SHORTWAVE LISTENING AND DXING IS, without a doubt, an enjoyable hobby. However, it does pose a hazard to your ears—or to your peace of mind—because of the annoying loud-volume pops and blasts you're sure to hear from your communications receiver. Although the AGC (*A*utomatic *G*ain-*C*ontrol) circuits in communications receivers are supposed to take care of those sudden changes in volume, they never seem to do the job well enough. Those of you who wear headphones are especially vulnerable to the annoyance. What's especially annoying then is that you're probably wearing the headphones not for your own benefit, but for the benefit of those around you.

I tried several ways to reduce the problem (for example, using FET's as attenuators) but I was unhappy because I was always trading one problem off for another: distortion. But I finally came up with a design that does what I want—it attenuates the blasts from my communications receiver while causing no noticeable distortion.

The circuit of the audio limiter is shown in Fig. 1. The level at which it comes into action can be set with the LIMIT LEVEL trimmer potentiometer. When that level is exceeded, the output from the LIMITER-DETECTOR half of the op-amp (which is used as a comparator) causes the LED to light. The light from the LED causes the resistance of the photoresistor to decrease rapidly. That in turn causes the gain of the LIMITER half of the op-amp to decrease. When the signal drops below the desired limiting level the LED turns off, the resistance of the photoresistor increases, and the gain of the LIMITER op-amp returns to its normal level—that set by the combination of resistors R1 and R2. A dual-polarity power supply (±12 volts is desirable) is, of course, needed for the op-amp.

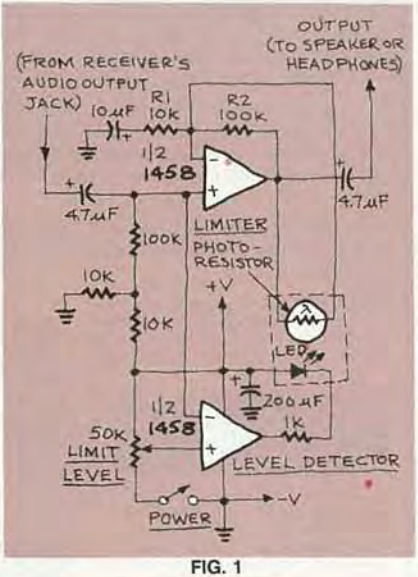

FIG. 1

The circuit is very easy to build, and since the construction method is not critical, use the one you prefer. You might even want to mount the circuit inside your receiver. One important construction note, however, is that the photoresistor and LED should be encased facing each other in a light-tight enclosure.

The parts that you use are not critical either. One note here however is that the (cadmium sulfide, or CdS) photoresistive cell is most sensitive to light with a wavelength of about 5000 angstroms (or, approximately, green light). Therefore, you may want to use a green LED for best response.

Perhaps the best feature of the audio-limiter circuit is that it can be used with any receiver, whether it's a tube-type shortwave receiver or a new solid-state scanner. Your ears will thank you.—*Daniel Ulmer*