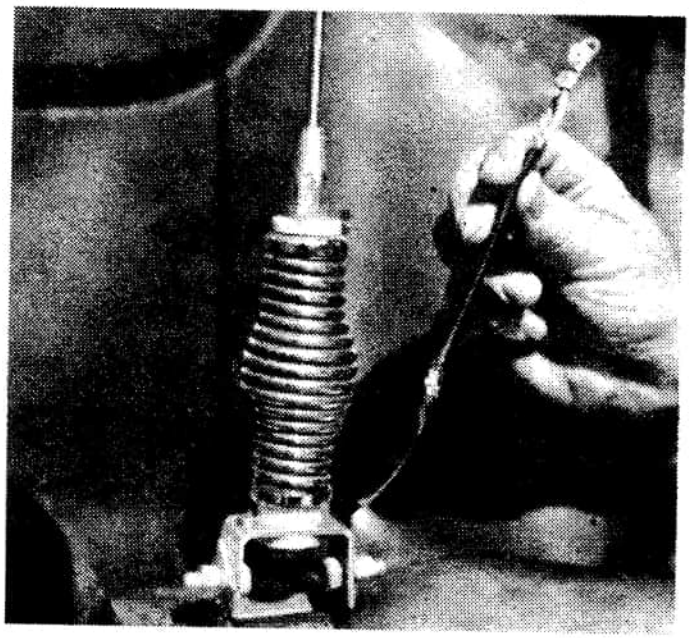


PERK UP YOUR MOBILE

Careful inspection and repair can give you like-new performance.

By Bert Mann

TAKE a high-quality Citizens Band transceiver, install it in a car or truck, use it continuously and subject it to vibration and bumps—and what happens? After six months you can't even remember its like-new operation.

To get some of the old zip back you need a perk-up job. A CB rig is just like a car in that respect. For maximum performance a twice-yearly tune-up is called for.

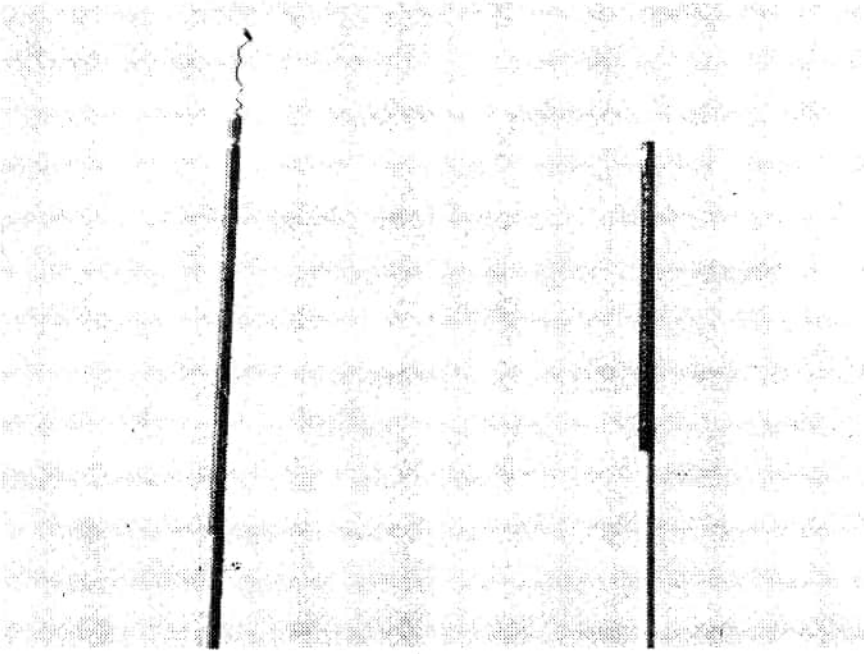
A mobile revamp is considerably different from that given a base station. Dusting, tube-checking and so on may be enough for a home rig but thorough cleaning is required for mobiles.

Start with the tip of your whip and go all the way through your system. That little ball on top of the antenna is more than a decoration. It discharges static electricity built up by air friction, distributing it over a large area. Without it, the discharge is from a sharp point and causes high-intensity noise shots. If the ball is gone get a steel marble, such as those used in toys, and drill a snug-fit hole in it. Then force-fit it on the antenna. A plastic ball also can be used.

Continuously loaded whips usually have a plastic sheath over their coils. If the sheath cracks the coils can be exposed to damage. If there are breaks or cracks in your sheath wrap it with a single layer of plastic tape and saturate it with poly or coil dope for waterproofing. If insulation is chipped off the coil itself saturate it with Glyptal. When that dries, wrap the exposed coil with tape and then waterproof the job.

The spring at the base has an internal braid running from one end to the other, which prevents the spring from acting as a loading coil (the braid shorts out the would-be coil). To check, bend the coil and look inside to make sure the braid is connected to both ends. If the braid appears corroded jam a pencil or screwdriver into it. Replacement of the spring was past due if the braid breaks.

In bumper mounts, check the coax at the base (our lead photo shows a cable damaged by bumper vibration). Look carefully for corrosion on the braid (the ground connection). When you find corrosion remove it with a wire brush, trim the end of the coax and form a new ground with the braid. If the coax must run in a tight bend around the bumper,



If a loaded mobile whip's plastic sheath cracks, it can result in damage to the loading coil, as in the picture at far left. To repair, restore coil and wrap exposed section tightly with plastic tape (see photo right, after repair).

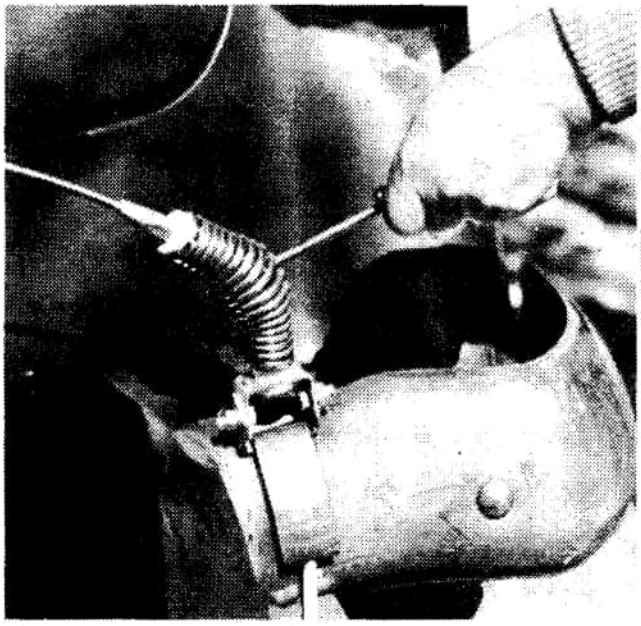
cement some rubber grommets to the cable to prevent direct contact.

Body mounts require especially close checking. It is not unusual for the hard Bakelite insulators used on low-cost mounts to develop fine cracks between the ball (the RF hot lead) and the grounded mounting screws. Dirt and grime, accumulated in the cracks, tend to bleed off some of the RF energy. As a temporary measure you can clean the cracks with carbon tet and cover them with plastic tape. But the only final solution is replacement.

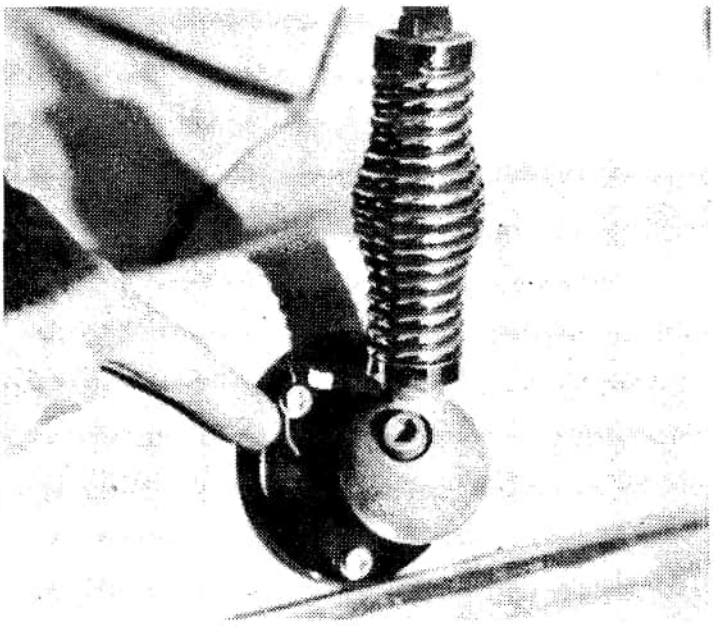
The last check on the antenna is the cable. If it runs under the car, look for rock damage; if under the back seat or floor mats, be on the lookout for a squashed spot. Cable is cheap. Spend a dollar for a new one if you need it.

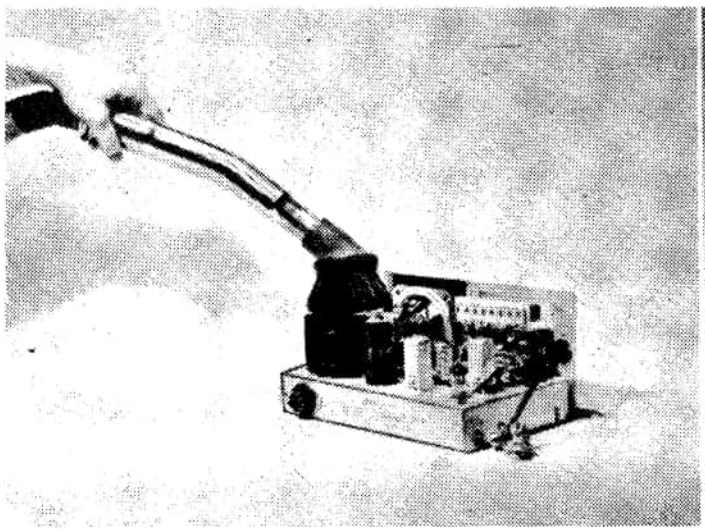
On front cowl mounts, the mounting nut should be tightened because the

A defective or corroded shorting braid in the whip's spring will break when jabbed with tool.

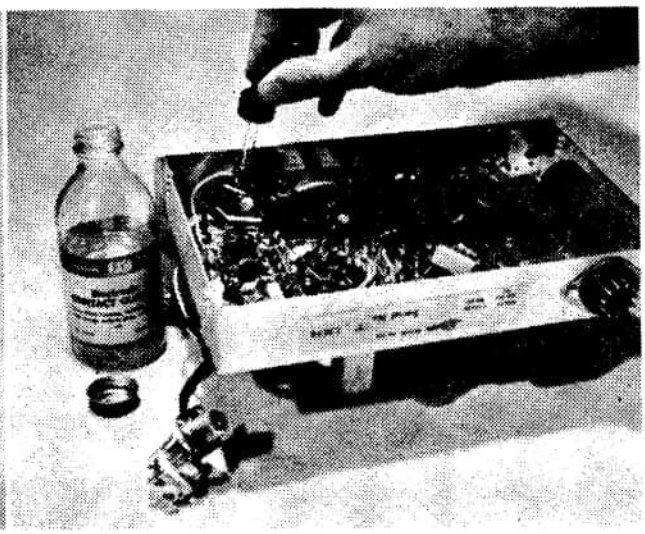


Body mounts should be checked for cracks around mounting screws; grime in cracks shorts out RF.





Thorough vacuum-cleaning removes dust and dirt from mobile transceiver. Cleaning can prevent intermittent operation. Do not blow out dust.



Transmit and receive switches require periodic cleaning for trouble-free operation. A liquid cleaner is being used here; never file contacts.

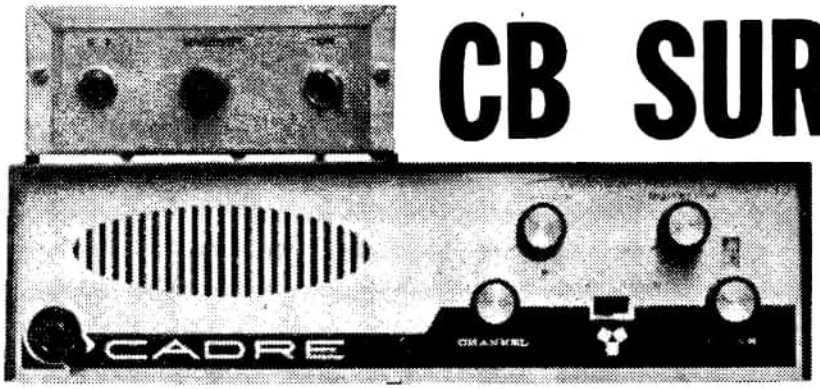
coax ground connection is determined by the tension of the nut.

Turning to the transceiver, take off the cabinet and vacuum the inside thoroughly. If you find dust in the tuning capacitor, dip a piece of washed linen in solvent and pass it through the plates. Rotary switch contacts are cleaned with contact cleaner, while relay contacts can be put in shape with a business card saturated in the same cleaner (put the card between the contacts and pull it through).

Naturally, you will want to replace any defective tubes. Then check the rig's performance against your base station transceiver. If the set has really had it rough you may have to realign the receiver with a signal generator. After putting the transceiver back in the vehicle, use a standing wave ratio meter to peak the transmitter.

While usually not required, realignment of a CB rig's receiver may sometimes be necessary after a long period of sustained operation. An RF signal generator is being used below to realign a set.

CB SURE-LIGHT



By Herb Friedman
2W6045

When the lamp flickers, modulated RF is in the transmission line and you're getting out.

HOW often have you called another Citizens Band station or your own mobile unit, received no response and wondered whether you really were transmitting? Many rigs have an on-the-air light but most indicate merely that the B+ is on. They *don't* tell you whether RF is going to your antenna. But EI's CB Sure-Light lets you know for certain whether your modulated signal is getting out.

The Sure-Light samples the RF in the transmission line. If there is RF, the lamp lights. When the RF is modulated, the lighted lamp flickers. No flicker—no modulation. No light—no RF. It's as simple as that.

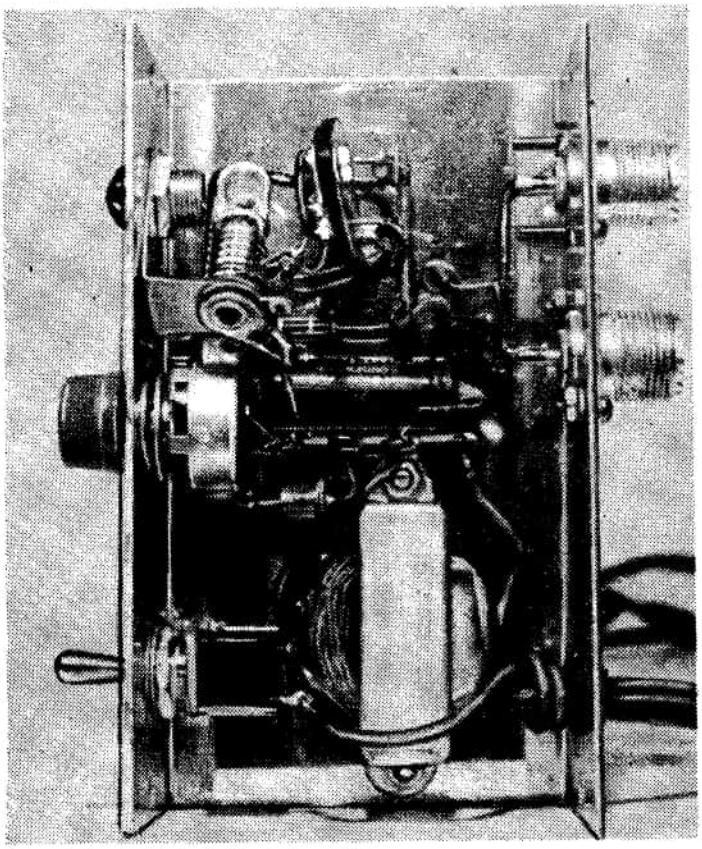
The Sure-Light, which is self-powered, is connected in series with your transmission line through J1 and J2 and doesn't require modification of the transceiver.

Construction. The Sure-Light is built in the U-section of a 5x3x2-inch Minibox. While the parts layout is not critical, follow the pictorial closely and keep the RF leads as short as possible.

Q1 can be any low-cost transistor, such as a 2N301 or 2N307. Though Q1 is designed for chassis mounting, it can be soldered directly to the terminal strip. Bend two terminal strip points toward the front panel at a 45-degree angle. Bend small hooks in Q1's emitter and base leads. Place the hooks in the tie points and solder them quickly, using as little heat as possible. Use an alligator clip as a heat sink on each lead when soldering.

Q1's collector is its mounting flange. Do not attempt to solder the lead from PL1 to it. The heat would destroy Q1. Fasten a solder lug to the flange with a 6-32 screw and make the connection to the lug. Since the power supply is negative with respect to ground, take care that the polarity of SR1 and C3 is correct to prevent trouble.

Adjustment. Connect the transceiver output to J1 and the antenna to J2. Set sensitivity control R2 fully counterclockwise and turn on all power. As you transmit, turn R2 until PL1 glows slightly. (If R2 is opened up wide, PL1 or Q1 may be damaged by excessive current.) When you modulate by talking into the mike, the lamp flickers at the modulation rate. Now you'll never have to worry about whether your signal really is getting out.

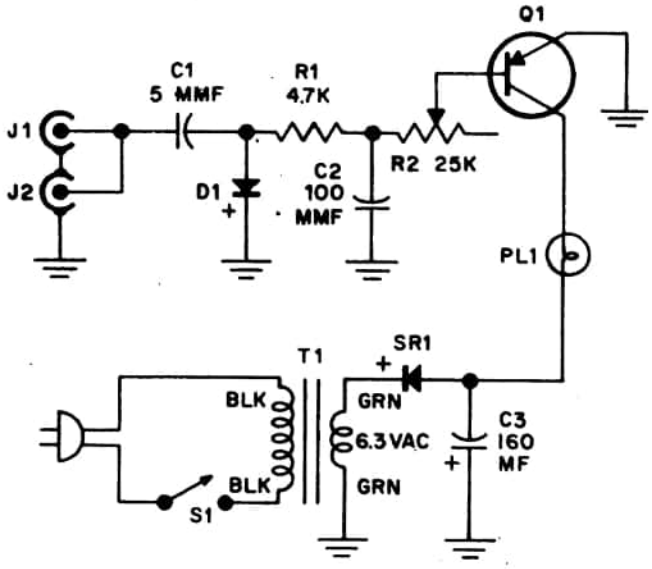


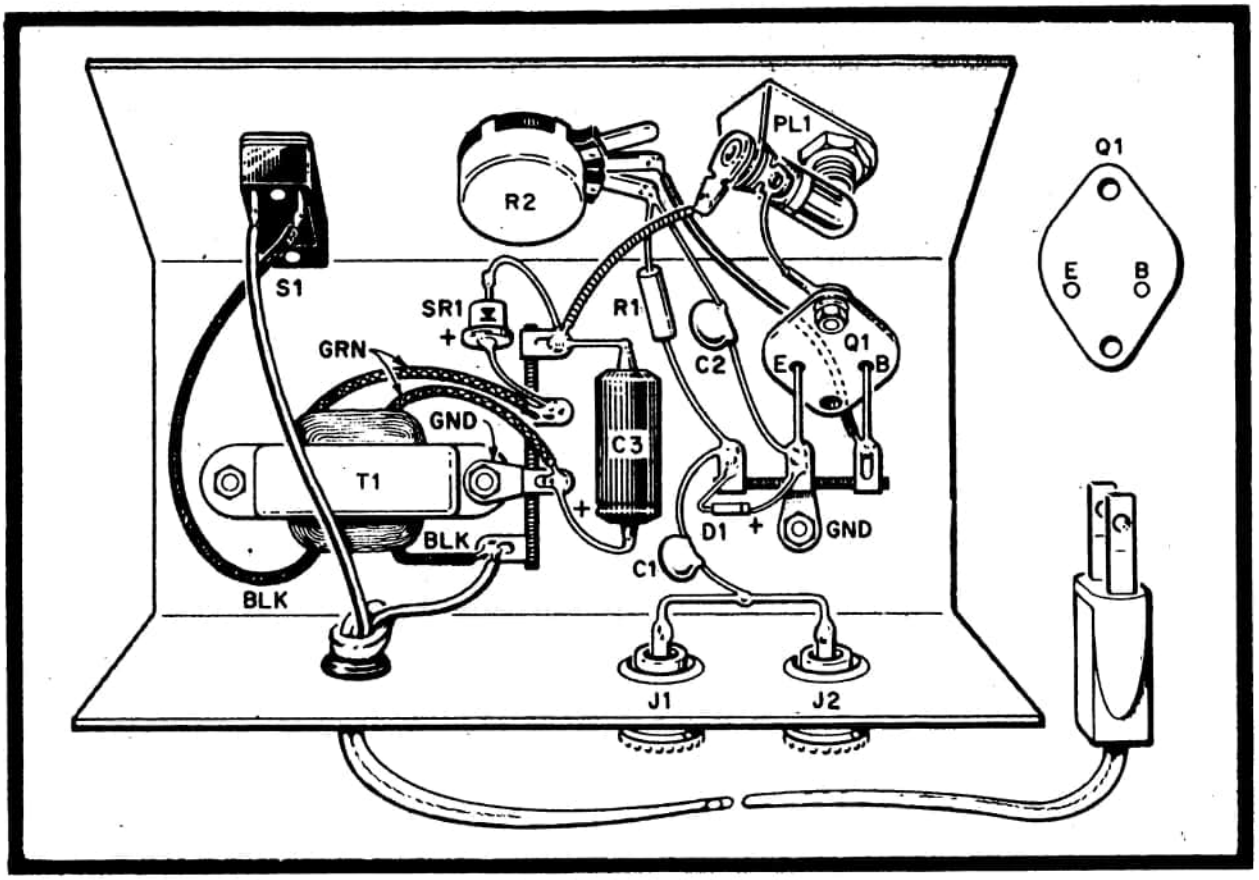
Grip leads of Q1 and D1 with pliers when soldering to prevent heat damage. Collector of Q1 is case, so scrape paint from around hole in mounting flange for good electrical contact.

PARTS LIST

R1—4,700-ohm, ½ watt, 10% resistor
R2—25,000-ohm, linear-taper potentiometer
C1—5 mmf, 500 VDC ceramic disc capacitor
C2—100 mmf, 500 VDC ceramic disc capacitor
C3—160 mf, 15 V electrolytic capacitor
S1—SPST toggle or slide switch
T1—Filament transformer: 117 V primary, 6.3 V @ .5 A secondary
D1—1N34A crystal diode
SR1—Silicon rectifier, 100 ma, 25V PIV or higher
Q1—2N301 or 2N307 (see text)
PL1—No. 48 pilot lamp and holder
Misc.—Terminal strips, coaxial jacks

RF, demodulated by D1, is applied to the base of Q1, causing it to conduct and to light PL1.





16db SPEECH COMPRESSOR

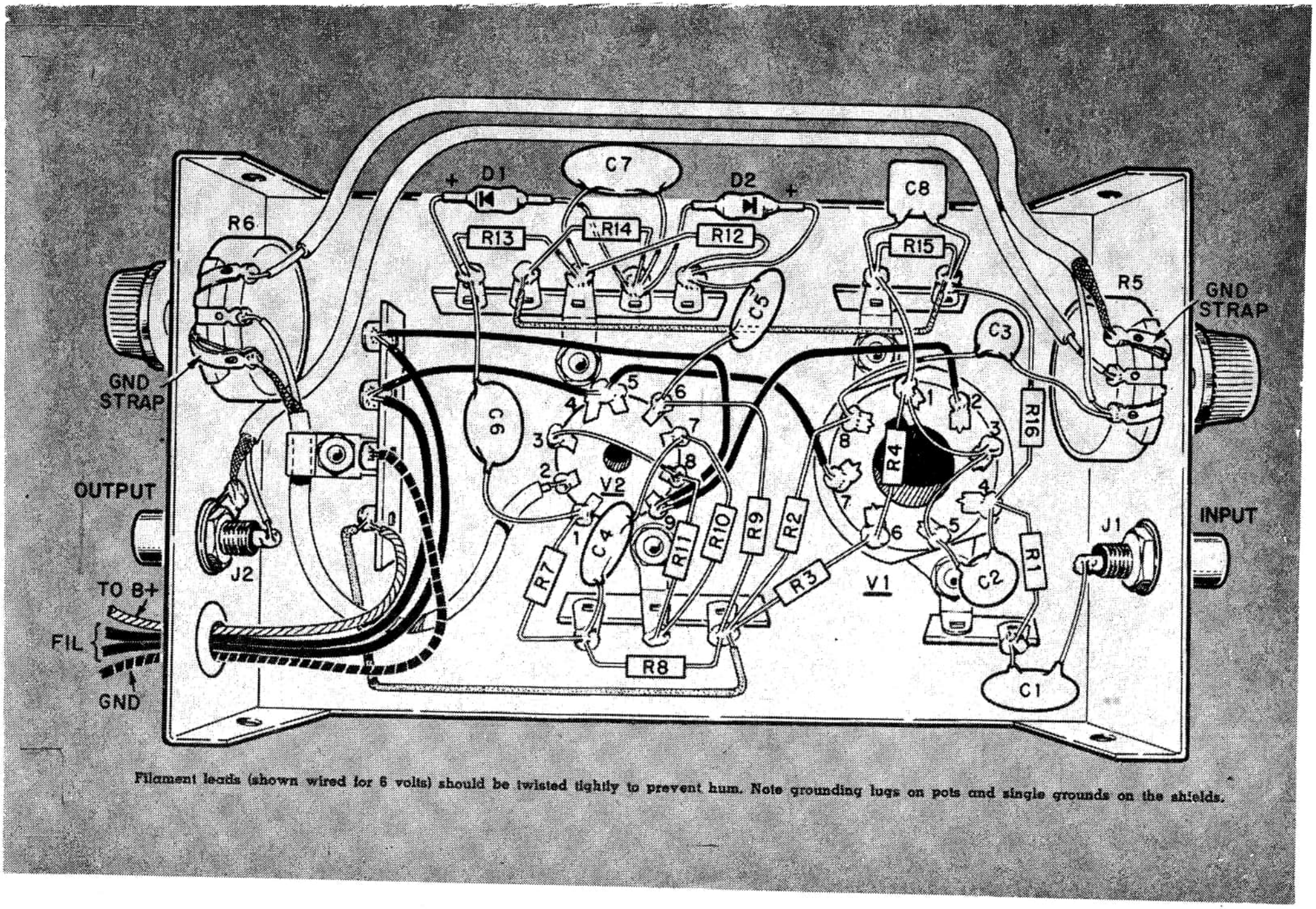
Novel circuit gives you the biggest 5-watt signal on the air.

By Herb Friedman, 2W6045

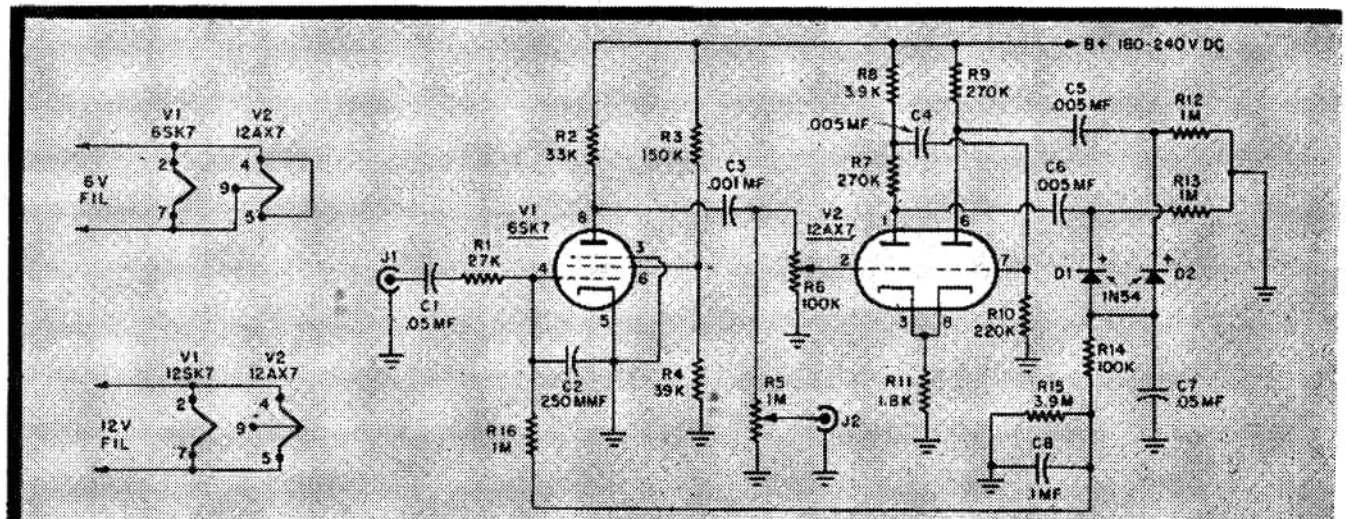
WITH MORE AND MORE stations getting on the air, the normal CB problems of short range and interference are compounded. In fact, in metropolitan areas it's frequently difficult to get solid copy even on the shortest-range contact. But now, by adding EI's Speech Compressor you can cut through the interference and considerably extend your solid copy communications range. Speech compression modifies your rig's modulation in such a manner that the *effect* is equivalent to a large increase in power output.

When you say a CB transmitter's signal is modulated 100%, you refer to the situation when audio power is at its *peak*. The *average* power is another factor—usually about 10db less than peak, producing 30% modulation. Our speech compressor lowers (not clips) the peaks, permitting average modulation to be moved up toward 100%. The effect is a signal that is all audio and one that stands out from others. With the usual CB microphone and EI's compressor, up to 16db compression can be obtained. If you suddenly raise your voice, additional compres-

Compressor is shown in use with an Olson Electronics transceiver.



Filament leads (shown wired for 6 volts) should be twisted tightly to prevent hum. Note grounding lugs on pots and single grounds on the shields.



PARTS LIST

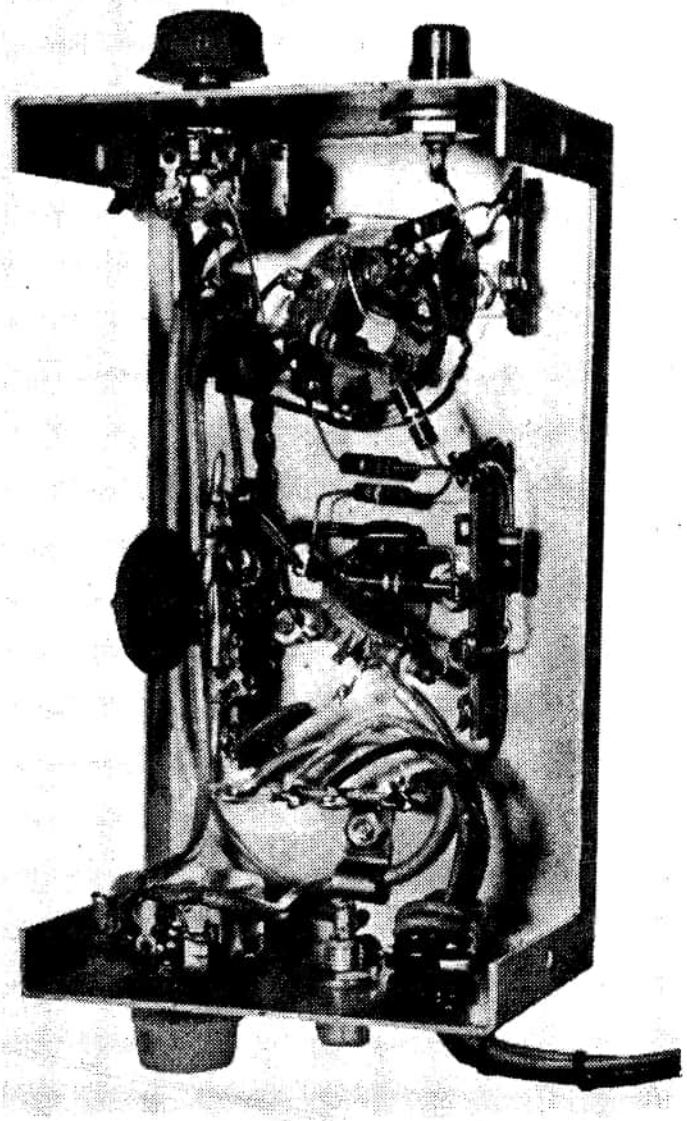
Resistors: ½ watt, 10% unless otherwise indicated
R1—27,000 ohms R3—150,000 ohms
R2—33,000 ohms R4—39,000 ohms
R5—1 megohm potentiometer
R6—100,000 ohm potentiometer
R7,R9—270,000 ohms
R8—3,900 ohms
R10—220,000 ohms
R11—1,800 ohms
R12,R13,R16—1 megohm
R14—100,000 ohms
R15—3.9 megohms
Capacitors: 1,000 VDC ceramic disc types unless otherwise indicated
C1,C7—.05 mf
C2—250 mmf
C3—.001 mf
C4,C5,C6—.005 mf
C8—1 mf @ 75 VDC or higher
V1—6SK7 or 12SK7
V2—12AX7 or ECC83
D1,D2—1N54 diodes
J1,J2—See text
Misc.—1-octal, 1-9-pin miniature tube socket; terminal strips; Minibox, 2"x3"x5" (approx.) etc.

sion is brought into the act. Not only is there a higher average modulation percentage, but distortion-producing overmodulation is forestalled.

Construction. The speech compressor is built in a Minibox with the tube sockets spaced and oriented so the terminal strips do not interfere with each other. For wiring ease, cut off the center ground post (if present) of V2's socket. Microphone input jack J1 and volume control R5 are mounted side by side, as are compressor output jack J2 and compression control R6. If you intend to use the compressor with a push-to-talk rig, J1 should mate with the microphone plug and J2 should have enough terminals to handle the push-to-talk leads.

Since V1 *is* an amplifier, care must be taken to avoid hum pickup. Run the filament leads as shown, but twist them together tightly, keeping them away from V1's components and J2. Even if one side of the filament circuit is grounded at the transceiver, do *not* ground the compressor's filament to the Minibox.

Notice that the three shielded leads shown in the pictorial have an insulating outer covering and that the shields are grounded at only *one* end. To make wiring easy, use thin insulated phono



cable for the shielded leads. When soldering D1 and D2 use a heat sink, such as an alligator clip, on each diode lead.

Tube V2 usually will not require a shield; however, a poorly grounded transceiver or a poor antenna system can cause RF hum. If this occurs shield V2.

Installation and Checkout. Connect the filament leads across the transceiver's filament supply and the ground lead to the transceiver chassis. The compressor's B+ lead is connected to the transceiver's power supply at the point of maximum filtering (this is where the transceiver mike preamp's plate load resistor connects to B+).

Set controls R5 and R6 to full counterclockwise (off). Connect a modulation percentage indicator to the transceiver's output. With the mike in its usual position, speak in a normal voice. Advance R5 until the modulation meter reads 100% on speech peaks. Turn R6 full clockwise and the per cent of modulation will fall considerably. If you are speaking close to the microphone the peak modulation should indicate below 30% (12-16db compression). Advance R5 until the modulation peaks at 85%. At this setting you will have nearly full compression and the 85% setting leaves you a 1.5db safety margin. If you raise your voice, this margin will reduce the chance of overmodulation distortion.

If you do not have access to a monitor meter, the following adjustment procedure will give satisfactory results. Set your VTVM to the AC function on the highest range, connect the AC probe to the plate of the modulator tube (usually a 6AQ5) and the meter's common lead to the chassis. Connect the microphone directly to the transceiver and, using a dummy load, transmit in the normal manner. Note the peak reading on the VTVM as you speak. This reading will be assumed to equal 100% modulation. Next, connect the compressor and set R6 for maximum compression. Speaking as before, advance R5 until the VTVM indicates the same reading on speech peaks.

If you feel you do not need full compression on short-range contacts, an intermediate setting of R6 reduces compression. Keep in mind that as you reduce compression R5 must also be reduced or the transmitter will overmodulate. (Overmodulation sounds extra loud on short-range contacts but is just a mess of distortion when your signal is weak.)

EI's compressor is designed to operate with microphones supplied with CB transceivers or with such high-output types as the Astatic D-104, the Sonotone CM-30 and the Turner 350C. It will not perform satisfactorily with low-output microphones. Since the compressor provides gain, do not operate with R5 wide open or you will get distortion from overmodulation and overdrive.

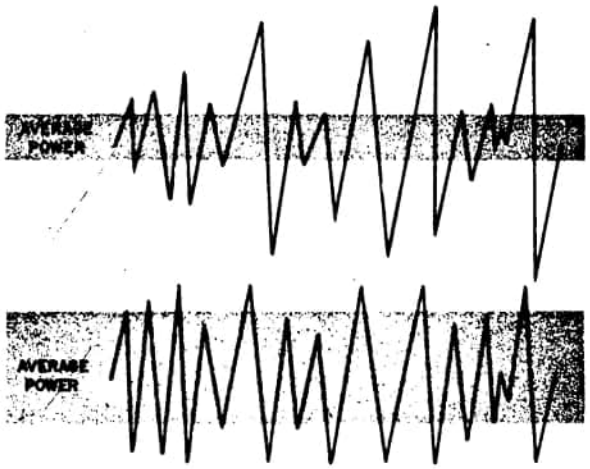
THEORY

V1 is a variable-gain preamplifier whose output is fed through volume control R5 to the transmitter via J2. V1's output signal also is fed through compression control R6 to V2, an amplifier phase inverter.

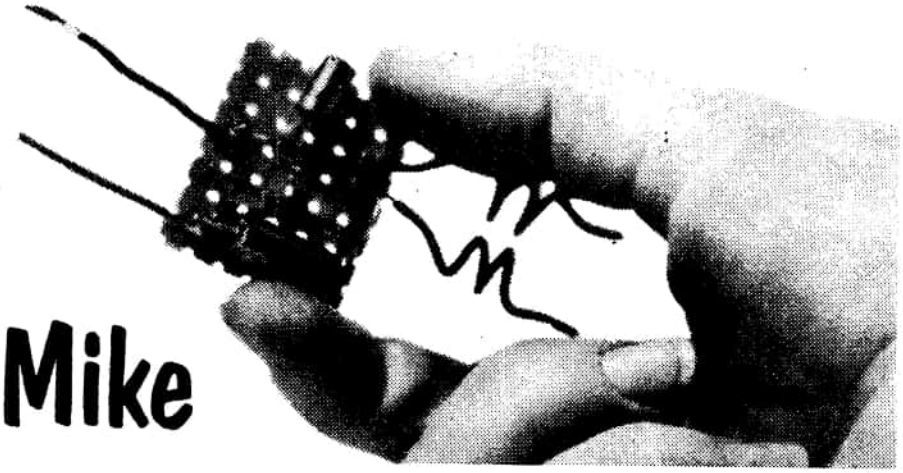
The signal at both plates of V2 is rectified by D1 and D2. The resultant DC is fed back via R14 and R16 to vary V1's grid bias, thereby controlling its gain. With R6 off, no signal is fed to V2 so there is no DC control voltage and V1 operates at full gain.

The use of the phase inverter permits both the positive and negative peaks to be compressed, rather than the negative peaks only, as is the usual case. This system eliminates distortion common to single-peak compression and provides a higher level of control voltage. Further, the frequency response is changed automatically to maintain maximum communications effectiveness. Under full compression the low frequencies are attenuated slightly to give a crisp sound. If the voice signal falls extremely low —below compression level—the low frequencies are attenuated sharply.

The waveforms at right show the difference in effective average power in a non-compressed signal (top) and a compressed signal (bottom).



Switch to a Better Mike

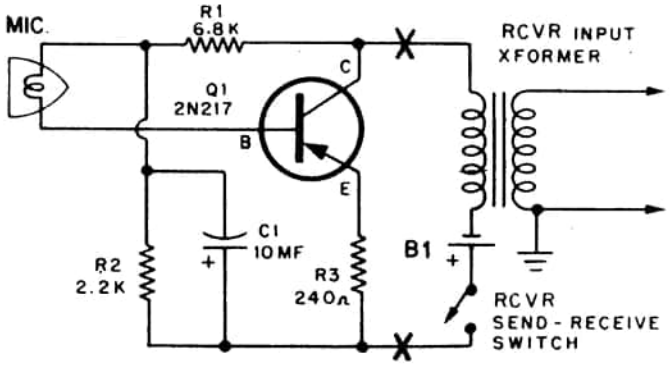


MANY an early CB rig is gathering dust because of the poor audio quality delivered by its carbon microphone. Converting the rig to use a ceramic mike is one answer, but the job may be more trouble than it's worth. However, by replacing the carbon mike element with a controlled-magnetic microphone cartridge and adding a simple one-transistor amplifier you can enjoy the advantage of a rig with lots of clean "talk power." Both the new magnetic element and the amplifier probably can fit inside the old carbon mike case.

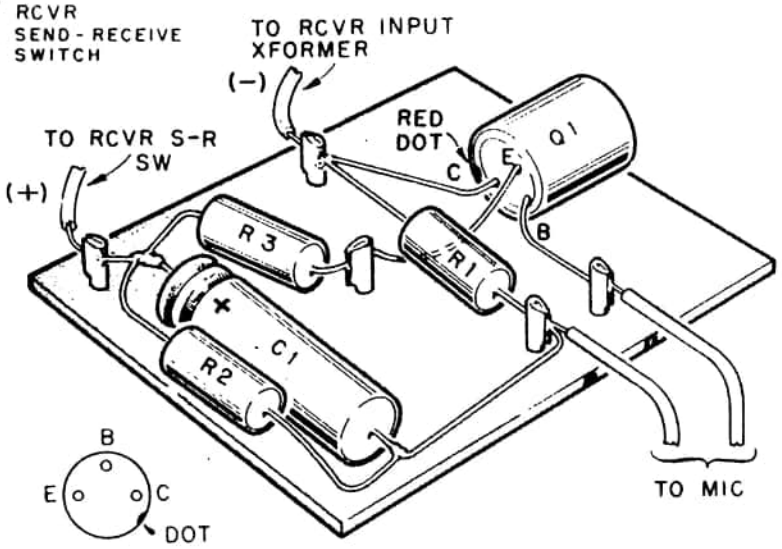
No additional battery is needed to power the amplifier since the transceiver's original carbon microphone voltage supply is used. The amplifier is built on a small section of perforated board, with flea clips as tie points. Layout and wiring is not critical, but protect Q1 from heat damage by placing an alligator clip or similar heat sink on Q1's leads when soldering.

The amplifier has no common ground lead and hence may be connected to the input transformer regardless of the polarity of the DC supply. It is important however, that Q1's collector be connected to a *negative* voltage.

—*Chet Stephens*



The preamp joins the original input circuit at the points marked X in the schematic. A jack for the original carbon mike, if present, may be used or direct connection to the circuit may be made at these points.



PARTS LIST

Resistors: ½ watt or lower, 10%
R1—6,800 ohms
R2—2,200 ohms
R3—270 ohms
C1—10 mf, 6 VDC capacitor
Q1—Transistor—2N217, 2N109 or equiv.
Mic.—Magnetic type replacement cartridge (Shure R5 or low-impedance type)
Misc.—Perforated board; flea clips