

The JF Array

You don't have a "green thumb" for antennas? This multiband "antenna farm" is easy to grow!

By Richard R. Schellenbach,* W1JF

It is purely accidental that the name of this antenna and my call sign are identical. However, it is no accident that the JF Array is a relatively simple but highly effective antenna system. It covers the 80-, 40- and 15-meter bands from a single transmission line. This antenna provides significant gain on the 40- and 15-meter bands, while acting as a standard $\lambda/2$ dipole on 80 meters. In fact, the array may be used on all hf amateur bands, without the gain and directional characteristics found on 40 and 15 meters.

The initials "JF" describe the physical configuration of this array. On 15 meters, the antenna consists of two back-to-back "J" type radiators; hence the name "J Flat-Top," which is shortened to JF.

Theory of Operation

In essence, the JF Array operates as four $1/2\lambda$ elements in phase on 15 meters, and two $1/2\lambda$ elements in phase on the 40-meter band. On both bands, the feed impedance is extremely high. Therefore, an open-wire feed line (300 to 600 ohms) is recommended between this antenna and your Transmatch. Remember that this is a balanced antenna system, so it is desirable to maintain current balance from the antenna all the way back to your matching network.

Under some circumstances you may find it necessary to experiment with the length of your open-wire feeder. This is because some operating frequencies and line-length combinations present a load impedance beyond the capability of your matching network. The use of a nonharmonic-length feeder is the usual prevention or cure for this condition. Feeder lengths in multiples of 25 to 27 feet should allow all-band operation without any problems.¹

Construction

The flat-top section of the antenna is made from no. 14 copperweld, or no. 12 hard-drawn copper wire (Fig. 1). Heavy-gauge wire is necessary to support the considerable weight of the array. The two stub sections should be made from no. 14

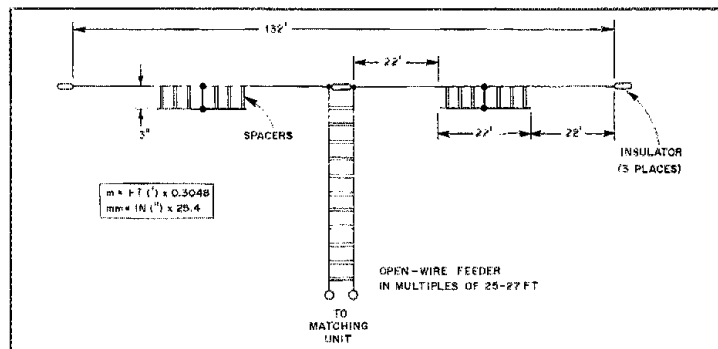


Fig. 1 — A dimensional drawing of the JF Array.

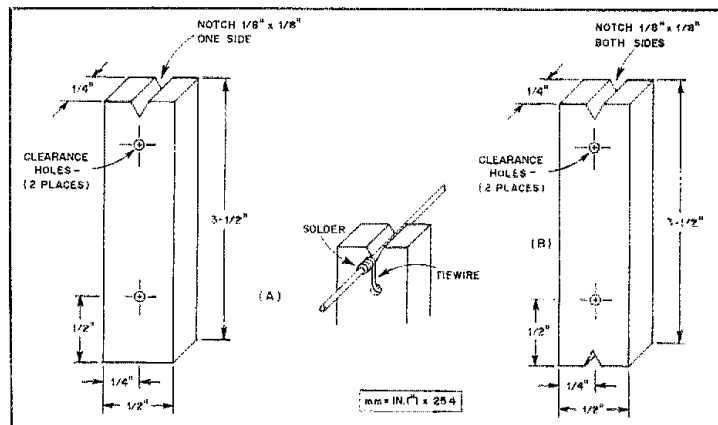


Fig. 2 — Spacer construction details for antenna sections are shown at A. Details of a spacer used for constructing the open-wire line are shown at B.

or 16 hard-drawn copper wire, and are held apart from the flat top by means of homemade spreaders. These are fabricated from 1/4-inch-thick plastic or Plexiglas sheet (Fig. 2A). The length of individual spreaders is not critical, but it should not be longer than 4 inches to prevent the wires from becoming unwieldy during installation. A spreader should be placed every foot, or less, along the stub

to provide support and to prevent undue movement during windy periods. The spreaders are held to the main antenna wire by small lengths (4 inches) of no. 14 or 16 copper wire. This tie wire should be passed through the clearance hole at the "V" groove end and wrapped tightly on both sides (Fig. 2). The stub wires then are passed through the opposite clearance hole, and *not* tied, allowing freedom of

¹m = ft x 0.3048.
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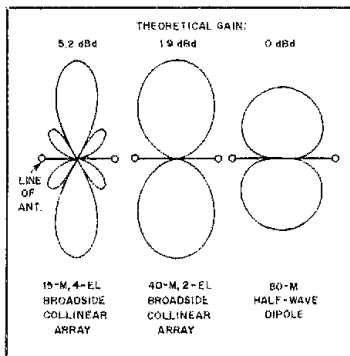


Fig. 3 — Radiation patterns and theoretical gain figures for the JF Array on different bands (for comparison only).

movement for stress-free support. After attaching the stubs, solder a jumper wire between the center-tap of each stub and the main antenna wire (Fig. 1). Ensure good electrical connections by first scraping off any enamel insulation or oxidation, and by wrapping the wires tightly before soldering.

Balanced feeders may be purchased, or constructed from no. 14 or 16 copper wire spaced apart by the spreaders shown in Fig. 2B. Various types of commercial open-wire transmission line offer the builder a lightweight, already-built option. Any of the popular 300- to 600-ohm lines will do.

Performance

It is worth noting that the JF Array radiates the main power lobe *broadside* to the wire and not off the ends as a conventional, harmonically operated antenna does (Fig. 3). With a properly balanced feed line, you will observe that the array has an extremely clean radiation pattern. Installed at the 30- to 45-foot level, the antenna provides good DX performance. There is yet another desirable advantage to be found: the JF Array provides an inherent diversity effect on the higher frequencies because of the large capture area. This effect greatly reduces fading that may occur during certain propagation conditions. Give this simple antenna a try. You shall be pleasantly surprised!

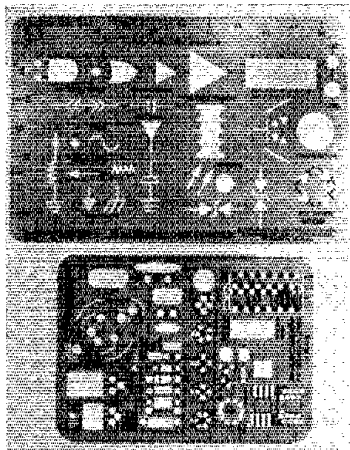
Dick, WJF, a native of Southern California, was first licensed as W6TKX in the late 1930s. He is a 9-year veteran of both the U.S. Army and Navy, and has served as a communications specialist for nearly 40 years. Currently, Dick is a consulting scientist with Support Systems Associates, Inc., of Burlington, Massachusetts. In addition to his extensive communications experience, Dick holds a BSEE degree, and has completed post-graduate work in Business Management and Industrial Engineering.

New Products

ARCHER CIRCUIT SYMBOLS AND PC-BOARD-LAYOUT TEMPLATES

Radio Shack offers two new tools geared to help students and amateur or professional circuit designers and builders achieve accurate, high-quality schematics and designs. A circuit-symbols template (276-180) and a pc-board-layout template (276-179) are available for \$3.95 each.

The circuit-symbols template offers a large selection of component and logic symbols. There are also two ruled edges with 0.1-inch graduations. A pc-board-layout template eliminates guesswork in pc-board design. It supplies exact-size ($\times 1$) stencils for most commonly used active and passive components, including ICs and discrete devices. Look for these offerings at your nearest Radio Shack store. — *Paul K. Pagel, N1FB*



colors, include top and bottom covers, filler panels, front and rear panels (adjustable in expandable height models) and an assortment of necessary spacers and hardware. Available options include handles and tilt stands. Interior mounting bosses for securing components are standard, and detailed assembly and modification instructions are included with each kit. Front and rear panels can be drilled, cut, punched and silk-screened for displays and controls.

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1mm = in. \times 25.4

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The kits, which come in four standard

