

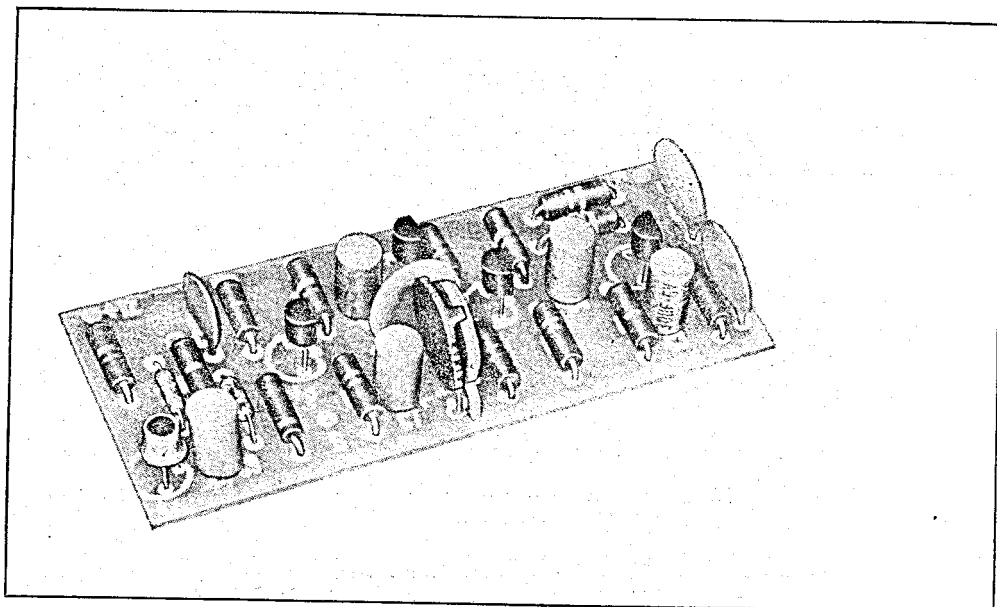
contacts objectionable, you lining of foam rubber, or absorbing material, under hard and along the inside box, to kill some of the

recorders have a separate or two leads in the mike external control of the tape-

If your tape recorder provision for remote control install a jack and wire it in one of the motor leads. You are able to plug in the control jack to turn on and off.

switches that are not internally controlled or more relays require the installation of a button or a switch to engage the tape transport drive. These driving elements are usually enclosed in a metal shield, and if allowed to overheat under pressure while the motor is running will develop flat spots sufficient to impede mechanical sound pickup on tape transport. Therefore, through your recorder, be sure to return all switches to the off position.

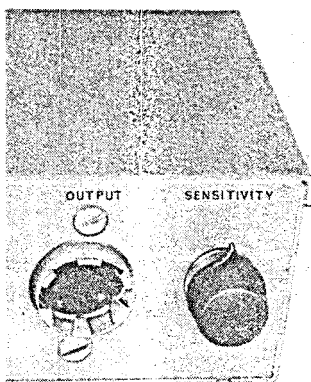
For all CB and ham transmitters, provide for a push-to-talk switch



BUILD

CB "AUDIO LEVELER"

COMPRESSOR/PREAMPLIFIER BOOSTS CB MODULATION AND CURBS MIKE BLASTING WITHOUT DISTORTION



of the off switch on the sensitivity control is simple, easy-to-operate, and rugged. Input and output jacks and switch design, but must be matching.

alone. This switch simply provides a ground-return lead of the transmit-receive change-over switch. Select matching plugs and sockets to interconnect the two pieces of equipment. -30-

NIC EXPERIMENTER'S HANDBOOK

By DANIEL MEYER

HOW many times have you had to repeat a message during a CB radio conversation because you were too far away from the mike or weren't talking loud enough to put your message across clearly? Now you can come over loud and clear each time you hit the mike by merely adding an "Audio Leveler" to your CB rig.

The Audio Leveler is a low-distortion preamplifier which you connect between your mike—incidentally, it must be of the low-impedance variety used with transistorized equipment—and your transmitter MIC input to amplify weak signals while attenuating strong ones, thus producing a constant-level modulating signal to the transmitter. As a result, whether you talk very loud into the

mike, or not loud enough when you move your head away from the mike, the transmitter "sees" a constant amplitude signal.

The Circuit. The Audio Leveler (Fig. 1) is a transistorized compressor circuit whose gain is automatically adjusted by the level of the speech input. It consists of *Q1*, the first amplifier; *Q2*, the gain-controlled stage; emitter follower *Q3*; a control amplifier, *Q4*; and a field-effect transistor (FET), *Q5*, which operates in the circuit as a varistor.

1968 Winter Edition

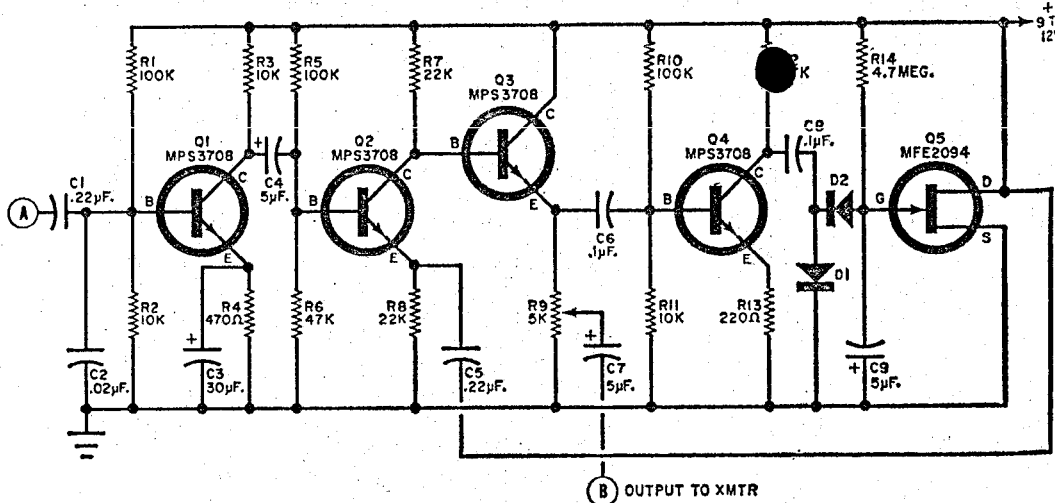


Fig. 1. The Audio Leveler takes advantage of the drain-source resistance characteristics of a FET, Q5, to control the amplifier gain automatically. Slightly more gain and slightly better compression may result from the use of a MPF-103 FET at Q5.

The signal at Q3's emitter is also amplified by Q4 and applied through C8 to the junction of D1-D2. When this signal is large enough to cause the diodes to conduct, the bias voltage on Q5 starts going negative. Since the drain-source static resistance of a FET is a function of the gate-to-source voltage, and since Q5 is in series with C5, Q2's emitter bypass capacitor, the resulting change in the resistance of Q5 causes more or less bypassing action.

A negative-going bias voltage on Q5's

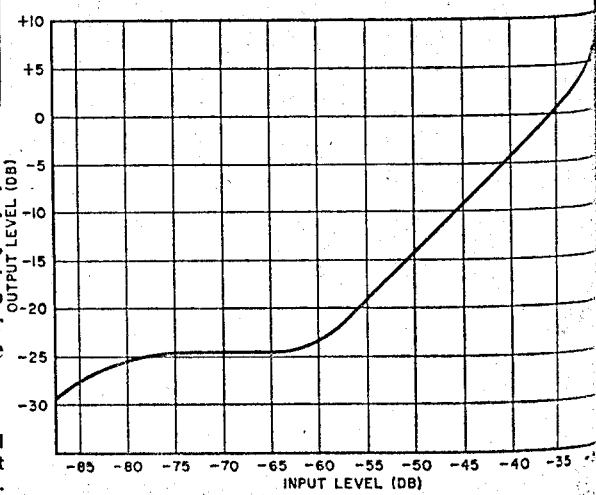


Fig. 2. Graphical representation of output signal level versus input signal level, in dB. The circuit has low distortion even with high-level inputs.

PARTS LIST

- C1, C5—0.22- μ F, 12-volt ceramic disc capacitor
 - C2—0.02- μ F, 50-volt ceramic disc capacitor
 - C3—30- μ F, 6-volt electrolytic capacitor
 - C4, C7, C9—5- μ F, 15-volt electrolytic capacitor
 - C6, C8—0.1- μ F, 12-volt ceramic disc capacitor
 - D1, D2—General-purpose germanium diode (1N34 or similar)
 - Q1, Q2, Q3, Q4—Motorola MPS-3708 transistor
 - Q5—Motorola MFE-2094 field-effect transistor
 - R1, R5, R10—100,000 ohms
 - R2, R3, R11—10,000 ohms
 - R4—470 ohms
 - R6—47,000 ohms
 - R7, R8—22,000 ohms
 - R9—5000-ohm PC-type trimmer potentiometer
 - R12—4700 ohms
 - R13—220 ohms
 - R14—4.7 megohms
- } all resistors
1/2-watt, \pm 10%
- 1—1 1/2" x 3 1/2" phenolic board, or etched and drilled printed circuit board (available for \$1.50 postpaid from Southwest Technical)*

*A complete kit containing all parts, including the PC board, is available from Southwest Technical Products, 219 W. Rhapsody, San Antonio, Texas 78216, for \$9 postpaid in the U.S.A.

The audio input from your mike is applied to the base of Q1 through capacitor C1. The amplified output at the collector is coupled through C4 to the base of Q2, whose gain is controlled by Q5. The output at Q2's collector is direct-coupled to Q3, hooked up as an emitter follower to provide a low output impedance to the transmitter through C7.

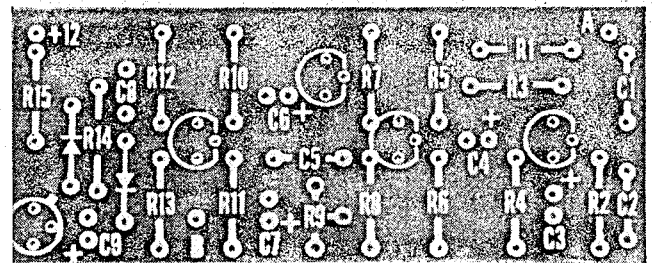
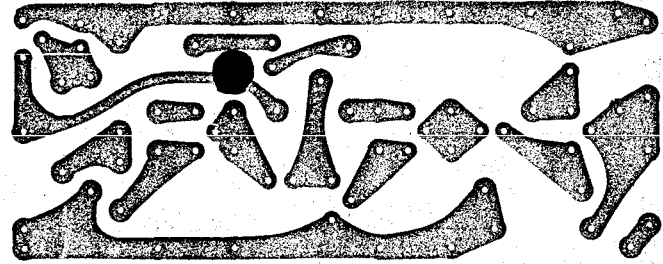


Fig. 3. Actual-size photo shows side of printed circuit board (per left); component side of b is below it. Observe polarity markings when installing diodes and electrolytic capacitors. Also, position the transistors as shown. Resistor R15 has been deleted as the result of tests of this compressor. A wire bridge should be placed across the two holes originally designed for mounting R15. If you obtain the printed circuit board from Southwest Technical, you get an up-to-date board and MPF-103 in place of the somewhat lower gain FET MFE-2

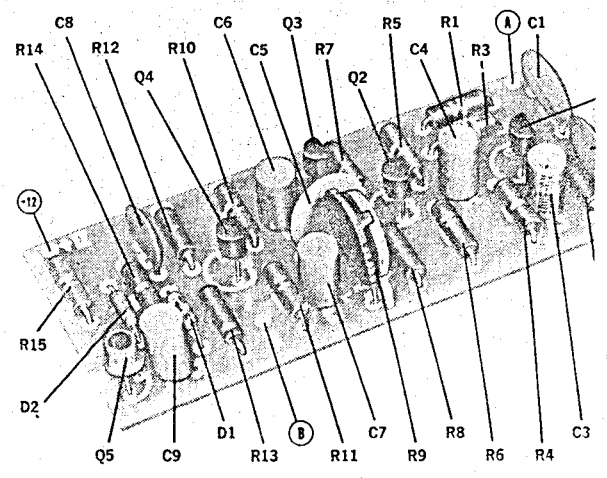
gate results in a higher drain-source resistance, and this, in turn, acts to reduce the bypassing action of C5 and limit the gain of Q2. Thus, as the signal level at the collector of Q2 tries to increase, the control circuit acts to reduce the gain to its original value.

Figure 2 shows, graphically, the result of this action. The gain of the circuit increases only a few dB although the signal input level may be increasing by as much as 20 dB—about 10 times!

Construction. The entire Audio Leveler circuit can be assembled on a 1 1/2" x 3 1/2" printed circuit board or phenolic

circuit board. An etched and drilled fiberglass printed circuit board (Fig. 3) is available (see Parts List). The board comes marked with the location of components, and it is only necessary for the builder to insert the parts in the marked positions and solder the leads to the copper foil.

When installing the parts on the board, be sure to position the flat side of Q1 through Q4 as shown in Fig. 3. Also, the locating tab on Q5 must be oriented as indicated. The ground of this transistor (Fig. 4) must be off since it is not used. And be sure to observe the proper polarity when



Parts identification of the fully assembled printed circuit board includes input A, output B, and +12-volt supply connection point.



Fig. 4. These outline drawings show the terminal identification of the transistors used in the circuit. Ground terminal of the MFE2094 must be cut.

stalling the diodes and electrolytic capacitors.

If you prefer to make your own circuit board, you can still follow the parts layout shown, using the schematic (Fig. 1) as a wiring diagram.

Installation. Since the Audio Leveler goes between the microphone (remember, it can be used *only* with a low-im-

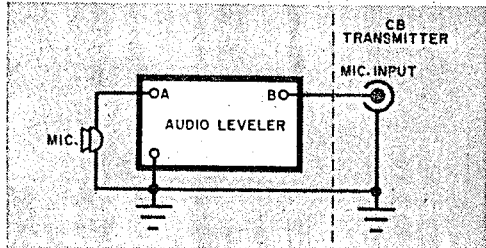


Fig. 5. Terminal A goes to the microphone and terminal B connects to the MIC input on the transmitter. The unit is grounded to the transmitter.

pedance mike) and your transmitter's MIC input (see Fig. 5), it can easily be installed in any rig.

If there's room inside the unit, mount the circuit board in any convenient spot, supporting it on standoff spacers. The photo on page 154 shows the Audio Leveler installed inside a Heathkit GW-

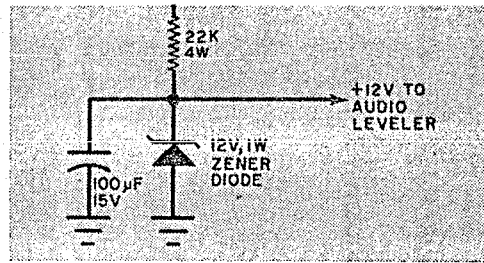


Fig. 6. This simple voltage divider can be used in a tube-type transceiver to obtain a 9-12 volt regulated output for operating the Audio Leveler.

14 transceiver. If lack of room does not permit this type of installation, the unit can be mounted in a small metal case and installed outside of the transmitter or VFO enclosure. Connection is between points A and B on the circuit board.

To use the Audio Leveler with a transistorized CB radio, connect a lead from the +12-volt power source to the +12-volt terminal on the circuit board, and another lead from the *common* terminal on the circuit board (negative side of C3) to the transmitter ground.

If the Audio Leveler is to be used with a tube-type transceiver, a 9-volt battery can serve as the voltage source. However, if you would rather operate the Audio Leveler from your transceiver's power supply, a circuit similar to that of Fig. 6 will provide the 12-volt d.c. power. But be sure to connect the resistor to the cathode of the rectifier rather than to the load side of the power supply to avoid overloading the set's filter system.

(Continued on page 154)

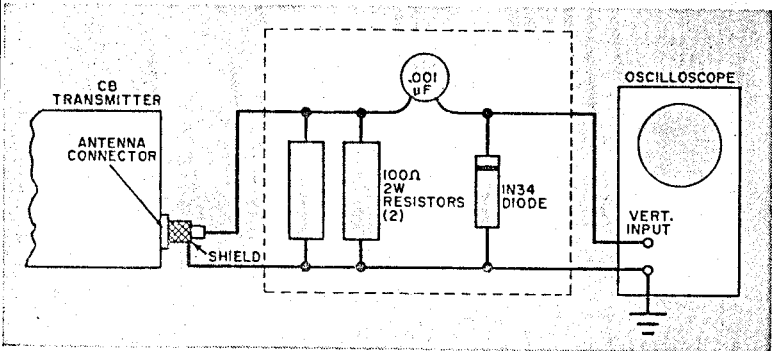
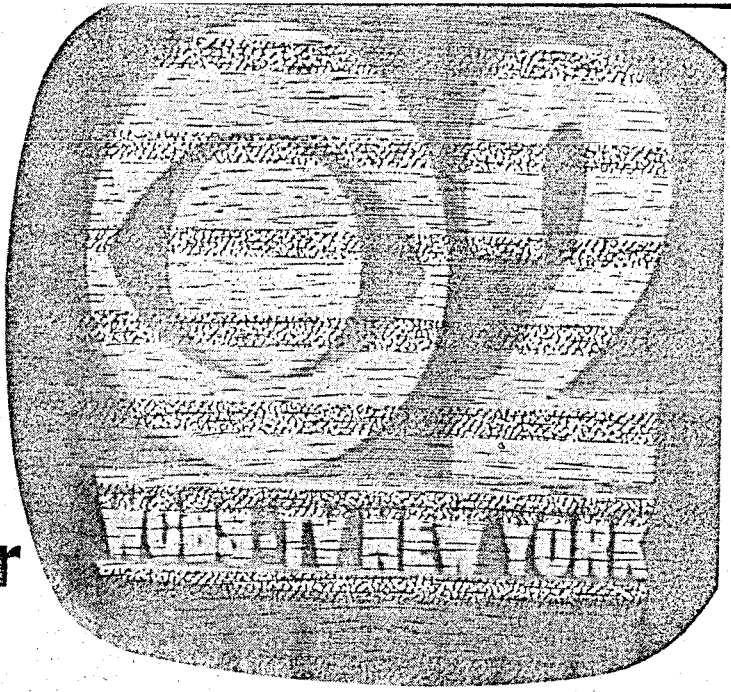


Fig. 7. The Audio Leveler can be tested and adjusted with an oscilloscope connected to the transmitter output through the network shown here. The gain is adjusted while observing the transmitter output.

NBFM Routs 6-Meter TVI

By R. L. WINKLEPLECK, WA9IGU



YOU SAY your neighbors are up in arms because of the massive dose of TVI that blankets the valley when you work your six-meter rig, even though you've tried every type of filter in the book? Have you tried the sure-fire narrow-band FM solution?

Most TVI caused by the radio amateur operating on six, and which cannot be cleared up by the usual techniques, can be traced to high-level amplitude-modulated signals. Thus, if your carrier is clean and your neighbor's TV reception goes haywire when you talk, it's time for you to switch over to FM transmission. Conversion is easy, quick, and inexpensive.

Even if you are planning the construction of a 6-meter transmitter, you might consider going FM, exclusively. For the AM modulator is always a significant expense item; and if you're shooting for high power, the AM modulator will take a big chunk of your budget.

This article will describe an inexpensive solid-state FM modulator that is equally efficient when used with a half-kilowatt job or a measly one-watt.

Hams! Simple Conversion Adds Frequency Modulation to 50-MHz VFO

Simple Approach to FM. The simplicity of the FM modulator is due largely to the use of a "Semicap," a solid-state voltage-variable capacitor that replaces the old-fashioned reactance tube modulator circuitry. Essentially a diode, the Semicap's capacity varies inversely with the magnitude of the reverse bias voltage across it. Thus, if this voltage is varied as by modulation, the Semicap's capacity is also varied. The device can therefore be used to vary the transmitter's tank circuit by merely connecting it across the VFO's frequency-determining capacitor. Simple, isn't it?

This principle also disproves the claim of some old-timers who believe that diode detector-type communications receivers cannot fully meet the requirements of FM. Since frequency-modulated signals are reproduced by slope detection, it is only necessary to tune slightly off-frequency on an AM receiver to pick these signals clearly. Putting it another