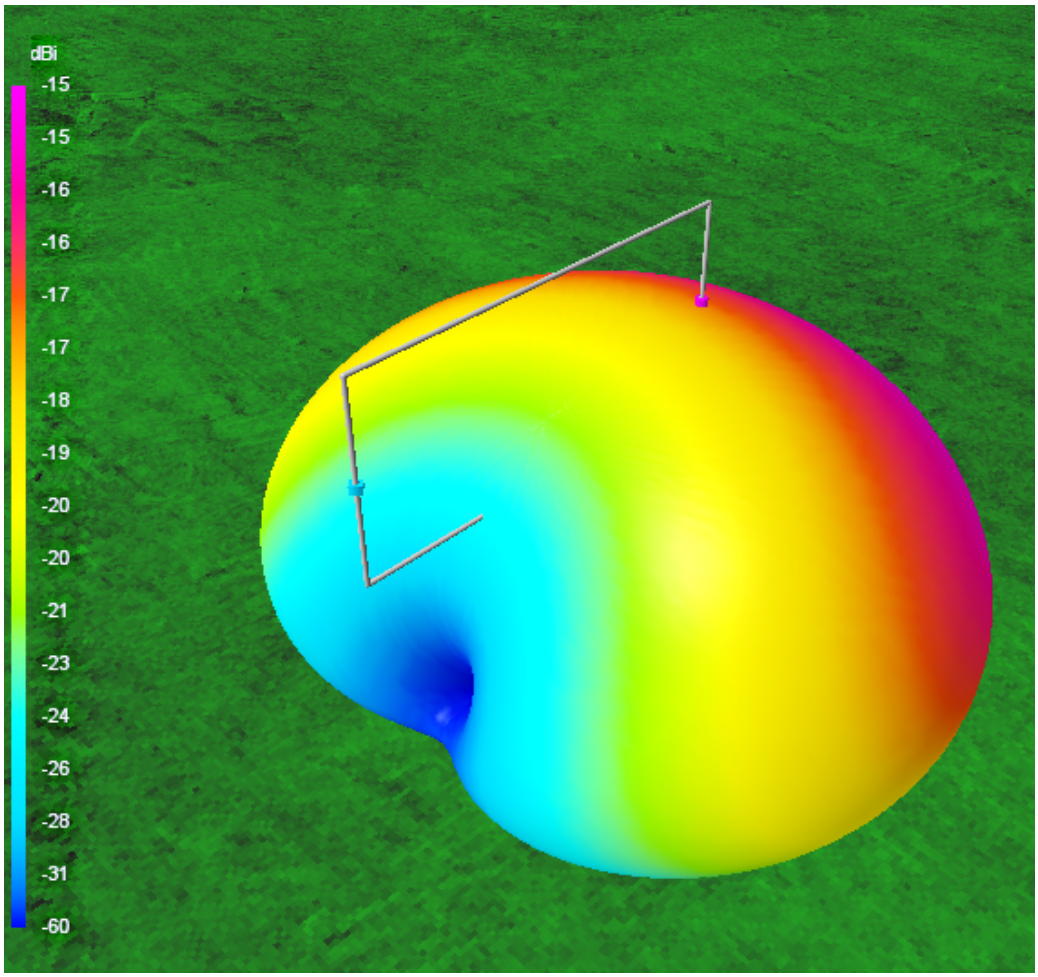


and the complete transformer

Be careful when winding so as not to damage the enamel insulation. I had one transformer the developed leakage between the windings and created IMD products all over 160! The transformer is probably the most critical single component in this RX antenna system. If you have a problem with a flag or pennant, look to the transformer!

```
CM W7IUV Rotatable Receiving Flag
CM at 10 m
CM by OK1RR
CM 8.84 x 4.27 m
CE
SY    RL = 940
GW    1     26    -4.42 0     10          4.42  0     10          0.003
GW    2     5     4.42  0     10          4.42  0     5.7328      0.003
GW    3     26    4.42  0     5.7328      -4.42 0     5.7328      0.003
GW    4     5     -4.42 0     5.7328      -4.42 0     10          0.003
GE    1
LD    4     4     3     3     RL    0
GN    2     0     0     0     13    0.005
EK
EX    0     2     3     0     1.0000      0     0
FR    0     0     0     0     1.83  0
RP    0     181   1     1000  90    0     -1    0
EN
```


Tot-gain [dBi]
5.4 MHz
Vertical plane
0 Z
-26 dg
-60 dg
-14.6 dB
bw: 54 dg
fb: 27.5 dB
-80 dg
flag_w7iuv_opt.out
Phi= 176
-999 < dBi < -15
Max gain The:-60
Tot-gain [dBi]
5.4 MHz
Horizontal plane
88 dg
356 dg
-14.6 dB
bw: 176 dg
fb: 25.8 dB
272 dg
flag_w7iuv_opt.out
Theta= -62
-42 < dBi < -15
Max gain Phi:176


dBi
-15
-15
-16
-16
-17
-17
-18
-19
-20
-20
-21
-23
-24
-26
-28
-31
-60