

Every antenna is a compromise and the 43 foot vertical is no exception. But if you have limited space, a 43 foot vertical and 25 ground radials out to the limit of your property can provide you with all band capability.

For 60 through 10 meters, one can tune the vertical with preferably a manual tuner through a 1:4 Unun at the base.

For 80 through 160 meters, it is more of a challenge since the capacitive reactance on 160 meters is more like 600 ohms and the radiation resistance is very low.

Capt. Paul Lee was one of the early pioneers to address the tuning of practical Amateur Radio verticals in his book, **The Amateur Radio Vertical Antenna Handbook**, CQ Communications, 1984. Rudy Severns, Phil Salas, Shef Robotham, Jerry Sevick, Al Christman, Barry Boothe, and others both modeled and experimented with short verticals.

The simplest approach to tuning the short vertical and the one I used was adapted from Phil Salas, AD5X.

This loading design uses an autotransformer to transform impedances. Specifically, the lower taps of the coil's inductance are presented to a 1:4 Unun, via the switching of those taps using a two relay system.

Phil Salas presented a number of designs using toroids and open air coils. Of course, 12 gauge and larger open air coils have the least heating and power loss.

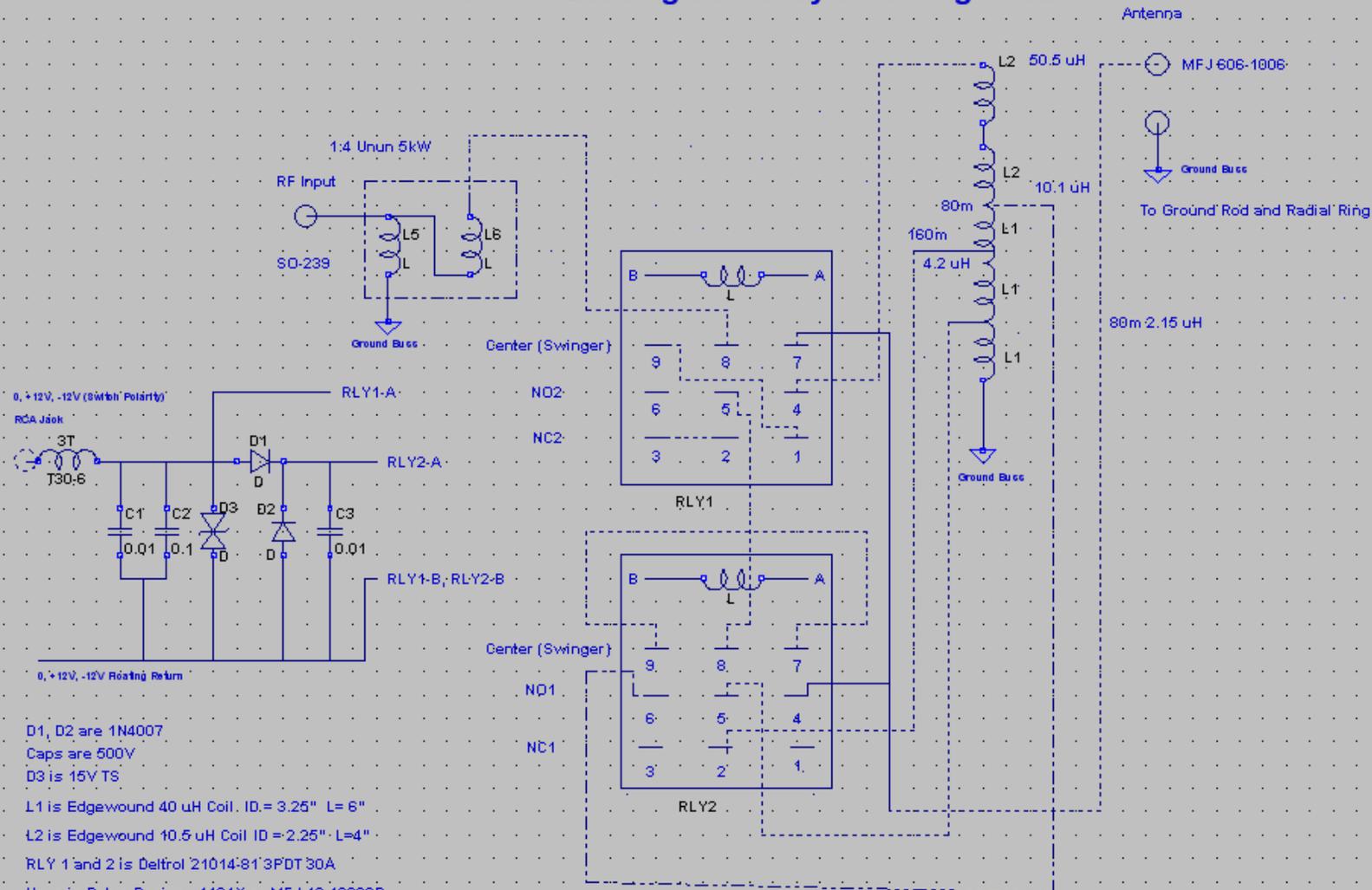
My first switched base loading coil implementation for feeding my 43 foot S9 antenna used the T400A-2 toroid material, but power loss and heating was more than anticipated.

I had acquired two large edge wound coils at Hamfests over the years and decided to use these coils in the latest design. One coil was 10.5 uH and the other was 40 uH, giving me a total of 50.5 uH, producing an inductive reactance of 603 ohms at 1.9 Mhz. I used a 12X12X6" plastic weatherproof box to hold the components. Calculated power level is 3kW continuous (conservative rating).

Included is a pdf of the "Large Coil" implementation I used, Phil Salas' amended article, and some photos.

Your vertical implementation may require slightly different taps on the L1 coil, depending on your configuration.

# 160 Meter 80m Loading Coil Relay Switching Circuit



D1, D2 are 1N4007  
Caps are 500V  
D3 is 15V TS

L1 is Edgewound 40 uH Coil. ID= 3.25" L= 6"

L2 is Edgewound 10.5 uH Coil ID = 2.25" L=4"

RLY 1 and 2 is Deltrol 21014-81 3PDT 30A

Unun is Balun Designs 4134X or MFJ 10-10989D

Grounding Strap is 0.5" 0.022 Copper

[Grounding buss strap is from bottom screws of SO-239 shell to bottom of L1 to Unun and to ground lug]

## 160 Meter 80m Loading Coil Power Supply

