Build a Rhombic

and Equal a Legal 80 Watts Input!

Have you ever dreamed of an antenna system that would *amplify* your CB transmitter signal to a level comparable with say a 250 watt transmitter?

You have? Well read on, for here is just such an antenna, with all the physical problems and erection headaches that must go along with anything so powerful and effective.

The Rhombic antenna is wire in construction, with a sprinkling of ceramic insulators thrown in to keep it taut and away from nearby foreign objects. The Rhombic antenna is large . . . very large . . . and only those CB'ers with a fair piece of property to play on will want to tackle its construction.

As diagram 1 shows (a horizontally mounted Rhombic), the beast is diamond shaped and fires in one direction . . . away from the end to which the feed line is attached. You really can't imagine how directive a horizontal rhombic is until you run out in front of one with a horizontal dipole (at a distance of five miles or so) and a field strength meter. On my test installation in Kansas, I found a meter reading of '200' (just relative field strength—forget how strong this may or may not be) in a path 100 yards across at five miles, and then a reading of only '10' 150 yards either side of the center 100 yard strong signal area point. Running around to the sides of the antenna, and keeping about 5 miles "out," the signal level registered from 0 to 15 all of the way around. In other words the signal off the front of the Rhombic is nearly 16 times as strong, in relative field strength, as off the nearest competing side lobe point.

Truly, this is a *directional* antenna!

So what good is it? You can't rotate it, it makes a poor clothesline 30-50 feet above ground, and it may cost you as much as $50.00 to install.

In my installation, I need to cover 37 miles

Diagram 1

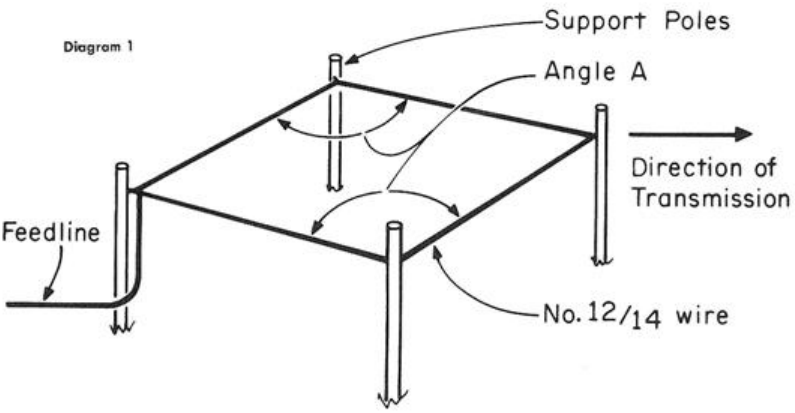
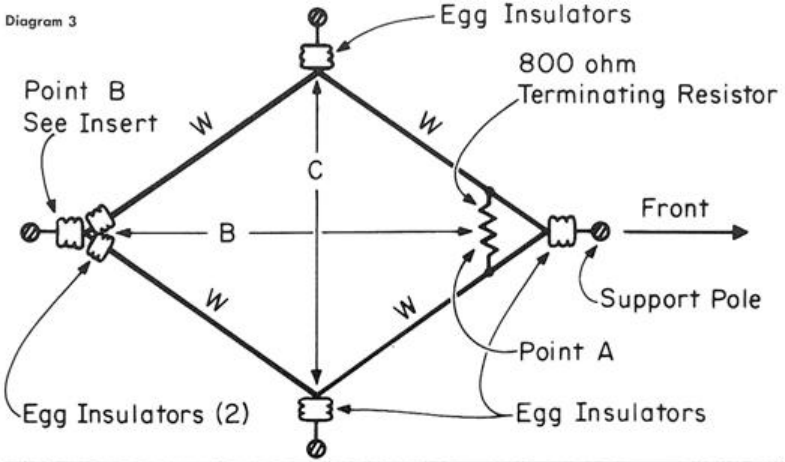


Diagram 3



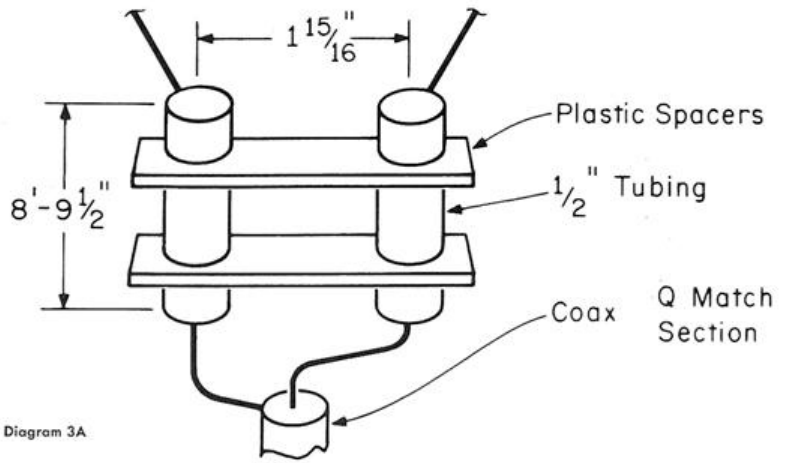


Diagram 3A

over flat mid-western grassland with consistent signals S5 over better. I don't want to be bothered by skip, and if a mobile unit happens across my channel someplace between here and my 37 mile communications point, I don't want him clobbering my communications. On top of this, I don't want my signals heard in any of the neighboring towns, *if I can help it!*

The Rhombic fills this bill because it allows me to pinpoint my 5 watt signal with a fraction of a mile at 37 miles, it is horizontal and does not react to vertical mobile or other CB base station antennas (also vertical), and its signal is held so close to the ground that skywave (skip) DX is virtually non-existant except on the very worst days.

You probably don't have these requirements for an antenna, so I will give you a few ideas I have on how this antenna might serve your needs. Vertically mounted, the Rhombic would be illegally high, even if *properly* mounted horizontally it would dent the rules. But with an improperly mounted Rhombic orientated on a nearby town or center of CB activity (say 25-50 miles away) and you would be assured of rock solid contacts into the area *all of the time*. If you operate a delivery type business, you may have one direction out of town which you travel

Wavelengths per Leg (Length W)	Angle A (diagram 1)		Foot Measurement (Length W)	Gain in db
2	70	degrees	63	4.25
4	50	"	126.5	6.0
8	35	"	252	9.25
12	22.5	"	378	12.5

Table 1. This will give you the different measurements and gains for the various sizes of rhombics.

a little further than the rest. A Rhombic orientated in that direction would give you rock solid mobile coverage (if the rhombic is vertical, like mobile antennas, and majority of base station antennas) out to 25-35 miles under even the most adverse conditions.

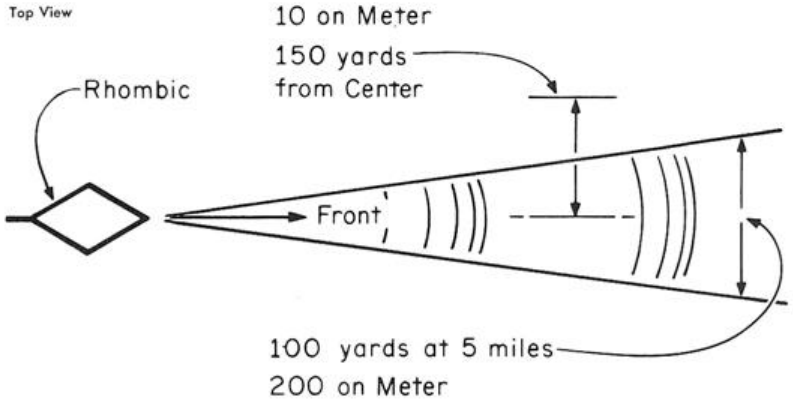
The Rhombic, you see, is a high gain antenna. Depending on its size "per leg," gains up to 12.5 db over a reference dipole are not uncommon. In terms of "effective radiated power," this means your average 3.5 watt output CB transceiver would sound like 56 watts if pushed through a 12.5 db gain Rhombic. This is a healthy improvement, and that same 12.5 db of antenna gain will help just as much on receive. Although this hasn't yet been borne out in experimentation, two 5 watt CB stations operating over essentially flat terrain, and driving a Rhombic antenna at each end (assuming 12.5 db gain for each antenna) should be able to communicate over a distance of not less than 50 miles day in and day out with very consistent signals.

A Rhombic antenna should ideally be mounted one wavelength above ground, however, due to FCC regulations, our Rhombic is mounted 20 feet above ground, in a horizontal plane.

The horizontal Rhombic antenna shown is a terminated device with a terminating "load resistor" across the wires at point A in figure 3. This resistor is an 800 ohm noninductive (carbon core only)! 5 watt type. This resistor is very important, as it keeps your signal from floating off the back side of the antenna.

Point B in diagram 3 shows an insert, 3A, which explains how you match the 800 ohm Rhombic antenna to your 52 ohm coaxial trans-

Top View



The signal path from a rhombic is pretty potent. Five miles from the beam width is about 100 yards across. 150 yards from the center of the beam the signal gives a 95% lower S-meter reading.

mission line. This is a "Q matching section," constructed from ½ inch O.D. aluminum or copper tubing, spaced apart by plastic spacers 1 5/16 inches center to center. The Q matching section is 8 feet 9½ inches long from the top where it attaches to the *fire-end* of the Rhombic, to the base where the RG-8/U coax cable from your transceiver attaches on. The Q matching section transforms your feed impedance to 800 ohms, matching the antenna.

Length W is equal on each of the four legs on the Rhombic. A table (table one) lets you decide how large or how small you wish to make your Rhombic. Gain figures are also given. Distances B and C are also given for each of the three W dimensions. These vary with size (W).

It is suggested that you mount the Rhombic on wooded treated poles (try your local phone or power company for some they have recently pulled from the ground), using heavy duty egg insulators where they are indicated in diagram 3 to keep the wire away from the pole. Nylon rope, running through pulleys mounted at the top of the four poles, can attach to the back of each insulator. This will allow you to erect the antenna on the ground level, and then pull it into place with the nylon rope over the pulleys. The rope-pulley combination will also aid you in leveling off the antenna (horizontal to the plane of the earth). I have small bags filled with sand suspended on the bottom of my nylon ropes. This allows the wires to give in the winds we have here in the midwest (as the winds blow the antenna wire grows taut, pulling on the nylon rope. The sandbags raise and "give" with the wind, but lower again because of gravity when the wind slows down or stops).

No. 12 or 14 copper clad steel wire is recommended for the actual construction. The steel adds strength, while the copper gives the antenna electrical conductivity.

I hope you find this to be a very useful antenna, if you too have a CB communications problem over *extreme* long haul distances. If any antenna design known to man will do the job, the Rhombic is it! S9