GENERAL INFORMATION
FOR OPERATORS

TERMINAL 2101

VIATRON

SYSTEM 21

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1. INTRODUCTION

System 21 allows you to originate data; store it; display it; revise it; receive it from, or send it to outside sources; record it on, and read it from magnetic tapes; print it on paper; and read or punch cards. The word data means a collection of letters, numbers, or other characters (such as punctuation marks) that give information.

The Terminal was designed with operator convenience and comfort in mind. You will enjoy its simple, convenient, and noiseless operation.

When you sit down at Terminal 2101, you will see the four main parts that you will be using:

the video display which permits you to see data in the system;

the control panel which has indicator lights and control switches you may be using;

Viatape recorders which you can use to record or play back data;

the keyboard which you can use to enter data.
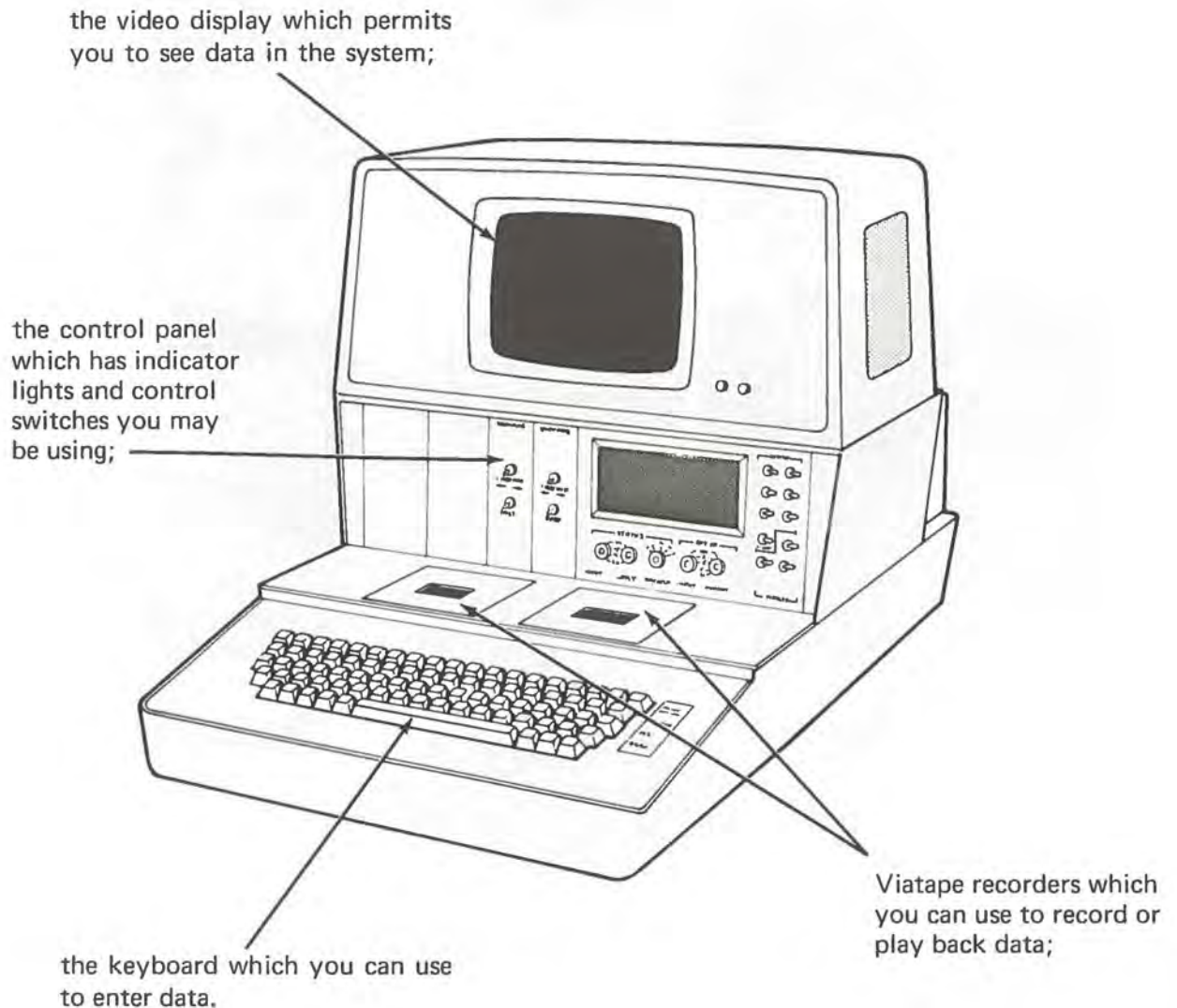
Behind the control panel is the heart of the Terminal, the *microprocessor*. This is the part that handles the data. A feature of the Terminal 2101 is that the operator is always able to see on the video display exactly what data is in the microprocessor.

The sketch below illustrates the three basic capabilities of the Terminal: *input, keyboard data entry,* and *output.* To *input* means to bring data into the microprocessor — from any of the sources shown. *Keyboard data entry* is a special kind of input in which you use the keyboard to enter data into the microprocessor. To *output* means to send data from the microprocessor to any of the destinations in the illustration.
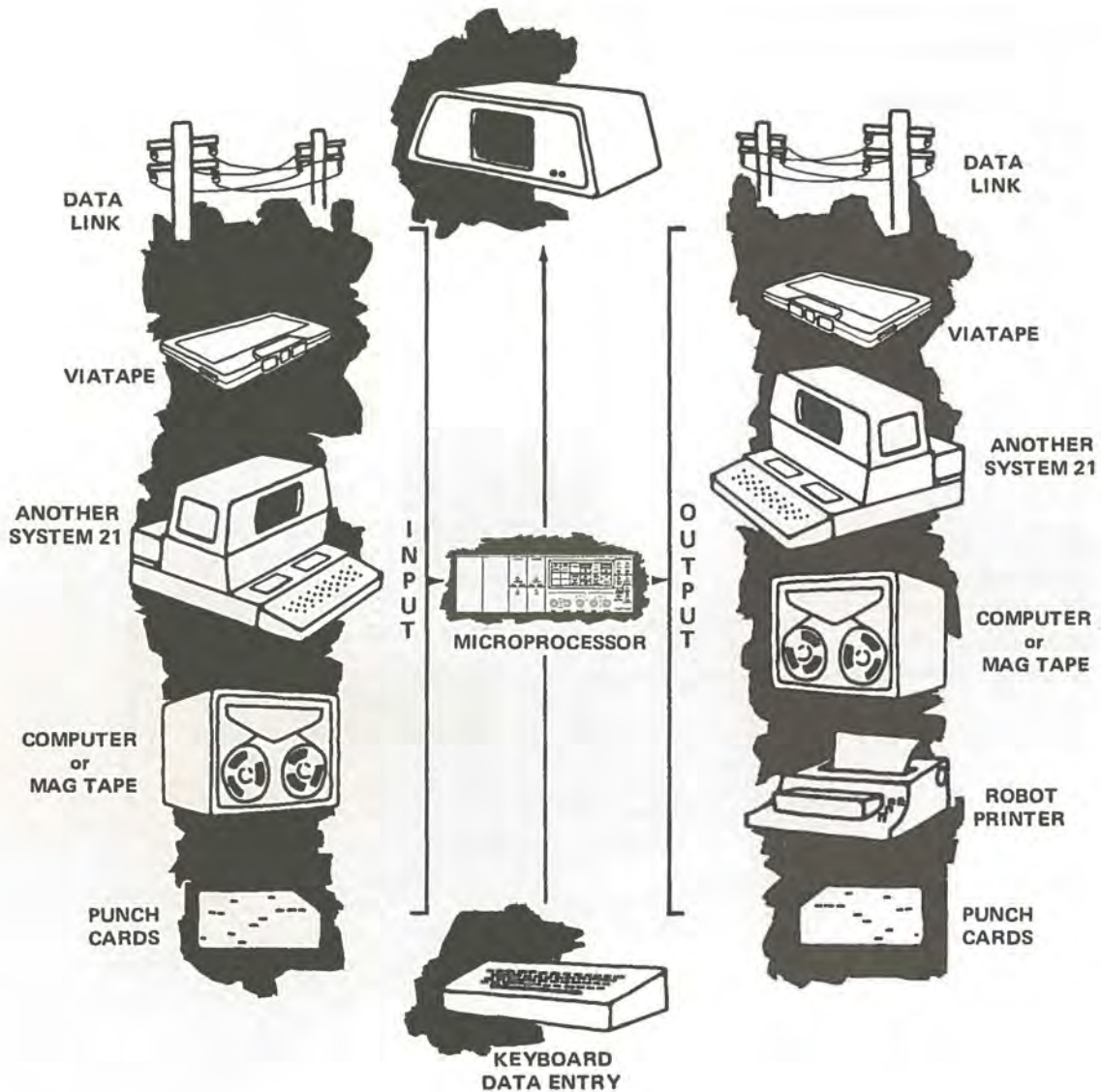
The input sources or the output destinations can be in the same room . . . or they can be many miles away.

The microprocessor can store 400 characters, (letters, numbers, symbols, etc.). It is arranged so that the 400 characters are divided into five 80-character groups called *records*. The record names are:

READ
WRITE
MASTER
CONTROL 1
CONTROL 2

Normally, each record has a specific use. The WRITE record is used for data input or entry. After output of data from the WRITE record, the data is erased from the WRITE record and transferred to the READ record. The READ record, in other words, contains the last output from the WRITE record. The MASTER record usually contains a guide to help you in keyboard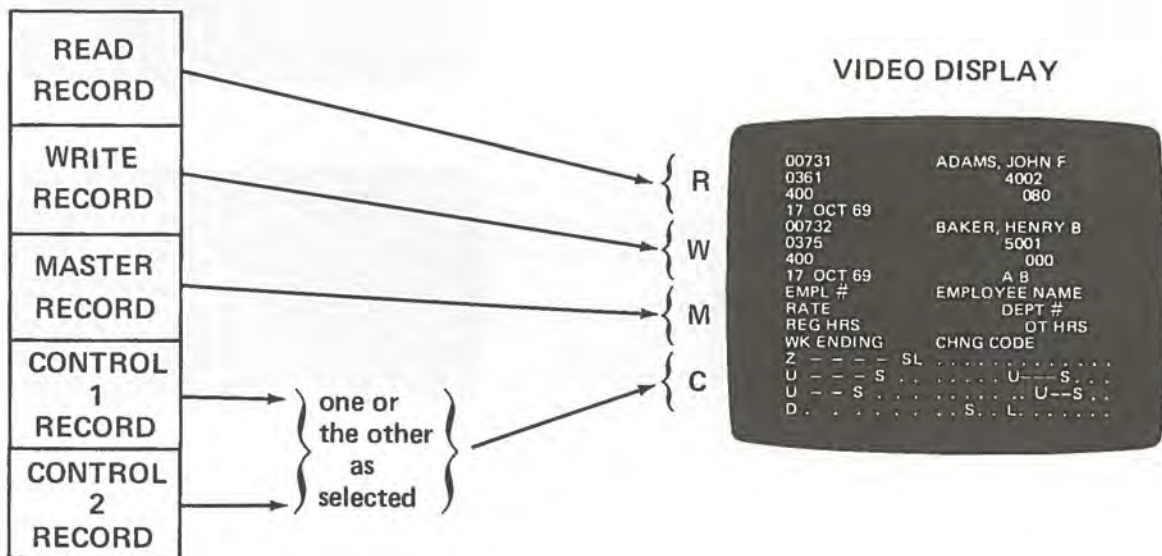 entry. The CONTROL records contain control programs, which you can use to have the microprocessor perform certain operations automatically.

As shown below, a microprocessor record appears on the video display as four 20-character lines. You can display the READ, WRITE, and MASTER records and one of the two CONTROL records at a single time.

| READ RECORD |
| WRITE RECORD |
| MASTER RECORD |
| CONTROL 1 RECORD |
| CONTROL 2 RECORD |

one or the other as selected

R
W
M
C

VIDEO DISPLAY

```
00731           ADAMS, JOHN F
0361                    4002
400                      080
17 OCT 69
00732           BAKER, HENRY B
0375                    5001
400                      000
17 OCT 69        A B
EMPL #           EMPLOYEE NAME
RATE                    DEPT #
REG HRS                 OT HRS
WK ENDING        CHNG CODE
Z - - - - SL . . . . . . . . . .
U - - - S . . . . . . . . U--S . . . .
U - - S . . . . . . . . . . U--S . .
D . . . . . . . . . . . S . . L . . . . . . .
```

Each record can be divided into one or more data *fields* containing a single kind of information (like "EMPLOYEE NAME"). Each *field* can contain one or more *characters* (letters, numbers, symbols, etc).

A feature of Terminal 2101 is that you can always see your place in the record where you are entering data. The illustrations below show how you do this by watching a line called a *cursor* that appears under the next position to be entered.

To enter the word "KEYBOARD" at the beginning of the record, the operator sees that the cursor is in the first position of the record, as shown here.

Here the operator has typed the letter "K" which appears immediately on the display and the cursor has moved to the next position.

Here the operator has finished entering the word and the cursor is in the next position.
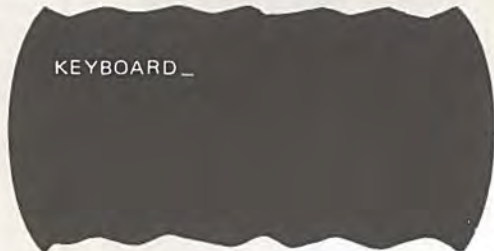
When the operator has finished entering characters (or spaces) in all 80 positions of the record, the cursor disappears from the display. When the cursor is off the display, no data can be entered.

CURSOR

The keyboard is designed to be familiar to both operators who have had experience with a typewriter and those who have had experience with a card punch machine.

Some of the keys will enter alphabetic and numeric characters into the microprocessor; these keys are the *alphanumeric* keys. Four other keys are used for *cursor movement*. The remaining keys, called *function* keys, are used for various control functions such as input and output.
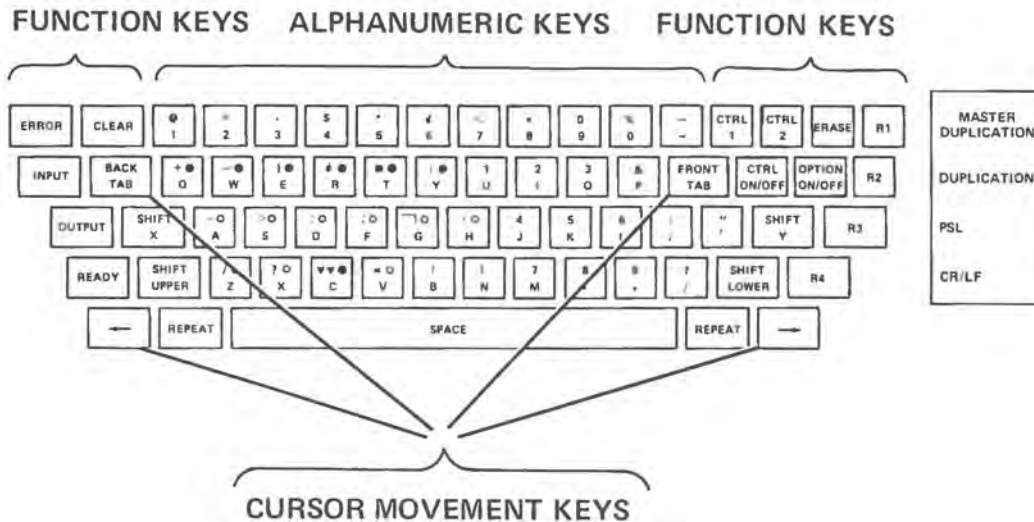
You can see above that each alphanumeric key is marked with two characters. Those on the bottom are *lower shift* characters. They include letters, conventional punctuation marks, and numbers located as they are on typewriter keyboards.

The upper shift characters include numbers arranged and located as they are on card punch machines or touch tone telephones. The upper shift characters also include conventional punctuation marks and some special purpose symbols.

2. STATUS AND THE VIDEO DISPLAY

In addition to the keyboard, there are four paths through which data can input to the microprocessor. These same four paths can be used to output from the microprocessor. The paths are called DC1 and DC2 (Data Channels 1 and 2) and TC1 and TC2 (Tape Channels 1 and 2). The STATUS selectors, shown below, determine the "path" of data through the Terminal.
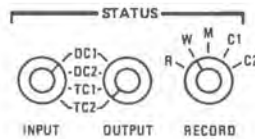
The STATUS INPUT selector positions DC1 and DC2 refer to the two data channels through which data can be input from System 21 devices, such as a System 21 Card Reader. Input from outside devices, such as a computer, is also accomplished through these two data channels. The positions TC1 and TC2 refer to the two tape channels through which data can be input from Viatape recorders or from a System 21 Computer Tape Recorder.

The STATUS OUTPUT selector has the same abbreviations: DC1, DC2, TC1 and TC2. Here the Data Channels are used for output to equipment outside the Terminal, such as a System 21 Printing Robot, a System 21 Card Punch, another System 21 Terminal, or an outside computer, and the Tape Channels, to Viatape or computer tape.

Each of the four channels (DC1, DC2, TC1 and TC2) can be used either to input or to output data. Normally, however, the same channel will not be used for both input and output. In other words the STATUS INPUT selection will usually be different from the STATUS OUTPUT selection.

An example of a STATUS selection is STATUS INPUT at TC1 and STATUS OUTPUT at TC2. Here input of data would be into the microprocessor from the left-hand tape recorder, and output to the right-hand tape recorder.

The STATUS RECORD selector is used to determine the record in the microprocessor for data input and output. The RECORD selector has five positions, one for each record in the microprocessor. These five positions are marked R, W, M, C1, and C2. "R" means READ, "W" means WRITE, "M" means MASTER, "C1" means CONTROL record 1 and "C2" means CONTROL record 2. The setting of the RECORD selector also determines the record that will accept keyboard data entry. The cursor will appear in the selected record.

The drawing below shows how data moves in and out of the microprocessor.
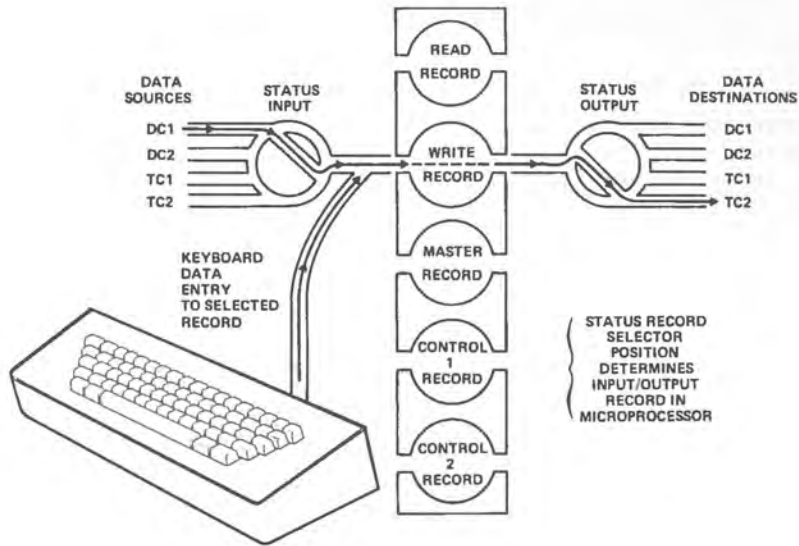
The STATUS RECORD selector position determines the input/output record in the microprocessor. For example, the illustration above shows the WRITE record as the selected record.

Changing the position of any of the three STATUS selectors will cause the control panel NOT READY light shown below to go ON. This light indicates that the new STATUS selection has not yet been recognized by (or read into) the microprocessor. To put the light out and read in the STATUS selections, you must press the READY key.
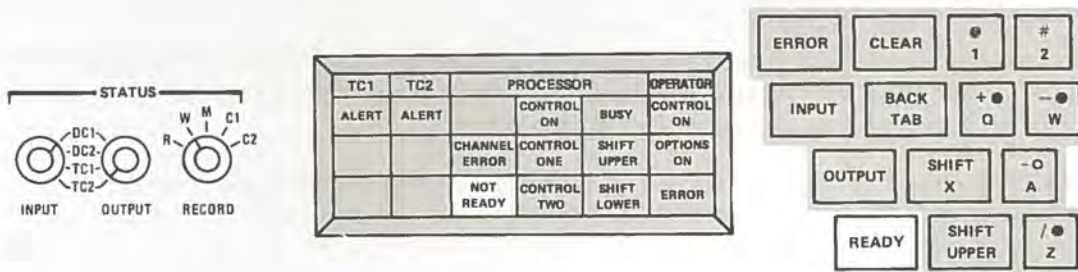
Although data input or entry may occur in all of the five records, only four of these can be displayed at one time. Only one of the CONTROL records is displayed at a time.

The switches that you use to control what is seen on the display are located on the control panel as shown below.

The READ, WRITE, MASTER, and CONTROL switches are used to turn on or off each of these records of the display.

The FIELD MKR switch is used when operating under *program control*, which will be covered in Section 5 of this manual.

The COLOR switch is used when your system is equipped for System 21 Color Display or a System 21 Printing Robot. Separate instructions are provided with these accessories.

In the ON position, the FORMAT switch alternates the four lines of the WRITE record with the four lines of the MASTER record.

When the WRITE record is selected on the STATUS RECORD selector and the FORMAT switch is ON, the cursor appears in both the WRITE and MASTER records.

The illustrations below show the before and after results of setting the FORMAT switch ON.

WRITE RECORD

MASTER RECORD

WRITE RECORD
&
MASTER RECORD
(INTERLEAVED)

When the lines of the WRITE and MASTER records are alternated in this way, the records are said to be *interleaved*.

3. VIATAPE

Terminal 2101's may have two Viatape recorders, identified in the picture below as Tape 1 to the left and Tape 2 to the right. Although you can input from or output to either Tape 1 or Tape 2, in most cases you will input from Tape 1 (TC1) and output to Tape 2 (TC2).

Tape 1   Tape 2
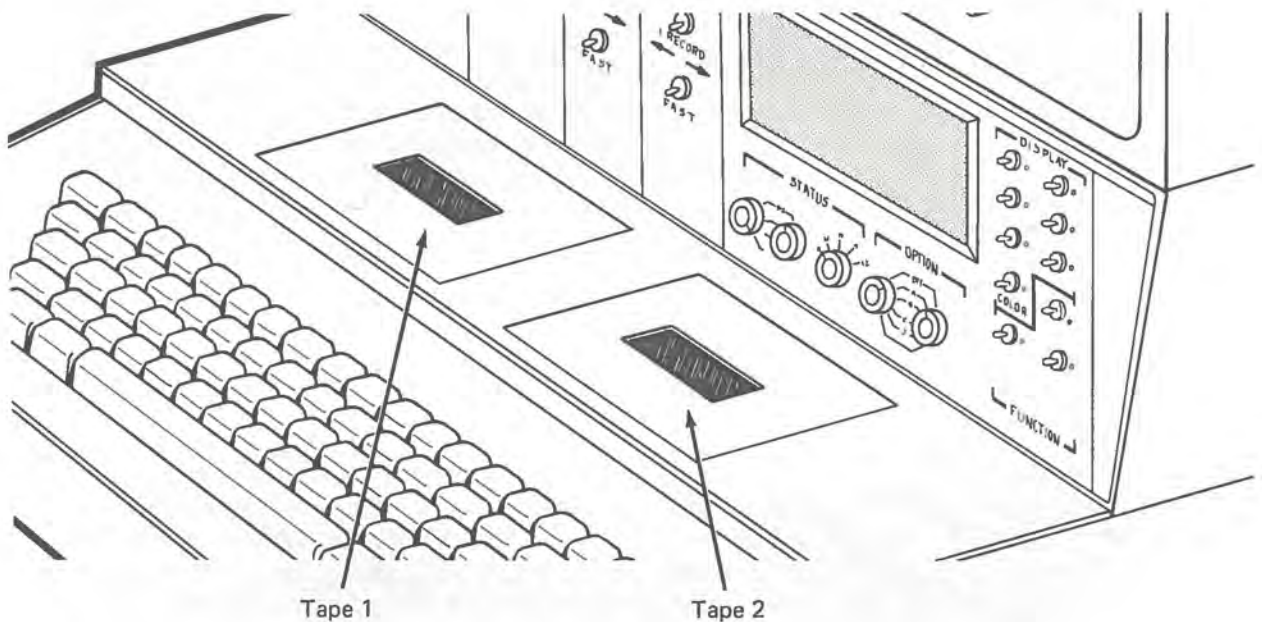
The Viatape cartridge, illustrated below, contains magnetic tape especially prepared for use in System 21. The cartridge contains two spools on which the tape is wound. There is a window on the top of the cartridge through which you can see the amount of tape wound on each spool.

Identification Label
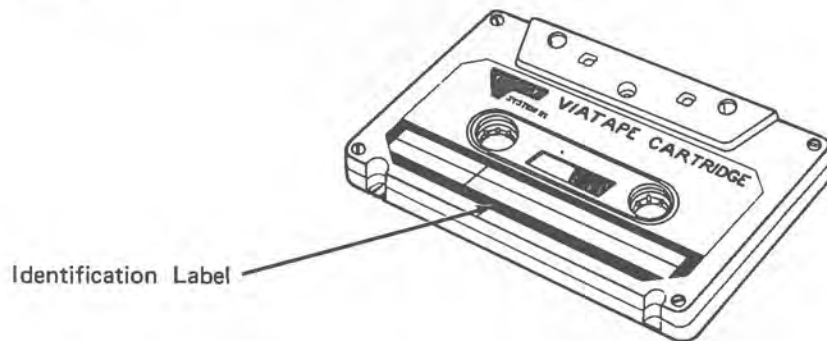
Each cartridge has a place where you can write a title or a description of its contents. If you want to erase what has been written on the label make sure that you take cartridge out of the recorder so that eraser dust doesn't fall into the recorder.

Tab

Each time you input from (read from) or output to (record on) Viatape, the tape moves across the length of tape required to store one record of data. Viatape recorders are able to recognize the beginning of each record.

Whenever new information is recorded on Viatape, whatever had been recorded before is automatically erased. There are some occasions when it is desirable to prevent what has been recorded from being erased. On one of the edges of the cartridge, as shown above, is a tab. When this tab is intact the Viatape cartridge can be either recorded on, or read back from. If the tab has been removed the Viatape cartridge becomes a "Read Only" tape. The information on it cannot be erased, nor can new information be recorded.

Release Latch
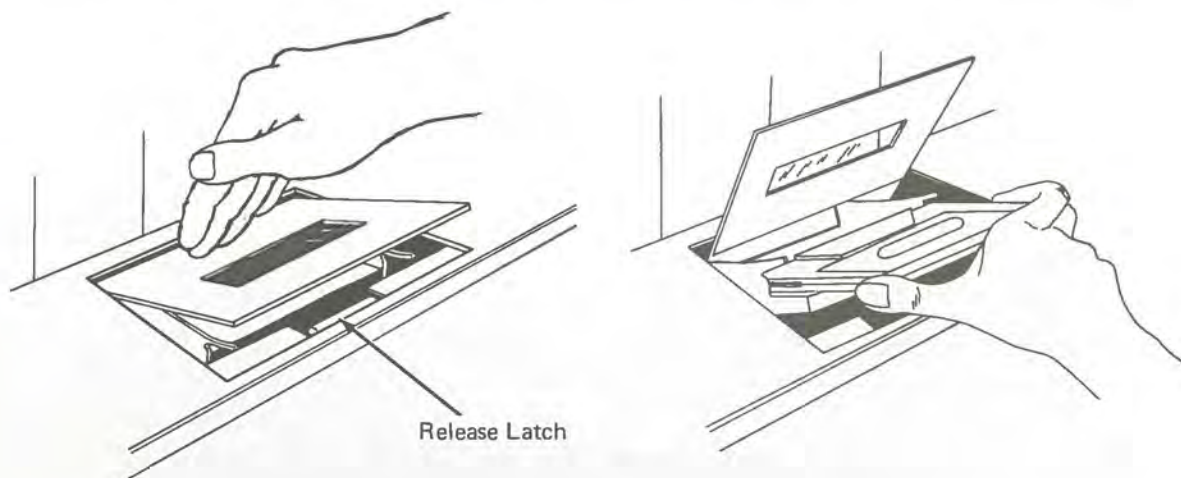
A hinged plastic cover protects each Viatape recorder. To remove or install a cartridge you must raise this cover as shown in the illustration above. To remove a cartridge lift the latch gently, then slide the Viatape cartridge toward you.

To install a Viatape cartridge, hold it so that the identification label is right side up, and gently slide it into the track. Do not use heavy pressure. If the Viatape cartridge does not slide in easily, something is wrong. First check to make sure you have it properly positioned and that nothing has been dropped accidentally into the recorder. If everything appears to be in order and you still can't install the cartridge (remember do NOT try to force it!), call your supervisor.

After removing or installing a Viatape cartridge, return the cover to its original position.

The Terminal has a separate set of controls for each Viatape recorder. These controls are located on the control panel shown below. The switches are normally in the center position. When a switch is moved to the right, it moves the tape FORWARD; when moved to the left, it moves the tape in the REVERSE direction. The FAST switch moves the tape as long as you hold the switch in that position or until you run out of tape, in which case the tape automatically stops. The 1-RECORD switch moves the tape either FORWARD or REVERSE the length of one record each time you press the switch.
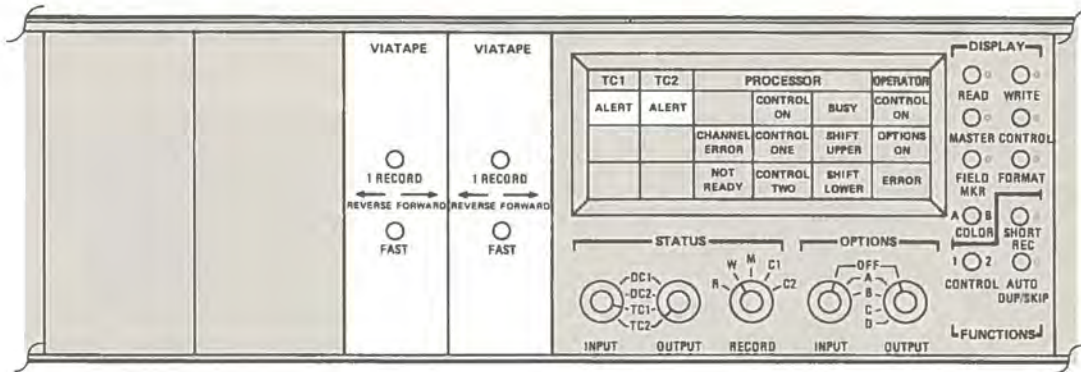
Whenever a tape is moving or other conditions prevent input from or output to a Viatape, an ALERT light goes on. Whenever you input from or output to a Viatape, this light will come on and stay on for the time that it takes the tape to move across the record. If the light stays on for longer than 5 seconds, something is wrong. You may have come to the end of the tape, the cartridge may be improperly installed, or the tape may have broken. The ALERT light will also go on if you try to OUTPUT to a Viatape cartridge that has no tab.
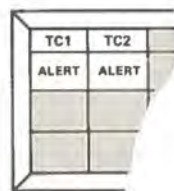
To turn off an ALERT light that stays on and return the Viatape to normal service, press the CLEAR key.

After installing a Viatape cartridge you will position the tape to make it ready for input or output. You may want to position the tape at the beginning or somewhere in the middle.

To position the tape at the beginning you press the FAST switch to the REVERSE side and hold it there until the tape stops. You can see the Viatape moving by watching the cartridge. After the Viatape stops, the ALERT light will stay on. To turn the ALERT light out and prepare the tape for the first input or output, you press the CLEAR key on the keyboard.

To position the tape one or more records forward or reverse, you push and release the 1-RECORD switch once in either the FORWARD or REVERSE direction for each record you want to skip. After first pressing the 1-RECORD switch, you must wait for the ALERT light to go out before pressing it again.

To position the tape at a specific record when you know its approximate location on tape, you will want to scan quickly to that location then read and examine enough records to find the record where you want to begin. You start by setting the STATUS INPUT selector to the Tape Channel (TC1 or TC2) containing the Viatape you will be using, setting the STATUS RECORD selector to the record where you will input (usually WRITE), and setting the DISPLAY switch for that record to ON. Then, you will press the READY key to turn off the NOT READY light. Next, you will hold the FAST switch in either the FORWARD or REVERSE direction, depending upon the location of the record on the tape. You will observe the tape buildup on the spool and release the FAST switch when you think that you have reached the approximate location of the record. You will then press the INPUT key. This inputs the next record on the tape so that you can read it on the display. If you want to read more of the records, you press the INPUT key once to input and display each new record.

4. THE KEYBOARD IN MANUAL OPERATION

There are two different methods of entering data with the keyboard: *manual* and *program control*. In manual operation, you must press a key to perform each operation. When operating under program control, the terminal can be set up to perform certain operations automatically. This section describes the use of the keyboard in manual operation.
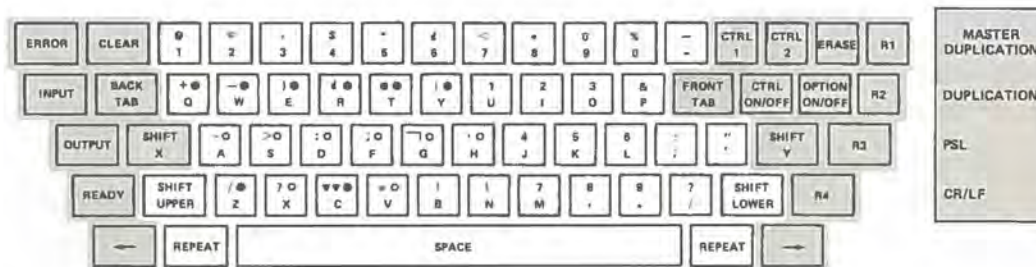
The keyboard can be divided into three sections: *alphanumeric* keys, *cursor movement* keys, and *function* keys.

The *alphanumeric* keys are already familiar to both typists and cardpunch operators. Each alphanumeric key represents two characters and the character to be entered depends upon whether the keyboard is in *upper shift* or *lower shift*.

The keyboard is normally in lower shift, with the SHIFT LOWER indicator on the control panel lighted. In other words, the alphanumeric characters on the lower position of each key will be entered when the key is pressed. When you wish to change to upper shift, you press down the SHIFT UPPER key and *hold it down* while you press *each* alphanumeric key. Pressing the SHIFT UPPER key does not affect the SHIFT LOWER indicator on the control panel.

Some of the keys have additional markings in the upper shift area. The keys, Q, W, E, R, T, Y, Z, and C each have a solid colored dot. The keys, A, S, D, F, G, H, X, and V each have an open colored ring. These keys are used for color coding when the Terminal is equipped with a Color Video Display. If you have a black and white display, the color coding keys will not affect you.

The SPACE bar is different from that on a typewriter. Pressing the SPACE bar enters a blank. The SPACE bar cannot be used to skip over previously entered characters.

There are two REPEAT keys, one at each side of the SPACE bar. They both perform the same function and are duplicated only for your convenience. Their function is to make other keys continuous when pressed at the same time as the REPEAT key. For example, as long as you press the REPEAT key and the "B" key at the same time, a continuous stream of "Bs" will be entered into the record.

ALPHANUMERIC KEYS   4–1

Otherwise, there is nothing new to learn about using the alphanumeric keys. You must remember, however, that you cannot enter data unless you can see the cursor on the display.

The cursor location always indicates where data will be entered. Pressing an alphanumeric key will enter a character at the cursor location. The cursor movement keys are used to move the cursor forward or backward *without affecting* any of the data already entered.

There are four cursor movement keys: two *skip* keys, marked with arrows, and the FRONT TAB and BACK TAB keys. The *frontskip* key is marked with an arrow pointing to the right and the *backskip* key with an arrow pointing to the left. Each time you press one of these keys, the cursor will move one position in the direction of the arrow. When a skip key is pressed in conjunction with either of the REPEAT keys, the cursor will move in the direction of the arrow until the keys are released.

The FRONT TAB and BACK TAB keys allow you to position the cursor rapidly. Pressing the BACK TAB key returns the cursor to the first position. Pressing the FRONT TAB key moves the cursor off the display. When the cursor is off the display, it is convenient to think of it as being in the 81st position because, when you press the backskip ($\leftarrow$) key once, the cursor will reappear in the 80th position.

The READY key can also be used to move the cursor. Pressing the READY key returns the cursor to the first position.

The primary use of the READY key, however, is as a *function key*. Function keys give instructions to the microprocessor for performing certain operations.

The READY key is used to "read" the settings of the STATUS INPUT, OUTPUT, and RECORD selectors into the microprocessor. After turning on the power or changing the setting of any of the STATUS selectors, the NOT READY light on the control panel goes on. Pressing the READY key turns out the NOT READY light, enters the STATUS selector settings, and returns the cursor to the first position.

The INPUT and OUTPUT keys cause input to and output from the microprocessor. The source of the input is determined by the setting of the STATUS INPUT selector and the destination of the output by the setting of the STATUS OUTPUT selector. Operation of either the INPUT or OUTPUT keys is not affected by the cursor position. In other words, it doesn't matter where the cursor is for input or output. Following an input or output operation the cursor always returns to the first position.

When the data output is from the WRITE record the data is erased from the WRITE record and transferred to the READ record. The READ record then contains the last output from the WRITE record. Thus, the operator is always able to see the last output.

Your terminal may be equipped with *options* for automatic input and output. The OPTION ON/OFF key turns on any option that is selected and also lights the OPTIONS ON indicator on the control panel. In some models of Terminal 2101, only a single option (AUTO OUTPUT) is available. The options are explained in Section 6.

The R1 (MASTER DUPLICATION) key gives you the capability of duplicating data from the MASTER record into the selected record. Each time that you press the R1 key, one character of data is duplicated at the cursor location from the corresponding position in the MASTER record. By simultaneously holding down the R1 and REPEAT keys, you can duplicate continuously from the MASTER record into the selected record. The R2 (DUPLICATION) key performs the same function as the R1 (MASTER DUPLICATION) key except that the data is duplicated from the READ record into the selected record.

Both the R1 (MASTER DUPLICATION) and R2 (DUPLICATION) keys are useful in entering data characters that are common to a series of records. For example, if several records contain the same data in positions 15 through 20, you can save time in entering the records by duplicating the data into those positions from the READ record, which contains the last output from the WRITE record.

The ERASE, ERROR, and CLEAR keys are also used in manual operation. When you press the ERASE key, all of the data in the selected record is erased from the display and the cursor returns to the first position.

The ERROR key is used to turn off the *OPERATOR* ERROR light, which comes on if you attempt to perform incorrect procedures, such as attempting to enter data when the cursor is not on the display or attempting to output to a Viatape cartridge which has had its tab removed. The ERROR key will also turn off the CHANNEL ERROR light which comes on when there is a faulty character in the input data.

The CLEAR key is used to stop all activity of the microprocessor, to turn off the *TC1* and *TC2* ALERT indicators, and to stop Viatape movement.

In addition to the SHIFT UPPER and SHIFT LOWER keys, there are two other shift keys, SHIFT Y and SHIFT X. As is the case with SHIFT UPPER and SHIFT LOWER, SHIFT Y and SHIFT X are used with alphanumeric keys.

SHIFT Y is used when preparing data for output to a printer. When SHIFT Y is pressed along with an alphabetic alphanumeric key, each character entered will be printed as a lower case character. Some of the lower case characters, those described earlier as color coding keys (Q, W, E, R, T, T, A, S, D, F, G, H, Z, X, C, and V), generate color codes when pressed in conjunction with SHIFT Y.

FUNCTION KEYS   4—3

SHIFT X is used when the Terminal is in communications environment. When pressed along with an alphanumeric key, it enters an ASCII communications control character.

In a communications environment, the carriage return (CR) and line feed (LF) characters are those most commonly used. A separate key, R4, is used to code these two characters. In lower shift, pressing the R4 key enters the CR code. When R4 is pressed along with SHIFT UPPER, the LF code is entered.

Although CTRL 1, CTRL 2, CTRL ON/OFF, and R3 may be used in manual operation, they are most commonly used when operating under program control. These keys are described in Section 5.

FUNCTION KEYS

5. PROGRAM CONTROL

Program control can be set up to automatically:

a. switch from one keyboard shift to another,
b. duplicate data from one record into another,
c. skip parts of a record, and
d. position numbers within a record.

To operate under program control you indicate your requirements using a set of instructions that tell the Terminal when to perform these automatic operations. The set of instructions is called a *control program*. Either CONTROL record 1 or CONTROL record 2 will contain the control program.

Records are divided into areas, called *fields*, which contain a single kind of information. Some fields in a record may be blank.

Control programs are made up of *field begin* characters, which instruct the Terminal to begin an operation, and *field continuation* characters, which instruct the Terminal to continue the operation indicated by the field begin character.

The six field begin characters and their meaning are:

L   Set the keyboard to lower shift
U   Set the keyboard to upper shift
Z   Perform a left zero fill operation
D   Duplicate from the READ record into the selected record
M   Duplicate from the MASTER record into the selected record
S   Skip

There are two field continuation characters, " . " (period) and " - " (hyphen). The "." means continue the operation indicated by the field begin character in lower shift. The "-" instructs the Terminal to continue in upper shift.

" L " should be followed by " . " (period) and " U " by " - " (hyphen). The field continuation character for a left zero fill field (Z) will be " . " if lower shift numbers are to be entered, or " - " if the numbers are to be in upper shift. The field continuation character selected for a " D ", " M ", or " S " field does not affect operation in that field; either field continuation character may be used.

All 80 positions in a control program must be filled in order for the Terminal to operate under program control. Each position must contain either a field begin character or a field continuation character.

You will probably operate under program control when you enter or revise a series of the same kind of records. For example, a series of sales orders could be prepared using the MASTER record shown below. The MASTER record provides a guide for entering the data just as on a form that you fill in.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C	U	S	T	O	M	E	R		N	A	M	E				O	R	D	#
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
M	O	D	E	L	#							Q	U	A	N	T	I	T	Y
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
U	N	I	T	$								T	O	T	A	L	$		
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
S	A	L	E	S	M	A	N					D	A	T	E				

In this example of a MASTER record, the first 16 positions are reserved for the "CUS-TOMER NAME" field which will be entered in lower shift. Positions 17 through 20 are for a four-digit order number field. The control program can contain instructions to switch the keyboard to upper shift, if the upper shift numbers will be used in entering "ORD #". "MODEL #" is also a numeric entry field and, again, the keyboard can be set to upper shift, if the upper shift numbers will be used. Positions 27 through 32 will be blank and will be skipped automatically.

"QUANTITY" is the next field in the MASTER record. Up to five digits may be used in entering the quantity in positions 33 through 37. Positions 38, 39, and 40 will be skipped automatically.

For a computer to handle it properly, the quantity number must be *zero-filled.* This means that the quantity 1 must be entered as 00001 and the number 250 must be entered as 00250.

To avoid your having to stop each time to figure out how many zero's to enter before entering the number itself, program control has a feature called *automatic left zero fill.* When the cursor reaches the beginning of the "QUANTITY" field, immediately and automatically, zeros are entered in all five positions. Then, as you key each number, it appears in the right-most position (in this case record position #37). The next number previously entered will shift over one position to the left, and so on for each number you enter will appear in the rightmost position, and the number previously entered will shift over one position to the left, and so on for each number you enter. The example below shows the sequence and results of entering the number 250.

```
- - - - - - - - 00000
2 - - - - - - - - 00002
5 - - - - - - - - 00025
0 - - - - - - - - 00250
```

In a zero-fill field, note that the cursor is always at the right-most position. *After you have completed your entry in this field, you move the cursor to the beginning of the next field by pressing the FRONT TAB key.*

ARRANGEMENT OF FIELDS—AUTO ZERO FILL

The unit and total prices will also be entered using automatic left zero fill. Positions 46 through 52 will be skipped automatically. In the fourth line the salesman's name will be entered in lower shift. The control program will shift the keyboard accordingly. The date of the order will be the same for each batch of records you enter at a time. To avoid your having to enter the same date in each record, the control program will automatically duplicate the date from the previous output, which will be in the READ record. The date will require six position, 73-78. Positions 79 and 80 will be skipped. Positions 79 and 80 will be skipped.

Shown below are both the sales order entry MASTER record and the control program that would be used to perform the operations described in this example.

1 C	2 U	3 S	4 T	5 O	6 M	7 E	8 R	9	10 N	11 A	12 M	13 E	14	15	16	17 O	18 R	19 D	20 #
21 M	22 O	23 D	24 E	25 L	26 #	27	28	29	30	31	32	33 Q	34 U	35 A	36 N	37 T	38 I	39 T	40 Y
41 U	42 N	43 I	44 T	45 $	46	47	48	49	50	51	52	53 T	54 O	55 T	56 A	57 L	58 $	59	60
61 S	62 A	63 L	64 E	65 S	66 M	67 A	68 N	69	70	71	72	73 D	74 A	75 T	76 E	77	78	79	80

1 L	2 .	3 .	4 .	5 .	6 .	7 .	8 .	9 .	10 .	11 .	12 .	13 .	14 .	15 .	16 .	17 U	18 –	19 –	20 –
21 U	22 –	23 –	24 –	25 –	26 –	27 S	28 –	29 –	30 –	31 –	32 –	33 Z	34 –	35 –	36 –	37 –	38 S	39 –	40 –
41 Z	42 –	43 –	44 –	45 –	46 S	47 –	48 –	49 –	50 –	51 –	52 –	53 Z	54 –	55 –	56 –	57 –	58 –	59 –	60 –
61 L	62 .	63 .	64 .	65 .	66 .	67 .	68 .	69 .	70 .	71 .	72 .	73 D	74 –	75 –	76 –	77 –	78 –	79 S	80 –

The effect of this control program is detailed in the following table:

| POSITIONS	WHAT HAPPENS
1-16	Any data keyed is entered in lower shift.
17-20	Any data keyed is entered in upper shift.
21-26	Any data keyed is entered in upper shift.
27-32	These positions are skipped.
33-37	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
38-40	These positions are skipped.
41-45	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
46-52	These positions are skipped.
53-58	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
59-60	These positions are skipped.
61-72	Any data keyed is entered in lower shift.
73-78	Data for these positions is duplicated from the READ record.
79-80	These positions are skipped.

Two additional examples of MASTER and CONTROL records used in program control follow:

BANKING APPLICATION

MASTER RECORD

A	C	C	T	#			N	A	M	E								
A	D	D	R	E	S	S												
D	U	E		D	A	T	E						A	M	O	U	N	T
B	A	L		D	U	E			O	R	I	G		L	O	A	N	

CONTROL RECORD

U	–	–	–	–	–	S	L	.	.	.	.	.	.	.	.	.	.	.
L	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
L	.	.	.	.	.	.	S	.	.	.	.	.	.	Z	–	–	–	–	–
Z	–	–	–	–	–	–	S	.	.	.	Z	–	–	–	–	–	–	–

POSITION	WHAT HAPPENS
1-6	Any data keyed is entered in upper shift
7	This position is skipped
8-20	Any data keyed is entered in lower shift
21-40	Any data keyed is entered in lower shift
41-47	Any data keyed is entered in lower shift
48-54	These positions are skipped
55-60	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
61-67	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
68-71	These positions are skipped
72-80	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.

PARTS REQUISITION APPLICATION

MASTER RECORD	D	A	T	E						P	A	R	T	#					
	D	E	S	C	R	I	P	T	I	O	N								
	Q	U	A	N	T	I	T	Y		U	N	I	T		C	O	S	T	
	T	O	T		C	O	S	T		J	O	B	#						

CONTROL RECORD	D	.	.	.	.	.	S	.	.	.	U	−	−	−	−	−	S	.	.	.
	L	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Z	−	−	−	−	−	S	.	.	.	Z	−	−	−	−	−	−	S	.	.
	Z	−	−	−	−	−	−	−	S	.	U		−	−	−	−	−	S	.	.

POSITION	WHAT HAPPENS
1-6	Data for these positions is duplicated from the READ record
7-10	These positions are skipped
11-16	Any data keyed is entered in upper shift
17-20	These positions are skipped
21-40	Any data keyed is entered in lower shift
41-46	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
47-50	These positions are skipped
51-57	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
58-60	These positions are skipped
61-68	Zeros are entered by the microprocessor and upper shift characters move from right to left as they are entered.
69-70	These positions are skipped
71-77	Any data keyed is entered in upper shift
78-80	These positions are skipped

TYPICAL PARTS REQUISITION APPLICATION
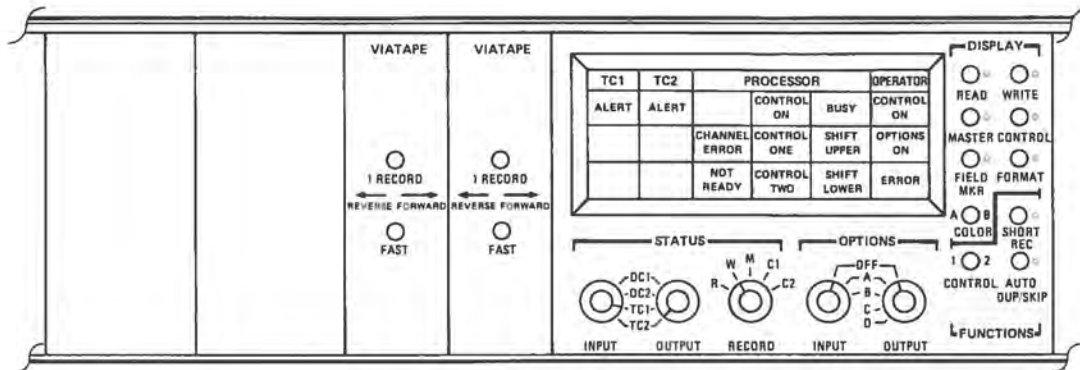
The illustration shows the controls and indicators related to operating under program control. The CONTROL 1-2 switch is used to select the control program stored in CONTROL record 1 or CONTROL record 2 as the operating program.

The AUTO DUP/SKIP switch is used to instruct the Terminal to perform the " D ", " M ", and " S " operations indicated by the control program. When the AUTO DUP/SKIP switch is ON, all of the operations in the program will be performed automatically. With the AUTO DUP/SKIP switch OFF, only the " L ", " U " and " Z " operations will be automatic. When the cursor reaches D, M, or S, it will remain at the beginning of the " D ", " M ", or " S " field, allowing you to perform any of the manual operations in that field, including entering data.

For example, " D " instructs the Terminal to transfer data into the selected record from the corresponding positions in the READ record, which contains the last output from the WRITE record. When you are about to enter the first record in a series, you will not want to duplicate if the READ record is blank or if the READ record contains the last output of a different series of data records. In this case, you will enter data for the first record with the AUTO DUP/SKIP switch in the OFF position. Then, instead of automatic duplication of blanks or incorrect data when the cursor comes to the "D" field, the Terminal will stop and permit you to enter data into that field. After output of the completed first record, you will put the AUTO DUP/SKIP switch in the ON position. In each of the following records that you enter, the READ record data in the "D" field positions will be automatically duplicated into the selected record.

The FIELD MKR switch, when in the ON position, displays marks at the beginning of each field in the record you are entering. These marks are called *field markers*.

FIELD MARKERS

PROGRAM CONTROL SWITCHES AND LIGHTS
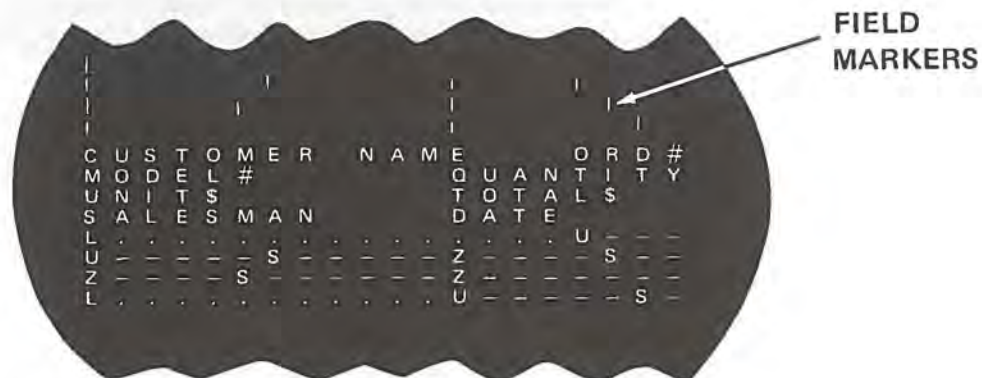
The CTRL ON/OFF Key is used to put program control in operation. In addition, pressing the key will turn on the operator CONTROL ON light, which indicates that you have placed the Terminal under program control. If the CTRL ON/OFF key is pressed when the CONTROL ON light is ON, the light will go off and the Terminal will no longer be under program control.

The CTRL 1 and CTRL 2 Keys can be used to override the selection on the CONTROL 1-2 switch. When you are operating under program control, either the CONTROL 1 or the CONTROL 2 light will be on to tell you which of the two control programs is being used. By pressing the key for the control program whose light is *not* on, you can *immediately* switch control to the other control program. The light for the other program will go on to show the change. After output of that record, the light for the control program selected on the CONTROL 1-2 switch will go back on to tell you that the switch-selected program is operating again.

Any selection made with the CTRL 1 or CTRL 2 key is in effect for only one record. Control always returns to the program selected on the CONTROL 1-2 switch.

The R3 (PSL) key provides a convenient way to input control programs and their related MASTER records. PSL is an abbreviation for *Program Sequence Load.* Pressing the the R3 (PSL) key will override the STATUS INPUT selector and will input two records from TC1 (Tape Channel 1), the first record into CONTROL record 1, and the second into the MASTER record. At the end of the PSL (Program Sequence Load) the cursor will be in the first position of the write record and in the first position of the MASTER record, if the FORMAT switch is on.

The R3 (PSL) key is used when you are entering more than one series of records. After entering all records in the first series, you will press the R3 (PSL) key to input, from TC1, the next control program into CONTROL record 1 and the MASTER record. You will then be ready to enter the data for the next series of records, and so forth, until all data in all series has been entered.

Under program control, the cursor movement keys, FRONT TAB and BACK TAB, function differently than in manual operation. Pressing the FRONT TAB key moves the cursor ahead to the beginning of the next field. Pressing the BACK TAB key moves the cursor back to the last field begin character position. If BACK TAB is pressed when the cursor is at the beginning of a field, the cursor moves to the previous field begin character. If BACK TAB is pressed when the cursor is in the middle of a field, the cursor moves back to the beginning of that same field.

PROGRAM CONTROL KEYS 5—7

Frontskip (→) and backskip (←) move the cursor one position, in the direction of the arrow, just as in manual operation.

The four cursor movement keys, FRONT TAB, BACK TAB, frontskip (→), and back-skip (←) move the cursor without affecting data, as in manual operation. When moving the cursor using one of these four keys, only with the FRONT TAB key will the Terminal perform the automatic operation indicated in the program at the new cursor location. With BACK TAB, frontskip (→), and backskip (←), the cursor will move as directed by the key but will not perform the automatic operation.

The ERASE key also operates differently under program control. When the ERASE key is pressed, the data in the field in which the cursor is located is erased and the cursor returns to the first position in the field. The automatic operation of the corresponding field begin character is not performed.

The SHIFT LOWER and SHIFT UPPER keys are used to override the shift set by program control. For example, if the SHIFT UPPER light is on, indicating that the control program has set the keyboard in upper shift, you can enter lower shift characters by holding down the SHIFT LOWER key for each character. As in manual operation, the light will not change when a shift key is pressed.

6. OPTIONS

Your Terminal control panel may be equipped with up to two OPTION selectors. The OPTION selectors are useful because they provide short-cuts for input and output. They can be used in either manual or program control operation.

One automatic option is standard on all 2101 Terminals. This option provides for automatic output of the record selected on the STATUS RECORD selector to the channel selected on the STATUS OUTPUT selector after the input or entry of the 80th character. This option eliminates the need for pressing the OUTPUT key for each output. If your Terminal has no OPTIONS selectors on the control panel, this automatic output option is turned on by pressing the AUTO OUTPUT ON/OFF key on the keyboard. Pressing the key also turns on the AUTO OUTPUT ON light. On the Terminals having no OPTIONS selectors, the AUTO OUTPUT ON/OFF key may appear in place of the OPTION ON/OFF key, and the AUTO OUTPUT ON light in place of the OPTIONS ON light.
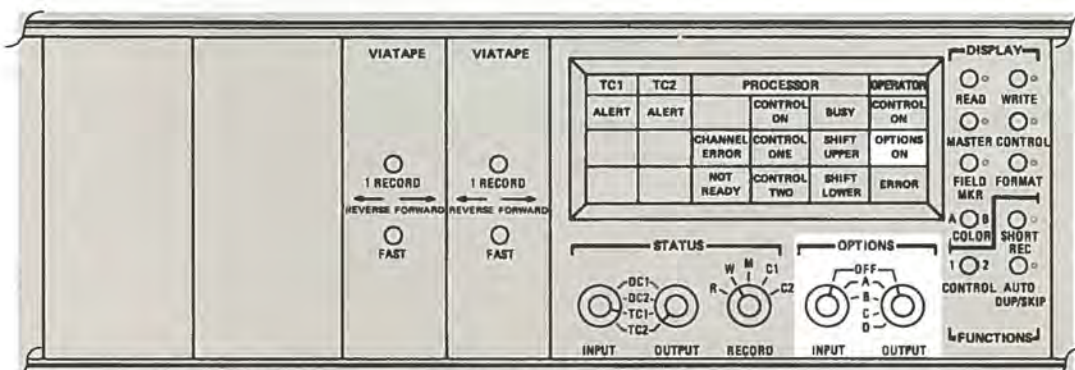
If you have on OUTPUT OPTIONS selector, it may have up to five positions, including OFF. All OUTPUT OPTIONS operate automatically when the cursor reaches the "81st" position (goes off the display):

OUTPUT OPTION	OPERATION
A	Automatic output to the selected channel, as described above.
B	Automatic output first to DC1, then to TC2.
C	Automatic output first to DC1, then to DC2.
D	Automatic output first to DC1, next to DC2, then to TC2.

Automatic OUTPUT OPTIONS B, C, and D provide for the output of data, in a pre-determined sequence, to several devices connected to the same Terminal. They override the setting of the STATUS OUTPUT selector. OUTPUT OPTIONS B, C, and D are useful when it is desirable to output the same data record to more than one destination. With OUTPUT OPTION B, for example, you can automatically output a record to another System 21 Terminal and have the same record recorded on a Viatape cartridge. With OUTPUT OPTION C, you can automatically output the same record to the devices connected to the two Data Channels, perhaps to two other System 21 Terminals, or to a computer and a Robot Printer. Using OUTPUT OPTION D, you can automatically output the same record to three destinations. The output can go to a card punch and a printer and be recorded on Viatape, or perhaps can go first to another Terminal, then to a second Terminal, and finally be recorded on computer tape.

If you have on INPUT OPTIONS selector, it will have up to three positions, including OFF:

INPUT OPTION	*OPERATION*
A	Automatic input from the channel selected on the STATUS INPUT selector to the record selected on the STATUS RECORD selector after the output of the 80th character.
B	Automatic Program Sequence Load (PSL) after the output of the 80th character.

INPUT OPTION A is useful when revising a series of records. Instead of pushing first the OUTPUT key, then the INPUT key, you push only the OUTPUT key to accomplish both functions.

INPUT OPTION B is useful when working with data entries that extend over more than one data record. An example of this would be a sales order that had the order number and customer's name and address on the first record and a description of the order on the second record. Each of these records would require a different MASTER record and, if working under program control, a different CONTROL record. Each time you output a data record there is an automatic input from TC1, of the CONTROL and MASTER records you need for the next data entry.

An important operation that requires the setting of both the INPUT and OUTPUT OPTION selectors is called *batch processing*. Batch processing is continuous and automatic input from the selected channel followed by automatic output, without operator attention. To prepare for batch processing you set the INPUT OPTION selector to A, and the OUTPUT OPTION selector to A, B, C, or D. After you press the INPUT key to begin, data records will continuously and automatically input and output from the selected source to the selected destination(s). Batch processing can be used to input and output an entire series of records. For example, using batch processing you can print out all the data recorded on a Viatape cartridge by just pressing the INPUT key once.

After making an OPTION selection, to have the Terminal perform the automatic inputs and/or outputs, you must press the OPTION ON/OFF key. When the Terminal is operating under a selected OPTION, the OPTIONS ON indicator on the control panel will be lighted. To turn off any selected OPTION, press the OPTION ON/OFF key or the AUTO OUTPUT ON/OFF key.

7. TYPICAL OPERATING ROUTINES

In order to simplify the operator's task, Viatron has designed a set of reference charts that provide step-by-step instructions for the operation of Terminal 2101. For easy reference, the charts are presented in abbreviated form, using pictures instead of words wherever possible, and including a minimum of explanatory material. They are reproduced here for your convenience. The introductory chart, reproduced below, gives instruction on how to interpret the charts:

1. The picture of the POWER switch tells you to push in the POWER switch. The line of dashes between the picture of the indicator tells you that the NOT READY indicator lights when you push in the POWER switch.

2. The pointer on the STATUS RECORD selector tells you to set it to the W position. The dotted lines on the STATUS INPUT and OUTPUT selectors indicate the several possible settings. The choice depends on the operation you are performing.

3. The pictures of the three DISPLAY switches tells you to set them in the positions shown.

4. If you need to perform this step you should refer to the routine on loading and positioning Viatape.

5. The picture of the READY key tells you to press it. The two lines of dashes tell you what happens. The grey background of the NOT READY indicator means that it is turned off. Only a portion of the display is shown.
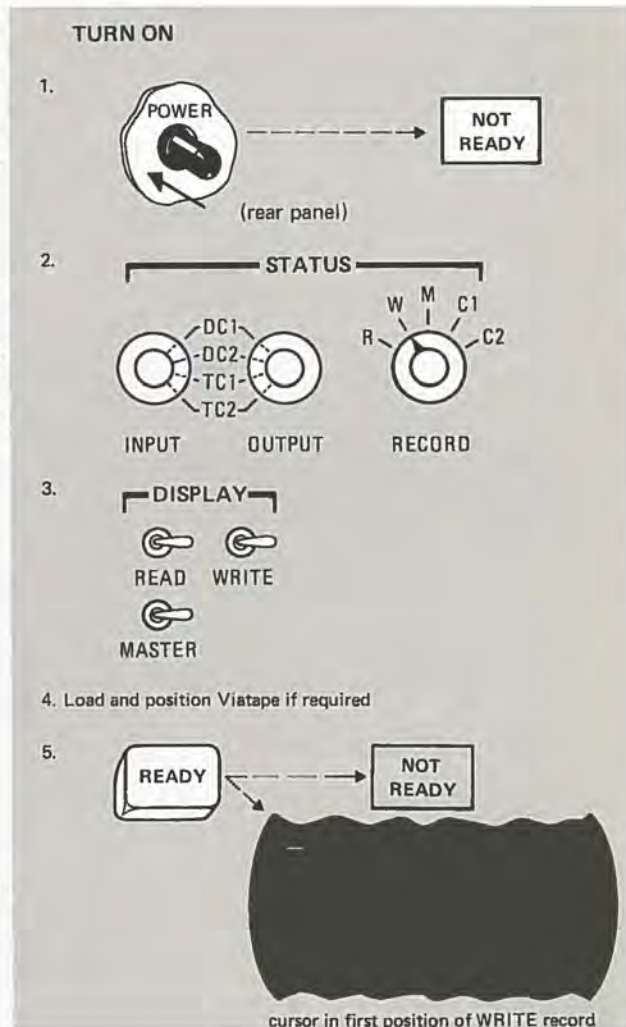
TURN ON

1.
POWER — — — — — → NOT READY
(rear panel)
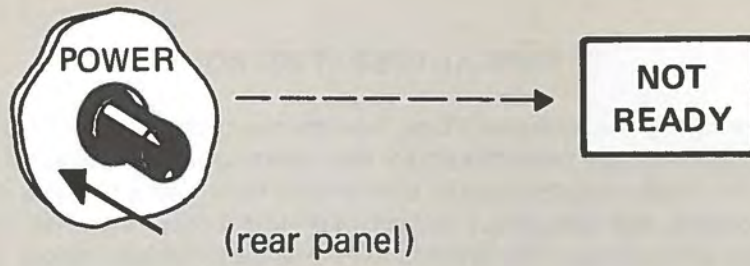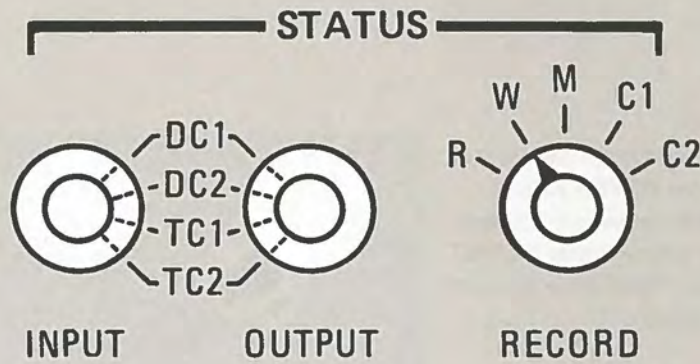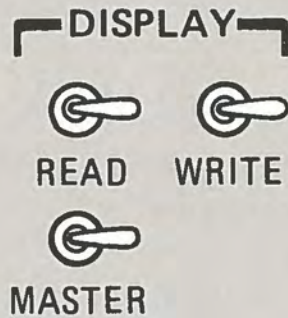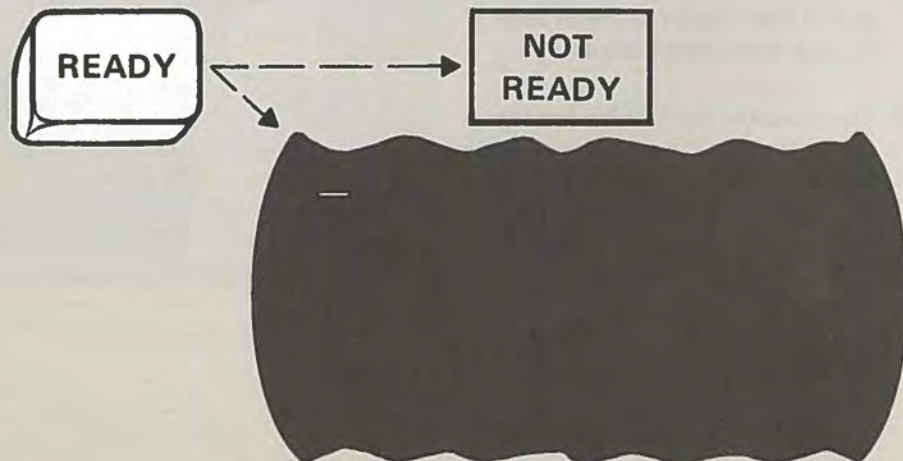
2. ┌─── STATUS ───┐
DC1
DC2
TC1
TC2

W M C1
R C2

INPUT   OUTPUT   RECORD

3. ┌─DISPLAY─┐
READ   WRITE
MASTER

4. Load and position Viatape if required

5.
READY ← — — → NOT READY

cursor in first position of WRITE record

TURN ON

1.

POWER → **NOT READY**

(rear panel)

2.

── STATUS ──

DC1
DC2
TC2
TC1

INPUT   OUTPUT

W   M   C1
R   C2

RECORD

3.

┌─ DISPLAY ─┐

READ   WRITE

MASTER

4. Load and position Viatape if required

5.

READY ⤑ **NOT READY**

cursor in first position of WRITE record

DISPLAY ADJUSTMENT (optional)

1.

REPEAT + 7 M

(TEST PATTERN)

2.

————Adjust for good picture.

3.

ERASE ---->

cursor at first position and test pattern erased
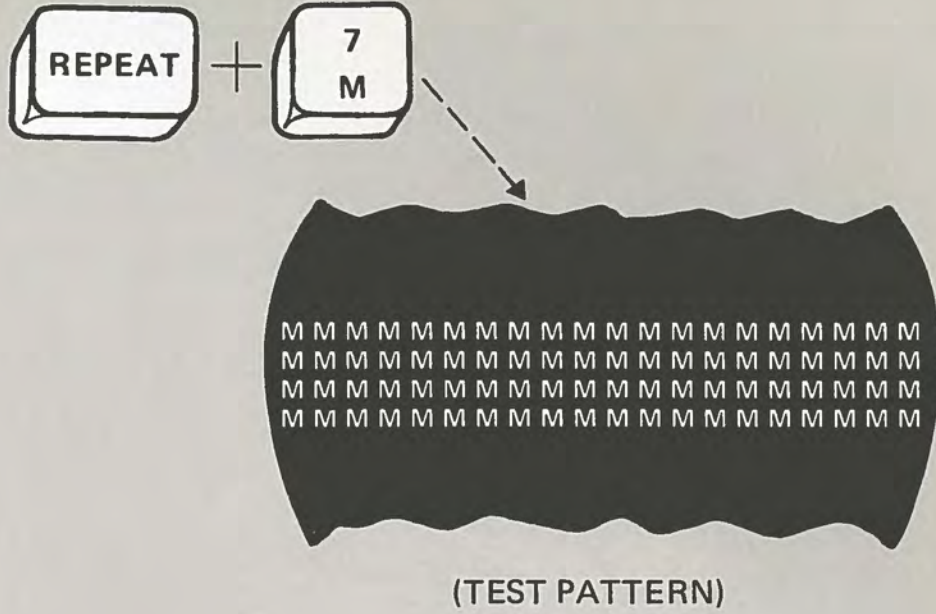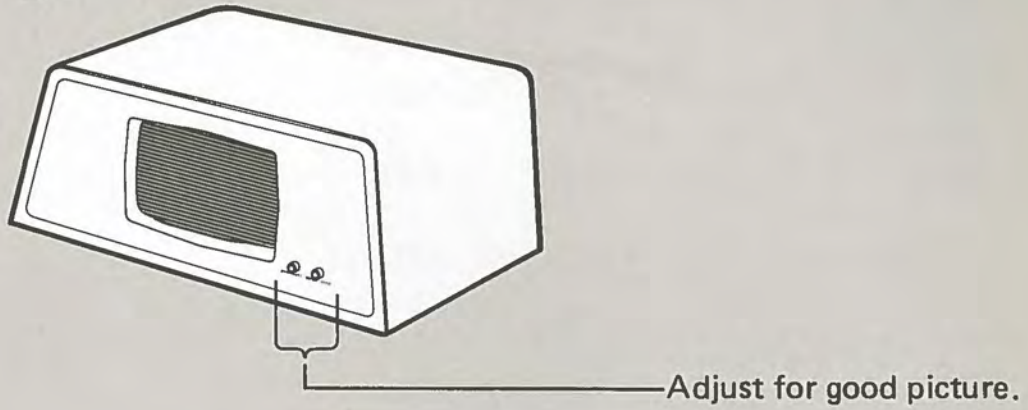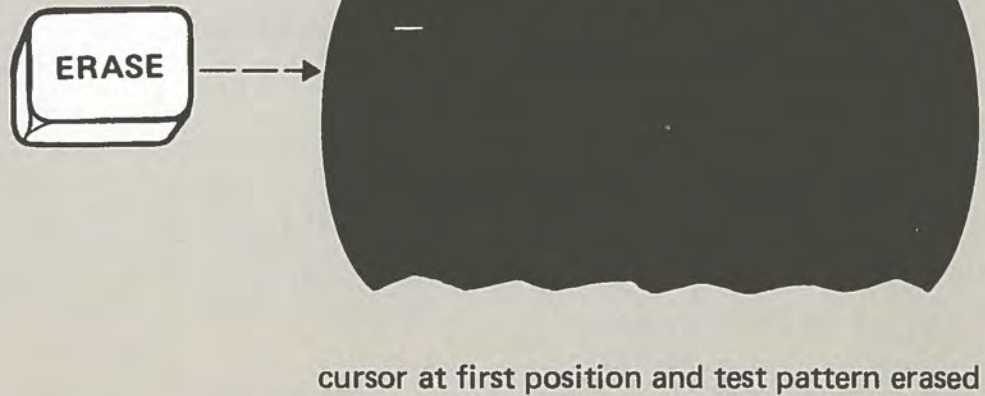
LOADING VIATAPE CARTRIDGE

1. Check Tab and identification.
2. Lift cover plate and pull Release latch (identified below).
3. Slide in Viatape cartridge, push down in flat position, and replace cover plate.

Identification

Tab
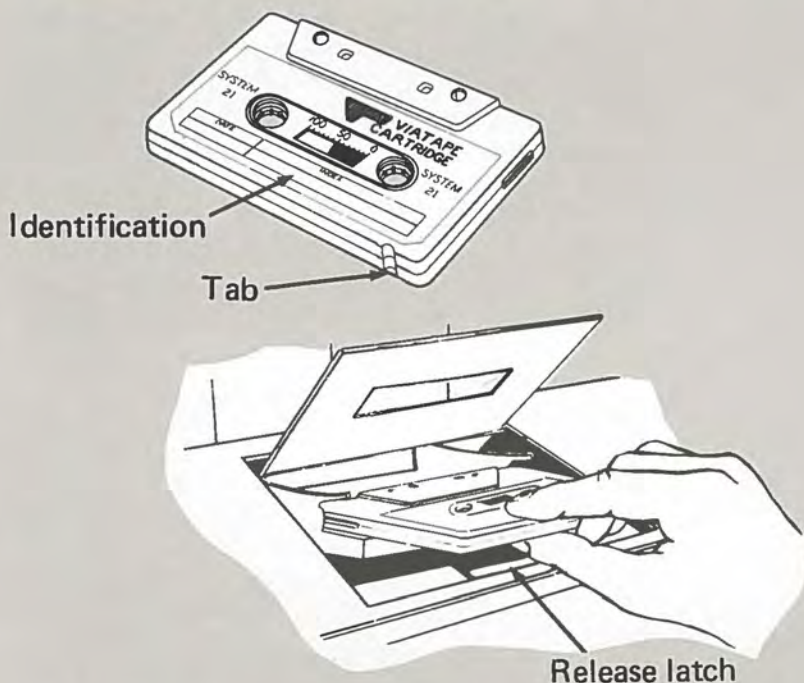
Release latch

REMOVING VIATAPE CARTRIDGE

1. Lift up the cover plate on the Viatape recorder.
2. Pull the Release latch.
3. Slide out the Viatape cartridge.

POSITIONING AT BEGINNING OF TAPE

1. Hold until tape movement stops.

REVERSE FORWARD

FAST

ALERT

2.

ALERT

CLEAR

NOT
READY
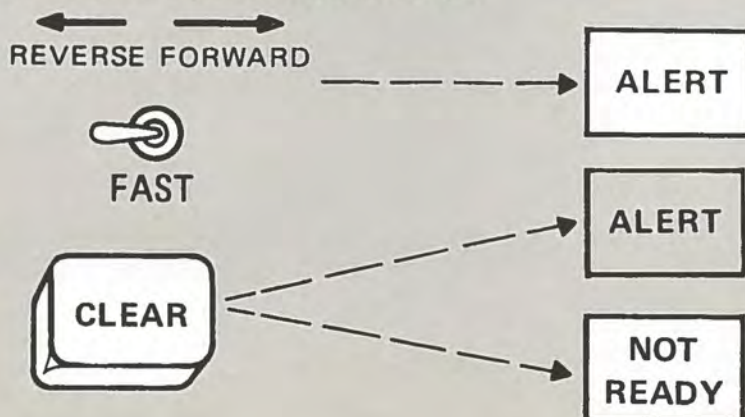
LOCATING A RECORD (when approximate location is known)

1. Press and hold:

REVERSE FORWARD   or   REVERSE FORWARD

FAST   FAST

2.

Observe buildup of tape on spool.

3. When Viatape buildup brings record desired into approximate position, begin examining records.

MOVING VIATAPE A SPECIFIC NUMBER OF RECORDS

1. Press, release, and repeat once for each record to be skipped.
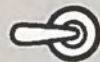
1 RECORD   or   1 RECORD

REVERSE FORWARD   REVERSE FORWARD

EXAMINING RECORDED DATA

1.

INPUT   RECORD

2.

┌─DISPLAY─┐

WRITE

3.

READY ──────────▶ NOT READY

4.

INPUT ──▶

SMITH   GEORGE
BEDFORD   MASS
SALES   MANAGER
9/7/30   021-67-6557
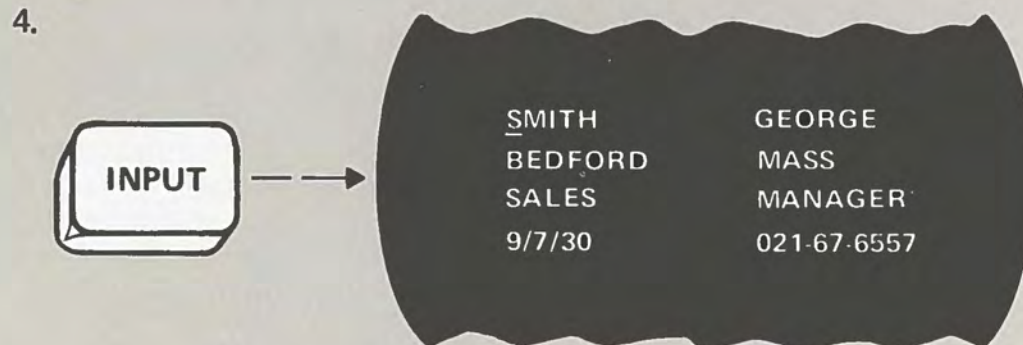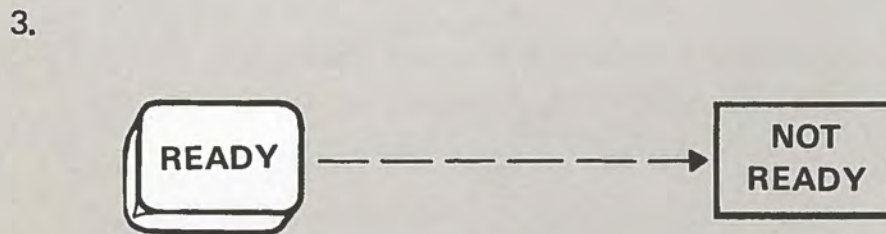
5. Read the display.

6. Repeat steps 4 and 5 until desired location is reached.

WAYS OF POSITIONING CURSOR—MANUAL

READY

or

BACK TAB — cursor at first position of selected record.

→ ——————— moves cursor *ahead* one position.

→ + REPEAT → moves cursor ahead until keys are released.

← ——————— moves cursor *back* one position.

← + REPEAT → moves cursor back until keys are released.

FRONT TAB → moves cursor to 81st position (off the display).
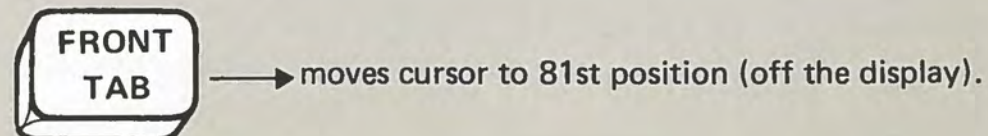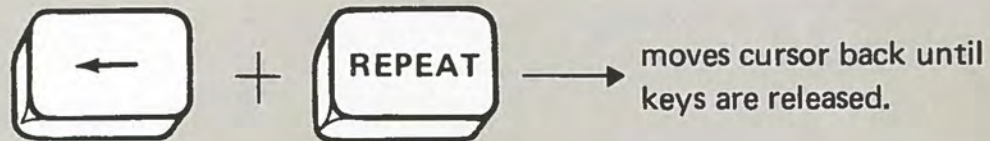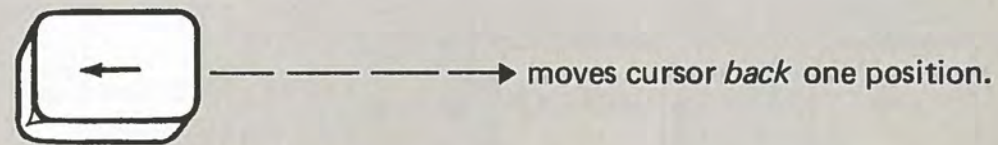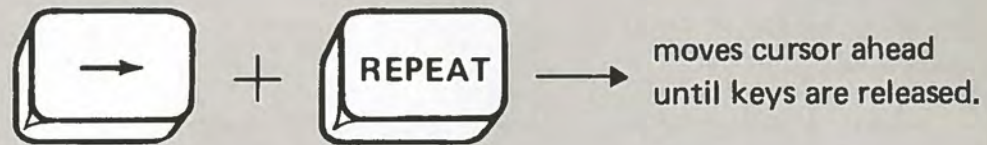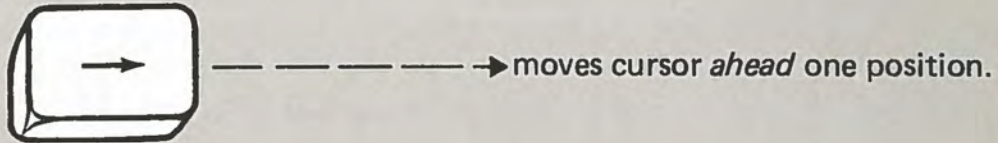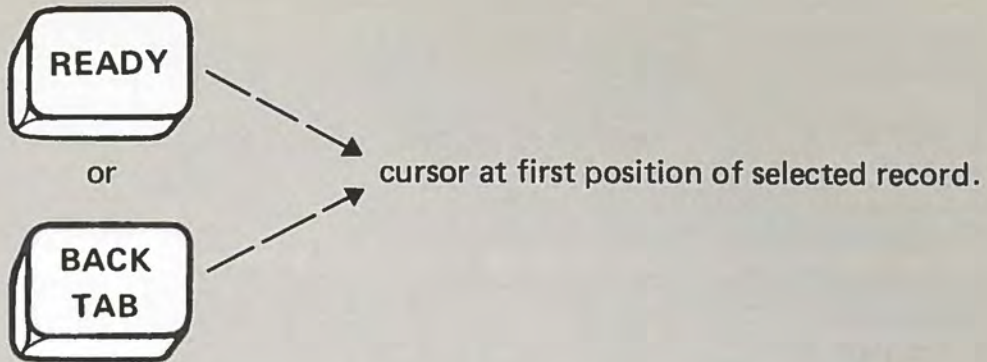
WAYS OF POSITIONING CURSOR – PROGRAM CONTROL

READY ————————▶ cursor at first position of selected record.

FRONT TAB ————————▶ cursor at first position of the next field.

BACK TAB ——▶ cursor at position corresponding to preceding field begin character.

→ ————————▶ moves cursor ahead one position.

→ + **REPEAT** ——▶ moves cursor ahead until keys are released.

← ————————▶ moves cursor back one position.

← + **REPEAT** ——▶ moves cursor back until keys are released.
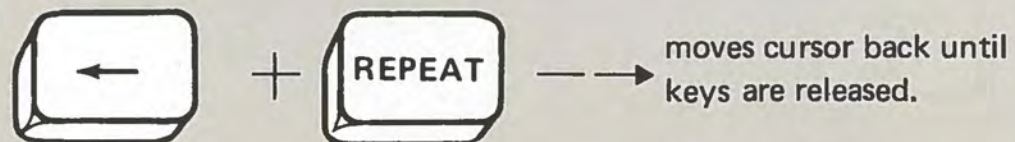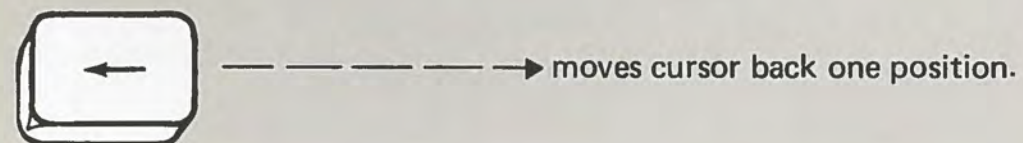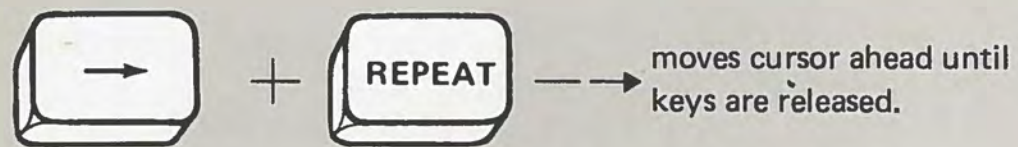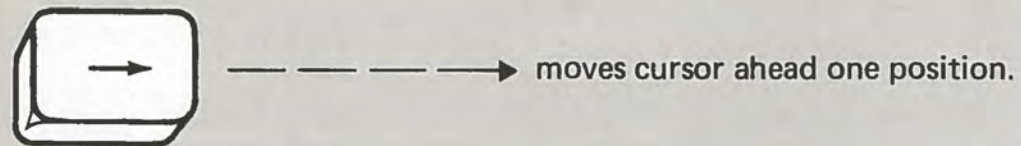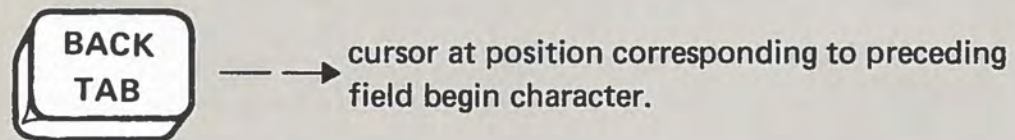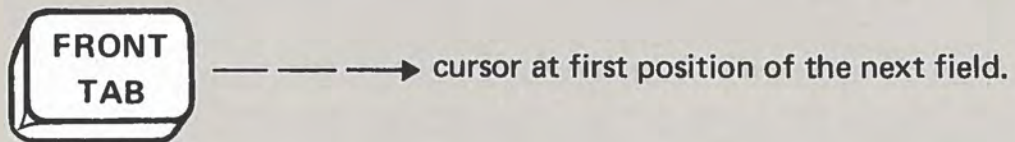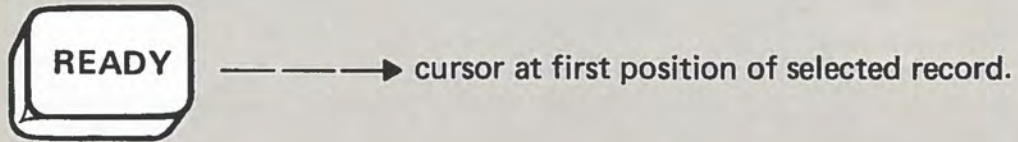
WITHOUT MASTER RECORD

1. Prepare for operation

2. STATUS

DC1
DC2
TC1
TC2

OUTPUT

W M C1
R C2

RECORD

NOT READY

3. DISPLAY
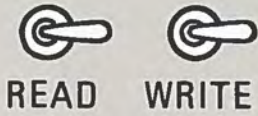
READ WRITE

READ and WRITE records are displayed.
Cursor is in first position of WRITE record.

4. READY

NOT READY
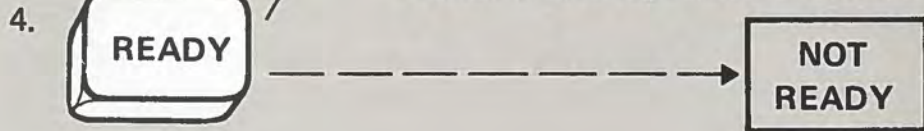
5. Enter data.

6. Proofread and correct

7.
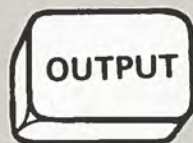
OUTPUT

Output of data to selected channel.
Data is transfered to READ record.
Cursor returns to first position of
WRITE record.

8. Repeat steps 5 through 7 until all data is entered.

WITH MASTER RECORD

1. Prepare for operation.

2. Enter or input MASTER record.

3.

```
┌──────── STATUS ────────┐
```

DC1
DC2
TC1
TC2

OUTPUT

W M C1
R   C2

RECORD

NOT READY

4. ┌─DISPLAY─┐

READ   WRITE

MASTER

FORMAT

READ, WRITE, and MASTER records are displayed. MASTER record shown interleaved with WRITE RECORD.

LAST NAME	FIRST NAME
CITY	STATE
DEPARTMENT	POSITION
DB	SS NO.

5.

```
[READY] — — — — — —→  [NOT READY]
```
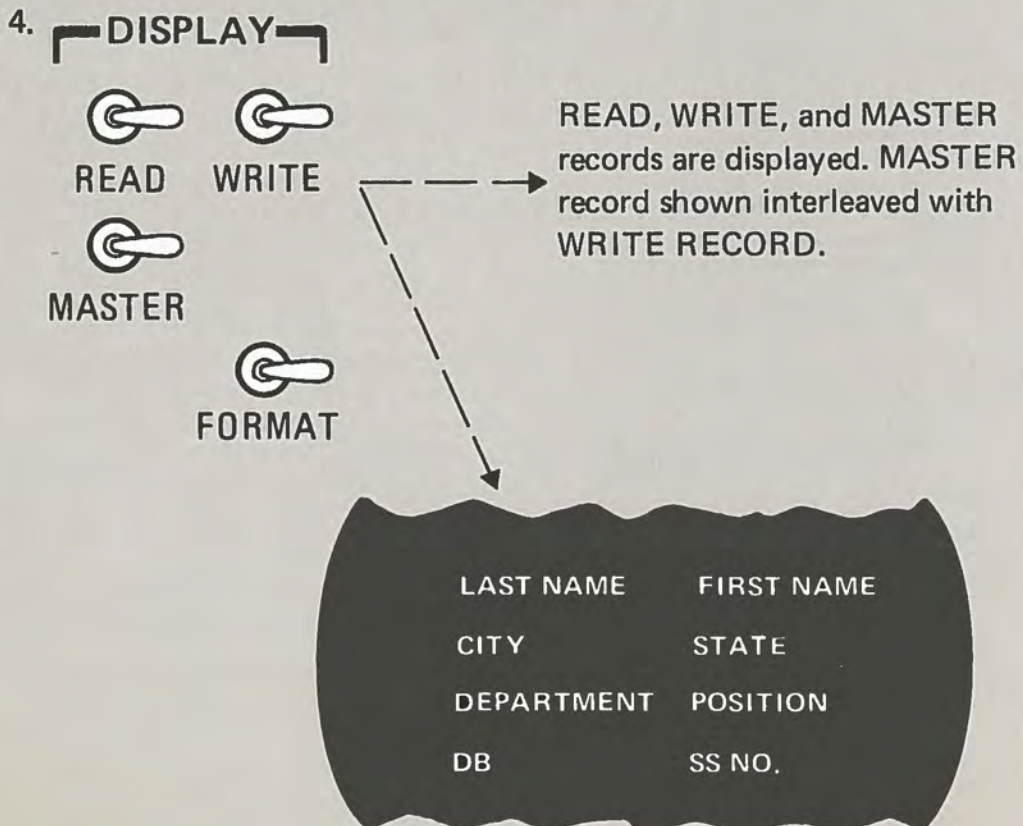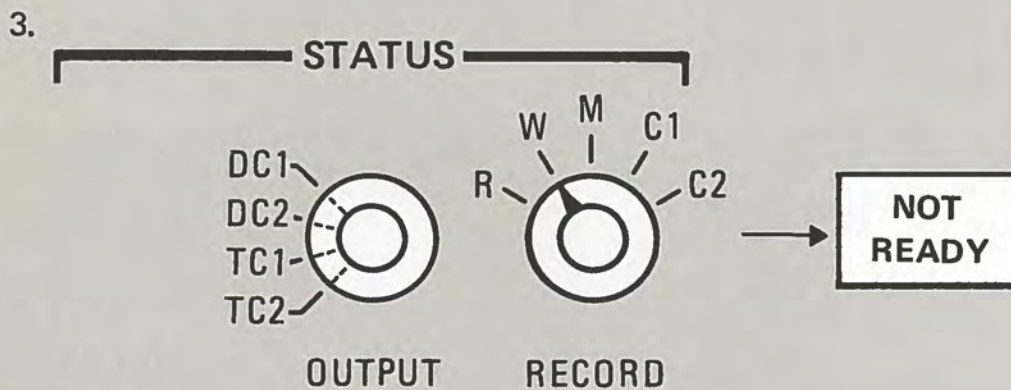
6. Following the guide provided by the MASTER record, enter data.

```
SMITH           GEORGE
LAST NAME       FIRST NAME
BEDFORD         MASS
CITY            STATE
SALES           MANAGER
DEPARTMENT      POSITION
9/20/30         021-67-6557
DB              SS NO.
```

7. Proofread and correct.

8.

```
[OUTPUT] →
```

```
SMITH           GEORGE
BEDFORD         MASS
SALES           MANAGER
9/20/30         021-67-6557

LAST NAME       FIRST NAME

CITY            STATE

DEPARTMENT      POSITION

DB              SS NO.
```
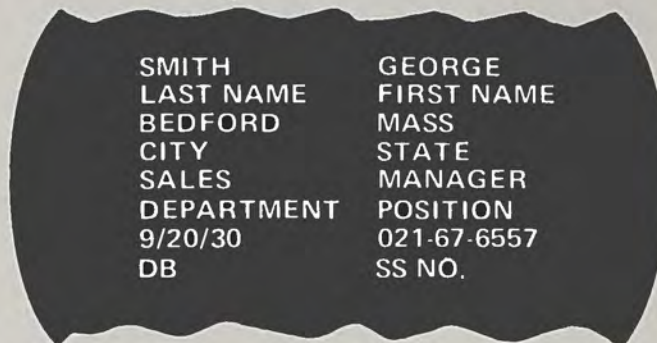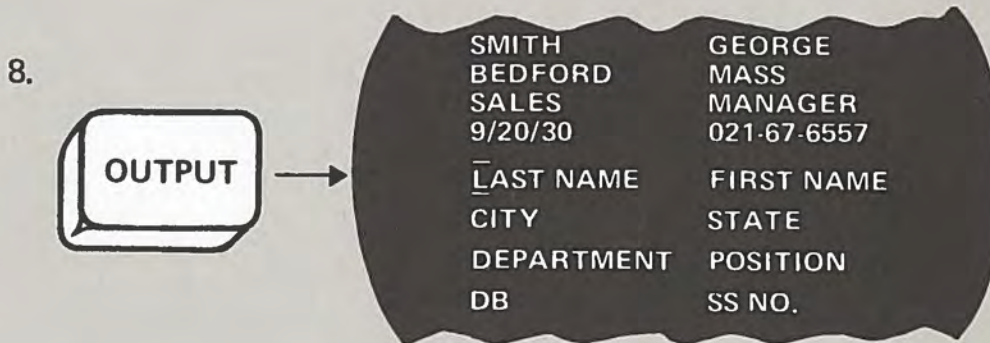
Cursors return to first positions of WRITE and MASTER records.

9. Repeat steps 6 through 8 until all data is entered.

ENTERING A CONTROL RECORD

1. Prepare to operate

2.

RECORD

NOT READY

3.
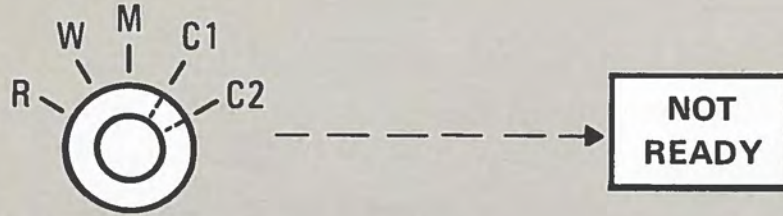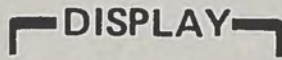
┌─DISPLAY─┐

— — → CONTROL record is displayed.

CONTROL

4.

READY — — — → NOT READY

5.

CTRL 1 — — — → CONTROL ONE

or

CTRL 2 — — — → CONTROL TWO
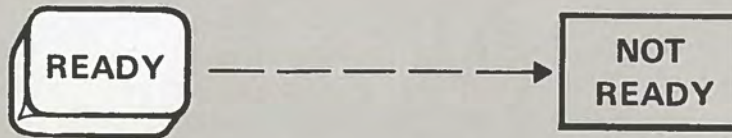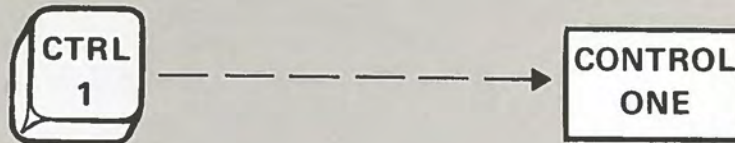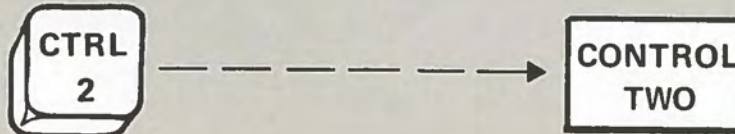
6. Enter CONTROL record

(for example)

```
L . . . . . . . . . . U — — — — — — — — —
D . . . . . . . . . . . S . . . . . . . . .
Z — — — — — — — — — — S . . . . . . . . .
M . . . . . . . . . . . . . S . . . . . . .
```
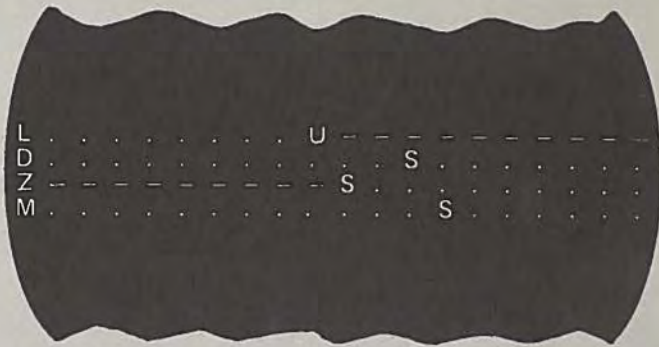
7. Proofread and correct.

ENTERING A MASTER RECORD

1. Prepare to operate

2.

W M C1
R   C2 ———————→ NOT READY

RECORD

3.

┌─DISPLAY─┐

MASTER

4.

READY ——————————→ NOT READY
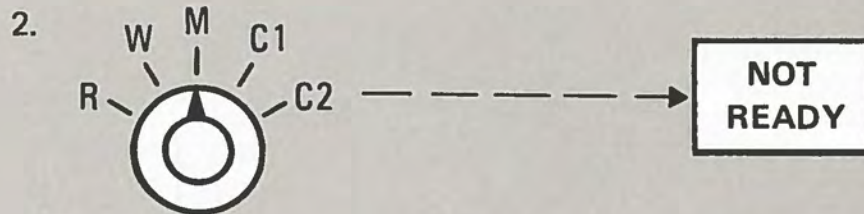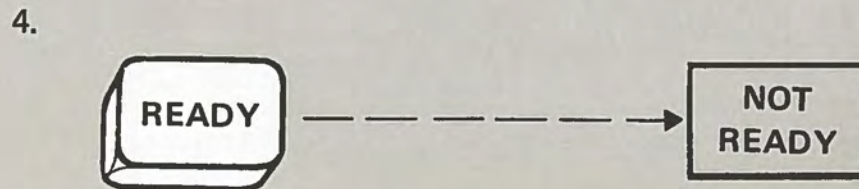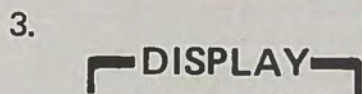
5. Enter MASTER record.

6. Proofread and correct.

INPUT OF A CONTROL RECORD

1. Prepare to operate.

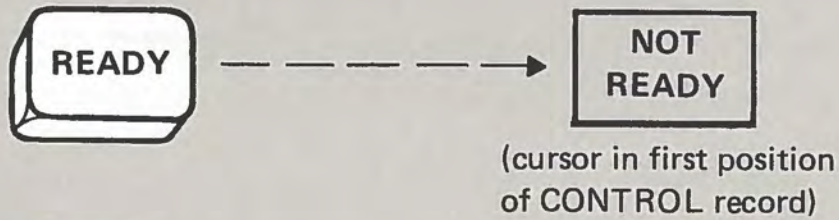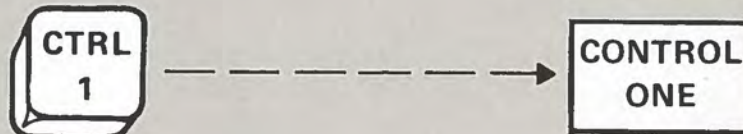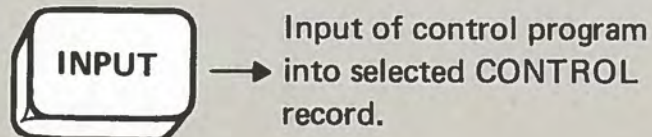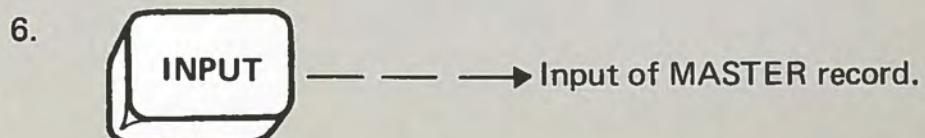2. If pre-recorded Viatape cartridge is to be used, load and position for desired record.

3.

INPUT   RECORD

4.

┌─DISPLAY─┐

CONTROL

5.

READY ─ ─ ─ ─ ─ ─ ─→ NOT READY

(cursor in first position of CONTROL record)

6.

CTRL 1 ─ ─ ─ ─ ─ ─ ─→ CONTROL ONE

or

CTRL 2 ─ ─ ─ ─ ─ ─ ─→ CONTROL TWO

7.

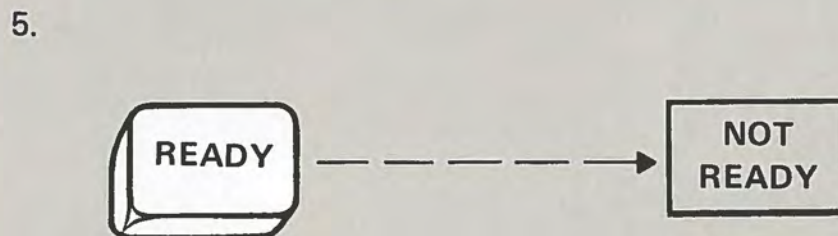INPUT ─→ Input of control program into selected CONTROL record.

8. Proofread and correct.

INPUT OF A MASTER RECORD

1. Prepare to operate.

2. If pre-recorded Viatape cartridge is to be used, load and position for desired record.

3.

DC1
DC2
TC1
TC2

INPUT

W M C1
R C2

RECORD

→ NOT READY

4.

DISPLAY

MASTER

5.

READY - - - - - → NOT READY

6.

INPUT - - - → Input of MASTER record.

7. Proofread and correct.

INPUT OF CONTROL AND MASTER RECORDS
USING PROGRAM SEQUENCE LOAD KEY

1. Prepare to operate.

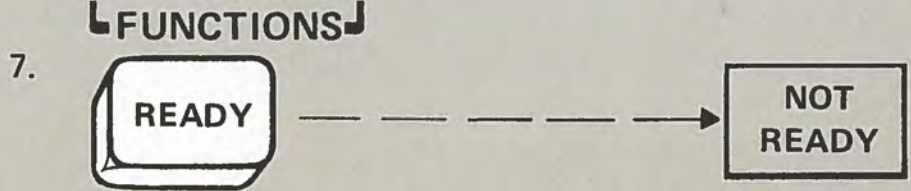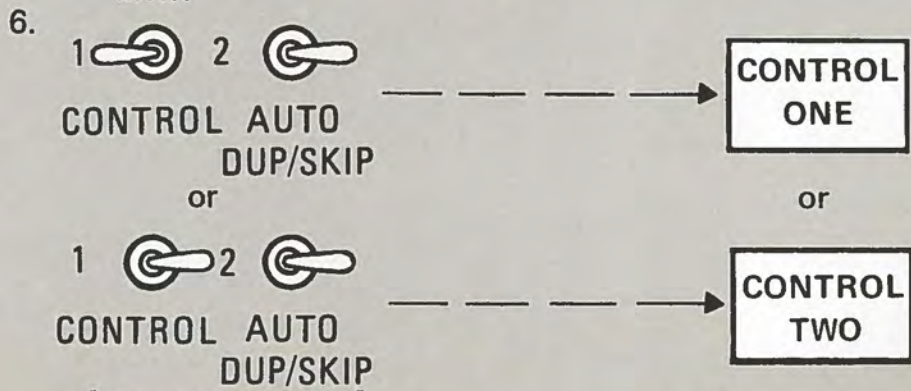2. Load pre-recorded Viatape cartridge for input from Tape 1 and position for desired record.

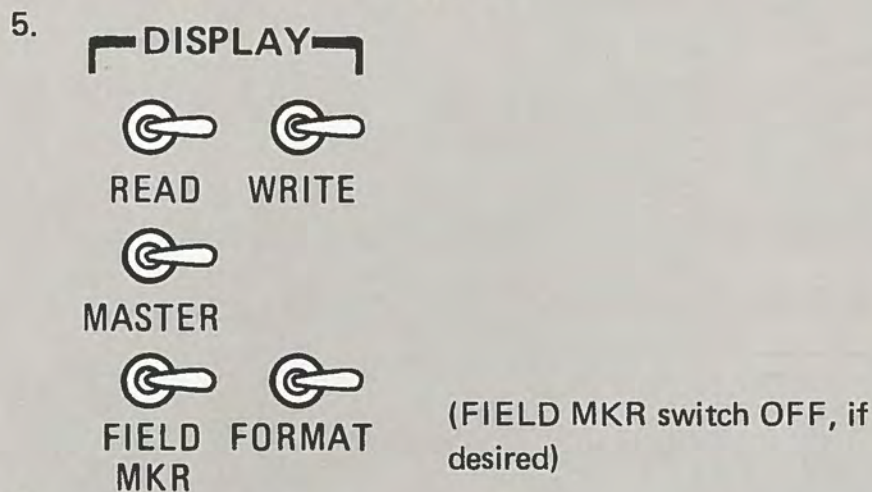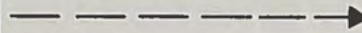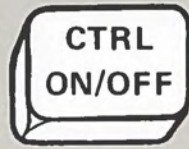3.
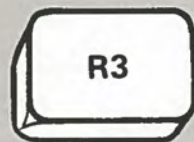
```
R3
```
(PSL) —— — input of control program into CONTROL 1 and MASTER record into MASTER. (Disregards position of STATUS selectors.) Cursor returns to first position of WRITE record and first position of MASTER record if FORMAT switch is on.

1. Prepare to operate

2. Load Viatape cartridge (if required)

3. Enter or input CONTROL and MASTER record

4.

DC1
DC2
TC1
TC2

OUTPUT

W M C1
R C2

RECORD

→ NOT READY

5.

⌐DISPLAY⌐

READ WRITE

MASTER

FIELD FORMAT
MKR

(FIELD MKR switch OFF, if desired)

6.

1 — 2

CONTROL AUTO
         DUP/SKIP

or

1 — 2

CONTROL AUTO
         DUP/SKIP
└FUNCTIONS┘

CONTROL ONE

or

CONTROL TWO

7.

READY — — — — → NOT READY

8.

```
CTRL
ON/OFF  ─ ─ ─ ─ ─ ─ ─ ─ ─→   CONTROL
                              ON
```
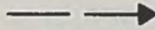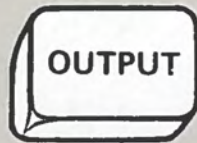
9. Enter data,

10. Proofread and correct.

11.

```
OUTPUT  ──────→   Output of data to selected channel.
                  Data is transferred to READ record.
                  Cursors return to first positions
                  of WRITE and MASTER records.
```
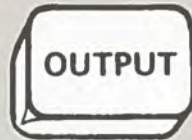
12. Repeat steps 9 through 11 until
    all data is entered.

CORRECTING AN ERROR BEFORE OUTPUT

1. Position cursor under the first character to be corrected.

2. Enter correct character (s).

3. Repeat steps 1 and 2 above as needed.

4. Proofread.

5.

OUTPUT

CORRECTING AN ERROR IMMEDIATELY AFTER OUTPUT TO VIATAPE

TC1 or TC2

1. ⟶(Selected STATUS OUTPUT tape channel)

1 RECORD — — — — ➔ moves tape back one record.

◀ REVERSE   FORWARD ▶

2. **R2** (DUP) + **REPEAT** ➔ duplicates contents of READ record into WRITE record to error position.

(Release when position of error is reached)

3. Enter correct character (s).

4. Repeat step 2 (and step 3 as needed) to end of record

5.

OUTPUT
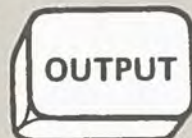
MANUAL

1. Prepare to operate

2. Load Viatape cartridges if required

3. Input or enter MASTER record to be used in revising data, if required

4.

STATUS

INPUT   OUTPUT   RECORD

DC1
DC2
TC1
TC2

W M C1
R   C2 → NOT READY

5.

DISPLAY

READ WRITE

MASTER

FORMAT

6.

READY — — — — — → NOT READY
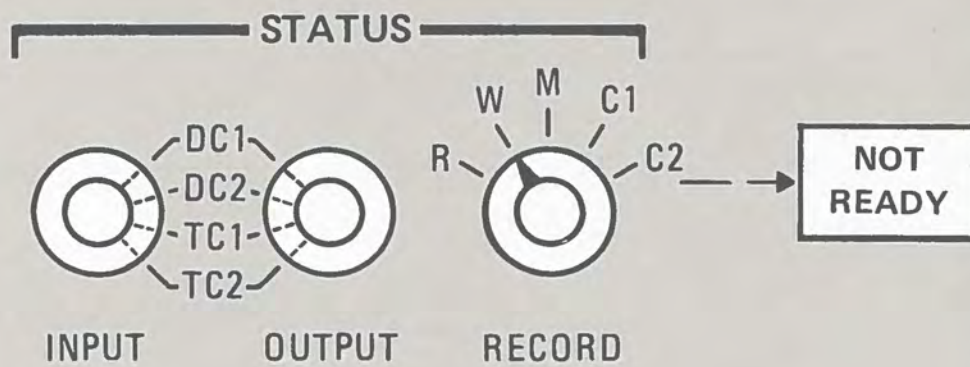
7. If input is to be from Viatape, position
   Viatape to the record to be revised.

8. INPUT — — — — — → Input of data to be
   revised. Cursors re-
   turn to first positions
   of WRITE and MAS-
   ter records.

9. If the step 8 input was from a Viatape
   being revised, and the revised record is
   to be re-recorded in the same position
   on that Viatape:

   1 RECORD
   ← →
   REVERSE FORWARD

10. Position cursor under first character to be
    revised

11. Enter revisions.

12. Repeat steps 10 and 11 until all revisions are
    entered.

13. Proofread and correct.

14. OUTPUT — — — → Output of revised record and transfer
    of data to READ record.

15. Repeat steps 7 through 14 until all
    records are revised.

PROGRAM CONTROL

1. Prepare to operate

2. Load Viatape cartridges if required

3. Input or enter control program and MASTER
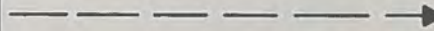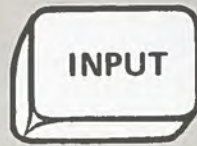   record to be used in revising data

4. STATUS

INPUT OUTPUT RECORD

NOT
READY

5. DISPLAY

READ WRITE

MASTER

FIELD FORMAT
MKR

(FIELD MKR switch OFF,
if desired)

6. 1 2

CONTROL AUTO
DUP/SKIP

or

CONTROL
ONE

or

1 2

CONTROL AUTO
DUP/SKIP
FUNCTIONS

CONTROL
TWO

7. READY

NOT
READY

8.

```
CTRL
ON/OFF
```
- - - - - - - - →
```
CONTROL
ON
```
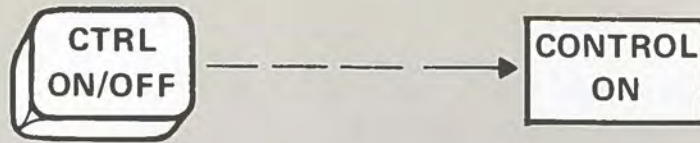
9. If input is to be from Viatape, position Viatape to the record to be revised.

10.

```
INPUT
```
- - - - → Input of data to be revised. Cursors return to first positions of WRITE and MASTER records.

11. If the step 10 input was from a Viatape being revised, and the revised record is to be re-recorded in the same position on that Viatape:
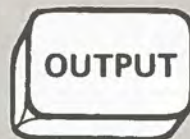
1 RECORD

← →

REVERSE FORWARD

12. If necessary, position under first character to be revised.

13. Enter revisions.

14. Repeat steps 12 and 13 until all revisions are entered in this record.
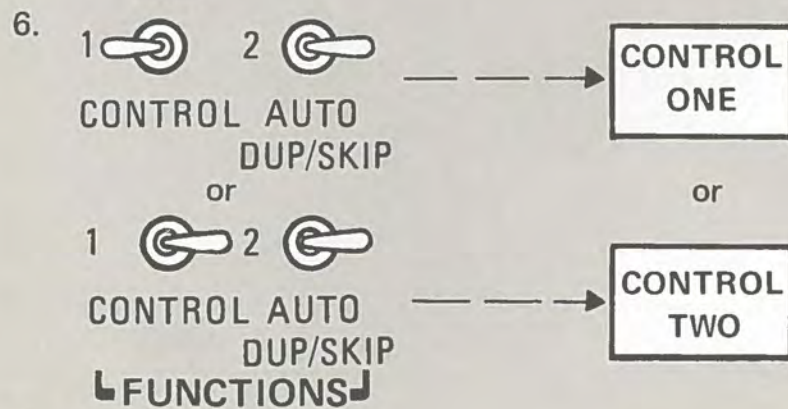
15. Proofread and correct.

16.

```
OUTPUT
```
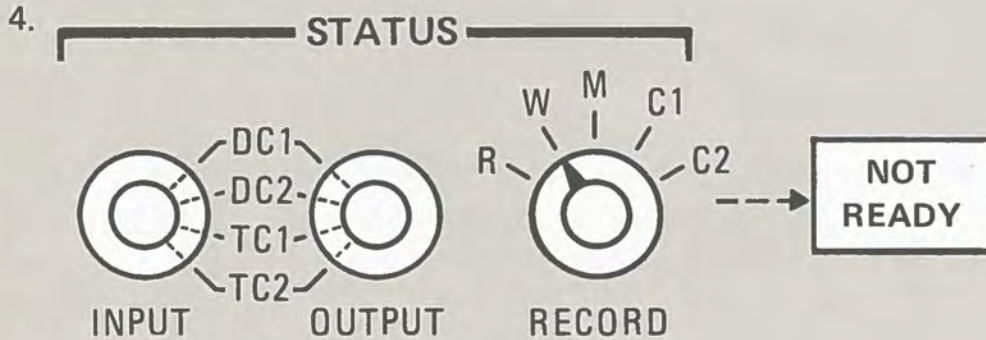- - - - → Output of revised record and transfer of data to READ record.

17. Repeat steps 9 through 16 until all records are revised.

AUTOMATIC INPUT OPTION A

1. Prepare for operation.

2. If pre-recorded Viatape cartridge is to be used,
   load and position for desired record.

3.   ┌──── OPTIONS ────┐

   ```
            ┌─ OFF ─┐
            ┌─ A ─┐
       (○)  ─ B ─  (○)
            ─ C ─
            ─ D ─
       INPUT      OUTPUT
   ```
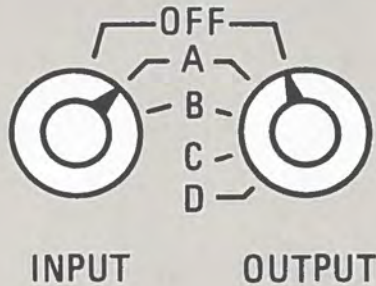
4. Enter or input CONTROL and MASTER records
   if required.

5. If operating under program control:

   ```
   ┌──────────┐                    ┌──────────┐
   │ CTRL     │  ─ ─ ─ ─ ─ ─ ─ ─ ▶ │ CONTROL  │
   │ ON/OFF   │                    │ ON       │
   └──────────┘                    └──────────┘
   ```

6.

   ```
   ┌──────────┐                    ┌──────────┐
   │ OPTION   │  ─ ─ ─ ─ ─ ─ ─ ─ ▶ │ OPTIONS  │
   │ ON/OFF   │                    │ ON       │
   └──────────┘                    └──────────┘
   ```

7.

   ```
   ┌──────────┐
   │ INPUT    │  ─ ─ ─ ─ ─ ─ ─ ─ ▶   Input of first record
   └──────────┘                       into selected record.
   ```
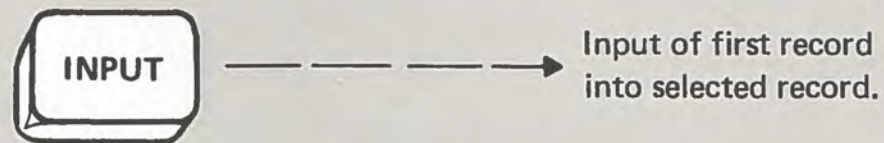
8. Revise data

9.

Output of revised data to selected channel. Data is transferred to READ record. Automatic input of next record to WRITE record from selected channel.
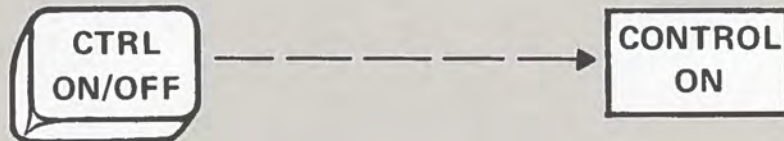
10. Repeat 8 & 9 until all records are revised.

AUTOMATIC INPUT OPTION B (PSL)

1. Prepare for operation

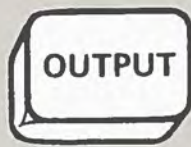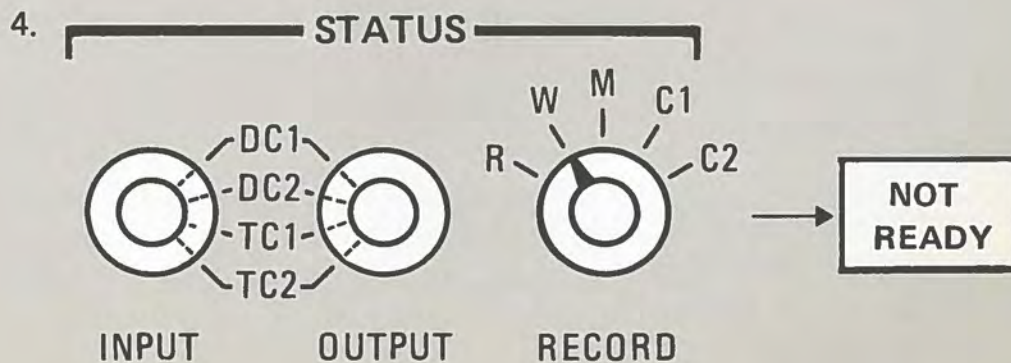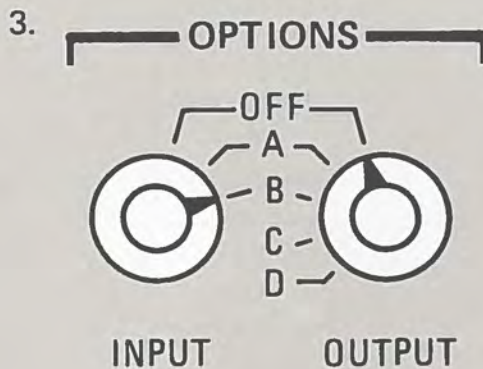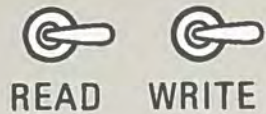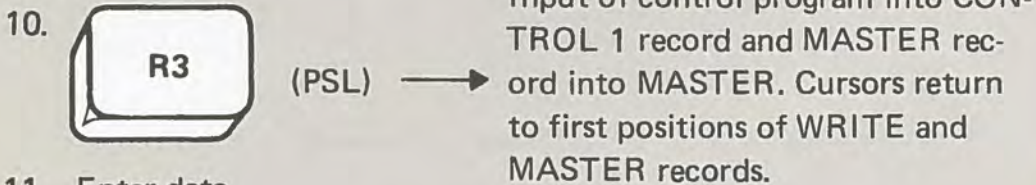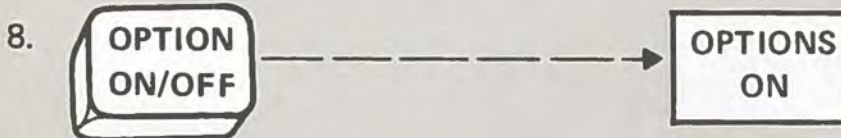2. Load pre-recorded Viatape cartridge in Tape 1 and position for desired record.

3.

4.

5. ⌐DISPLAY¬

   READ   WRITE

   MASTER

   FIELD   FORMAT   (FIELD MKR switch OFF,
   MKR   if desired)

6.   1 ⌐⊙ 2   - - - - - - - - →   ┌─────────┐
        CONTROL   │ CONTROL │
                                       │   ONE   │
                                       └─────────┘

   └FUNCTIONS┘

7. ┌──────────┐   ┌──────────┐
    │ READY   │ - - - - - - - - - →   │   NOT   │
    │   │   │ READY   │
    └──────────┘   └──────────┘

8. ┌──────────┐   ┌──────────┐
    │ OPTION │ - - - - - - - - - →   │ OPTIONS │
    │ ON/OFF │   │   ON   │
    └──────────┘   └──────────┘

9. ┌──────────┐   ┌──────────┐
    │   CTRL   │ - - - - - - - - - →   │ CONTROL │
    │ ON/OFF │   │   ON   │
    └──────────┘   └──────────┘

10.   Input of control program into CON-
    ┌──────────┐   TROL 1 record and MASTER rec-
    │   │   ord into MASTER. Cursors return
    │   R3   │ (PSL) ──────→   to first positions of WRITE and
    │   │   MASTER records.
    └──────────┘

11. Enter data.
12. Proofread and correct.

13.   Output of data to selected channel. Data is
                                       transferred to READ record. Input of next
    ┌──────────┐   CONTROL and MASTER records. Cursors
    │ OUTPUT │ ──────→   return to first positions of WRITE and MAS-
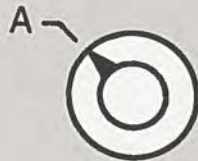   └──────────┘   TER records.
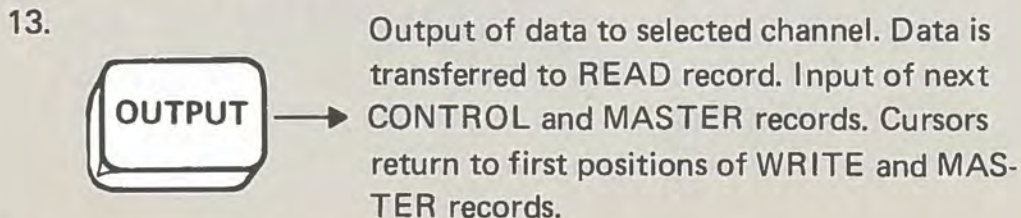
14. Repeat steps 11 through 13 until all data is entered.

AUTOMATIC OUTPUT OPTIONS

(Each output option is executed after entry of
the 80th character. OPTION ON/OFF key is
pressed, lighting the OPTIONS ON indicator.)

┌─── OPTIONS ───┐

A

OUTPUT

Automatic output of contents
of selected record to selected
STATUS OUTPUT channel.

┌─── OPTIONS ───┐

B

OUTPUT
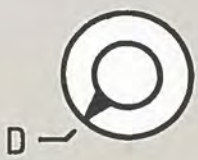
Automatic output of contents
of selected record to DC1 and
then TC2 (regardless of STATUS
OUTPUT position).

┌─── OPTIONS ───┐

C

OUTPUT

Automatic output of contents
of selected record to DC1 and
then DC2 (regardless of STATUS
OUTPUT position).

┌─── OPTIONS ───┐

D

OUTPUT

Automatic output of contents
of selected record to DC1 then
DC2, and then TC2 (regardless
of STATUS OUTPUT position).

1.

```
        ┌─── OPTIONS ───┐
           ┌── OFF ──┐
           │   A   │
      ◯    │ ─ B ─ │    ◯
           │   C   │
           └── D ──┘
      INPUT         OUTPUT
```
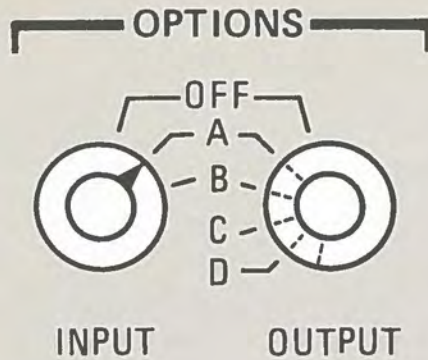
Set OUTPUT OPTION selector as instructed by your supervisor.

2. After setting both OPTIONS selectors:

| OPTION ON/OFF | - - - → | OPTIONS ON |

3.
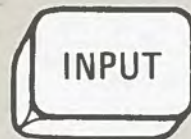
| INPUT | — — → | Continuous and automatic input of data record from selected STATUS INPUT channel, immediately followed by an automatic output to selected STATUS OUTPUT or OPTION OUTPUT channels. |

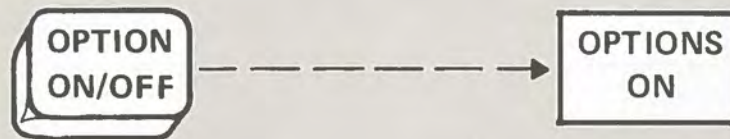| TC1	TC2	PROCESSOR			OPERATOR
ALERT	ALERT			BUSY	CONTROL ON
		CHANNEL ERROR	CONTROL ONE	SHIFT UPPER	OPTIONS ON
		NOT READY	CONTROL TWO	SHIFT LOWER	ERROR

INDICATOR	REASON	WHAT TO DO
TC1 and TC2 ALERT	No cartridge in recorder	Install cartridge in recorder. Press CLEAR key.
	Beginning of Viatape	CLEAR
	End of tape and input or output is attempted	Rewind, or replace, as needed. Press CLEAR key.
	Viatape in motion	Wait until it stops.
	Viatape jammed or broken	Press CLEAR key. Call supervisor.
	Attempt to write on read-only tape (Recording tab removed)	CLEAR
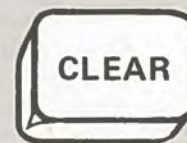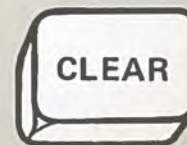
INDICATOR	REASON	WHAT TO DO
Processor CHANNEL ERROR	Error in incoming data. Location of error shown by "?" on video display	Call your supervisor
Processor BUSY	Microprocessor is active. This light is normally on intermittently	If BUSY stays on, press CLEAR key, then repeat operations.

NOTE: If the indicated recovery procedure does not correct the error, then call your supervisor.

OPERATOR ERROR	Incorrect operator procedure (such as attempting to enter data with cursor off display)	ERROR
		Correct what you were doing wrong.
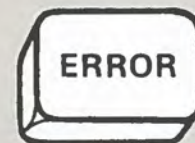
8. TABLE OF FUNCTION KEYS, SWITCHES, SELECTORS AND LIGHTS

A. FUNCTION KEYS

	MANUAL	PROGRAM CONTROL
← (Backskip)	Back spaces cursor one position.	Same. In addition, automatic operation at new cursor location is not performed.
BACK TAB	Moves cursor back to first position.	Moves cursor back to previous field begin character. Automatic operation at new cursor location is not performed.
CLEAR	Resets the microprocessor to initial conditions: 1. All microprocessor activity stops. 2. OPTIONS ON light goes OFF. 3. NOT READY light goes ON. 4. SHIFT UPPER light goes ON. 5. ALERT lights go OFF, if Viatape is in recorder. 6. Tape movement stops.	Same. In addition: 1. CONTROL ON lights go OFF. 2. CONTROL 1 light goes ON.
CTRL ON/OFF	Turns program control ON.	Turns program control OFF.
CTRL 1 CTRL 2	Selects CONTROL record 1 (or 2) for display.	Selects control program 1 (or 2) as operating program for duration of current record. Control reverts to panel switch-selected control program at completion of record.
ERASE	Erases contents of record selected on STATUS RECORD switch and returns cursor to first position.	Erases contents of field in selected record in which cursor is located, and returns cursor to first position of field. Automatic operation at new cursor location is not performed.
ERROR	Releases keyboard lock-out resulting from an operator error condition. Turns off *OPERATOR* ERROR and CHANNEL ERROR lights.	Same.
→ (Frontskip)	Moves cursor ahead one position.	Same. In addition, automatic operation at new cursor location is not performed

	MANUAL	PROGRAM CONTROL
FRONT TAB	Moves cursor ahead and off the display (81st position). Any output OPTION selected is executed.	Moves cursor ahead to beginning of next field. Automatic operation at new cursor location is performed.
INPUT	Inputs one record from channel selected on STATUS INPUT selector to record selected on STATUS RECORD selector. Cursor returns to first position.	Same.
OPTION ON/OFF	Turns selected INPUT/OUTPUT OPTIONS and OPTIONS ON light ON or OFF.	Same.
OUTPUT	Outputs one record from record selected on STATUS RECORD selector to channel selected on STATUS OUTPUT selector. Cursor returns to first position.	Same.
R1 (MASTER DUPLICATION)	Duplicates data at cursor location from MASTER record into record selected on STATUS RECORD selector.	Duplicates from MASTER record into record selected on STATUS RECORD selecter all of a left zero field and, in all other fields, from cursor location to end of field.
R2 (DUPLICATION)	Duplicates data at cursor location from READ record into record selected on STATUS RECORD switch.	Duplicates from READ record into record selected on STATUS RECORD selector all of a left zero field and, in all other fields, from cursor location to end of field.
R3 (PSL)	Inputs two records from Tape Channel 1, the first into CONTROL record 1 and the second into the MASTER record, regardless of STATUS INPUT and RECORD selector settings. Cursor returns to first position of WRITE record and first position of MASTER record, if the FORMAT switch is on.	Same.
R4 (CR/LF)	Enters ASCII characters for carriage return (CR) in lower shift and line feed (LF) in upper shift.	Same.

FUNCTION KEYS (CONT.)

	MANUAL	PROGRAM CONTROL
READY	Reads all STATUS switch settings into the microprocessor, turns OFF the NOT READY light, and returns the cursor to the first position.	Same. In addition, automatic operation at cursor location is performed.
REPEAT	When pressed in conjunction with any other key, function or alphanumeric, repeats the action of that key.	Same.
SHIFT LOWER	No effect.	Changes keyboard to lower shift when programmed shift is upper.
SHIFT UPPER	Changes keyboard to upper shift.	Changes keyboard to upper shift when programmed shift is lower.
SHIFT X	When pressed in conjunction with an alphanumeric key, enters the ASCII communication control character associated with that key.	Same.
SHIFT Y	When pressed in conjunction with any of the alphabetic keys, enters the code for printing that character in lower case. When pressed in conjunction with an alphabetic color coding key, enters the color code character associated with that key.	Same.

B. SWITCHES

(All switches are on when positioned to the right except for COLOR and CONTROL.)

DISPLAY SWITCHES		EFFECT
READ WRITE MASTER CONTROL		When ON, displays the individual record, when OFF suppresses the individual record.
FIELD MKR		When ON, in program control operation, displays vertical markers at the beginning of each field in the record selected on the STATUS RECORD selector.
FORMAT		When ON, interleaves the four lines of the WRITE record with the four lines of the MASTER RECORD, and causes cursors to appear in the WRITE and MASTER records, regardless of the setting of the STATUS RECORD selector.
COLOR	A	Allows selection of 8 color codes for data characters and 8 color codes for background in any combination.
	B	Assigns 1 fixed color each to upper case, lower case, numeric, and communications control characters.

FUNCTIONS SWITCHES

SHORT REC — When ON, allows inputs to and outputs from DC1 or DC2 of records less than 80 characters long.

CONTROL   1-2 — Allows the selection of the control program in CONTROL record 1 or CONTROL record 2 as the operating program.

AUTO DUP/SKIP — When ON, control program instructions for duplication, master duplication, and skipping will be performed automatically.

C. SELECTORS

OPTIONS SELECTORS

INPUT — INPUT OPTIONS, when selected, are performed automatically after output of the 80th character.

A — Inputs one record to record selected on STATUS RECORD selector from the channel selected on the STATUS INPUT selector.

B — Automatic PSL inputs two records from Tape Channel 1, the first into CONTROL record 1, the second into the MASTER record. Overrides the setting of the STATUS INPUT selector. Returns cursor to first position of the WRITE record and the first position of the MASTER record, if the FORMAT switch is ON.

OUTPUT — OUTPUT OPTIONS, when selected, are performed automatically after input or entry of the 80th character. The output is from the record selected on the STATUS RECORD selector.

A — Outputs one record to the channel selected on the STATUS OUTPUT selector.

OUTPUT OPTIONS B, C, and D override the setting of the STATUS OUTPUT selector.

B — Output first to DC1, then to TC2.

C — Output first to DC1, then to DC2.

D — Output first to DC1, next to DC2, then to TC2.

STATUS SELECTORS

INPUT	DC1	Allows selection of Data Channel 1, Data Channel 2, Tape
and	DC2	Channel 1, or Tape Channel 2 as input and output channels.
OUTPUT	TC1	
	TC2	

RECORD	R	Allows selection of READ, WRITE, MASTER, CONTROL 1,
	W	or CONTROL 2 record for input, keyboard data entry, or
	M	output
	C1	
	C2	

D. LIGHTS

INDICATOR	MEANING
TC1 and TC2 ALERT	Viatape in motion, at end, jammed, not in recorder, or otherwise not ready for use.
PROCESSOR CHANNEL ERROR	Error in input data. (Each error character is displayed as a "?.")
NOT READY	Current setting of STATUS selectors not read into the microprocessor.
CONTROL ON	Microprocessor under program control.
CONTROL ONE CONTROL TWO	CONTROL 1 (or 2) can be displayed and, if CONTROL ON light is also ON, the microprocessor is under the control of the indicated program.
BUSY	Microprocessor performing an operation.
SHIFT UPPER SHIFT LOWER	Keyboard in upper (or lower) shift.
OPERATOR CONTROL ON	Program control selected for operation.
OPTIONS ON	Selected automatic input and/or output option(s) in effect.
ERROR	Incorrect operator procedure.

E. VIATAPE CONTROLS

TC1 and TC2	EFFECT
1 RECORD	Pressing switch moves Viatape one record in direction indicated by arrow.
FAST	Viatape moves rapidly in direction indicated by arrow until switch is released or end of Viatape is reached.

VIATRON

COMPUTER
SYSTEMS
CORPORATION

Route 62, Bedford,
Massachusetts 01730
(617) 275-6100