DIGITAL COMPUTER LABORATORY
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

OPERATING INSTRUCTIONS FOR PHOTOELECTRIC PAPER TAPE COMPARATOR
(A Revision of Digital Computer Laboratory Report No. 62)

by

Clifford E. Carter

October 15, 1958

File No. 256
I. Photoelectric Reader

The principal parts of the photoelectric reader from the operational standpoint are the brake, reading position (the 6 holes) and the clutch. These are listed in order, from right to left, along the tape race in the direction of tape motion. The purpose of the brake is to stop the tape as soon as possible after the release of the clutch. The read holes are for sensing of all bits of a character in parallel. The clutch, when engaged, causes the motion of the tape.

All tapes used on any of the photoelectric readers should have at least a 4-inch leader at each end. This leader should be a series of non-significant characters, usually the (5th and 8th hole) double delay. This leader serves to span the gap between the read holes and the clutch.

To place a tape on a reader:

1) make sure the clutch is not engaged;
2) depress the small latch on the brake and raise the brake to a vertical position (it should remain);
3) place the tape in the tape race ("1" hole edge to the front) so as to read from right to left; be sure the leader is positioned between the two rollers of the clutch;
4) latch the brake firmly in place.

II. Comparer (General)

The purpose of the photoelectric comparer is to check the accuracy of tape making. This usually means a check on the reperforator. In some cases the comparer is a good device for catching teletype errors.
It is suggested that proper use of the photoelectric comparer will save much time in programming.

The device is operated through the use of two photoelectric tape readers and a control panel. The readers described above are the same as used on Illiac.

III. Turn On

The **red light** on the control panel should be lighted at all times. (If it is not, notify the teletype operator at the desk.) To turn the unit on, switch S5 to **ON** and push the **red** pushbutton S6 (see Figure 1). At this time the green light should be lighted. Before inserting tapes in the readers, be sure that **run** switch S3 is in the **stop** position and **reset button** S4 has been depressed.

IV. Description of Controls

There are two telephone switches (S2, S3), one rotary switch (S1), one toggle switch (S5), and two pushbuttons (S4, S6). There are also two rows of five neons each and one single neon marked **Compare**. The positions and names of the lights and switches are shown in Figure 1.

A. **Skip Switch**

Comparison of the tapes can be controlled for three different modes of comparison by the skip switch. In the **Compare all Characters** position, all characters on each tape will be compared. In the **Skip all Fifth-Holes Characters** position, none of the characters having fifth holes will be compared on either reader. Thus, with the switch in this position and one tape with more fifth hole characters punched than the other tape, the comparer will not stop until it detects an error in characters having only the "1", "2", "4", and "8" hole punch combinations. In the **Skip all Spaces** position, none of the 5-hole space characters will be compared, but all other characters will be compared. To insure correct operation, the position of the skip switch should be changed only when the run
Figure 1
PHOTOELECTRIC TAPE COMPARATOR
switch is in the Stop position and the set button has been depressed.

B. Comparison of Tapes

After the skip switch has been set, tape comparison is controlled by the run switch, the set button and the jump switch.

The set button should be pushed at the start of any comparison operation, regardless of the position of the skip switch.

The run switch has three positions:

Run. When the run switch is in this position, tapes are compared automatically in the mode of operation defined by the skip switch. If an error occurs, the comparer stops and the neon indicators of the comparer read from each tape. The jump switch (see below) may then be used.

Stop. The run switch should be in this position when turning on the power, when changing position of a tape, when inserting a new tape, and after comparing tapes.

Single Character. Each time the run switch is moved to this position (which has a spring return to stop), one character will be compared. If an error occurs, the comparer will remain stopped when this switch is used.

C. Jump Switch

This spring return switch, moved up to Jump Back Tape, will advance the back tape to the next character to be compared (as defined by the position of the skip switch); moved down to Jump Front Tape, it will advance the front tape to the next character to be compared (as defined by the position of the skip switch).

This switch is used when an error is indicated. Its purpose is to allow one tape to be moved without bothering the other.
D. **Character Indicating Neons**

The two rows of five neons each indicate the last character read from the respective tapes as labeled.

E. **The Compare Neon**

This neon will be on if the last two characters read (one from each tape) successfully compare. It will be off if these two characters fail to compare.

V. **Some Examples of Operation**

Three examples of possible operation for the comparer are given here to aid in the understanding of the switch operations. These examples are not meant to cover all possibilities for the use of the switches.

A. **Program and Subroutine Tapes**

Assume a single program tape has been made by using a reperforator to copy a series of separate tapes. It is desired to compare the program tape with the individual pieces from which it was made.

1. Assuming there are no significant fifth-hole characters, place the tapes in the readers on a group of double delays (5th and 8th holes) preceding the routines (program tape in back reader, first individual tape in the front reader). Move the skip switch to the **Skip all Fifth-Hole Characters** button and move the run switch to **run**. Comparison should be allowed to continue until an error is indicated. If reperforation has been done properly, this should be the first significant character of the next tape. Remove the first tape from the front reader and place the next individual tape in place corresponding identically with the program tape. In this way the program tape can be completely compared without changing the position of the rear tape by hand.
2. If there are some useful fifth-hole characters (scope headings, tape headings, or parentheses), place the tapes in the readers on corresponding characters. Move the skip switch to Compare all Characters, push the set button and move the run switch to run. Allow the comparison to continue until an error is indicated. If the reperforation was done correctly, this stop should be the end of the first individual tape. Move the run switch to run and push the set button. Move the program tape in the rear reader to the first significant character of the next section. Place the next individual tape in the front reader so as to correspond with the position of the program tape in the rear reader. Move run switch to run. The repetition of this procedure will allow correct comparison to be done.

B. Newly Reperforated Tape

If it is desired to compare a newly reperforated tape (with no changes) with the old tape, set the skip switch to Compare all Characters position. Place the tapes in the readers on the first significant character, push the set button and set the run switch to run. The comparer will stop if any errors are present. These errors can be noted, and the comparison re-started by use of the jump switch.

C. Corrected Tape

Reperforations are quite often made in order to form new tape by making corrections. There are two cases to be covered under this heading:

1. If the corrections are few and minor, the tapes should be run under the conditions described in part IV-B. The jump switch will be used quite frequently to by-pass the error characters.

2. If the corrections are major and new correction tapes are made for reperforation purposes, the comparison can be done
as just described. The major difference is that each stop means the insertion of a small correction tape. This necessitates careful marking of correction tapes and careful placing in the readers for smooth operation of the comparer. For this type of operation the use of the run switch moved to the single character position allows the operator to stop the comparer on the marked characters.

If the comparer stops and does not seem to respond to normal operational procedures, check the Compare neon. This neon is not lighted when there is a failure to compare. The two rows of five neon each can be checked to see the last character's read. This is an aid in jumping through an error section of tape and a correct section of tape since it allows a visual display of each character of the tape as it is jumped. Each stoppage in which the Compare neon fails to light is an error.

VI. Report of Errors

The comparer is not an error-free device. When all indications point to some malfunction of the equipment and the operator is satisfied that proper procedures are being followed, notify the teletype operator of the difficulty.