Jones Antenna Handbook

By

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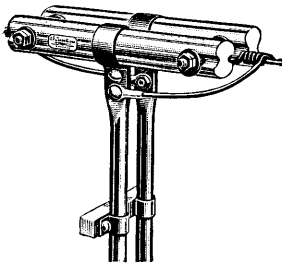

Fig. 26
Pictorial Sketch of Johnson "Q."

The design formulas are as follows:

$$L \text{ (in feet)} = \frac{467{,}000}{f}$$

$$l \text{ (in feet)} = \frac{246{,}000}{f}$$

where L is the antenna length in feet.
l is the matching section length in feet.
f is the frequency in kilocycles.

This antenna is quite widely used on 20 meters because of its relatively high efficiency. The 600 ohm untuned or non-resonant line can be of any length and should be connected across the equivalent of 600 ohms of impedance at the transmitter.

The Collins Multi-Band Antenna

● This antenna system is a special form of Zepp antenna suitable for operation on several bands. The losses are less in dry weather, and even in wet weather it should be a comparable system to the Zepp antenna. It consists of a half wave antenna at the lowest frequency of operation, with parallel copper tubing quarter wave feeders connected in the center of the antenna. See Figs 27 and 28. The system can be used on harmonics because of the special form of RF feeders which are used.

The center impedance of a half wave antenna is approximately 75 ohms; the center impedance of a full wave antenna is bout 1200 ohms. Consequently the RF feeder is designed to have an impedance which is the geometric mean of these two values, or 300 ohms. This value of 300 ohms is obtained by using quarter-inch copper tubing with 1½-inch spacing, held in position with small ceramic separators. The impedance mismatch between 300 ohms and 75 or 1200 ohms is 4-to-1, which is not great enough to cause excessive values of standing waves on the feeders. The line is made a multiple of quarter waves in length and thus the reactance at the station end is negligible; it will provide a resistive impedance of 75 or 1200 ohms. A simple untuned pickup coil (variable turns) is suitable for coupling to the transmitter or receiver tuned circuits. The design formulas are as follows:

$$\text{Antenna length in ft.} = L = \frac{(k-.05)\,492{,}000}{f}$$

$$\text{Feeder length in feet} = l = \frac{234{,}000\ m}{f}$$

Where k = number of half wavelengths.
f = frequency in kilocycles.
m = number of quarter wavelengths.

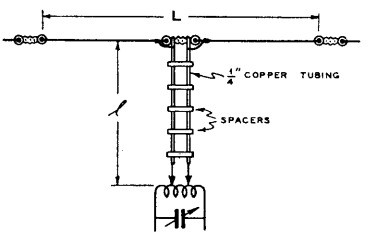

Fig. 27

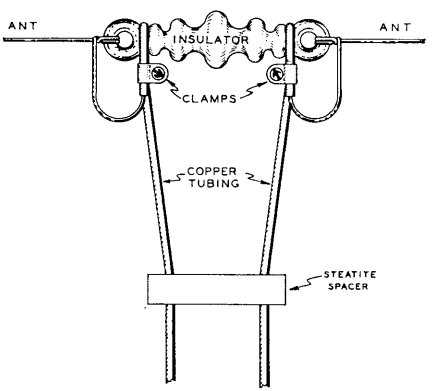

Fig. 28
Close-Up of Center of Antenna, Showing Feeder Connections.

CHART FOR COLLINS MULTI-BAND ANTENNA

Antenna	A	B	C	D	E	F	G
Antenna Length in Feet	136	136	275½	250	67	67	103
Feeder Length in Feet	66	115	99	122	65	98	82½
Frequency Range in Megacycles	3.7— 4.0 7.0— 7.3 14.0—14.4	3.7— 4.0 14.0—14.4	1.7— 2.0 3.7— 4.0 7.0— 7.3 14.0—14.4	1.7—2.0 3.7—4.0	7.0— 7.3 14.0—14.4 28.0—29.0	7.0— 7.3 14.0—14.4 28.0—29.0	3.7— 4.0 7.0— 7.3 14.0—14.4
Nominal Input Impedance in Ohms	1200 all bands	75 all bands	1200 160—80—20M., and 75 on 40M.	1200 all bands	75 on 40M. 1200 on 20 and 10M.	1200 all bands	1200 all bands

The efficiency of the feeders may run as high as 97% in spite of the impedance mismatch. The feeders weigh approximately 10 pounds and they hang from the center of the antenna, therefore the antenna wire should be copper-clad steel under tension, unless a support in the form of a mast is placed at the center of the antenna. A study of the antenna chart will indicate several possibilities for amateur installation.

Zepp Antenna

● This antenna consists of a half wave section with tuned feeders connected to the end, Fig. 29, or into the center, Fig. 30, of the half wave radiating section.

The purpose of the feeders is to permit the erection of an antenna as high above ground and as clear from nearby objects as possible. The feeders transfer radio-frequency power from the final amplifier of the transmitter to the radiating portion of the antenna. The portion of the antenna called the *Zepp Feeder* (which is a resonant coupling device, and thus forms part of the antenna proper) simply consists of an additional length of antenna which is folded back upon itself in such a way that the standing waves on the two feeders neutralize each other, thus preventing the feeder portion of the antenna from radiating. The first fundamental of Zepp Antenna design is that the flat top portion must be cut to within 10% for the frequency used. Variations of less than 10% can be compensated for by tuning the feeders in the radio room.

When one wire of a Zepp Feeder is connected to the end of a half wave antenna the feeders should be some odd multiple of quarter wavelengths long, because the two wires folded back on each other form half wave resonant sections. The coupling coil and tuning condensers in the feeder circuit

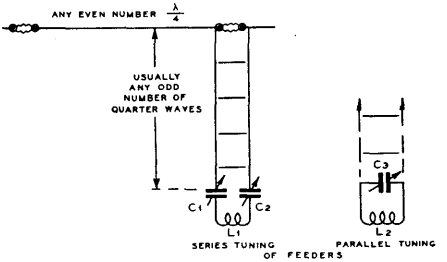

Fig. 29
Zepp Antenna System and Feeder Tuning Methods.

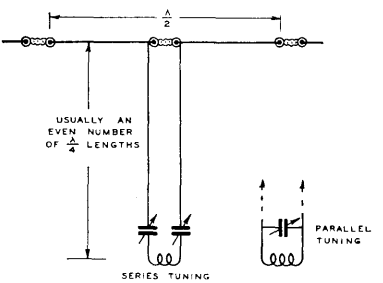

Fig. 30
Zepp Feeders Connected in Center of Half Wave Antenna.