Conducted By
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THE QUAD-J-COLLINEAR ANTENNA

☐ This new antenna is essentially a four-element, wide-spaced, collinear broad-side array. However, it has been reduced to the minimum possible overall size without diminishing its performance. The Quad-J-Collinear antenna is a highly efficient, bi-directional array that produces a moderate 6-dB gain over a 1/2-λ dipole. If it's installed so the lower element is at least 1/2 λ above ground, this array will provide low-angle, elliptically polarized radiation useful for DXing. The elliptical-polarization feature provides a desirable polarization-diversity effect, which overcomes signal fading caused by constant variations in ionospheric refraction.

Fig. 1 illustrates the basic principle of operation, and may also be used as a design guide. Fig. 2 provides the dimensions for a 10-m antenna. The array is constructed from copper wire for light weight and low wind resistance. It may be suspended by nylon ropes from existing towers, masts or even trees — provided that sufficient separation between supports exists.

This is a fairly broadband type of array and provided the dimensional proportions are maintained, it will work effectively over a large frequency range. Overall bandwidth is primarily governed by the "J" type phasing stubs and the method employed in transmission-line matching.

Feed methods are left to your particular station requirements. However, it should be known that the feed point has a high impedance (>1 kΩ), and is balanced. Because of these characteristics, either tuned feeders or a 1/4-λ matching section with a balun (Fig. 2) may be used. The length of coaxial cable from the balun to the transceiver is non critical in this application. — *Richard Schellenbach, W1JF, Reading, Massachusetts*

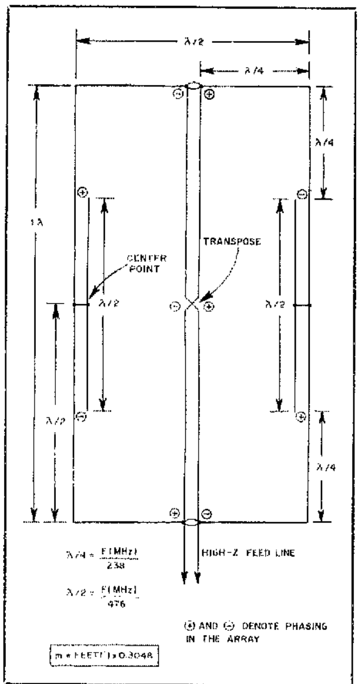

Fig. 1 — Drawing of the Quad-J-Collinear antenna, showing principal phase and element-length relationships.

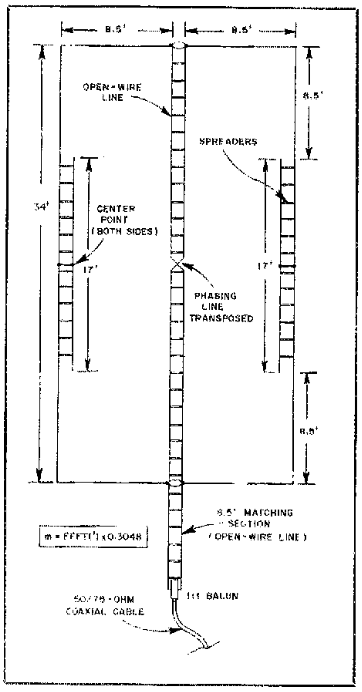

Fig. 2 — Dimensional drawing of a Quad-J-Collinear antenna for the 10-m band. Resonance is set for 28.0 MHz.

IMPROVEMENTS FOR THE AA6PZ POWER CHARGER

☐ The AA6PZ Power Charger (Dec. 1982 *QST*, p. 17) has proven most useful in maintaining my HT battery in both mobile and home operation. Zander's article is informative as well as descriptive, and the charger fills the need to quick-charge a battery safely. I have a few comments that will correct a minor circuit error, and help the builder ensure that his battery is charged to maximum capacity.

Correspondence received with the power-charger pc board indicates that the emitter of Q4 is connected to the wrong side of the ammeter jumper. A voltage drop in the meter could turn on Q4 and limit the current to a lower-than-normal value. Cut the pc trace and reconnect the emitter of Q4 to the correct side of the jumper.

The text implies that R5 should be left out for a 700-mA charge-current limit; however, any variation because of the tolerance of R1 and other resistors will affect the current limit value markedly. In my charger, R1 was actually 1.1 Ω and the limit was only about 250 mA! A value of 1 kΩ for R5 was required (as indicated by Eq. 1) to bring the limit to 700 mA.

Calibration of the output voltage is extremely critical, and most inexpensive VOMs are definitely not accurate enough to do the job. Furthermore, typical milliammeters have a relatively high series resistance and will affect the charge current when removed from the circuit. Here's why: To charge the battery to 100% of capacity, the individual cell voltage must reach a minimum of 1.42 V at a charge rate of 0.1C, or 11.36 V for an 8-cell battery without an internal diode.[1] A set point of 11.20 V, or 1.40 V per cell (as suggested), will result in only 15-37% of full charge. I experienced an apparent loss of battery capacity, which was actually due to insufficient charge current at 11.20 V. Similarly, voltmeter errors as little as 0.16 V or milliammeter-induced voltage drops of the same amount will result in failure to charge the battery properly.

The charge rate must taper to the normal charge rate of 0.05C to 0.1C at 1.42 to 1.44 V per cell, or 22.5 to 45 mA for a 450-mAh battery.[2] This charge rate may be left on indefinitely. A charge rate of 0.02C is a trickle charge, and it is used only to maintain a battery which previously has been fully charged. The power charger should not taper below 0.05C, or the battery will never reach 100% of capacity; 0.1C is a better minimum value.[3]

You may wish to calibrate the charger with a digital voltmeter as follows:

1) Using the slow-rate "wall charger," give your battery a 16-hour charge.

2) Connect the battery to the power charger for at least one-half hour. Monitor the current with a meter having a resistance of less than 0.2 Ω. You may use a current-sampling resistor of 0.1 Ω in series with the charger, and measure the voltage drop across it with a *good* DVM. For example, a reading of 0.0045 V indicates a charging current of 45 mA. (This measurement is usually beyond the means of anything but laboratory-grade instruments.)

3) If a laboratory-grade DVM is not available,

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[1] *Nickel-Cadmium Application Engineering Handbook*, 2nd ed., General Electric Co. (Battery Business Dept., Box 861, Gainesville, FL 32602), pp. 4-22, 4-33.

[2] *Ibid.*, p. 4-11.

[3] *Ibid.*, p. 4-12.