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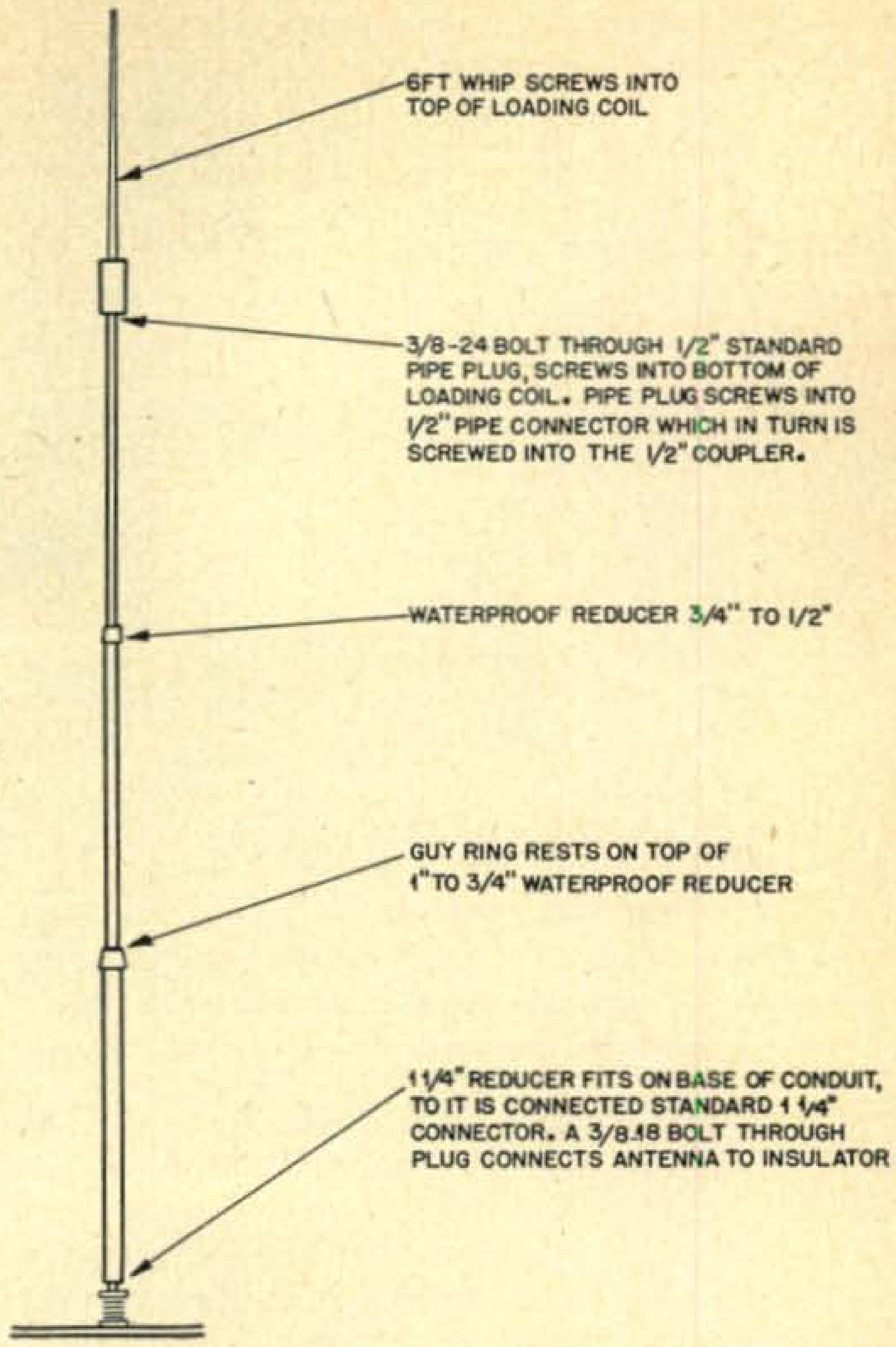


Fig. 1. The Top Loaded Ground Plane for 75 Meters stands 35 feet. 10 foot sections of thin-wall conduit, a loading coil and a 6 foot whip make up the vertical radiator.

a "shorty" Ground Plane

A Top Loaded Ground Plane Antenna for 75 Meters

Three ten foot sections of thin wall electrical conduit, a high Q loading coil and a six foot whip antenna can be easily made into a very effective vertical radiator. When worked against an array of quarterwave radials it becomes an efficient ground plane antenna.

There are a number of advantages to vertical antennas and a number of disadvantages as well. This configuration affords all of the advantages and eliminates one of the main disadvantages. While the advantages are well known they might be reviewed before getting into constructional details. They are:

1—Low angle of radiation with a substantial concentration of radiated signal equivalent to several db gain at an angle approximating 45°

2—Ease of feeding. Readily available coaxial cable need only be connected to the base as described later. No elaborate networks, balun coils or the like are required

3—Little space is required in which to erect the antenna.

4—Excellent efficiency is possible. Broadcast station vertical antennas have demonstrated efficiencies in excess of 90%

The main disadvantage to a vertical radiator is that it must work against a good ground system if reasonable efficiency is to be expected. As a rule, this implies an elaborate radial ground system. The latter, in turn, usually means digging small trenches in the lawn, flower bed and tunnelling under sidewalks and driveways, all of which is nothing but hard

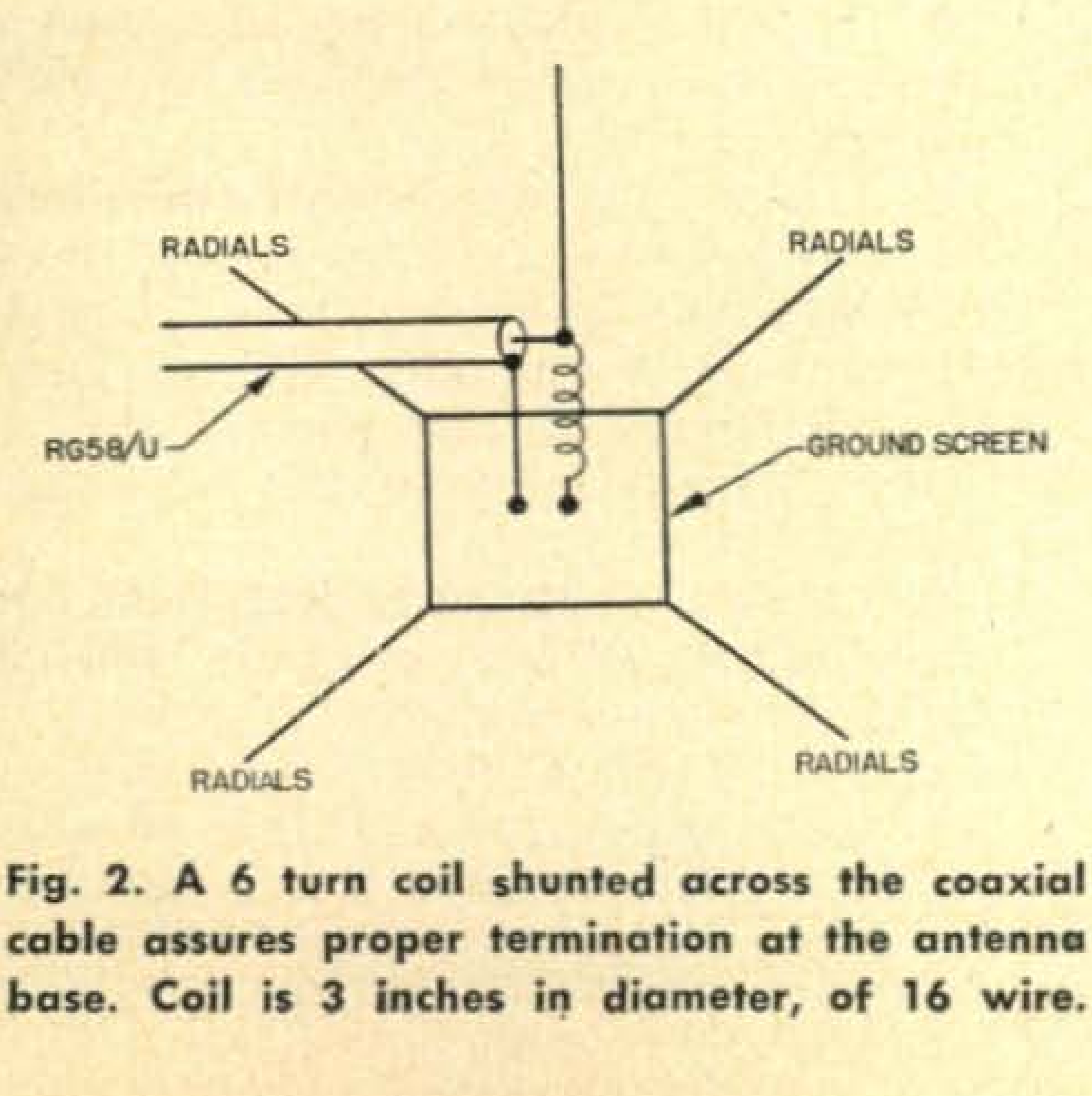
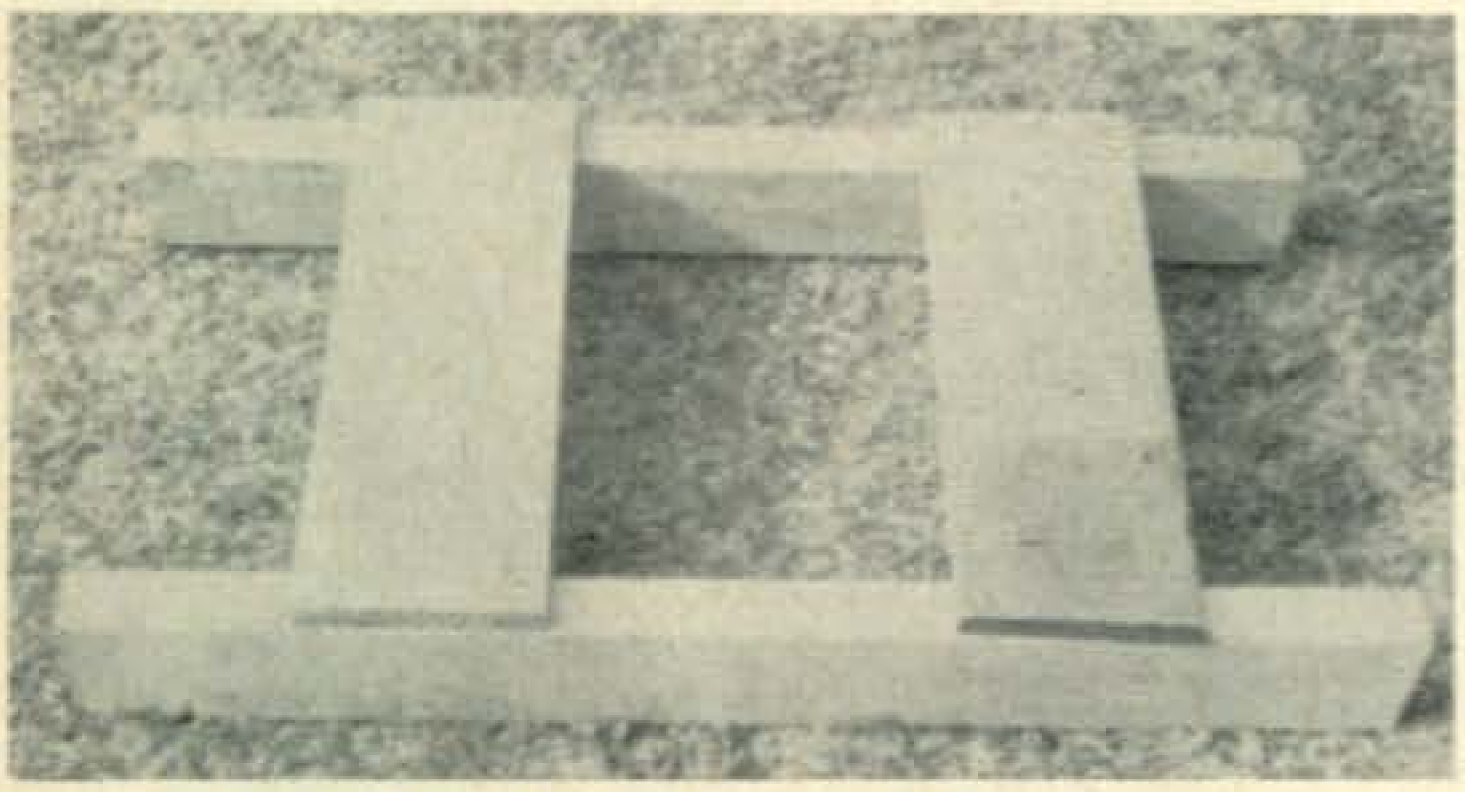


Fig. 2. A 6 turn coil shunted across the coaxial cable assures proper termination at the antenna base. Coil is 3 inches in diameter, of 16 wire.

work. By use of ground plane radials, as described herein, a good ground system is obtained with a very minimum of effort.

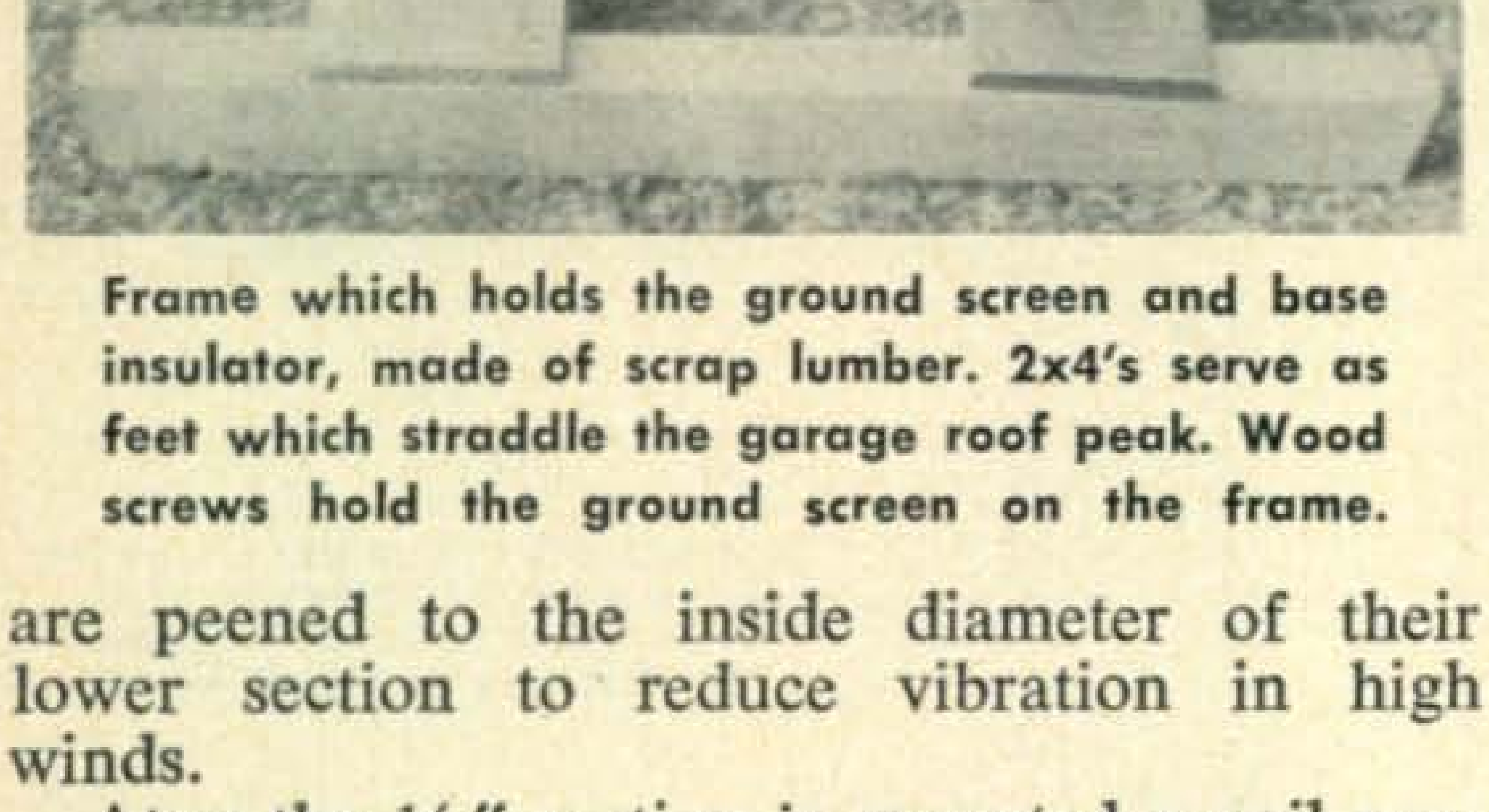
Figure 1 tells the story of the vertical radiator itself. A base section made of 1″ thin wall electrical conduit supports a ¾″ section which in turn supports a ½″ section. Each section is telescoped into the other, 12″. Telescoped ends



Frame which holds the ground screen and base insulator, made of scrap lumber. 2x4's serve as feet which straddle the garage roof peak. Wood screws hold the ground screen on the frame.

are peened to the inside diameter of their lower section to reduce vibration in high winds.

Atop the ½″ section is mounted a coil normally used for loading mobile antennas. While waterproof reducers couple the section of conduit together, a ½″ coupler that takes a standard ½″ pipe connector is used to mount the coil onto the conduit. A standard ½″ pipe plug is drilled to take a ⅜ 24 bolt through its center. The connector is screwed onto the coupler. The ⅜ 24 bolt is fed through the plug up into the base of the coil and then the plug



Ground screen, base insulator and frame, with 62 foot radials cut and rolled into coils await hoisting atop garage roof. Ground screen is scrap dural 20x24 inches.

is screwed into the pipe connector. The whip screws into the top of the loading coil to complete the antenna.

At the base is connected a 1-¼″ reducer to which a standard 1-¼″ pipe connector is attached. A 1-¼″ standard pipe plug fits into the connector, after having been drilled through its center to take the ⅜ 18 bolt that holds the antenna onto the base insulator.

While a porcelain insulator is shown, the type of insulator used at the base is not critical. At even maximum legal power, voltage at this point will be quite low. Ordinary hardwood impregnated with paraffin, coil dope or other dielectric material to keep it dry will do a good job.

Feeding the antenna is accomplished as shown in the schematic of *Figure 2*. Fifty ohm coaxial cable shunted by a small coil connects to the base. The coil which consists of 6 turns of No. 16 wire space wound three inches in diameter cancels the capacitive reactance of the line and effectively keeps the line out of the antenna system.

The ground system consists of a ground screen and six quarterwave radials. Size of the ground screen is not too important. The one shown just happened to be 20 inches by 24 inches, but obviously the larger the screen the better. Radials were cut to measurement, however. Each one was pruned to a length of 62 feet.

After radials were cut to length they were assembled on the ground screen. The latter is supported by a frame (see photo), which straddles the peak of the garage roof upon

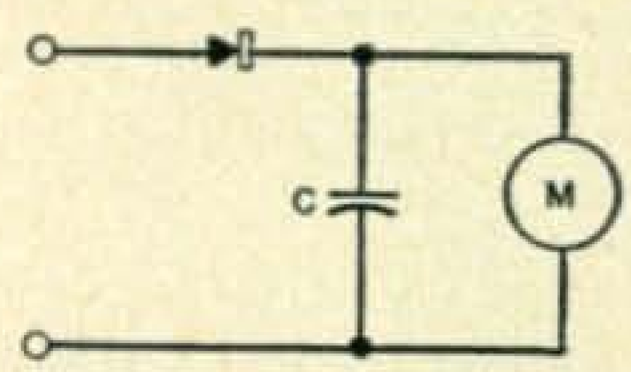


Fig. 3. This simple field strength meter consists of a germanium diode such as a 1N34, a .005 condenser and a 0-5 milliampere movement meter. More sensitive meters can be used, but since readings are only comparative, in this usage, a more common movement will suffice. Many surplus meters that read low DC voltages have 0-5 ma. movements and can be bought quite inexpensively.

which the radiating system has been erected. However, the radiator was 'rough tuned' before being hoisted to the garage as follows:

1—Coax was connected to antenna as shown in Figure 2

2—The opposite end of the coax was terminated with a 50 ohm ½ w. carbon resistor

3—The transmitter was set on the desired frequency and a random length of wire was attached to its antenna connection

4—A simple field strength meter, Figure 3, was connected to the end of the coax that is terminated with the 50 ohm resistor

5—Input to the transmitter was then set to where about a quarter scale deflection appeared on the meter

6—Antenna was lowered and turns of the coil were shorted out a few at a time until optimum reading was achieved on the meter

The whole system was then hoisted to the roof. The ground screen was put in place and radials were strung out as far as possible in straight lines and then bent around until they were extended to their full length. While it would be nice if radials could be laid out as though they were spokes of a wheel this is seldom practical for the amateur. Therefore it is necessary to string radials around in several directions. Even though radials might run through trees, shrubs, down sides of buildings and along fences, they are considerably better than no radials at all.

The antenna was then hoisted into position and guyed loosely. Impregnated rope serves as guys although that new plastic clothesline with the nylon tire cord core is even better. The latter does not stretch while the rope has stretched for several months, requiring frequent trips to the roof to take up slack.

With the antenna in position the same procedure as outlined previously was gone through. The coil was tapped down until optimum reading was obtained. This requires raising and lowering the antenna a number or times, but it is time well spent.

Since the meter is attached to the far end of the coax, it was brought up to the roof of the garage. There readings were available as fast as the antenna could be lowered and raised. As a result the coil pruning process took less time than it might first appear. The whole job was done by one man, but two makes life so much simpler!

At W6GEG this top loaded ground plane has worked out even better than expected. While rag chewing is preferred to DX, contacts have been made as far West as Midway Island, as far North as Kodiak, Alaska and up and down the East coast of the United States with excellent reports.

The transmitter is a single sideband transmitter with a pair of grounded grid 6L6's in the output stage. Despite this modest tube array 50 db over S9 reports have been obtained from San Francisco, 30 db over S9 from Denver, Colorado and 40 db over S9 from Seattle during rag chews! No such reports were received before a conventional half wave dipole was replaced by the top loaded ground plane. ■

2 On Two

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Just a few years ago if one wanted to use crystal control on two-meters it would have meant a l.f. crystal and four or five doubler stages. In addition, the h.f. performance of the old high-inter-electrode capacity tubes would be poor. Now with the new harmonic-crystals, and h.f. tubes at low prices, a crystal-controlled two-meter transmitter can be constructed with just two *Amperex 6360* miniature tubes. This transmitter will run 17 w. input on phone or 30 w. input on CW.

The *Amperex 6360* is similar to its big brother, the *Amperex 9903/5894,* but is of the 9-pin miniature type and sells for about four dollars. The tube is a dual-tetrode with a common cathode, common screen and dual-filaments that can be used in parallel for 6 v. operation or in series for 12 v. operation. This allows the tube to be used for mobile work in either the older 6 v. cars or the newer 12 v. ones. The tube is designed with short leads and a button stem for full ratings up to 200 mc.

The transmitter is constructed on a 4″ x 6″ aluminum bottom plate in order that a *Bud AC-430* 4″ x 6″ x 3″ aluminum chassis can be used for a base and cover. This small size makes the transmitter useful for mobile work since it can be clamped to the steering wheel post, or kept in the glove compartment.

From the picture of the top of the transmit-