THE TAPE RECORDER AS A PROGRAMMER¹

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Many experimental designs using auditory stimuli require the presentation of a sequence of tones which vary in frequency and/or intensity, and which are correlated with the occurrence of other stimulus events, such as shock, feeder availability, *etc.* If a conventional punched tape programmer is used to program the stimuli, it becomes necessary to adjust the frequency or intensity settings of the signal source during the experimental session. The Connecticut College Laboratory has found that a two-track magnetic tape recorder permits the construction of a program of auditory stimuli which is perfectly synchronized with the occurrence of other stimulus events and does not require monitoring or adjustment. Buckhout (1965) has already noted the use of the Sony (Model 211-TS) recorder as a laboratory programmer. The system described here has the advantage that it can be used with any two-channel recorder.

Figure 1 diagrams the major components in this system. One track of the tape contains the auditory stimuli which are pre-recorded at the proper frequencies, intensities and durations. The second track is recorded with tone pulses, which are used to actuate the associated programming equipment in a manner similar to conventional punched tape programmers.

So that the recorder output from the second track can be used to drive standard programming apparatus, it is necessary to amplify the output with the simple, two-stage, common-emitter amplifier, also shown in Fig. 1. The output of this amplifier is sufficient to drive a small plate relay which, in turn, controls standard 28 v dc relays, timers, and solenoids. By using the transistor amplifier and the re-

Fig. 1. Block diagram of tape recorder programming system (top). Schematic diagram of transistorized amplifier (bottom).

corder output directly, instead of taking the signal from ahead of the recorder's output transformer, no internal connections are made to the recorder. It can thus be freed easily for other laboratory uses when necessary. The entire amplifier-plate relay circuit, which can be assembled for less than \$10.00, has been in service for more than a year without failure.

Using a 7-in. reel with 3600 feet of $\frac{1}{2}$ mil tape (Scotch 290-36), an experimental session of up to 6 hr can be programmed at a tape speed of $1\frac{7}{8}$ ips. Where higher frequency response is required, a tape speed of $7\frac{1}{2}$ ips is recommended. This, of course, will result in a proportionately shorter maximum program duration for the same tape footage.

REFERENCES

¹Developed under Research Grant M-4705 from the National Institute of Mental Health to Dr. Otello Desiderato.

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Buckhout, R. An inexpensive laboratory stimulus programmer. *J. exp. Anal. Behav.*, 1965, 8 (in press).