Try the "TJ"

Whether TJ makes you think of Cameroon or Tokyo, Japan, the "DXpertise" of this antenna could help you snag the rare ones.

By R. R. Schellenbach,* W1JF

City dwellers and small-lot owners frequently complain, "No room for a good DX antenna." Can you work DX on 160, 80 and 40 meters from that restricted bit of real estate? The answer is yes. Let me tell you about a compact antenna that is useful for working DX.

The TJ is a five-band, vertically polarized antenna system. In the 160-meter band the TJ is essentially a 1/4-wavelength (λ) T (see Fig. 1). It becomes a 1/2-λ T on 80 meters and a 5/8-λ T on 40 meters. For 20 and 15 the configuration becomes a 1/2-λ inverted J. It is from this combination of T and J that the antenna gets its name.

High performance is realized with the TJ on 80 through 15 meters because the maximum current point is elevated above ground. On 160 meters, the performance approaches that of a full-size, 1/4-λ vertical antenna. The horizontal section of the TJ does not radiate appreciably. The current on each side is of equal magnitude and opposite phase, thus canceling radiation.

The three lower frequency bands employ a combination of top-loading techniques to physically shorten the antenna. The end sections act as capacitance hats on 80 and 160 meters. On those two bands there is an almost 2/3 size reduction in the TJ. Because top loading is employed, bandwidth is not reduced as drastically as it would be if other methods were used. On 160 meters, top loading means a more desirable current distribution and a more favorable feed point impedance (30 to 40 Ω compared with 8 to 10 Ω for a base-loaded vertical). If the ground system has a resistance of 5 Ω, the TJ should be about 85% efficient on 160 meters. A base-loaded vertical would exhibit only half that efficiency. Better efficiency means more effective radiated power — exactly what we all want.

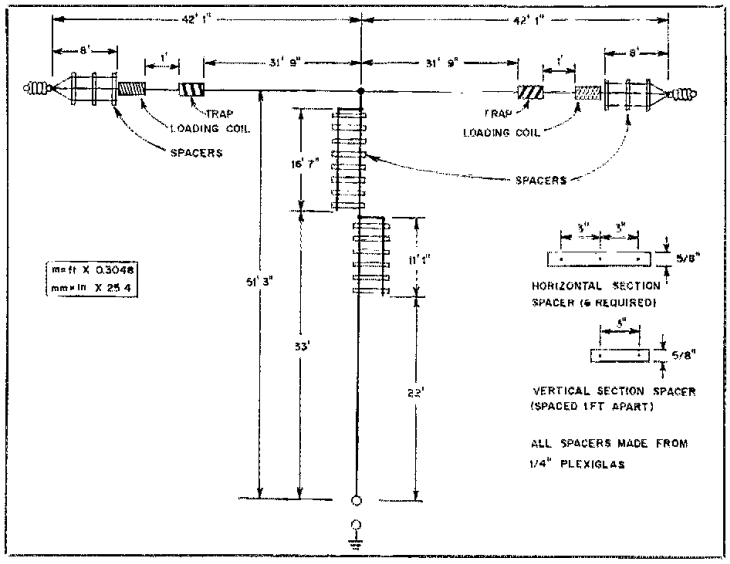


Fig. 1 — The TJ antenna.

Construction Details

The loading coils are wound on 8-inch lengths of 1-1/2 in. PVC tubing.[1] Use 120 turns of close-wound, no. 14 enam. copper wire. I installed a pair of egg insulators inside each coil for support.

The 40-meter traps employ the same type of tubing and support scheme. They were constructed after a *QST* article by Johns.[2] I used RG-59/U coaxial cable and found resonance at 7.05 MHz, using 11 turns.

The dimensions shown in Fig. 1 were derived empirically. You can copy the measurements or modify them for operation in your favorite parts of the bands. I find resonance in my antenna at 1.815, 3.6, 7.05, 14.1 and 21.1 MHz.

Install the TJ in the clear, as far from surrounding objects as is possible. High quality glass or ceramic insulators should be used at the antenna ends. Nylon rope can be used to support the antenna. The feed point should be no more than 2 feet above the ground.

A good ground is required for efficient operation on 160 and 40 meters. My ground system covers 2 acres and employs a buried network of over 5000 feet of solid copper ribbon. You may not want to duplicate that, but you should install an effective ground system. Stanley described several possible configurations in *QST*.[3]

Tuning the TJ

An antenna-matching network is essential to proper operation of the TJ. The network should be installed at the antenna feed point, using the shortest leads possible. Adjustments can be set for the

*12 Whitehall La., Reading, MA 01867

[1]Notes appear on page 19.

Table 1
Antenna Feed-Point Impedance

Band	*Impedance (approx.)*
160	35 Ω
80	>1000 Ω
40	100 Ω
20	>1000 Ω
15	>1000 Ω

favorite band of operation, or you can do it by remote control.[4, 5, 6]

Feed-point impedances are given in Table 1. These impedances can be matched with the three configurations shown in Fig. 2. The exact values for these networks should be determined experimentally for each installation. Components for the matching networks should be mounted in a weatherproof housing.

Start with a quarter wavelength of coaxial cable for the 40-meter matching stub. To find the length in feet, divide 234 by the frequency in megahertz and multiply by the velocity factor of the cable. (Velocity factor is 0.66 for polyethelyene dielectric and approximately 0.80 for foam.) Short the free end of the stub and observe the SWR. Now shorten the stub, short the end and check SWR. Continue this process until a satisfactory match is found. The stub can now be rolled into a coil and the end taped.

One nice feature of stub matching is bandwidth. As you move away from resonance, the reactance of the antenna and stub move in opposite directions. The reactances tend to cancel, thus providing greater bandwidth.

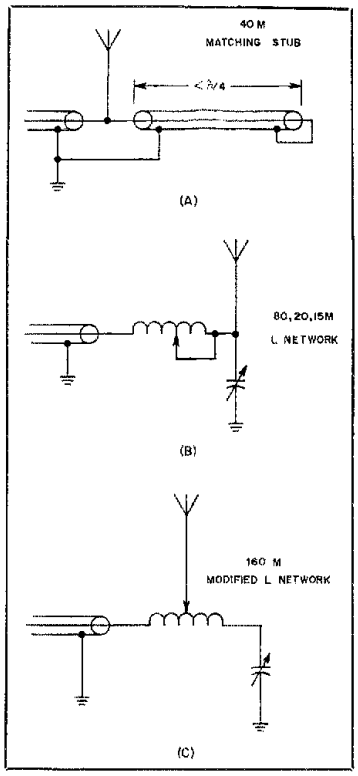


Fig. 2 — Matching networks for the TJ. Capacitance and inductance values should be determined experimentally for each band.

The matching circuit for 80, 20 and 15 meters is a simple L network. On 160 meters I employ a modified L network. I found that the best match and highest antenna current was obtained with the tap a little more than half way toward the variable capacitor. The TJ covers the entire cw portion of any of the five bands, with one setting of the antenna-matching unit.

Performance

Short-skip performance is not as effective as it is with a low horizontal antenna. Lack of high-angle radiation explains that characteristic. Ground-wave coverage is very good, thanks to vertical polarization and a low angle of radiation. Best of all, that low angle accounts for the excellent DX results I have obtained while using the TJ.

I found it satisfying and a lot of fun to build my own antenna. You would, too. Why not construct your own TJ? Good luck and good DX!

Notes

[1]mm = in. × 25.4, m = ft × 0.3048.
[2]R. H. Johns, "Coaxial Cable Antenna Traps," *QST*, May 1981, p. 15.
[3]J. O. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, December 1976, p. 13.
[4]H. Drake, Jr., "A Remotely Controlled Antenna Matching Network," *QST*, January 1980, p. 32.
[5]B. K. Imamura, "A T-Network Semi-Automatic Antenna Tuner," *QST*, April 1980, p. 26.
[6]W. H. Sanford, Jr., "A Modest 45-Foot DX Vertical for 160, 80, 40 and 30 Meters," *QST*, September 1981, p. 27.

Strays

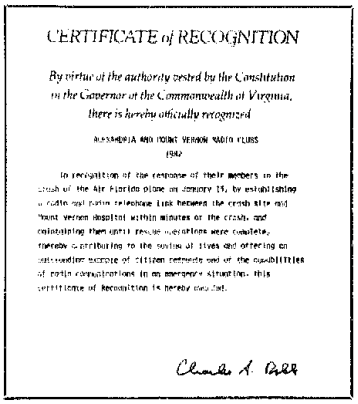
Last December, four members of the Sam Houston Amateur Radio Klub went to jail — just for a day — as part of the club's Christmas Project on behalf of the inmates at the Huntsville (Texas) State Prison. Using stations operating on 2-meter fm and ssb, the amateurs braved bone-chilling temperatures to relay seasons greetings to the families of more than 450 inmates. Seated, l-r, are N5CDN, WA4AOG, KA5DQP and KA5FPV. Two inmates look on. *(photo by Jim Bacon)*

FIELD DAY SATELLITE INFORMATION

☐ Field Day rules in May *QST* allow 100 points for a satellite QSO. This year, with the addition of the Soviet Amateur Radio satellites, operating activity can be spread out to make your operation more enjoyable. AMSAT-OSCAR 8 will remain in the mode listed in the operating schedule (page 93) for June 26 and 27, UTC. The Soviet RADIO satellites will operate Mode A, and a QSO with one of them will count for the 100 points; just list the QSO number (for the ROBOT), date and time. See the schedule for operating times and frequencies. — *Bernie Glassmeyer, W9KDR, OSCAR Program Manager, ARRL*

I would like to get in touch with . . .

☐ amateurs who are interested in volunteering two hours a week to record textbooks for blind and handicapped students. Dorothy Dorben, Reading for the Blind, Inc., 5022 Hollywood Blvd., Los Angeles, CA 90027.



CERTIFICATE of RECOGNITION

By virtue of the authority vested by the Constitution in the Governor of the Commonwealth of Virginia, there is hereby officially recognized

ALEXANDRIA AND MOUNT VERNON RADIO CLUBS

1982

In recognition of the response of their members to the crash of the Air Florida plane on January 13, by establishing a radio and voice telephone link between the crash site and Mount Vernon Hospital within minutes of the crash, and maintaining them until rescue operations were complete, thereby contributing to the saving of lives and offering an outstanding example of citizen interest and of the capabilities of radio communications in an emergency situation, this certificate of Recognition is hereby awarded.

Charles S. Robb

In the wake of the crash of an Air Florida jetliner in Washington, DC, on January 13, 1982, Virginia Governor Charles Robb issued this proclamation, commending the members of the Alexandria and Mount Vernon ARCs for establishing and maintaining a communications link between the crash site and a local hospital until rescue operations were complete.