APPENDIX H

PERIPHERAL DEVICES

H.1 OPERATING THE TELETYPE

The ASR-33 Teletype is the basic input/output device for PDP-11 computers. It consists of a printer, keyboard, paper tape reader, and paper tape punch, all of which can be used either on-line under program control or off-line. The Teletype controls (Figure H-1) are described as they apply to the operation of the computer.

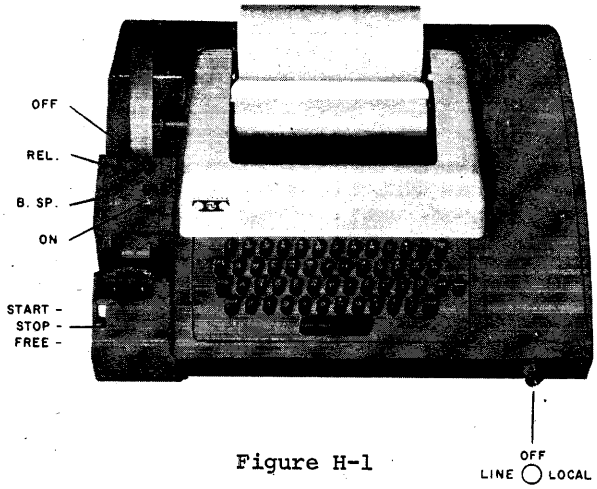

Figure H-1
ASR-33 Teletype Console

H.1.1 Power Controls

LINE - The Teletype is energized and connected to the computer as an input/output device, under computer control.

OFF - The Teletype is de-energized.

LOCAL - The Teletype is energized for off-line operation.

H.1.2 Printer

The printer provides a typed copy of input and output at 1Ø characters per second, maximum.

H.1.3 Keyboard

The Teletype keyboard is similar to a typewriter keyboard. However, certain operational functions are shown on the upper part of some of the keytops. These functions are activated by holding down the CTRL key while depressing the desired key. For example, when using the Text Editor, CTRL/U causes the current line of text to be ignored.

Although the left and right square brackets are not visible on the keyboard keytops, they are shown in Figure H-2 and are generated by typing SHIFT/K and SHIFT/M, respectively. The ALT MODE key is identified as ESC (ESCape) on some keyboards.

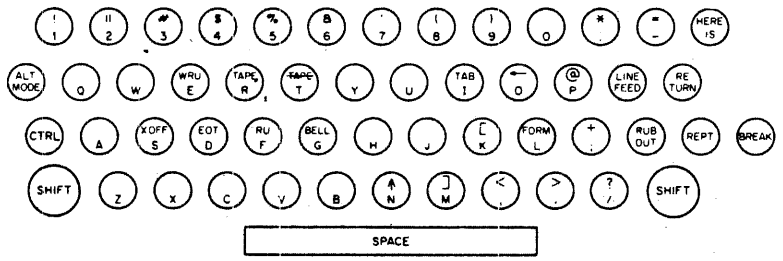

Figure H-2
ASR-33 Teletype Keyboard

H.1.4 Paper Tape Reader

The paper tape reader is used to read data punched on eight-channel perforated paper tape at a rate of 1Ø characters per second, maximum. The reader controls are shown in Figure H-1 and are described below.

START	Activates the reader; reader sprocket wheel is engaged and operative.
STOP	Deactivates the reader; reader sprocket wheel is engaged but not operative.
FREE	Deactivates the reader; reader sprocket wheel is disengaged.

The following procedure describes how to properly position paper tape in the low-speed reader.

a. Raise the tape retainer cover.

b. Set reader control to FREE.

c. Position the leader portion of the tape over the read pens with the sprocket (feed) holes over the sprocket (feed) wheel and with the arrow on the tape (printed or cut) pointing outward.

d. Close the tape retainer cover.

e. Make sure that the tape moves freely.

f. Set reader control to START, and the tape will be read.

H.1.5 Paper Tape Punch

The paper tape punch is used to perforate eight-channel rolled oiled paper tape at a maximum rate of 1Ø characters per second. The punch controls are shown in Figure H-1 and described below.

RELease	Disengages the tape to allow tape removal or loading.
B.SP	Backspaces the tape one space for each firm depression of the B.SP button.
ON (LOCK ON)	Activates the punch.
OFF (UNLOCK)	Deactivates the punch.

Blank leader/trailer tape is generated by:

1. Turning the TTY switch to LOCAL,
2. Turning the low speed punch on (depress ON button),
3. Typing the HERE IS key,
4. Turning the low speed punch off (depress OFF button), or
5. Turning the TTY switch to LINE.

H.2 OPERATING THE HIGH-SPEED PAPER TAPE READER AND PUNCH UNITS

A high-speed paper tape reader and punch unit is pictured in Figure H-3 and descriptions of the reader and punch units follow.

H.2.1 Reader Unit

The high-speed paper tape reader is used to read data from eight-channel fan-folded (non-oiled) perforated paper tape photo-electrically at a maximum rate of 3ØØ characters per second. Primary power is applied to the reader when the computer

POWER switch is turned on. The reader is under program control. However, tape can be advanced past the photoelectric sensors without causing input by pressing the reader FEED button.

H.2.2 Punch Unit

The high-speed paper tape punch is used to record computer output on eight-channel fan-folded paper tape at a maximum rate of 5Ø characters per second. All characters are punched under program control from the computer. Blank tape (feed holes only, no data) may be produced by pressing the FEED button. Primary power is available to the punch when the computer POWER switch is turned on.

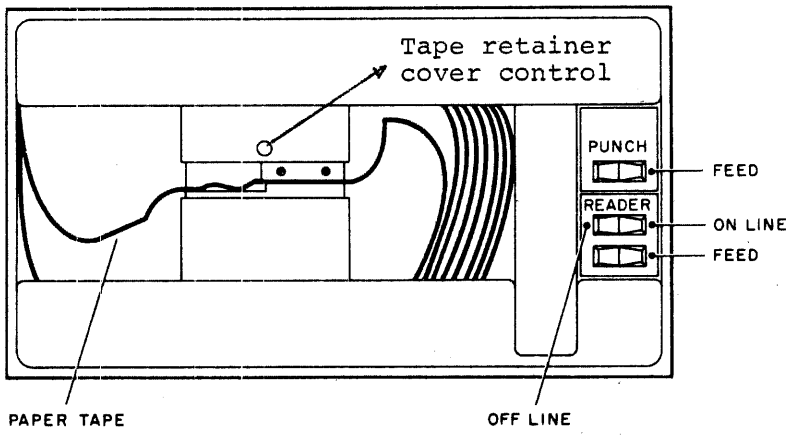

Figure H-3
High-Speed Paper Tape Reader/Punch

Paper tape is loaded into the reader as explained below.

1. Raise tape retainer cover.
2. Put tape into right-hand bin with channel one of the tape toward the rear of the bin.
3. Place several folds of blank tape through the reader and into the left-hand bin.
4. Place the tape over the reader head with feed holes engaged in the teeth of the sprocket wheel.
5. Close the tape retainer cover.
6. Depress the tape feed button until the leader tape is over the reader head.

CAUTION

Oiled paper tape should not be used in the high-speed reader or punch - oil collects dust and dirt which can cause reader or punch errors.

H.3 The LP11 LINE PRINTER

The LP11 is a line printer with 8Ø column capacity, capable of printing more than 3ØØ lines per minute at a full 8Ø columns, and more than 11ØØ lines per minute at 2Ø columns. The print rate is dependent upon the data and the number of columns to be printed.

Characters are loaded into the printer memory via the Line Printer Buffer (LPB) serially. When the memory becomes full (2Ø characters) the characters are automatically printed. This continues until the 8Ø columns have been printed or a carriage return, line feed, or form feed character is recognized.

H.3.1 Printer Control Panel

Figure H-4 illustrates the printer control panel on which are mounted three indicator lights and three toggle switches.

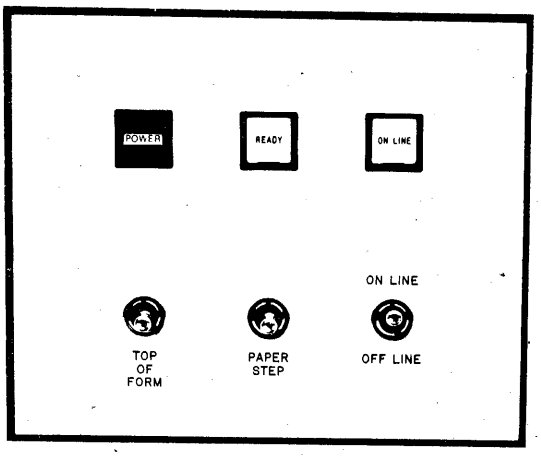

Figure H-4
Line Printer Control Panel

Operation of the lights and switches is as follows:

POWER light — Glows red to indicate main power switch (located inside cabinet) is at ON position and power is available to the printer.

READY light	Glows white, shortly after the POWER light goes on to indicate that internal components have reached synchronous state and the printer is ready to operate.
ON LINE light	Glows white to indicate that ON LINE/OFF LINE toggle switch is in ON LINE position.
TOP OF FORM switch	This switch is tipped toward the front of the cabinet to roll up the form to the top of the succeeding page. It is spring-returned to center position, and produces a single top-of-form operation each time it is actuated. The switch is effective only when the printer is off line.
PAPER STEP switch	Operates similarly to TOP OF FORM but produces a single line step each time it is actuated. It is only effective with printer off line.
ON LINE/OFF LINE switch	This two-position toggle switch is spring-returned to center. When momentarily positioned at ON LINE it logically connects the printer to the computer and causes the ON LINE light to glow. Positioned momentarily at OFF LINE, the logical connection to the computer is broken, the ON LINE light goes off, and the TOP OF FORM and PAPER STEP switches are enabled.

H.3.2 Maintenance Panel

The maintenance panel contains controls used for the line printer's initial set-up and maintenance. It is accessible only by opening the front cabinet door, located beneath the control panel.

This panel contains three switches, and three indicators.

1. Main AC power switch;
2. PRINT INHIBIT switch - must be off (down) to enable printing;
3. DRUM GATE indicator - if lit, drum gate not properly locked;
4. PAPER FAULT - if lit, check for no paper, or torn paper;
5. PRINT INHIBIT indicator - if lit, turn PRINT INHIBIT switch off;
6. MASTER CLEAR switch - spring-loaded to off (down); if toggled to on (up), resets printer logic, turns off READY and ONLINE indicators.

H.3.3 Adjustment Controls

Controls are provided as listed in Table H-1.

Table H-1

Adjustment Controls

Control	Location	Function
Drum gate latch	Gearshift type knob near right-hand side of maintenance panel.	Unlocks drum gate which can then be swung open for access to components on back.
Tractor paper width adjustment	Setscrew at far right of tractor pressure plate behind drum gate.	Adjusts right tractor for various paper widths; left tractor is factory adjusted.
Tractor horizontal tension adjustment	Next to left side of tractor paper width adjustment.	Adjusts horizontal tension of paper.
COPIES CONTROL lever	Extreme upper right-hand corner of cabinet just above drum gate hinge.	Adjusts the distance between hammer bank and character drum for different numbers of printed copies. Settings are: 1-2, 3-4, and 5-6.
Paper vertical adjustment control	Knob at upper left of cabinet, directly above right-hand side of maintenance panel.	Adjusts vertical alignment of printing so that it prints on lined paper. Can be adjusted to plus or minus one line and may be adjusted while the printer is in operation.
Top-of-form indicators	Red arrows visible when drum gate is swung open one on each side of paper directly below tractor pressure plates.	Aligns paper during loading.

H.3.4 Loading Paper

Follow the steps listed on the following page to load paper into the printer.

Step	Procedure

1. Open front door of cabinet to gain access to maintenance panel and turn main AC power switch on. Verify that control panel POWER indicator lights.

2. Lift control panel TOP OF FORM switch and release to move tractors to correct loading position.

3. Open the drum gate by moving the drum gate latch knob to the left and up. Swing drum gate open.

4. Adjust right-hand tractor paper width adjustment for proper paper width. This is accomplished by loosening the set screw on the 8Ø-column model or by using the easy release mechanism on the 12Ø-column model. Make certain that the right-hand tractor is tightened in place after it is adjusted.

5. Open spring-loaded pressure plates on both tractors.

6. Load paper so that a perforation is pointed to by the two red arrows (top-of-form indicators). Paper should lie smoothly between tractors without wrinkling or tearing the feed holes.

7. Close spring-loaded pressure plates on both tractors.

8. Adjust the COPIES CONTROL lever to the proper number for the number of copies to be made. For example, set to 1-2 for single forms, set to 5-6 for six-part forms.

9. Close drum gate and lock into position with drum gate latch. After approximately 1Ø seconds the control panel READY indicator should light. If it does not, check to see if any error is indicated. An error is indicated if one of the following lights is on: DRUM GATE, PAPER FAULT, or PRINT INHIBIT.

10. Lift TOP OF FORM switch several times to ensure paper is feeding properly.

11. Set system to on-line mode by lifting ON LINE/OFF LINE switch and verifying that ON LINE indicator lights. At this point, printed matter can be aligned with the paper lines by rotating the paper vertical adjustment knob.

For further details on the LP11, refer to the LP11 Line Printer Manual, DEC-11-OLDPB-A-D.

H.4 THE TU1Ø MAGTAPE DRIVE

The TU1Ø is a magnetic tape drive which may be 7- or 9-track unit and which will record data in densities of 2ØØ, 556 or 8ØØ bits per inch.

Figure H-5 shows the magnetic tape drive control panel and its schematic representation. Table H-2 shows the meaning assigned to each indicator light and Table H-3 explains the function of each switch.

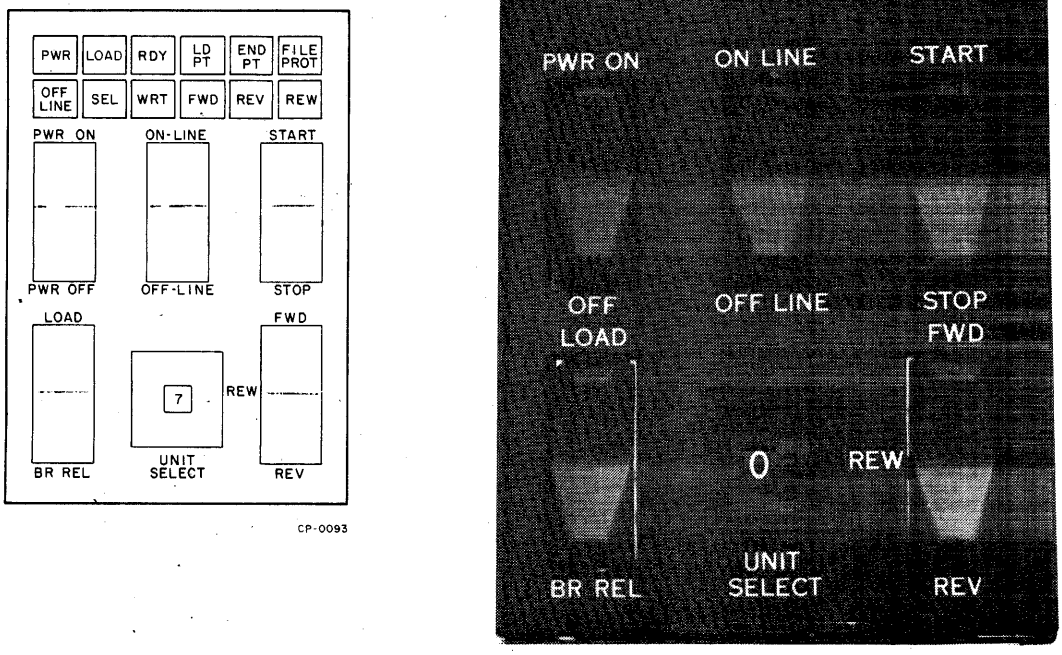

Figure H-5
Magnetic Tape Drive Control Panel

Table H-2

Status Indicators

Indicator	Procedure
PWR	Indicates that power is being supplied to the drive unit.
OFF-LINE	Indicates local operation by the control box.
LOAD	Indicates that the vacuum system has been enabled and the unit is prepared to accept on-line or off-line commands.
SEL	Indicates the tape transport has been selected by the controller (program).
RDY	Indicates that the drive is ready to accept requests for operation (provided the SEL light is also lit).
WRT	Indicates that the program has initiated a write operation in the tape transport.
LD PT	Indicates that the tape mounted on this unit is at its Load point (BOT marker is being sensed). REW command is disabled.
FWD	Indicates that a forward command has been issued.
END PT	Indicates that the tape mounted on this unit is at its end point (EOT marker is being sensed). FWD command is disabled.
REV	Indicates that a reverse command has been issued.
FILE PROT	Indicates that the tape may not be written on (no Write ring in tape reel).
REW	Indicates that a rewind command has been issued.

Table H-3

Switch Functions

Switch	Function
PWR ON/OFF	Controls power to the drive.
ONLINE/OFFLINE	Transfers drive control to processor (ON LINE) or enables local control box control by operator (OFF LINE).
START/STOP	Initiates or terminates tape movement.
LOAD/BR REL	LOAD position causes tape to be drawn into vacuum columns. Center position applies reel motion brakes. BR REL position releases reel motion brakes.
UNIT SELECT	Assigns a logical unit number (zero through seven) to this drive.
FWD/REW/REV	Selects tape motion direction to be controlled by START/STOP switch. FWD position indicates transfer to take-up reel until EOT (end of tape) marker is sensed, REV position indicates transfer to file reel until BOT (beginning of tape) marker is sensed, REW position indicates transfer as in REV at a higher tape speed; when the tape stops at BOT, depressing the start switch again causes tape to unload.

H.4.1 Operating Procedures

H.4.1.1 Loading and Threading Tape

Use the following procedure to mount and thread the tape:

Step	Procedure
1	Apply power to the transport by depressing PWR ON switch.
2	Ensure the LOAD/BR REL switch is in the center position (this applies the brakes).
3	Place a write enable ring in the groove on the file reel if data is to be written on the tape. Ensure there is no ring in the groove if data on the tape is not to be erased or written over.
4	Mount the file reel onto the lower hub with the groove facing towards the back. Ensure that the reel is firmly seated against the flange of the hub.

Step	Procedure
5	Install the take-up reel (top) as described in Step 4.
6	Place LOAD/BR REL switch to the BR REL position.
7	Unwind tape from the file reel and thread the tape over the tape guides and head assembly as shown in Figure H-6.
8	Wind about five turns of tape onto the take-up reel.
9	Set the LOAD/BR REL switch to the LOAD position to draw tape into the vacuum columns.
10	Select FWD and press START to advance the tape to Load Point. When the BOT marker is sensed, tape motion stops, the FWD indicator goes out, and the LOAD PT indicator comes on.

NOTE

If tape motion continues for more than 10 seconds, press STOP, select REV (reverse) and press START. The tape should move to the BOT marker (Load Point) before stopping.

H.4.1.2 Unloading Tape

To unload the tape proceed as follows:

Step	Procedure
1	Press OFF-LINE switch if the transport has been operating in the on-line mode.
2	Press STOP switch and select REW.
3	Press START switch. The tape should rewind until the BOT marker is reached.
4	Press the LOAD/BR REL switch to release the brakes.
5	Gently hand wind the file reel in a counterclockwise direction until all of the tape is wound onto the reel.

CAUTION

When handwinding the tape, do not jerk the reel. This can stretch or compress the tape which could cause irreparable damage.

6	Remove the file reel from the hub assembly.

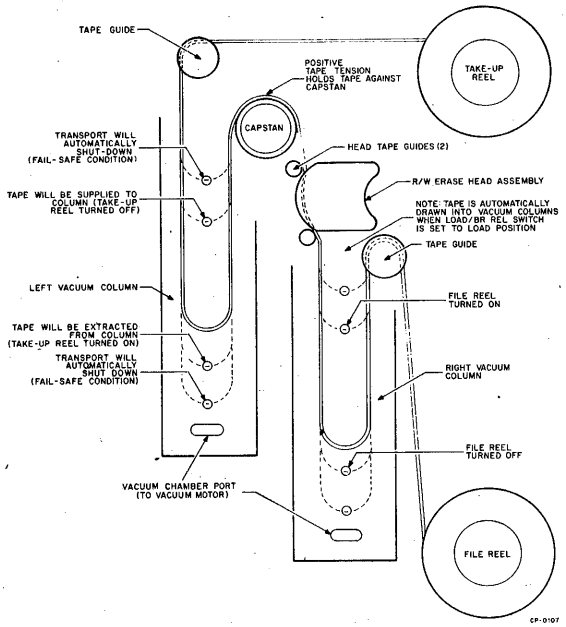

Figure H-6

Tape Transport Mechanism

H.4.1.3 Restart After Power Failure

In the event of a power failure, the magtape automatically shuts down and tape motion stops without damage to the tape. Return of power is indicated when the PWR indicator lights. To restart the transport proceed as follows:

Step	Procedure
1	Press the LOAD/BR REL switch to release the brakes.
2	Manually wind the reels to take up any slack in the tape.
3	Set the LOAD/BR REL switch to the LOAD position to draw tape into the vacuum columns.
4	Set ON-LINE/OFF-LINE switch to the desired position and continue operation.

H.4.1.4 Restart After Fail-Safe

If the tape loop in either buffer column exceeds the limits shown in Figure H-6, the vacuum system automatically shuts down and tape motion stops without damage to the tape. When this fail-safe condition occurs, the magtape does not respond to on-line or off-line commands. To restart the transport, perform Steps 1 through 4 in Section H.4.1.3.

H.4.1.5 Tape Handling

Observe the following precautions when handling magnetic tape:

a. Always handle a tape reel by the hub hole; squeezing the reel flanges can cause damage to the tape edges when winding or unwinding tape.

b. Never touch the portion of tape between the BOT and EOT markers. Oils from fingers attract dust and dirt. Do not allow the end of the tape to drag on the floor.

c. Never use a contaminated reel of tape. This spreads dirt to clean tape reels and can affect tape transport operation.

d. Always store tape reels inside their containers. Keep empty containers closed so dust and dirt cannot get inside.

e. Inspect tapes, reels, and containers for dust and dirt. Replace take-up reels that are old or damaged.

f. Do not smoke near the transport or tape storage area. Tobacco smoke and ash are especially damaging to tape.

g. Do not place the magtape near a line printer or other device that produces paper dust.

h. Clean the tape path frequently as described in Section H.5.2.1.

H.5 THE TC11 DECTAPE DRIVE

Figure H-7 pictures the TC11 DECtape drive unit.

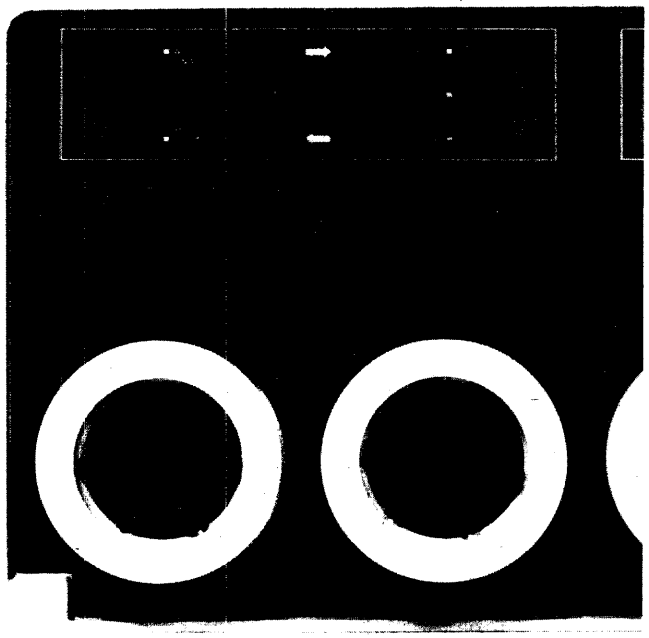

Figure H-7 TC11 DECtape Drive

To mount a DECtape on the TC11:

1. Move the LOCAL/REMOTE/OFF switch to the OFF position.
2. Mount a DECtape by centering it over the left band hub and pushing it firmly onto the spring loaded hub.
3. Wind sufficient tape to wrap around the recording head guides and the empty DECtape reel which should be mounted on the right hand hub.
4. Take up a few inches of tape on the right hand hub by hand.
5. Move the LOCAL/REMOTE/OFF switch to LOCAL position.
6. Depress the DECtape motion switch to the LOAD position until about 6 feet of tape are on the right hand hub.
7. Depress the WRITE PROTECT switch or write enable as appropriate.
8. Assure that the unit number showing for this drive does not show on any other drive.
9. Move the LOCAL/OFF/REMOTE switch to the remote position.

To dismount a DECtape from the TC11.

1. Move the LOCAL/OFF/REMOTE switch to the LOCAL position.
2. Depress the tape motion switch in the rewind direction (←) until all the tape is on the left hand reel.
3. Move LOCAL/OFF/REMOTE switch to OFF position.
4. Pull the DECtape reel from the left hand hub.

H.6 OPERATION OF THE LA30 DECWRITER

The LA30 DECwriter is a dot matrix impact printer and keyboard for use as a hard copy I/O terminal. It is capable of printing a set of 64 ASCII characters at a speed of up to 30 characters/second on continuous forms. Data entry and system control is accomplished from the keyboard, which is capable of generating either 97 or 128 characters.

The DECwriter is available in two models: The LA30S for serial operation and the LA30P for parallel operation.

H.6.1 Controls and Indicators

Controls and indicators for the LA30 are listed in Table H-4 and shown in Figures H-8 and H-9. (Figure H-8 shows the controls and indicators for the serial version of the LA30; the parallel version has only the READY lamp and the LOCAL LINE FEED switch.)

Table H-4

LA3Ø Controls and Indicators

Index	Control/Indicator	Function
1	READY	Lamp - Indicates power up on printer electronics and that the DECwriter is READY for use.
2	LOCAL LINE FEED	Switch - When depressed, causes a local line feed to be applied to the printer without a code being sent to the computer. This control will also disrupt printing, but no characters will be lost.
3	MODE LOCAL LINE	2-Position Switch - Selects either local or on-line operation.
4	BAUD RATE 110,150,300	3-Position Switch - Selects the baud rate clock frequencies for 110,150, and 300 baud.
5	MOTOR POWER	Breaker (CB2) - Applies power to printer stepping motor electronics.
6	AC POWER	Breaker (CB1) - Applies ac power to the unit power supply.

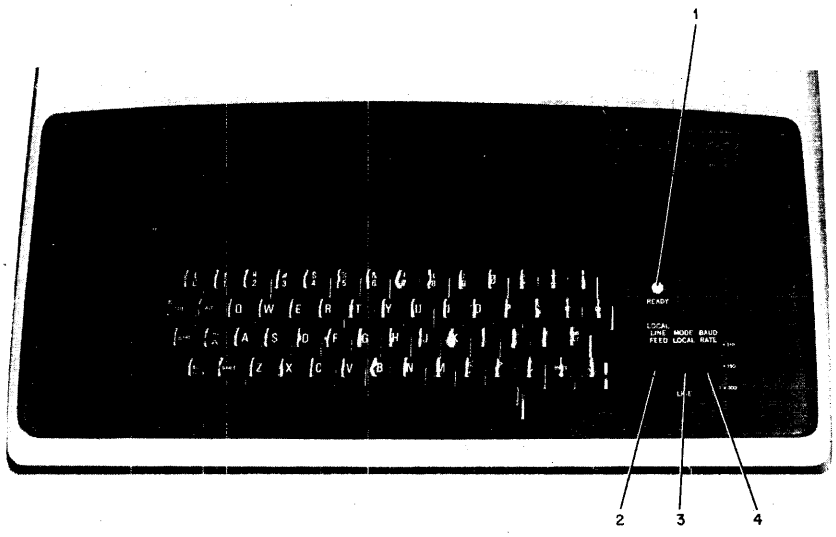

Figure H-8

LA3ØS DECwriter (Serial Machine)

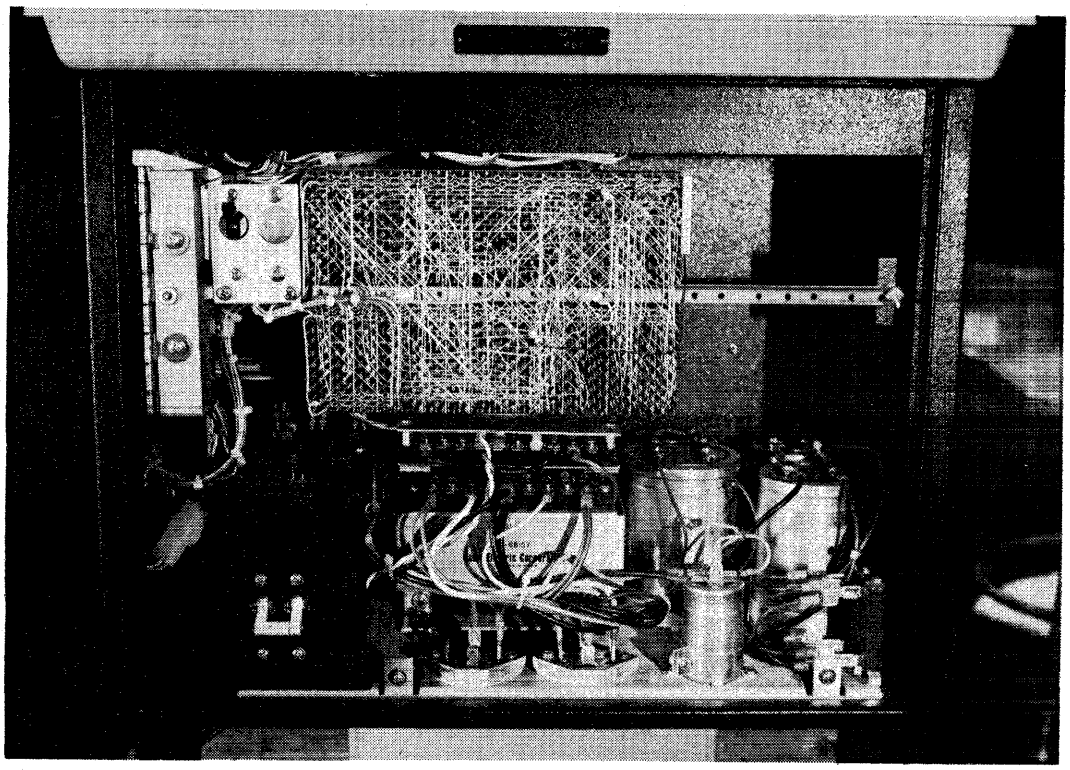

Figure H-9

LA3Ø Power Controls

H.6.2 Loading Paper

When loading paper, proceed as follows:

1. Remove main power at CB1.
2. Open the cover of the DECwriter by pulling up on both sides of the front.
3. Raise the cam lever located on the left-hand side of the print bar assembly until it disengages and slide the assembly back.
4. Feed the paper from its box on the floor under the DECwriter up through the opening in the bottom of the base casting (Figure H-10). Pull the fresh supply into the machine and discard any remnants of the old supply.
5. Make certain that the paper is feeding straight and re-engage the paper with its sprocket tractor pins.
6. Pull the assembly forward and re-engage it by pressing the cam lever down until it locks in place on its retainer stud. Adjust tractor width, using vernier knob. Tractor pins should not elongate holes in paper.
7. Advance the paper by rolling the knobs.
8. Feed end of paper through the smaller hole in the cover and close the cover, latching both ball studs to the base assembly.
9. Re-apply main power at CB1.

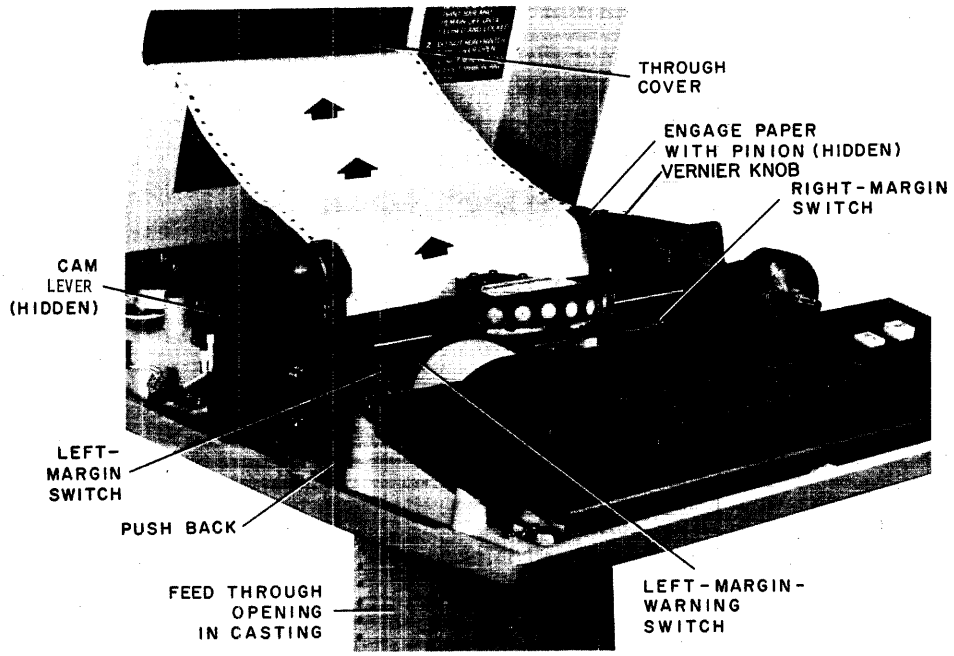

Figure H-10

Paper Loading and Threading Diagram

H.6.3 Changing Ribbon

When it is necessary to change the ribbon, which under normal operating conditions should be every 10 hours of continuous printing, proceed as follows:

CAUTION

Ribbons left in service for more than 16 hours of continuous printing may function poorly with possible damage to print head.

1. Wait until the present reel has completely emptied and is ready to reverse.

2. Remove main power at CB1.

3. Raise lid and move the platen assembly back as described in Section H.6.2.

4. Remove ribbon from the idler rollers, the print head, and the direction reversing sense arms.

5. Snap both reels off of their motor shafts, run the ribbon off of the most empty reel, and discard the full reel of ribbon.

6. Secure a new reel of ribbon and reel off approximately 1 ft. If the ribbon is not equipped with a hook at its end, skewer the ribbon on the arrow-shaped piece on the take-up reel (Figure H-11).

7. Wrap the ribbon on the take-up reel beyond the direction-reversing rivet.

CAUTION

If the rivet is not between the reel and the sensing arm, the ribbon will not reverse.

8. Snap both reels on their motor shafts and thread the ribbon through the sensing arms and over the idler rollers and print-head assembly as shown in Figure H-12.

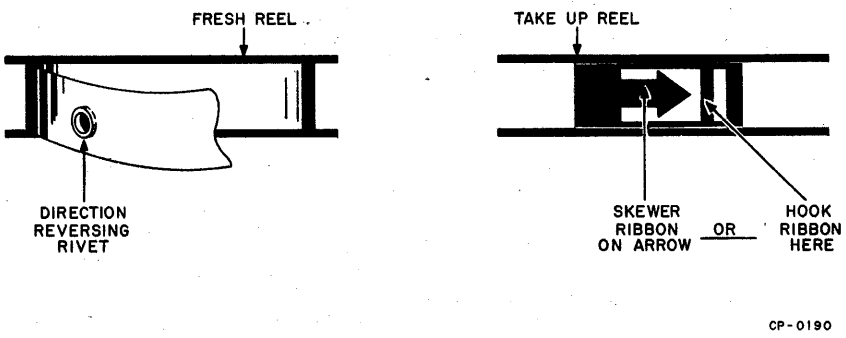

Figure H-11

Securing Ribbon to Reel

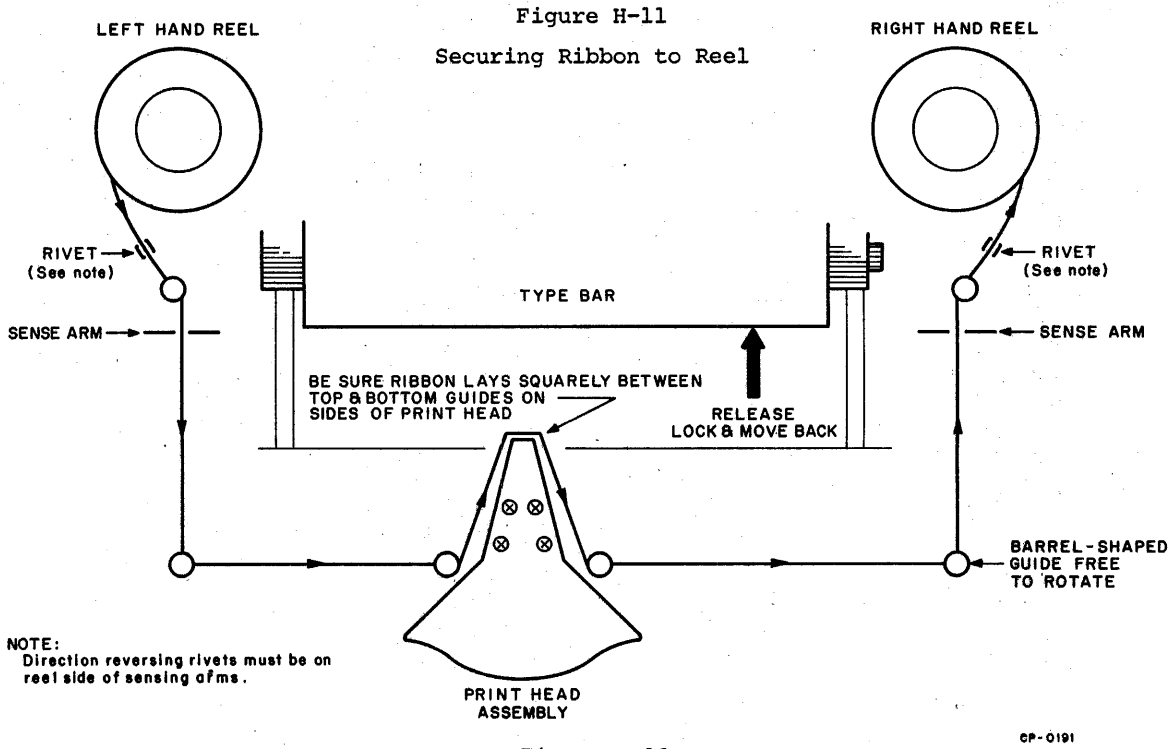

Figure H-12

Ribbon Threading Diagram

H.7 OPERATION OF THE VTØ5 ALPHANUMERIC DISPLAY TERMINAL

The VTØ5 Alphanumeric Display Terminal, consisting of a CRT display and self-contained keyboard, can be used as a peripheral I/O device with the PDP-11. Basic operation of the VTØ5 is described in the section that follows; detailed information is available in the VTØ5 Alphanumeric Display Terminal Reference Manual (DEC-00-H4AC-D).

H.7.1 Controls and Indicators

VTØ5 controls and indicators and their respective functions are listed in Table H-5.

Table H-5
VTØ5 Controls and Indicators

Control or Indicator	Functions
Power ON/OFF Switch	This switch is located on the right front of the VTØ5. When the ON/OFF switch is turned ON, power is applied to the complete system and the VTØ5 display refresh memory is cleared. After approximately one minute has elapsed, the cursor should appear in the upper left-hand corner (HOME position) of the screen.
LOCAL/REMOTE Switch	This switch is located on the right front of the VTØ5. In LOCAL mode, the terminal is off-line and data transmitted from the keyboard is applied back to the VTØ5 receiver logic by connecting the transmitter output to the VTØ5 receiver input. In REMOTE mode, keyboard data is transmitted from the VTØ5 to the processor while the VTØ5 is simultaneously receiving data from the processor for entry into the buffer memory (full-duplex operation). When operating in HALF-DUPLEX mode, if the VTØ5 is transmitting and receiving simultaneously, two sets of information are garbled.
FULL/HALF-DUPLEX Switch	This switch is located on the rear of the VTØ5. In the FULL-DUPLEX position, while keyboard data is transmitted to the computer, the display can concurrently receive data from the computer. In the HALF-DUPLEX position, data is transmitted to the VTØ5 receiver logic as well as to the computer. In both cases, received data will be recognized and processed by the VTØ5 (see Figure H-13).

Table H-5 (Cont.)

Control or Indicator	Functions
CONTRAST Control	The CONTRAST control is located on the right-hand side of the VTØ5 and is used to adjust for picture contrast (clarity).
BRIGHTNESS Control	The BRIGHTNESS control is located on the right-hand side of the VTØ5 and is used to adjust for CRT display brightness or intensity. NOTE To correctly adjust the VTØ5 character presentation, turn the CONTRAST control counterclockwise to minimum, then adjust the BRIGHTNESS control decreasing the intensity until the brightness is barely intensified (just above the CRT cutoff point). As a final step adjust the CONTRAST control to the desired level, according to ambient lighting conditions.
VERTICAL Sync Control	The VERTICAL sync control is located on the right-hand side of the VTØ5 and is used to properly synchronize the screen in the vertical direction.
HORIZONTAL Sync Control	The HORIZONTAL sync control is located on the right-hand side of the VTØ5 and is used to adjust the picture for proper synchronization in the horizontal direction.
BAUD RATE SELECTION Switch	This switch is located on the rear of the VTØ5 and has ten positions (see Figure H-13). The various switch positions and respective transmit and receive rates are provided in Table H-6. See Filler Character Requirements, below.

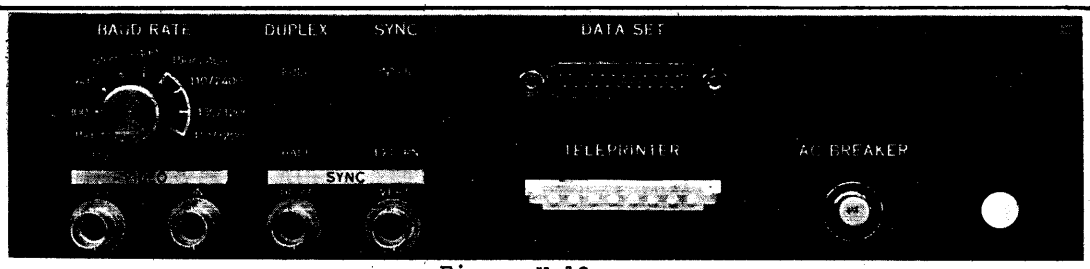

Figure H-13

VT05 Rear Panel Connectors and Controls

At the 11Ø-baud rate, an 11-unit code consisting of one start bit, seven data bits, one parity bit, and two stop bits is used. A 1Ø-unit code is used for all other baud rates (only one stop bit is used). The parity bit can optionally be set to a "mark" (no parity) or to even parity.

Table H-6

Baud Rate Selector Switch Positions

Switch Positions	Transmit Rate	Receive Rate
Fully Counterclockwise	110	110
	150	150
	300	300
	600	600
	1200[1]	1200[1]
through	2400[1]	2400[1]
	150[1]	2400[1]
	110[1]	2400[1]
	150[1]	1200[1]
Fully Clockwise	110[1]	1200[1]

[1]VTØ5B only; not implemented on VTØ5A.

H.7.2 Filler Characters Required at High Baud Rates

At speeds above 300 baud, filler characters (or time delay) are required after many of the control characters transmitted to a VTØ5-B.

Characters Requiring Fillers Above 300 Baud:

Line Feed
Cursor Down
HOME
Cursor Up
Erase Screen
Cursor Y Address

Filler characters should be null (ØØØØØØØ) as a rule, though other characters may be satisfactory if direct cursor addressing is not used. (Fillers after Cursor Y Address must be null to be interpreted correctly.)

The delay required is slightly greater than one full cycle of the ac line. At both 5Ø Hz and 6Ø Hz, the number of fillers required to accomplish the delay is:

2400 baud	4
1200 baud	2
600 baud	1
300 baud or less	none required

H.7.3 Local Operation Turn-On Procedure

The following procedure is provided for initial turn-on when operating in LOCAL

mode. Perform step 3 of this procedure only during installation or initial setup, or in instances when the VTØ5 must be moved to a different location and a different wall receptacle must be used.

Step	Procedure
1	Ensure the power switch is set to the OFF position.
2	Set the LOCAL/REMOTE switch to the LOCAL position.
3	Check the selected wall receptacle for the correct line voltage. Ensure the line voltage and frequency agree with the line voltage and frequency specified on the rear panel. Insert the power cord into the wall receptacle.
4	Set the power switch to ON; the blinking cursor will appear in the HOME position (the first character position of the first line), and the speaker will "beep" once.
5	Allow approximately one minute for CRT filament warmup.
6	If the cursor does not appear as specified, press the HOME key. If the cursor still fails to appear, ensure that the BRIGHTNESS control has not been adjusted too low. If the cursor still fails to appear, turn the terminal off and contact the local DEC Field Service Office.

H.7.4 Remote Operation Turn-On Procedure

The following procedure is provided for initial turn-on when operating in REMOTE mode. Perform step 4 of this procedure only during installation or initial setup, or if the VTØ5 is moved to a different location and a different wall receptacle must be used.

Step	Procedure
1	Ensure that the power switch is set to the OFF position.
2	Set the DUPLEX switch on the rear panel to FULL or HALF according to the requirements of the particular system to which the VTØ5 is connected.
3	Set the LOCAL/REMOTE switch to the REMOTE position.
4	Check the selected wall receptacle for the correct line voltage and frequency as specified on the rear panel of the VTØ5. Insert the power cord into the wall receptacle.
5	Set the power switch to the ON position.
6	Allow approximately one minute for CRT filament warmup before continuing. The blinking cursor should appear in the HOME position (upper left-hand corner), and the speaker should "beep" once.

Step	Procedure
7	If the cursor fails to appear as specified, press the HOME key. Ensure that the BRIGHTNESS adjustment has not been turned down. If the cursor still fails to appear, turn the terminal off and call the local DEC Field Service Office.
8	Set the BAUD RATE switch on the rear panel to the desired position.

H.8 CR11 CARD READER

The usual medium of batch input will be the CR11 card reader. Two models are available for use with Batch: CR-11A and CR-11B. Operating procedures for each are detailed below.

H.8.1 CR11-A Card Reader

Figure H-14 illustrates this mode. To operate CR11-A:

1. Turn power switch ON.
2. Remove card-deck weight from input hopper.
3. Place card deck in input hopper. Cards should be face down, with the notched corner to your left. Edges of all cards should be aligned evenly.
4. Replace card-deck weight on top of deck.
5. Press MOTOR START button.
6. Press READ START button.

The unit is ready for operation if the green lights associated with MOTOR START and READ START are lit; no red lights should be on. If a red light is on, do not attempt to enter the BATCH command at the keyboard, because the card reader is not ready.

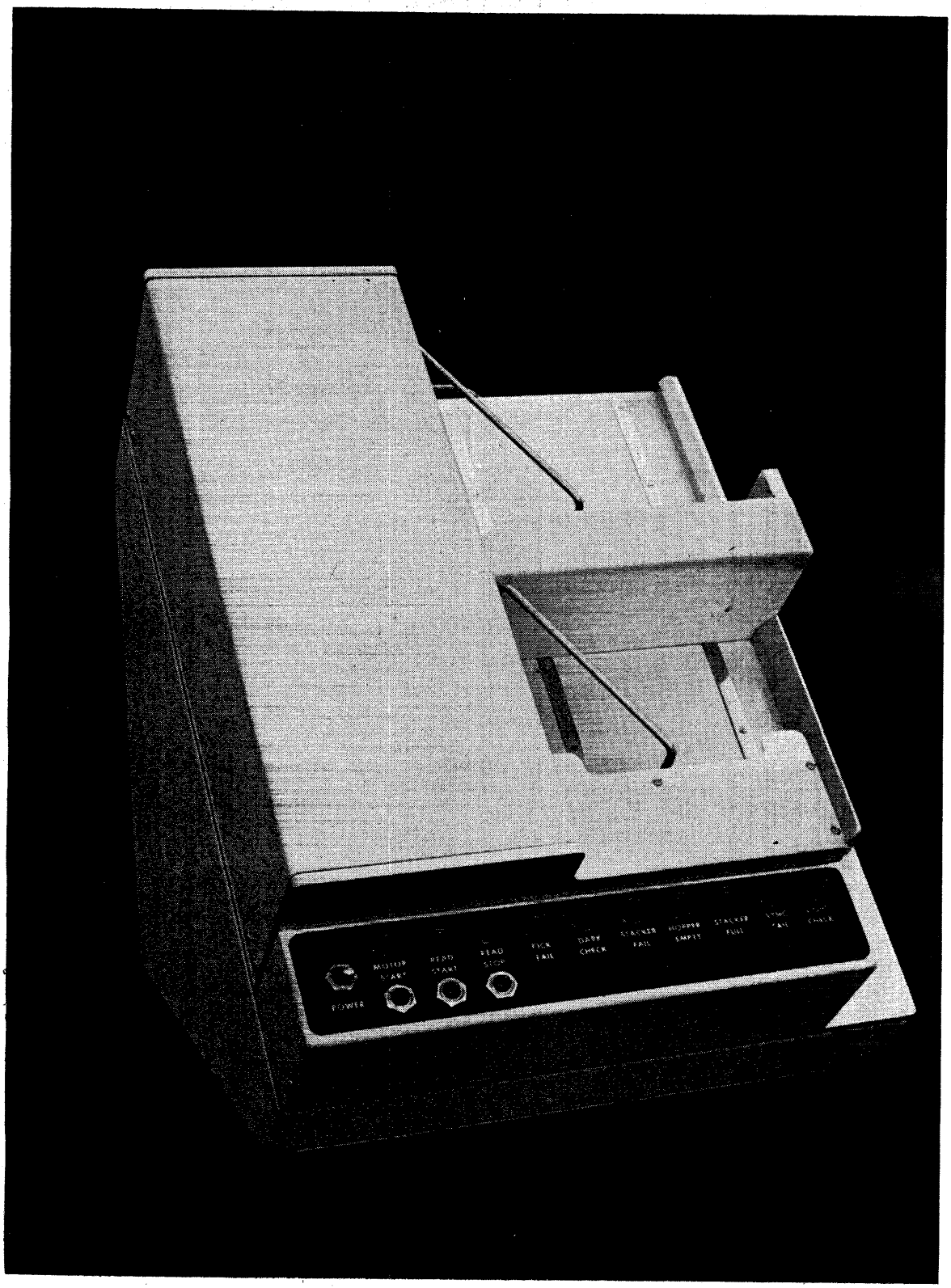

Figure H-14

Model CR11-A Card Reader

H.8.2 CR11-B Card Reader

Model CR11-B is shown in Figure H-15. It is operated as follows:

1. Turn power on (switch located in upper left corner in back of the unit).
2. Remove card-deck weight from input hopper.
3. Place deck in hopper, with cards evenly aligned, face down, notched corner to your left.
4. Replace card-deck weight on top of deck.
4. Press RESET button.

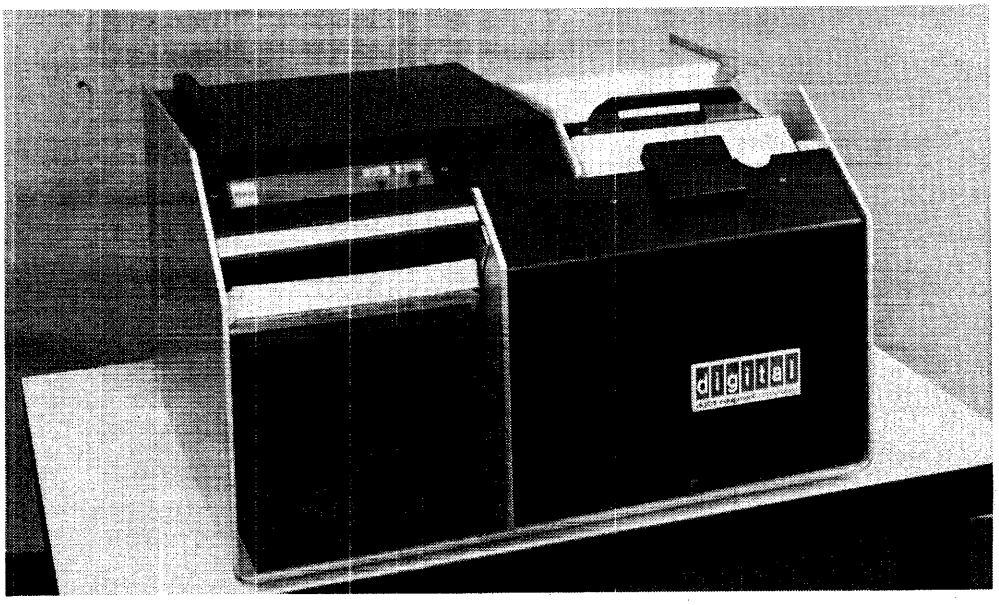

Figure H-15
Model CR11-B Card Reader

H.9 Multipunch Cards

Character or Function	Ø29 code	Ø26 code
[(left bracket)	12-8-2	11-8-5
] (right bracket)	11-8-2	12-8-5
EOF (end of file)*	12-11-Ø-1-6-7-8-9	12-11-Ø-1-6-7-8-9
blank suppress*	12-11-1-2-8-9	12-11-1-2-8-9
Ø26 mode*	12-2-4-8	12-2-4-8
Ø29 mode*	12-Ø-2-4-6-8	12-Ø-2-4-6-8
*multipunch must appear in column one.		

H.1Ø LP11 LINE PRINTER

H.1Ø.1 Control Panel

The LP11 Control Panel is located at the top of the cabinet, to the left of the window. This panel contains the controls for normal operation of the printer.

To operate in batch mode, the line printer controls and indicator lights must be set as follows:

1. POWER indicator on;
2. READY indicator on;
3. ONLINE/OFFLINE switch in UP (ONLINE) position; and,
4. ONLINE indicator lit. (If the printer is not on line, the system hangs until the ONLINE/OFFLINE switch is put to ONLINE.)

H.1Ø.2 Maintenance Panel

The maintenance panel contains controls used for the line printer's initial set-up and maintenance. It is accessible only by opening the front cabinet door, located beneath the control panel.

This panel contains three switches and three indicators:

1. Main ac power switch;
2. PRINT INHIBIT switch - must be off (down) to enable printing;
3. DRUM GATE indicator - if lit, drum gate not properly locked;
4. PAPER FAULT - if lit, check for no paper or torn paper;
5. PRINT INHIBIT indicator - if lit, turn PRINT INHIBIT switch off.
6. MASTER CLEAR switch - spring-loaded to off (down); if toggled to on (up), resets printer logic, turns off READY and ONLINE indicators.

H.1Ø.3 Adjustment Controls

Controls are provided as listed in Table H-7.

Table H-7

Adjustment Controls

Control	Location	Function
Drum gate latch	Gearshift type knob near right-hand side of maintenance panel.	Unlocks drum gate which can then be swung open for access to components on back.
Tractor paper width adjustment	Setscrew at far right of tractor pressure plate behind drum gate.	Adjusts right tractor for various paper widths; left tractor is factory adjusted.
Tractor horizontal tension adjustment.	Next to left side of tractor paper width adjustment.	Adjusts horizontal tension of paper.
COPIES CONTROL lever	Extreme upper right-hand corner of cabinet just above drum gate hinge.	Adjusts the distance between hammer bank and character drum for different numbers of printer copies. Settings are: 1-2, 3-4 and 5-6.
Paper vertical adjustment control.	Knob at upper left of cabinet, directly above right-hand side of maintenance panel.	Adjusts vertical alignment of printing so that it prints on lined paper. Can be adjusted to plus or minus one line and may be adjusted while the printer is in operation.
Top-of-form indicators	Red arrows visible when drum gate is swung open; one on each side of paper directly below tractor pressure plates.	Aligns paper during loading.

H.1Ø.4 Loading Paper

Follow the steps listed below to load paper into the printer.

Step	Procedure
1.	Open front door of cabinet to gain access to maintenance panel and turn main AC power switch on. Verify that control panel POWER indicator lights.
2.	Lift control panel TOP OF FORM switch and release to move tractors to correct loading position.
3.	Open the drum gate by moving the drum gate latch knob to the left and up. Swing drum gate open.
4.	Adjust right-hand tractor paper width with adjustment for proper paper width. This is accomplished by loosening the set screw on the 8Ø-column model or by using the easy release mechanism on the 12Ø-column model. Make certain that the right-hand tractor is tightened in place after it is adjusted.
5.	Open spring-loaded pressure plates on both tractors.
6.	Load paper so that a perforation is pointed to by the two red arrows (top-of-form indicators). Paper should lie smoothly between tractors without wrinkling or tearing the feed holes.
7.	Close spring-loaded pressure plates on both tractors.
8.	Adjust the COPIES CONTROL lever to the proper number for the number of copies to be made. For example, set to 1-2 for single forms, set to 5-6 for 6-part forms.
9.	Close drum gate and lock into position with drum gate latch. After approximately 1Ø seconds the control panel ready indicator should light. If it does not, check to see if any error is indicated. An error is indicated if one of the following lights is on: DRUM GATE, PAPER FAULT, or PRINT INHIBIT.
10.	Lift TOP OF FORM switch several times to ensure paper is feeding properly.
11.	Set system to on-line mode by lifting ONLINE/OFFLINE switch and verifying that ON LINE indicator lights. At this point, printed matter can be aligned with the paper lines by rotating the paper vertical adjustment knob.