

Published: 09/09/66

u

Identification

Flexowriter Specifications for Multics Documentation
L. L. Selwyn

Purpose

This section presents a summary of the specifications of the Friden Model 2201 Flexowriters that are being used in the preparation of documents created in the course of the Multics development effort. In addition, this section also covers the use of the 2201, and the format and appearance of the punched tape it produces.

Background

The 2201 Flexowriter serves as an alternative to the use of TYPSET within CTSS for the preparation of documents. As a document is typed on the Flexowriter, a punched paper tape is prepared as a by-product. This tape may be corrected and edited, so that a final, presumably perfect copy may then be run off (in like manner as RUNOFF is used in connection with TYPSET). The tapes prepared on this machine may, at some future time, serve as input to the 645 when the Multics equivalent of TYPSET is available.

The 2201 will incorporate all printed characters within the ASCII character set, although four of these must be created by an overstrike. These four are:

exclamation point	!	≡	'	bs	.
dollar sign	\$	≡	S	bs	
left brace	{	≡	(bs	-
right brace	}	≡)	bs	-

The actual tape codes corresponding to all characters and function codes on the 2201 are contained in Table 1.

Although the 2201 will not right-adjust the text, it will return the carriage automatically when it is within 12 positions of the right-hand margin. This is the normal mode of operation, and is initiated by an F-11 control code. In the normal mode, the carriage return character does not punch in the tape if inadvertently typed. As a result, any subsequent editing of the text, such as adding or deleting a few words, will cause the 2201 to continue to type out lines of the proper length, since all words in a paragraph appear on the tape as one continuous string. In addition to the automatic carriage return feature, the normal mode will not permit a space to occur when the carriage is at the left-hand margin. If such happens, a switch is automatically made to the auxiliary tape reader, which contains a continuous loop of tape containing backspace codes, such that the carriage is once again reset at the left margin.

When it is desired to punch a carriage return in the tape, such as at the end of a paragraph or for tabular or formatted text, it is necessary to enter the tabulate mode, which may be done by typing an F-13 control code. Under this mode, the carriage will return only when a carriage return is either typed or read from the tape. Also, spaces at the left margin are valid. Note, for example, that at the end of paragraph, it is necessary to type the sequence

F-13 C-R C-R F-11

in order to separate the two paragraphs. This is analogous to the .break command in TYPSET and RUNOFF.

Like TYPSET, the 2201 system requires that a tape first be prepared, corrected and edited, and then be run off to create a final, presumably perfect copy. The 2201 views its tape reader as being identical to its keyboard, such that any function caused by the keyboard will also be caused by the tape reader when a like code is encountered.

Additional Features

The 2201's in use within Multics have several additional features which are noted here.

- 1) Non-print -- An F-2 code in the tape will cause the printer to be turned off, to be turned on upon the appearance of an F-3 code in the tape. However, the text on the tape that lies between the printer-off and printer-restore codes will be reproduced on a new tape, if one is being prepared. The purpose of this feature is to permit the appearance of

special codes on the tape, that might be used when the tapes are later transferred to the computer. However, no rules for such codes have as yet been determined, and thus this feature is not in use at present.

- 2) Punch on or off -- the punch may be turned on by an F-4 code, or off by means of an F-5 code, either from the keyboard or from a tape being read.
- 3) Auxilliary tape reader -- The F-9 code in a tape being read causes a switch to the auxilliary tape reader if read by the main one, or to the main reader if read from the auxilliary reader.
- 4) Stop codes -- there are two distinct machine stop codes which will cause reading of tape to stop when either code appears in the tape. The F-1 code will always cause the machine to stop. It should, therefore, be the very last code to be punched on a tape. The other stop code is F-12 which should be used for all other stops, such as a stop that will permit certain variable information to be entered. If a tape is being reproduced without being printed, the F-12 codes will not cause a machine stop.

Editing

The four program modification switches are used during the editing process. Switch 1 causes the machine to stop reading, and hence reproducing, a tape when it encounters a carriage return at the left margin, such as at the end of a paragraph. Switch 1 also brings the machine into Edit mode. Switch 2 down will cause the reader to stop at the end of a line. Switches 3 and 4 are momentary switches, and must be held down to be operative. Switch 3 down causes the reader to stop upon encountering a space code, such as the end of a word. Switch 4 is related to the Non-Print feature discussed above, and causes printing of the otherwise non-printed information. Switch 2 alone (i.e., without Switch 1) causes the reader to ignore the F-12 STOP code, and keep right on going.

Preparation of a Tape

Generally, tapes are prepared using the normal, or fill mode of operation. When power is turned on, the machine is in this mode. Thus, for all unformatted text, there are no carriage returns punched in the tape, except for headings, separations of a paragraphs, or for some formatted text, such as a list or a tabulation. The beginning of

a tape should contain an F-4 (punch on) code followed by an F-13 (tabulate mode) code. These should be followed by six carriage returns, after which the title or, in the case of an MSPM section, the standard MSPM heading should be entered. This should be followed by at least two carriage returns. If unformatted text is to begin at this point, an F-11 code should be typed; else the formatted information should be entered. Typing should proceed according to these rules and standard practice until the end of the page is reached. The last character on the tape should be an F-1 machine stop code.

Each page of the text should be prepared on a separate piece of tape. The 2201 system in use here does not permit continuous form paper nor automatic page formatting, as does TYPSET and RUNOFF. Because of this, it is generally useful to leave a rather wide bottom margin on each page, such that additions may be made without the necessity of reformatting several ensuing pages. Each page is prepared and run off separately, and thus may be thought of as a complete document unto itself, at least from an operational standpoint.

Errors. Errors caught immediately may be corrected rather simply. The tape must be backed up the number of spaces to be corrected, and the TAPE FEED key depressed until at least that number of tape feed, or delete characters have been punched. When this is done, the correct characters may be entered, and normal typing may continue. It is important to bear in mind that there are a number of codes that advance the tape but which do not get printed. For example, the upper- and lower-case shift codes, the backspace code, the tabulate code, and any of the F-codes. Thus, if a correction is to be made, the presence of such codes in the tape must be considered. If an error is not observed immediately, it is not possible to correct it on the current pass of the tape. This becomes an editing operation, where a new tape is reproduced from the old, with changes and corrections made as desired.

Editing. In order to make changes in an existing tape, it is necessary to create a new one by reproducing the correct portions and by manually entering any changes. The first three program modification switches described above are employed in this process. For example, an entire paragraph may be reproduced by placing Switch 1 down and hitting the START READ key. Or, reproducing might be controlled so as to stop at the end of the current word, by holding Switch 3 down. If material is to be skipped, the Tape SKIP key should be used instead of the START READ key, and will be subject to the control of Switches 2 and 3 as above. Use of the TAPE SKIP key does not permit the

tape being skipped to be printed. If this is desired, an alternative method is to turn the punch off by typing an F-5 code, skip over the desired material by means of the START READ key and the appropriate program modification switches, and then turn the punch on by typing F-4. It is important to note that with the 2201 the process of editing is not as simple as with TYPSET. As a result, some additional care should be taken to see that original drafts are as correct as far as possible.

Running off a Tape. For all operations of the Flexowriter where a tape is to be punched, the 3-position PUNCH SWITCH should be in the SEL (select) position. However, when a tape is to be run off with no new tape being prepared, the switch should be in the OFF position. The tape should be loaded into the reader, the paper loaded into the platen such that only the very top edge is exposed, and all program modification switches should be up. To start the process, the START READ key should be depressed. In some instances, variable information will have to be entered, in which case an F-12 code, punched in the tape, will cause the machine to stop. After the new information has been entered, the START READ key should once again be depressed, to resume the printing operation.

References

- 1 Repository document # M0076, "Operating Procedures for the Model 2201 Flexowriter to Prepare Documents for Multics," by L. L. Selwyn
- 2 Friden, Inc., "2201 Flexowriter Operating Instructions"
- 3 Friden, Inc., "Technical Manual for 2201 Flexowriter"

