This simple but effective antenna will also increase the security of your new three-headed gear.

Build A Three-Purpose Antenna

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The advent of in-dash radio units combining a CB transceiver with a broadcast receiver for both m.f. a.m. and v.h.f. f.m. has brought about a need for a single antenna that will serve the triple-purpose unit. This article tells how you can build just such an antenna.

Almost every antenna represents a compromise between the ideal and the practical, even those designed to function on a single band. Although departing from the ideal, these antennas provide fully acceptable service, especially for reception. Modern radio receivers are so sensitive to even weak signals that less-than-ideal antennas perform to the full satisfaction of their users.

With transmitting antennas, compromise is less easily accepted, especially in the Citizens Radio Service, (CRS) where power is sharply limited. Space, appearance, and other cogent considerations express compelling arguments for compromise, however. Almost every vehicle equipped with CB carries an antenna that implies a practical settlement of the several and somewhat divergent considerations.

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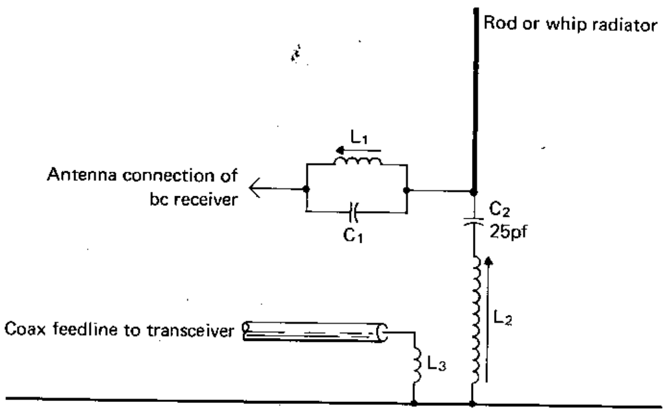

Fig. 1—Schematic of the three-purpose antenna. C1 10 to 25 pF; L1, suitable inductance to tune 27 MHz in conjunction with C1. C2, 25 pF mica; L2, suitable inductance to tune to 27 MHz in conjunction with C2 and rod antenna; L3, 2-turn link at low-potential end of L2.

The three-purpose antenna is a compromise, too, but one that does not appreciably deteriorate the performance of the receiver and transceiver it serves.

How Big And Where Located

Concerning size, one should keep in mind that for any transmitting antenna, the old adage "The bigger the better" holds good. There are reasonable limits, of course. A quarter-wave at 27 MHz can be a bit awkward to handle on a car but is quite practical on a recreational vehicle. For your car, your aesthetic standards probably will dictate something much less than a quarter wave. And for uniform response over a band of frequencies, such as 23 or 40 channels of the CRS, remember the law stating the ratio of diameter to height sets the bandwidth of an antenna. Here, again, aesthetic and wind-resistance considerations probably will impose reasonable limits.

As to its location on a vehicle, one consideration is feedline length, which is a more important factor for the broadcast receiver than for the CB transceiver. It is not feasible to attempt to match impedances between antenna and broadcast receiver; so the antenna lead does not function as a true transmission line. Its losses increase markedly with length. For the CB transceiver, impedance matching is easily attainable and losses are negligible for any length likely to be found on any vehicle.

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Even though lead losses to the receiver are greater, receiver sensitivity is so great that a drop in signal input can be tolerated.

The location of the antenna on the vehicle will affect the radiation pattern to some degree. It's seldom, though, that a mobile radio station, with its changes in direction of travel, has need of a radiation pattern favoring any one direction. A truly omnidirectional pattern probably would be the most suitable but that would necessitate mounting the radiator squarely in the center of the top of the vehicle. Fortunately, placing the antenna on a side or on the trunk of a car does not adversely affect the radiation pattern seriously.

How It Works

The three-purpose antenna, shown in fig. 1, consists of a base-loaded CB radiator or rod, with a small capacitor beween the rod and a series coil. The coil is slug-tuned and has no parallel capacitor. Between rod and capacitor, a connection leads to a wave-trap tuned to 27 MHz.

Here's how these serve to channel signals only to desired paths. The series capacitor has high capacitive reactance to signals in the MF AM broadcast band, and the series coil has high inductive reactance to signals in the VHF FM broadcast band. Those signals therefore seek the optional path through the parallel-tuned wave-trap, which has negligible impedance to their frequencies. For CB signals, which are inductively coupled into and out of the series coil, the wave-trap presents a very high impedance. They, therefore are not attenuated by the tap-off to a broadcast receiver.

Getting The Parts Together

It's a sad state of affairs, but nevertheless true, a builder spends more time gathering parts than putting them together. This project is no exception. Only a few years ago one could obtain from any of several mail order houses slug-tuned coil forms in a variety of sizes and slug compositions. No 1977 mail-order catalog lists them! So your most probable source, if you lack a well-stocked "junkbox," is from a wrecked TV receiver. By a bit of judicious cannibalization, you can salvage coils with slugs suitable for upper-h.f. applicatons. Don't try to use forms you may find that have high-inductance windings. It's probable their slugs are of a material having high losses at the upper end of the HF spectrum.

One coil form, that for the 27-MHz wave-trap, can be the more common ¼-inch diameter. The one for the series coil possibly could be that small but a larger one would be much preferred. Fewer turns would be needed for a given inductance. Also, a better "form factor" could be achieved.

The other parts are more readily obtained. For the wave-trap, almost any capacitors between 10 and 25 pF capacitance may be used. The series capacitor should be a mica or glass type and approximately 25 pF capacitance. For the actual radiator, a wide choice is possible. A flexible rod or a rigid one with a base spring may be used. If you do use a spring, be sure to provide an r.f.

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