strength. This must be done to compensate for the capacity added to the primary tuned circuit of the i.f. transformer by the shielded lead.

Then plug in the Q-multiplier, adjust capacitor *C1* and resistor *R1*, and adjust coil slug *L1* for maximum signal strength. Retard control *R1* as necessary during this operation to prevent the Q-multiplier from breaking into sustained oscillation (indicated by a steady squeal from the loudspeaker or by the receiver suddenly going dead). Also, the value of resistor *R3* may be increased or decreased if necessary to give resistor *R1* full control.

Operation. In operation, receiver selectivity is maximum when resistor *R1* is adjusted just below the oscillation point. Capacitor *C1* acts as a vernier tuning control, permitting the desired signal to be picked out of a mess of interference.

40-METER ANTENNA FOR SMALL ROOF

Are you one of those people who claim that they don't have room on the roof for an efficient transmitting antenna? Actually, if you have an outside TV antenna, you probably do have room for an effective 40-meter (7-mc.) antenna which will also work on 15 meters. The secret is to use a pair of the TV antenna guy wires as the radiating portion of an "inverted-V" transmitting antenna as shown in the diagram.

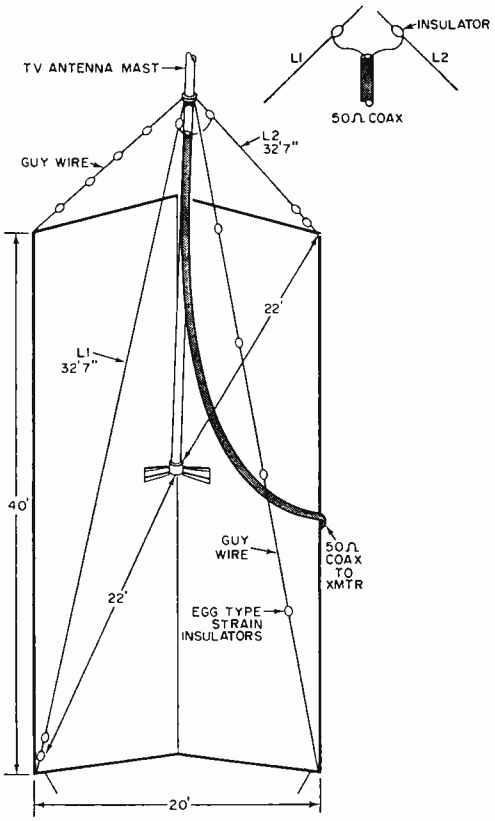
Let's work out the details for installing a 40-meter dipole which has an overall length of approximately 66 feet on a 20′ x 40′ roof—a *very* small roof, incidentally. You'll need a few "egg" type strain insulators (approximately 1¾″ x ¾″) and some 50-ohm coaxial feedline to do the job. Use RG-8/U coaxial cable if you can; RG-58/U will be okay if the length is not excessive.

Design Details. Assuming that the TV antenna is mounted in the center of the roof, we first determine the distance from its base to the corners of the roof, where the guy wires are undoubtedly anchored.

Using the Pythagorean theorem (*the square of the hypotenuse of a right triangle is equal to the sum of the squares of the other two sides*, or $Z^2=X^2+Y^2$), and substituting the distances from the TV antenna base to one side and to the front (or back) of the roof in the formula, we come up with $10^2 + 20^2 = 500$. From a table of roots and squares in a high-school math book, the square root of 500 is something over 22 feet.

Allowing a foot at each end of the dipole for insulators means that approximately 34 feet will be required to accommodate each half of the antenna. Substituting 34 feet for Z and 22 feet for X in the formula gives: $500 + Y^2 = 1152$. Solving for Y, we get $Y = 26$ feet, approximately. Consequently, the apex of the "V" will have to be 26 feet

(*Continued on page* 163)



Where roof space is at a minimum, a pair of guy wires supporting a TV antenna installation can be used as the radiating portions of a 7-mc. (and 21-mc.) "inverted-V" transmitting antenna.

which fits into the mouthpiece groove. The ends of the wire clip fit into small holes in the side of the box.

Switch *S1* is mounted with two screws, and wired to two battery connectors (which may be salvaged from discarded 9-volt batteries) in series. The batteries can be wedged into position by the circuit board, or held in the box with a bracket or cement. Spray-painting the box after assembly will improve the appearance, and title decals will add the finishing touch.

Operation. When the Beeper is in use, the first beep will be heard about 30 seconds after the switch is turned on. Thereafter the beeps will be heard at approximately 15-second intervals. To test the Beeper, temporarily connect a 10,000-ohm resistor across *R1*; this should increase the beep rate. Current drain is only about 2½ ma., so the batteries should last over 200 operating hours with normal intermittent phone use.

If you regularly record telephone conversations of technical discussions, business transactions, long-distance family calls or for any other purpose, the Telephone Beeper will be a useful accessory to remind the party at the other end that he is being recorded, and may also prevent you from being charged with unlawful recording. The investment is small, the inconvenience slight, the result worthwhile. -30-

40-Meter Antenna

(*Continued from page* 112)

higher than the ends to fit in the available space. If your TV antenna mast is not high enough for the purpose, you can add a length of mast to it above the TV antenna.

Modifying the Guy Wires. Insert an egg-type strain insulator (which is stronger than ordinary antenna insulators) in the pair of guy wires where they are fastened to the mast. Then determine the exact length of each half of the antenna (*L1* and *L2* in the diagram) for the desired frequency with the formula: $Length_{ft.} = 234/Freq._{mc.}$,

which works out to 32′ 7″ for 7.175 mc., the center of the 40-meter Novice band. Both *L1* and *L2* should be cut to this length if you want to operate around this frequency.

Now measure off the desired lengths from the center insulators and insert another strain insulator at each measured point. If your transmitter power is much over 100 watts, it might be wise to use two strain insulators in series at these points for increased insulation.

Finally, solder the inner conductor of your coaxial feedline to one side of the antenna at the apex and the outer shield to the other side. Tightly tape the end of the cable to keep moisture out of it, and drop the cable down the pole, along the roof, and into the radio room.

Don't worry about the guy wires not being copper; they will radiate okay. But you might insert strain insulators in the unused guy wires at 10′ intervals for slightly improved results. -30-

Stereo Indicator

(*Continued from page* 75)

ture is connected to the frame, and in the case of the stereo indicator, it's necessary to keep it off ground.

Connect a multimeter or VTVM across diode *D1,* and tune in a stereo signal. A negative potential of about 0.5 volt d.c. will appear across the diode with respect to ground. If no stereo signal is available at the time, a 19-kc. signal from the audio oscillator can serve as the input. Set the audio oscillator to provide a signal of 0.5 to 1.0 volt or so, and tune coil *L1* for maximum voltage across *D1.* The input sensitivity of the stereo indicator is about 0.03 volt r.m.s. at 19 kc.

Potentiometer *R7* is a level or threshold control. Adjust it to set the threshold high enough to light the lamp when a moderate level FM stereo signal is being received, but not so high that the unit trips on inter-station noise. Stronger bursts of noise between stations will trip the relay. However, careful adjustment of *R7* will eliminate most of the trouble from this source. -30-