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2 m/70 cm Quad Revisited — Part 2

Try out this new, improved update to a CQ *article (July 1999).*

Now that you have an excellent antenna, we need to move on to the feedline, rotor, and whatever else is needed to make a complete VHF/UHF antenna system.

Well, it is obvious that we do not need any $500 rotor system to turn this little light antenna. We have all seen those used — sometimes well-used Alliance Mfg. TV antenna rotors from the '50s and '60s era. The price is usually two to five dollars for the rotor section and about one or two dollars for the control units.

That might seem like an ideal solution for rotating our quad system, but first let us look at the biggest problem faced by the VHF/UHF folks: transmission power line loss. Coax feedline has many times more losses at 100 feet than, say, a good 300-ohm ladder line. However, the matching is much simpler. Yep! It is one of those trade-offs again. Nowadays, coax manufacturers make 1,000 MHz RG-6 75-ohm satellite receiver coax, which is about as good as it gets, and no problem at about fifteen cents per foot. So we can use up to about 100 feet without worry in the VHF/UHF range.

I am a believer that the antenna system should be located as close as possible to the ham shack to minimize the transmission line loss problems. I always use an odd multiple of one-half electrical line lengths, 7 feet in our case, to minimize the SWR problems. So you can see where 50-ft. and 100-ft. lengths look good! My Kenwood TS-780S puts out 20 watts RF when loading a 50-ohm resistive load. I have found that hybrid modules used in most transceivers can handle 75-ohm coax with very little SWR problem, and you still get full RF output. It is that stray inductance that the modules do not like! I have never been a believer in using two 100-watt "blocks" and a huge DC power supply to run them just to get 20 watts up at the antenna. The home-brew of a 4CX300 high voltage linear amplifier does not

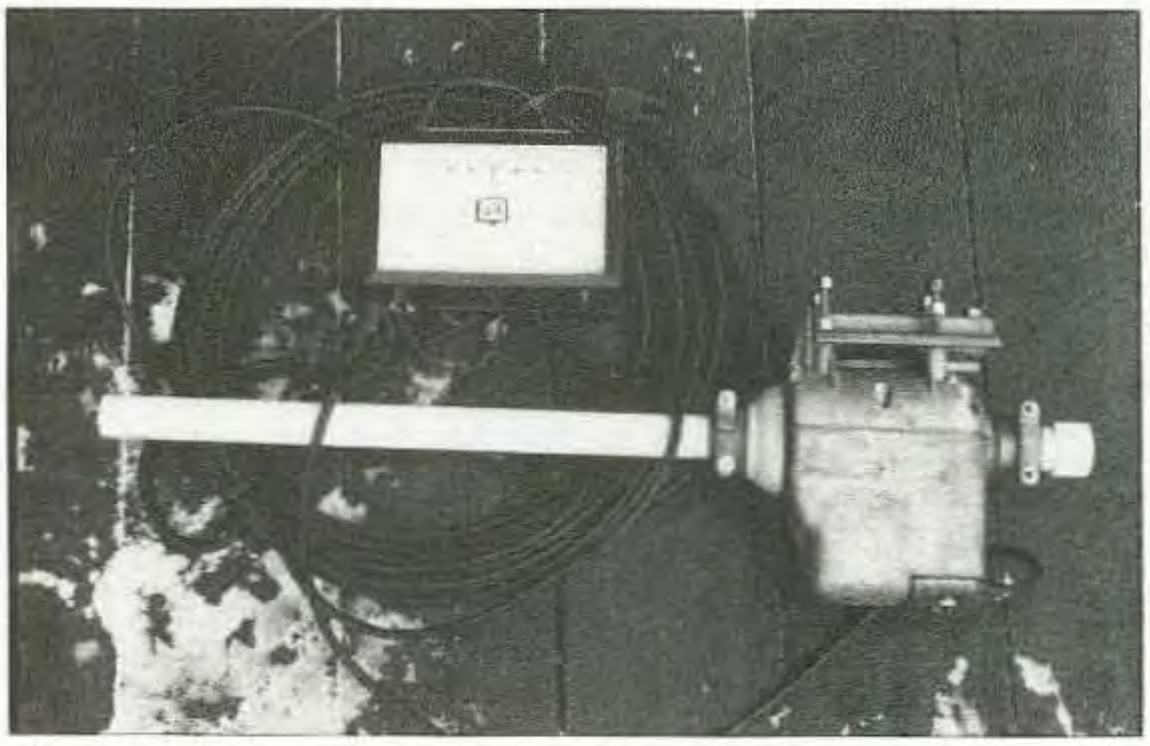

Photo A. *Rotor, cable, and control box assembly.*

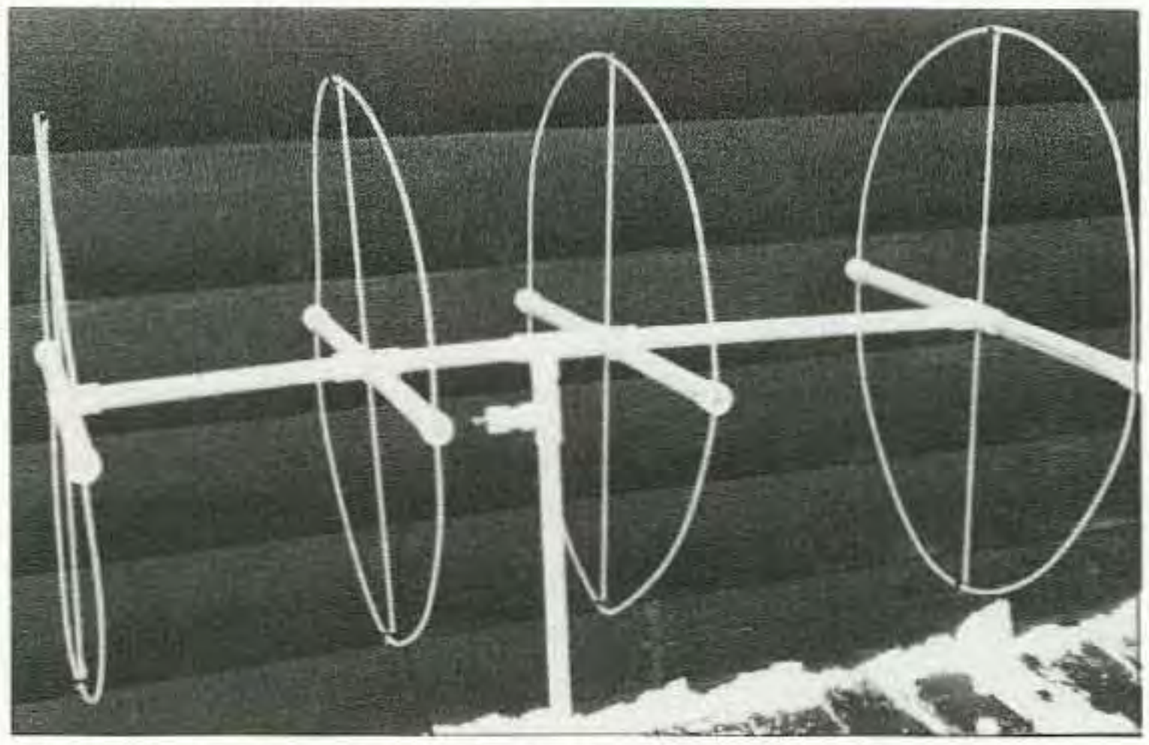

Photo B. *Another shot of the finished quad from Part 1.*

interest me much either! (I might try a project like that sometime in the future for those folks who think they really need one.)

I went to a couple of summertime ham flea market affairs and started looking for those crusty old TV rotors. They were there, and in big numbers. Seems like the new folks do not know what to do with them. Anyway, I started looking at rotors, since they are the hardest to find in good condition. I found a couple in the two- or three-dollar-each class, and purchased them. I then looked at the rotor case to check the stamped model number so that I could find the compatible control boxes. The control boxes are many, and usually run in the one- to two-dollar class. Purchase several just to make sure you have good parts if needed.

I found an old model T-45 rotor that was in like-new condition. I looked for the matching control box and found three of them for one dollar each. Such a deal! When I got them home and opened up the rotor, I was amazed. Almost like a mirror inside. I cleaned the insides of gear grease and checked everything out.

Take an old 24 VAC filament transformer and connect it to the motor wires to see if you hear a growl. Usually you will, since these motors are almost never bad. Then take one of the control boxes and check it out with a voltmeter. If everything looks good, plug it in to the 120 VAC power line. You should get 24 to 30 VAC when activated. Do the wire hookup to the rotor and see if you get action.

If the motor does not go with AC voltage on it, usually this means the start capacitor is bad. Among the two or three control units you purchased, you will have a good capacitor. It is the large white capacitor located in the control box, 100 µF, 30 VAC. Yes! I did say AC. If you had to, you could use a 100 VDC replacement capacitor. Once you have a working rotor system, you can swap parts off of the other controls to get the best-looking control. Sometimes the meters are bad, so make sure you have one that looks good and works. You do want to know what direction the antenna is in.

Open the rotor housing again. Purchase some electronic white grease or garage door opener white grease to lubricate the gears and slip bearings of the rotor. This is a light lubricant which has a low temperature rating and will not turn into cement on those cold nights. You might want to put a little zinc oxide primer paint, spray can of course, on the rotor housing, and finish with a coat of enamel paint. No rusting or oxidizing after that. I do recommend replacing the rotor screw terminal screws with #6-32 stainless steel machine screws. This will keep you out of trouble in the future. I have also used a male and female DIN-8 plug/socket system in-line so that I could have quick disconnect of the rotor line should I ever want to remove the antenna or rotor for repairs. PVC black tape weatherizes the connectors.

I recommend purchasing the eight-conductor light-duty black rotor cable. Anything beyond that is just a waste of money unless you have another suitable cable on hand. The cable has two AWG-18 conductors for the motor voltage and six AWG-22 conductors that provide the servo indicator job. This cable usually costs under twenty cents per foot when purchased new.

I have a roof mounting using two-inch PVC pipe and caps with stainless wood screws. I run the cable to the mounting using one-half-inch PVC (gray) pipe clamps and drywall screws. This system works for bringing the coax and rotor cables to the shack. Two couplings and a small piece of PVC pipe make a good wall entry for the cables. Use clear 100% silicone caulk to backfill and weatherize the entry.

Well, that is about it for this project. Remember, if using satellites you will need a second rotor system to elevate the antenna in the "Z" axis. You will need elevation to track those guys!

If there are any questions, I am available via USPS only, and only if I receive an SASE. Good luck! 73

Qty.	Item	Source	Cost
30 ft.	AWG-14 bare copper wire	Any	$1.20
1	Ferrite clamp-on RF choke	TDK via Hosfelt #80-287	$1.00
12 ft.	0.75 in. PVC water pipe	Any	$3.00
4	0.75 in. PVC "T" fitting	Any	$2.00
2	0.75 in. PVC cross fitting	Any	$2.00
8	0.75 in. PVC pipe caps	Any	$2.00
30 ft.	0.25 in. PVA agricultural clear tubing	Any	$3.00
2	Female type F coax connector	Hosfelt #60-342	$.50
1	Double female bulkhead type F	Hosfelt #FC-67	$.50
50 ft.	RG-6 Sat TV 75 ohm coax	Hosfelt #60-236	$7.50
Alt.	RG-59/U Alpha #1354 75 ohm coax	Hosfelt #60-506	—
Optional: 24	SS #4-025 sheet metal screws	—	—
Alt.	PVC glue and solvent/cleaner	—	—
Optional: 4	0.25 in. x 36 in. wood dowels	Local	$1.20
Optional: 8	#4 0.75 in SS panhead phillips sheet metal screws	—	—
Optional: 8	0.25 in. coax cable strips for stiffeners	—	—

Table 1. *Parts list.*

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