SIMPLE
COMPRESSOR-EXPANDER

"SNAPS UP" ANY PROGRAM MATERIAL

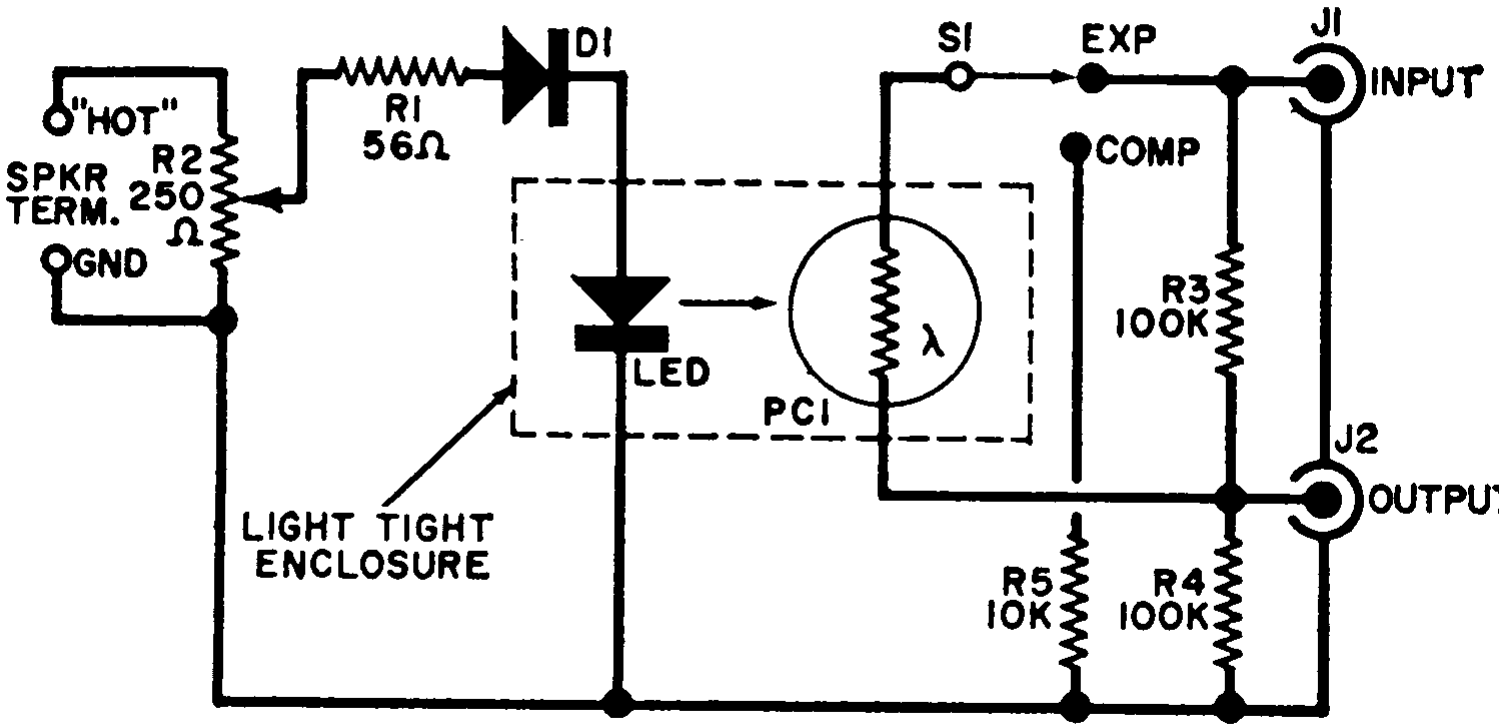
BY CRAIG ANDERTON

TWO very useful techniques for the audio experimenter are compression and expansion. The compression of the dynamic range of program material (type, records, or off the air), permits maintaining a constantly high modulation level; while expansion, when used with the compressed material, restores the dynamic realism. You can also use the expansion mode in reproducing conventional program material with some surprising results in many cases.

Creating these effects can be costly and complex; but it need not be if the circuit shown here is used. Although simple in form, this circuit works surprisingly well. It gives a slight, though measurable, amount of distortion, a certain amount of loss (since it is a passive circuit), and some (almost unnoticeable) delay. Nevertheless, in all but the most critical audio applications, the circuit will prove very useful.

As shown in the accompanying diagram, an LED is attached to the speaker terminals (via a limiting resistor and volume control) of the audio system to sample the program

An LED samples audio output of system.



PARTS LIST

D1--50PIV, 1A silicon diode
Jl,J2-Phono connectors
LED-Light-emitting diode (Radio Shack 276-026 or similar)
PCl-General-purpose cadmium-sulfide cell (Radio Shack 276-116 or similar)
RI-56 ohm resistor (see text)
R2-250-ohm, 2-watt potentiometer
R3,R4-l00,000-ohm, ½-watt resistor (see text)
R5-l0,000-ohm, ½-watt resistor (see text)
SI-Spdt switch
Misc.-Opaque tube for light-tight enclosure, suitable chassis, knob, etc.

material. Diode D1 and resistor R1 protect the LED against drawing excessive current. Volume control R2 is used to vary the sensitivity of the circuit. The exact value of R1 is determined experimentally-with a high-power audio system, a correspondingly high value of R1 is required to prevent the LED from burning out.

The audio modulated light from the ***LED*** falls on the sensitive surface of a photo-resistive cell. PC1. To prevent ambient light from becoming a factor, both the ***LED*** and PC1 are enclosed in a light-tight tube.

With S1 switched to ***EXPAND, PC1*** is connected across the high end of the R3-R4 voltage divider. The output signal at J2 is then a function of the resistance ratio of R3 to R4. When audio-modulated light from the ***LED*** strikes PC1, which is connected in parallel with R3, the composite resistance lowers thus increasing the audio output level. With S1 on compress, PC1 and R5 are in parallel with ***R4*** and when PC1 is illuminated by the modulated light from the ***LED,*** the composite resistance is lowered thus lowering the audio level at J2. This, in effect, compresses the signal.

The amount of expansion depends on the resistance values of R3 and ***R4.*** A higher value for R3 means a greater expansion range is possible. Compression depends on the resistance of ***R5.*** As this value is decreased, the compression effect is increased.

Applications. The circuit can be used as the volume control between the preamp and the power amplifier in an audio system, between the tape deck and preamp, etc.

It can also be used in musical instrument amplifiers to extend the signal-to-noise ratio on expansion or prevent speaker blowout on compression; in PA systems; and in making tape recordings so as to add several dB of signal-to-noise improvement.

By using a switch with a neutral center position for S1, the signal can be left unaffected. Two of these units can be connected to a stereo system, to put new life into overly-compressed recordings. O