Y2K Portable J-Pole

What emergency will you *need to handle?*

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For 2-meter portable use, I like the idea of having a full-size roll-up antenna available for situations where communication necessity outweighs the compact convenience of the usual rubber-flex antenna. Sometimes, we need to "get out" better! Roll it up and an antenna like this will fit perfectly in your Y2K emergency preparedness kit!

The portable, flexible J-pole is not a new idea; I've seen several over the past decade or so and tried most of them—but with mixed results. They did radiate after a fashion, but VSWR was much higher than expected, and band coverage was narrow or the coax tap point for a decent match was very picky and difficult to move. While moderate VSWR can be tolerated by most handhelds, maximum power transfer always occurs when the source and load impedances are matched. Besides, high VSWR nags at me, even when overall results seem to be satisfactory.

The approach taken in this antenna is so old, it might be considered novel. I was browsing through an early radio book and noticed in a diagram that a half-wave Zeppelin antenna (the original J-pole) used link coupling between the transmitter and the quarter-wave matching section (which feeds the half-wave radiator). Aha! Link coupling ... I haven't seen that tried, so here it is! It gives full band coverage on 2 meters, with VSWR less than 1.3—very broad.

My first attempt at construction used ordinary hookup wire for the link and plastic tape to hold it in place at the shorted end of the matching section. It worked fine but, realizing the difficulty of describing how to do it, I decided to use a PC board to "freeze" this potentially critical portion of the antenna for easy duplication, convenience, and improved long-term stability (no tape to come unraveled!).

On the J-pole coupler PC board, the outermost U is actually the cold end of the quarter-wave matching section. Inside it is the link coupling loop and donut pads to mount the series tuning capacitor (3.5–20 pF, Mouser 24AA022 or equivalent). Pads are also provided to install a small fixed capacitor in parallel with the trimmer just in case the one you use is too small in value. The remaining small pad is for RG-58 (or equivalent) coax center conductor; the two larger pads nearby accept pigtails from the coax shield, one on each side of the coax. The two isolated pads are drilled out to provide holes for coax strain relief. Use a nylon tie-wrap or small magnet wire wrapped around the coax and through these holes to secure it to the PC board. Now your connections

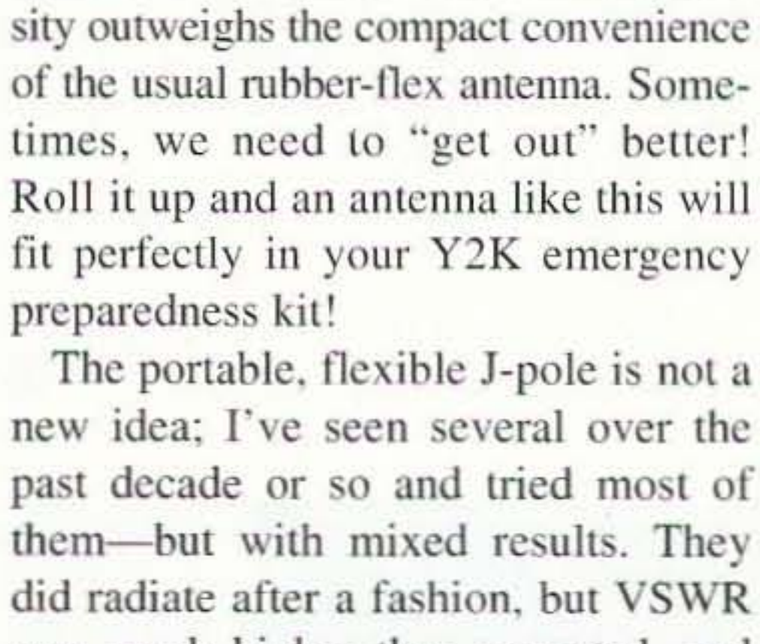

Photo A. *Y2K portable J-pole antenna, coiled up and ready to go.*

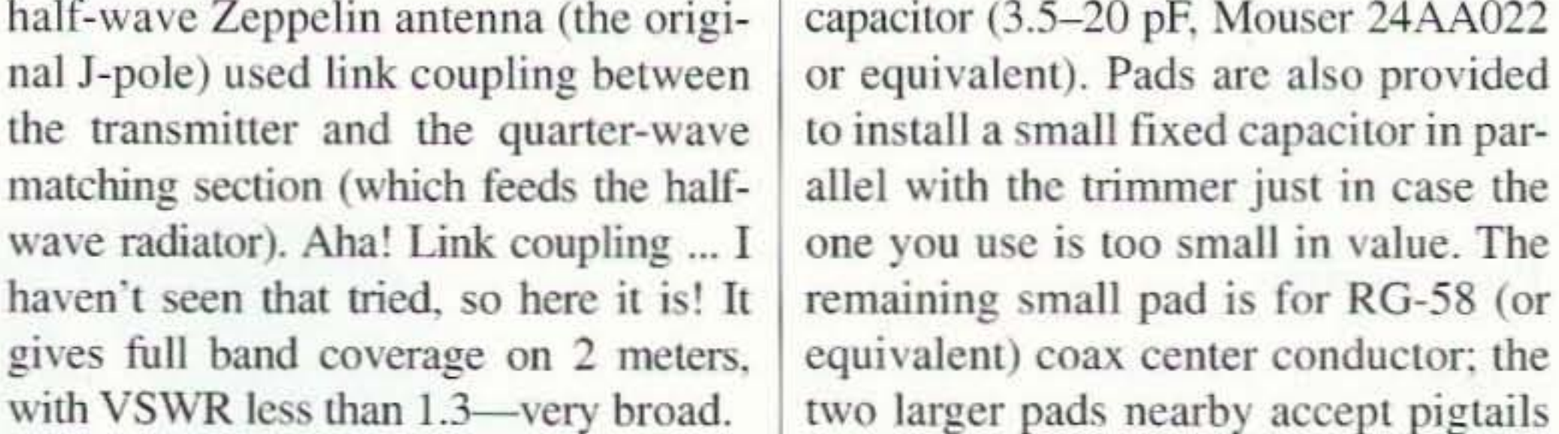

Fig. 1. *Portable J-pole antenna for 2 meters.*

are all secure, and nothing can move around or shift over time.

The coax cable may be any length you wish, fitted with a connector on the far end to mate with your transceiver. I chose a five-foot length with BNC connector for general use, but if you anticipate pulling this antenna up into a tree or some other support, use a longer piece of cable to gain that height advantage.

The remainder of the matching section and the half-wave radiator are fabricated from a single piece of plastic-covered ladderline, approximately 55 inches long. The type I used was a standard radio store item with conductors spaced 0.8 inches and roughly fifty percent dielectric fill in between, alternating between plastic spacers and air.

Measure 13 inches from one end of the line, and in the middle of the next spacer section beyond that point, make a 1/2-inch gap in one side of the line (the gap is placed in a spacer section so it won't weaken the structure as it would if you placed it in an air section). Now

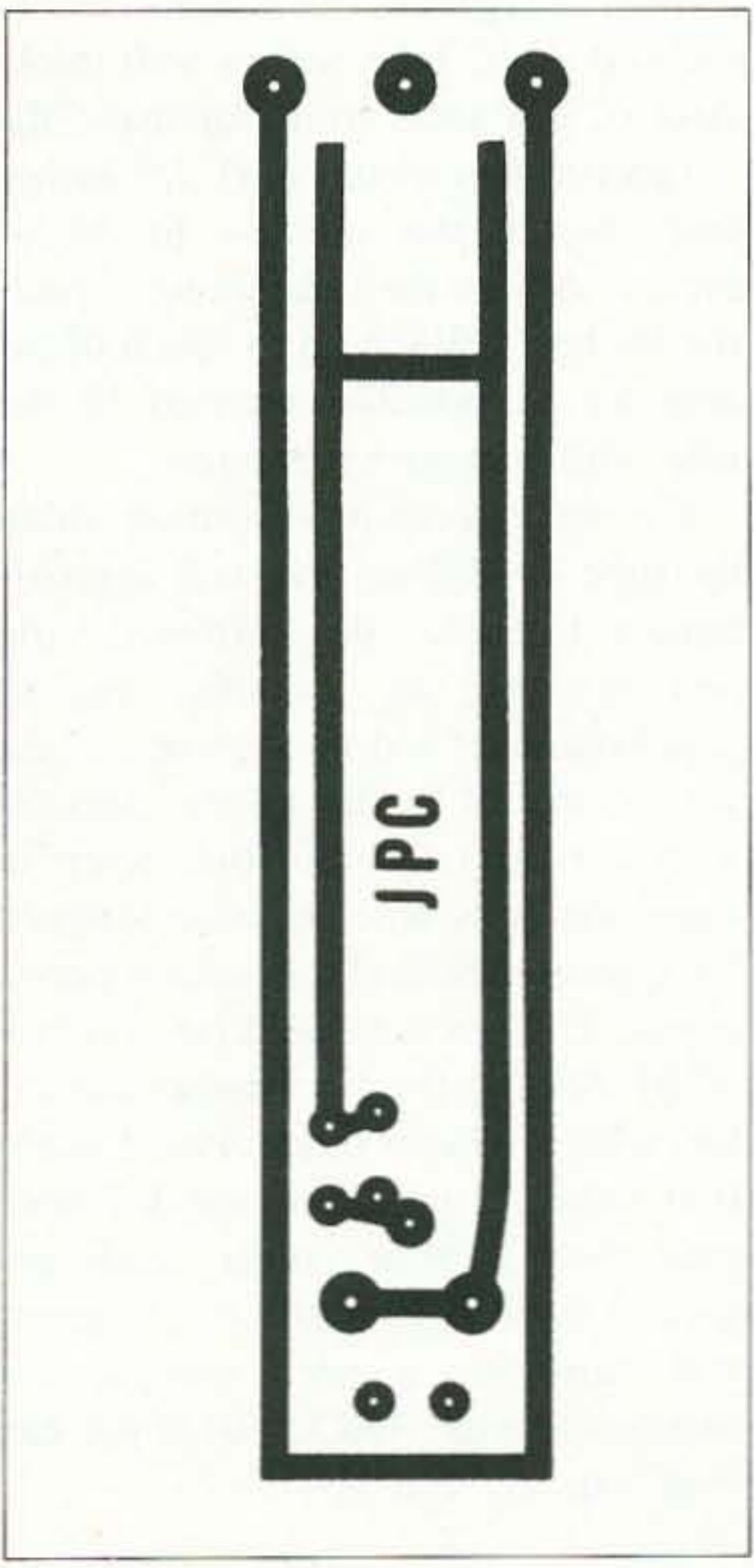

***Fig. 2.** Full-scale etching pattern.*

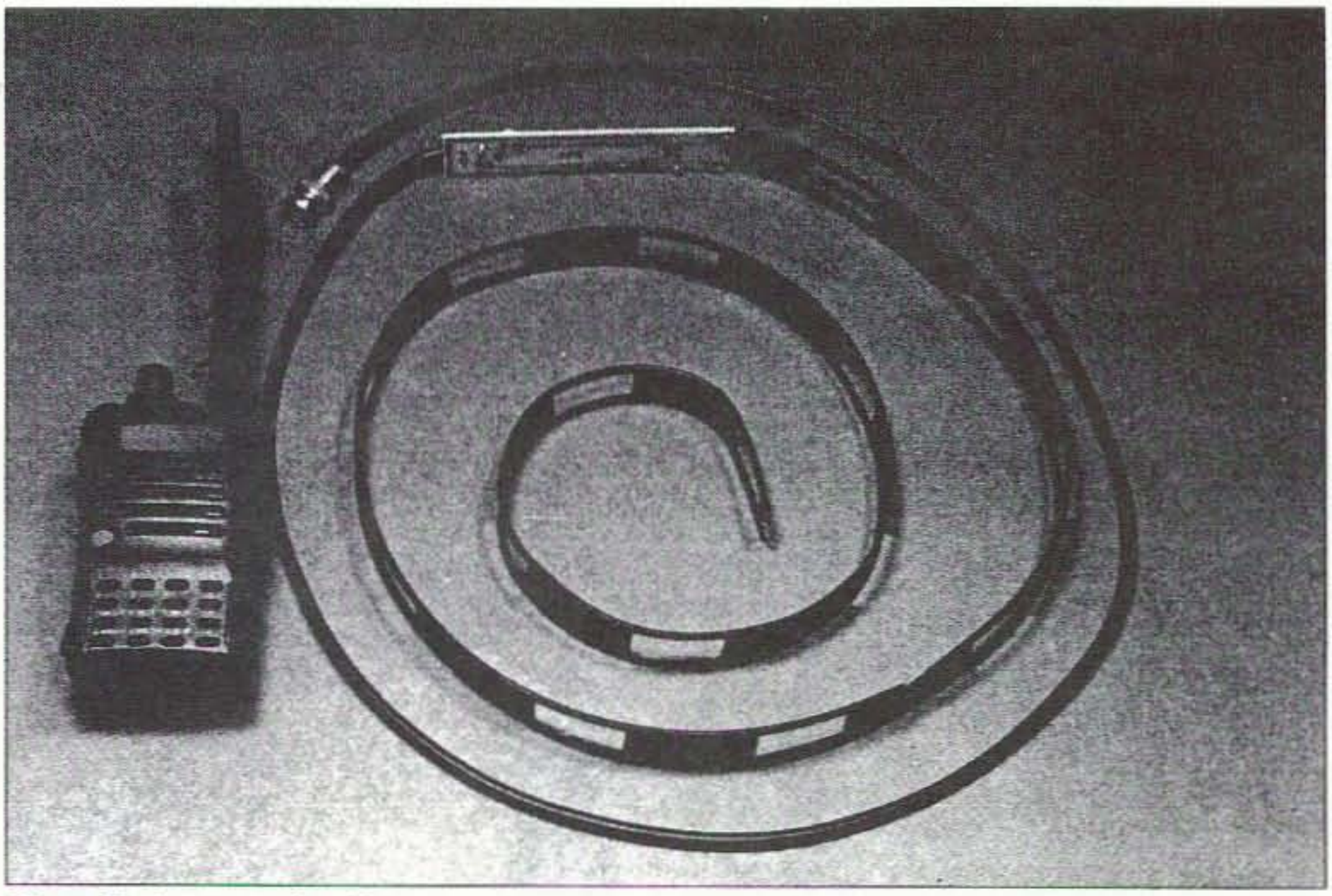

***Photo B.** Antenna detail.*

measure 12-7/8 inches back toward the same end, cut the line, and remove 1/4 inch of insulation from each wire. Connect this end of the line to the large pads at the open end of the outer U on the coupler PC board. The distance between these pad connections and the beginning of the gap should be 12-5/8 inches.

From the other side of the gap, measure out 37-5/8 inches and cut the ladderline at that point. Remove 1/2 inch of insulation from each side of the line and bend the wires at right angles so that they touch each other. Solder them together. This makes the radiator just over 37 inches long, and connecting the two wires fattens it considerably for broadband performance. For suspending this antenna vertically, attach string, shoelace, or small rope of a length that will suit your needs.

With the antenna hanging in a clear area, adjust the link tuning capacitor for minimum VSWR while transmitting in the middle of the band. Reflected power should go down to zero or nearly so, and VSWR at the band edges should not rise much beyond 1.3 to 1 (at least that was the case in several units built and tested here).

Other types of parallel conductor transmission line, even TV twinlead, should work with this coupler PC board, but differences in propagation velocity will likely change the dimensions somewhat—especially the distance from the coupler to the gap—so you may have to experiment.

If you're tempted to push this antenna into a piece of PVC tubing (with end cap) for use as a fixed station antenna, it will work—but not with the dimensions given. For use inside a 1-inch-i.d. PVC tube with a wall thickness of 1/8 inch, you can make the coupler-to-gap distance 11-7/8 inches and shorten the radiator to 34-3/4 inches. Adjust the link tuning capacitor for best SWR with as much of the antenna as possible inserted in the tube, and then push in the rest.

The antenna can be supported within the tube by drilling the wall approximately 18 inches down from the top and inserting an insulative pin or small-diameter rod through one of the air sections of the ladderline. Seal the holes to keep the rain out. Keep in mind that this antenna was designed for typical handheld transceiver power levels. Though it showed no evidence of RF heating (in the trimmer capacitor) with a 10 watt transceiver, I doubt if it would handle a whole lot more than that. If your power needs are greater than the 10 watt level, I suggest you substitute a mica compression trimmer like the ARCO 401 if you can find one.

Continued on page 36

Y2K Portable J-Pole

continued from page 18

It remains to be seen whether the year 2000 will bring some special, urgent need for ham radio communications, but I see Y2K as a good excuse to review and upgrade my preparations for emergency communications. If Y2K turns out to be a dud, there's always another disaster waiting around the corner somewhere, sometime. If you get ready now, Murphy's Law dictates it will happen somewhere else (maybe)!

Note: A parts kit consisting of coupler PC board, trimmer capacitor, and ladderline is available. Order #JPK-2 from Lectrokit, 401 W. Bogart Rd.,

Sandusky OH 44870. The price is $15 postpaid in the USA and Canada. Questions or comments? Please use my E-mail address shown above. 73