INEXPENSIVE PLUG-IN CIRCUITS¹

THOMAS A. GENTRY²

COLUMBIA UNIVERSITY

In many laboratories, particularly in those for student instruction, economics and available space determine the type of control circuits that are used.

In one of the advanced undergraduate laboratories at Columbia University, a programming and recording unit was developed, using inexpensive plug-in circuit boards.

Fig. 1. Diagram of the unit.

This plug-in programmer consists of standard items used in operant conditioning, *i.e.*, general- and special-purpose relays, counters, timers, recorders etc., which are permanently rack mounted. The contacts for all components are wired to a panel containing female Cannon connectors. Figure 1a (a rear view of the rack) shows the components and the cables

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leading to the Cannon connector panel. The plug-in board, on which the programming circuits are wired, is placed on the front of the rack. Figure 1b shows this board in the center of the rack, directly above the rectangular Cannon plugs. This circuit board is constructed of standard pegboard, mounted with Nu-Way studs to represent each contact of the components on the rack. The Nu-Way studs are wired to male Cannon connectors, which are mated to the females coming from the programming elements. The board can be removed from the rack by disconnecting the Cannon plugs and by removing the four retaining bolts in the corners of the circuit panel that attach the pegboard to the rack. Any number of pegboard panels can be constructed, each representing the total switching capacity of the rack. In this manner, each student can have a separate circuit board on which to program his experimental contingencies, and he can use the full capacity of all available programming and recording apparatus.

The concentration of connections on one panel results in increased rack space. For example, in the panel space required for eight relays in some commercial products, our rack contains 20. The concentration of the stud connectors within an approximately 3-foot-square area limits the number of snap lead lengths necessary.

Because of the number and compactness of the studs on the pegboard panel, a color coding system was used by placing colored washers behind the studs. (On our panels, all operate studs have a green washer; normally closed contacts, blue; common, yellow; and normally open, white.)

This method need not be limited to the use for which it was designed. The individual researcher, for example, could use this design to have several proven circuits ready for use at any time.