Building An All-Band Coil

R. A. ROBERGE, W6OZS and R. W. McCONNELL, W6SCX

Vaaro Electronics Engineering Co.

For Those Who Might Want to Make Their Own

This "all-band" coil was designed for use in a base-loaded mobile antenna with a minimum over-all length of six feet. It will resonate an antenna of this length to any frequency between approximately 3.75 Mc. and 30 Mc. Using a longer whip or adding a capacity hat to the antenna will permit operation on still lower frequencies.

The continuously adjustable feature is valuable in emergency or portable operation. The car may be parked and a long wire antenna clipped to the end of the mobile antenna. Then the entire combination may be resonated to the operating frequency by means of the slider in the loading coil, resulting in an antenna that may often rival the home antenna in efficiency.

Figure 1 illustrates the constructional details of the loading coil. The fiber-glass rod that carries the weight of the antenna may be obtained from a sporting-goods store in the form of a "glass" fishing-rod blank. Obtain a fairly husky one and cut the piece required from the large end. Damaged blanks can frequently be picked up from larger sporting goods stores, where fishing rods are repaired, almost for the asking.

The necessary plastic may be obtained from plastic extruding firms or specialty shops. It should preferably be one of the new butyrates that resist shattering and do not deteriorate under exposure to weather and sunlight. Some amateurs, who have built similar coils, have utilized plastic household utensils as a source of this material.

Construction

Start construction with the plastic end pieces *(B,C)*. One of several possible methods of making them is described here. Cut two discs, three inches in diameter, from 3/16-inch or ¼-inch plastic. Then, cut two more discs of a diameter just sufficient to fit inside the ends of the *B&W* coil *(A)*. Cement them to the centers of the larger discs. Drill a hole through the center of each end piece, to pass the fiber-glass rod *(D)*.

Place these end pieces on the ends of the coil and measure the exact overall length. Cut the fiber-glass center rod one inch longer.

Now make the metal fittings *(E* and *F)*. They may be of brass or aluminum and are about ¾" in diameter and 1" long. Drill half way through them from one end and tap the hole for ⅜" x 24 threads to match standard mobile antenna fittings.

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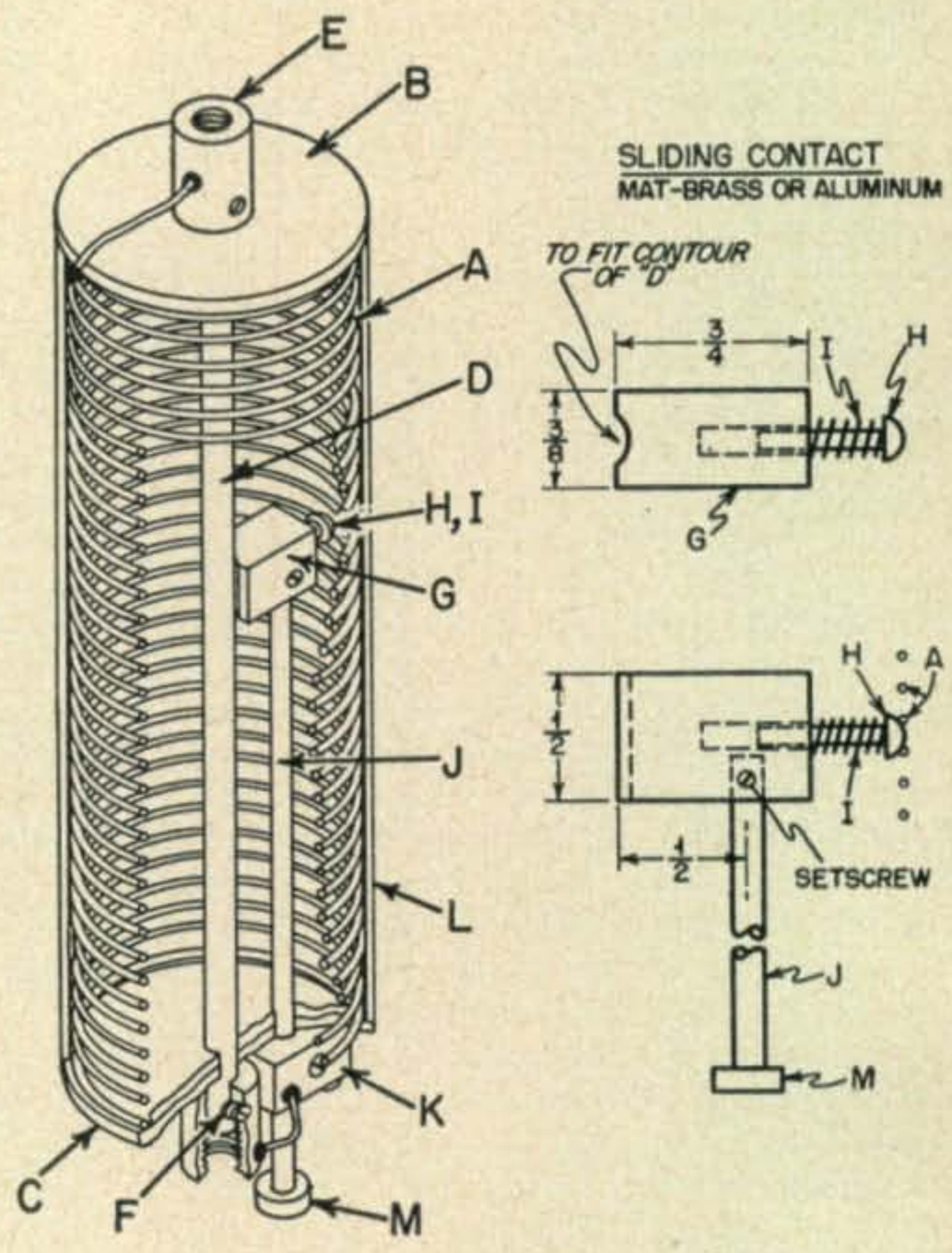

Fig. 1. Details of the "all-band" loading coil described in text. A—B&W, No.-3906-1, bulk loading coil consisting of #14 tinned copper wire spaced wire diameter, 2½ inches in diameter, ten inches long. B, C—Three-inch diameter plastic discs, ⅛ or ⅜-inch thick, to which are cemented smaller discs to fit inside ends of A. D—Fiber-glass rod, approximately ⅜ inches in diameter x 11½ to 12 inches long. E, F—¾ x 1-inch brass or aluminum, drilled and tapped as described in text. G—¾ x ⅜ x ½-inch, aluminum or brass block, modified as shown. H—brass contact pin. I—small coil spring. J—12 x ¼-inch brass rod. K—¼-inch shaft lock (Millen No. 10063). L—Outside plastic coil shield. M—Knob for adjusting rod.

ALL BAND COIL

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Drill a hole through from the other end to be a tight fit on the fiber-glass rod. Drill and tap holes in the fittings for an *8-32* set screw to fasten them to the rods. Alternately, a small hole may be drilled through the fittings and rod to accommodate a brass drive pin.

Next, make the slider mechanism *(G, H, I)*. Obtain a piece of brass or aluminum about ⅜"x½"x¾". Cut a groove lengthwise along one of the ⅜"x½" sides to fit the contour of the center rod. This may be done with a file or by drilling a hole of the proper diameter in a piece of metal somewhat longer than desired and sawing it in two, lengthwise through the hole.

Drill a ¼-inch hole into the bottom of the block, ½" from the groove for the brass adjusting rod *(J)*, which should be about a foot long. Drill and tap a hole for a set screw to hold the rod to the block.

The contactor *(H)* can be formed from a round-head brass screw or pin. It is held in a small hole in the face of the sliding block *(G)*. The contactor is spring loaded by slipping a small coil spring over its shaft before inserting it into the hole.

Drill a hole through the bottom disc *(C)* to accommodate the adjustment rod. Fasten a *Millen 10063* shaft lock *(K)* to the disc in alignment with the hole. At this time, drill a few additional holes in the disc to allow moisture to escape from the completed loading coil.

Before assembling the various components, cement a narrow strip of thin plastic parallel to one of the ribs on the coil *(A)* about ⅜" from it. The contactor *(H)* will ride between these strips. Be sure that the turns between them are clean and free of cement.

Assemble the various parts as shown in *Fig. 1*, connecting the top of the coil to the top fitting *(E)*. The other connection is made between the shaft lock *(K)* and the bottom fitting *(F)*. Complete the job by cementing a thin wrap of plastic around the coil to the end discs.

Mounting The Coil

Although the coil is designed for base loading, it should be mounted at least a foot from the bottom of the whip. This position permits pulling the adjustable slider clear out when operating on the lower frequencies. Equally important, this is a very high-*Q* coil, and any large metal mass in its field will reduce its *Q* sharply. For this reason, too, the coil should

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also be at least a foot from the car body.

The simplest way to adjust the coil is to install it in the antenna and couple the antenna loosely to the final amplifier tank circuit. Tune the tank to resonance, and adjust the coil slider for maximum loading. Then, increase coupling for normal amplifier plate current, resonate the tank circuit again, and lock the loading adjusting rod.

The first time these adjustments are made on each band, a remote field-strength meter is helpful in confirming the settings. Once made, the operator may cement decals to the plastic coil cover to mark the correct position of the slider for each band.

LOADING COILS

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built-in loading coil, to be used with a standard base insulator. It consists of a fiber glass support column, upon which is wound the loading coil, and an adjustable upper section. The upper section is connected to a circular contactor which rides inside of the coil.

The antenna is resonated by sliding in and out the upper section. This operation is facilitated by factory-calibrated marks for the center of each amateur band.

A plastic covering protects the coil from the weather, and a packing gland keeps moisture from entering the sliding joint. In addition, the upper whip is covered with flexible fiber glass. Maximum diameter is 1⅛ inches at the coil, tapering to ⅛-inch at the tip. Weight is less than two pounds, and length varies from 117 inches to 63 inches, depending on frequency of adjustment.

A similar antenna, less the adjustable feature, is available for any frequency between 1.5 and 30 Mc. Also available is an adjustable base inductor to lower the minimum frequency of any mobile antenna.

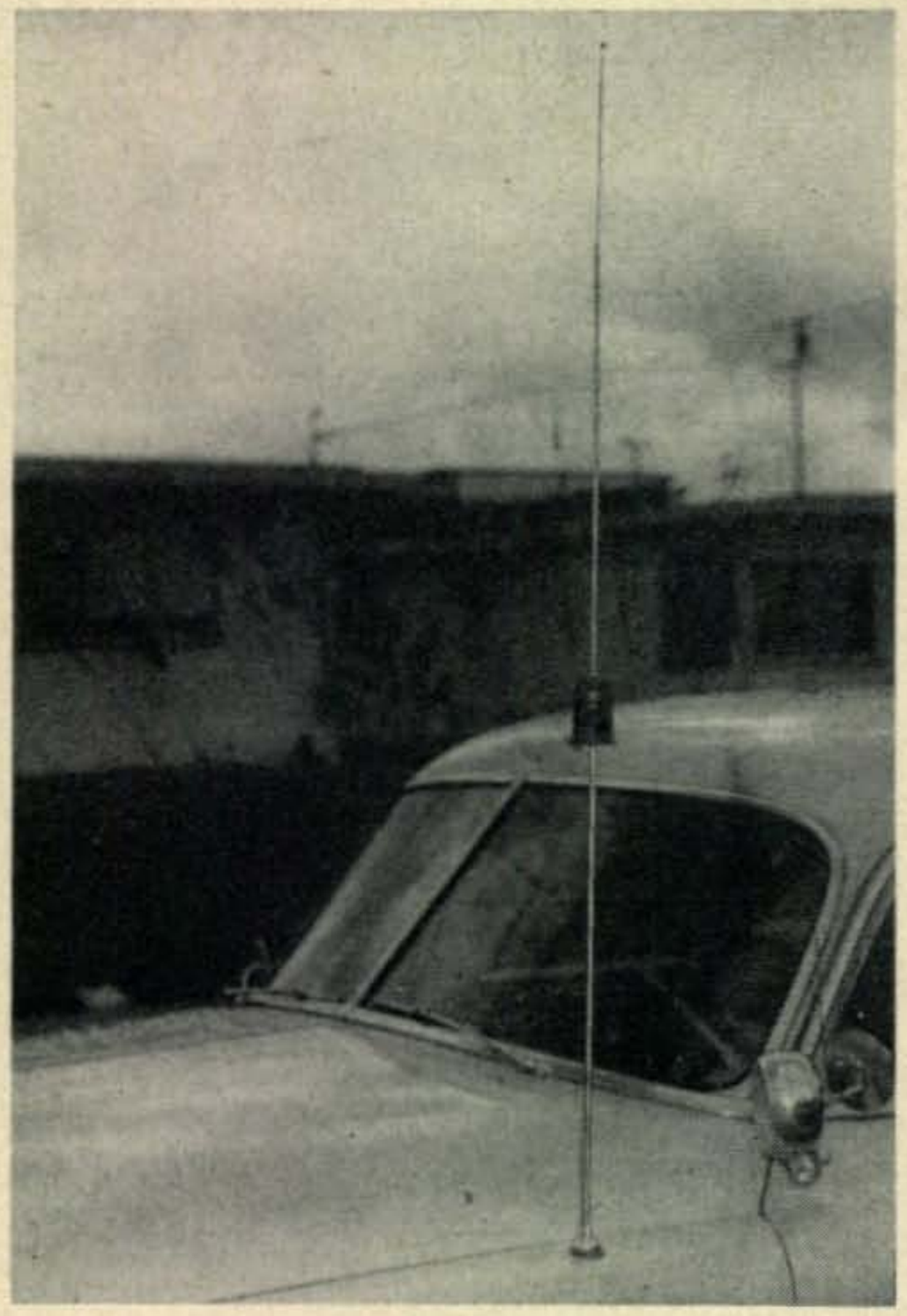
These products are manufactured by *Webster Manufacturing Company, 242 Shoreline Blvd., Mill Valley, Calif.*, and are available through amateur parts distributors.

VS Baby Mobile Antenna

It will probably surprise many of our mobile operators to find that some fellows are not on the air simply because the XYL objects to the "big" antenna.

To get around this objection Bill Davis, W6VS, has designed a cowl or fender mounted broadcast whip with midget loading coils. No claim is made that it will outperform the 9-foot whip, but it will give a good account of itself.

The modification is a matter of dividing the broadcast whip into two isolated sections. A 5"



The "VS Baby" is a very compact center loaded antenna for mounting on the cowl or fender. A plastic housing protects the loading coil.

length of fibre-glass rod is then formed and mounted through the use of fishing-rod ferrules between the sections. *B&W* coils are attached to this insulating rod and the antenna is loaded up in the usual fashion. What results is a form of center loading. The coils on the lower frequencies are tapered and are hand-made. A broadcast coil is available and has been tested by a member of *CQ* staff. He reports that resonating the BC antenna brought stations up over 24 db. on the low frequency end of the band and up over 36 db. on the high end of the broadcast band.

The coils and complete antennas are available from *Bill Davis, 225 Cambridge Ave., Berkeley 8, Calif.*

"W3GH" Mobile Antenna Coil

The heart of the W3GH "Green Hornet" mobile antenna is its loading coils. They are wound on rugged, low-loss Synthane forms, fitted with aluminum end pieces to accommodate standard mobile components. They are two inches in diameter, wound of *G.E.* Formex-insulated wire and coated with a *G.E.*, high-frequency weatherproof compound.

The 75-meter coil contains eighty turns of #16 wire and is eight inches long. Inside the form is an adjustable aluminum slug, which

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permits a resonant frequency shift of about 180 kc. The 7 and 14-Mc. coils are similar, except that they are only four inches long and do not contain the adjustable slug.

A whip at least five feet long should be used above the "Green Hornet" coil. It is recommended that the antenna below the coil be rigid, with any flexing spring mounted above the coil.

A fourteen-inch capacity hat is available as an accessory to the coil. W3GH believes that the hat not only increases the radiation efficiency of the antenna, but also adds a horizontal component to the radiated signal that helps in getting out under all sorts of conditions.

The coil, a complete antenna, or individual components may be obtained from *Van Kirk Radio, 92 East Pettybone St., Forty Fort, Pennsylvania.*

W5BZO All-Band Mobile Antenna*

The *W5BZO All-Band Mobile Antenna** is a base-loaded antenna with a built-in, adjustable loading coil, designed to operate on any frequency between 3.75 Mc. and 29 Mc. With the upper whip section "in," the loading coil is completely out of the circuit, and the antenna is self resonant in the 28-Mc. band. As it is pulled out, more and more of the coil turns are inserted, and the antenna resonates at progressively lower frequencies. The minimum resonant frequency is 3.75 Mc.

The coil is wound of #16 bare copper wire on a slim slotted and grooved lamicoid form, the bottom of which is terminated in a fitting threaded to fit any standard mobile antenna base mount. Another tube of lamicoid is slipped over the winding and sealed at both ends with glyptal to weatherproof the coil.

A phosphor-bronze "cup" on the end of the upper whip section makes contact with the inside of the coil turns through the slot in the lamicoid form. A knurled lock nut and a brass ferrule holds the upper whip in position, once it is adjusted for the desired frequency. A packing gland keeps moisture out of the assembly. All exposed parts of the antenna are constructed of stainless steel for strength and to prevent corrosion.

Average measured radiation resistance of the W5BZO mobile antenna is fifteen ohms at 3855 kc. The coil *Q* is 300 at the same frequency.

Up to the present time, these antennas have been custom made on order, but W5BZO has just enlarged his shop and obtained additional machinery to produce them on a production-line basis. They are available directly from the manufacturer, *G. R. Ellis Communications, 2520 Avenue E, Bay City, Texas.*

* Patent Pending