A FIVE-CHANNEL PHOTOELECTRIC PROGRAMMER¹

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This laboratory has been faced with the problem of synchronizing a stimulus program with several VI reinforcement programs. Traditional single-channel punched film units proved inadequate, and multi-channel paper tape readers were prohibitively expensive. During the past year extensive use has been made of a unit that has effectively and reliably solved the programming problem.

Thirty-five mm film, divided longitudinally into five channels, is programmed with strips of opaque tape. Although the manufacturer of the programmer does supply tape precut to the proper channel width, we have successfully used printed circuit masking tape, plastic electrical tape, and Chartpak drafting tape for program construction. The programmed film strip is drawn through a photocell reading station by a synchronous motor drive. Motor units may be interchanged with ease to provide different time bases.

Literature supplied by the manufacturer describes available motor speeds in terms of the length of time needed to complete one cycle of a standard 120 sprocket film loop. Ten standard cycle times ranging from 30 sec to six days are available. Output pulse width is a function of both film speed and the length of programming tape placed of the film. Minimum pulse widths range from 39 msec to 12 min depending on the motor used. In practice, motor speed is best determined by the minimum pulse width and inter-pulse interval required. Programs over 10 standard cycle lengths long have been run with no difficulty.

¹This work was supported by Grant MY 5757 from the National Institute of Mental Health.

The reading head senses the presence or absence of the opaque tape strips. The presence of a piece of tape triggers a solid state relay driver circuit. Readout from each channel is provided by an indicator lamp and two sets of transfer contacts brought out to banana jacks. The relay contacts are rated at 5 amps at 125 v ac into a non-inductive load. Once a program has been constructed and checked, a dense negative print of the film strip is made at a local photographic laboratory. This procedure makes little difference in the operation of the unit, but it does eliminate the possibility that a crucial piece of tape will become dislodged. In addition, spare programs can be made with little expenditure of time or money.

The unit is normally supplied ready for mounting in a standard 19-in. relay rack. A variety of accessory functions and controls are available to meet special requirements. We are currently investigating a new stepping motor drive that is fully compatible with the current unit. The five binary bit output, with simple diode matrix decoding, will provide up to 31 unique outputs per step. This type of application promises to alleviate many of the problems inherent in conventional stepping switch circuitry when a number of complex programs are needed.

The unit described above may be purchased from Space Mechanisms, Inc. 639 Massachusetts Avenue, Cambridge 39, Massachusetts. The price of the SM 607 model was \$475, additional drive motors cost \$20.00 each. Pre-printed program film is available at \$.50 a foot. A 10-channel programmer is also available.