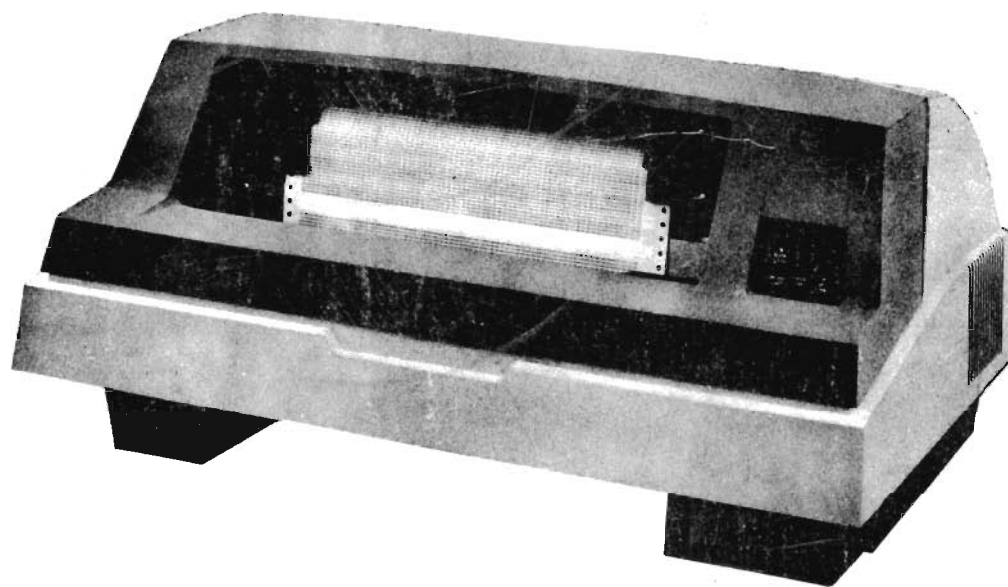


300 LPM Line Printer



MAINTENANCE GUIDE

FAULTS - 7-3

INTERFACE BRD. SW. SETTING 7-11

INTERFACE BRD 726-1108

PROCESSOR BRD. 726-1105 less PROMS

TIMING & STATUS BRD 726-1107

POWER BRD. 726-1104

HAMMER DR. BRD 726-1101

VFU KIT 726-1111

FLSS Assy w/o VFU 726-1179

5,6,7



DPC 245058A

MAINTENANCE GUIDE

300 LPM LINE PRINTER

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Dataproducts

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RELATED PUBLICATIONS

<u>Title</u>	<u>Publication Number</u>
B-300 Operators Guide	245044
B-300 Master Support and Logistics Manual	245059
B-300 Line Printer Character Sets	B-300-CS

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SECTION I

GENERAL DESCRIPTION

1.1 INTRODUCTION

This maintenance guide contains information depicting printer installation, operation performance specifications, and interface requirements. Also listed are recommended periodic maintenance schedules, troubleshooting and adjustment instructions as well as available options which may be added to the printer. Appendix "A" contains a parts index providing replacement information of the major assemblies and recommended spares.

1.2 DESCRIPTION

This section describes the major functions of the printer in general, including the character band drive system, the ribbon drive system, the form movement mechanism, and the actual printing of characters. Also included are the interface requirements and a discussion of available options.

The printer, shown in figure 1-1, is a medium speed, impact type, solid font line printer utilizing a continuous character band. It functions as an output terminal which produces hard copy printout for use with electronic information processing systems. The printer contains a dedicated microprocessor which controls the electrical and mechanical functions as well as providing diagnostic testing to detect and indicate malfunctions.



245058A, 101

Figure 1-1. Line Printer

1.3 CHARACTER BAND DRIVE SYSTEM

The character band is a continuous steel loop, is operator changeable, and contains the raised characters and necessary timing and index marks. It also contains band identification marks. Unless specially ordered, the printer is shipped with a 64 ASCII character electronic data processing (EDP) band. The utility and upper/lower case character sets are available as options, and may be ordered; and unique character sets may be designed upon receipt of special customer request.

Standard character band sets are designed to produce print with a horizontal column spacing of ten (10) characters per inch; however, bands are available with condensed print capability which produce columns spaced at fifteen (15) characters per inch.

The character band is mounted over two pulleys which are positioned at opposite ends of the drive bed, and protected by a hinged band cover. A DC motor, coupled to the drive pulley, rotates the band in a counterclockwise direction at a constant velocity. The vertical position of the band is controlled by the displacement of the downward force until the bottom edge of the band contacts two edge guide bearings. Tension is maintained to prevent vertical travel of the band as it rotates, and a tension release lever is provided to allow easy replacement of the character band.

The processor control provides detection of and protection for band drive overload conditions and also initiates start up and shut down procedures. In the event of an input data interrupt for a period longer than three seconds, the band motor motion will cease, and an automatic restart will occur upon the subsequent receipt of valid data.

1.4 RIBBON DRIVE SYSTEM

The ribbon transport system consists of a gear-driven capstan roller whose motion is derived from and is simultaneous with the character band drive. The driven capstan roller, along with a contra-rotating idler roller, pulls the ribbon past the print station and then compacts the ribbon in even fan-form folds, into the ribbon cartridge.

The ribbon consists of a continuous loop of ink impregnated nylon, contained in a cartridge capable of storing the total length of the ribbon except that portion which is passing in front of the print station. The cartridge is held in place by the tension of preformed, snap action, button receptacles molded into the bottom of the cartridge which mate with two precise metal buttons mounted to the ribbon cartridge mounting shelf.

The ribbon is guided diagonally across the print station, and its path is determined by fixed position guide posts which are attached to the printer frame. A ribbon mask is attached to the print station by an adhesive strip which minimizes extraneous ink smear on the form being printed.

By design, the first indication of ribbon failure will be deterioration of print quality due to ink content exhaustion. Since print quality is subject to individual interpretation, an exact life figure may not be established. Instead ribbon life is stated as the number of lines printed until one of the following failures occur.

- a. The ribbon fails to load properly into the cartridge, causing improper ribbon motion.
- b. Print quality becomes deteriorated to the extent that printed copy is not legible.
- c. The ribbon fabric develops runs, tears or holes.

Ribbon life is dependent on such variables as print density, the type of forms being used, and ink characteristics. Since ribbons may vary from one supplier to another by such factors as type and amount of ink, thread count, etc., it is recommended that the ribbons shown in table 1-1 be used in order to obtain optimum print quality.

TABLE 1-1. RIBBON SELECTION GUIDE

Part Number	
251753-001	5 mil thickness, recommended for optimum life expectancy when printing on single part forms.
251753-004	4 mil thickness recommended when printing on forms of 2 to 6 part.
251753-003	3 mil thickness recommended for optimum print quality when printing an original plus 5 carbons.

1.5 FORM MOVEMENT

The printer produces hard copy print on either single or multipart forms, and uses a pin feed sprocket method to move the forms. A phase controlled stepper motor, which is under microprocessor control, advances the form in either single or multiple line rates, and will initiate form movement as a result of manual control when the printer is off line, and automatically when data line instruction commands are received and the printer is on line. The data line instruction commands are coded format control signals which produce specific responses from the printer. Table 1-2 shows the control codes and the appropriate response.

TABLE 1-2. FORMAT CONTROL CODES

Code	Printer Response
Line Feed (LF)	The (012) ₈ code terminates the load cycle, initiates the print cycle, and then causes a single line forms advance.
Form Feed (FF)	The (014) ₈ code terminates the load cycle, initiates the print cycle, and causes the form to advance to the next Top of Form position.
Carriage Return (CR)	The (015) ₈ code terminates the load cycle, initiates the print cycle, and results in no forms advance.

Forms are loaded from the bottom of the printer and move up through the paper throat and across the print station and over two pin feed sprockets which provide the form drive. The forms are then guided to the form exit located at the rear of the printer. As the form moves through the paper throat, it passes over three solenoid clamps which provide vertical tension during the print mode. The tension is released upon receipt of a control code, thus allowing specific form movement in response to the particular code received. In addition to automatic form tension control, both form motion and low form supply are detected electronically, and appropriate action is initiated to notify the operator when these conditions exist.

Vertical format flexibility may be added to the printer by obtaining the optional vertical format unit (VFU). Two distinct types of VFU systems are available, a tape control unit (TCVFU) or the direct access unit (DAVFU). The tape control unit uses a 12 channel optical tape reader and allows the operator to change the format of a variety of form lengths. Data requirements are punched onto a paper tape, which is then inserted into the TCVFU optical reader. The coded information is then loaded into the printer memory, and provides the synchronization between form and vertical format unit.

The direct access VFU provides the same flexibility but instead of loading the printer memory from a tape, the DAVFU provides for direct loading from the control system by receipt of format data over the interface lines. Once the memory has been loaded, DAVFU data then provides form movement instructions and performs operations identical to the tape controlled unit.

The following form data shown in table 1-3 is recommended to assure acceptable print quality and reliable forms movement in the printer. Various other forms construction is possible but should be tested by the user to assure adequate printer performance.

The values, shown in grams per square meter (pounds), represent maximum paper weights. Lower weight forms may be used in all cases as long as the paper weight is above 56 gsm (15 lb) for any individual paper sheet.

Form location number 1 represents the side of the form closest to the operator.

TABLE 1-3. PRINTABLE FORMS
BOND PAPER WITH CARBON
SINGLE SHOT CARBON 19 G/M² (8 LB)

FORM LOCATION							THICKNESS	
FORM	1	2	3	4	5	6	MM	MILS
2 PT	56(15)	56(15)					.15	6
3 PT	56(15)	63(17)	56(15)				.23	9
4 PT	56(15)	63(17)	63(17)	56(15)			.33	13
5 PT	56(15)	63(17)	63(17)	63(17)	56(15)		.40	15
6 PT	56(15)	63(17)	63(17)	63(17)	63(17)	56(15)	.50	20

Table 1-4 is presented as a guide for selecting forms to be used in the printer. Forms meeting the specifications should produce satisfactory printing results.

NOTE

Forms should be tested under the user's operating conditions to verify proper form handling and print-out legibility. Forms other than those listed herein may be used to fulfill the operating requirements provided that they do not increase the maintenance requirements of the printer.

TABLE 1-4. FORM REQUIREMENTS

Item	Specification
Type	Standard fanfolded, edge-punched. From single to six part.
Dimension	
Width	3 to 16 in. (7.62 to 40.64 cm) overall.
Length	<p>The basic machine accommodates an 11 in. (27.94 cm) fixed form length. A 12 in. (30.48 cm) fixed form length is available.</p> <p>A printer with the optional form length selector being used may accommodate a minimum form length of 3 in. (7.62 cm) and a maximum of 14 in. (35.56 cm).</p> <p>A printer with the optional tape controlled vertical format unit or the direct access vertical format unit being used may accommodate forms up to a maximum of 144 lines.</p>

TABLE 1-4. FORM REQUIREMENTS (Contd)

Weight*	The minimum paper weight is 15 lb (56 gsm) bond. Thinner forms are subject to embossing and handling difficulties, and may cause reduced print life. The maximum form thickness is 0.020 in. Refer to PRINTABLE FORMS for recommended form weights.
Environmental	<p>Recommended storage of forms: Temperature of 16 °C (60 °F) and a relative humidity of 40% to 60%.</p> <p>*Paper weights are based on: bond = 17 inches x 22 inches x 500 sheets. or carbon = 20 inches x 30 inches x 500 sheets (gsm = grams per square meter)</p>

1.6 PRINT SYSTEM

The print system uses a series of friction-free electromagnetically controlled print hammers, with one hammer being used to produce two columns of print. When current is applied, an electromagnetic field is produced around the hammer which causes it to accelerate and strike the print surface. The start time of hammer travel is controlled by the printer's microprocessor, while the actual flight time is mechanically adjusted by changing the hammer travel distance with a backstop screw which provides damping of the return motion of the hammer.

With the combination of precise timing by the microprocessor and field adjustable hammer travel distance, print registration is optimized so that such print defects such as character tilt, ghosting, voids, and character clipping become minimal.

Poor character registration occurs when the character to be printed is not in the proper position with respect to the paper at the time of hammer fire. Reasons for this include paper movement at the print start time, print firing time of the wrong duration, or improper character band timing causing incorrect character position at time of fire.

Hammers that make impact at the wrong time can be caused by hammer flight times that are improperly controlled, or are out of adjustment.

1.7 INTERFACE REQUIREMENTS

The standard **printer** interface consists of seven data lines, status lines, one demand line and a strobe line. Data transfer between the user system and the printer follows a demand/response format.

The data transfer timing allows control of the ASCII bit-parallel data rate of 5×10^5 characters/second.

1.7.1 Interface Connections

Table 1-5 lists the standard interface signals and describes their functions.

TABLE 1-5. INTERFACE CONNECTIONS

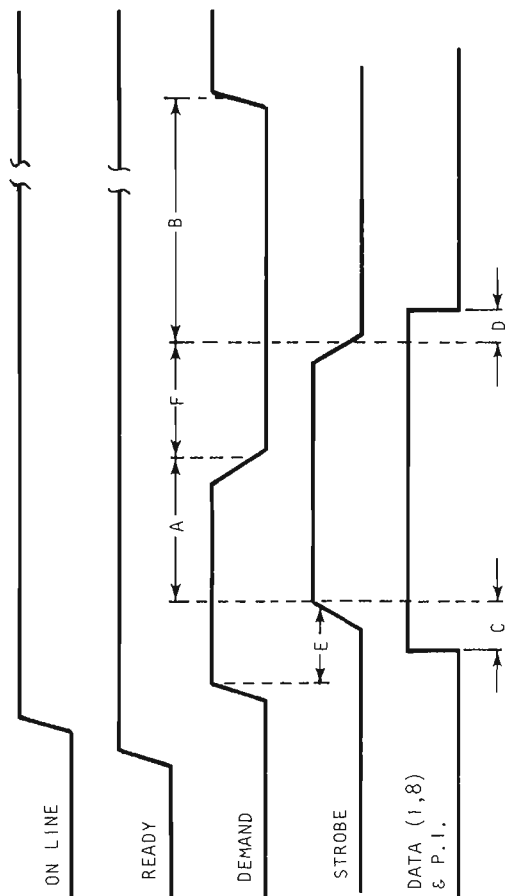
Signal	Definition	Std Signal Pin	Std Ground Pin	Option Signal	Option Ground
READY	A signal sent to the user system to indicate that no printer fault exists, paper is loaded, and the printer is capable of going to the ON-LINE condition.	22	6	CC	EE
ON LINE	This printer generated signal indicates that the print inhibit switch is OFF and the printer is ready to accept data.	21	5	Y	AA
DEMAND	A printer generated signal which synchronizes data transmission between the user system and the printer. The demand signal requests a character from the user system and remains active until DATA STROBE is received.	23	7	E	C
DATA STROBE	This signal line is controlled by the user system to define when the information on the data lines is to be accepted by the printer. Each time a Data Strobe occurs, the printer samples the data lines and the Data Demand line is made false while the character on the data lines is stored.	38	37	<u>j</u>	<u>M</u>

TABLE 1-5. INTERFACE CONNECTIONS (Contd)

Signal	Definition	Std Signal Pin	Std Ground Pin	Option Signal	Option Ground
DATA lines	Eight (8) user generated data lines which carry print data codes and format control codes. The data is transferred to the printer memory when the STROBE signal is high. An additional line is used if Parity data is sent along with the data code.				
DATA 1		19	3	B	D
DATA 2		20	4	F	J
DATA 3		1	2	L	N
DATA 4		41	40	R	T
DATA 5		34	18	V	X
DATA 6		43	42	Z	b
DATA 7		36	35	N	<u>K</u>
DATA 8		28	44	<u>U</u>	<u>W</u>
IDENT	These lines indicate to the user system the characteristic of the band installed in the printer. These lines are valid only if READY is active. Coding is as follows: IDENT "0" IDENT "1" BAND TYPE BAND 0 0 UNDEFINED 1 0 EDP 0 1 Utility 1 1 96 U/L Case				
IDENT "0"		50	32	<u>d</u>	<u>f</u>
IDENT "1"		49	16	<u>a</u>	<u>c</u>
INTER- FACE VERIFY	Two interface connector pins are jumpered together to allow the user to verify that the interface connector is plugged into the printer.	46 45		V <u>X</u>	

1.7.2 Interface Timing

Figure 1-2 is an interface timing diagram. Figures 1-3 and 1-4 show typical short line and long line interface circuits.

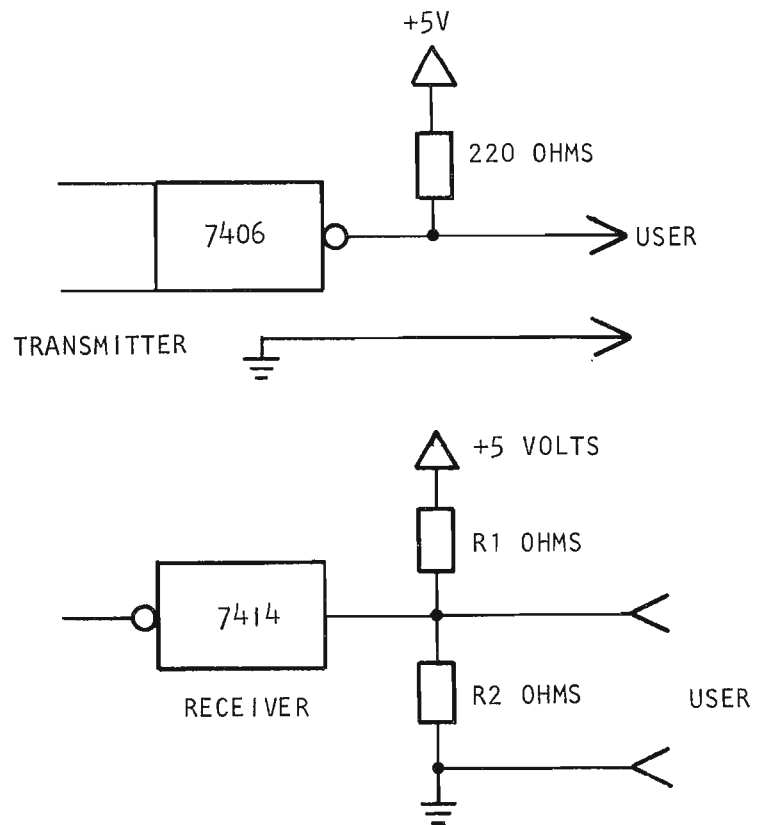


		MAX	MIN	
A	DEMAND REMOVED AFTER DATA STROBE	601 NS	351 NS	THIS IS THE TIME THE PRINTER WILL TAKE TO DROP THE DEMAND AFTER THE LEADING EDGE OF THE DATA STROBE
B	DEMAND PRESENT AFTER DATA STROBE REMOVED	926 NS	376 NS	THIS IS THE TIME THE PRINTER WILL TAKE TO RAISE THE NEXT DEMAND AFTER THE TRAILING EDGE OF THE PREVIOUS DATA STROBE
C	SETTLING TIME	N/A	50 NS	THIS IS THE MINIMUM DATA SETTling TIME THE USER MUST GUARANTEE PRIOR TO RAISING THE DATA STROBE
D	SETTLING TIME	N/A	50 NS	THIS IS THE MINIMUM DATA SETTling TIME THE USER MUST GUARANTEE AFTER REMOVING DATA STROBE
E	DATA STROBE PRESENT AFTER DEMAND PRESENT	300 NS	50 NS	THIS IS THE TIME RANGE THE USER MAY TAKE TO RAISE DATA STROBE FOLLOWING THE LEADING EDGE OF THE DEMAND, TO GUARANTEE THE MAXIMUM TRANSFER RATE.
F	DATA STROBE REMOVED AFTER DEMAND REMOVED	600 NS	50 NS	THIS IS THE TIME RANGE THE USER MAY TAKE TO REMOVE DATA STROBE FOLLOWING THE TRAILING EDGE OF THE DEMAND TO GUARANTEE THE MAXIMUM TRANSFER RATE.

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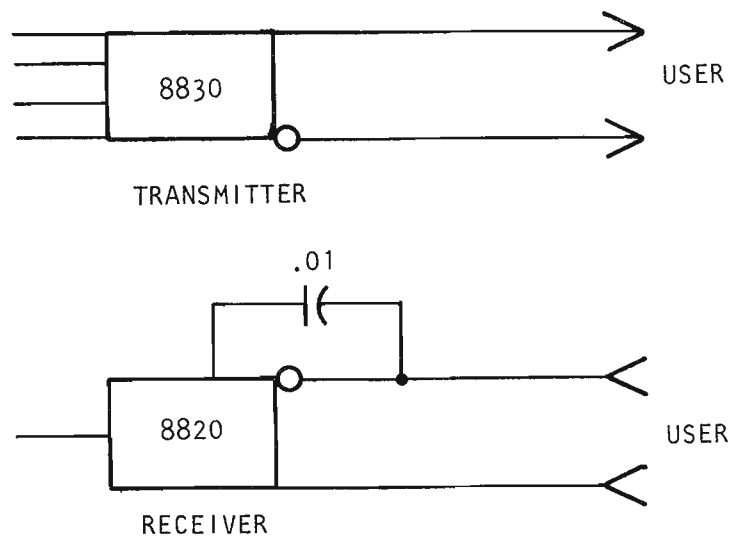
Figure 1-2. Interface Timing Diagram

NOTE: R1 AND R2 ARE
200 Ω MINIMUM TERMINATION
RESISTORS PROVIDED ONLY
UPON CUSTOMER REQUEST.
WHEN BOTH R₁ AND R₂
ARE INSTALLED, 470 Ω
IS THE OPTIMUM VALUE
OF EACH RESISTOR.



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Figure 1-3. Interface Circuit, Typical Short Line



245058A. 106

Figure 1-4. Interface Circuit, Typical Long Line (Optional)

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section contains the printer specification summary, preparation for use procedures, and installation procedures. In addition, a pictorial guide has been included which shows installation and removal procedures for the character band and ribbon cartridge, as well as paper loading and print registration adjustment procedures.

2.2 SPECIFICATIONS

Table 2-1 summarizes the printer specifications. Space requirements for proper operation of the printer are shown in figure 2-1.

TABLE 2-1. SPECIFICATION SUMMARY

Item	Specification	Remarks
Domestic Power Supply Input Voltage	90 to 132 VAC, 60 \pm 1 Hz, Single phase	Selection of low or high voltage and 50 or 60 Hz is made by plug connections on the power supply assembly (see figure 2-2).
Universal Power Supply Input Voltage	90 to 132 VAC, 50/60 \pm 2 Hz low range. Single phase 180 to 250 VAC, 50/60 \pm 2 Hz, high range. Single phase	
Temperature: Operating	10°C to 30°C (50°F to 86°F)	
Storage	-10°C to 50°C (14°F to 122°F)	
Transit	-40°C to 71°C (-40°F to 160°F)	

TABLE 2-1. SPECIFICATION SUMMARY (Contd)

Item	Specification	Remarks
Humidity:		
Operating	20% to 80% relative humidity	Humidity non-condensing
Storage	10% to 90% relative humidity	10% per hour rate of change
Transit	95% max relative humidity	10% per hour rate of change
Printer Dimensions:		
Weight	63 Kg (138 lbs)	Cover Closed Cover open
Weight (shipping)	80 Kg (176 lbs)	
Height	378 mm (14.9 in) 747.53 mm (29.43 in)	
Width	770 mm (30.3 in)	
Depth	640 mm (25.2 in)	
Printer on Pedestal:		
Weight	77 Kg (170 lbs)	Cover Closed Cover Open
Height	1111 mm (43.74 in) 1480 mm (58.26 in)	
Width	770 mm (30.3 in)	
Depth	853 mm (35.58 in)	With paper rack
Print Characteristics		
Band Speed (standard font)	4191 mm (165 in) per second	Optional config.
Printable Columns	132 max	
Horizontal characters per inch	10 characters/25.4 mm (1 in) 15 characters/25.4 mm (1 in)	
Method	Impact	

TABLE 2-1. SPECIFICATION SUMMARY (Contd)

Item	Specification	Remarks
Hammer Bank	66 Mark V double column spacing hammers (16 four-hammer modules and 1 two-hammer module)	
Paper Feed Step	40 milliseconds max	Single line advance
Slew	381 mm (15 inches) per second	Following the receipt of a control character that causes two or more lines to be slewed
Format Control	LF, FF, CR, 11 in. standard form, TC/DAVFU, FLS, or fixed 12 in. form optional	
Interfaces	15 meters (49 feet) 150 meters (492 feet)	Short line Long line
Power Consumption	Standby Printing	
Standard Supply	200 watts max 250 watts max	
Universal Supply	250 watts max 350 watts max	
Standard Controls	5	See Section III
Optional Controls	Determined by configuration	
Indicators	4	See Section III
Circuit Breaker		
Standard config.	1	See Table 7-3
Optional config.	2	See Table 7-3
Protective Devices		
Interlock Switches	3	See Section III
Fuses	5	See Table 7-3
Power Cord Length	4 meters (13.1 ft.)	

2.3 PREPARATION FOR USE

The following procedures are included in this section to assist personnel in preparing the printer for use. The applicable paragraphs should be referenced when performing any of these procedures.

- a. Printer Installation (Paragraph 2.3.1)
- b. Pre-operating visual inspection (Paragraph 2.3.2)
- c. Power Connection (Paragraph 2.3.3)
- d. Power Up Procedure (Paragraph 2.3.4)
- e. Paper Loading (Paragraph 2.3.6)
- f. Registration Adjustments (Paragraph 2.3.7)
- g. Ribbon Cartridge Installation/Removal (Paragraph 2.3.8)
- h. Character Band Installation/Removal (Paragraph 2.3.9)
- i. Repacking (Paragraph 2.3.10)

2.3.1 Printer Installation

The printer may be secured to any flat mounting surface which is capable of supporting its weight. It may also be mounted on the optional pedestal when space requirements dictate a floor mount.

The procedure for securing the printer to the pedestal is outlined in Paragraph a, and the procedure for securing the printer to other mounting surfaces is outlined in Paragraph b.

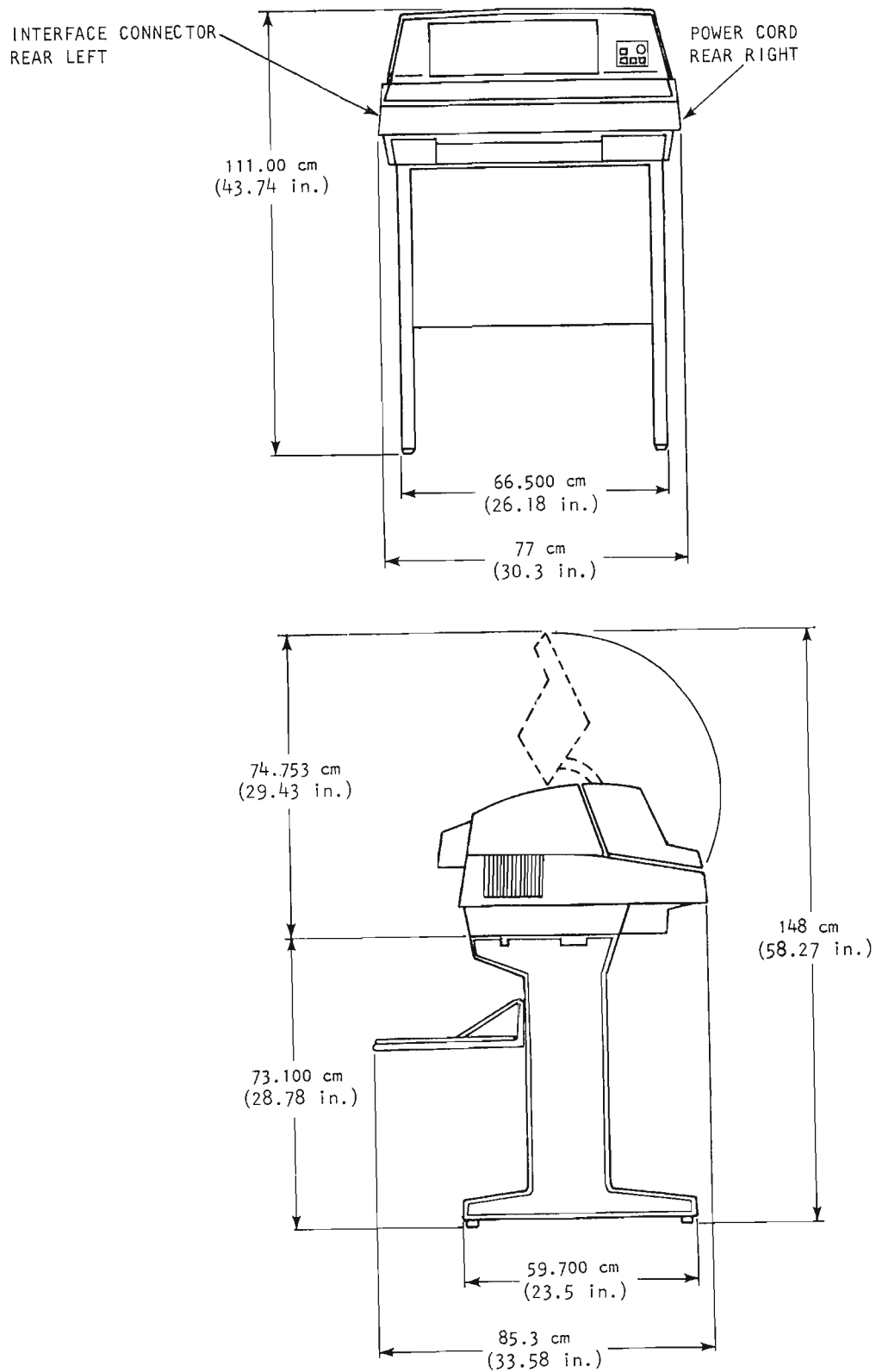
Space requirements for proper operation of the printer are shown in figure 2-1.

a. Mounting Printer to Pedestal

WARNING

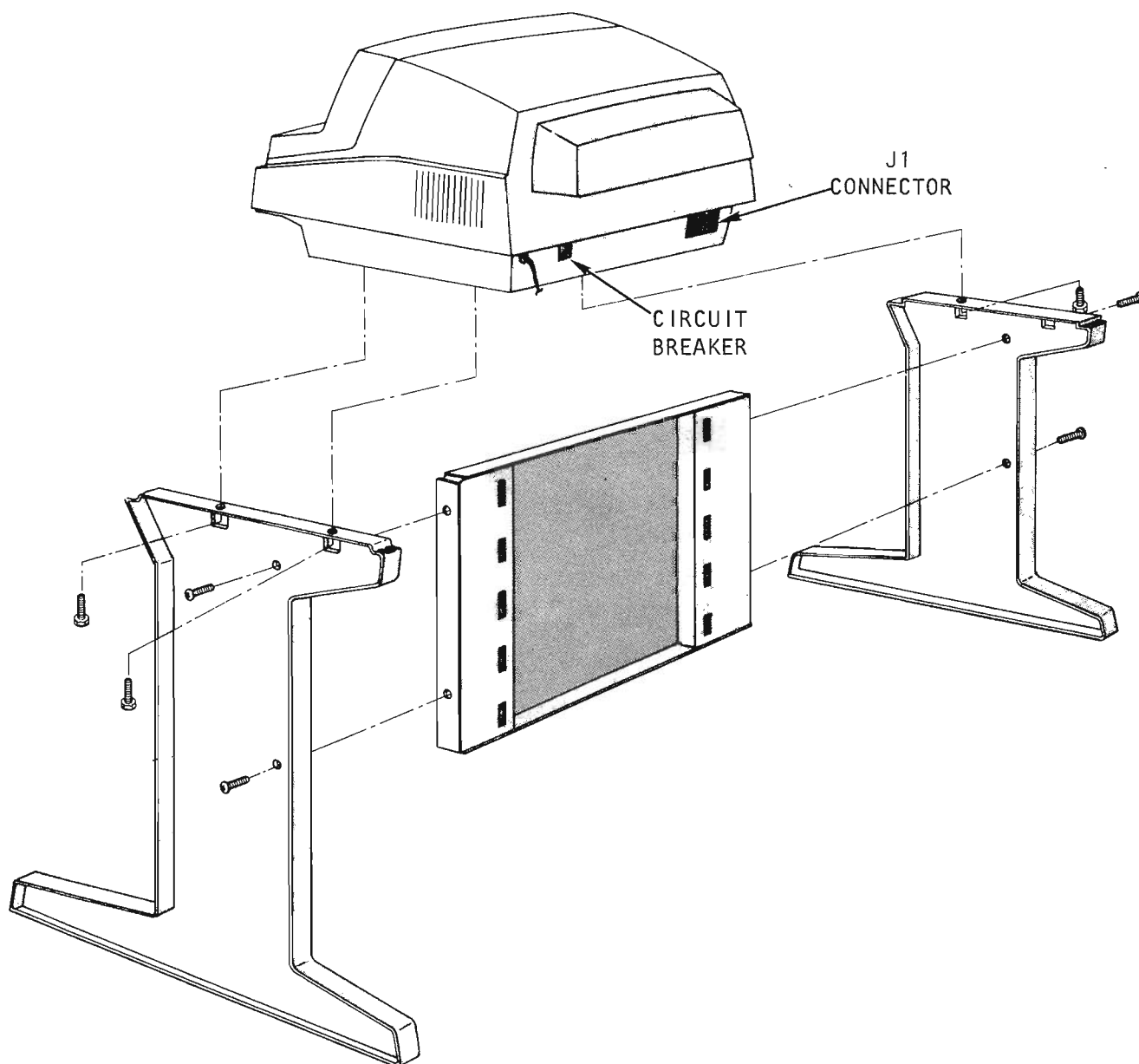
Two or more persons may be required to lift the printer onto the mounting surface because of its weight of 63 Kg (138 lbs).

- 1. Assemble and secure the pedestal with four Allen head bolts, using a 5mm Allen wrench (refer to figure 2-2).
- 2. Position the printer onto the pedestal and secure with three 6mm retaining bolts, using a 10mm open end wrench (refer to figure 2-2).



245058A.202

Figure 2-1. Printer Dimensional Drawing



245058A. 201

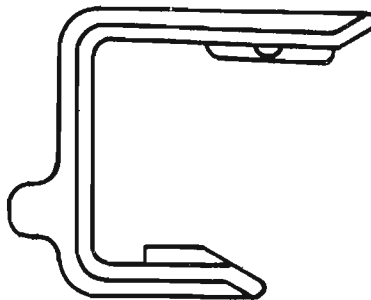
Figure 2-2. Printer Pedestal (Optional) Installation Drawing

b. Mounting Printer to Table

If the printer is to be secured to a base other than the manufacturer's recommended pedestal, it is advised that the unit be bolted to the surface and that a section be removed from the mounting surface to allow paper to move freely through the print station.

2.3.2 Pre-Operating Visual Inspection

- a. Locate the two 5 mm hex-head retaining screws under the front of the printer base. Use an 8 mm wrench and remove. Ensure that the printer cover is open to allow it to clear the control panel.
- b. Remove the printer cover by lifting the front edge and pushing back, taking care to clear the paper exit tray.
- c. Inspect for any damage and/or loose connections.
- d. Remove the pulley retainers (see figure 2-3). and verify free counterclockwise movement by turning each character band drive pulley
- e. Using the vertical paper adjust knob (see table 3-2), advance the paper sprockets and verify freedom of movement.
- f. Using the hammer bank latch lever (see table 3-2), check for smooth opening and closing of hammer bank.



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Figure 2-3. Pulley Retainer Drawing

2.3.3 Power/Interface Connection

Ensure that the supply voltage and frequency labeled on the rear of the printer correspond to the available power at the site.

The printer has been provided with a 4-meter power cord, and a standard three prong plug for connection to a polarized 115 VAC outlet.

If the printer has been supplied with the optional universal power supply, no connector is provided.

CAUTION

Severe damage will occur if the printer is operated with incorrect power supply voltage and frequency.

For the Universal power supply option, ensure that the power supply transformer connections for appropriate inputs are as shown in table 2-2 below.

TABLE 2-2. UNIVERSAL TRANSFORMER PLUG/JACK CONNECTIONS

INPUT VOLTAGE VAC	INPUT FREQUENCY ± 2Hz	TRANSFORMER PLUGS*		
		P4	P5	P9
90-132	50 Hz	J4A	J5A	J9A
180-250	50 Hz	J4B	J5A	J9A
90-132	60 Hz	J4A	J5B	J9B
180-250	60 Hz	J4B	J5B	J9B

* P4 connects to J4A or J4B on the Universal Rectifier Board. P5 connects to J5A or J5B on the Universal Rectifier Board. P9 connects J9A or J9B on the Resonant Capacitor.

- a. Replace the printer cover.
- b. Ensure that the power switch is set to the OFF position.
- c. Connect the power cable to the primary power source.

- d. Ensure that the user system connector is the same as that supplied with the printer and connect it to the J1 data receptacle mounted on the right side of the rear panel of the printer (see figure 2-2).

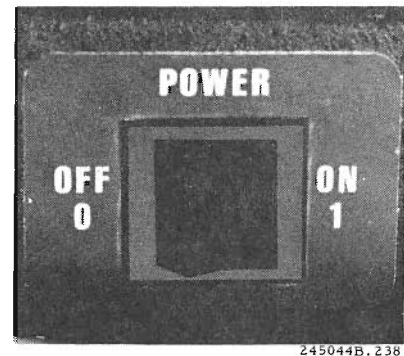
NOTE

The printer has been supplied with either the standard AMP connector or, at the customer's request, the optional Winchester connector. Pin assignments for these connectors are found in table 1-5.

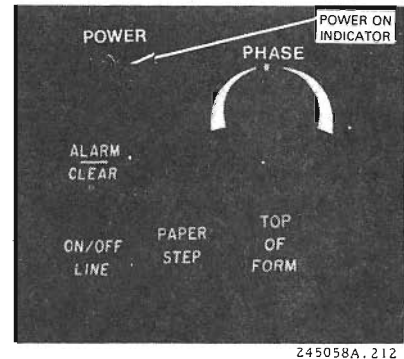
2.3.4 Power Up

The power up procedure assumes that the printer is properly loaded with paper, the ribbon and character band are properly installed, the TEST switch is in the OFF position, and all doors and latches are closed. See paragraph 2.3.6 for the paper loading procedure, paragraph 2.3.8 for the ribbon replacement procedure, and paragraph 2.3.9 for the character band change procedure.

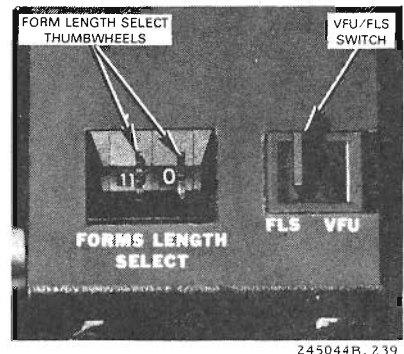
- a. Place the power switch to ON.



- b. Ensure that the power on indicator is illuminated. Allow three seconds for the ALARM/CLEAR indicator to extinguish. If it does not extinguish, refer to the STATUS indicator and correct the error, if possible (see tables 7-1 and 7-2).

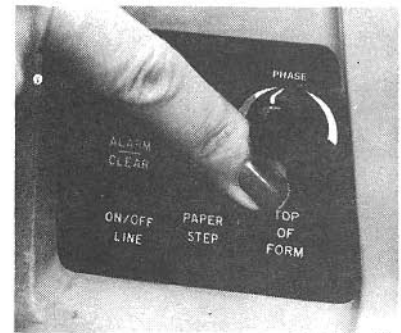


- c. If the printer is equipped with the optional forms length indicator (FLS) and also equipped with either the optional tape controlled vertical format unit (TCVFU) or the direct access vertical format unit (DAVFU), open the cover door and ensure that the VFU/FLS switch is set to the desired position.



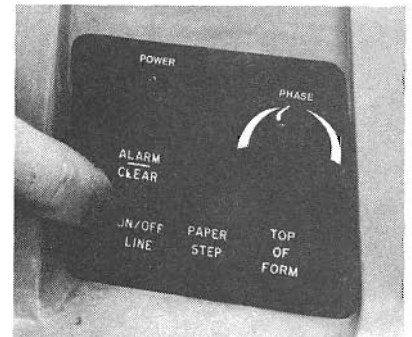
- d. If the FLS option is to be used, open the cover door and ensure that the FORMS LENGTH SELECT thumbwheels are set to the appropriate form length.

e. Momentarily press the TOP OF FORM switch.



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f. Press the ON/OFF LINE switch and verify that the ON/OFF LINE indicator is illuminated.



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2.3.5 Shut Down

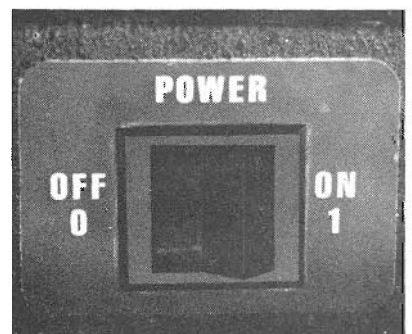
Prior to machine shut down, the operator should observe the status of the ON/OFF line switch/indicator. If the indicator is on, press the ON/OFF LINE switch. If the indicator remains on, this indicates that unprinted data resides in the printer memory. If it is desired to immediately continue with shut down disregarding this data, place the power switch to OFF.

a. If the ON/OFF LINE indicator is on, press the ON/OFF LINE switch.



245058A.214

b. Place the power switch to off and ensure that the power indicator is extinguished.

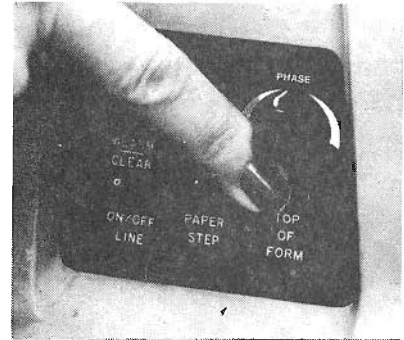


245044B.266

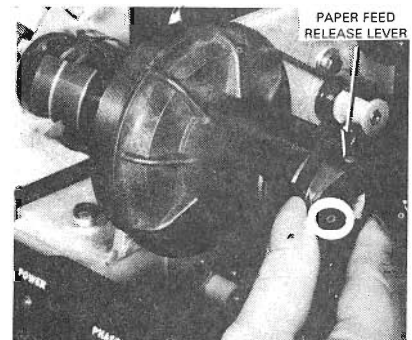
2.3.6 Paper Loading

This procedure assumes that the ribbon cartridge and the character band are properly installed.

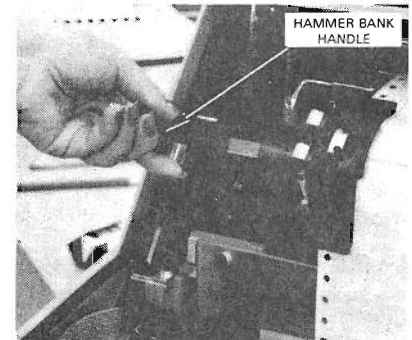
a. If the printer is powered up, raise the printer cover, then press the TOP OF FORM switch.



b. Place the paper feed release lever to the adjust position so that the red numeral ZERO is visible.

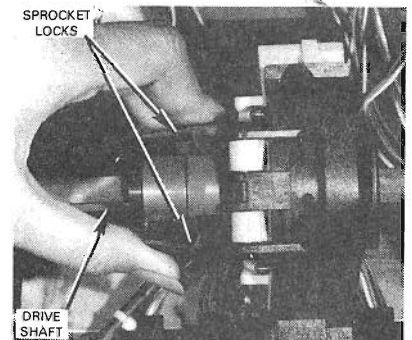


c. Open the hammer bank by lifting up the hammer bank handle which releases the hammer bank latch.

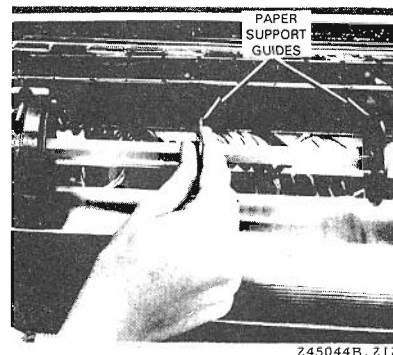


CAUTION
Rotating parts. Keep clear until character band stops.

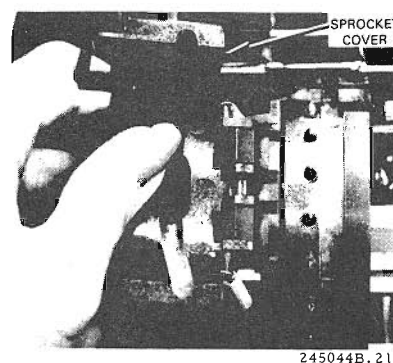
d. Position the sprockets to the approximate form's width by squeezing the sprocket locks and sliding the sprockets along the drive shaft.



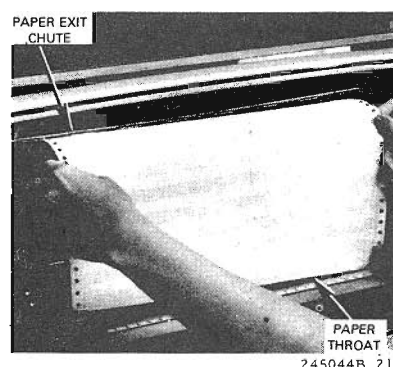
e. Ensure that the paper support guides on the sprocket drive shaft are spaced equally between the sprockets.



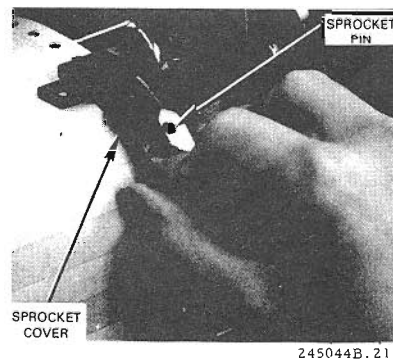
f. Swing open both sprocket covers. (One shown.)



g. Slide the paper up through the paper throat, over the sprocket pins, and into the paper exit chute.



h. Align the form feed holes over the right side sprocket pins and close the right side sprocket cover.



i. While squeezing the right sprocket lock, slide the right sprocket to align the form feed holes to the left sprocket pins and close the left sprocket cover.

NOTE

Ensure that the form is not skewed on the sprockets.

j. To achieve horizontal positioning, proceed as follows:

Simultaneously, squeeze both sprocket locks and then slide the form to the left or right until the first print column is in the desired position, being careful not to over-tension the form.

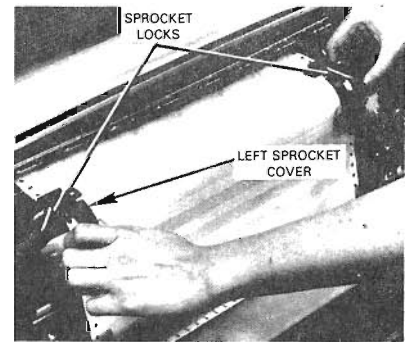
NOTE

Over-tension is indicated by elongation of the form feed holes.

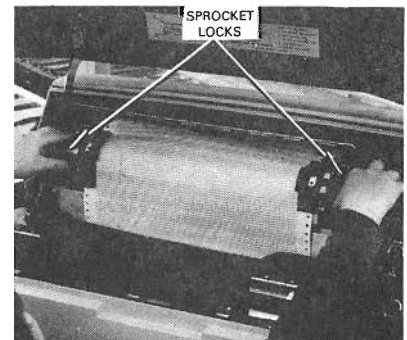
k. To achieve vertical positioning, proceed as follows:

Rotate the paper adjust knob to line up the desired paper print line with the applicable hammer bank scale line.

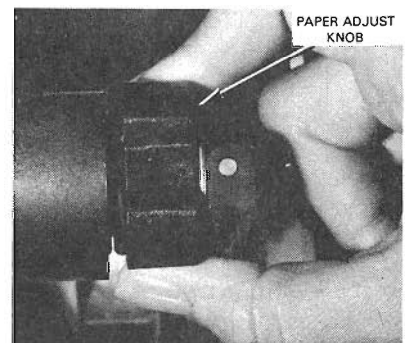
l. The top of form index markings indicate where the paper perforation should be positioned in order to allow the first line of print to appear on any one of ten lines following the paper perforation. In the example shown, the first line of print will appear 6 lines after the perforation.



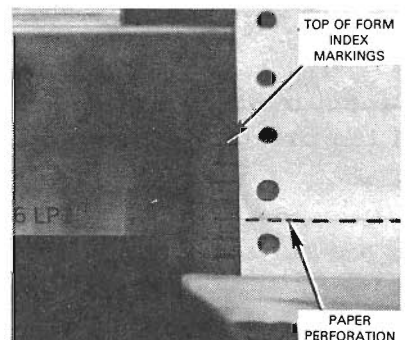
245044B. 216



245044B. 242



245044B. 244



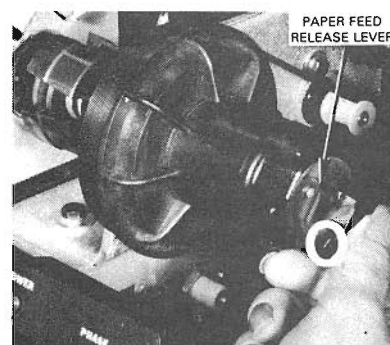
245044B. 245

m. Lower the hammer bank handle and ensure that it is in the locked position.



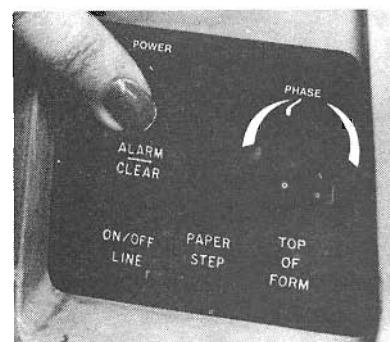
245044B. 246

n. Place the paper feed release lever at the run position so that the green numeral ONE is visible; then close the printer cover.



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o. Press the ALARM/CLEAR switch and ensure that the ALARM/CLEAR indicator is extinguished.

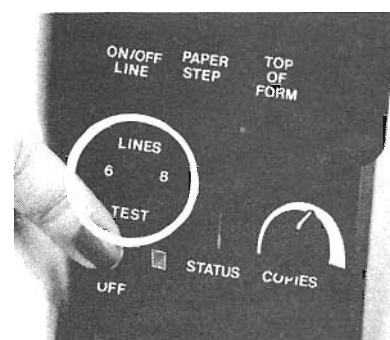


245044B. 211

2.3.7 Registration Adjustments

This procedure assumes that the printer is properly loaded with paper, ribbon, and character band and that all interlocks are closed. If the printer is powered up, proceed as follows:

a. Open the printer cover and select either 6 or 8 lines.




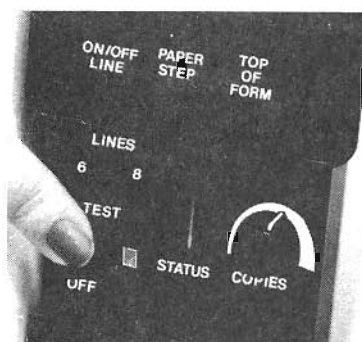
245058A. 212

b. Momentarily press the TOP OF FORM switch. The form should slew to the top position of the next form with no tearing or wrinkling.



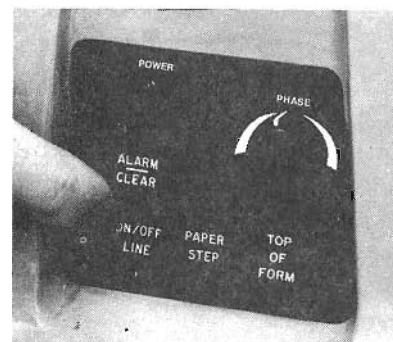
245058A.221

c. Position the TEST switch to the sliding pattern. 



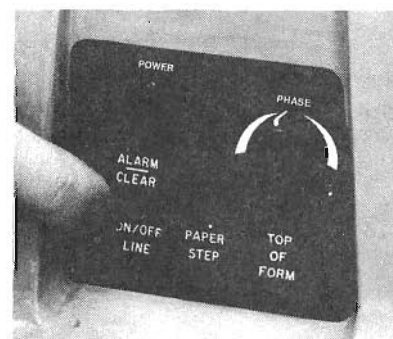
245058A.212

d. Press the ON/OFF LINE switch, and allow a sufficient number of lines to be printed to determine vertical and horizontal registration.




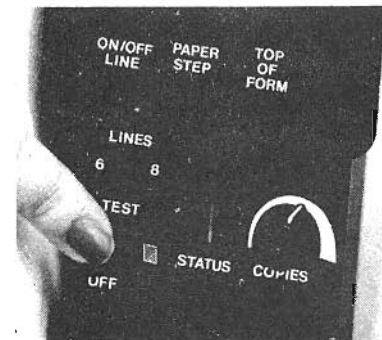
245058A.214

e. Press the ON/OFF LINE switch to halt the print cycle, then ensure that all letters and symbols are legible and that all columns have been printed.



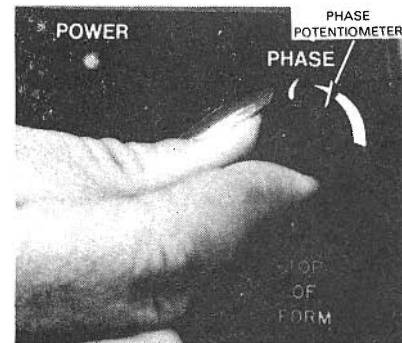
245058A.214

f. Set the TEST switch to the fixed character pattern ; then press the ON/OFF LINE switch to start the print cycle.



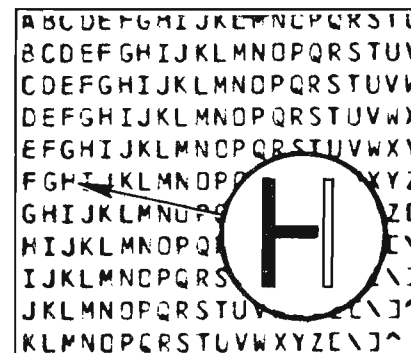
245058A. 212

g. Adjust the PHASE potentiometer for proper registration of the entire character being printed. Clockwise movement will cause increased density to the right side of the character.



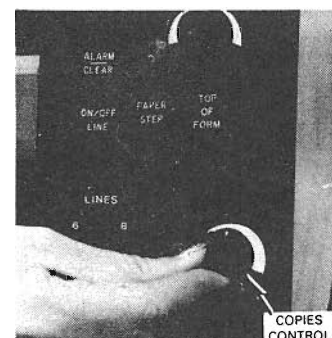
245058A. 223

h. If the character being printed is the H, ensure that both left and right sides have equal density and that the center bar meets both sides. (In the adjacent figure, a phasing adjustment is required.)



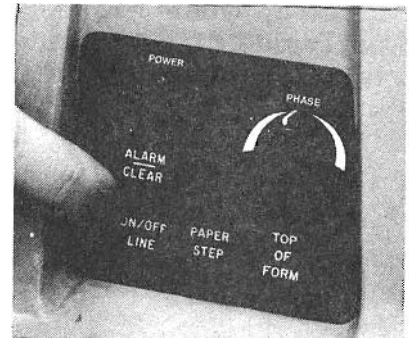
245044B. 245

j. Adjusting the copies control varies the striking force of the hammers. Set this control to the lowest setting that allows the best print quality for the number of forms being printed.



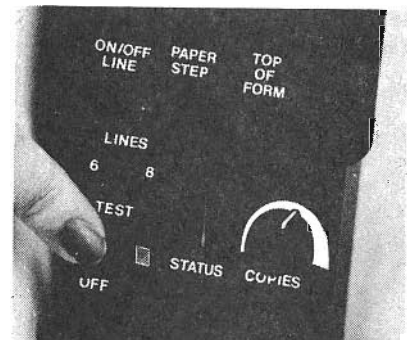
245058A. 301/2

k. Momentarily press the ON/OFF LINE switch to stop the print cycle.



245058A.214

1. Set the TEST switch to the center or OFF position, and close the printer cover.

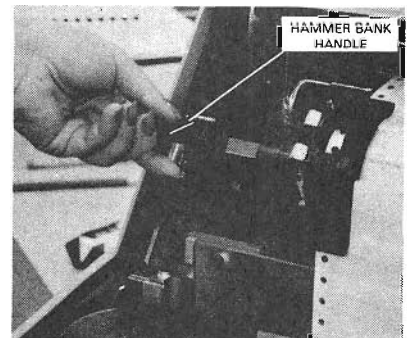


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2.3.8 Ribbon Installation/Removal

Installation

a. Ensure that the printer is off line, then raise the printer cover and disengage the hammer bank latch by lifting up the hammer bank handle.

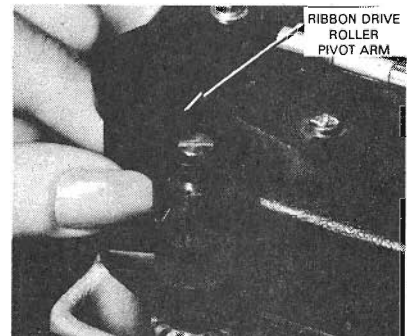


245044B.240

CAUTION
Rotating parts, keep clear
until character band stops.

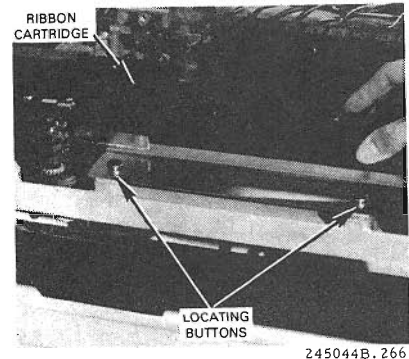
b. Install the ribbon cartridge
as follows:

1. Open the ribbon drive roller
pivot arm.

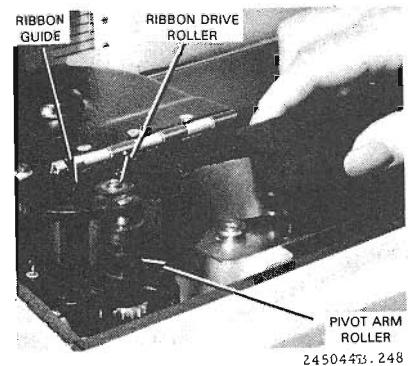


245044B.247

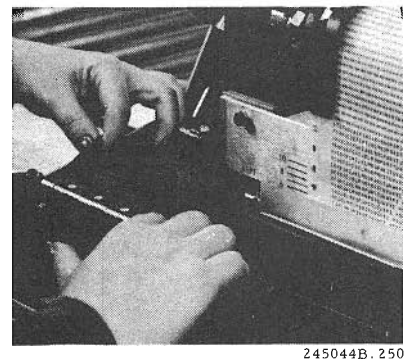
2. Remove the ribbon cartridge from its packaging (retain the towelette to clean up when finished). Ensure that the ribbon cartridge drive roller indentation is facing to the left, and place the cartridge over the two locating buttons.



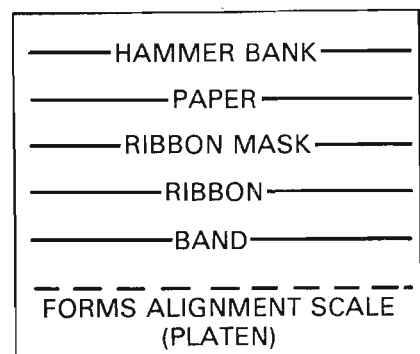
3. Thread the ribbon between the pivot arm roller and the ribbon drive roller and around the first ribbon guide.



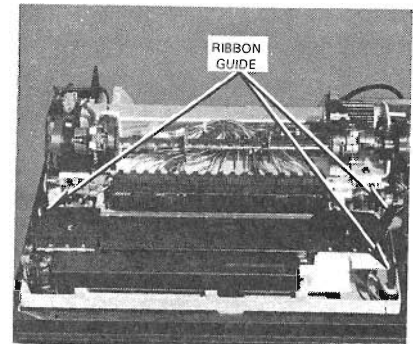
4. Tension the ribbon very lightly and slide the ribbon cartridge to the left until it locks into place.



5. When installing the ribbon, ensure that it is positioned as indicated in relation to the hammer bank, paper, ribbon mask, band, and forms alignment scale.

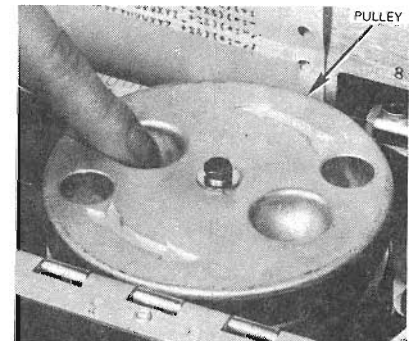


6. Close the ribbon drive roller pivot arm and thread the ribbon around the second, third, and fourth ribbon guides.



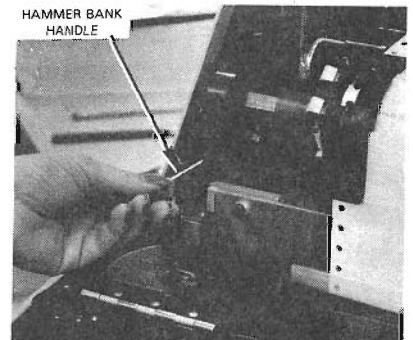
245044B. 229

7. Spin either pulley by hand in a counterclockwise direction for several revolutions until all of the ribbon slack has been taken up.



245044B. 251

8. Lower the hammer bank handle and ensure that it is in the locked position; then close the printer cover.

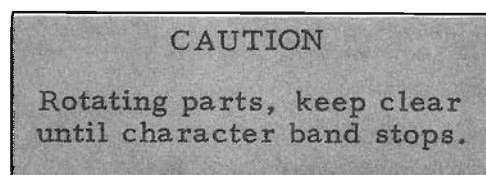


245044B. 246

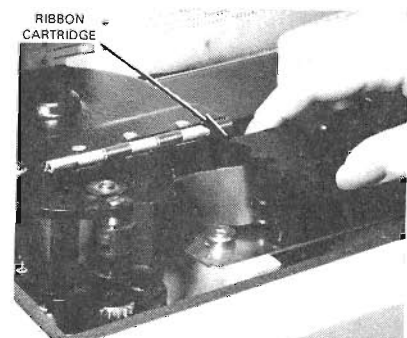
Removal

a. If it is desired to remove the ribbon cartridge (previously installed) in the printer, proceed as follows:

1. Ensure that the printer is off line, then raise the printer cover and disengage the hammer bank latch by lifting up the hammer bank handle. (Refer to paragraph 2.3.8, step a.) Then open the ribbon drive roller pivot arm.

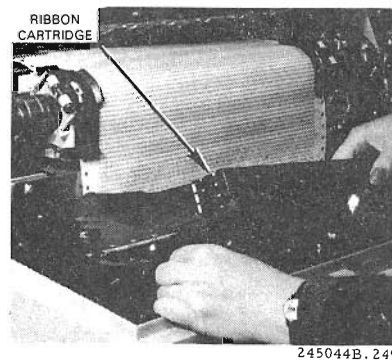


2. Grasp the ribbon cartridge and slide it approximately 4 centimeters (1-1/2 inches) to the right.



245044B. 248

3. Remove the ribbon cartridge from the printer.



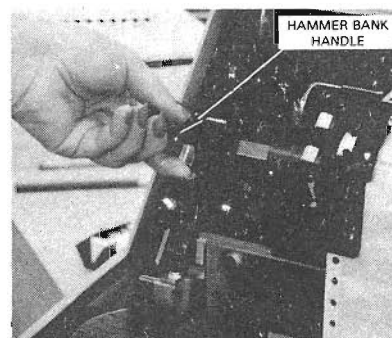
245044B.249

2.3.9 Character Band Installation/Removal

Installation

This procedure assumes that the ribbon cartridge has not yet been installed. If it is installed, remove it as outlined in paragraph 2.3.8 and proceed as follows:

a. Ensure that the printer is off line, then raise the printer cover and disengage the hammer bank latch by lifting up the hammer bank handle.

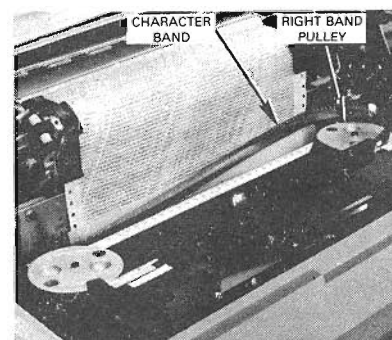


245044B.240

CAUTION

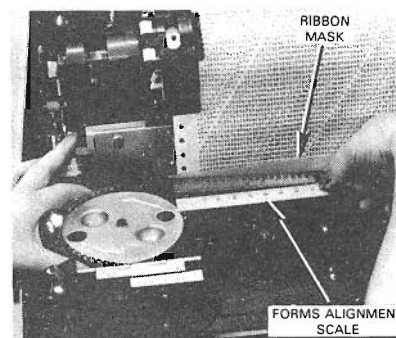
Rotating parts, keep clear until character band stops.

b. With the print characters facing up, place the band in position, allowing the band to rest on the top of the right band pulley.



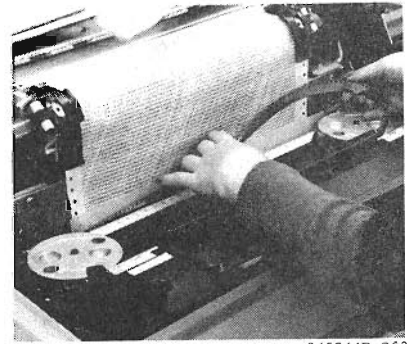
245044B.255

c. Place the band around the left band pulley and carefully insert it between the ribbon mask and the forms alignment scale.



245044B.256

d. While holding the band in position, slide it over the right band pulley, ensuring that it is positioned between the band sensor and the pulley.

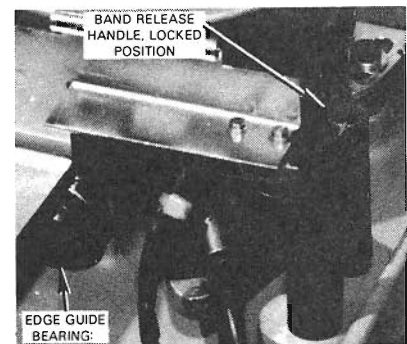


245044B. 253

e. Move the band down the pulley until the bottom edge of the band rests on the edge guide bearing; then move the band release handle to the locked position as shown.

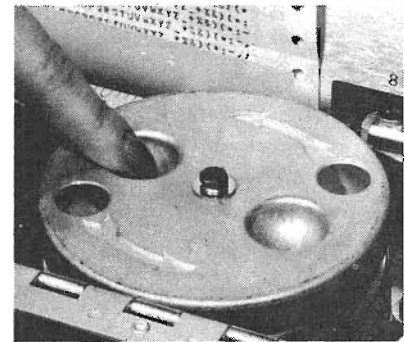
NOTE

When the band is correctly seated, the bottom edge will rest on the edge guide bearing.



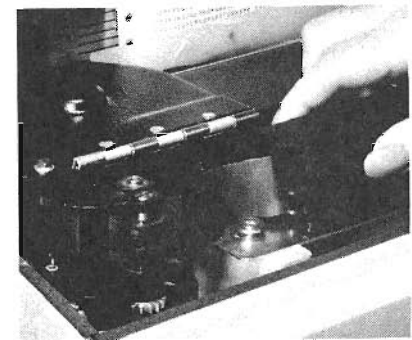
245044B. 257

f. Spin either pulley by hand in a counterclockwise direction for several revolutions until the band is seated correctly on the edge guide bearings.



245044B. 251

g. Install the ribbon cartridge on the printer. (See paragraph 2.3.8.)



245044B. 248

h. Close the band cover, then lower the hammer bank handle and ensure that it is in the locked position; then close the printer cover.

Removal

a. If it is desired to remove the character band (previously installed) in the printer, proceed as follows:

b. Ensure that the printer is off line, then raise the printer cover and disengage the hammer bank latch by lifting up the hammer bank handle. (Refer to paragraph 2.3.9, step a.)

CAUTION

Rotating parts. Keep clear until character band stops.

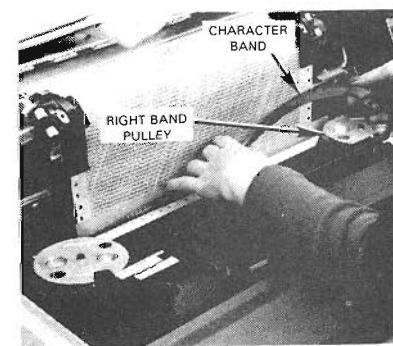
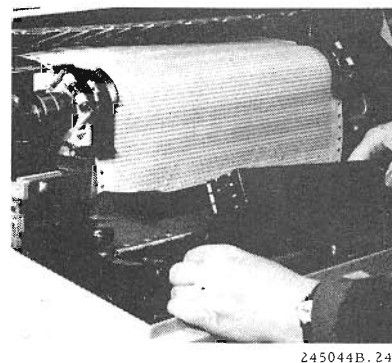
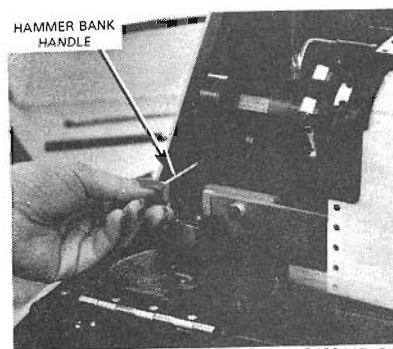
c. Remove the ribbon cartridge from the printer. (See paragraph 2.3.8.)

d. Open the band cover and remove band tension by moving the band release handle forward, toward the paper.

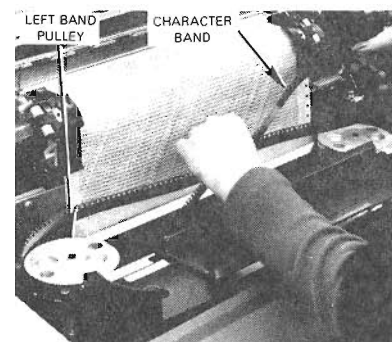
CAUTION

Do not bend the character band to a radius of less than that of the band pulleys when removing or during storage.

e. While holding the band with the left hand, carefully lift the band from the right band pulley.



f. Squeeze the band together at the center, carefully lifting it off the left band pulley, and remove it from the printer.



245044B. 254

2.3.10 Repacking

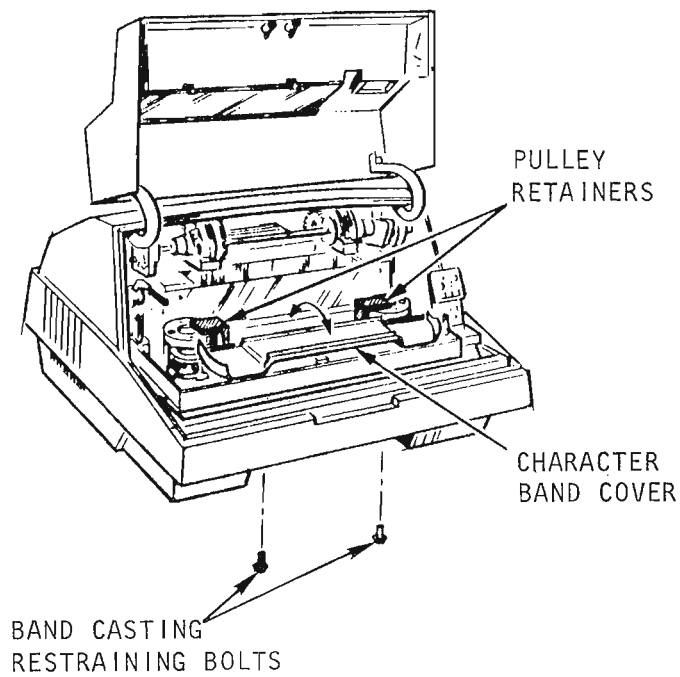
In the event that your printer is to be reshipped, careful packaging will minimize the possibility of machine damage.

- a. Remove all paper from the printer and disconnect the line cord and the input/output signal connector.

NOTE

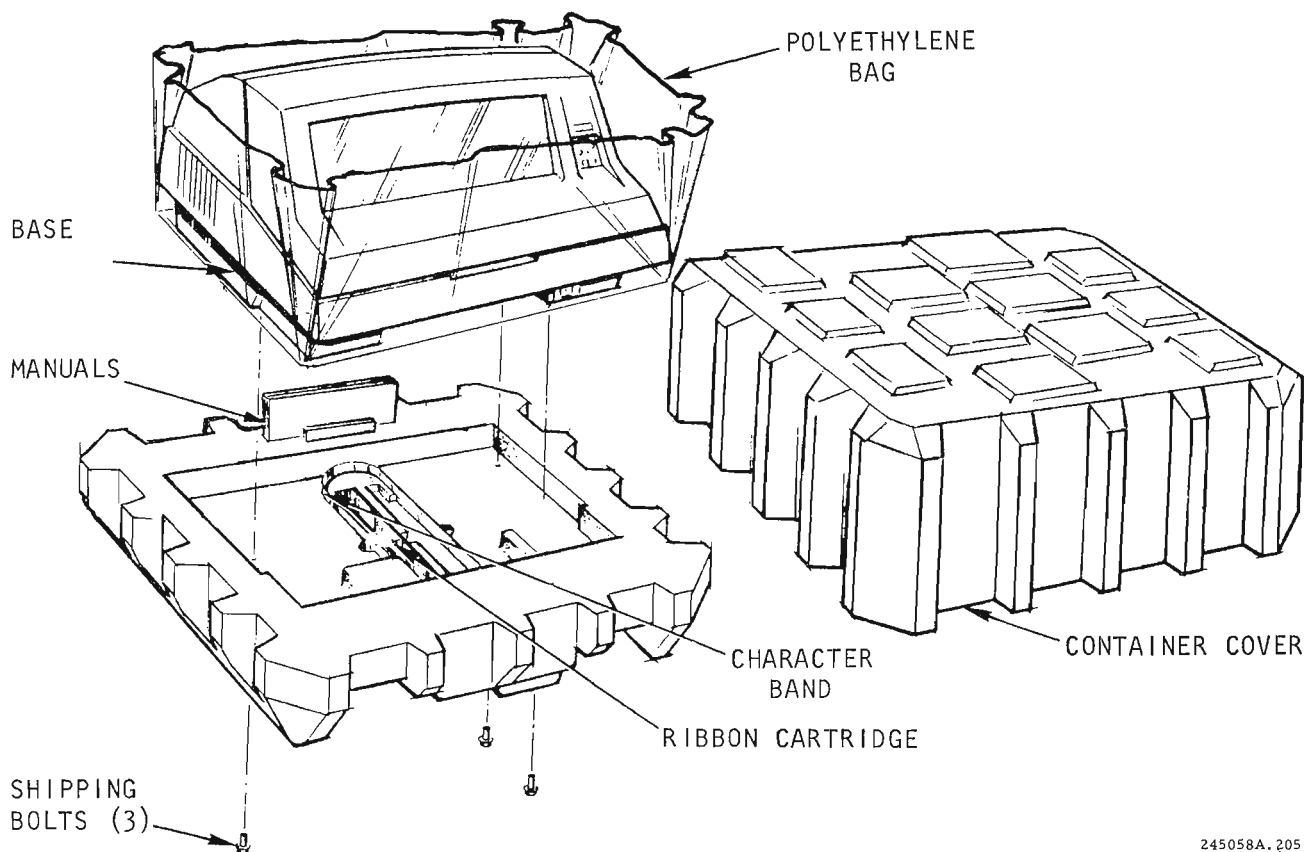
The user should consider the feasibility of shipping the printer with the ribbon cartridge and the character band installed. The manufacturer has provided shipping pockets for these items in the bottom of the pallet base.

- b. Install the two band casting restraining bolts as shown in figure 2-4.
- c. Install the two pulley retainers as shown in figure 2-4.
- d. Close the band cover as shown in figure 2-4 and ensure that the hammer bank is closed and locked.
- e. Place the printer inside the polyethylene bag (see figure 2-5).
- f. Place the printer inside the pallet base and secure it with the three shipping bolts (see figure 2-5).
- g. Place the container cover over the pallet base and secure it with filament tape or its equivalent.



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Figure 2-4. Packaging Printer for Reshipment



245058A, 205

Figure 2-5. Printer and Packing Materials

SECTION III

CONTROLS AND INDICATORS

3-1 INTRODUCTION

This section contains a description of the printer electronic controls and indicators listed alphabetically in table 3-1, and the mechanical controls listed alphabetically in table 3-2. Figures 3-1A and 3-1B show the locations of the various controls on the printer.

TABLE 3-1. PRINTER CONTROLS AND INDICATORS

Item	Description	Figure No.	Item No. Index
ALARM/CLEAR Switch Indicator	This switch/indicator illuminates on the occurrence of a fault condition. The specific ALARM condition is identified by the diagnostic display. Momentarily pressing the ALARM/CLEAR switch master-clears the printer logic.	3-1A	4
Character Band Cover Interlock	This switch senses when the character band cover is closed. If the cover is open, the switch will inhibit printer operation and the appropriate indication will be displayed on the STATUS indicator.	3-1A	1
COPIES Control Potentiometer	This control is a potentiometer which varies hammer energy to optimize print quality. When printing on forms of various thicknesses, the lowest setting which provides acceptable print quality should be used.	3-1A	8
Hammer Bank Interlock Switch	This switch senses when the hammer bank is latched. If the hammer bank is not properly latched, the appropriate indication will be displayed on the STATUS indicator.	3-1A 3-1B	2

TABLE 3-1. PRINTER CONTROLS AND INDICATORS (Contd)

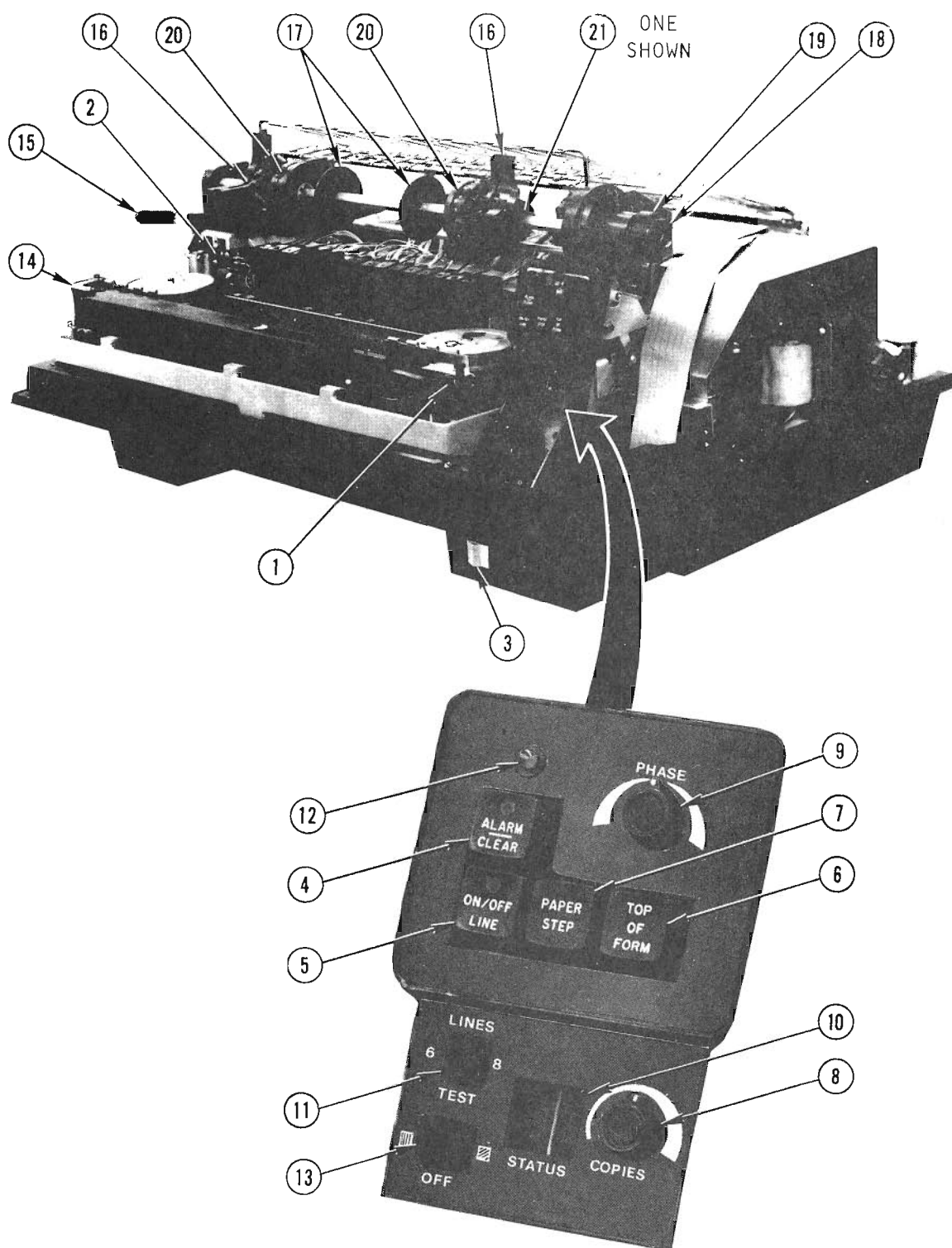
Item	Description	Figure No.	Item No. Index
6/8 LPI (Lines per inch) Switch	This is a two-position switch which allows the operator to select either six (6) or eight (8) lines per inch vertical spacing.	3-1A	11
ON/OFF LINE Switch Indicator	This switch/indicator is illuminated when the printer is in the ready condition and the ON/OFF LINE switch has been actuated. The interface is active only in the ON LINE condition. Momentarily pressing the switch will alternately place the printer on line and off line.	3-1A	5
Paper Low Interlock Switch	This switch detects when the paper is present in the printer throat.	Not Shown	
PAPER STEP Switch	This is a momentary switch that can be used to advance the form one line if the printer is in an OFF LINE condition. This switch is disabled during tape loading of the optional VFU or when the ON LINE indicator is illuminated	3-1A	7
PHASE Control Potentiometer	Phase control is used to maintain equal printing density on the left and right side of the characters.	3-1A	9
POWER SWITCH	This switch allows AC line voltage to be applied to the internal printer electronics.	3-1A	3
POWER-ON Indicator	This indicator is illuminated when primary power is on.	3-1A	12
PRINT INHIBIT Switch	This switch, located on the Timing and Status Board, prevents the hammers from firing when the printer is in a maintenance mode.	3-1B	22
STATUS Indicator	This indicator is comprised of digital readouts which indicate printer status. See Table 7-1 and 7-2 for definitions of the various readouts.	3-1A	10

TABLE 3-1. PRINTER CONTROLS AND INDICATORS (Contd)

Item	Description	Figure No.	Item No. Index
TEST/OFF Switch	This is a three position switch which provides a means for exercising the printer off line when in the Self Test mode. The operator can select one position for a 132 column sliding character pattern, or the other position for a single character fixed pattern, followed by a single line feed. The third position is OFF.	3-1A	13
TOP-OF-FORM Switch	This is a momentary switch that can be used to advance the form to the next TOP-OF-FORM position (TOF), if the printer is in the OFF LINE mode. This switch is disabled during tape loading of the optional VFU.	3-1A	6

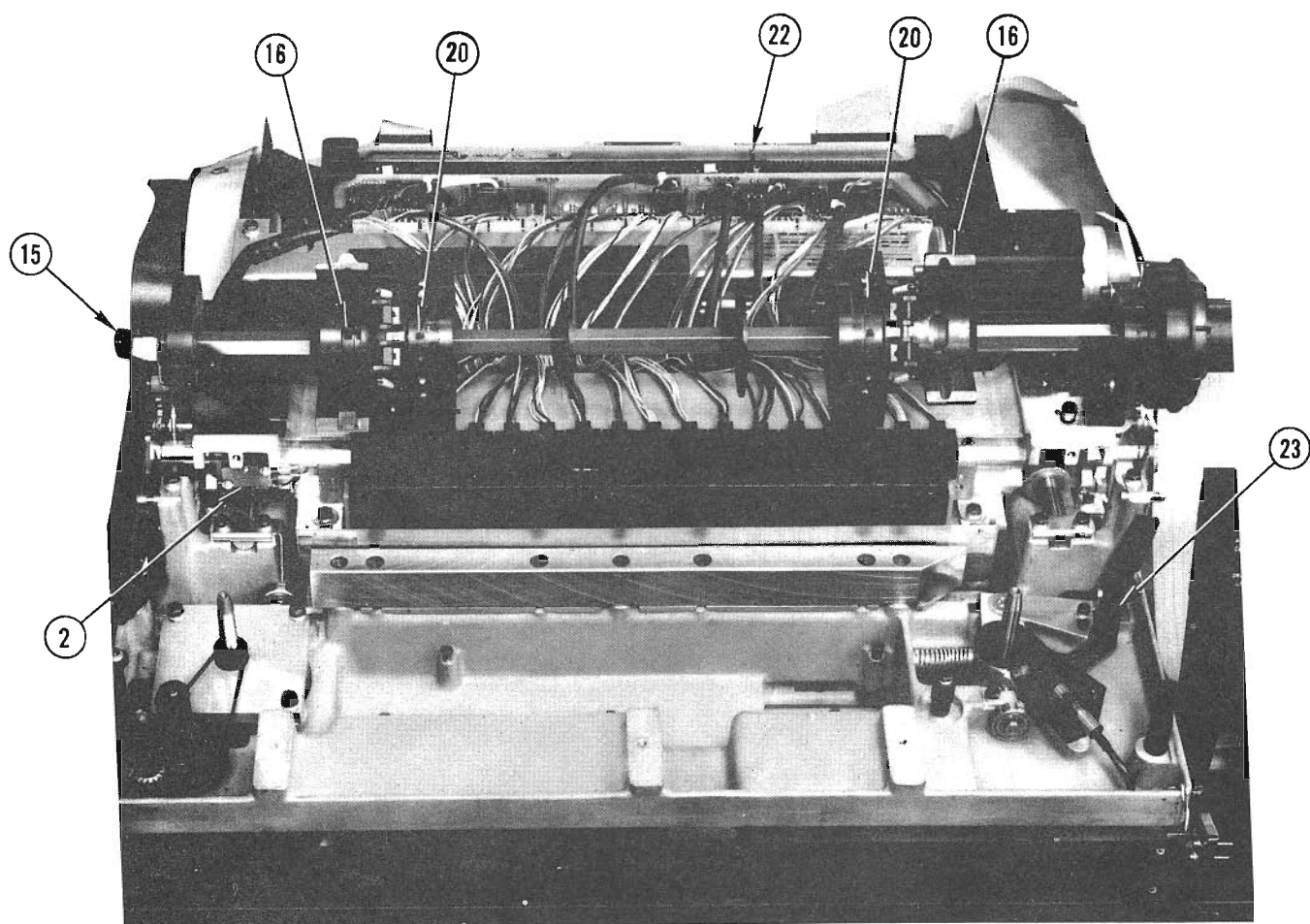
TABLE 3-2. PRINTER MECHANICAL DEVICES

Item*	Description	Figure No.	Item No. Index
Band Release	This is a lever which allows the operator to release and reset the tension on the print band during band changing.	3-1B	23
Hammer Bank Latch Handle	This lever allows the operator to open the throat on the printer to facilitate paper loading and removal. An unlatched condition causes a display of STATUS and inhibits the READY and ON LINE signals.	3-1A 3-1B	15
Paper Feed Release Lever	This lever engages the paper feed drive to the sprockets which move the paper. When disengaged, it allows use of the vertical paper adjust knob.	3-1A	18
Paper Support Guides	The paper support guides, when spaced at an equal distance between the sprockets, provide center support to the forms.	3-1A	17
Pivot Arm	The pivot arm provides roller tension to the ribbon to allow it to feed into the cartridge. When open, access is provided to the first ribbon guide post.	3-1A	14
Sprockets	The sprockets provide the means to advance the paper through the print station.	3-1A 3-1B	20
Sprocket Covers	The sprocket covers open to allow the form to be loaded and close to keep the form feed holes positioned over the sprocket pins.	3-1A 3-1B	16
Sprocket Locks	Squeezing the sprocket lock allows the sprocket to be moved along the drive shaft to achieve horizontal form alignment or to accomodate various form widths.	3-1A	21
Paper Vertical Adjust Knob	Manually rotating this knob allows the paper to be moved through the paper throat.	3-1A	19
*All Devices listed in this table should only be operated with the printer in an off line condition.			



245058A. 301/1/2

Figure 3-1A. Location of Printer Controls and Indicators



245058A. 302

Figure 3-1B. Location of Printer Controls and Indicators

SECTION IV

ORGANIZATION AND ASSEMBLY DESCRIPTION

4.1 INTRODUCTION

This section describes the organization of the printer and contains general information on the major electronic assemblies and their function as shown in figure 4-1. The printer power distribution, and the printer program instruction routines are also covered.

4.2 GENERAL DESCRIPTION

Each description will cover one of the seven major electronic assemblies, and will describe any subassembly interfacing with it. The major assemblies are listed, and will be discussed in the order shown.

- A. Mother Board (A7)
- B. Power Supply (A9)
- C. Interface Board (A2)
- D. Processor Board (A3)
- E. Timing and Status Board (A4)
- F. Power Board (A5)
- G. Hammer Driver Board (A6)

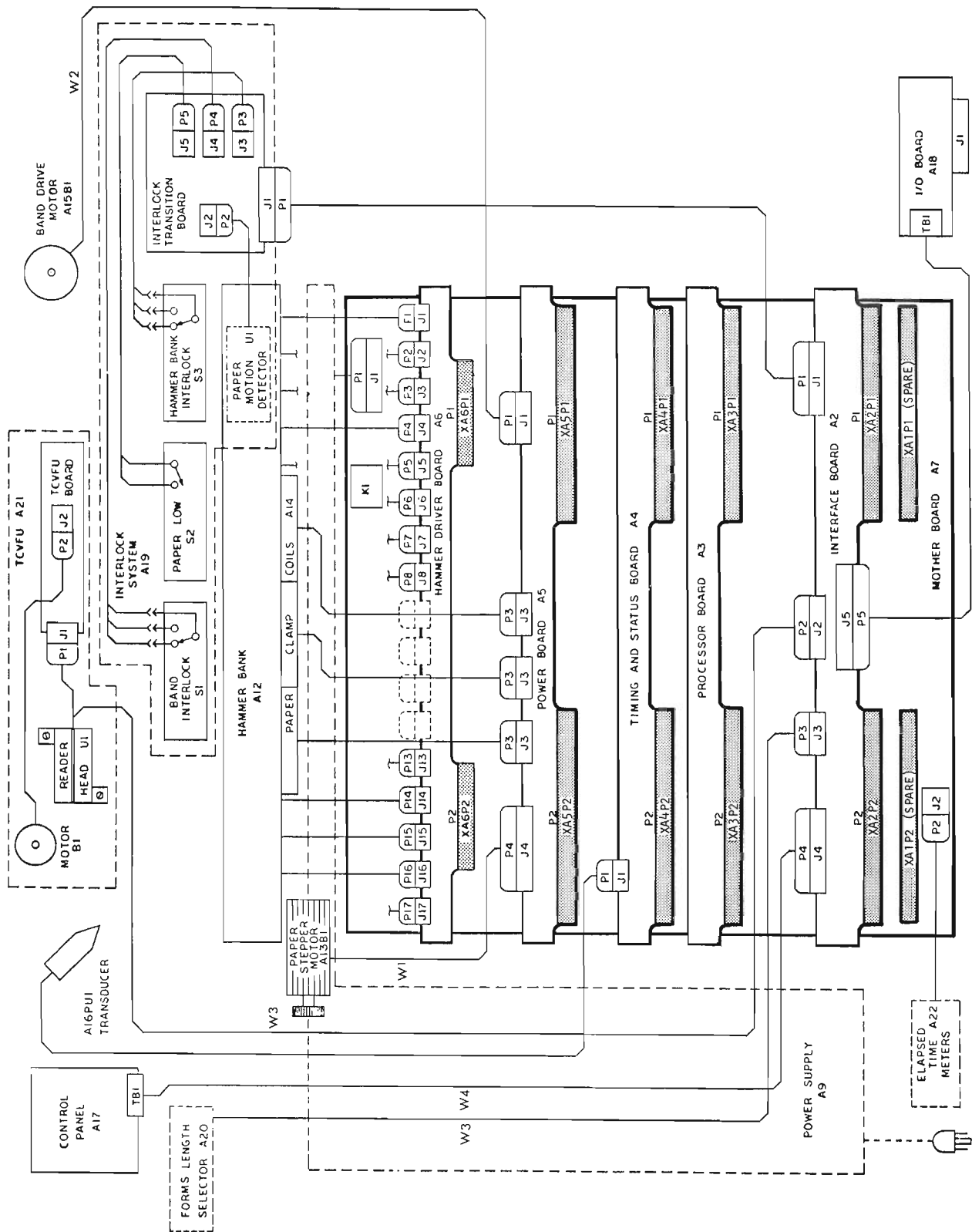
4.2.1 Mother Board (A7)

The mother board contains the connectors which interface with the circuit cards. In addition to containing keyed receptacles for circuit cards A2 through A6 (receptacle XA1 is a spare), the mother board provides for incoming power supply voltages from its J1 connector. A J2 connector allows the utilization of the optional elapsed time meters (referenced as A-22).

Interconnections contained on the mother board provide the common bus functions which allow signal transfer between circuit cards. Relay K1 is mounted to the mother board and transfers the +38 VDC from the J1 connector to circuit card slot XA6 which contains the hammer driver board, and figure 4-2 shows the power distribution of the printer.

4.2.2 Power Supply (A9)

Source voltage is applied to the primary windings of a constant voltage transformer. The transformer output is sent to a rectifier board within the power supply to obtain a raw +38 VDC, a fused +38 VDC, a +9 VDC (which is dedicated to early warning), a general purpose +9 VDC, a -9 VDC, and logic



245058A-401

Figure 4-1. Printer Assembly Organization Diagram

ground. Interlock protection is provided, and isolation between logic ground and frame may be accomplished by removal of P8.

Appropriate filtering is provided for the output voltages by sending them through a capacitor pack which provides spike suppression. Once filtered, the output voltages are distributed, as required, by the mother board.

4.2.3 Interface Board (A2)

This board provides a means of accepting subassembly processed commands and signals which are then sent along the appropriate mother board bus lines which interface with the remaining major assemblies. All of the assembly signals are brought into the interface board by dedicated connectors located on the top edge. Control panel (A17) information is applied to the interface board through connector P4. Data lines from the user system are brought through the I/O board (A18) and applied to the interface board through connector P-5.

The various interlocks are brought into the interface board through the interlock transition board (A19) and connected by P1.

Two other connectors have been provided; they are P2, which allows connection of the tape control VFU option (A21), and P3 for the form length selector option (A20) .

4.2.4 Processor Board (A3)

This circuit card assembly provides the computing function of the printer. The processor, besides containing the master program, controls and stores data, compares character band position and identity and also decodes control characters into system commands.

Secondary functions of the processor provide for housekeeping and diagnostic routines, control initialization sequences, and generation of the necessary enable signals.

The processor board is configured with five program PROM locations. The five PROM program set, installed in locations MEM1 through MEM5, may be the standard 1K program or the optional 2K PROM set containing the VFU program. Three additional locations, MEM6 through MEM8, are dedicated for inserting band image PROMs. A minimum of one band image PROM is required for printer operation. The etched code on the band must match the PROM code to allow printer initialization.

4.2.5 Timing and Status Board (A4)

The timing and status board monitors the state of the printer's electronic and electromechanical assemblies and stores the status so that interrogation by the processor may be performed.

The character band timing marks that are picked up by the transducer (A16PU1) are received by the timing and status board which then amplifies and converts them to digital information to provide the time base required for the

control of hammer fire. Character band timing and printer motor clock pulses are synchronized and then applied to control the speed of the character band drive motor (A15B1).

A print inhibit switch (S1), is located on the top edge of the timing and status board, and when actuated, disables the hammer drivers.

This board provides monitoring of hard faults, such as a +38 VDC failure or a -9 VDC fault. Any detected failure will initiate a display on the status indicator, and will cause the printer to go off line.

4.2.6 Power Board (A5)

The power board (A5) converts necessary processor commands to analog functions and handles all power functions. Regulated voltage and current levels are derived from the power board which controls the speed of the character band, and in turn drives the ribbon, as well as providing control signals to the paper stepper motor (A13B1) and the three paper clamp solenoid coils (A14).

Voltage is applied to the stepper motor from P4 located on the top edge of the board, and voltages to the three clamp coils are derived from P3 a, b and c, also located on the top edge. Connector P1, located on the top edge, goes to the band motor (A15B1).

The operator-controlled setting of the copies potentiometer is used to obtain the required hammer drive current in order to control print penetration. Over-current detection is provided for the clamp coils as well as the band motor. In addition, over-temperature conditions are monitored. Any voltage, current, or temperature fault will cause the printer to go off line, with the appropriate status being displayed.

4.2.7 Hammer Driver Board (A6)

The hammer driver board is located in a dedicated slot, and is mounted with its components facing in the opposite direction of the other circuit cards.

This board contains the power amplifiers and drive circuits for the 66 hammers contained on the hammer bank assembly (A12).

The top edge of the hammer driver board contains the connectors for the hammer bank, and although they are capable of being interchanged, they must remain in alignment with their associated hammer.

4.3 POWER DISTRIBUTION

This section describes the power distribution used in the printer and is provided to enable the technician to minimize verification time of voltage faults. Figure 4.2 is a voltage distribution line drawing, indicating system interconnections and pin assignments to allow troubleshooting and eventual replacement of a malfunctioning assembly.

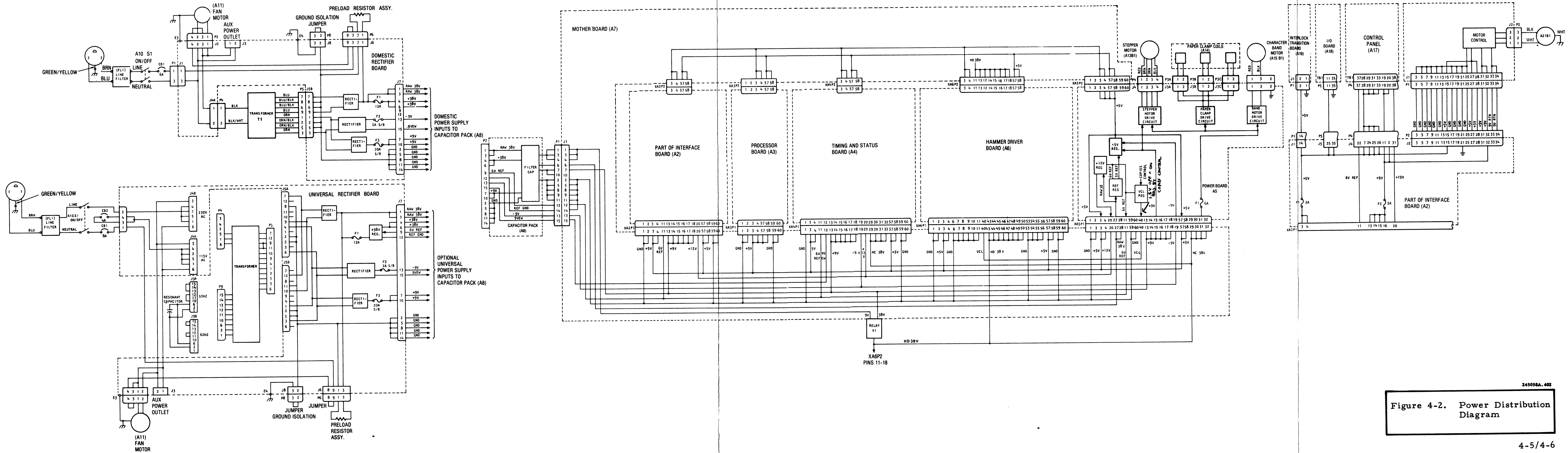


Figure 4-2. Power Distribution Diagram

No voltage adjustments are required to maintain the printer power system, since circuit breakers and fuses are provided to detect and react to current abnormalities.

4.3.1 Primary Power

Primary power is applied to the printer and appears on switch S1, which is the double pole ON/OFF Line switch. This primary power is felt across a 6 AMP, operator-resettable, circuit breaker, and is then sent to the jumper shown on connector P6. This jumper ensures that the +38 VDC Preload resistor is connected and is then applied through the Jumper on P2. This jumper, prevents printer operation unless the fan motor (A11) is connected.

The AC line voltage is then applied to the primary windings of a constant voltage transformer (T1) and across the transformer to three secondary windings. One of the secondary windings is dedicated to a resonant capacitor while the remaining windings provide step down voltages as inputs to the rectifiers on the rectifier board (A9). These two remaining secondary windings are center-tapped to provide the ground return, and are shown going to connector P8, whose removal provides for isolation between logic ground and chassis ground.

4.3.2 Secondary Voltages

Voltages from the secondary winding are rectified, and provide five distinct voltages. The first two voltages are both +38 VDC, from the first rectifier; however, one of these is fused through F1, while the other is not fused and is entitled RAW +38 VDC.

The second rectifier provides a -9 VDC which is fused through F2 and also a +9 volts which is entitled 9VEW. The EW is the designator for early warning, which is used for error detection.

The third rectifier produces a +9 VDC which is fused through F3 and provides coil voltage to K1, as well as providing operating voltage to various devices.

4.3.3 Optional Universal Power Supply Voltage

An optional universal power supply is available and provides the capability of selecting a low range source voltage of from 90 to 132 VAC or a high range of from 180 to 250 VAC. In addition, the input frequency is selectable to either 50 Hz or 60 Hz.

Selection of voltage and/or frequency is accomplished by moving the location of transformer connector P4, P5, or P9. Table 2-2 shows the configurations required to obtain the selected inputs, with the outputs remaining identical to the standard power supply.

4.3.4 Voltage Destinations

Once the AC voltage has been rectified, the DC voltages derived are applied to a capacitor bank (A8) where both the raw 38 volts and the fused 38 volts are filtered. In addition, the +9 VDC, the -9 volts, and the early warning 9VEW go through, but are not filtered on the capacitor bank. Instead these voltages are directed to circuit card assemblies which contain the necessary capacitors to provide filtered DC voltages.

All output voltages from the capacitor bank are applied to the mother board (A7) through the J1 connector and then distributed to the other major assemblies. With the exception of the 9VEW, which is sent to the timing and status board for further utilization, the voltages are directed to each circuit card receptacle, and remain unmodified except when applied to the power board (A5). This board contains the necessary circuitry to produce regulated and reference voltage levels which are used throughout the printer.

4.4 INSTRUCTION ROUTINES

The program is a collection of instructions, which in proper order perform a particular task. The following paragraphs describe the various instruction routines and include a general flow chart (figure 4-3) of the major routines.

4.4.1 Initialization Routine

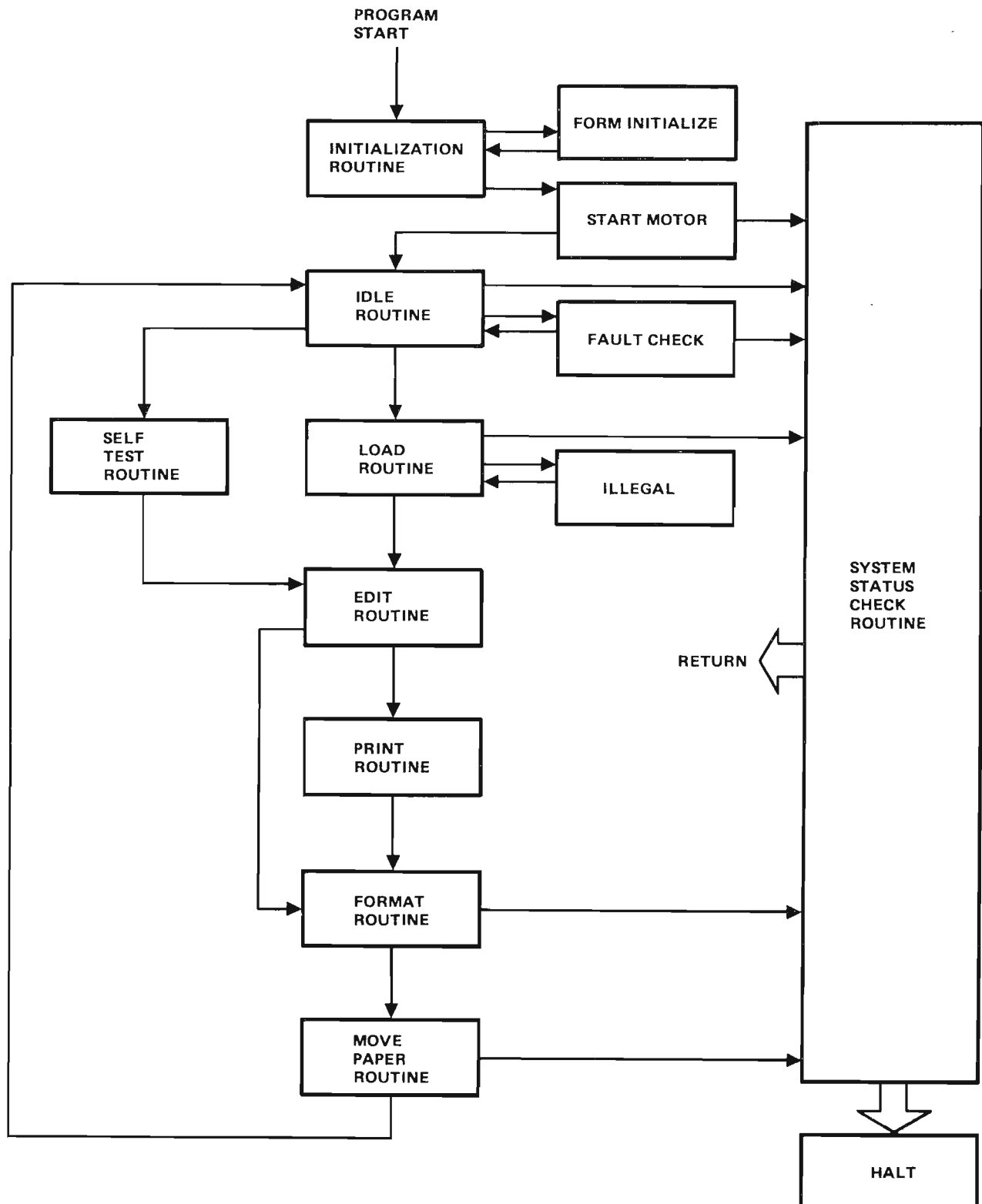
The major execution blocks of the program begin with the initialization routine, whose primary function is to prepare the printer for normal operation. During initialization, all possible major faults are checked and stabilization delays are initiated. A sub-routine of the initialization block is the forms initialize instruction which establishes the form length and position as well as such criteria as skip over area which is defined by configuration settings.

4.4.2 Start Motor Routine

After form initialize has been completed, the program moves to the start motor block where the column to be printed is established and character band checks are performed. This routine actually starts the character band drive motor and then reads and compares the identity code and other band markings. During the start motor routine and at various other points in the program, system status checks are made, and if any faults are encountered, the program is interrupted and branched to the status check routine.

4.4.3 Idle Routine

At completion of the start motor routine, the program moves to the idle routine to await an operator action such as a top of form or an on line command. If no operator action places the printer on line, the program will continue to cycle through the idle routine, periodically performing fault checks and waiting for instructions to go to either the data load routine or to perform the self test routine.



245058A.403

Figure 4-3. Program Overview

4.4.4 Self Test Routine

If the self test switch is activated, the program will move from the idle routine into the self test routine where built-in exercises are loaded into memory. The self test patterns consist of either a sliding character print pattern or a single fixed character printout. During self test print, the operator may adjust the phase and copies potentiometers to insure optimum print quality.

4.4.5 Load Routine

If the self test routine is not initiated and the operator places the printer on line, then the program moves to the load routine. Data transfer between the printer and the user system is activated during the load routine, and the incoming data is loaded into the memory to await the print command. During the load routine, a branch is activated to the illegal sub-routine where loaded data is analyzed for any illegal characters or control commands.

4.4.6 Edit Routine

Both the self test routine and the load routine are followed by the edit routine. The edit routine detects any illegal characters that were found during the illegal sub-routine and prevents them from being printed.

4.4.7 Print, Format and Move Paper Routines

The edit routine next moves to the print routine where legal printable data contained in memory is sent to the hammer fire circuits. Simultaneously a branch is initiated to the format routine where the control characters are decoded allowing the printer to move the forms, and where the form position data is updated. Upon completion of updated information, the program moves to the paper move routine where signals are initiated to various mechanical portions of the printer.

SECTION V

PREVENTIVE MAINTENANCE

5.1 INTRODUCTION

This section contains information on preventive maintenance performed via visual inspection and as required, subsequent cleaning.

5.2 VISUAL INSPECTION

It is necessary to make a visual check of the printer at regular intervals for worn, loose, or broken parts. The following inspections must be periodically made:

- a. Check character band and path for cleanliness.
- b. Check ribbon mask for breaks or tears.
- c. Check ribbon drive belt and rollers for wear and cracks.
- d. Check band edge guide rollers for grooves or bearing noise.
- e. Check interlock switches for damage, adjustment, or non-operation.
- f. Check for inoperative or damaged items and loose hardware.

5.3 CLEANING/PREVENTIVE MAINTENANCE SCHEDULE

The printer is designed for the maximum amount of usage with the minimum amount of maintenance and adjustments. Table 5-1 is a cleaning and maintenance schedule to be followed to ensure good print quality and printer reliability.

TABLE 5-1. CLEANING AND MAINTENANCE SCHEDULE

Interval	Item	Reference Section
7 Days	Clean (vacuum) printer mechanical assy*	5.4.1
30 Days	Clean character band and ribbon drive rollers *	5.4.1
30 Days	Clean the band platen	5.4.1
30 Days	Check ribbon mask for wear or breaks *	5.2
30 Days	Check cooling fan for unrestricted air flow *	5.2
180 Days	Check/adjust hammer flight time	6.2.5
180 Days	Check/adjust band tracking	6.2.2
180 Days	Replace ribbon drive rollers, if necessary	6.2.11
180 Days	Check/replace ribbon drive belt	6.4.16
180 Days	Check/replace edge guide rollers	6.4.14/ 6.4.16
180 Days	Clean band pulleys	5.4.1
180 Days	Check/adjust transducer gap	6.2.8
180 Days	Check/adjust paper feed belt	6.2.3
180 Days	Check interlock switches	6.2.6
180 Days	Blow out printer interior. (Do not remove PCBs).	---
180 Days	Check operator controls and fault indicators	5.2

*More frequent servicing may be required if operating in an abnormally dirty environment or beyond the normal duty cycle.

NOTE

Normal printer usage is based on 40 hrs per week at a 30% duty cycle (print time divided by power on) printing 30,000 sheets per month. Increased usage may require additional servicing.

5.4 OPERATOR CLEANING PROCEDURES

The recommended cleaning solution for all subassemblies is 91% isopropyl alcohol.

NOTE

DO NOT use trichloroethylene, methylethyl-ketone, or acetone.

WARNING

ISOPROPYL ALCOHOL IS A COMBUSTIBLE LIQUID, AND MUST BE KEPT AWAY FROM HEAT AND OPEN FLAME.

5.4.1 Character Band, Band Area and Ribbon Drive Roller/Area Cleaning

CAUTION

When handling the character band, be careful not to bend the band to a radius less than that of the band pulleys.

- a. Disconnect the AC power plug.
- b. Remove the ribbon.
- c. Remove the character band and place it in a shallow pan.
- d. Vacuum the printer interior. Do not remove the PCBs.
- e. Place the cleaning solution in a bottle equipped with a spray nozzle and saturate the character band.
- f. Using a small, stiff bristled brush, clean the type faces thoroughly, adding more solution as required.
- g. Clean both sides of the entire character band and allow to drip dry.
- h. To clean the band area, moisten a soft cloth with the cleaning solution and clean both band pulleys, the ribbon mask, the platen (the area facing the hammers), and along the path traveled by the character band.

- i. To clean the ribbon drive rollers, moisten a soft cloth with the cleaning solution and clean the pivot arm roller, the ribbon drive roller, the ribbon guides, and along the path traveled by the ribbon. (See figure 5-1 for an illustration of some of the ribbon drive roller problems requiring replacement.)
- j. Reinstall the character band and ribbon.

5.4.2 Ribbon Drive Roller Check

Check the Ribbon Drive Rollers for wear, splitting, or loss of edge (see figure 5-1). Replacement, if necessary, should be performed by a technician.

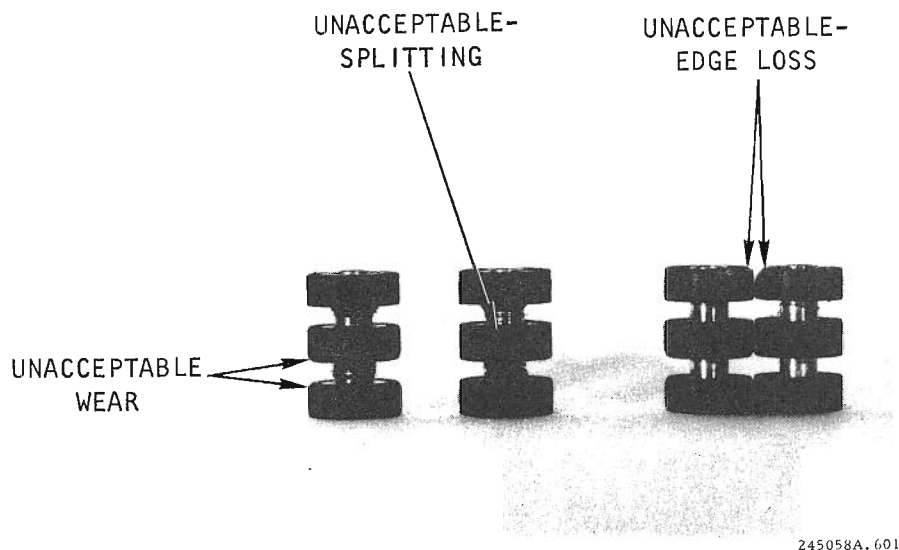


Figure 5-1. Ribbon Drive Rollers

SECTION VI

MAINTENANCE

6.1 INTRODUCTION

This section contains the following maintenance procedures necessary to support the printer. In addition, a printer cover removal/replacement procedure is given which may be a prerequisite to performing most of these listed procedures.

- a. Band Idler Tracking Adjustment
- b. Paper Feed Belt Tension Adjustment
- c. Paper Clamp Solenoid Face Plate Adjustment
- d. Hammer Flight Time Adjustment
- e. Band Cover and Band Interlock Switch Adjustment
- f. Hammer Bank Latch Adjustment
- g. Transducer Gap Adjustment
- h. Transducer Phasing Adjustment
- i. Ribbon Mask Replacement
- j. Ribbon Roller Replacement

6-3

All procedures outlined in this section are to be performed by qualified personnel only, using equipment capable of giving reliable and accurate measurements. Personnel performing any of the outlined procedures must be familiar with the printer operation as well as the mechanical configuration of the printer.

6.2 MAINTENANCE

Maintenance adjustment or replacement of specific items on the printer may require removal of the printer cover. To remove and replace the printer cover, the following procedure should be performed:

6.2.1 Printer Cover Removal/Replacement Procedure

- a. Remove printer power by disconnecting the ac plug.
- b. Remove the printer paper, if applicable.
- c. Remove the two mounting screws (under the front edge) securing the top cover to the base.
- d. Lift the front door slightly to clear the control panel buttons.
- e. Lift the printer cover at the front enough to unhook the rear, then lift cover off.

- f. To install printer cover, perform steps a through e in reverse.

6.2.2 Band Idler Tracking Adjustment

- a. Set the Power switch to OFF.
- b. Raise the printer cover door.
- c. Open the band cover.
- d. Rotate the pulley by hand (8 or more revolutions) to allow the pulleys to settle in their normal tracking position (band installed).
- e. Check the vertical float on both band drive pulleys. The pulleys should be free to move vertically within their limits in both directions. Total travel should be approximately 6.5mm (0.25 inch). If no adjustment has been done to the band drive components and float is present in both directions from the tracking position, then no adjustment should be attempted. Verify the existence of float utilizing all bands (if more than one) used on the printer (see figure 6-1).
- f. If either pulley tracks at the extreme top or bottom, or if work has been performed on the band drive components, then proceed to step g.
- g. Loosen the band alignment lever clamp screw slightly.
- h. Move the band alignment lever in the appropriate direction for the desired band pulley operate position.
- i. Adjust the band alignment lever to cause both band pulleys to track in the approximate center of their travel. (Moving the lever to the rear will cause the band pulley to track higher.) After each adjustment, verify the tracking position as described in step e.

LEFT NOT
REALLY TOO
IMPORTANT

CAUTION

This adjustment must be made in small increments.

- j. Tighten band lever alignment clamp screw.
- k. Close band cover.
- l. Plug in AC power and set power switch to ON.

- m. Visually verify that the pulleys are operating near their center of travel.
- n. Re-install the printer cover (section 6.2.1).

NOTE

Each character band may float at a different point.

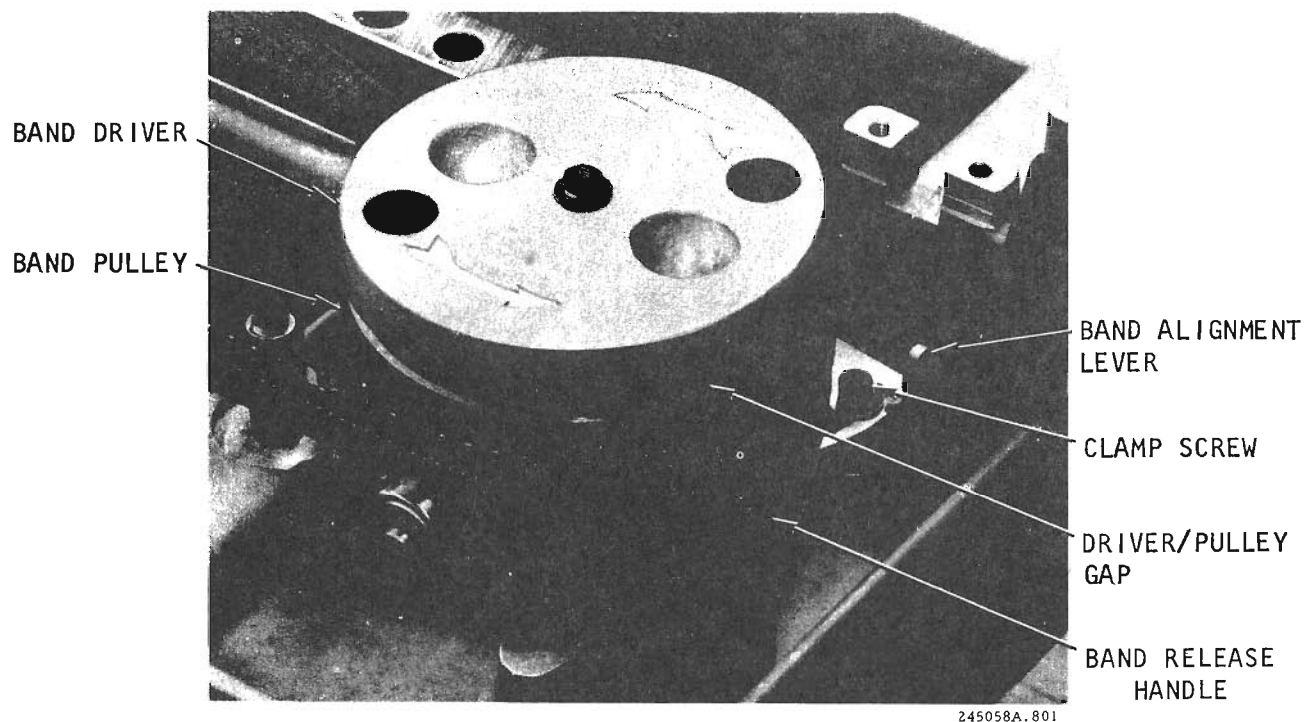


Figure 6-1. Band Alignment

6.2.3 Paper Feed Belt Tension Adjustment

The paper feed belt must be maintained at a proper tension. A loose belt will cause line variations on the printed form. If the belt is too tight, excessive drag will occur. Perform the adjustment procedure as follows:

- a. Set the POWER switch to OFF.
- b. Remove the printer cover (paragraph 6.2.1).
- c. Loosen the three mounting screws securing the paper feed drive motor. (See figure 6-17.)

- d. Connect a spring scale to the paper feed motor shaft; apply 7 kg. (15 lb) pull to the scale to tension the belt. If a spring scale is not available, push the motor by hand until all the belt slack has been removed. Do not over-tighten belt.
- e. Tighten the three mounting screws.
- f. Reinstall the printer cover (paragraph 6.2.1).

6.2.4 Paper Clamp Solenoid Face Plate Adjustment

- a. Set the POWER switch to OFF.
- b. Remove the printer cover (paragraph 6.2.1).
- c. Remove the ribbon and character band.
- d. Remove the hammer bank mask.
- e. Loosen the two solenoid assembly mounting screws (see figure 6-17).
- f. Adjust the gap to 1mm (.040 inch) at both ends, adjacent to the mounting screws, with the hammer bank closed.
- g. Tighten the mounting screws.
- h. Install the hammer bank mask. Reinstall the character band and ribbon, if removed.
- i. Reinstall the printer cover (paragraph 6.2.1).

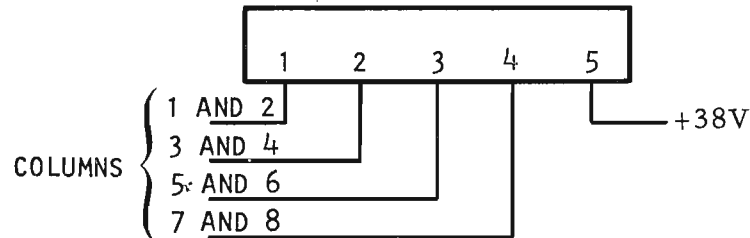
6.2.5 Hammer Flight Time Adjustment

- a. Set the POWER switch to OFF.
- b. Remove the printer cover (paragraph 6.2.1).
- c. Remove the paper exit chute (see figure 9-4).
- d. Remove the card cage cover (see figure 9-1).
- e. Set up the scope as follows:
VOLTS/DIV: 10V (DC)
TIME/DIV: .5 mS
TRIGGER: Int, Neg.
- f. Set up the printer as follows:

Plug in AC power and set POWER switch to ON. Load single part paper in the printer. Rotate COPIES control fully counterclockwise and put printer in TEST Mode, single character pattern, and 8 LPI.

- g. Connect scope Ch1 probe to Hammer Driver Board connector J1 (pin 1) for columns 1 and 2. Connect scope ground to pin 5. There are 17 Hammer Driver Board connectors (J1 - J17). The columns increment (Columns 1-136) in the same manner as the connectors. There are two columns per pin, 8 columns per connector. See the example below for the connector pin assignment.

HAMMER DRIVER BOARD CONNECTOR J1



- h. Press the ON/OFF Line switch to initialize the printer.
- i. Observe the oscilloscope trace. The hammer flight time should be approximately 1.95 ms ($\pm .02$ ms), as shown in figure 6-2. Refer to figure 6-3 for a full scale view of the waveform.
- j. For greater accuracy, expand the horizontal oscilloscope trace to the 10X setting and bring the trace to the center point of the graticules.
- k. Adjust the hammer back stop screw to bring the flight time to specification.
- l. Repeat step k for the balance of the hammers.
- m. Remove the oscilloscope probe and ground. Set the POWER switch to OFF. Install the card cage cover and the paper exit chute. Reinstall the printer cover (paragraph 6.2.1). Remove the printer from the test mode.

6.2.6 Band Cover and Band Interlock Switch Adjustment

To adjust the band cover:

- a. Set the POWER switch to OFF.
- b. Raise the printer cover.
- c. Remove the ribbon cartridge.

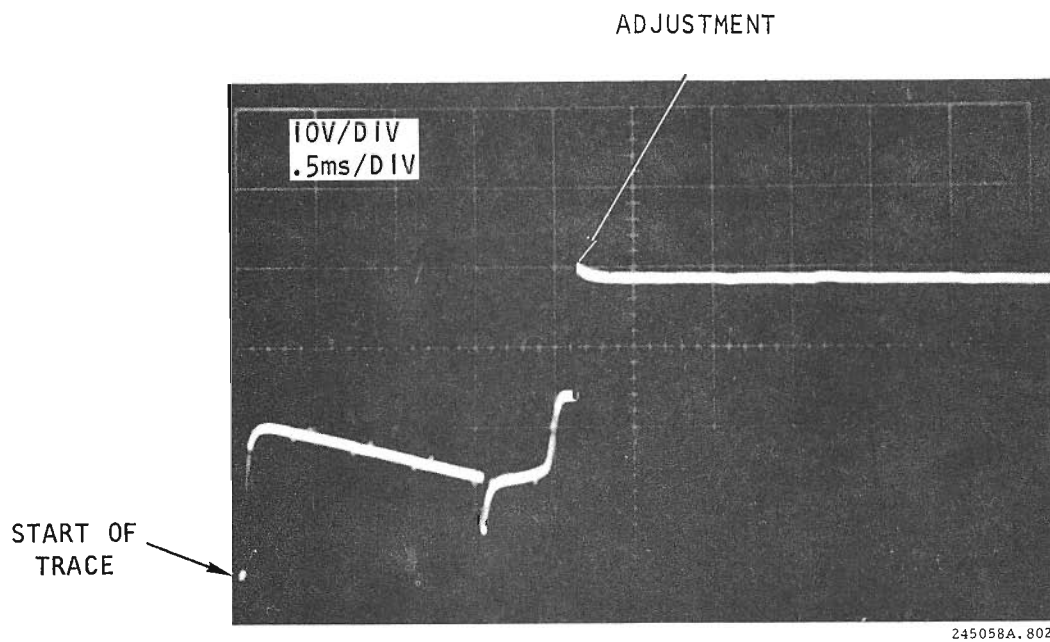


Figure 6-2. Hammer Flight Time

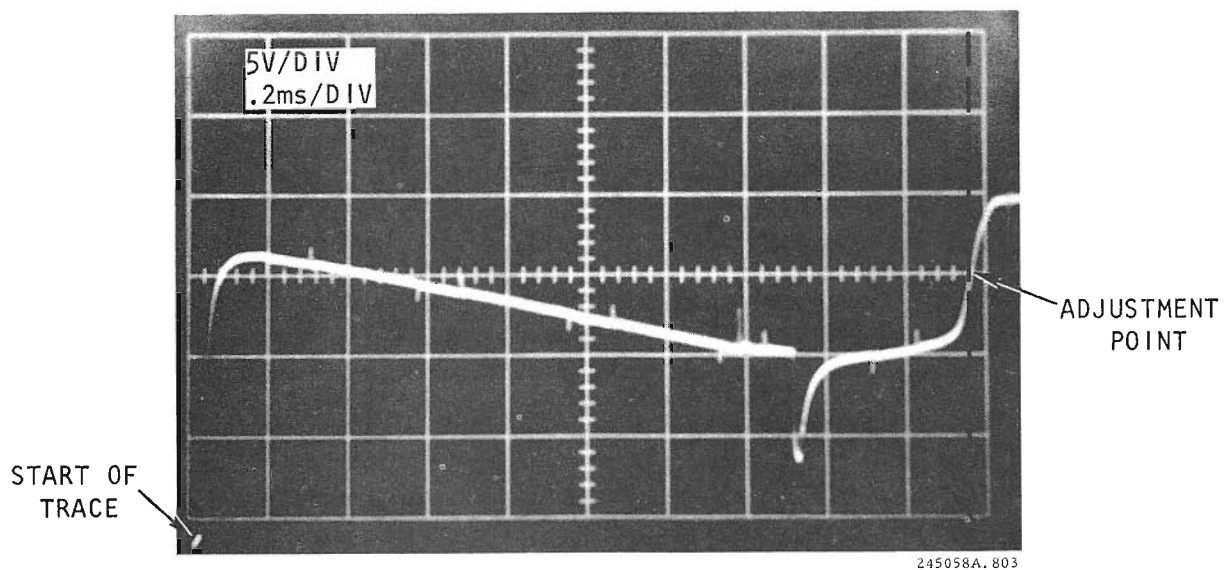


Figure 6-3. Hammer Flight Time (Full Scale)

- d. Loosen the three band cover mounting screws so that the band cover can be moved to the left or right. Position the band cover, ensuring that the cover does not touch the left rear ribbon guide and the left band pulley.
- e. Tighten the three mounting screws and insert the ribbon cartridge.

To adjust the interlock switch:

- f. Check/adjust the band interlock switch to activate when the band cover is raised approximately 25.44mm (1 inch). Two mounting screws secure the interlock switch to the band cover assembly. The switch may be adjusted to the proper setting by loosening the two mounting screws. Once adjusted tighten the screws.

6.2.7 Hammer Bank Latch Adjustment

- a. Set the POWER switch to OFF.
- b. Remove the printer cover (paragraph 6.2.1).
- c. Verify hammer bank is closed.
- d. Loosen the mounting screws securing each of the adjustment brackets (see figure 6-4).
- e. With the hammer bank closed and both hammer bank latches fully engaged against their pins, position the right hand bracket so that the latch roller has clearance to rotate. Tighten the bracket mounting screws. Verify that the hammer bank moves freely in both directions.
- f. Reinstall the printer cover (paragraph 6.2.1).

6.2.8 Transducer Gap Adjustment

- a. Set the POWER switch to OFF.
- b. Raise the printer cover.
- c. Open the hammer bank and raise the band cover.
- d. Loosen the transducer set screw (see figure 6-20).
- e. Adjust the Transducer gap to .125mm (.005 inch) with the band installed.
- f. Tighten the set screw and lower the printer cover.

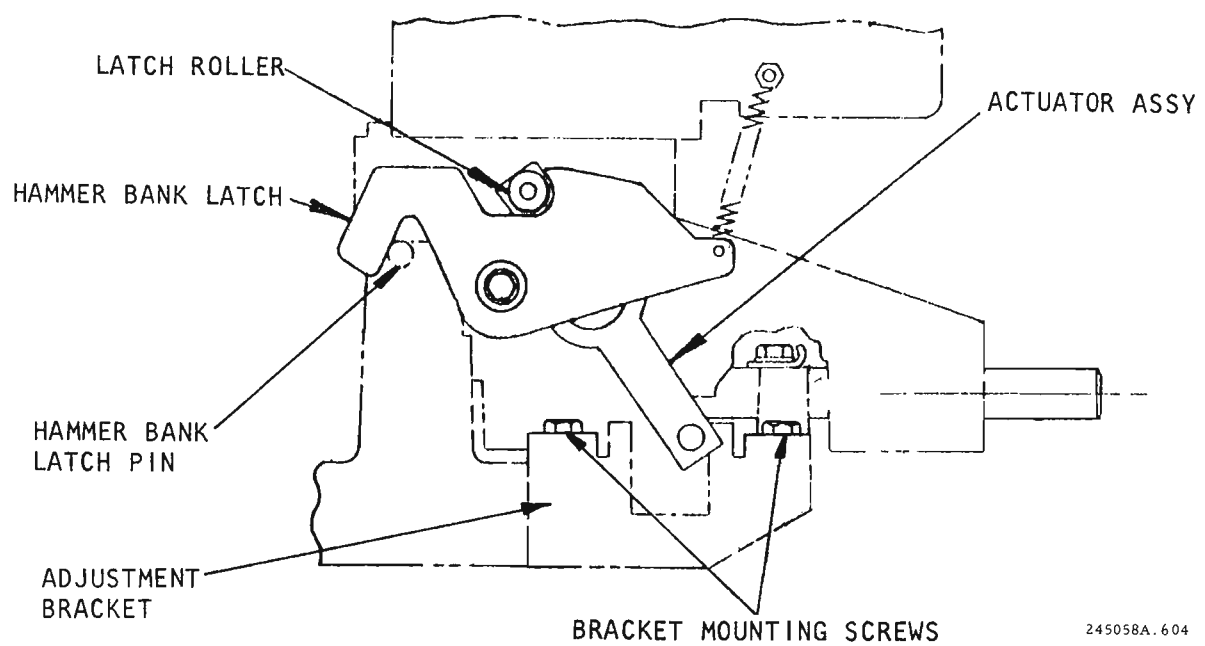


Figure 6-4. Hammer Bank Latch Assembly (Right Side)

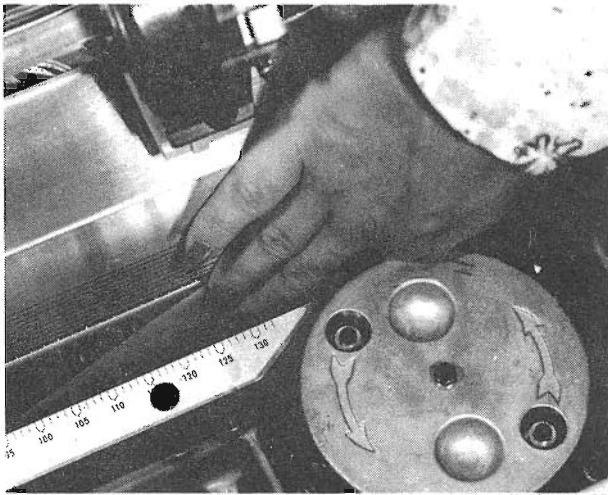
6.2.9 Transducer Phasing Adjustment

- a. Set the POWER switch to OFF.
- b. Position the panel PHASE control to the center of its adjustment.
- c. Raise the printer cover and open the band cover.
- d. Loosen the transducer adjustment screw (see figure 6-20).
- e. Move the transducer bracket (moving the bracket to the left will enhance the left side of the characters). Move the transducer bracket in the applicable direction, tighten the mounting screw, close the band cover and power up the printer. Verify the adjustment with the printer in the Self Test Mode, single character and 8LPI. Repeat step if necessary.
- f. Check the transducer gap (paragraph 6.2.8), close the band cover and the printer cover.

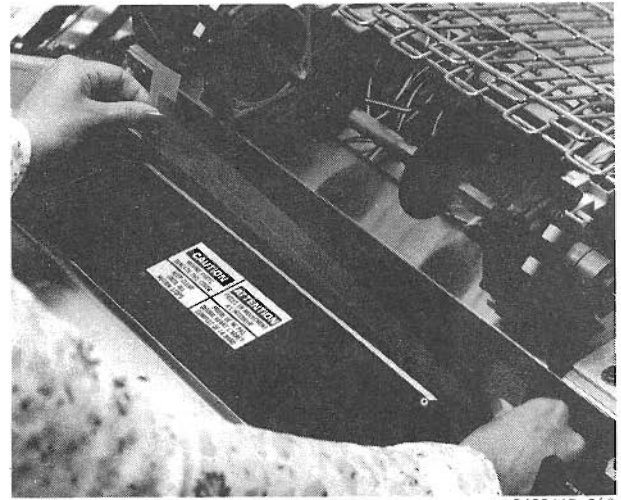
6.2.10 Ribbon Mask Replacement

- a. Set the POWER switch to OFF.
- b. Raise the printer cover and open the hammer bank.
- c. Remove the ribbon cartridge and character band.
- d. Remove the ribbon mask by pushing out and away at the bottom edge (see figure 6-5, step A).
- e. Place the new mask on a flat surface, then remove the protective backing from the adhesive strip.
- f. With the open portion of the mask facing up, and the adhesive strip facing the operator, lower the mask into the paper throat until the bottom edge rests on the alignment ledge (see figure 6-5, step B); then press firmly into place.

- g. Install the character band and the ribbon cartridge; close the hammer bank and lower the printer cover.



STEP A



STEP B

Figure 6-5. Ribbon Mask Replacement

6.2.11 Ribbon Roller Replacement

- a. Set the POWER switch to OFF.
- b. Raise the printer cover.
- c. Open the Pivot Arm Assembly (see figure 6-15), and lift the ribbon up and away.
- d. Remove the two ribbon roller mounting screws.
- e. Remove the ribbon rollers, replace and secure with the two mounting screws.
- f. Place the ribbon in its path, close the Pivot Arm Assembly, rotate the band pulley to take up ribbon slack and close the printer cover.

6.3 MAINTENANCE TOOLS AND SUPPLIES

The following tools and equipment listed (or their equivalents) are required to maintain the printer:

- a. Metric nut drivers - 5.5mm, 7mm, 8mm, 10mm (Xcelite 99 Series).
- b. Metric Allen Wrench - 2mm, 2.5mm, 3mm, 4mm, 5mm (Xcelite 99 Series).

- c. Standard Allen Wrenches - 7/64 inch (Hunter #12150), 5/64 (2mm).
- d. Metric box/open-end wrenches - 7mm, 10mm.
- e. Retainer ring pliers, external - (Proto #391 and #393).
- f. Feeler stock - 1mm (.040 in), 0.5mm (.020 in), 0.125mm (.005 in), 30 cm (12 inches) in length.
- g. Spring gauge - 0-9.072 kg (0-20 lb), 0-.907 kg (0-2 lb).
- h. Straight edge - 10 cm long (25.4 in).
- i. Inspection mirror.
- j. Oscilloscope, Tektronix 535.

6.4 ASSEMBLY REMOVAL/REPLACEMENT PROCEDURES

The following information pertains to the removal sequence of the mechanical assemblies of the printer.

Figure 6-6 lists the removal sequence in which the procedures are to be performed. For example, the printer cover is to be removed in most cases when adjustments are to be performed except in the case of the ribbon cartridge and the ribbon drive rollers.

6.4.1 Capacitor Bank Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the paper exit chute/gnd wire, the PCB cover, and the capacitor bank cover.
- c. Remove the four mounting screws securing the capacitor bank and disconnect the power cable to the Rectifier and the Mother Boards (see figure 6-7).
- d. Disconnect Power Board connectors (see figure 9-2) and remove the Power Board. Remove the Hammer Driver Board, (see figure 9-2) placing it on the printer, leaving the hammer connectors intact. Remove the capacitor bank.

6.4.2 Capacitor Bank Installation

- a. Install the capacitor bank and secure with the four mounting screws.
- b. Connect the power cable to the Rectifier and Mother Boards.

- c. Install the Hammer Driver and the Power Boards and re-install connectors as required.
- d. Install the capacitor bank cover, the PCB cover and the paper exit chute.
- e. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.3 Rectifier Board Assembly Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the paper exit chute/ground wire, disconnect the Power Board connectors (see figure 9-2), remove the PCB and capacitor bank covers. Disconnect the Interface, Timing and Status Board connectors and the six power cables to the Rectifier Board (see figure 9-3).
- c. Remove all PCBs with the Hammer Driver Board placed on the printer leaving the hammer connectors intact.
- d. Remove the five screws securing the Rectifier Board.

6.4.4 Rectifier Board Assembly Installation

- a. Install the Rectifier Board and secure with the five mounting screws.
- b. Connect the six power cables.
- c. Insert the PCBs (as illustrated on the circuit card orientation decal), install the PCB and capacitor bank covers, and connect the Power, Interface, Timing and Status Board connectors.
- d. Install the paper exit chute/ground wire and perform the printer cover installation procedure (paragraph 6.2.1).

6.4.5 Power Supply Component Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the paper exit chute/ground wire, PCB, capacitor bank and the power supply covers and the two left ribbon cables to the Interface Board (see figure 9-2).
- c. To remove the transformer:
Remove the four mounting screws and disconnect the

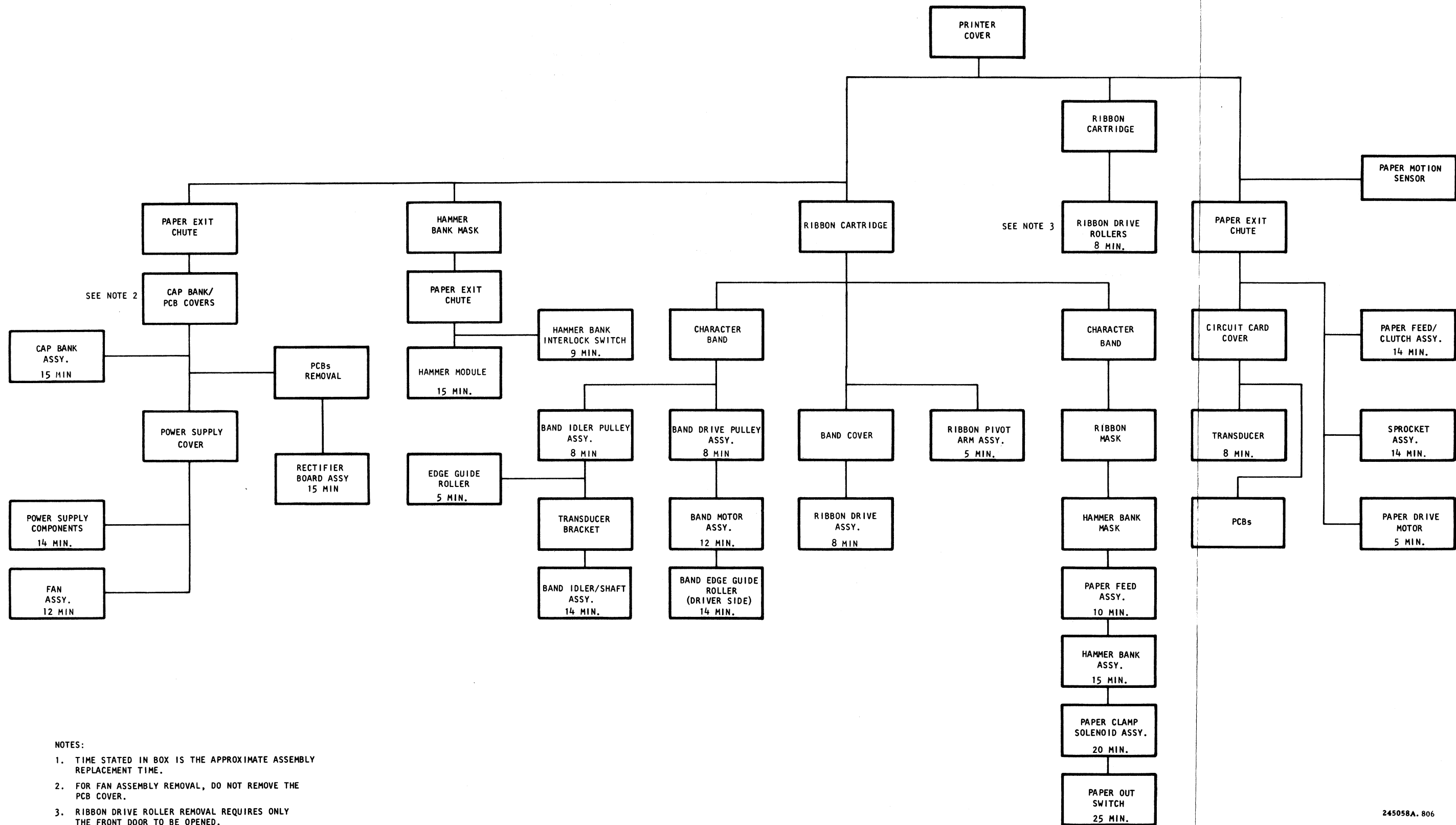


Figure 6-6. Assembly Removal Sequence

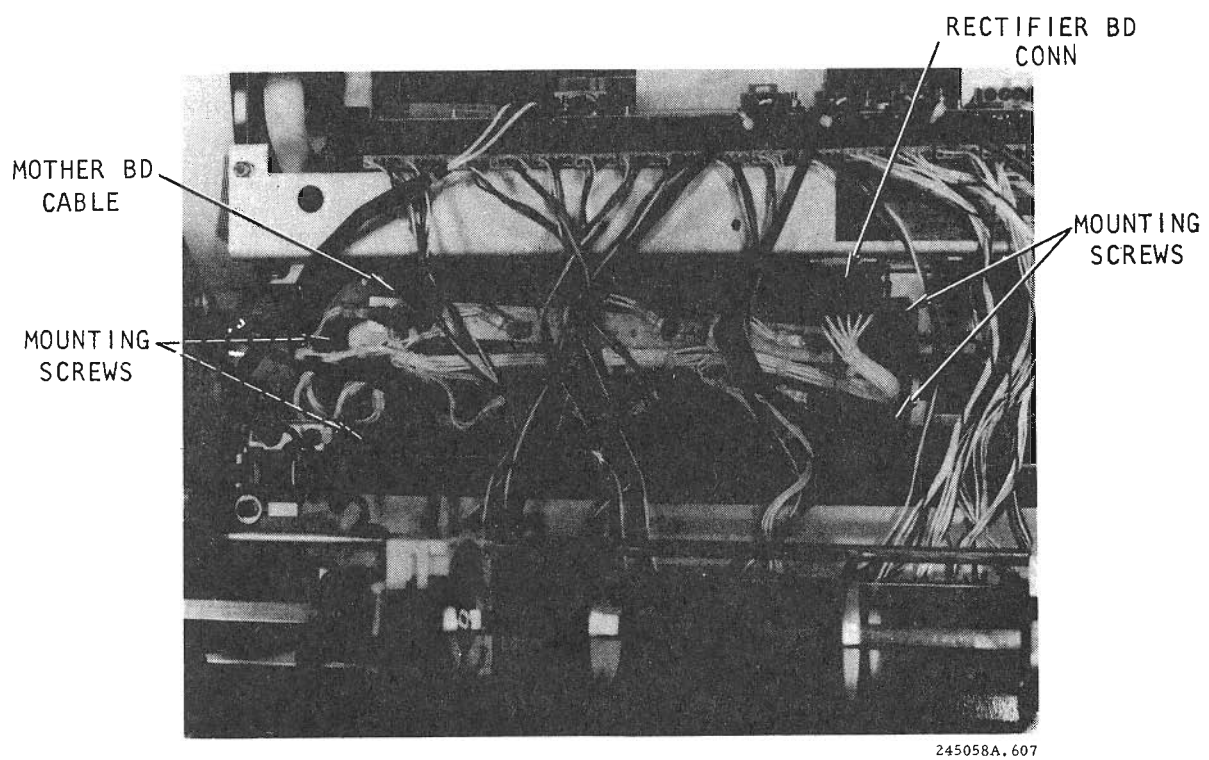
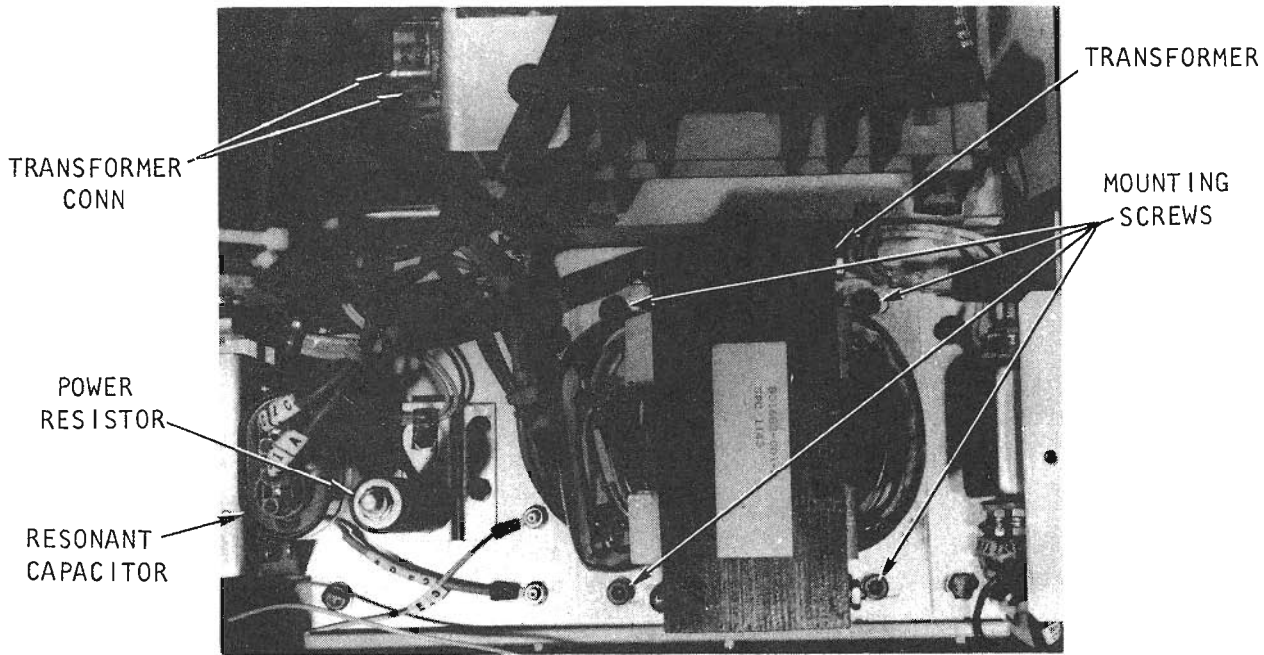


Figure 6-7. Capacitor Bank Assembly

two transformer connectors to the Rectifier Board (see figure 6-8).

- d. To remove the resonant capacitor:
Remove the two mounting screws and disconnect the two capacitor wires.
- e. To remove the power resistor:
Remove the mounting nut and disconnect the two resistor wires.



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Figure 6-8. Power Supply Components

6.4.6 Power Supply Component Installation

- a. Install the appropriate component, secure and perform the removal procedures in reverse.
- b. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.7 Fan Assembly Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the paper exit chute/ground wire, capacitor bank cover, power supply cover and the fan shroud.

- c. Remove the two mounting screws securing the fan and disconnect the ground wire and the power cable to the Rectifier Board (see figure 9-3 for Rectifier Board location).

6.4.8 Fan Assembly Installation

- a. Install the fan, secure with the two mounting screws, and connect the ground wire and the power cable to the Rectifier Board.
- b. Install the fan shroud, power supply cover, capacitor bank and the paper exit chute/ground wire.
- c. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.9 Hammer Module Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the two mounting screws securing the hammer bank mask.
- c. Remove the paper exit chute/ground wire.
- d. Open the hammer bank.
- e. Remove the hammer module mounting screw (upper screw only) and disconnect the wiring to the Hammer Driver Board.

6.4.10 Hammer Module Installation

- a. Insert the hammer module and secure with the mounting screw.
- b. Connect the module wiring to the Hammer Driver Board.
- c. Install and secure the Hammer Bank Mask.
- d. With the printer in an operational status and loaded with paper, adjust the hammer backstop screw (white nylon) to the flight-time equal to the balance of the hammers (reference paragraph 6.2.5).
- e. Install the paper exit chute and connect the static ground wire.
- f. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.11 Hammer Bank Interlock Switch Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Open the hammer bank.
- c. Remove the two mounting screws securing the hammer mask.
- d. Remove the two switch mounting screws (figure 6-9).
- e. Disconnect the wiring.

6.4.12 Hammer Bank Interlock Switch Installation

- a. Connect the switch wiring (figure 6-9).
- b. Attach the switch with the two mounting screws.
- c. With the hammer bank closed, rotate the switch until the switch activates.
- d. Tighten the mounting screws.
- e. Install and secure the hammer bank mask.
- f. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.13 Band Idler Shaft/Edge Guide Roller Assembly Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the ribbon cartridge and character band.
- c. Remove the idler pulley mounting screw and lift the pulley assembly out.
- d. Remove the transducer bracket mounting screw (figure 6-10), lift bracket and move to the side.
- e. Remove the band alignment lever mounting screw (figure 6-11) and lift lever up and out. Remove band tension spring.
- f. With the hammer bank open and the band release lever closed, remove the idler shaft assembly.
- g. To remove the edge guide roller:
Perform steps a - c. Remove the mounting screw securing the edge guide roller (figure 6-10). Remove the C-ring and pull the bearing off the shaft.

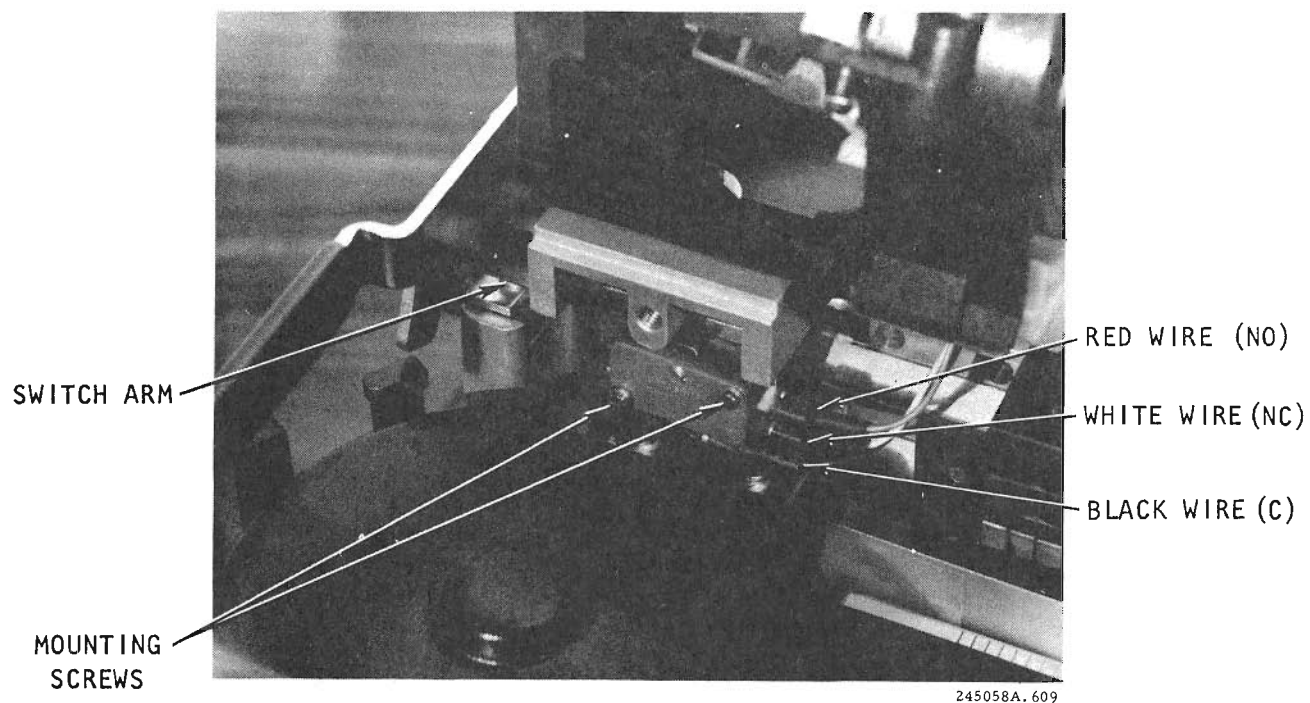


Figure 6-9. Hammer Bank Interlock Switch

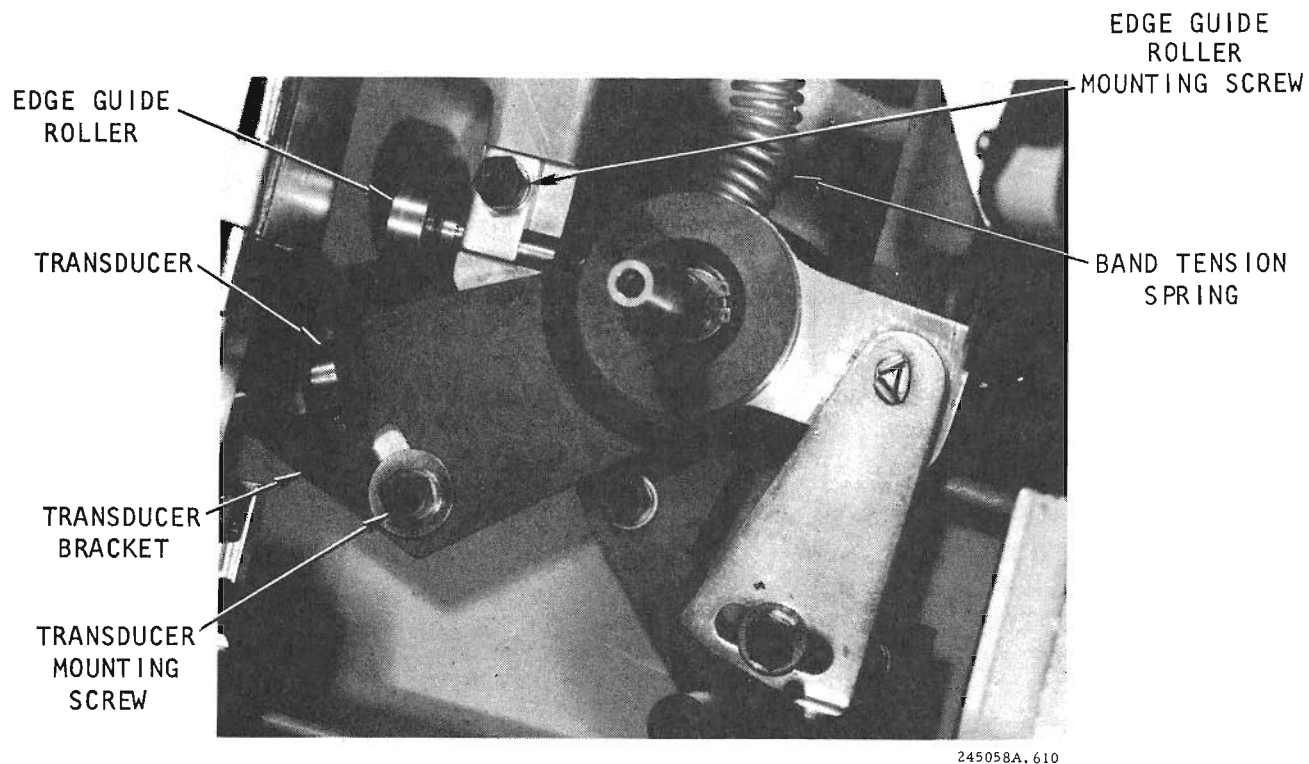


Figure 6-10. Transducer Bracket

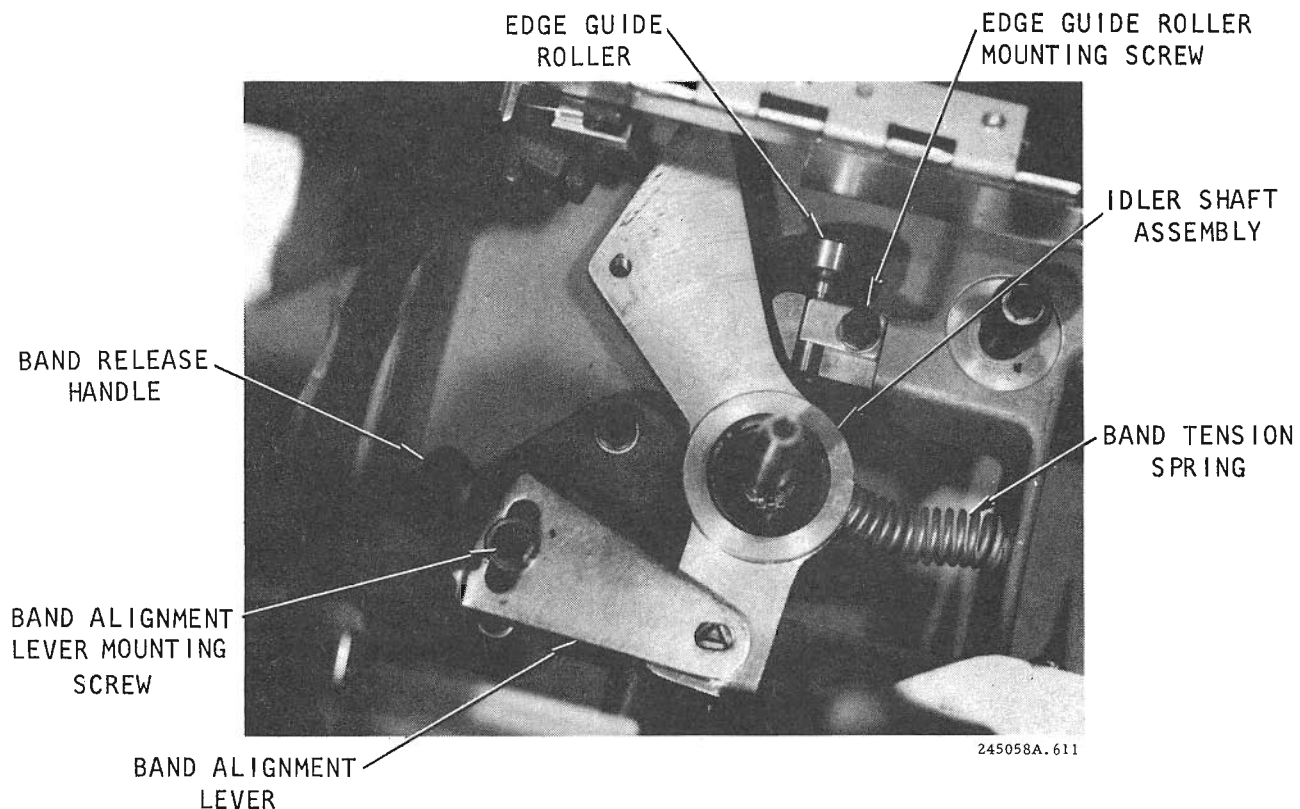


Figure 6-11. Idler Shaft Installed

6.4.14 Band Idler Shaft/Edge Guide Roller Installation

- a. Grasp the idler shaft assembly as illustrated in figure 6-12 (Hammer Bank open) and place into position.
- b. Insert the band tension spring over the nipple and into the detent (on the idler shaft) as shown in figure 6-11.
- c. Install the band alignment lever and mounting screw.
- d. Install the transducer bracket assembly and mounting screw.
- e. Install the pulley assembly by holding the pulley and the driver apart (by hand) and pressing the bottom pulley down until it bottoms out. There is approximately 0.25 inches of travel between pulleys. Install and tighten the band pulley mounting screw.

- f. Install band, check/adjust transducer gap (paragraph 6.2.8) and check/adjust the band alignment lever (paragraph 6.2.2) for the proper pulley flotation position.
- g. Install ribbon cartridge and perform printer cover installation procedure (paragraph 6.2.1).
- h. To install the edge guide roller:
Mount the bearing, install the C-ring, install (shaft end flush with casting) and secure the edge guide roller with the mounting screw (see figure 6-13). Perform steps e and g of this procedure.

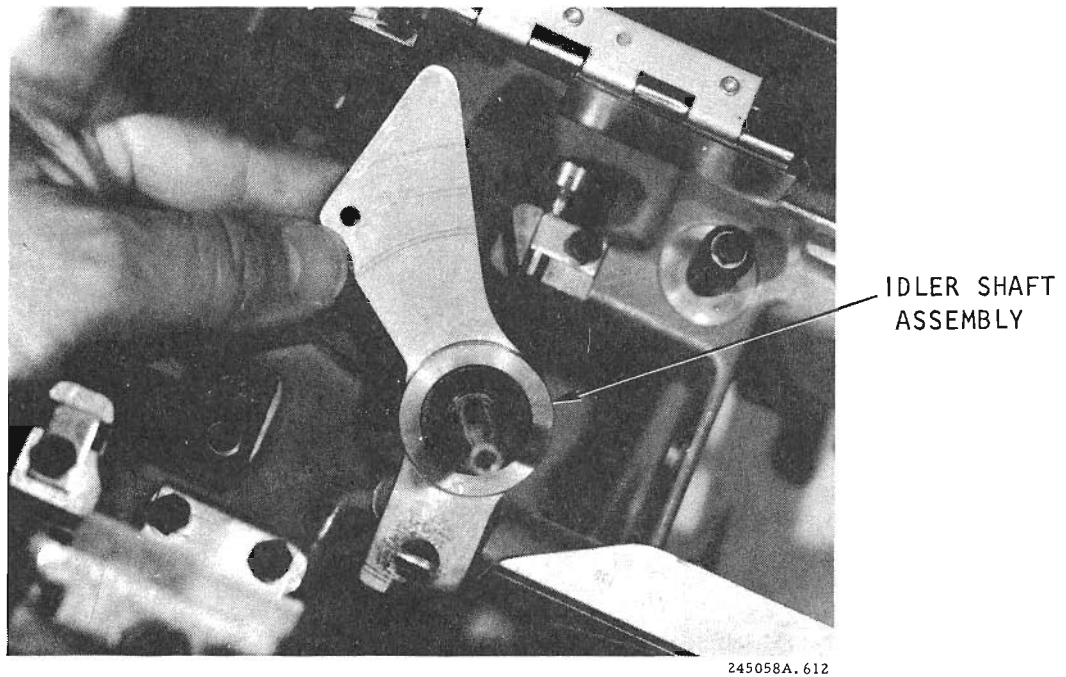


Figure 6-12. Idler Shaft Assembly

6.4.15 Band Motor/Edge Guide Roller Assembly Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the ribbon cartridge and character band.
- c. Remove the left drive pulley mounting screw and lift the drive pulley assembly out (see figure 6-13).
- d. Disconnect the power cable from the power board (see figure 9-2).
- e. Remove the four band motor mounting screws (see figure 6-14) and ribbon drive belt.

- f. Remove the band motor assembly.
- g. To remove the edge guide rollers:
Remove the C-ring and the bearing (if required).

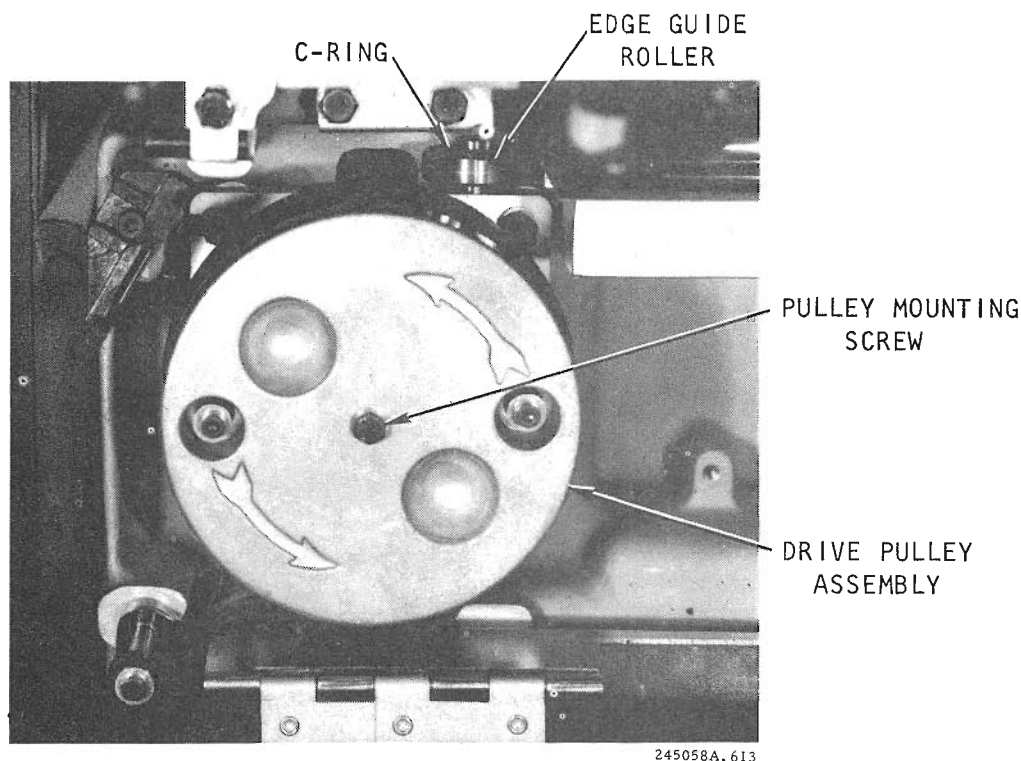


Figure 6-13. Pulley Assembly

6.4.16 Band Motor/Edge Guide Roller Installation

- a. Install the bearing (if removed) and secure with the C-ring.
Note: Edge guide roller must be positioned to the rear.
- b. Install the motor assembly as illustrated in figure 6-14. Feed the power cable through and connect to the Power Board (see figure 9-2).
- c. Secure the motor with the four mounting screws.
- d. Install the ribbon drive belt.
- e. Install the pulley assembly by holding the pulley and the drive apart (by hand) and pressing the bottom pulley down until it bottoms out. There is approximately 0.25 inches of travel between pulleys.

- f. Install and tighten the pulley mounting screw.
- g. Install the band and ribbon cartridge and perform the printer cover installation procedure (paragraph 6.2.1).

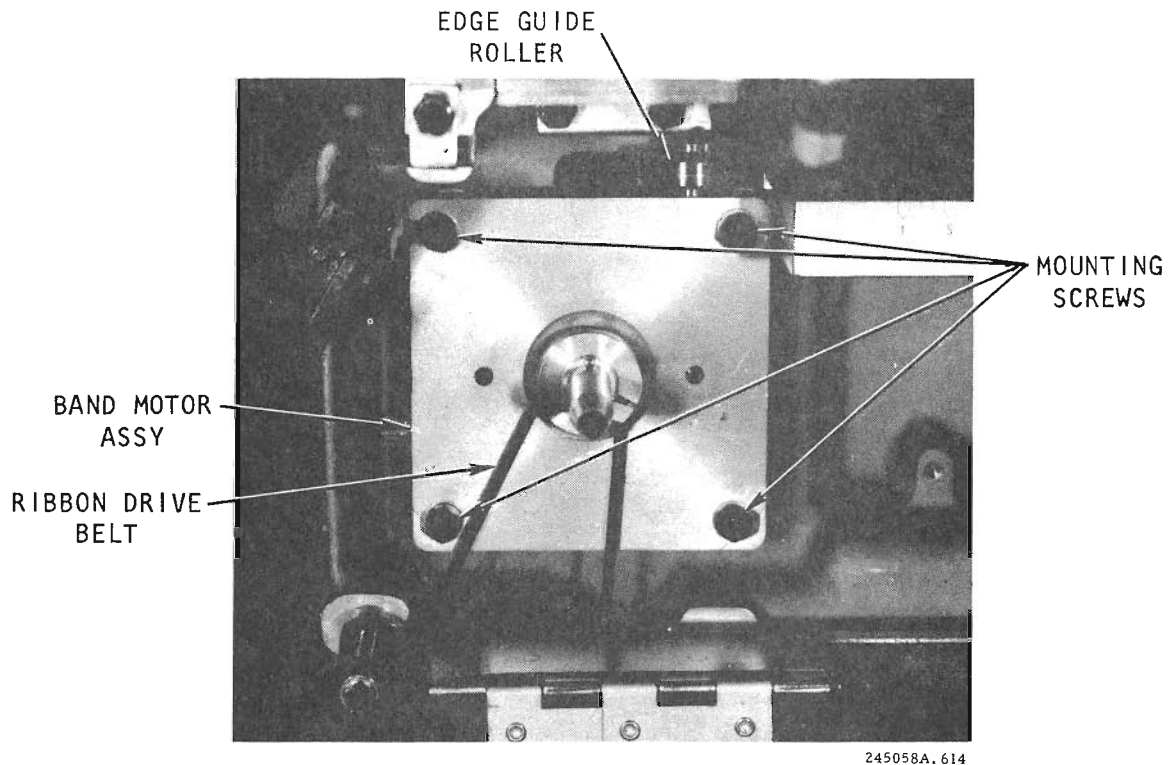


Figure 6-14. Band Motor Assembly

6.4.17 Ribbon Drive and/or Pivot Arm Assembly Removal

- a. Perform the printer cover removal sequence (paragraph 6.2.1).
- b. Remove the ribbon cartridge.
- c. To remove the Ribbon Drive Assembly:
Remove the three band cover mounting screws and lift off the band cover.
- d. Loosen the pivot arm assembly mounting screw, lift up and swing out (see figure 6-15).

- e. Remove the two hex head mounting screws (figure 6-15), slide off the ribbon drive belt and lift out the Ribbon Drive Assembly.
- f. To remove the Pivot Arm Assembly:
Remove the mounting screw (figure 6-15) and lift out.

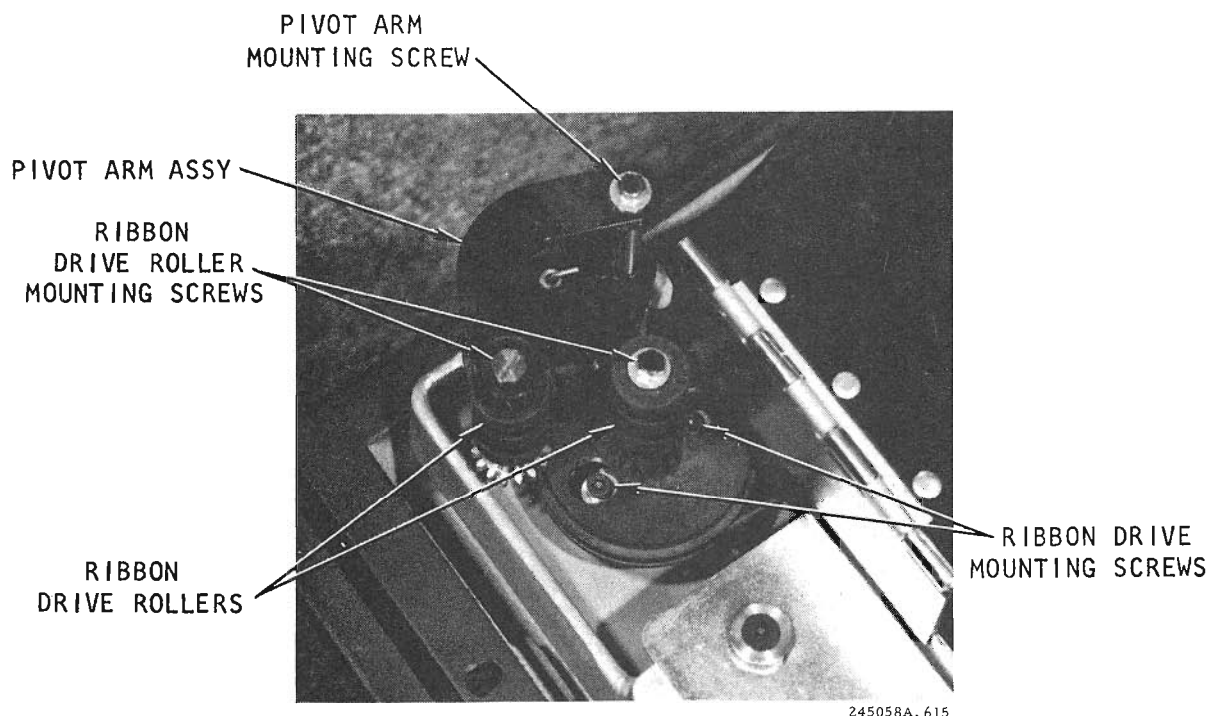


Figure 6-15. Ribbon Drive Assembly

6.4.18 Pivot Arm and/or Ribbon Drive Shaft Assembly Installation

- a. To install the Ribbon Drive Assembly:
Insert the ribbon drive assembly into position and secure with the two mounting screws. Mount the ribbon drive belt (see figure 6-15).

Swing the pivot arm assembly back, attach the tension spring, and tighten the mounting screw (figure 6-16).

Install the band cover assembly, position the band cover so that it clears the left rear ribbon guide and the left band pulley (hammer bank open).

- b. To install the Pivot Arm Assembly:
Install the pivot arm assembly, attach the tension spring, and secure the mounting screw.
- c. Perform the printer cover installation procedure (paragraph 6.2.1).

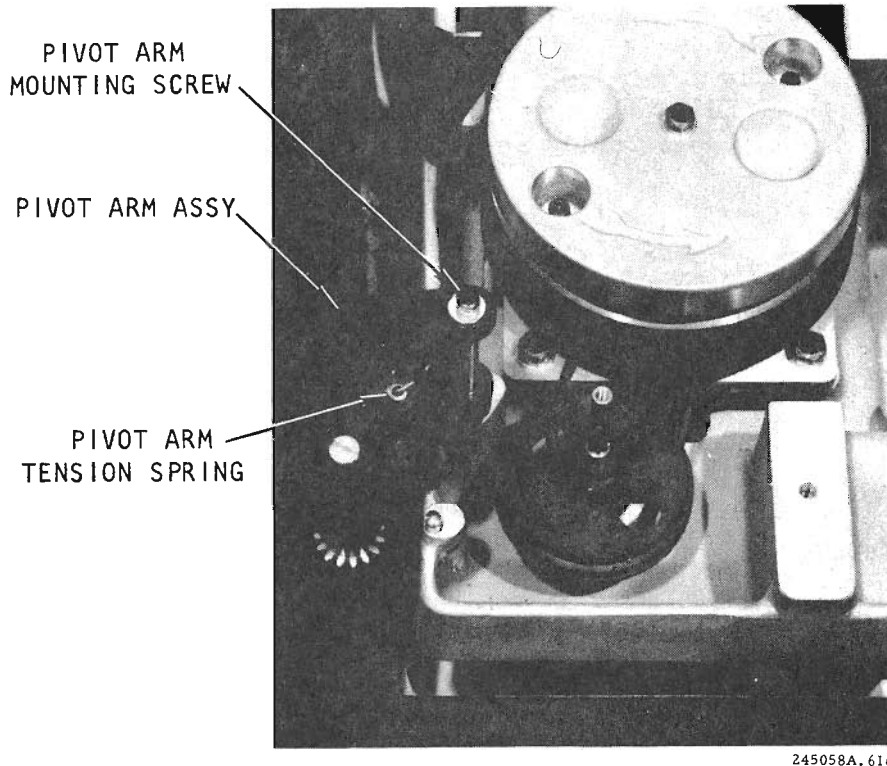


Figure 6-16. Pivot Arm Assembly (Roller Removed)

6.4.19 Paper Clamp Solenoid Assembly Removal

- a. Perform the printer cover removal sequence (paragraph 6.2.1).
- b. Remove the ribbon cartridge and character band.
- c. Open the hammer bank and remove the ribbon mask.
- d. Remove the two hammer bank mask mounting screws and mask.

- e. Remove the four mounting screws securing the paper feed assembly (figure 6-17). Disconnect the paper feed motor cable, the paper motion sensor cable and unhook the hammer bank latch springs.
- f. Loosen the four front hammer bank mounting screws and remove the four rear mounting screws and two guide pin hold-down brackets (figures 6-18 and 6-19).
- g. Loosen the two solenoid assembly mounting screws (figure 6-17), disconnect the three solenoid cables from the power board and disconnect the paper out switch cable.
- h. Move the hammer bank guide pins approximately 1 inch to the rear. Lift the hammer bank assembly carefully and slide out the clamp solenoid assembly (figure 6-19).

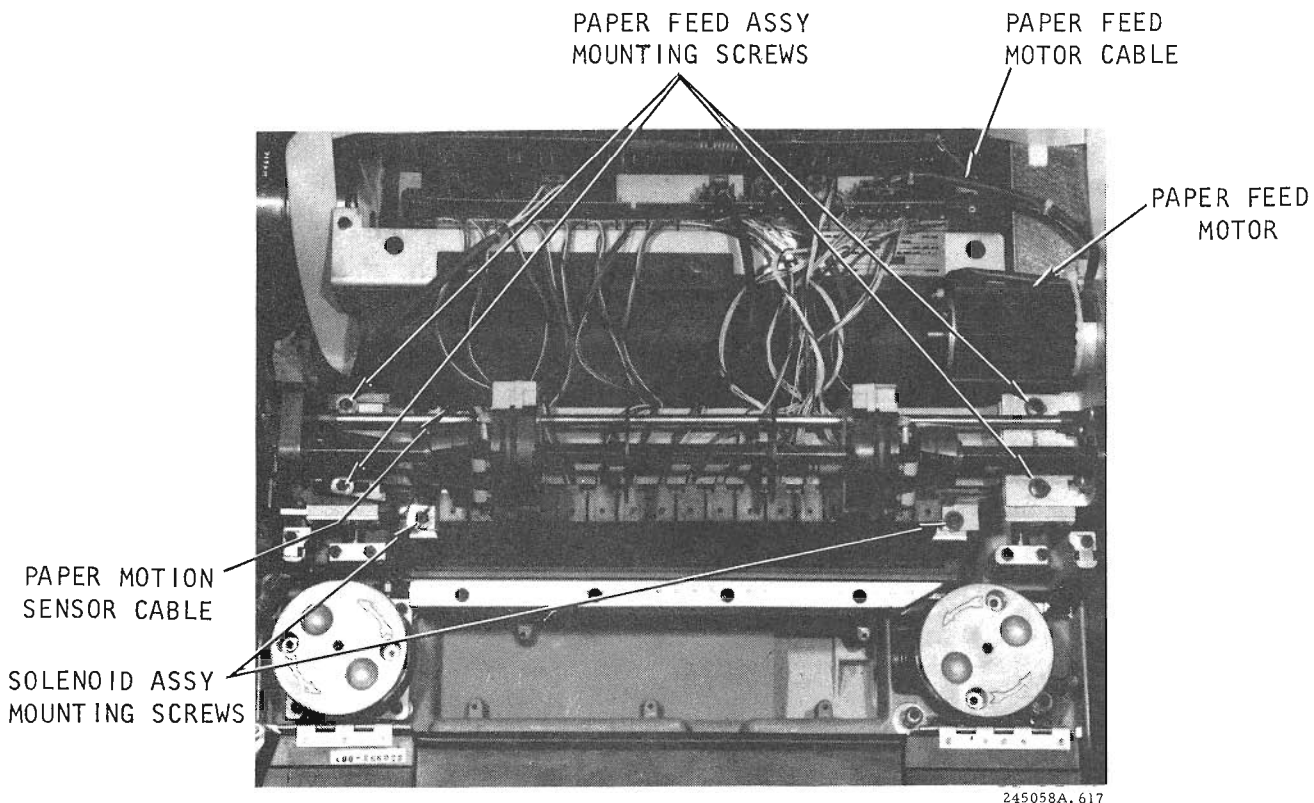


Figure 6-17. Solenoid Clamp Assembly

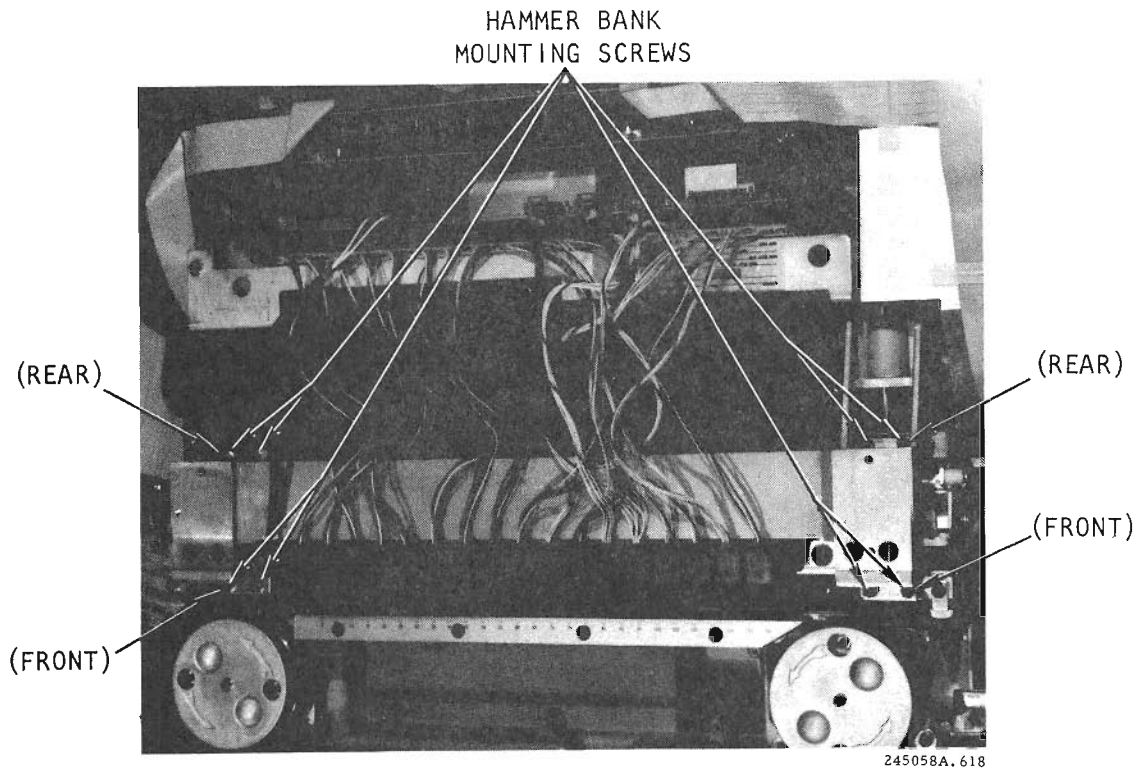


Figure 6-18. Paper Feed Assembly Removed

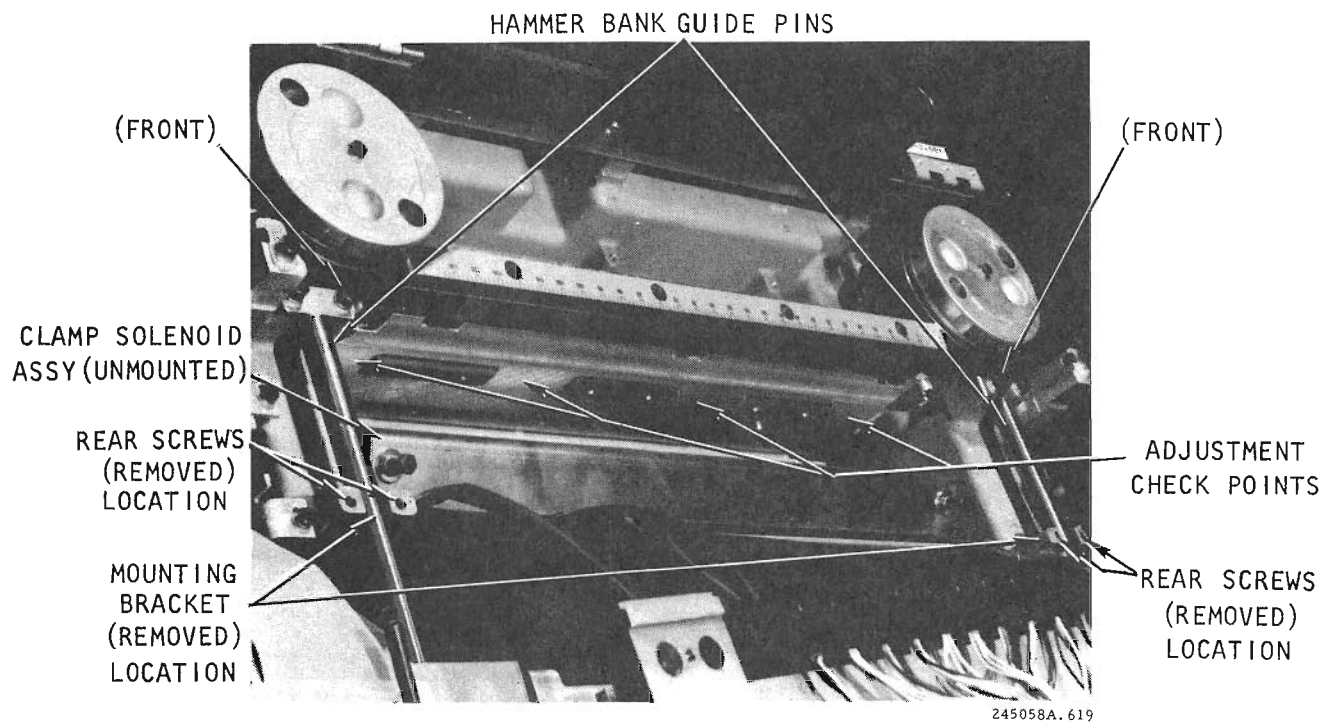


Figure 6-19. Solenoid Adjustment Check Points
(Left Rear View)

6.4.20 Paper Clamp Solenoid Assembly Installation

- a. Attach the clamp solenoid assembly to the hammer bank assembly.
- b. Install the hammer bank assembly. Be sure that the hammer bank latch is positioned properly during assembly and push the hammer bank guide pins against the stop (apply a light film of oil on the guide pins). Install the two guide pin hold-down brackets and the four mounting screws. Tighten all eight mounting screws. Verify that the hammer bank moves freely in both directions.
- c. Position the paper feed assembly so the left base mounting bracket (slotted) aligns with the left (hammer bank) bracket corner. Secure with the four mounting screws.
- d. Connect the paper feed motor cable, the paper out switch cable, and the paper motion sensor, and hook up the hammer bank latch springs.
- e. With a 1 mm (.040 in) feeler gauge (hammer bank closed), adjust the solenoid assembly for parallelism to the armature assembly, with the feeler gauge inserted vertically at the points illustrated in figure 6-19.
- f. Install and secure the hammer bank mask.
- g. Install the ribbon mask, the character band and the ribbon cartridge.
- h. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.21 Transducer Removal

- a. Perform the printer cover removal procedure (paragraph 6.2.1).
- b. Remove the paper exit chute and the circuit card cover.
- c. Open the band release handle.
- d. Loosen the transducer set screw (see figure 6-20).
- e. Disconnect the transducer cable assembly and remove the transducer.

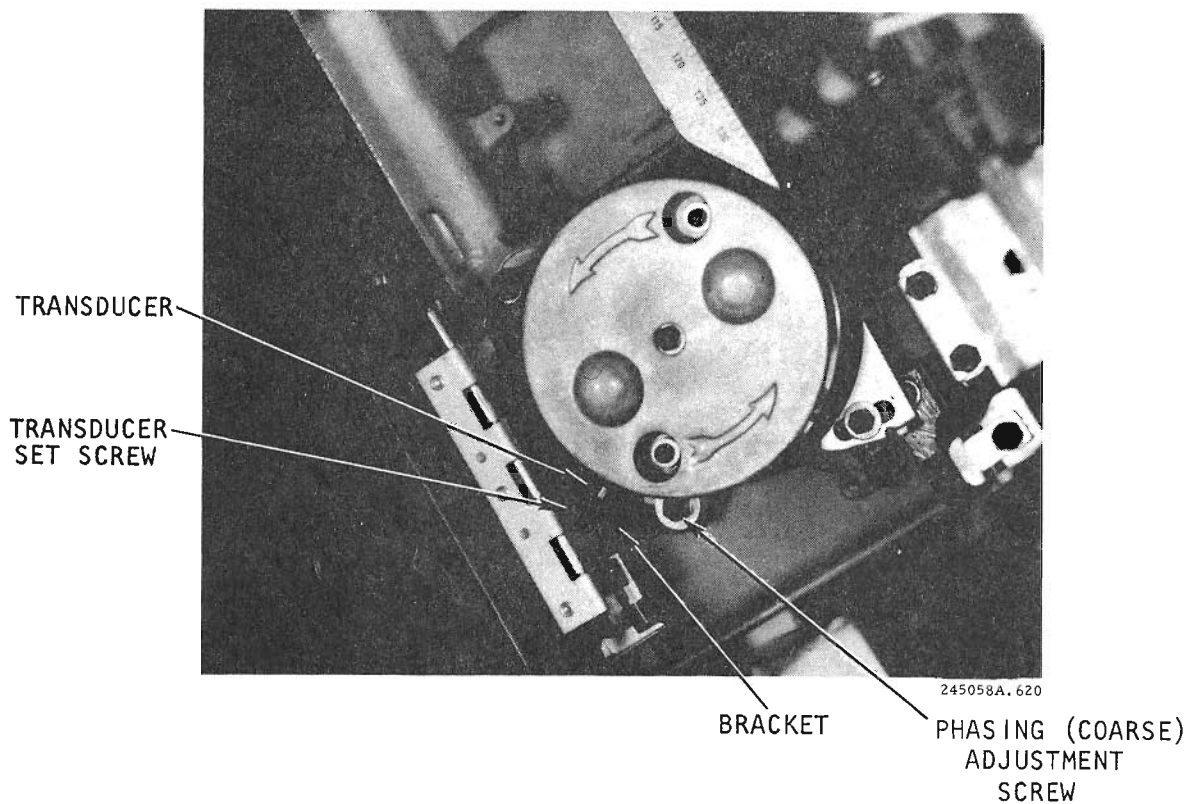


Figure 6-20. Transducer Assembly

6.4.22 Transducer Installation

- a. Insert the transducer into the holder, feed the cable through and connect to the Timing and Status Board.
- b. Close the band release handle (band installed) and spin the band a few times.
- c. With a .125 mm (.005 in) feeler gauge, adjust the transducer and tighten the set screw (paragraph 6.2.8).
- d. Install the paper exit chute and circuit card cover.
- e. Perform the transducer phasing adjustment (para. 6.2.9).
- f. Perform the printer cover installation procedure (paragraph 6.2.1).

6.4.23 Sprockets, Paper Drive Motor, and Shaft/Clutch Assembly Removal

- a. Perform the printer cover removal sequence (paragraph 6.2.1).
- b. Remove the paper exit chute (see figure 9-4).
- c. Remove the right-hand mounting screws (see figure 6-21) and the left-hand C-ring. Unplug the paper motion sensor cable.
- d. Move the clutch assembly to the right, allowing the drive belt to slide off to remove the clutch assembly. Squeeze the release knobs and slide the sprockets off to the left.
- e. To remove the paper drive motor:
Remove the three motor mount screws, the belt, and the power cable.

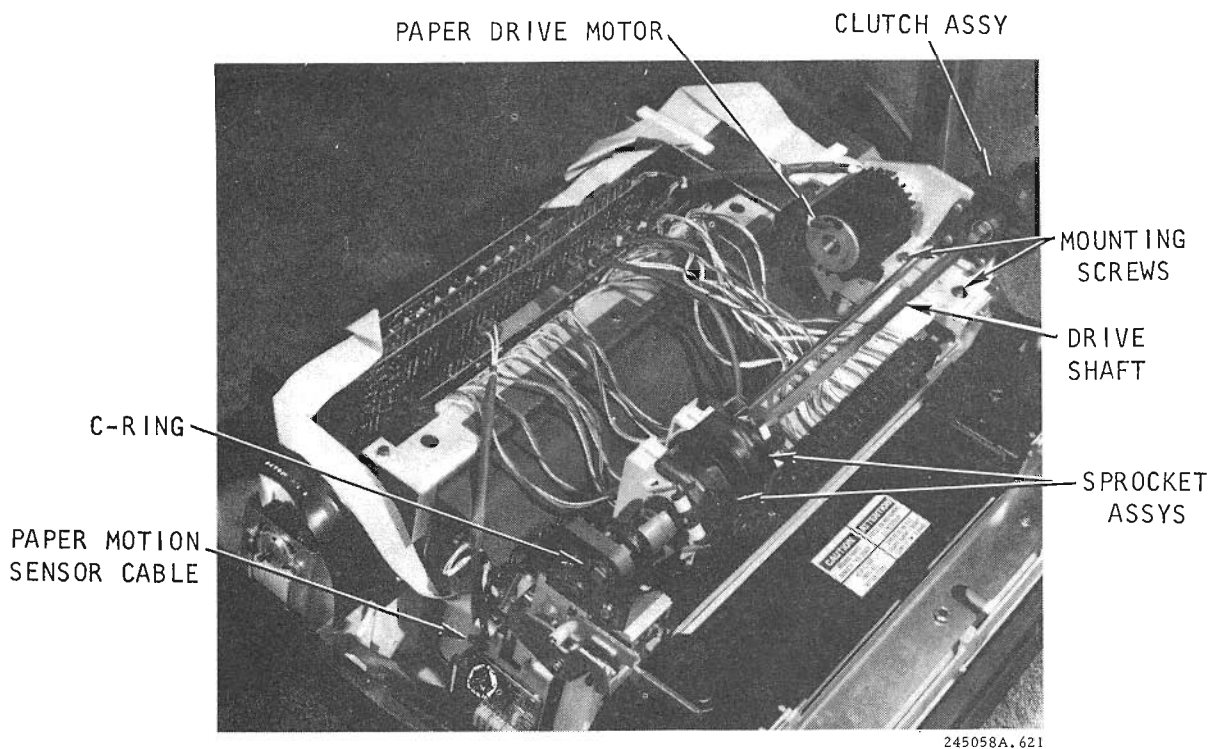


Figure 6-21. Paper Feed Assembly

6.4.24 Sprockets, Paper Drive Motor, and Shaft/Clutch Assembly Installation

- a. If removed, install the clutch assembly first, then install the sprocket assemblies.
- b. Install the paper drive motor belt. Slide the clutch assembly/shaft to the left into the plastic bushing and secure with the C-ring.
- c. Secure the clutch assembly/shaft with the two mounting screws.
- d. To install the Paper Drive Motor:
Install the paper drive motor and belt. Pull the paper drive motor against the belt until all slack is removed. Secure with the three mounting screws and connect the motor power cable.
- e. If removed, reinstall the paper exit chute (see figure 9-4).

SECTION VII

PRINTER SYSTEM TROUBLESHOOTING

7.1 INTRODUCTION

This section contains the information necessary to troubleshoot the printer with the aid of the fault indicator status readout.

7.2 SYSTEM TROUBLESHOOTING

The System Troubleshooting Guide, table 7-1, lists status indications for some possible faults, the definitions of those faults, the possible corrective actions, and probable cause and remedy. The guide groups the status checks into four sections as follows:

- a. Basic Machine Requirements - Status Indicators 1-7 (Operator correctable)
- b. Optional Related Checks - Status Indicators 8-19 (Operator correctable)
- c. Printer/User System Checks - Status Indicators 20-39 (Technician correctable)
- d. Printer Hardware Checks - Status Indicators 40 and higher (Technician correctable)

For assistance in board isolation or assembly troubleshooting, refer to the Fault Probability Guide, table 7-2. Here the specific faults are analyzed and broken down as they relate to the most probable circuit board that pertains to the indicated fault.

There may be instances when the printer may not power up. If this is the case, refer to figure 7-1 for the Power-Up flow chart, which lists probable reasons and suggested remedies.

For a general overview of the printed circuit board (PCB) functions and how they interface as a total printer system, refer to the PCB Module Interface and Function Diagram, figure 7-2.

Many printer faults or problems will be denoted by the Status Indicator on the Control Panel. However, the printer front door must be open in order to view the readout. Other problem areas such as print quality must also be taken into consideration. Many of the print quality problems can be attributed to lack of cleanliness, incorrect paper and ribbon selection, or lack of attention to the control panel adjustments and specific maintenance procedures. Some typical print quality problems and probable causes are listed as follows:

PROBLEM	PROBABLE CAUSE
Left or right portions of all characters missing	(1) Improper PHASES Control setting. (2) Improper COPIES Control setting.
Smeared characters	(1) Dirty band (2) Ribbon too wet (inky) (3) Poor paper quality.
Carbon copies too light or too dark	(1) Improper COPIES Control adjustment. (2) Too many copies or paper too stiff. (3) Poor quality carbon.

TABLE 7-1. SYSTEM TROUBLESHOOTING GUIDE

Diagnostic Display	Definition	Action	Probable Cause	Remedy
01	Paper supply low	1	No paper	Install paper
02	Paper motion fault	1	No paper motion for 8 line feed commands	Clear paper jam, plug in stepper motor connector
03	Band or cover not locked	2	Band or cover open	Close band cover or band release lever
04	Hammer bank not closed	2	Open hammer bank gate	Close hammer bank gate
05	Undefined character band loaded	1	Wrong band or PROMs	Replace with valid band or PROM
06	Undefined form length selected	2, 1	Line length & line pitch not compatible (illegal form size)	Set 6/8 LPI switch or FLSS ---- (FLSS option only)
09	No tape in reader	1	No tape in reader during tape load operation	Install valid paper tape
10	VFU memory not loaded	1	VFU memory not loaded & paper instruction received	Reload VFU memory
11	Tape reader jam	1	Tape reader halted or jammed	Replace or reinsert VFU tape
12	No Top of Form in tape	1	No channel 1 hole or tape inserted wrong	Replace with valid tape or install correctly
13	Tape too long	1	Load longer than 144 lines (TCVFU)	Limit TCVFU to 144 lines
14	Channel not found	1	Channel data not found in VFU memory	Install valid tape, or reload DAVFU
15	Unable to read tape	1	Unable to successfully read and verify tape	Validate tape
20	No data comparison	1	Data loaded and edited ok but can't print	Validate data
21	Print inhibit	2	Print inhibit switch on	Place print inhibit switch to OFF position
22	Interlock cable error	3	Interlock cable not connected	Connect or reseat interlock transition board cable
23	I/O parity error, data load	1	Illegal character from user (visual, but will print)	Normally cleared by user
24	Nine consecutive carriage returns	1	User system - no LF between print data and carriage return	User system - do not over print
25	Format code not recognized	1	Illegal VFU format code received from user system	Channel >12 (a print inhibit command)
26	DAVFU stop code error	1	DAVFU load incorrect	Stop code must be on an even byte. Reload DAVFU
27	DAVFU data transfer >143	1	Data transfer exceeded 286 characters	Correct user system and initialize new DAVFU load
28	VFU check sum error	1	VFU memory error (bit dropout or hard failure)	Reload VFU
29	I/O parity error, DAVFU load	1	Data error (odd parity check)	Validate input data
30	Bad VFU memory	1	RAM will not load data	Replace interface board
32	Band system fault	3	Excess band drag or paper too thick	Clean band, platen, or change paper
41	Paper drive system fault	3	Power board fault, paper clamp open, or power board not seated or stepper motor shorted	Replace power board or shorted items
42	Hammer system fault	3	Hammer firing in not print mode (open hammer or connector off)	Replace hammer driver board, reconnect connector
43	12 volt fault	1, 3	Over-voltage and under-voltage	Replace power board
45	-9 volt fault	3	Power supply, fuse F2	Reset circuit breaker, replace F2, replace rectifier bd.
46	VCL fault	3	VCL under/over-voltage or shorted to ground	Replace power board, replace hammer drive board, replace rectifier board, check clamps
47	+38 volt fault	3	Power supply, defective relay, fuse F1	Repair power supply, replace relay, replace Timing and Status Board or F1
48	Transducer fault	3	Transducer out of adjustment, defective or unplugged	Adjust gap to .005 or replace transducer
60	Start motor routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
61	Idle routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
62	Data load routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
63	Edit routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
64	Print routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
65	Format routine (failure mode)	1, 3	Undefined (hard true on system status lines)	Interface, Processor, or Power Board
66	Self test mode - print inhibit	2	Self test and print inhibit switches ON	Place self test and print inhibit switches to OFF
67	Self test mode	2	Self test switch in TEST position	Place switch to OFF position
68	DAVFU load routine		Normal indication	
76	ON LINE - print inhibit	2		
77	ON LINE	-		
80	OFF LINE, Ready	-		
89	Power fault	3	+5V, +12V, or +6.2V ref out of tolerance	Reset circuit breaker or replace power supply fuses, power board
H	Hot condition	3	No air flow, or disconnected fan	Clean and/or replace fan, or connect fan
C	Clock fault	3	System clock or processor board	Replace timing and status board, processor board

HARD FAULTS
SYS. STATUS
CHANGE
HARD FAULTS
REFLECT FAULTS

SHOULD VARY W/ COPIES CONTROL
1.3 TO 1.5 V NORM.
AS READ AT PIN 40 OF PI ON
THE POWER OR HAM DRIVE BOARDS

NOT MOVING

06 RICHES MOTION FAULT

32 (VS PARALLEL MUST BE IN VFU NOT FLSS)

31

"Cleared by" F1 ON INTERPACE BRD.

- Action
1. Press alarm/clear switch
 2. Correct error or change status
 3. Turn power OFF and ON

MODE ERROR
DAVFU ERROR

USER CODE RECD. WHILE IN FLSS MODE.
DATA LOAD ERROR.

TABLE 7-2. FAULT PROBABILITY GUIDE

Status Display	Definition	Interface Board (A2)	Processor Board (A3)	Timing & Status Board (A4)	Power Board (A5)	Hammer Driver Board (A6)	VFU Board	Power Supply	
01	Paper supply low	1	2	4	3	5 N/A	N/A	5	
02	Paper motion fault	1	2	4	3	N/A	N/A	5	ON POWER UP, NO BAND -- BAD PAPER
03	Band or cover not locked	1	2	3	N/A	N/A	N/A	4	
04	Hammer bank not closed	1	2	3	N/A	N/A	N/A	4	
05	Undefined character band loaded	N/A	2	1	3	N/A	N/A	4	
06	Undefined form length selected	1	2	3	N/A	N/A	N/A	4	OK ON TOP OF PDRM - MISSING GED SPARE ON LEFT END OF TRACER SHARP
09	No tape in reader	2	3	4	N/A	N/A	1	5	
10	VFU memory not loaded	2	3	4	N/A	N/A	1	5	
11	Tape reader jam	2	3	4	N/A	N/A	1	5	08162009 WON'T PRINT. REPLACED CENT INT
12	No Top of Form in tape	2	3	4	N/A	N/A	1	5	PIGGY BACK TOGETHER + OK. PAPER
13	Tape too long	2	3	4	N/A	N/A	1	5	BASE MAY HAVE BEEN BLOWN UP OTHER
14	Channel not found	2	3	4	N/A	N/A	1	5	
15	Unable to read tape	2	3	4	N/A	N/A	1	5	
20	No data comparison	1	2	3	N/A	N/A	N/A	4	
21	Print inhibit	N/A	N/A	1	2	3	N/A	4	
22	Interlock cable error	1	2	3	N/A	N/A	N/A	4	
23	I/O parity error, data load	1	2	3	N/A	N/A	N/A	4	
24	Nine consecutive carriage returns	1	2	3	N/A	N/A	N/A	4	
25	Format code not recognized	1	2	3	N/A	N/A	N/A	4	
26	DAVFU stop code error	1	2	3	N/A	N/A	N/A	4	
27	DAVFU data transfer > 143	1	2	3	N/A	N/A	N/A	4	
28	VFU check sum error	1	2	3	N/A	N/A	N/A	4	
29	I/O parity error, DAVFU load	1	2	3	N/A	N/A	N/A	4	
30	Bad VFU memory	1	2	3	N/A	N/A	N/A	4	
40	Band system fault	N/A	2	1	3	N/A	N/A	4	
41	Paper drive system fault	5	4	2	1	N/A	N/A	3	
42	Hammer system fault	N/A	2	1	3	4	N/A	5	
43	12 volt fault	5	4	3	2	N/A	N/A	1	
45	-9 volt fault	5*	4	3	2	N/A	N/A	1	*BLOWN FUSE F2 ON INT BR
46	VCL fault	5	4	3	2	N/A	N/A	1	
47	+38 volt fault	5	4	3	2	N/A	N/A	1	
48	Transducer fault	N/A	2	1	3	N/A	N/A	4	
60	Start motor routine (failure mode)	N/A	2	1	3	N/A	N/A	4	
61	Idle routine (failure mode)	2	3	1	4	N/A	N/A	5	
62	Data load routine (failure mode)	2	3	1	4	N/A	N/A	5	
63	Edit routine (failure mode)	2	3	1	4	N/A	N/A	5	
64	Print routine (failure mode)	2	3	1	4	N/A	N/A	5	
65	Format routine (failure mode)	2	3	1	4	N/A	N/A	5	
66	Self test mode - print inhibit	These are not fault conditions; they are status only.							
67	Self test mode								
68	DAVFU load routine								
76	ON LINE - print inhibit								
77	ON LINE								
88	ON LINE, Ready								
P	Power fault	4	N/A	3	2	N/A	N/A	1	
H	Hot condition	4	N/A	3	2	N/A	N/A	1	
C	Clock fault	5	4	3	2	N/A	N/A	1	

DATA DECODE PROM/CENT INT/PIGGY BK ←

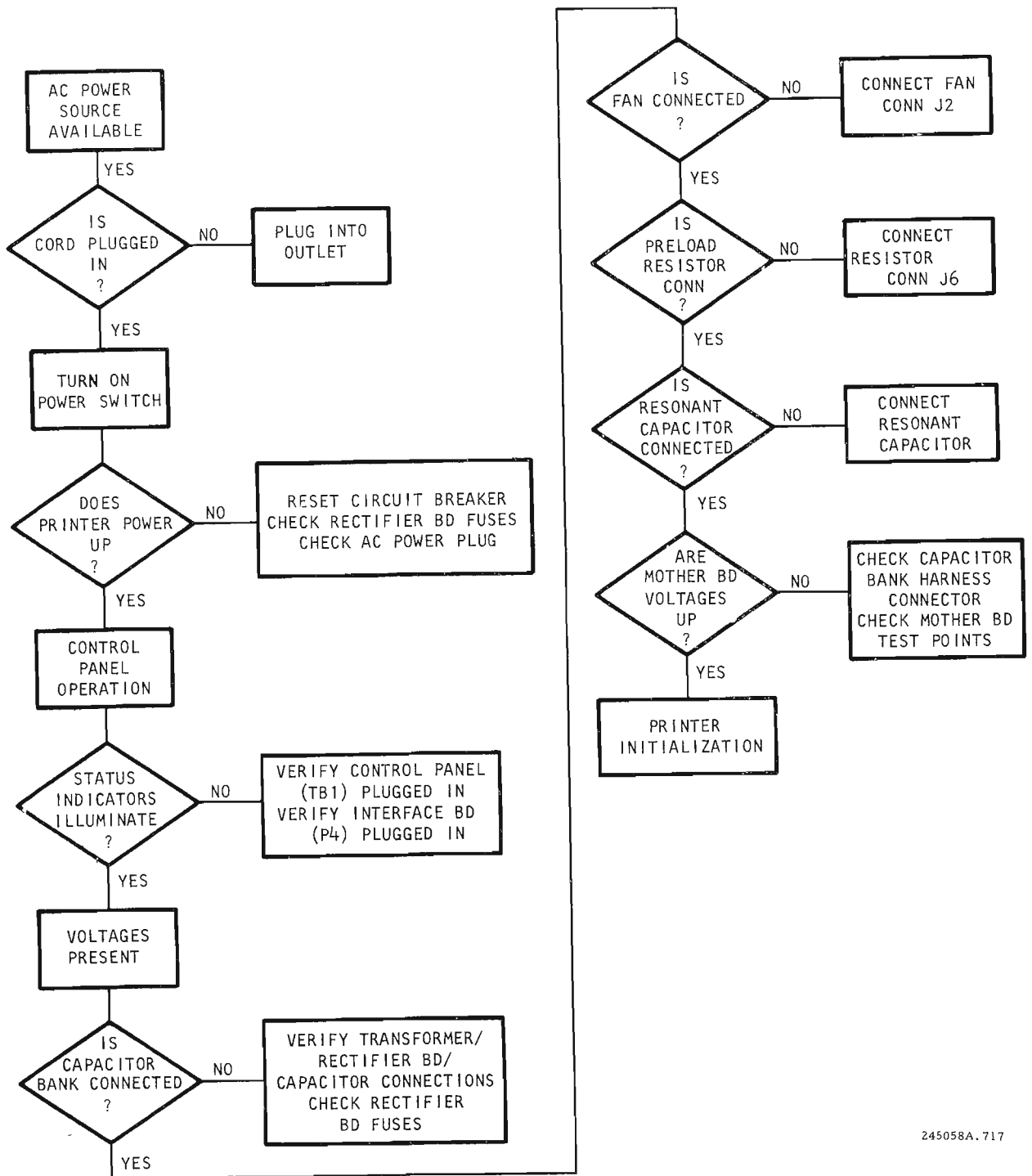
42 ODD HAMMER FLTS
43 EVEN HAMMER FLTS

08162009 WON'T PRINT. REPLACED CENT INT
PIGGY BACK TOGETHER + OK. PAPER
BASE MAY HAVE BEEN BLOWN UP OTHER

*BLOWN FUSE F2 ON INT BR

These are not fault conditions; they are status only.

NOTE: The most likely board to be replaced is signified by number 1; conversely, the least likely is number 5.



245058A. 717

Figure 7-1. Power-up Flow Chart

7.3 FUSE IDENTIFICATION

Table 7-3 lists the various types of protective devices, their ratings and locations. Figure 7-3 illustrates the location of the fuses/circuit breaker(s) in the printer.

TABLE 7-3. FUSE IDENTIFICATION/PROTECTIVE DEVICES

Device	Protects	Location	Voltage	Type
F1	Motors/Clamp and Timing & Status Board	Power Supply Rectifier Board	+38V	12A (3AB)
F2	Timing & Status Board	Power Supply Rectifier Board	-9V	2A S/B (3AG)
F3	Timing & Status Board and Interface Board	Power Supply Rectifier Board	+9V	20A S/B (3AG)
F1	Band Drive and Stepper Motor	Power Board	+38V	6A (3AG)
F1	Printer 5V Bus	Interface Board	+5V	2A Sub Miniature
F2	Control Panel and/or TCVFU	Interface Board	+9V	2A Sub Miniature
F3		INTERFACE BOARD		2A SUB MINATURE
CB1	Power Supply	Rear of Printer	Input	8A Thermal
CB2	Power Supply	Rear of Printer (optional Universal Power Supply)	Input	4A Thermal

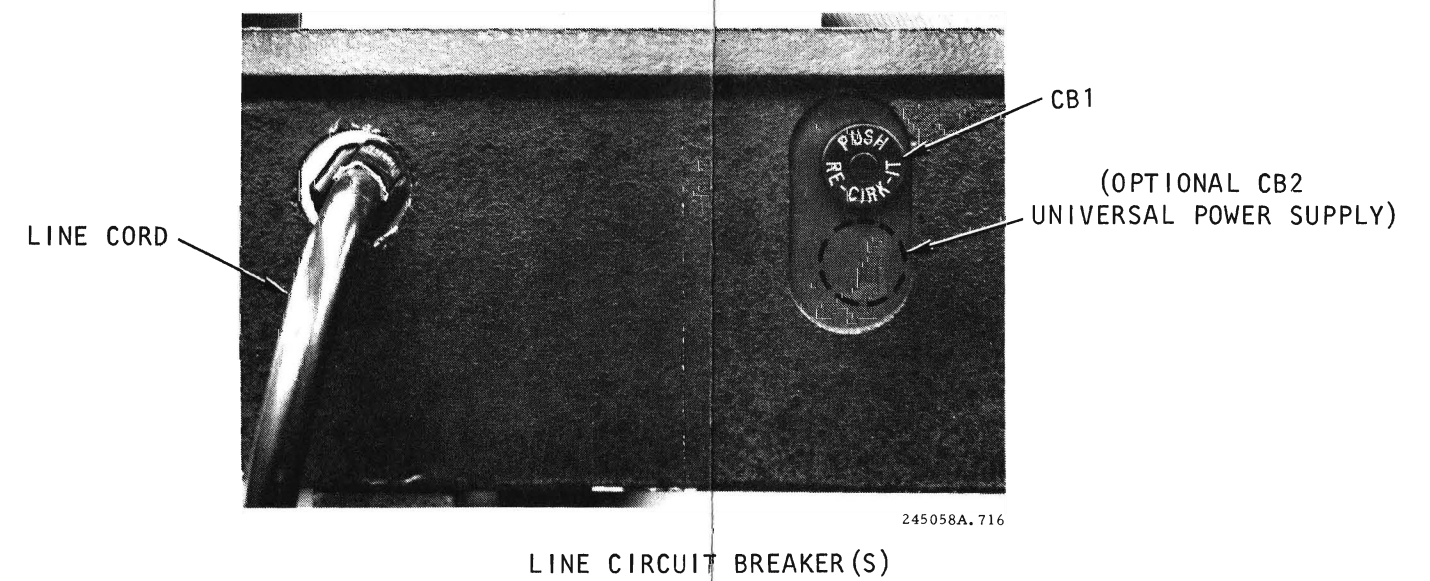
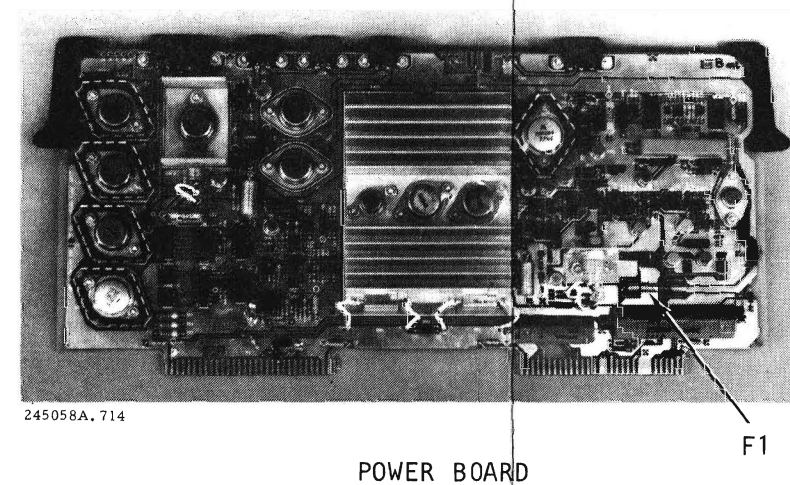
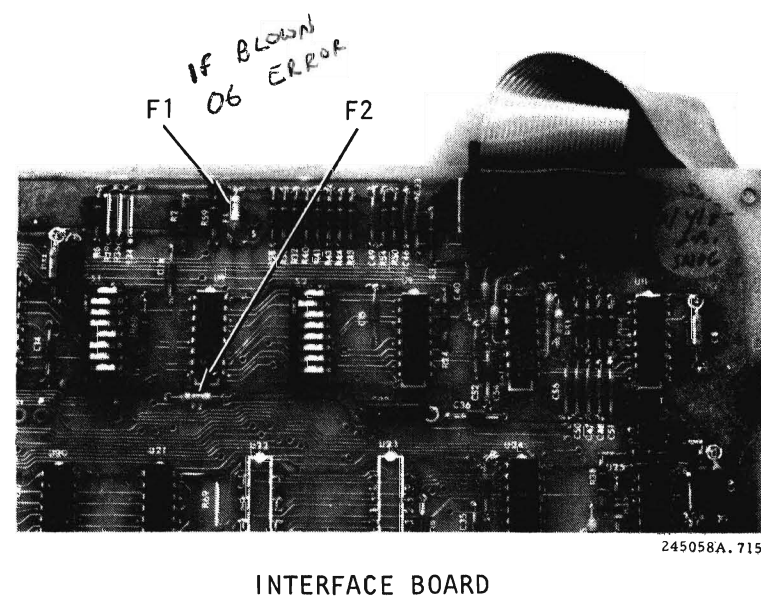
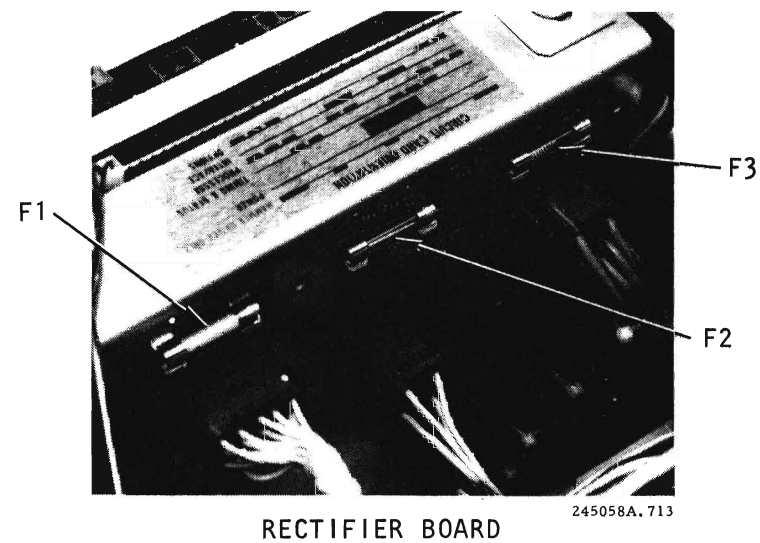


Figure 7-3. Fuse Location

7.4 PRINTED CIRCUIT BOARD TEST POINTS AND REFERENCES

Test points are located on various printed circuit boards. These test points may be used for the monitoring of signals or data in the process of board fault isolation. The field maintenance philosophy is to replace (not repair) the boards when a fault or failure occurs. Figure 7-4 illustrates the Timing and Status Board test points, locations, and the signals found at these test points. Figures 7-5 through 7-9 illustrate the signal waveforms found at the specific test points.

7.4.1 Timing and Status Board Test Points

The following test points are for reference only. No adjustments can be made except for the Transducer Gap (section 6.2.8). The following voltages are nominal.

TP-B - Transducer Threshold Detector (Digitized), 4V P-P

TP-E - Transducer Output, 1.4V P-P

TP-F - Transducer AGC Amplifier Output, 5V P-P

TP-J - Character Clock, 4.5V P-P

TP-L - Hammer Presence, 4V P-P

Figures 7-5 through 7-9 are referenced with the printer in the On line Self Test Mode and operating in a continuous manner.

INTERFACE BRO. SWITCH SETTINGS

S1	S2	S3	S4
1	<input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON	1
2	2	<input checked="" type="checkbox"/> ON	2
<input checked="" type="checkbox"/> ON	3	3	3
4	4	4	4
5	5	5	<input checked="" type="checkbox"/> ON
6	6	6	6
7	<input checked="" type="checkbox"/> ON	7	7
8	8	8	8

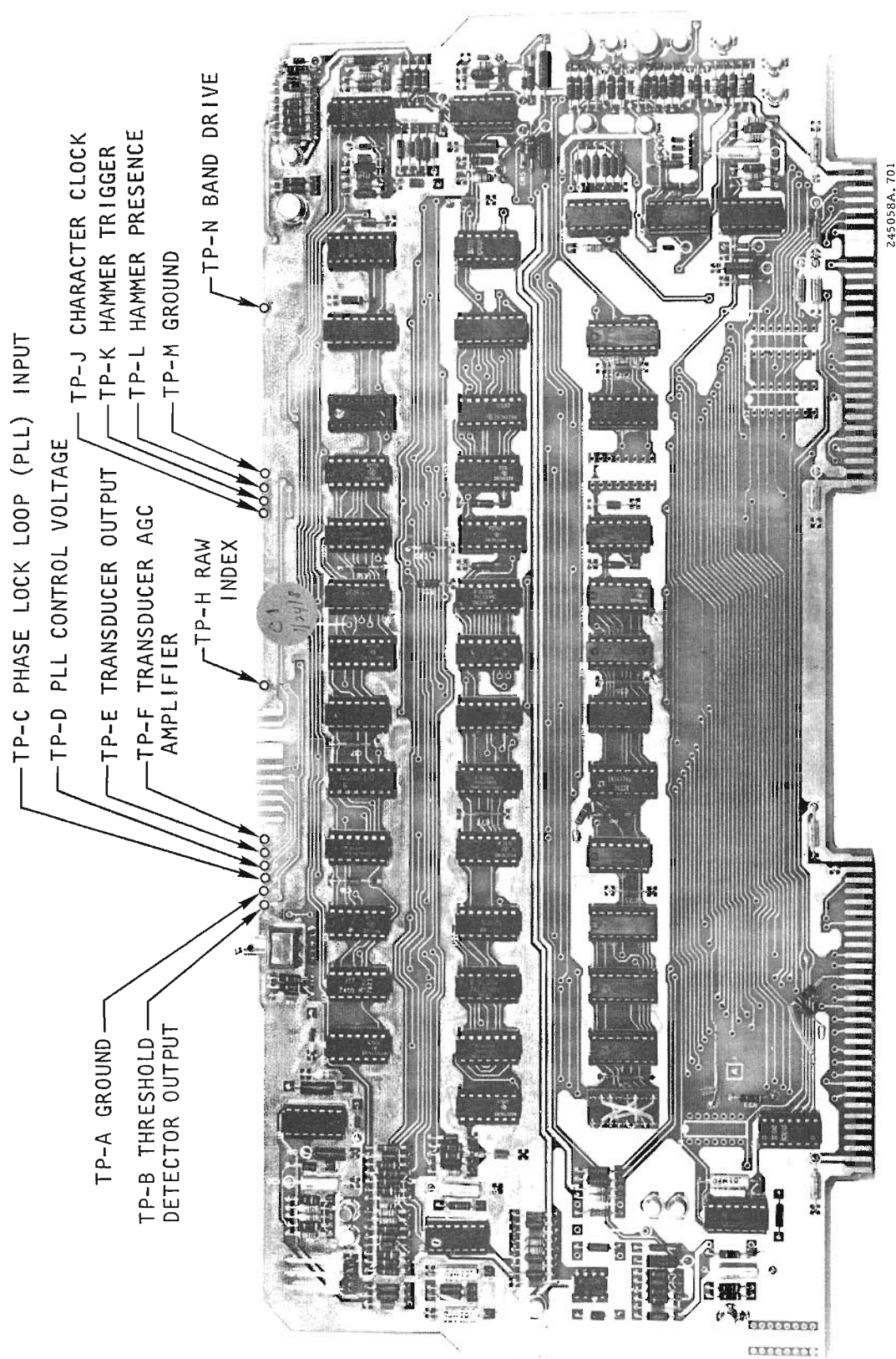
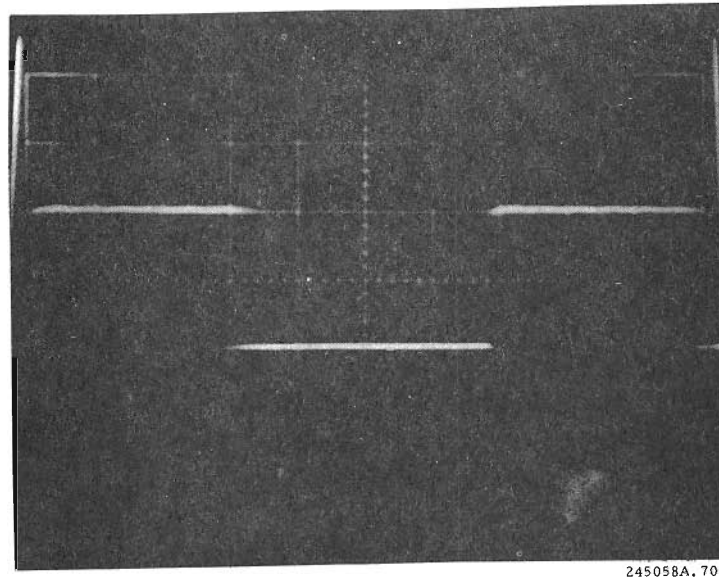


Figure 7-4 Timing and Status Board Test Points



Test Point-B

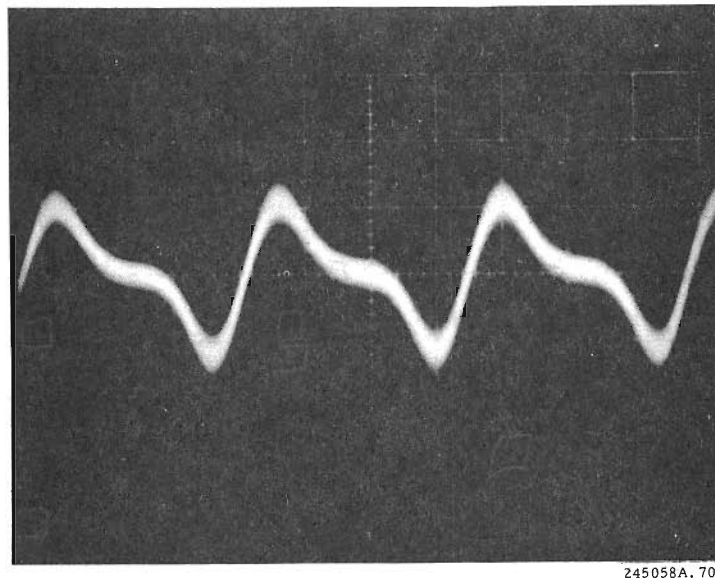
VOLTS/DIV:
2V (DC)

TIME/DIV:
.1 mS

TRIGGER:
Auto, Pos, Int

245058A.702

Figure 7-5. Transducer Threshold Detector



Test Point-E

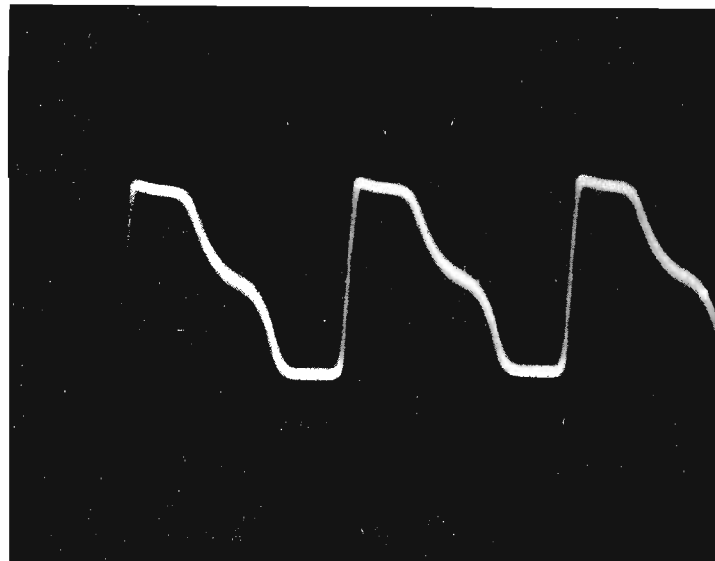
VOLTS/DIV:
500 mV (AC)

TIME/DIV:
2 mS

TRIGGER:
Auto, Pos, Int

245058A.703

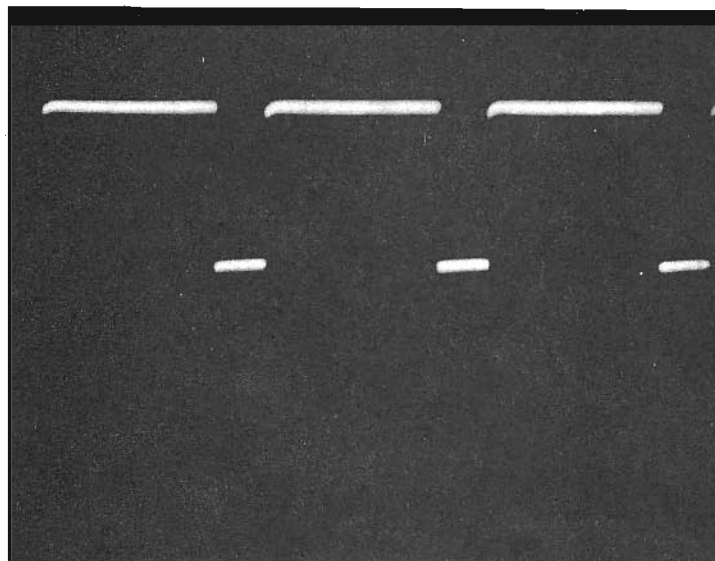
Figure 7-6. Transducer Output



Test Point-F
VOLTS/DIV:
2V (DC)
TIME/DIV:
.2 mS
TRIGGER:
Auto, Pos, Int

245058A.704

Figure 7-7. Transducer AGC Amplifier Output



Test Point-J
VOLTS/DIV:
2V (DC)
TIME/DIV:
.2 mS
TRIGGER:
Auto, Pos, Int

245058A.705

Figure 7-8. Character Clock

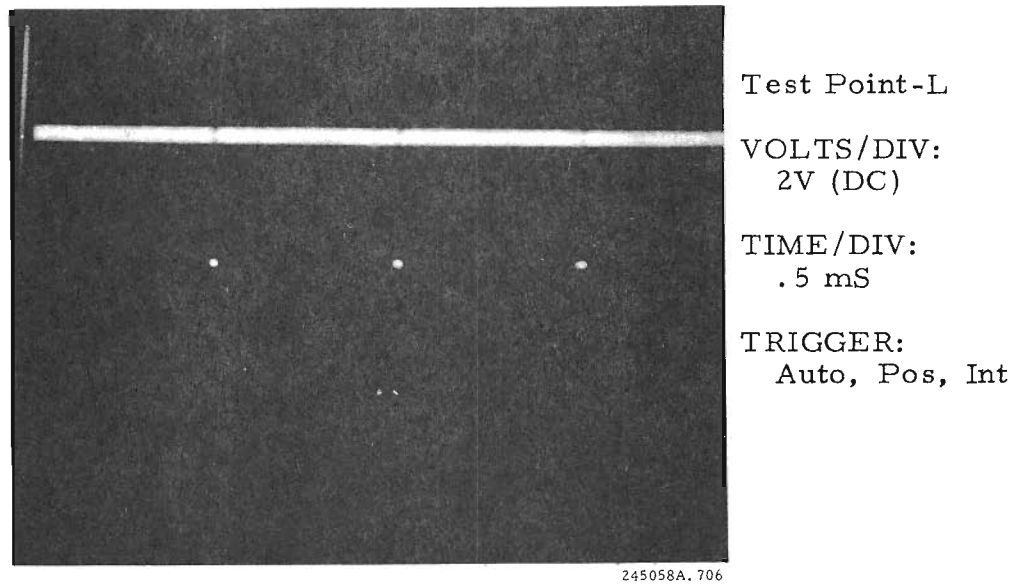


Figure 7-9. Hammer Presence

7.4.2 Interface Board Test Points

The following test points on the Interface Board are for monitoring user data and control signals. The data or information on these test points can only be utilized when all parameters are known. These are reference points only. Figure 7-10 shows the Interface Board test point locations.

7.4.3 Power Board Test Points

The following test points on the Power Board are for reference only. No adjustments can be made. Figure 7-11 shows the Power Board test point locations.

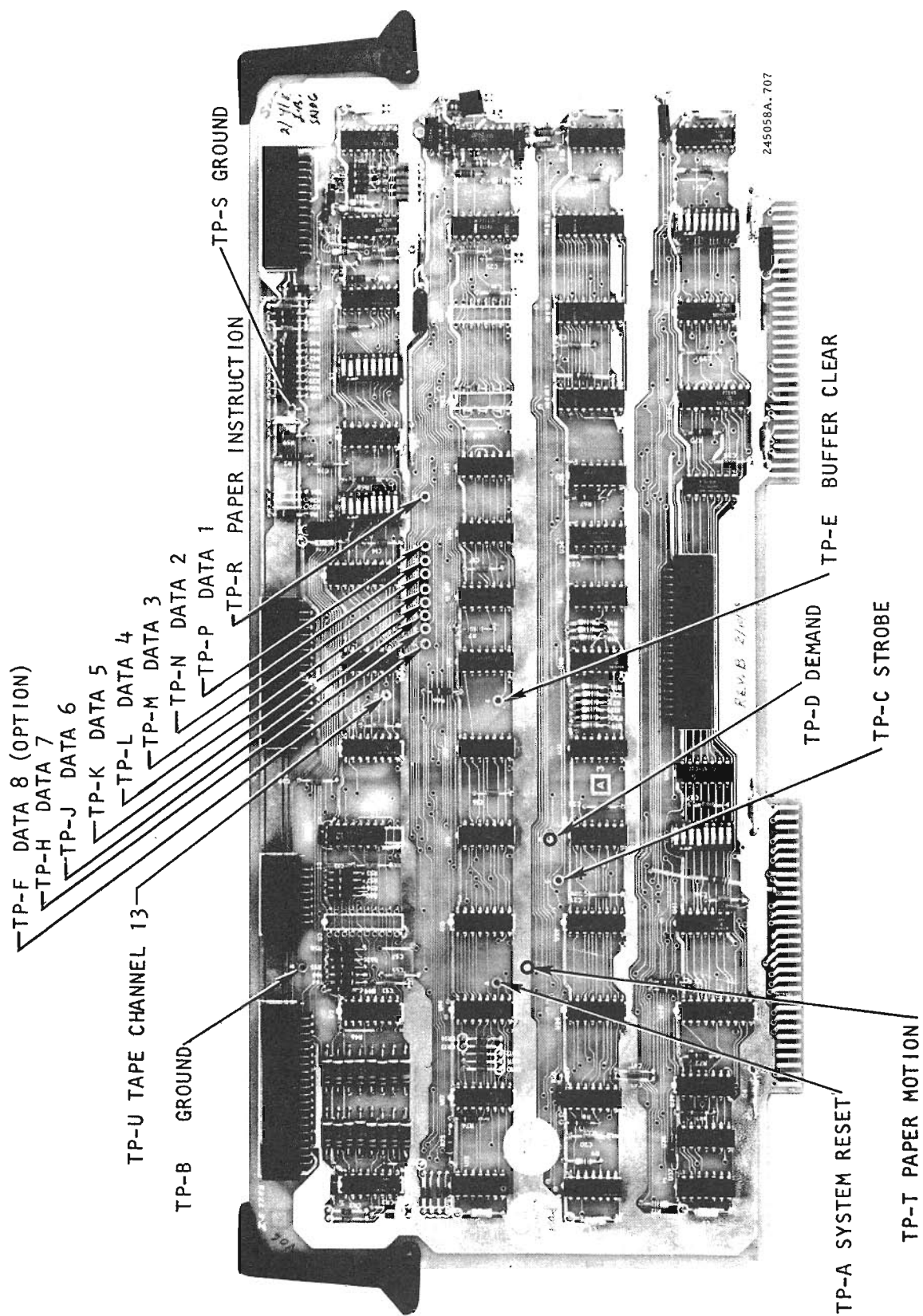


Figure 7-10. Interface Board Test Points

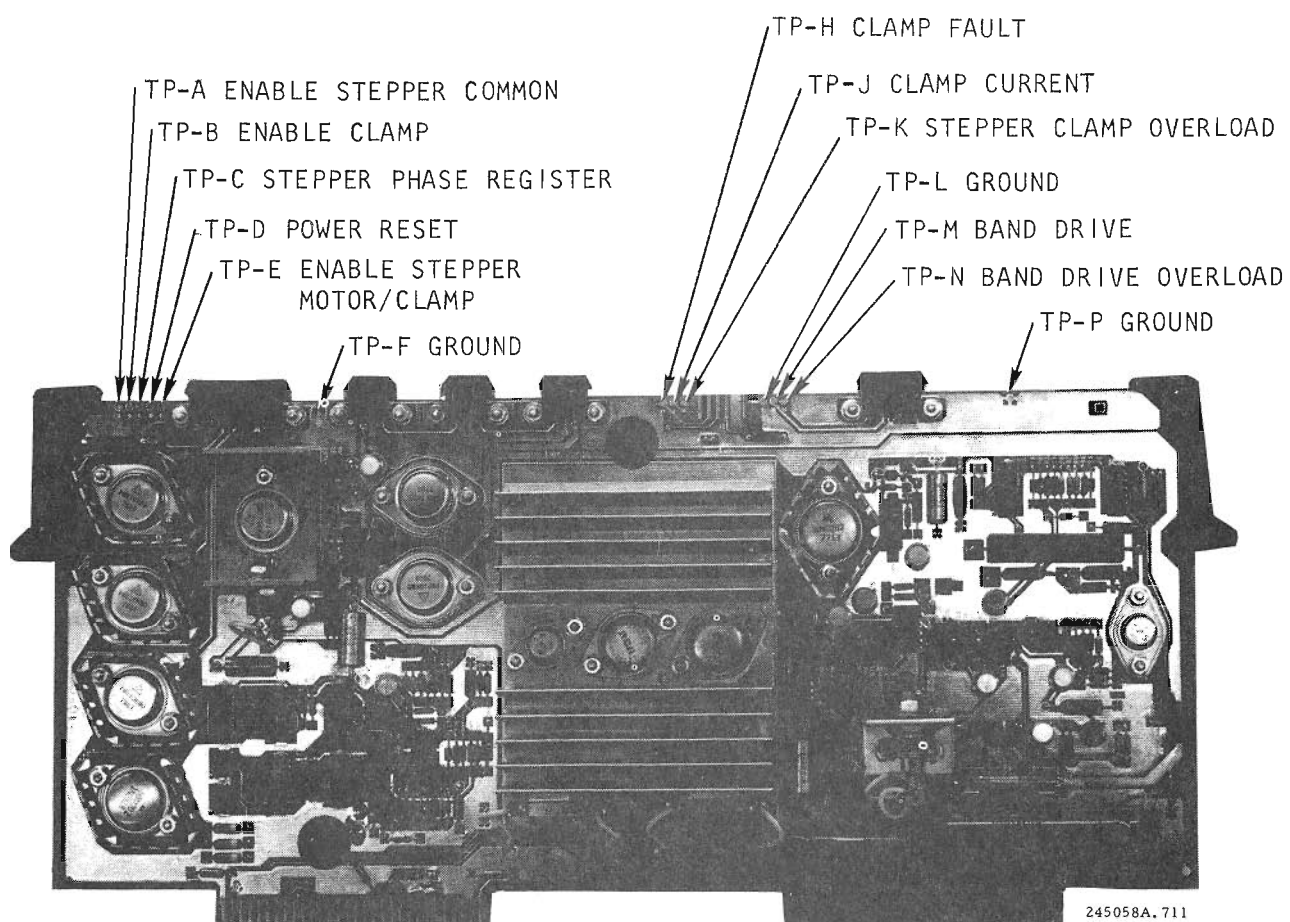


Figure 7-11. Power Board Test Points

7.4.4 Mother Board Test Points

Test points for monitoring voltages are located on the Mother Board. The test points shown are for reference only. No adjustments can be made. Figure 7-12 shows the Mother Board test point locations.

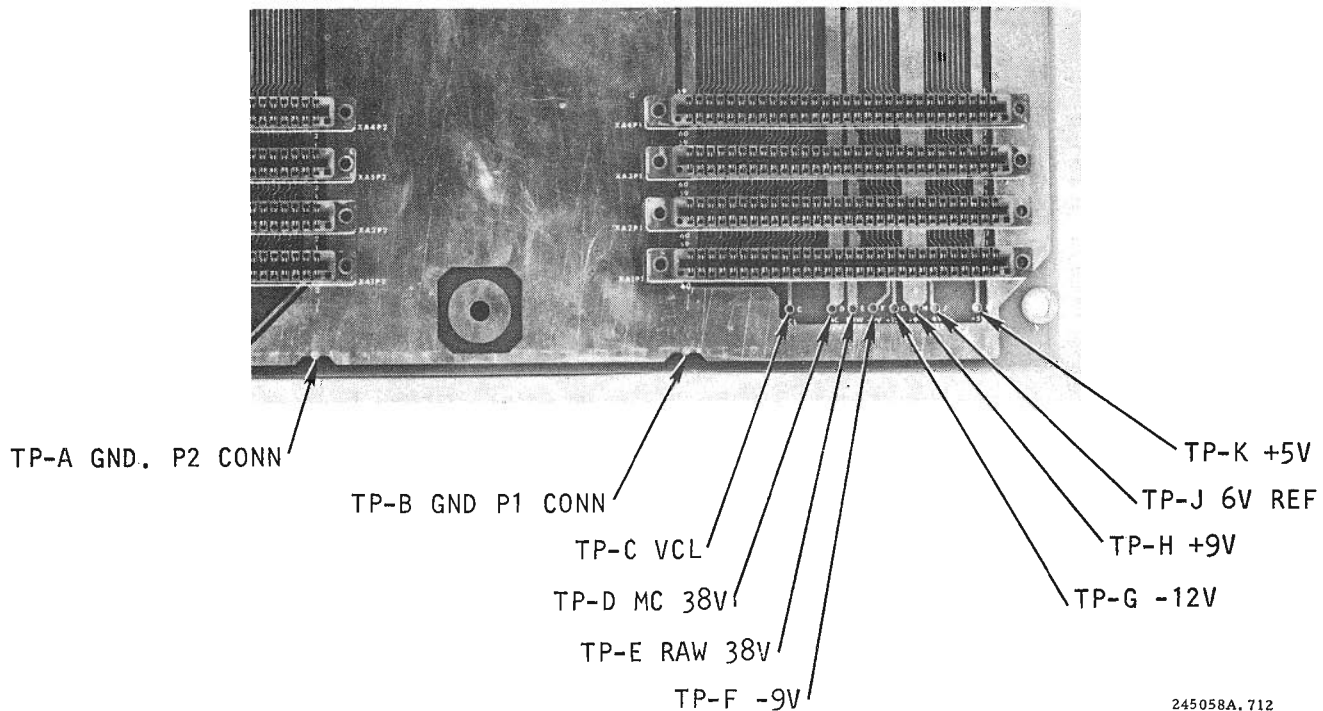


Figure 7-12. Mother Board Test Points

7.4.5 Processor Board Test Points and PROM Location

The following test point is for reference only. No adjustment can be made.

TP-A, B Ground

TP-C Clock

The Processor Board Contains the Operate Program PROMs and the Band Image PROMs. Table 7-4 illustrates the location of each PROM including the FLSS (option) PROM on the Interface Board.

TABLE 7-4. MEMORY LOCATIONS

	No VFU	W/VFU	Option	Location	Part Number
Processor	X	X		MEM1	XXXXXXX-001 } See Note 1 XXXXXXX-001 }
Processor	X	X		MEM2	XXXXXXX-002 } See Note 1 XXXXXXX-002 }
Processor	X	X		MEM3	XXXXXXX-003 } See Note 1 XXXXXXX-003 }
Processor	X	X		MEM4	XXXXXXX-004 } See Note 1 XXXXXXX-004 }
Processor	X	X		MEM5	XXXXXXX-005 } See Note 1 XXXXXXX-005 }
Processor				MEM6	See Note 2
Processor				MEM7	See Note 2
Processor				MEM8	See Note 2
Interface			FLSS	MEM1	249320-001

Note 1: See Appendix A for the applicable part number.

Note 2: The band image PROMs may be inserted into any combination of the MEM6, 7, and 8 locations. Refer to the configuration sheet for the pertinent PROMs

The last three digits of the band part number define the band identifier. The last three digits of the PROM part number define the PROM identifier. There must be a match between the band and PROM identifiers before the machine is allowed to initialize.

When bands of different identifiers are used, verify that a corresponding PROM occupies one of the three memory locations (MEM6, 7, 8).

SECTION VIII

OPTIONS/CONFIGURATIONS

8.1 INTRODUCTION

This section contains information regarding the options available with the printer and the configurations and functions performed by each option. The options include:

- a. Automatic Line Feed
- b. Character Sets (Font Style and Condensed Print)
- c. Elapsed Time Meter
- d. Format Control
- e. Ground Isolation
- f. Interface
- g. Paper Exit Guide
- h. Parity Error Detect
- i. Power Supply (Universal)
- j. Pedestal
- k. Paper Shelf

8.2 AUTOMATIC LINE FEED

When implemented, this option allows a line feed to occur automatically upon detection of a carriage return (CR) code at the interface. A line feed (LF) code will also cause a single line advance.

8.3 CHARACTER SETS AND FONT STYLES

A variety of special characters and font styles are available at special request.

8.3.1 Multiple Band Sensing

The printer may be configured to accept up to three differently configured bands. The three available bands are 64 character EDP, 64 character utility, and 96 character upper/lower case.

8.3.2 Condensed Print

Conversion from 10 to 15 characters per inch printing may be accomplished for a particular band array by simply changing the print band from a standard (10 CPI) to a condensed (15 CPI) print version.

8.4 ELAPSED TIME METERS

Dual elapsed time meters of the chemical type enable the user to measure both POWER ON and PRINT TIME within + 10% accuracy.

8.5 FORMAT CONTROL

Format Control options include the following:

8.5.1 Fixed Form Length

The standard 11 inch Top of Form length may be modified and set for 12 inches to suit international requirements. Other form length requirements may be met by use of the Form Length Select Switch or the Vertical Format Unit options.

8.5.2 Fixed Perforation Skipover Length

The standard three-line perforation skipover distance may be modified to 0, 4, or 6 line skipover. Skipover is activated upon detection of Bottom of Form (BOF).

Presence of either Tape Controlled or Direct Access Vertical Format Unit transfers control of the skipover distance to the BOF and TOF data contained in the VFU memory.

8.5.3 Form Length Selector Switch

The Form Length Selector (FLS) consists of dual thumbwheel switches which allow the operator to conveniently handle a variety of commonly used form lengths and to advance the paper the appropriate number of lines to Top of Form under switch or code-control. Each switch may be set independently to any of its designated positions. The combined settings of the two switches define the length of form the printer will handle. Switch designations are as follows:

Switch Designations (Inches)		Switch Designations (Centimeters)	
Switch #1:	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	7.62, 10.16, 12.7, 15.24, 17.78, 20.32, 22.86, 25.4, 27.94, 30.48, 33.02, 35.56	
Switch #2:	0, 1/4, 1/3, 1/2, 2/3, 3/4	0, .0635, .8467, 1.27, 1.69, 1.905	

The FLS operates compatibly with the Top of Form switch and the 6/8 LPI switch. It is also compatible with the DAVFU but is disabled when the DAVFU memory is loaded. Slewing to print positions within a form requires use of the Vertical Format Unit. The printer cannot be simultaneously equipped with the FLS and the TCVFU.

8.5.4 12-Channel Direct Access Vertical Format Unit

The Direct Access Vertical Format Unit (DAVFU) is offered as an option to enable the handling of a variety of form lengths and to allow rapid paper slewing within a form in a manner identical to the Tape Controlled Vertical Format Unit.

Instead of loading the memory from a tape loop, the DAVFU provides for direct loading from the controller via the printer interface lines. A start load code may be sent to the printer any time data is requested. Upon recognition of the start load code, the printer enters the LOAD MEMORY state. Subsequent codes are used to load the VFU memory rather than to cause printing or paper motion.

Once the number of memory positions corresponding to the length of form (143 lines maximum) have been loaded, a STOP LOAD code is sent to the printer. This causes the unit to return to a normal mode where all recognized codes are utilized for printing or paper motion. During transmission of the start and stop codes, the P.I. (Paper Instruction) line must be active.

Once the memory has been loaded via the interface, DAVFU-controlled paper motion instructions and operation are identical to those of TCVFU. When the DAVFU is loaded, the Perforation Skipover feature is disabled. Perforation skipover will occur whenever Bottom of Form (BOF) is detected, and will stop when Top of Form (TOF) is detected.

8.5.5 12-Channel Tape Controlled Vertical Format Unit

The Tape-Controlled Vertical Format Unit (TCVFU) consists of an optical tape reader and associated electronics. This unit will enable the handling of a variety of form lengths and will allow rapid slewing within individual forms. The reader utilizes 12-channel tape (DPC P/N 800958-012) or equivalent. Table 8-1 lists the TCVFU connector pin assignments.

The maximum tape length is 144 lines (24 inches at 6 lines per inch; 18 inches at 8 lines per inch). Each tape loop should have only one hole punched in the least significant channel (LSC). If the format is short, multiple forms may be punched into one tape if -- and only if -- each repetition of the format pattern is identical to all other format patterns on that tape.

The VFU tape is calibrated in lines, not inches; therefore, a given tape will yield different dimensional formats at 6 and 8 lines per inch. Special tape preparation methods are not required for 8 lines per inch operation. Data is read from tape during a LOAD TAPE mode and stored in memory. The memory load will start when a hole is detected in the least significant tape channel, and continues until a hole is again detected in this channel.

TABLE 8-1. TCVFU CONNECTOR PIN ASSIGNMENTS (INTERFACE BOARD)

Connector	Live Pin	Return Pin	Signal
<div style="text-align: center;"> P2 ↑ ↓ P2 </div>	1	-	LED 5V
	2	3	Tape Channel 1
	4	5	Tape Channel 2
	6	7	Tape Channel 3
	8	9	Tape Channel 4
	10	11	Tape Channel 5
	12	13	Tape Channel 6
	14	-	Tape Channel 13
	15	-	+5V
	16	17	Tape Channel 7
	18	19	Tape Channel 8
	20	21	Tape Channel 9
	22	-	Tape Channel 10
	23	-	Tape Reader Request Switch (TRRQSW)*
	24	25	Tape Channel 11
	26	-	Tape Channel 12
	27	-	+5V
	28	-	+5V
	29	-	End Reader Drive (ENRDR)*
	30	-	Tape Reader Request (TRRQ)*
	31	-	+9V
	32	-	+9V
	-	33	+9V
	-	34	+9V

* = Low Active Signal

The LOAD TAPE operation will be initiated on power up or when an operator presses the LOAD TAPE switch located on the tape reader assembly. When the printer is in the OFF LINE mode, VFU memory loading must be initiated following any tape change, or following the detection of a VFU error. At the end of the operation -- which is indicated by the tape coming to a stop -- the sprockets will be synchronized with the memory at the Top of Form position.

After the memory has been loaded, the reader turns off and all mechanical activity ceases. TCVFU instructions are transmitted to the printer by activating the PI line at the same time that coded instructions are presented on the data lines. By holding data line 5 true or false, it is possible to slew a specified number of lines (up to 15 maximum) or to select a channel under program control.

As paper is advanced, the buffer memory is electronically shifted in synchronization with this advance. This memory shift occurs in the same manner that a tape loop would be rotated in a purely mechanical system. The inherent advantage of the TCVFU is the total lack of mechanical motion after the initial memory load sequence.

Turning off the power will result in loss of synchronization between the form and TCVFU.

8.6 GROUND ISOLATION

The standard printer is shipped with the logic and frame grounds tied together. For those systems where ground isolation is desirable, this may be accomplished by the removal of a jumper in the power supply area.

8.7 INTERFACES

Long-line and Low True Interfaces are available with the printer. In addition an Input/Output Harness (option) is available to facilitate a Winchester interface. Refer to table 8-2.

8.7.1 Long-Line Interface

This option allows the interface lines to be extended from the standard 15 meters (49 feet) to 150 meters (492 feet). Integrated circuit differential transmitters and receivers of the DM 8830/8820 class are used. The inclusion of this option requires the user to supply similar long-line devices at the controller end. Refer to table 8-3 for the long line interface pin assignments.

8.7.2 Low True Interface

This option allows all interface signals, both received and transmitted, to be inverted with the exception of Buffer Clear.

8.7.3 Pull Up/Pull Downs

Custom termination resistor values on the receiver lines may be provided upon special request. The minimum acceptable value is 100 ohms.

TABLE 8-2. USER PIN ASSIGNMENT (I/O LONG LINE OPTION,WINCHESTER)

I/O Board	Live Pin	Return Pin	Signal
<div style="text-align: center;"> J1 ↑ ↓ J1 </div>	S W M FF CC E R \overline{Y} \overline{D} \overline{A} \overline{B} F L R V Z \overline{N} \overline{U} \overline{E} \overline{H} \overline{J} \overline{P} \overline{Z} \overline{H} HH V \overline{X} -	U Y P DD EE C T \overline{AA} \overline{F} \overline{C} \overline{D} J N T X \overline{B} \overline{K} \overline{W} - - \overline{M} \overline{S} \overline{BB} A - - - K	Top of Form (TOF) Paper Moving Std PPRMVG/VFURDY Bottom of Form (BOF) Paper Moving Opt PPRMVG/VFRDY Ready Demand Parity Error On Line IDENT 0 IDENT 1 DATA 1 DATA 2 DATA 3 DATA 4 DATA 5 DATA 6 DATA 7 DATA 8 VFU Verify VFU Verify Strobe Paper Instruction Parity Buffer Clear +5V Interface Connector Verify Ground

TABLE 8-3. USER PIN ASSIGNMENT (LONG LINE STD)

I/O Bd.	Live Pin	Return Pin	Signal
J1	24	8	Top of Form (TOF)
↑	26	10	Paper Moving STD PPRMVG/VFURDY
	25	9	Bottom of Form (BOF)
	48	17	Paper Moving Opt PPRMVG/VFURDY
	19	3	DATA 1
	20	4	DATA 2
	1	2	DATA 3
	41	40	DATA 4
	34	18	DATA 5
	43	42	DATA 6
	36	35	DATA 7
	28	44	Optional 8 Line I/O
	30	14	Paper Instruction (PPR INST) VFU Option
	15	31	Buffer Clear (BUFCLR)
	47	-	VFU Verify
	33	-	VFU Verify
	12	-	+5V
	46	-	Interface Verify
	45	-	Interface Verify
	-	39	Ground
	22	6	Ready (RDY)
	23	7	Demand (DEM)
	27	11	Parity Error (PAR ERROR)
	21	5	On Line (ONLN)
	50	32	IDENT 0 (IDNT 0)
	49	16	IDENT 1 (IDNT 1)
	29	13	Parity (PARBIT)
J1	38	37	Strobe

8.8 PAPER EXIT GUIDE

This option is used with the printer in the table top configuration. It assists the paper exiting process, from printer to the edge of the table.

8.9 PARITY ERROR DETECT

The parity circuitry will check for the presence of odd parity. When an error is detected, the character in error is converted to a space code and a the parity error line will be raised to alert the user. The line will remain true until operation of the CLEAR switch, or until the receipt of either a format control character or a buffer clear signal.

8.10 UNIVERSAL POWER SUPPLY

This power supply is available for those applications requiring a printer capable of operating on any of the following voltages and frequencies:

Voltage: 90 to 136, 187 to 250

Frequency: 50 or 60 Hz \pm 2 Hz

Changing from one combination to another is easily accomplished in the field by changing the position of the plug connectors.

8.11 PEDESTAL

A pedestal is available for those applications requiring a floor-mounted printer. It is shipped separately from the printer.

8.12 PAPER SHELF

A paper shelf is available for pedestal-mounted printers. The paper shelf attaches to the pedestal and accepts various sized forms from the printer.

SECTION IX

PHOTO PARTS INDEX

9.1 INTRODUCTION

This section contains the photo parts index, which is directed toward field service replacement at the major assembly level.

9.2 PHOTO PARTS INDEX

The figures are used in conjunction with the corresponding tables to provide the location of the part, an index number, and a description of the part. Some of the assemblies containing various parts are illustrated by a photograph on the back of the photo parts index. These photos are matched directly with the index dash numbers.

Not all assemblies are illustrated by a photo.

Appendix A contains a list of part numbers corresponding to the parts shown in figures 9-1 through 9-7.

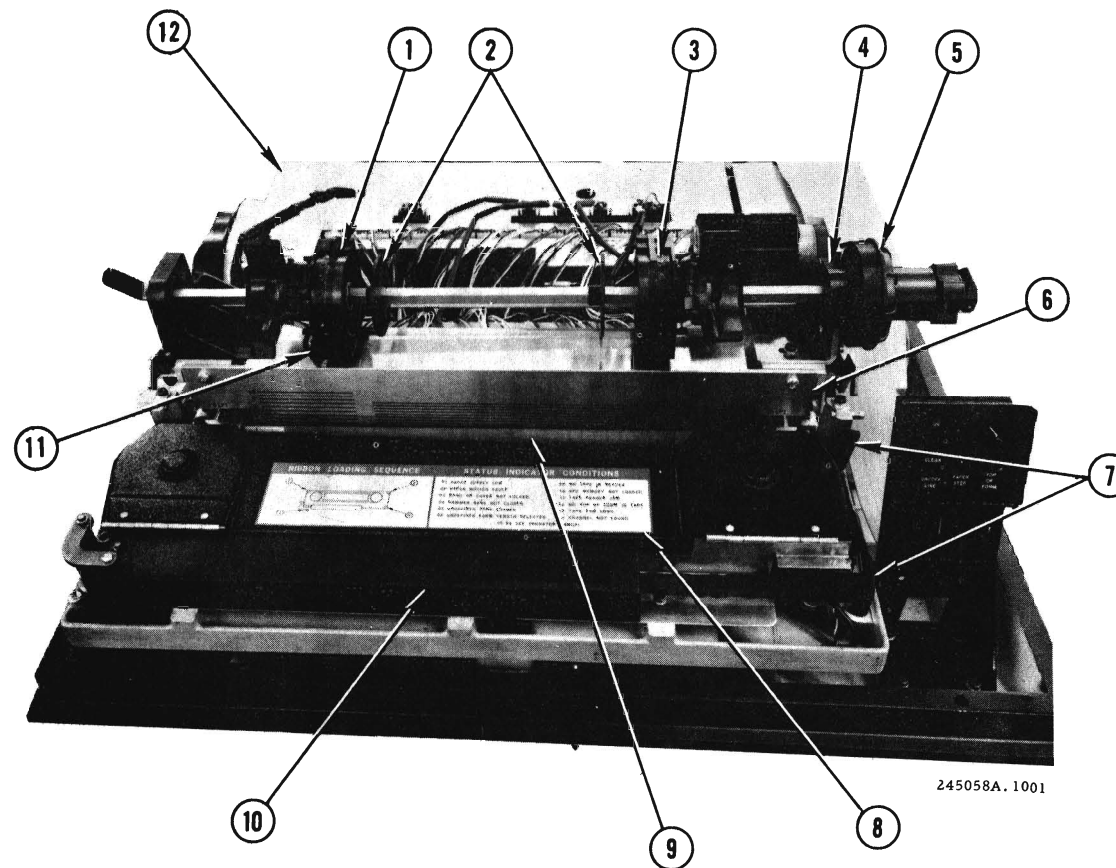
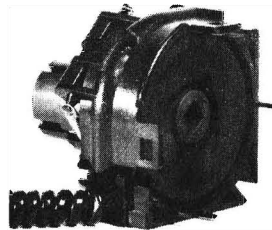


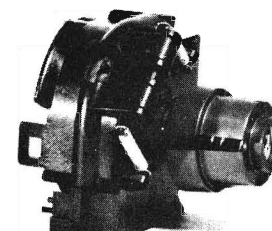
TABLE 9-1. PRINTER PHOTO PARTS INDEX, FRONT VIEW

Index No.	Description
REF Figure 9-1	
-1	Sprocket Assembly (Left) with Motion Sensor
-2	Paper Support Guides
-3	Sprocket Assembly (Right)
-4	Bearing Mount (Clutch Side) Ball Bearing (Shown Mounted on Inset Photo)
-5	Paper Feed Clutch
-6	Hammer Bank Mask
-7	Ribbon Guides
-8	Band Cover Assembly (with Hinge)
-9	Ribbon Mask
-10	Ribbon Cartridge
-11	Paper Motion Sensor
-12	Card Cage Cover

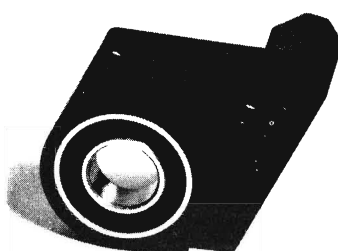
Figure 9-1. Printer Photo Parts Index, Front View



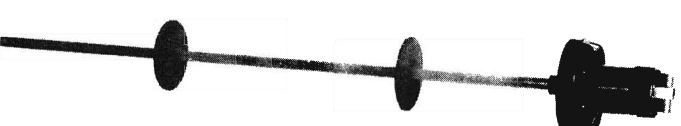
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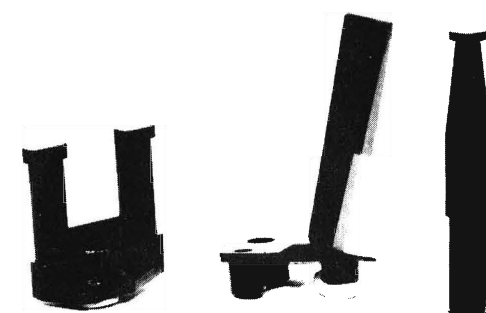
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245058A, 1001/3



245058A, 1001/4



245058A, 1001/5

Figure/Table 9-1
Item

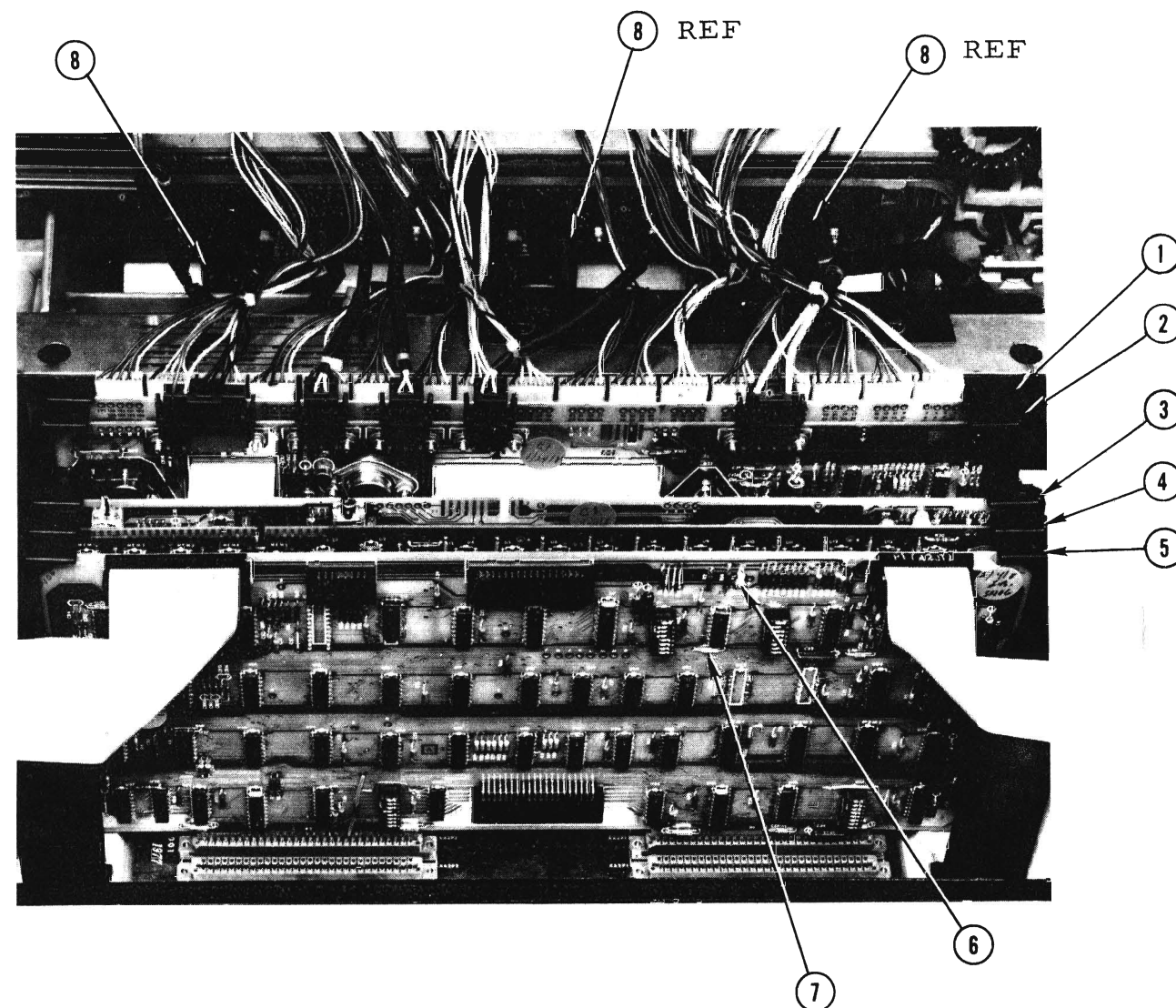
-1

-3

-4

-5

-7



245058A.1002

Figure 9-2. Printer Photo Parts Index, Rear View

TABLE 9-2. PRINTER PHOTO PARTS INDEX, REAR VIEW

Index No.	Description
REF Figure 9-2	
-1	Hammer Driver Board
-2	Power Board
-3	Timing and Status Board
-4	Processor Board (Less Program and Image PROMs) * Processor Board Program PROM Kit Std (without VFU) * Processor Board Program PROM Kit Std (with VFU)
-5	**Interface Board (Shortline without VFU) **Interface Board (Shortline with VFU) **Interface Board (Longline without VFU) **Interface Board (Longline with VFU)
-6	Fuse F1 2A Subminiature Wire Ended (Interface Board)
-7	Fuse F2 2A Subminiature Wire Ended (Interface Board) Fuse F1 6A 3AG Power Board (Not Shown)
	Rectifier Board (Standard) (Not Shown) (See Figure 9-3) Rectifier Board (Universal Option) (Not Shown)
-8	Solenoid with Cable and Connector for Clamp Mask Solenoid Assy, Clamp Mask (not shown)
<p>* Program PROM Kit MEM1 - MEM5. Number specified is for standard PROMs. For customized PROMs refer to configuration sheet for part numbers. Band Image PROMs MEM6 - MEM8, a maximum of three may be installed. Refer to the configuration sheet or the installed PROM for part numbers. Note that the three suffix digits of a band and its associated image PROM are identical.</p> <p>**Select appropriate Interface Board. Note optional Forms Length Select PROM is not included.</p>	

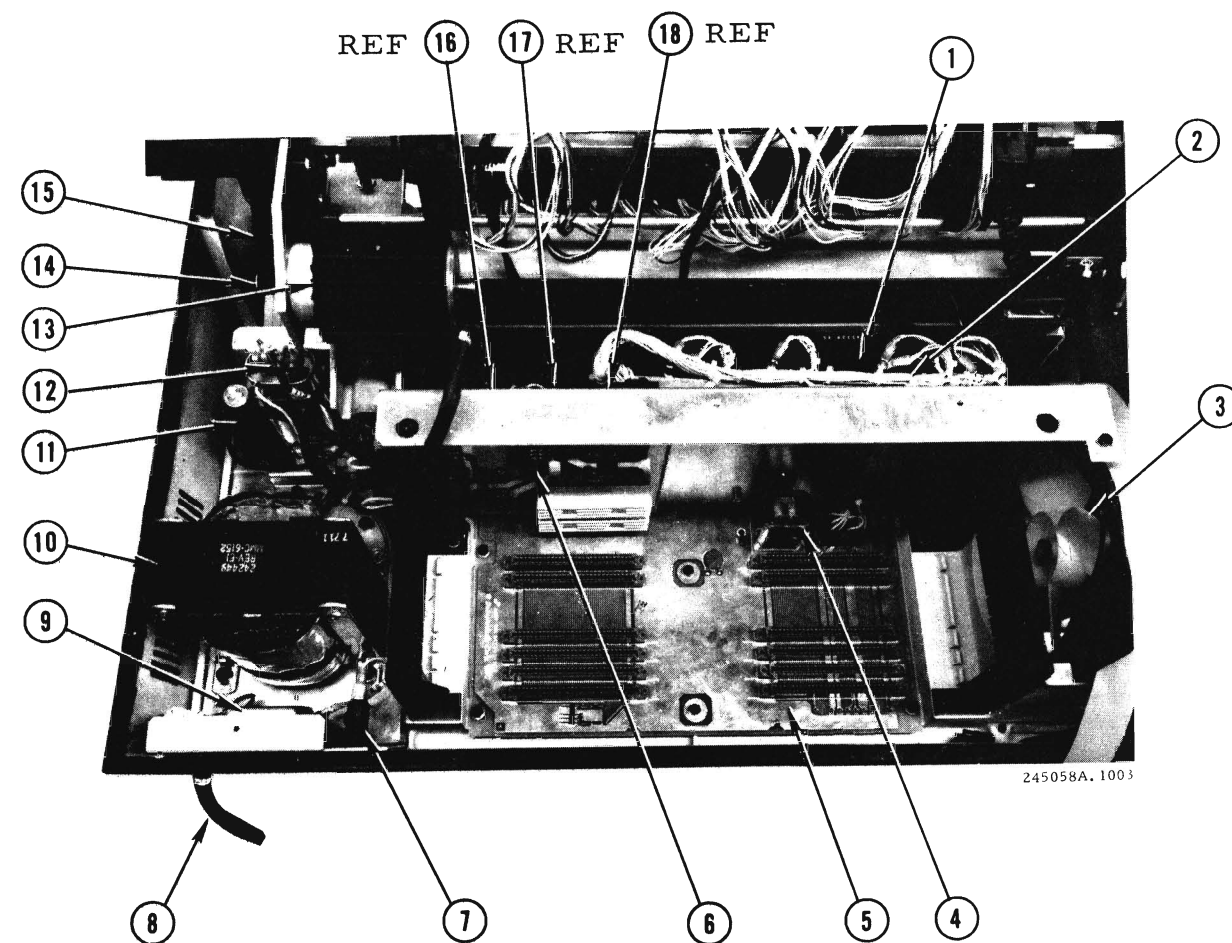
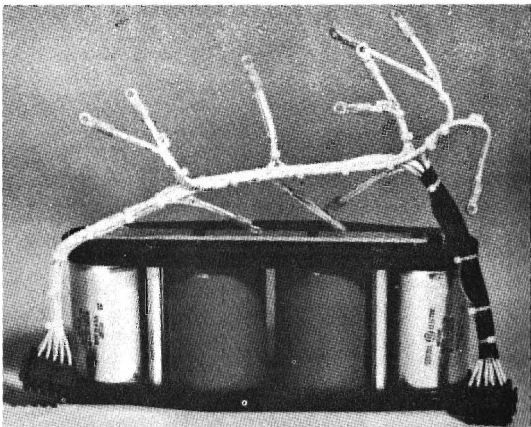


Figure 9-3. Printer Photo Parts Index, Rear View PCBs Removed

TABLE 9-3. PRINTER PHOTO PARTS INDEX, REAR VIEW PCBs REMOVED

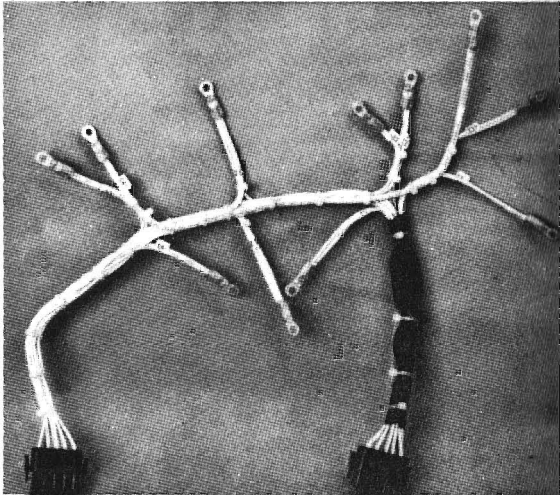
Index No.	Description
REF Figure 9-3	
-1	Capacitor Bank Assembly with Harness For Capacitor Bank Cover (see Figure 9-6)
-2	Power Supply Harness Assembly (Std)
-3	Fan Assembly
-4	Relay (K1)
-5	Mother Board Assembly with Relay
-6	Rectifier Board (Std) 60 Hz *Rectifier Board (Universal Option)
-7	Circuit Breaker CB1 *Circuit Breaker CB2 (Universal Option) (Not Shown)
-8	Power Cord
-9	Line Filter
-10	Transformer (110V 60 Hz) *Transformer (Universal Option) (Not Shown)
-11	Power Resistor Assembly
-12	Resonant Capacitor 110V 60 Hz *Resonant Capacitor (Universal Option) (Not Shown)
-13	Paper Feed Motor Assembly
-14	Paper Feed Motor Pulley and Retainer
-15	Paper Feed Timing Belt
-16	Fuse F2 2A S/B (3AG) (Not Shown)
-17	Fuse F3 20A S/B (3AG) (Not Shown)
-18	Fuse F1 12A (3AB) (Not Shown)
*Part of Universal Power Supply Option. See Table A-2	

Figure/Table 9-3
Item



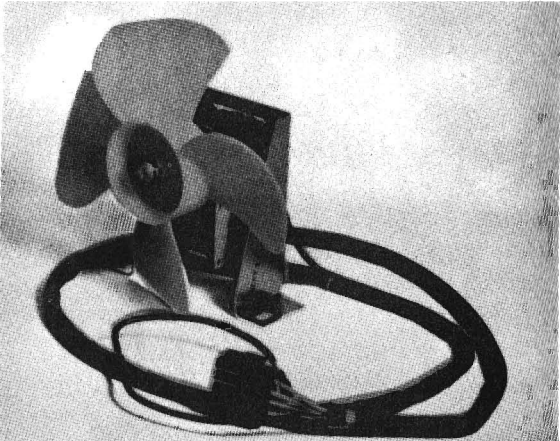
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-1



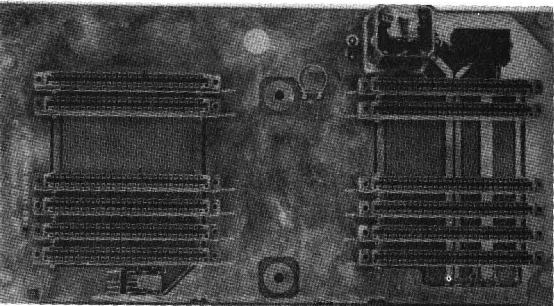
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-2



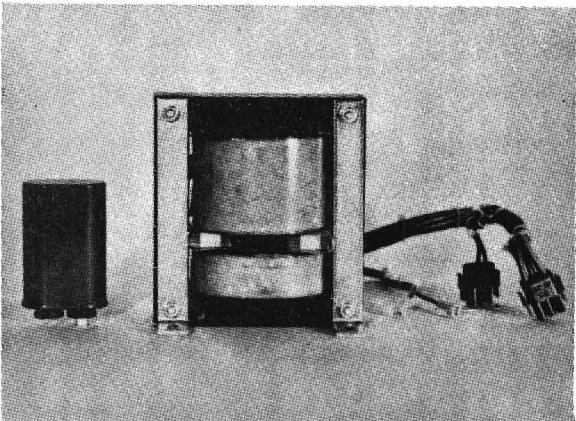
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-3



245058A.1003/4

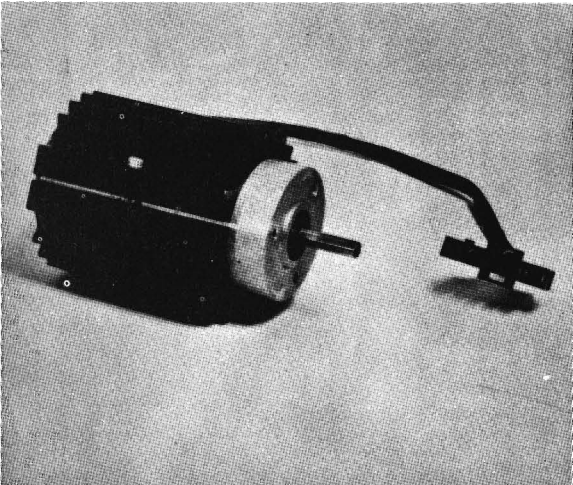
-5



245058A.1003/5

Item

-10/-12



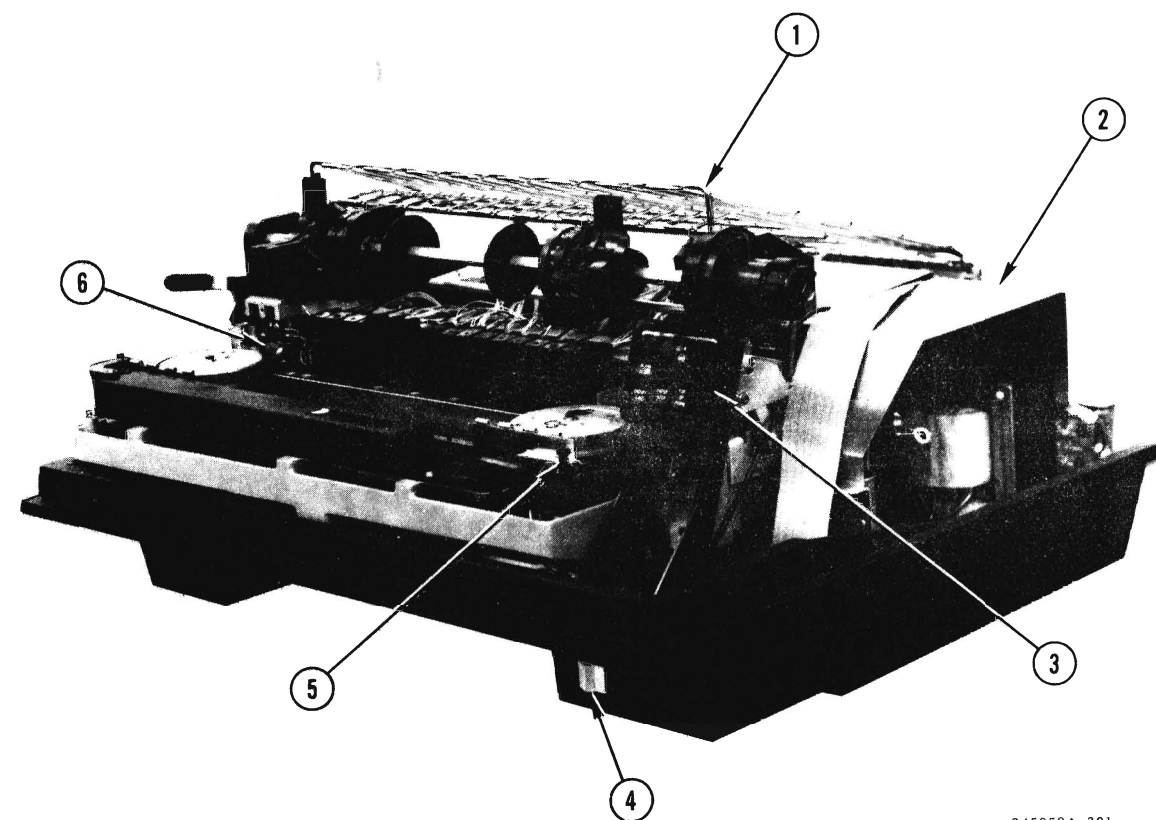
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-13



245058A.1003/6

-14



245058A. 301

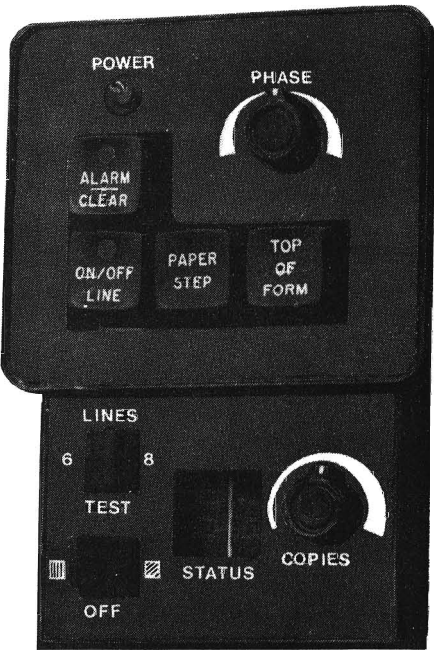
TABLE 9-4. PRINTER PHOTO PARTS INDEX, RIGHT FRONT VIEW

Index No.	Description
REF Figure 9-4	
-1	Paper Exit Chute (Paper Support)
-2	Power Supply Cover
-3	Control Panel Assembly (Less Push Keys, Knobs and Decals) Language Decal (Push Key and Knob Kit) Control Panel Circuit Board (Not Shown) Control Panel LED Green Control Panel Switch LED-Push Control Panel Switch Toggle (2 Position) (S2) Control Panel Switch Toggle (3 Position) (S1) Control Panel Resistor Variable - Long Shaft (R2) Control Panel Resistor Variable - Short Shaft (R1) Control Panel Digital Display
-4	Switch Rocker ON/OFF
-5	Band Interlock Switch Assy
-6	Switch (Hammer Bank) Interlock Harness Assembly Hammer Bank Interlock with Switch, Cable and Plug

Figure 9-4. Printer Photo Parts Index, Right Front View

Figure/Table 9-4
Item

-3



245058A.301

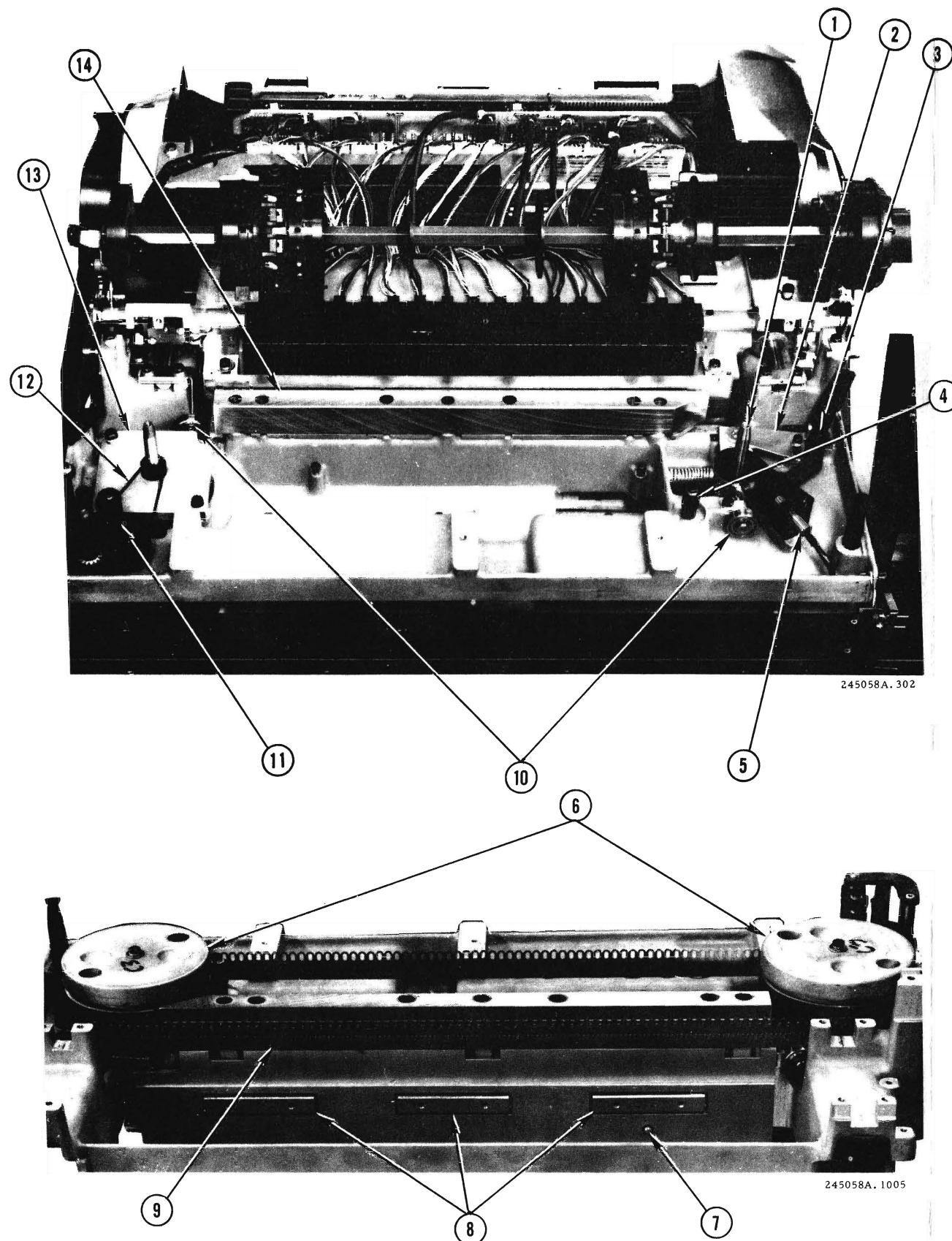
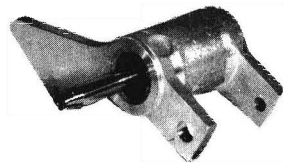


Figure 9-5. Printer Photo Parts Index, Front/Top View

TABLE 9-5. PRINTER PHOTO PARTS INDEX, FRONT/TOP VIEW

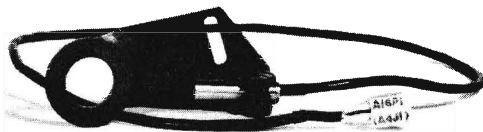
Index No.	Description
REF Figure 9-5	
-1	Idler Shaft Assembly
-2	Lever, Band Alignment
-3	Handle, Band Release
-4	Band Guide
-5	Transducer with Cable, Bracket and Screw
-6	Pulley/Drive Assembly
-7	Paper Low Switch Actuator Plunger
-8	*Clamp Mask Armature Assembly (Factory replacement only)
-9	**Character Band
-10	Bearing, Edge Guide with Retainer
-11	Ribbon Drive Assembly
-12	Ribbon Drive Belt
-13	Band Motor Assembly with Bearing and Retainer
-14	Hammer Bank Platen (Factory replacement only)
<p>*Armature and Paper Low Plunger springs are part of Spring Pack.</p> <p>**Part Number may be found on band or configuration sheet.</p>	

Figure/Table 9-5
Item



245058A.1005/1

-1



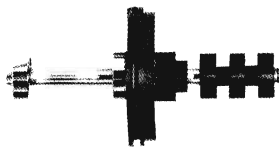
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-5



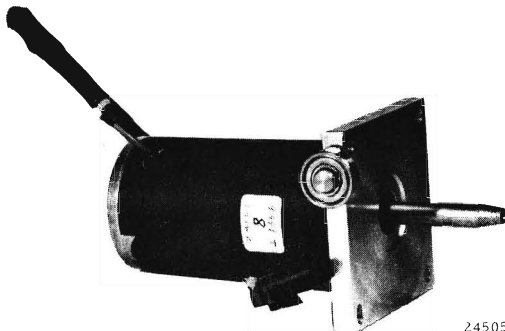
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-6



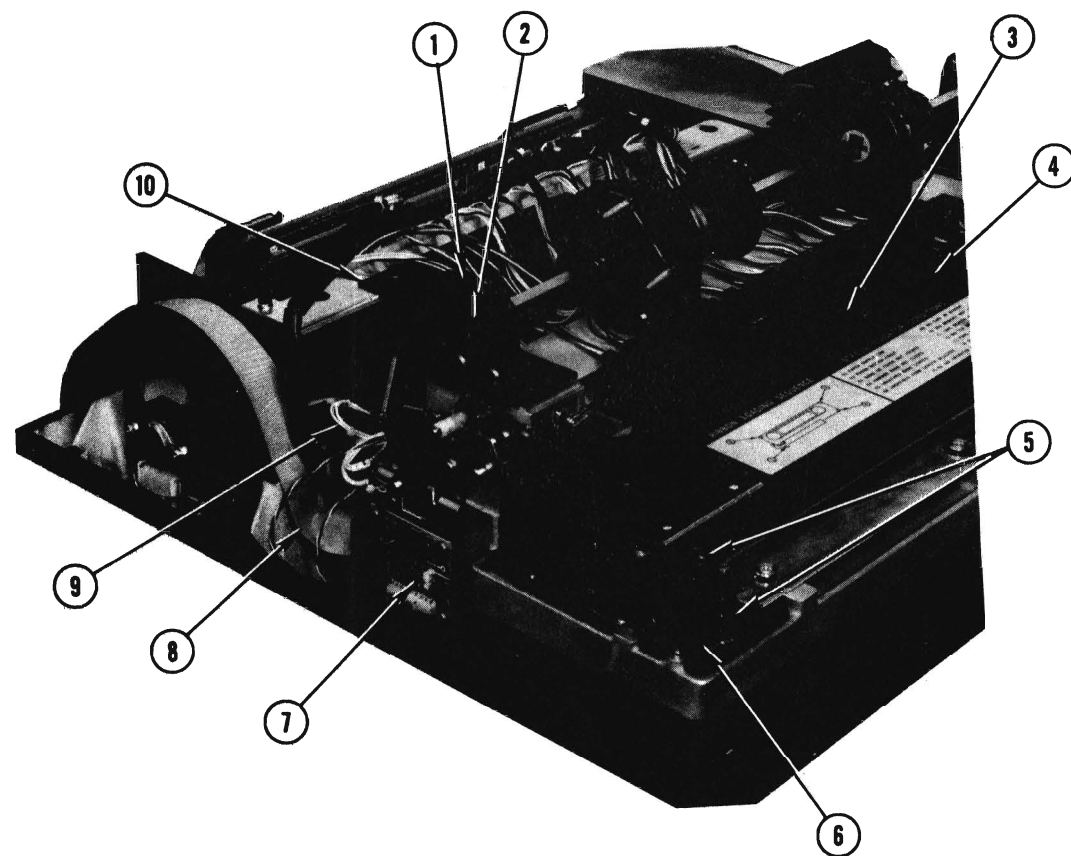
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-11



245058A.1005/5

-13



245058A. 10

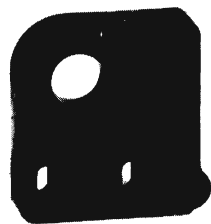
TABLE 9-6. PRINTER PHOTO PARTS INDEX, LEFT FRONT VIEW

Index No.	Description
REF Figure 9-6	
-1	Mount, Bushing
-2	Bushing (Plastic) and Retainer
-3	Hammer Bank Assembly
-4	Hammer Module and Mounting Hardware Kit Hammer Backstop Screw (Not Shown)
-5	Ribbon Drive Rollers (2) and Attaching Hardware
-6	Ribbon Pivot Arm and Spring Assembly
-7	Interlock Transition Board
-8	Interlock Harness Assembly
-9	Hammer Bank Interlock Harness Assembly (with Cable and Switch)
-10	Capacitor Bank Cover

Figure 9-6. Printer Photo Parts Index, Left Front View

Figure/Table 9-6
Item

-1



245058A, 1005/5

-2



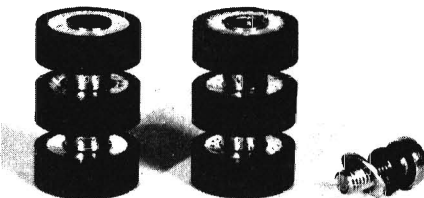
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-3



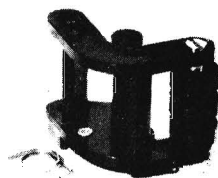
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-5



245058A, 1007/2

-6



245058A, 1005/4

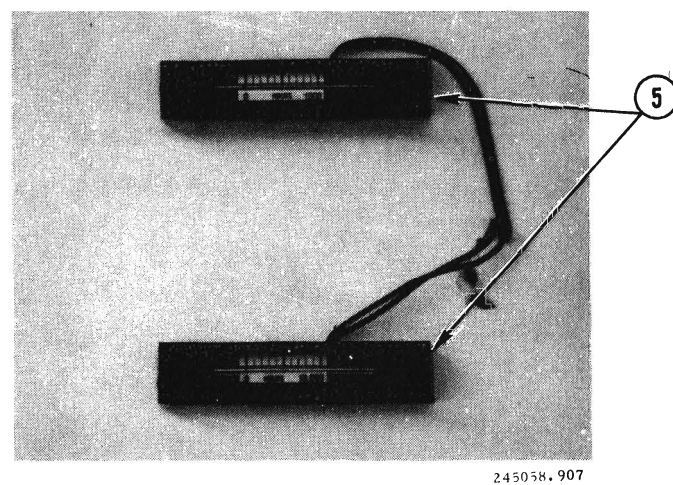
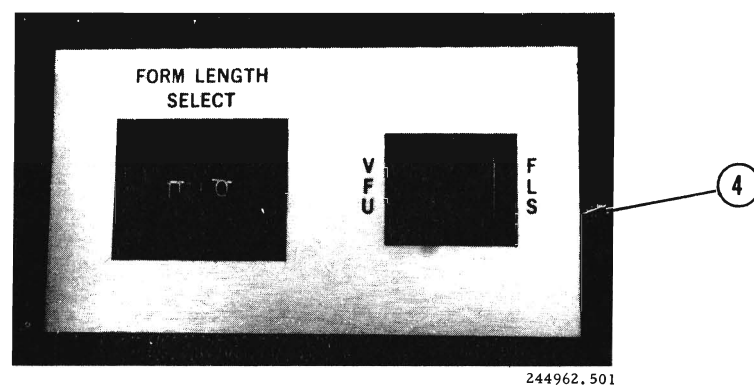
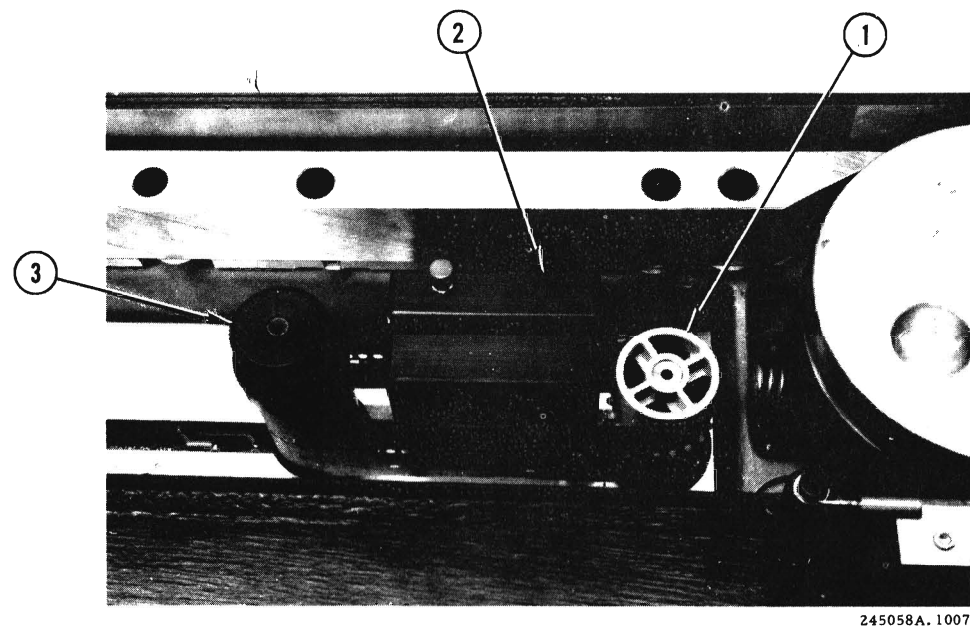


Figure 9-7. Printer Photo Parts Index, Front View

TABLE 9-7. PHOTO PARTS INDEX (OPTIONS)

Index No.	Description
REF Figure 9-7	
-1	VFU Motor Assy (VFU Option)
-2	Read Head and Cable Assembly
-3	Slide Tensioner with Spool, Nut, Screw, and Slide Stud
	VFU Circuit Board (Not Shown)
-4	Form Length Assembly Option with VFU Form Length Assembly Option without VFU (Not Shown)
-5	Elapsed Time Meter Assembly

APPENDIX A

PARTS NUMBER INDEX

This section contains a list of part numbers for the items shown in figures 9-1 through 9-7.

TABLE A-1. PARTS NUMBER INDEX

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-1				
-1	Sprocket Assy (Left) with motion sensor		246290-001	1
-2	Paper Support Guides		247962-001	2
-3	Sprocket Assy (Right)		246267-001	1
-4	Bearing Mount (Clutch Side)		242464-001	1
	Bearing Mount (Ball Bearing)		801517-018	1
-5	Paper Feed Clutch w/shaft & Paper Support Guides		242454-001	1
-6	Hammer Bank Mask		242253-003	1
-7	Guidepost RH		246169-001	1
	Guide RH		242395-001	1
	Guide LH		249251-001	1
-8	Band Cover Assy (with Hinge)		246175-001	1
-9	Ribbon Mask		251811-001	1
-10	Ribbon Cartridge		251756-001	1
-11	Paper Motion Sensor		251941-001	1
-12	Card Cage Cover		246384-001	1

726-1181

TABLE A-1. PARTS NUMBER INDEX (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-2				
-1	Hammer Driver Board	A6	247880-001	1
-2	Power Board	A5	249300-001	1
	Fuse, 6A, 3AG (Power Board)	F1	800316-060	1
-3	Timing and Status Board	A4	249295-001	1
-4	Processor Board, Less Program & Image PROMs. (For PROMs, see Table A-2.)	A3	251770-001	1
-5	Interface Board, Short Line without VFU. (For Interface Board Options, see Table A-2.)	A2	249310-002	1
	I/O Harness Assy (AMP) Std* (For I/O Harness Options, see Table A-2.)		247890-001	1
-6	Fuse, 2A, Submin. wire-ended (Interface Board)	F1	801702-001	1
-7	Fuse, 2A, Submin. wire-ended (Interface Board)	F2	801702-001	1
-8	Solenoid with Cable & Connector		246286-001	1
	Solenoid Assy, Clamp Mask		246368-001	1

*3 Suffix digits define termination component values. Refer to Configuration Sheet for details.

TABLE A-1. PARTS NUMBER INDEX (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-3				
-1	Capacitor Bank Assy	A8	247777-001	1
-2	Power Supply Harness Assy, Std		247958-001	1
-3	Fan Assy		246039-001	1
-4	Relay	K1	800795-001	1
-5	Mother Board Assy with Relay	A7	249325-001	1
-6	Rectifier Board, Std., 60 Hz		251725-001	1
-7	Circuit Breaker	CB1	801732-004	1
-8	Power Cord Assy		249222-001	1
-9	Line Filter		801778-001	1
-10	Transformer, Std., 60 Hz		247950-001	1
-11	Power Resistor Assy		247818-001	1
-12	Resonant Capacitor, Std., 60 Hz		801760-405	1
-13	Paper Feed Motor Assy		246200-003	1
-14	Paper Feed Motor Pulley & Retainer		251704-002	1
-15	Paper Feed Timing Belt		801669-001	1
-16	Fuse, 2A, Slo Blo (3AG)	F2	800917-020	1
-17	Fuse, 20A, Slo Blo (3AG)	F3	800917-200	1
-18	Fuse, 12A (3AB)	F1	800316-120	1

726-1154

TABLE A-1. PARTS NUMBER INDEX (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-4				
-1	Paper Exit Chute (Paper Support)		246284-002	1
-2	Power Supply Cover		249245-001	1
-3	Control Panel Assy, (less Push Keys, Knobs & Decals) w/CCA	A17	247780-001	1
	Language Decal (Push Key & Knob Kit) English		249214-001	1
	Control Panel Circuit Board		249235-001	1
	Control Panel LED, Green		801766-001	1
	Control Panel Switch, LED, Push		801768-001	1
	Control Panel, Switch, Toggle, (2-Position)	S2	801704-001	1
	Control Panel, Switch, Toggle, (3-Position)	S1	801704-002	1
	Control Panel, Resistor, Variable Long Shaft (Phase)	R2	801620-001	1
	Control Panel, Resistor, Variable Short Shaft (Copies)	R1	801620-002	1
	Control Panel, Digital Display		801746-001	1
	Control Panel, Switch		801767-001	1
-4	Switch Rocker, ON/OFF		800931-005	1
-5	Band Interlock Harness Assy with Switch, Cable, & Plug		246125-001	1
-6	Hammer Bank Interlock Switch		800679-001	1

TABLE A-1. PARTS NUMBER INDEX (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-5				
-1	Idler Shaft Assy		246161-001	1
-2	Band Alignment Lever		246116-001	1
-3	Band Release Handle		250993-001	1
-4	Band Guide		246102-001	1
-5	Transducer Assy		246193-001	1
	Transducer Bracket		249254-001	1
	Transducer Set Screw		801508-406	1
-6	Pulley/Driver Assy		246156-001	1
	Pulley Driver		246157-001	1
	Pulley, Flex Link		246126-001	1
-7	Paper Low Switch Assy with Cable		246381-002	1
-8	Clamp Mask Armature Assy (Factory Replacement only)		246369-001	1
-9	Character Band (See Table A-2)			1
-10	Bearing, Edge Guide with Retainer		246190-001	1
-11	Ribbon Drive Assy		246189-002	1
-12	Ribbon Drive Belt		242296-002	1
-13	Band Motor Assy with Bearing & Retainer		246164-001	1
-14	Platen (Factor Replacement only)			
	Platen Character Alignment Decal		247851-001	1

TABLE A-1. PARTS NUMBER INDEX (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-6				
-1	Mount, bushing		242462-001	1
-2	Bushing (Plastic) & Retainer		242463-002	1
-3	Hammer Bank Assy		244444-001	1
-4	Hammer Module & Mounting Hardware Kit (4-Position)		251704-001	1
	Hammer Backstop Screw		238840-001	1
-5	Ribbon Drive Rollers & Attaching Hardware		246189-002	2
-6	Ribbon Pivot Arm & Spring Assy		251823-001	1
-7	Interlock Transition Board		247935-001	1
-8	Interlock Harness Assy		247784-001	1
-9	Hammer Bank Interlock Cable with Switch		249221-001	1
-10	Capacitor Bank Cover		249246-001	1

TABLE A-2. PARTS NUMBER INDEX FOR OPTIONS

Figure & Index No.	Description	Reference Designator	Part No.	Qty
Table 9-7				
-1	VFU Assy (Tape Controlled)		246297-001	1
	VFU Motor Assy		246380-002	1
-2	VFU Reader Head		801649-001	1
-3	VFU Slide Tensioner Spool		246360-001	1
	VFU Slide Tensioner Nut		246299-001	1
	VFU Slide Tensioner Screw		801513-865	1
	VFU Slide Tensioner Slide Nut		246387-001	1
	VFU Circuit Board		247930-001	1
-4	Forms Length Select with VFU	A20	247968-001	1
	Forms Length Select without VFU	A20	247837-001	1
-5	Elapsed Time Meter Assy	A42	249217-001	1
	Paper Shelf Assy, Kit		247960-001	1
	Pedestal Assy, Kit		247840-001	1
	Program PROM Kit, Std, without VFU, Processor Bd (5 PROMs)	A3	249323-001	5
	Program PROM Kit, Std, with VFU, Processor Bd (5 PROMs)	A3	249324-001	5
	FLSS PROM Kit, Interface Bd		249320-001	1
	Interface Board, Standard	A2	251765-001	1
	Interface Board, Short Line with VFU.	A2	251765-002	1
	Interface Board, Long Line without VFU	A2	247915-001	1

TABLE A-2. PARTS NUMBER INDEX FOR OPTIONS (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
	Interface Board, Long Line with VFU	A2	247915-002	1
	I/O Harness/Connector Assy (Winchester)		247885-001	1
	I/O Harness Assy, Long Line (AMP) Standard		251720-001	1
	I/O Harness Assy, Long Line, (Winchester) Optional		247925-001	1
	Universal Transformer (Power Supply)		247951-001	1
	Universal Rectifier Board		247905-001	1
	Universal Resonant Capacitor, 50 Hz		246036-001	1
	Universal Circuit Breaker	CB2	801732-001	1
	Universal Power Supply Harness		247957-001	1
	Misc. Hdw., Screws/Nuts/Washers, Pack		251704-012	1
	Misc. Hdw. Springs, Pack		251704-013	1
	Misc. Hdw. Pack		251704-014	1
	Printer Cover Assy		247794-XXX*	1
	Front Door Assy		247808-XXX*	1
	Front Door Window		247809-001	1
	Paper Exit Cover Assy		247814-XXX*	1
	PROM, Band Image Scientific OCR1 Band	10 CPI	250500-003 250001-003	
	PROM, Band Image U/L Case OCR1 Band	10 CPI	250523-004 250002-004	

*Refer to the Configuration Sheet for dash numbers.

TABLE A-2. PARTS NUMBER INDEX FOR OPTIONS (Contd)

Figure & Index No.	Description	Reference Designator	Part No.	Qty
	PROM, Band Image		250503-002	
	EDP OCRI Band	10 CPI	250005-002	
	EDP OCRI Band	15 CPI	250006-002	

CHANGE RECORD

REVISION LEVEL	DATE	CHANGES INCORPORATED		PAGE NOS. AFFECTED	BRIEF DESCRIPTION
		E.O. NO.	DPC REVISION PACKAGE NO.		
A	11/78	N/A	N/A	Title Page	Removed "FIELD"; Added A to DPC 245058; Changed date to November, 1978.
		N/A	N/A	Related Publications	Changed "B-300 Master Logistics and Support Manual" to read B-300 Master Support and Logistics Manual.
		N/A	N/A	1-1	Deleted "field" from first sentence.
		N/A	N/A	1-2	First paragraph: Changed 6H to read 64
		N/A	N/A	2-1, Table 2-1	In remarks column: (see table 2-2)
		N/A	N/A	2-2, Table 2-1	Change to Depth Specification and Band Speed Specification.
		N/A	N/A	2-3, Table 2-1	Format changed to read Format Control.
		N/A	N/A	2-5, Figure 2-1	Pedestal change.
		N/A	N/A	2-8, Table 2-2	Clarified location of J4, J5, J9
		N/A	N/A	2-9	Added figure & table references.
		N/A	N/A	5-2, Table 5-1	Revised table 5-1.
		N/A	N/A	6-4	Added figure reference.

CHANGE RECORD

REVISION LEVEL	DATE	CHANGES INCORPORATED		PAGE NOS. AFFECTED	BRIEF DESCRIPTION
		E.O. NO.	DPC REVISION PACKAGE NO.		
A (contd)	11/78	N/A	N/A	6-5	Changed example connection drawing.
		N/A	N/A	6-24, figure 6-15	Changed figure callouts
		N/A	N/A	6-31	Revised para. 6.4.24.
		N/A	N/A	7-1	Text change.
		N/A	N/A	7-3	Text change.
		N/A	N/A	9-13	Changed parts description of Index No. 4.
		30470	N/A	A-2	Part No. change Ribbon cartridge.
		30389/ 30437	N/A	A-3	Part No. change Processor Board
		N/A	N/A	A-4	Part No. change Paper Feed Pulley
		N/A	N/A	A-6	Add to description of Index No. -8
		30282	N/A	A-7	Part No. change of Index No. -6
		N/A	N/A	A-7	Parts No. & Description change of Index No. -4 Interface Board
		30454	N/A	A-9	Part No. change PROM

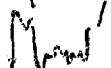
^ABNDCLK P2-11
 INDEX P2-14
 PWRES^{ON} P2-20
 ENBND^{AND} P2-6
 COCLK P2-5
 SYSCLK P2-7
 BND^{AND} P1-9
 HPRES* P1-7
^{ARMED}HWAF^{IT} P1-21
 VCL P1-40


.7 msec 3½ V pulse POS PULSE CONT.

NEG PULSE EVERY 283 ms 4V

W/ POWER ON GOES HI AFT. SEC.

HI GOES LOW w/ BAND DRIVE

 4V .32 msec PERIOD

 4V .44 msec PERIOD

.68 msec 5V PULSE

EVERY .16 mil NEG PULSE STOPPED .13 mil RUNNING

HI WHEN OFF ^{7.8V} SIMILAR TO HAMMER FET TIME 4V RUN 1 mil

1½ V OFF & ON LEVEL, ADJ. w/ COPIES