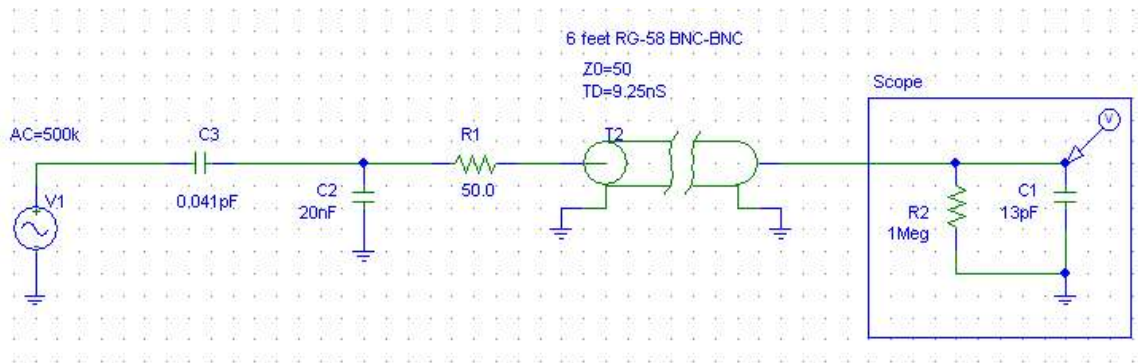


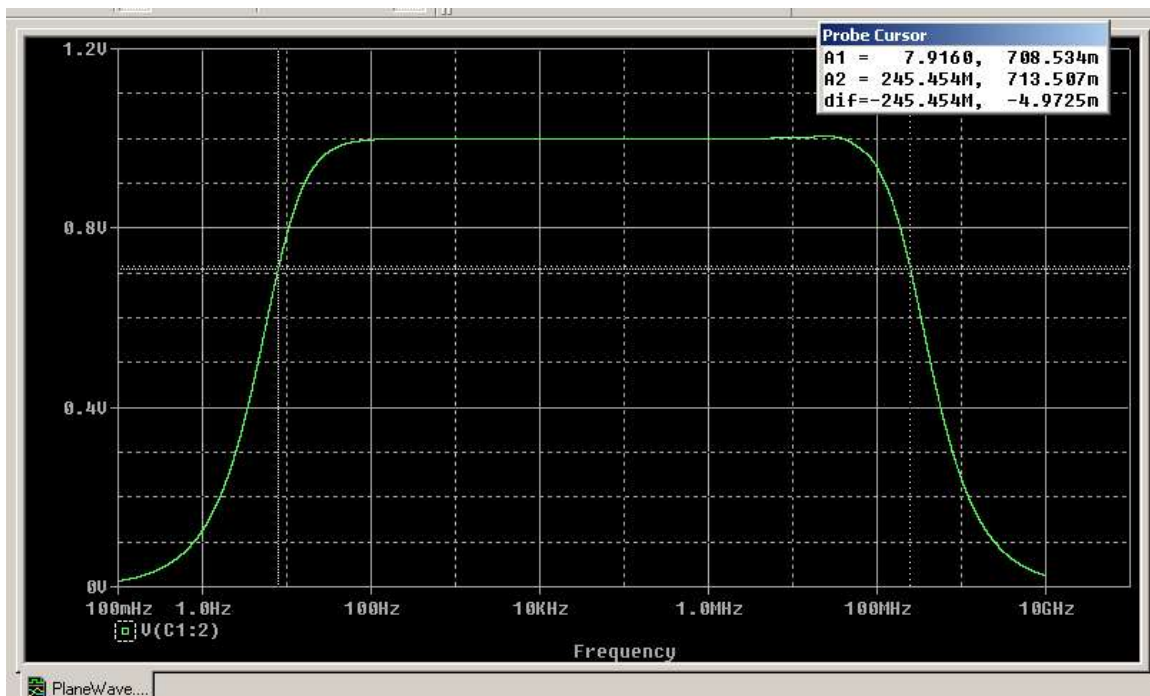
Large Wide-Bandwidth Plane-Wave Antenna

July 29, 2005
Terry Fritz

A Plane-Wave antenna is used to pick up the E-fields, from say a Tesla coil, and deliver an accurate signal to an oscilloscope. The antenna must have a very wide bandwidth and a very flat frequency response. A schematic diagram for such a system and the frequency response is shown below:

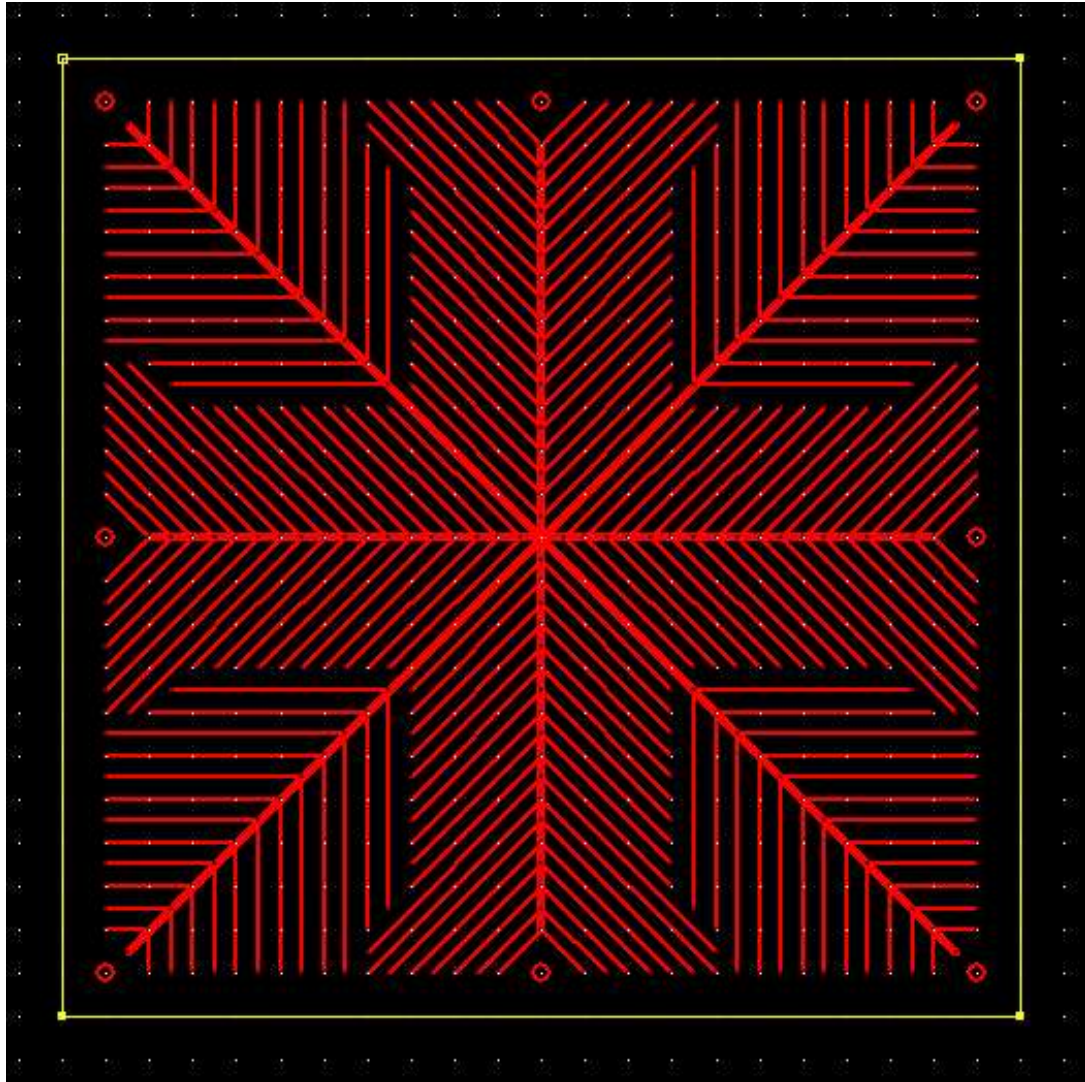


Note that the 50 ohm cable needs to be kept fairly short, at say 6 feet, to preserve the higher frequency flat response. R1 is fairly critical and should be a small 1/8W carbon resistor whose value is selected to be very near 50 ohms to match the impedance of the cable. C2 is not critical but it should be a high performance COG type capacitor. The antenna will plug directly into any scope of 1M Ohm + ~13pf input impedance. No compensation adjustment is required.



The -3dB frequency response in this case is 8Hz - 245MHz.

The pickup antenna is a 10 x 10 inch grid that is laid out to avoid ground loops and resonances. The grid pattern itself is not critical.



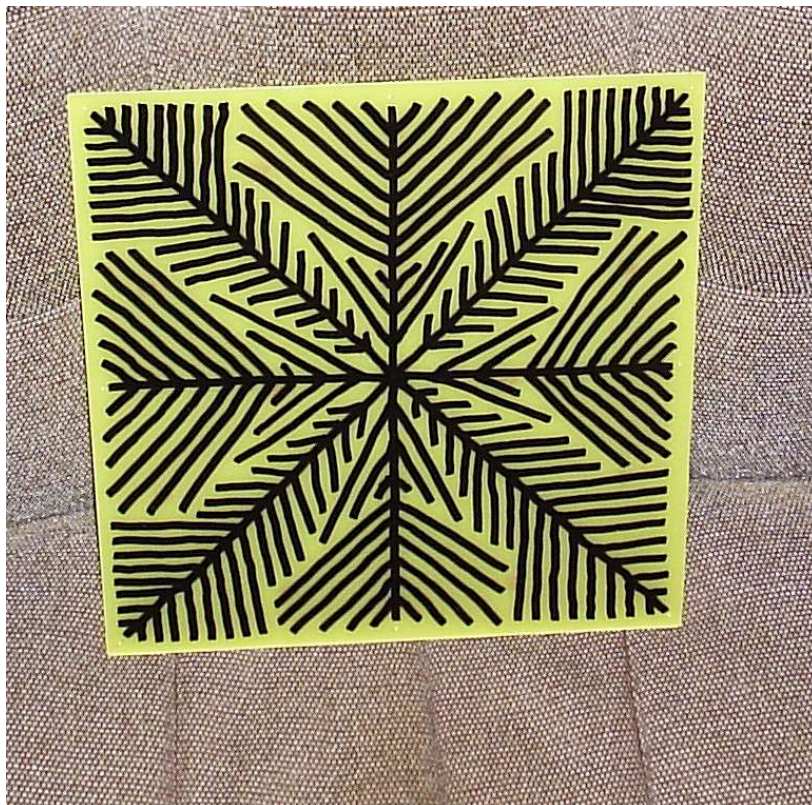
Parts List:

QTY	Description	Vendor	Part Number	Cost
2	12 x 12 x 0.064 inch 1 oz. single sided raw PC board	DigiKey	PC&-T-ND	15.24 ea.
17	#6 Nylon screws	DigiKey	H572-ND	0.0966 ea.
9	#6 x 1.0 inch Nylon Standoffs	DigiKey	1093EK-ND	0.711 ea.
1	ARF1064 BNC Connector	DigiKey	ARF1064-ND	3.23 ea.
1	ARF1068 Ground Lug	DigiKey	ARF1068-ND	0.74 ea.
1	51 Ohm 1/8W Carbon Resistor	DigiKey	51EBK-ND	0.0235 ea.
2	10nF 50V COG Capacitors	DigiKey	399-1835-1-ND	1.17 ea.
1	RG-58 6 foot BNC-BNC Cable	RadioShack	278-964	7.99 ea.
TOTAL				\$53.65

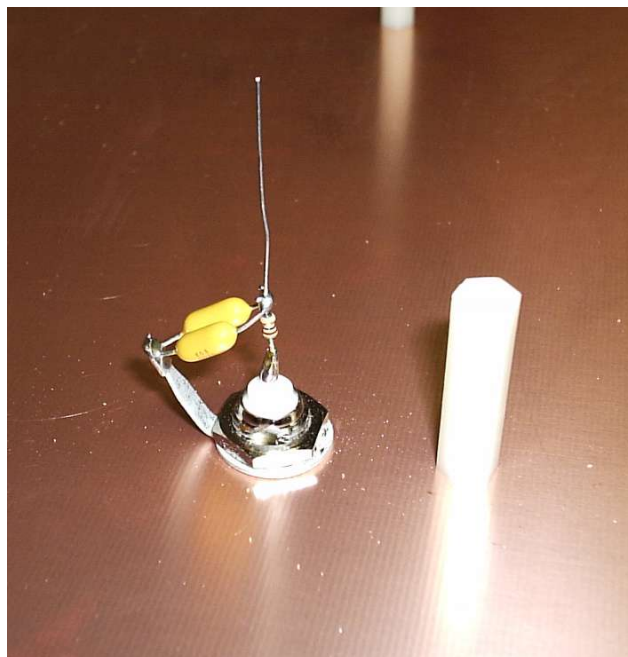
MISC - Soldering, Drilling, Cutting, Etching, Mounting...

Rather than going to the considerable expense of having the board etched commercially, I just hand drew a pattern on the copper with a paint pen (Testors 2547) and etched it myself in a large plastic plant tray from the hardware store

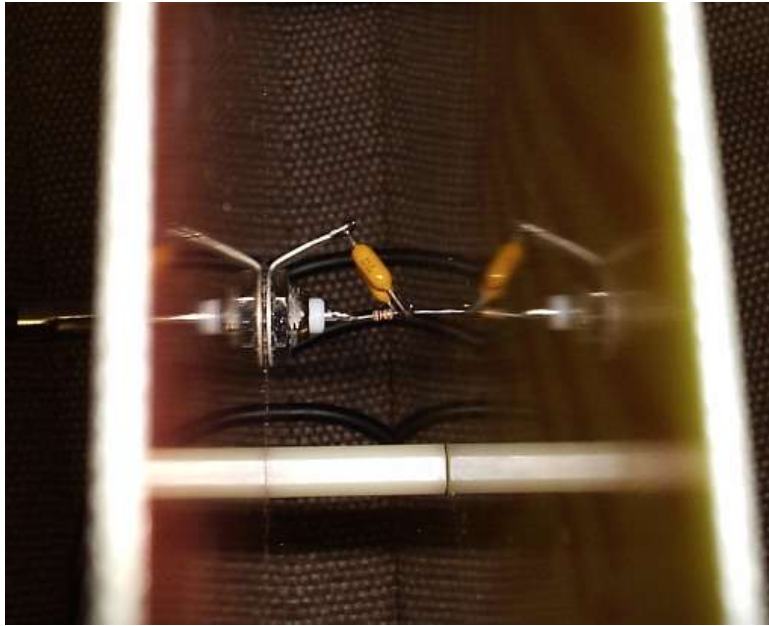




I then drilled and installed the BNC connector and standoffs in the back plane.

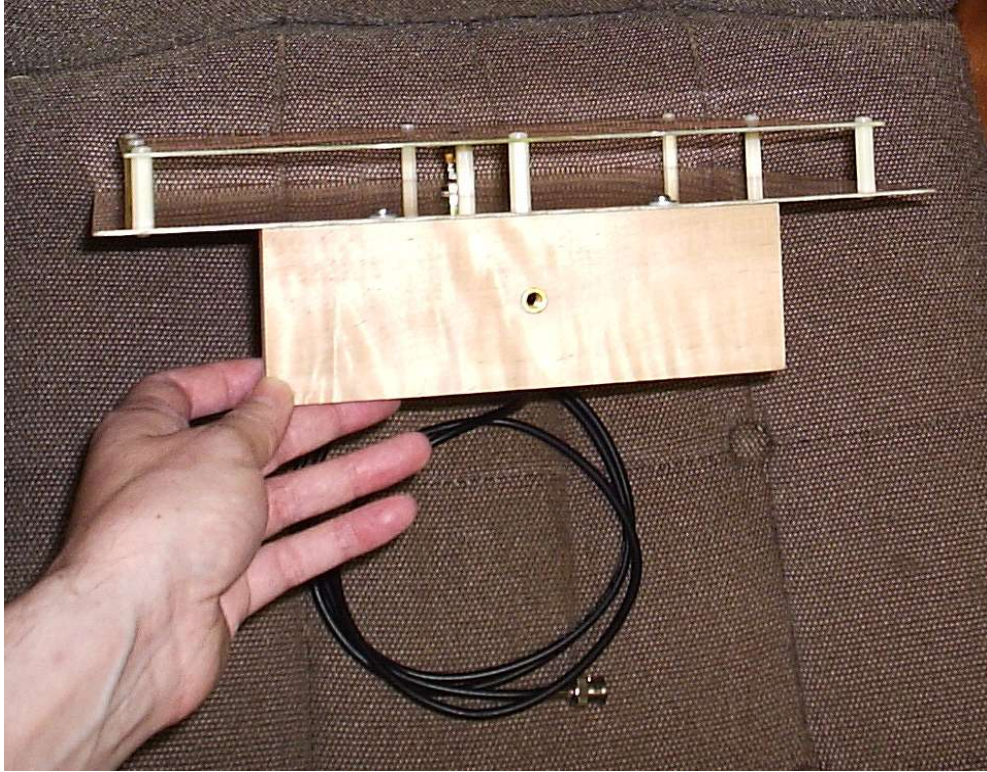


I then installed the resistor and caps on the BNC connector and assembled the unit.



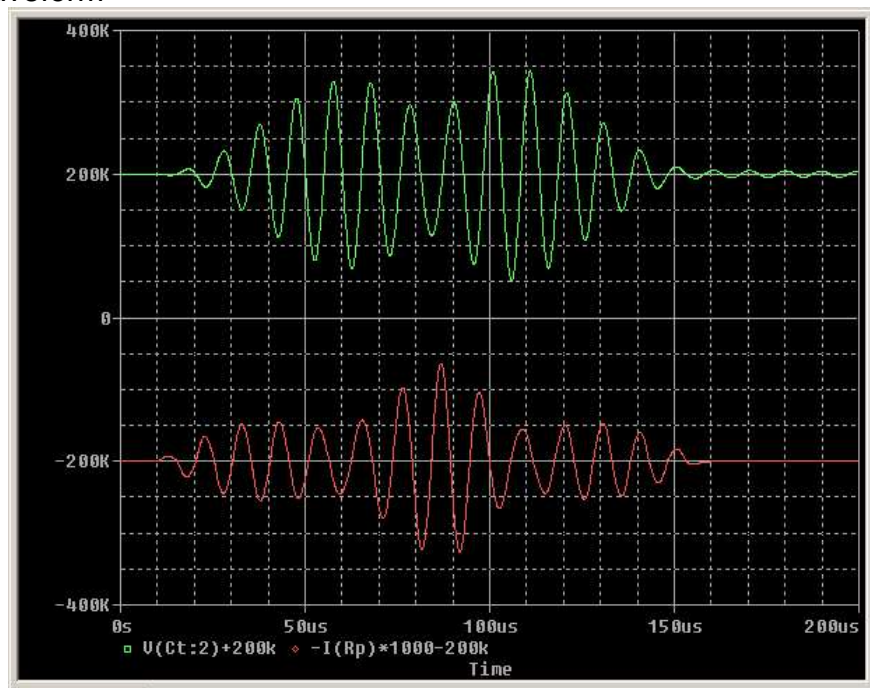
I used a wood block

for a base with a 1/4-20 screw thread for a tripod mount.

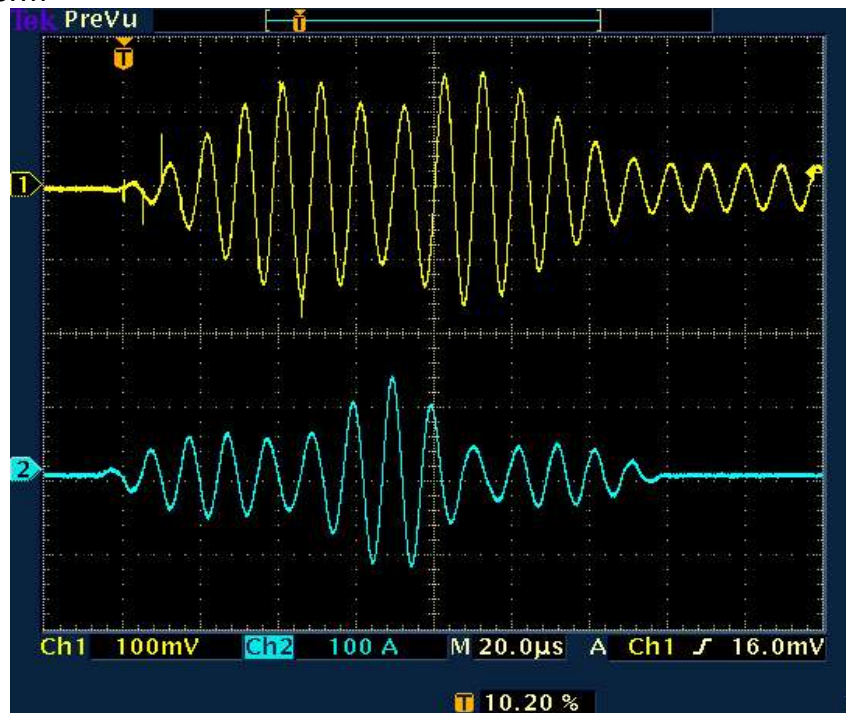


Testing:

Predicted waveform



Actual waveform



Almost a perfect match ;-)