

Need a Noise Blanker?

This impulse noise suppressor can be added to any SWL, ham, or CB receiver.

Automobile ignition and electrical impulse noise are serious problems for the ham station operator or SWL who lives near a busy street. Most commercial receivers have noise clipping provisions, but the circuit used is not effective for SSB or CW operation. Some receivers have no noise limiter of any kind. If your receiver is deficient in this respect and if you are bothered by ignition noise or other noise created by electrical impulses, this audio noise blanker is what you need.

The noise blanker works equally well with SSB, AM, and CW signals. It accepts a signal that is nearly indistinguishable because of impulse noise and makes it 90% readable. It is not necessary to modify your receiver; the noise blanker is connected between the low-impedance output of the receiver (3.2 to 16 ohms) speaker. The noise blanker itself requires no external power supply. An audio amplifier, which is used to raise the low level output of the blanker to a comfortable speaker level, does require a power supply. This will be explained later. Refer to **Fig. 4**.

Circuit operation

Refer to **Fig. 2**. Assume that a high level noise pulse, whose amplitude greatly exceeds the blanking level, enters the system. After passing through transformer T1, where it is split into two identical signals 180 degrees out of phase with each other, the signal takes two different paths, as shown in the diagram.

In the lower path, the signal (waveform A) passes through a peak clipper consisting of diodes D1 and D2, which are connected in opposite polarity and

are in parallel with the signal path and ground. When the noise-pulse amplitude reaches the voltage level equal to the reverse bias on the diodes, both diodes conduct and shunt everything above this level to ground. The truncated signal (waveform B) is then passed to balance potentiometer R6. This type of circuit is called a peak clipper, and similar circuits are found in many receivers.

The other input signal, waveform C, is fed to a base clipper consisting of a pair of diodes, D3 and D4, connected in opposite polarity and in series with the signal path. The arrangement does not allow the signal to pass until its amplitude exceeds the blanking level. The portion of the signal that exceeds the level (waveform D) is passed to a

peak clipper consisting of reverse-biased diodes D5 and D6 which are connected in opposite polarity between signal and ground. Operation is the same as in the D1, D2 peak clipper.

The two clipped output signals, waveforms B and E, are applied to opposite ends of balance potentiometer R6. If the wiper of this potentiometer is adjusted to receive signals of equal amplitude, the composite signal appearing as the audio output then looks like waveform F. Note that this signal contains far less power than the original input waveform, and even less power than a peak-clipped waveform.

The result is that, regardless of how great the noise is compared with the desired signal, any noise pulse that exceeds the blanking level will not only

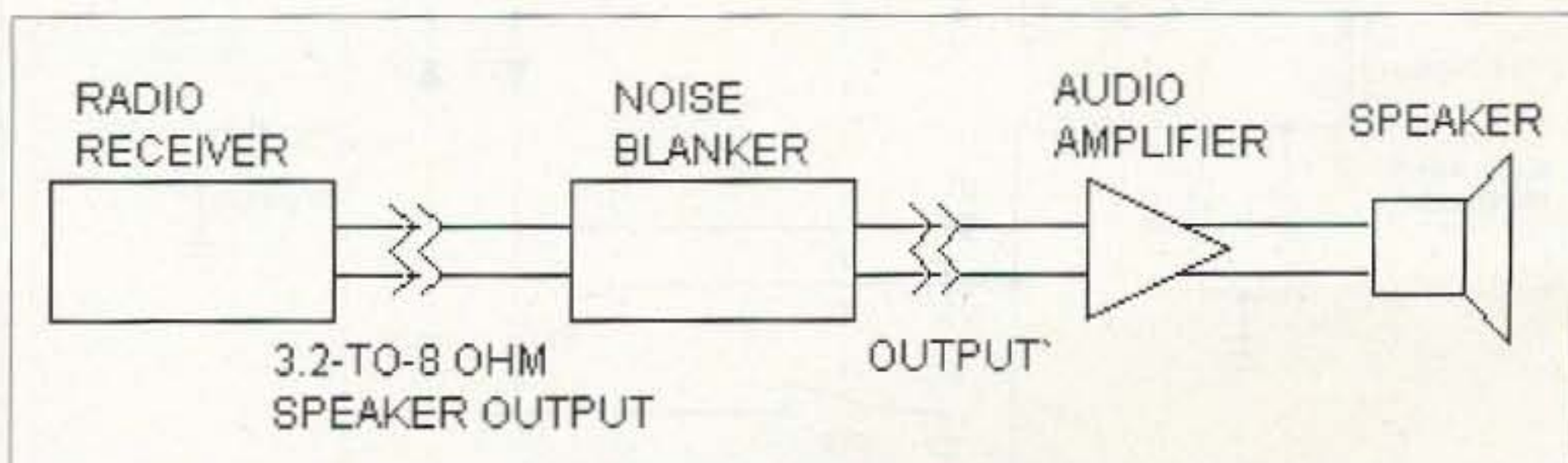


Fig. 1. The noise blanker connects between the receiver loudspeaker output and external audio amplifier.

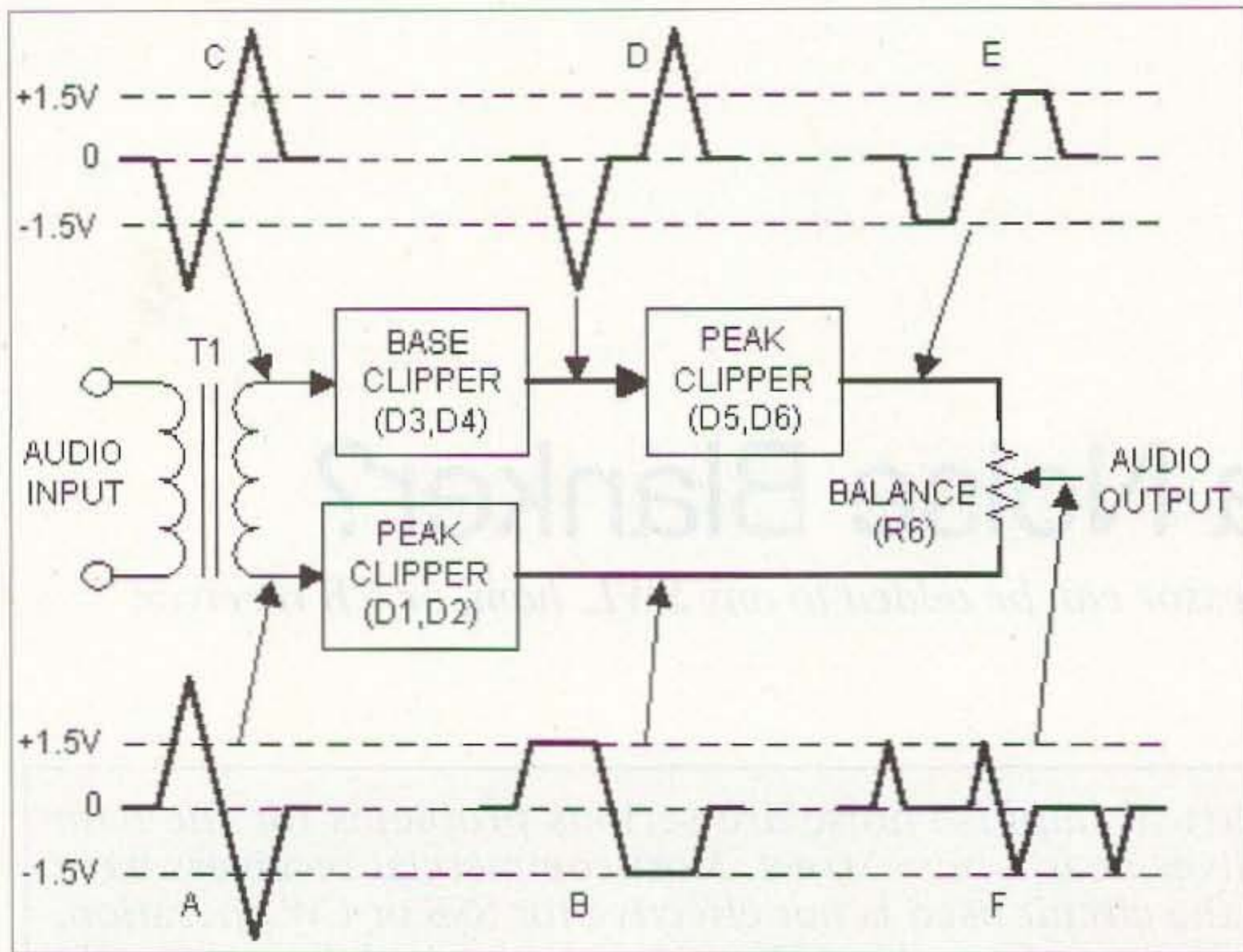


Fig. 2. Waveform diagram.

be greatly reduced, but will in fact have an audio power less than that of the desired signal. Thus the noise can hardly be heard.

Construction

The circuit of the noise blanker is shown in Fig. 3. It is used in conjunction with Fig. 4 and can be assembled on a printed circuit board, on perfboard, or with point-to-point wiring on tie strips. My version uses perfboard. The amplifier described here can work and any type of IC circuit can be used, such as LM380 or LM4862, etc. Remember, you must supply power for this audio amplifier. An LM386 was readily available and easy to use. Transformer T1 is a 50L6

audio output transformer, used because it was in my junk box — but any other type can be used if it has a low-impedance speaker winding and a 2000–5000 ohm primary winding. A good source for the transformer is Antique Electronic Supply, 6221 South Maple Ave., Tempe AZ 85285. Diodes D1 through D6 can be any general-purpose germanium signal units such as 1N34A. Be sure to observe the polarities on the diodes and, when soldering, use a heat sink on the leads.

Adjustment

The balance potentiometer R6 can be adjusted by ear, or for more exact results, with an oscilloscope. Connect the low impedance output of the receiver

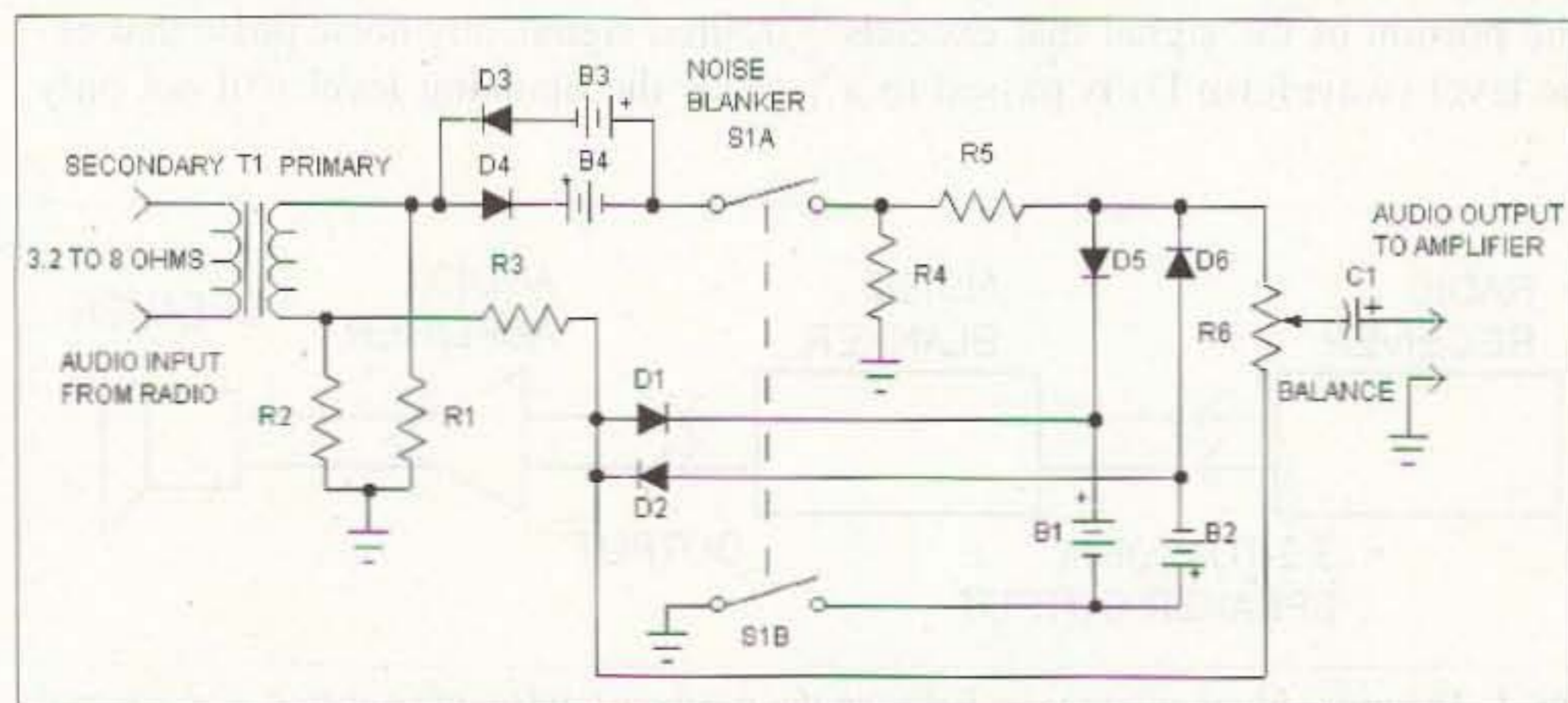


Fig. 3. The blanker circuit.

| Part | Value | Description |
|--------|-----------------|------------------------|
| B1-B4 | 1.5 V | AA penlight battery |
| C1 | 10 μ F 15 V | Electrolytic capacitor |
| D1-D6 | 1N34A | Germanium signal diode |
| R1, R2 | 1.8k 1 W | Resistor |
| R3-R5 | 10k 1/4 W | Resistor |
| R6 | 50k | Miniature trimpot |
| S1 | DPST | Switch |
| T1 | 50L6 | Transformer (see text) |

Misc.: Suitable perfboard, PCB, or other wiring method; battery holders, chassis box, solder, hookup wire, etc.

Table 1. Blanker parts list.

speaker to the blanker input (see Fig. 1). Turn on the receiver and the noise blanker and place noise blanker switch S1 in the OFF position. Set the receiver volume control to its normal position and turn the audio amplifier gain up so that you can hear a signal. Adjust the noise blanker amplifier gain R7 to a comfortable listening level and turn S1 ON. Turn up the receiver volume control until the speaker output is very distorted. Adjust the balance control R6 until the audio output is at a minimum. This will be close to the mid-position of R6. Once R6 is adjusted, it will remain correct for a long period of time unless components age or are replaced.

| Part | Value | Description |
|------|---------------------|------------------------|
| C2 | 0.22 μ F | Mylar capacitor |
| C3 | 10 μ F 15 WVDC | Electrolytic capacitor |
| C4 | 0.047 μ F | Disc capacitor |
| C5 | 220 μ F 15 WVDC | Electrolytic capacitor |
| C6 | 100 μ F 15 WVDC | Electrolytic capacitor |
| R7 | 50k | Panel-mount pot |
| R8 | 10 Ω 1/4 W | Resistor |
| ICI | LM386-N | Audio amp |

Table 2. Amplifier parts list.

Operation

Tune in a signal, set the audio amplifier gain for a comfortable listening level, and advance the receiver volume control until some audio distortion is noticed. At this point, back off the receiver volume control slightly until the audio is clear. This means that the noise blanker is operating properly; the receiver volume control is now the blanking-level control, and the audio output level is controlled by the gain control on the noise blanker amplifier.

When you tune in very weak or very strong signals, the receiver volume control may need to be readjusted, depending on the effectiveness of the receiver AGC system. If the receiver volume control is set too low, the noise blanker will not be as effective as desired; if the receiver audio control is too high, the desired audio will be distorted.

The noise blanker does not begin to work until the amplitude of the impulse noise is greater than that of the

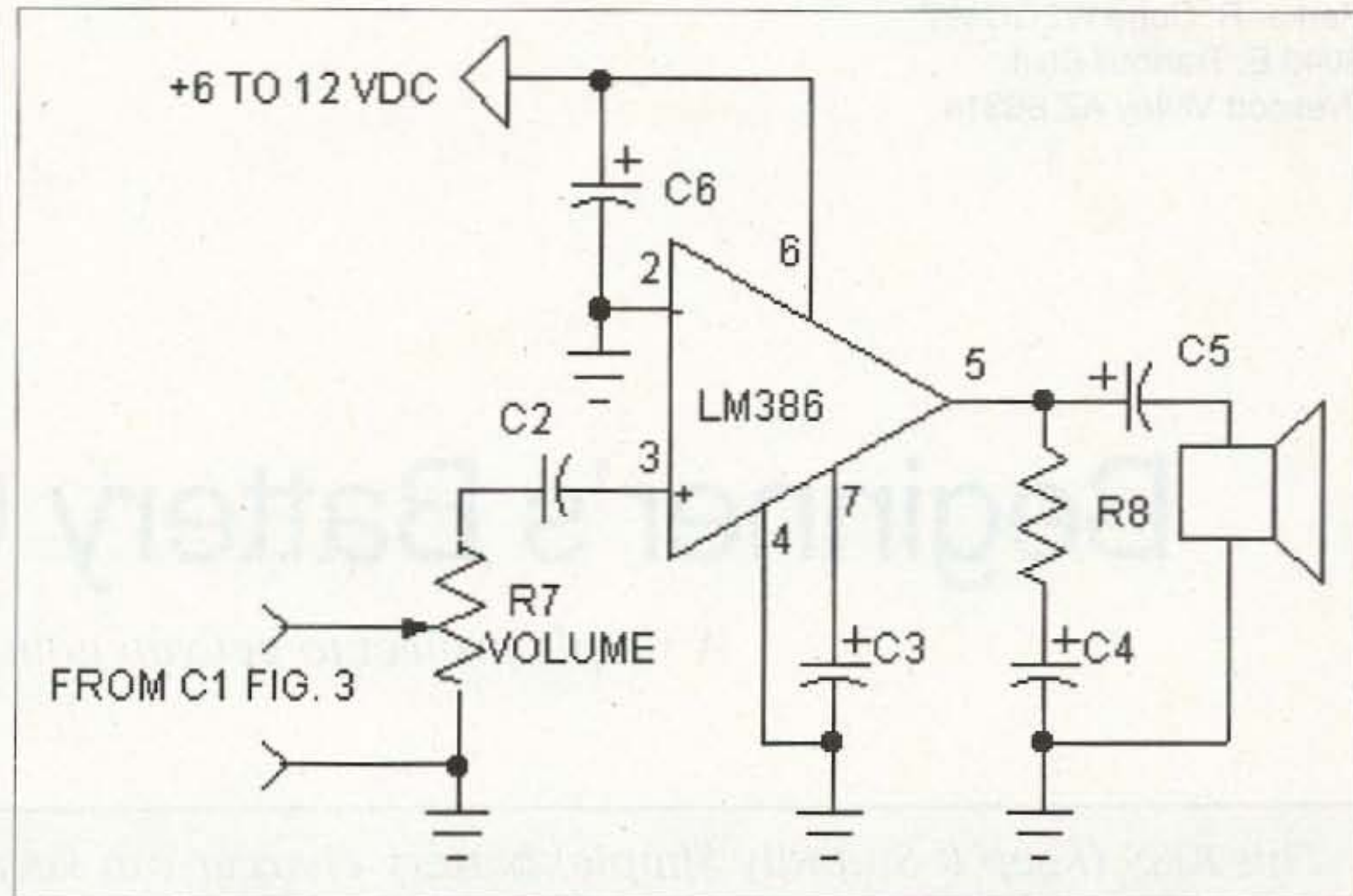


Fig. 4. The audio amplifier.

signal — it works best when the noise amplitude is several times that of the signal. Therefore, it is important that the noise pulse not be limited or suppressed by the receiver. In some cases, turning off the receiver AGC may improve the

noise suppression characteristics of the system.

The noise blanker has been used very successfully with a mobile SW

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receiver in an automobile having no ignition noise suppression. In this case, reception without the noise blanker was nearly impossible unless the signal was exceptionally strong. With the noise blanker, even the weakest signals are not bothered by the ignition noise.

Batteries B1 through B4 will last approximately as long as their shelf life, since the current drawn by the reverse-biased diodes is only a few microamperes (μA). Fresh batteries will last for about a year of normal usage before showing signs of leakage — an indication that they must be replaced.