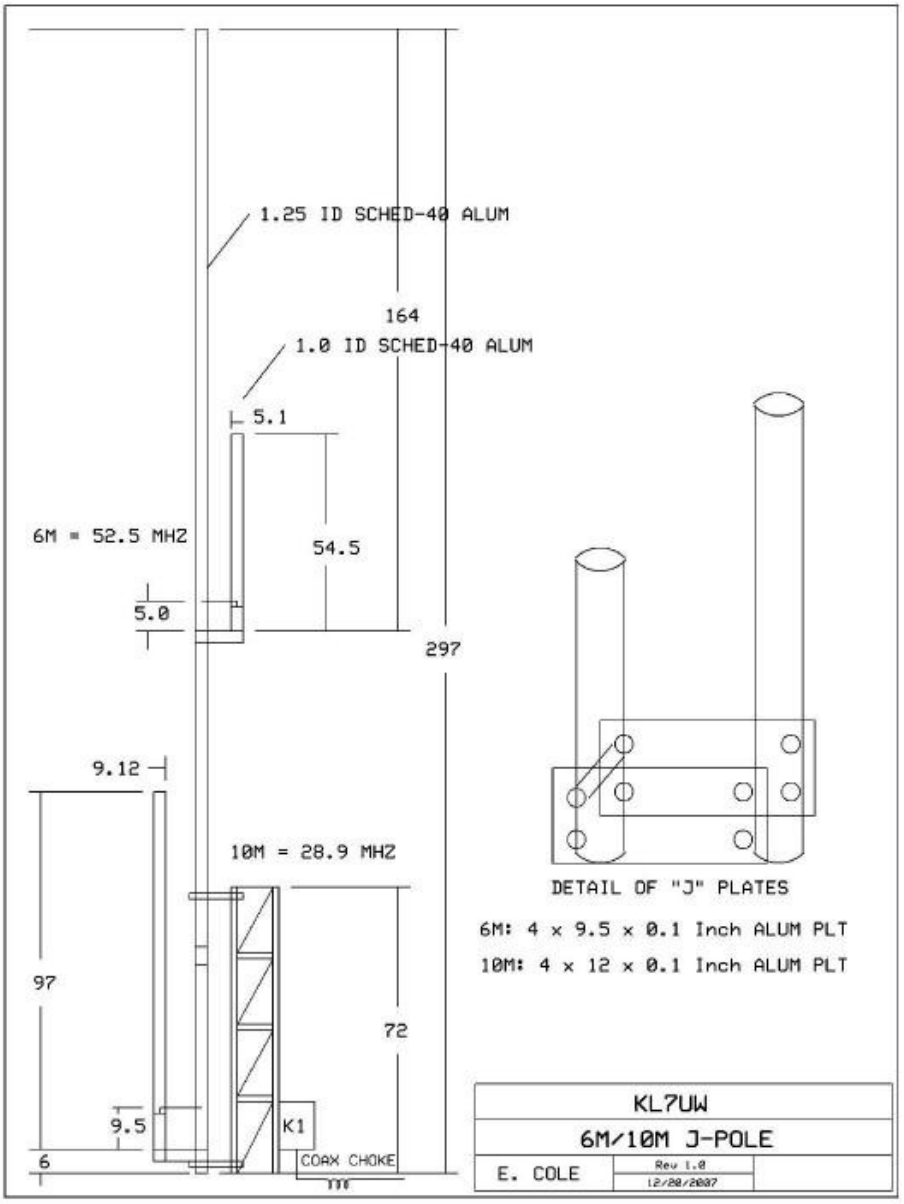
Dual-Band J-Pole Project

A dual-band J-Pole vertical antenna has been set up to permit working FM stations on 6-meters and 10-meters.

The J-Pole provides a simple vertically polarized antenna for these frequencies. The design is inspired from the many VHF/UHF dual-band J-Pole antennas that have been made over the years.



The antenna was initially designed using NEC4win95 antenna design software, but subsequently was taken from the excellent J-Pole calculator at DX-Zone. The calculator is for 1/2-inch copper tubing, but I substituted 1.25-inch schedule-40 aluminum tubing (1.66-inch O.D.). The tubing used in the "J" section are 1.0-inch aluminum tubing.

The antenna tuned almost exactly to the dimensions given in the calculator. Another variance to the design was the use of a section of Rohn-25 tower that had suffered frost damage making it unusafe to put up in a tower. I buried the 8-foot section of tower 2-feet into the ground and used tower clamps to attach the main J-pole mast. I made the main mast 297-inches long (24-ft, 9-in). This was intentionally longer than the 293-inch length that the calculator shows for 29-MHz, because I wanted some allowance for adjustment (Even though NEC4win95 showed little effect from the 16-inch triangular cross-section of the tower).

Construction used 4x9.5x0.1 inch aluminum plates to attach the "J" tube to the 6m J-Pole. 1/4-20 x2.5 stainless hardware is used (four bolts). 4x12x0.1 inch plates were used for the 10m "J" tube. Complete dimensions are shown in the drawing. Previously, it was mentioned that two galvanized tower-clamps were used to support the main mast at about 3-inches above ground and at the top of the tower-section. No attempt was made to insulate these clamps so the tower becomes part of the 29-MHz antenna. The 6m J-Pole is pretty much isolated from its effect being attached to a point on the mast above the tower. The main mast is grounded thru the tower section.

I fed each J-Pole with RG-8 coax to an SO-239 panel receptacle mounted with two 4-40 machine screws to a right-angle braket that is attached with sheet metal screws into the "J" tube at the appropriate position. No. 12 solid copper wire with insulation was used for the feed from the center conductor to the same position on the main mast.

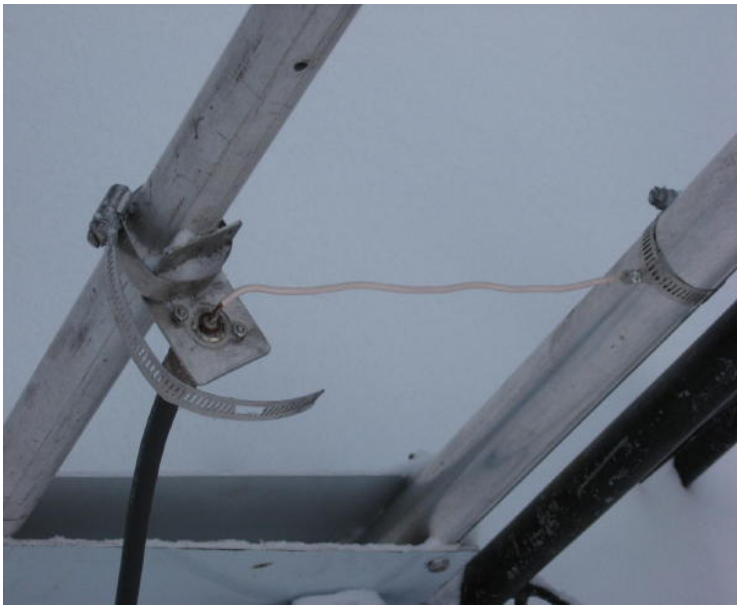
Base of the dual-band J-Pole showing tower support and plywood coax relay box

Six meter section of J-Pole

Six meter feed detail

Another view of the 6m feed point

Ten meter feed showing SO-239 connector held with hose clamps for easy tuning adjustment



The coax was routed down the main mast to a coax relay so that a single coax feedline could be used with the antenna. A small 12-vdc relay switches 115-vac to the coax relay. An extension cord provides 115-vac to the relay box and a run of No. 16 speaker wire provides 12-volt control from the "radio shack".

The 6m J-pole was tuned first:

6M J-Pole Tuning

Freq.	Fwd Pwr	Ref Pwr	SWR
50.125	50	5.5	2.0
50.300	50	5.0	1.75
51.150	50	3.0	1.65
52.500	50	1.5	1.4
53.000	50	1.9	1.5

The attachment position was at 5.0 inches from the base of the "J" vs. a calculated 5.5 inches. The antenna was designed for 51.5 MHz and ended up resonant at 52.5 MHz.

Theoretical development of the J-pole and other end-fed half-wave antennas is discussed in great detail at the DX-ZONE website. Since my J-pole was installed right at freeze-up beginning the Alaska winter, I did not explore the effects of adding a ground-plane. The main RG-8 feedline was extra long so that RF chokes could be made at the base of the antenna at connection to the coax relay. My wife reminded me I was talking thru her computer speakers when I was on the 6m yagi, but no stray RF was detected in her speakers when I tranmitted on the 6m J-Pole with 100w!

On air tests on 6m-FM simplex with hams out to about 40-miles indicate the antenna "talks" very well. The final test was accessing a repeater on 51.15/51.65 MHz in Anchorage over 70-miles away! Next is seeing how well 10 meters talks.

A quick test of the 10m J-Pole shows:

10M J-Pole Tuning

Freq.	Fwd Pwr	SWR
28.400	100	1.6
28.885	100	1.5
29.000	100	1.6