Multiband Mobile Antenna Loading Coil

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To most mobile hams the antenna system presents certain limitations and problems. Multiband operation multiplies the difficulties in nearly direct proportion to the number of bands used. Some of the problems have been overcome over the years by experimentation and "home-brewing," and it is the purpose of this paper to describe the results of a recent effort to improve on multiband mobile antennas. Specifically, the article describes the details of construction of a tunable mobile loading coil for the bands from 75 to 10 meters.

The construction of the coil will present no problem to the ham having access to a small machine shop. Because each ham may have other sizes and dimensions of material available than those shown in the cutaway view, Fig. 1, drawings and dimensions of the individual pieces will not be shown.

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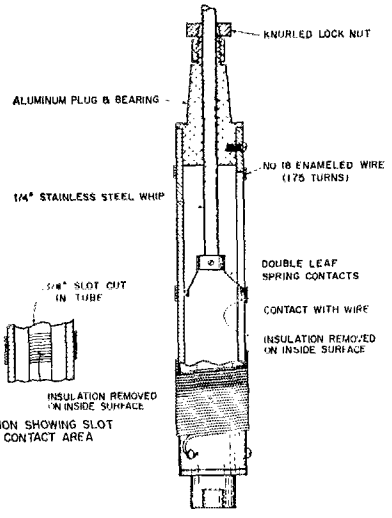
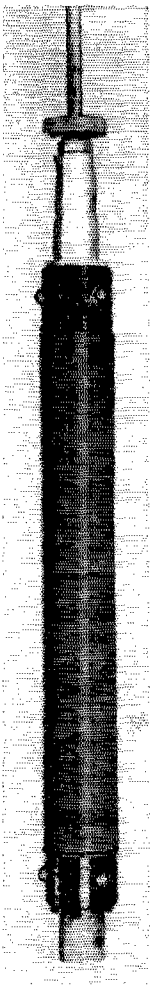


Fig. 1—Cutaway drawing showing the constructional features of the loading coil. Dimensions can be varied to suit materials available.



External view of the coil, whip bearing and locking system.

The body of the loading coil is a paper-laminate phenolic tube (Spaulding Fiber) 1⅛ inches o.d. by ⅞ inch i.d. by 10 inches long. A longitudinal slot ⅜ inch wide by 8 inches long is cut in the tube. The ends of the slot are equidistant from the ends of the tube. Contact between the slider and the inside of the wire is made through this slot to provide tuning adjustment.

The slider contacts were made from heavy-duty spring contacts obtained from a defunct Centralab JV-9002 switch. Two of these are soldered 180 degrees apart to a collar which is then fastened to the main whip with set screws. One spring contact rides on the inside of the fiber tube and provides electrical and mechanical stability. The other contact rides on the inside surface of the wires, which have been cleaned of insulation.

Because of the danger of shorting turns, a chemical cleaner could not be used to remove the insulation from the inside of the wire. Several slow and unsuccessful methods were tried before

it was found that coarse sandpaper placed on a flat, narrow piece of material with a long handle could be used to abrade the inside surface of the wire. This method quickly removed the insulation along the length of the slot. It is essential that good contact be made between the wire and the sliding contact, to prevent noise and detuning.

Additional support for the whip, to help prevent the contact on the wire from moving, is provided by a fairly long bearing at the top of the coil. The aluminum plug and bearing is about 2½ inches long. The hole to pass the whip rod is a snug fit to help hold the contact secure. A Millen No. 10062 shaft lock holds the whip firmly in position after tuning to the desired frequency. The loading coil is secured to the base section by another aluminum plug tapped for ⅜-24 thread. Both of these end pieces are fastened to the inside of the fiber tube by three 8-32 machine screws spaced 120 degrees apart. The ends of the wire are fastened under one of the screws at each end of the coil. The electrical circuit of the antenna is shown in Fig. 2.

Construction and Assembly Summary

The coil is wound with 175 turns of No. 18 enameled wire. The winding just covers the slot. The inductance with the slider all the way to the top (approximately 2.8 Mc.) is 120 microhenrys, with a Q of 150. About 80 μh. is used at 4 Mc. Before the coil is wound, the form is sprayed with Krylon to reduce the effects of moisture. Several coats are later sprayed on the completed coil to help hold the wire in place and for atmospheric protection.

The inside of the coil wires must be well cleaned. This will prevent detuning during transmissions and eliminate "intermittents" during reception. A good snug fit in the bearing plug will aid in maintaining good contact between the slider and wire.

The whip is marked for the various bands and

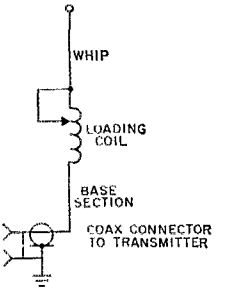


Fig. 2—Electrical circuit of the whip antenna with loading coil.

frequencies, which are then permanently stamped in the proper places. It was found that the 75-meter phone band could be covered with two settings, by tolerating a slight power loss at each side of a center frequency. The other bands were calibrated at only one setting. This permitted optimum adjustment for any frequency within a given band. When operating on the 75-meter band the slider is set near the top, while on 10 meters the slider is at or near the bottom of the coil.

The antenna loading coil system shown in the photograph has been used for about six months under all conditions with good results. No detuning or noise has been experienced. Power as high as 60 watts into an Elmac AF-67 has been used without any difficulty.

This antenna tuning system has solved most of the problems encountered with tapped coils, outside sliding contacts, cumbersome LC tuners and others. It is small, neat, stable and, after calibration, easy to adjust to resonance on any band.

No measurements of any sort other than those mentioned above have been made on the coil. Successful QSOs are being made and it is felt that this provides a good indication of its operating characteristics. QST

Strays

Editor, *QST:*

"As the Director, Naval Communications, it is one of my responsibilities to continue the long-standing Navy policy of working cooperatively with amateur radio. The Navy has found that Naval Communications has no more capable nor devoted proponents than radio amateurs.

Amateur radio in itself is an environment that encourages creditable invention and improvization. From that environment invaluable techniques have emerged to benefit the technology of mankind. From amateur radio have come some of the Nation's most gifted and talented communications-electronics engineers. From amateur radio the Nation and the Navy may draw upon a vast reserve of needed personnel in times of emergency.

My best wishes go to America's radio amateurs and to them goes the assurance that the

Navy's support of amateur radio will continue under Naval Communications' new Director."

Rear Admiral BERNARD F. ROEDER, *USN*
Director, Naval Communications