TECHNICAL NOTE

*AUTOMATED DATA ACQUISITION USING AN
IBM KEY PUNCH¹*

In discrete trial experimental situations that record three, four, or more possible events (responses, reinforcements, stimulus changes), data analysis is frequently a tedious procedure. Figure 1 illustrates a device in position over the numerical keys of an IBM

026 Key Punch, which can be programmed into a relay rack so that responses can be directly convertly to punches on computer data cards. The 0.125 in. (0.318 cm) Plexiglas sides of the unit are constructed so as to slip between the rows of keys on the keyboard. After the height of the solenoids is initially adjusted, no further adjustment is necessary. The weight of the unit is sufficient to keep it in place. There is no need to fasten the unit to the keyboard.

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A 50 msec, 24-v dc pulse, similar to that used to operate counters and other recording devices, can then

Fig. 1. Example of the unit in place on an IBM 026 Printing Card Punch.

be used to operate the solenoids to punch data onto computer cards directly from the controlling equipment. The push-type solenoids² are designed for continuous duty operation and contain an internal return spring. The push-force of 6 ounces (1.67N) is adequate to operate the key punch. Figure 2 shows where each of the 0.25 in. (0.635 cm) holes is drilled for placement of the solenoids. On the IBM keypunch, keys 4, 5, and 6 are concave to serve as "home keys" for the key-punch operator. Therefore, the solenoids that operate these keys must extend slightly further than for the other solenoids. This can be accomplished by inserting the mounting lock-washers below the horizontal plate on the home keys (4, 5, and 6) and inserting the mounting lock-washers above the horizontal plate on the remaining keys (1, 2, 3, 7, 8, 9, SKIP).

Fig. 2. A schematic of the horizontal plate indicating where the vertical supports were installed, where the holes were drilled for placement of the solenoids, and the location of the spacer used to position the solenoids correctly over the keys.

²Dormeyer p8-1L (12 v dc) or p8-2L (24 v dc) available for \$6.00 each from Allied Radio Corp., Chicago, Illinois.

The unit described has been in operation for six months, an average of five days a week for a total of over 125,000 operations. During this time, there were no difficulties with the solenoids. It has not been necessary, to date, to readjust the position of the unit on the keyboard. The unit is removed from the keypunch when it is not in use, so the keypunch can be used normally.

Although the IBM Keypunch can punch at a rate of 18 characters per second, 0.25 sec is necessary to register a new card, so usage is strictly limited to a discrete trial situation.

The unit has been in use on an auditory match-to-sample experiment in which the subject could respond on a sample button (which produced a 1-sec sample of whatever tone was correct at that moment) or on a keyboard containing eight separate keys. The following two examples of data cards are typical of those that were automatically punched when a subject was responding on the eight-note auditory match-to-sample procedure:

(1) 9987 959394 912 98691293 98 978996 95 947 91 98 976923 95 912

(2) 987695 949593 912 987 954 98691 98796 912 93 978 9679594 95

On card one (read from left to right) the subject started with two sample responses, then responded on the eighth key, then on the seventh key. The response on the seventh key was a correct match, so the 'SKIP' button was automatically depressed, which leaves one blank space. The program control card is used to set the keypunch into the numeric mode and the 'Auto-Feed' registers each new card in sequence. Each data card, therefore, shows several sequences of responses, each ending with a blank space (a correct match).

Most experiments can be programmed to use only numeric keys (1 to 9) which allows for using the design described herein. In the event that more responses must be recorded, the alphabetic keys may be used with appropriate changes in the computer program. Two alphanumeric keypunches are available. The IBM Model 024 (non-print) rents for approximately \$40.00 monthly. The IBM 026 (print), which can also be used for any other keypunching, is available for approximately \$55.00 monthly. Data cards are available at approximately \$10.00 per 10,000.

EDWARD R. CHRISTOPHERSEN
University of Kansas