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Logarithmic Compressor Has Low Distortion

PEAK limiters or clippers are widely used to prevent overmodulation of transmitters in amateur and other communication circuits. These devices abruptly clip the audio signal when it exceeds a predetermined level. This process produces high-order harmonics which must be removed by well-designed low-pass filters.

Designed to *compress* the signal above given levels without generating so much distortion is a logarithmic compressor circuit described in *G-E Ham News*. Because it generates less distortion and fewer harmonics, filtering is simplified. The circuit shown in Fig. 1 permits higher input levels to the speech circuits without overmodulating the transmitter. The compression takes place in a pair of copper-oxide meter rectifiers connected back-to-back in a circuit which looks like the conventional diode clipper. Figs. 2 and 3 show the transfer characteristics of copper-oxide instrument rectifiers and diode clippers, respectively.

The compressor is inserted between the microphone and speech amplifier in the transmitter. The first section of the 12AT7 brings the microphone voltage up to the level required at the compressor. The output of its second triode is connected through the primary of a push-pull output transformer to the compression circuit consisting of R1 and the instrument rectifier W.

The transformer matches the high-impedance plate circuit to the low-impedance compression circuit. It may be almost any standard push-pull output transformer. The instrument rectifier may be two half-wave units connected as shown. A bridge rectifier may be used if the proper terminals are used.

R2, R3, C1, and C2 make up a simple low-pass filter which removes high-order harmonics generated by nonlinearity in the rectifier unit. Coupling and bypass capacitors and other response-determining components are selected to develop response-curve characteristics which are best for voice communication circuits.

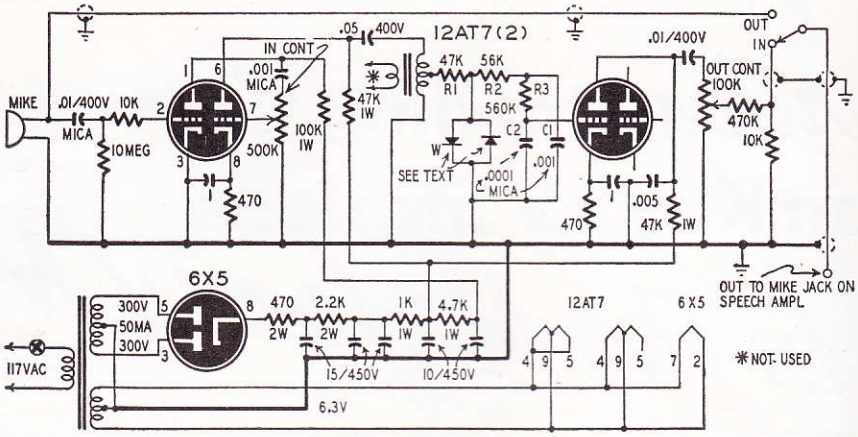

Fig. 1—Circuit of the compressor. Two meter rectifiers do the compressing.

Connect the output of the compressor to the input of the transmitter. Throw the output switch to OUT and adust the transmitter's gain control to the normal input level while checking the modulation percentage with a scope or other means. Set the compressor's output control to zero and the compression control to half way on. Throw the switch to IN and adjust the output control until the modulation level is the same with the compressor out of the circuit. Whistle a sustained note or sound a sustained OOOOO——O into the microphone while setting the compression control to make the average modulator plate current no more than twice that obtained with the compressor OUT. Make final adjustments of the compression control while on the air.

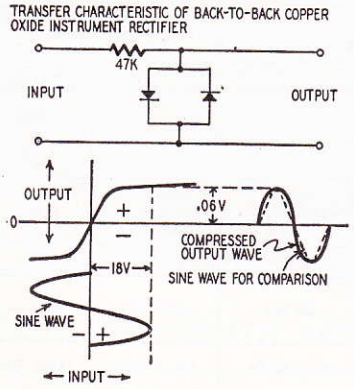

Fig. 2—Action of the meter rectifiers.

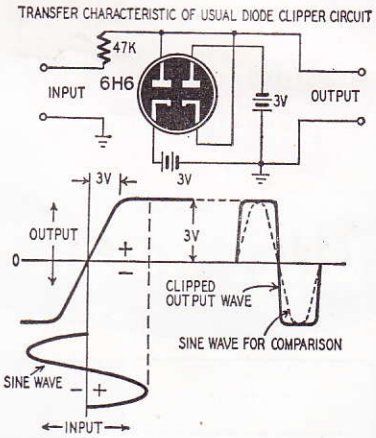

Fig. 3—The action of a diode clipper.