DESIGNING AND BUILDING A FIVE BAND INDOOR ANTENNA

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I HAVE no idea how many hams are operating from apartments rather than two acre antenna farms. There must be quite a few, considering the "shortened antenna" articles I have been reading. The problem was not simple. I wanted to get out reasonably well, the landlord had a firm "no wires-no antenna" policy and any indoor antenna had to go along with the XYL's decor.

For a year I have been experimenting with various forms of restricted space antennas with varying results. The mobile center loaded whip is unsightly in a room and is difficult to mount with its coax fitting at the base. It was very hard to tune and feed (probably because of no automobile capacitance to ground).

The long wire wound around the room, and a dipole up and around the furniture worked but on three bands got the rig so hot, I would get lip burns from a grounded mike.

A commercial inside center-loaded antenna system designed to be series fed could not be made to match to my rig's 52 ohm output without extra antenna tank circuitry.

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Front view of the L-net using the ARC-5 coil and a 250 mmf tuning capacitor. The s.w.r. bridge is built into the lower section of the L-net chassis.

Solution

Here is one solution. It is cheap, it really works all bands, and loads like mad. It cannot be compared to a high dipole or a beam but it gets out.

The antenna is made from a brass plated floor to ceiling support post originally designed to hold room dividers, lamps, *etc*. It comes equipped with plastic cups top and bottom to prevent marring the ceiling or floor. The bottom section has a spring-loaded rod to hold the assembly firmly to the ceiling. The three sections telescope-fasten together much like TV masting.

Construction

Hacksaw a 7" piece out of the center section of the post to separate the antenna for the loading coil. An insulating section has to replace this 7" length. The plastic insulation used started life as closet rod covering and is available in various colors. Cut it into 10" lengths and slip one over the other on top of the cut out section. Use DuPont cement between the plastic layers. Four layers did the trick but one or two more

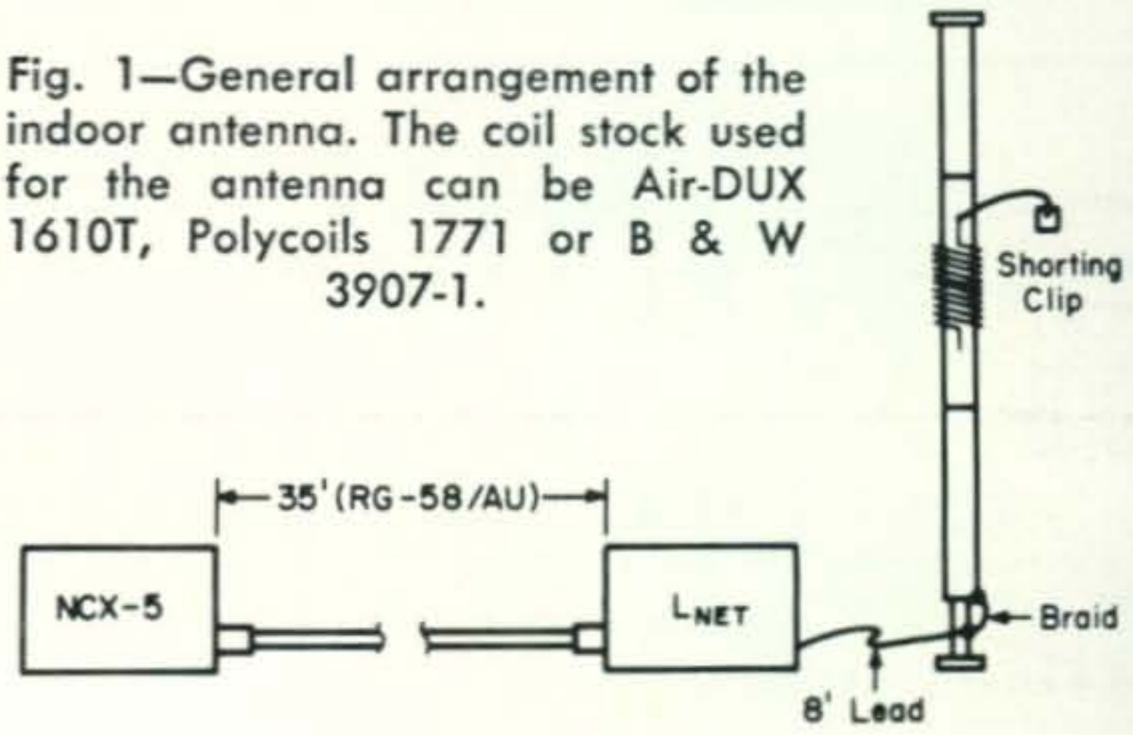


Fig. 1—General arrangement of the indoor antenna. The coil stock used for the antenna can be Air-DUX 1610T, Polycoils 1771 or B & W 3907-1.

could be used if you like. Don't skimp on the layers of insulation since there is quite a bit of pressure from the spring loaded rod that holds the antenna tightly between the floor and ceiling. Drill and fasten the plastic to the metal rod using sheet metal screws.

A 4½" length of 2" diameter 10 t.p.i. coil stock with 6" lead lengths is cut from the 10" length. It is then slipped over the plastic insulation and one lead of the coil is fastened to a sheet metal screw on the top section and the other lead is fastened to a sheet metal screw on the bottom section.

If you are a purist you may want to bound the individual slip fit sections with sheet metal screws but I didn't find it necessary. (It *must* be done if you use a *painted* pole.) It is necessary, however, to bond the telescoping spring loaded rod to the bottom section using some braid from a length of RG-58 and some sheet metal screws.

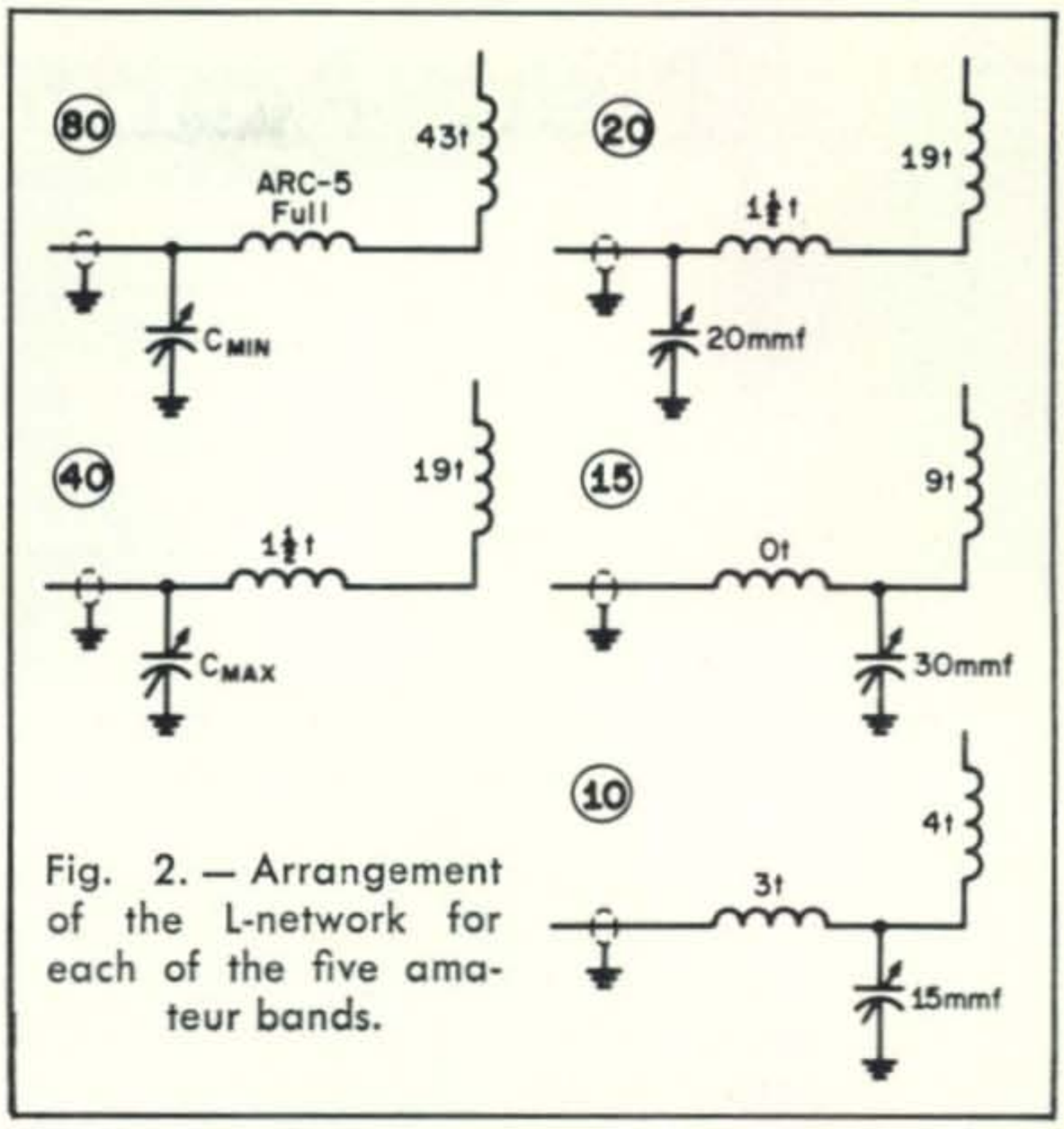


Fig. 2. — Arrangement of the L-network for each of the five amateur bands.

Feeding

The antenna is fed from an L-network as shown in fig. 1. During the experimental period it was found that feeding the antenna in this manner provided a broad frequency range. An s.w.r. bridge built into the L-network cabinet aids in tuning.

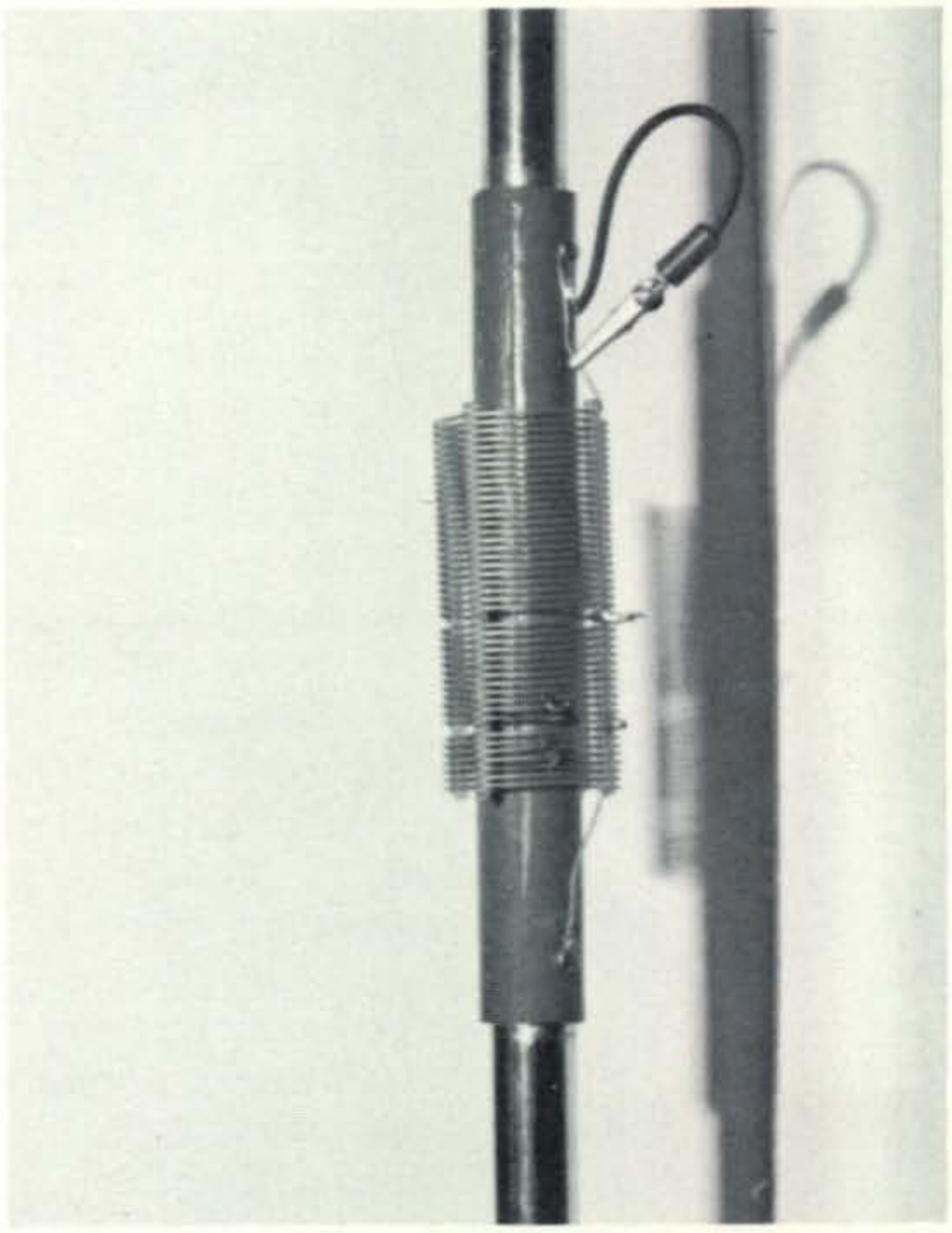
The network consists of a 250 mmf tuning capacitor and an ARC-5 adjustable coil (2" dia. 8 t.p.i. with a total of about 30 turns). If no ARC-5 tuner is available the balance of the coil stock used for the antenna center loading coil can be employed. The L-network arrangement for each band, along with the proper tap on the antenna loading coil, is shown in fig. 2. An 8' wire lead connects the antenna to the network. The coax feedline is exactly 35' long and the excess is coiled up under the furniture. When I used a 20' length reduced signal levels were observed.

I am using the hot water heating pipes for a ground but a 30' counterpoise wire dropped out the window worked just as well (if you can drop a wire out of the window). The ground lead from the L-network to the pipe ground point is 20' long.

Operation

The NCX was tuned up into a dummy load in the TUNE position. It was then switched to the c.w. position and carrier inserted for a 5 or 6 watt output, just enough to provide a reading on the s.w.r. bridge. The L-network and antenna coil are then tuned for minimum s.w.r.

I spent a week adjusting coils and taps using the s.w.r. bridge and a diode field strength meter to produce some terrific results. The same settings will not necessarily work as well in other locations and some experimenting should be done. The results will amaze you. ■



View of the center of the antenna shows the loading coil and the shorting clip. The antenna is usually turned to the wall so that the clip doesn't show.