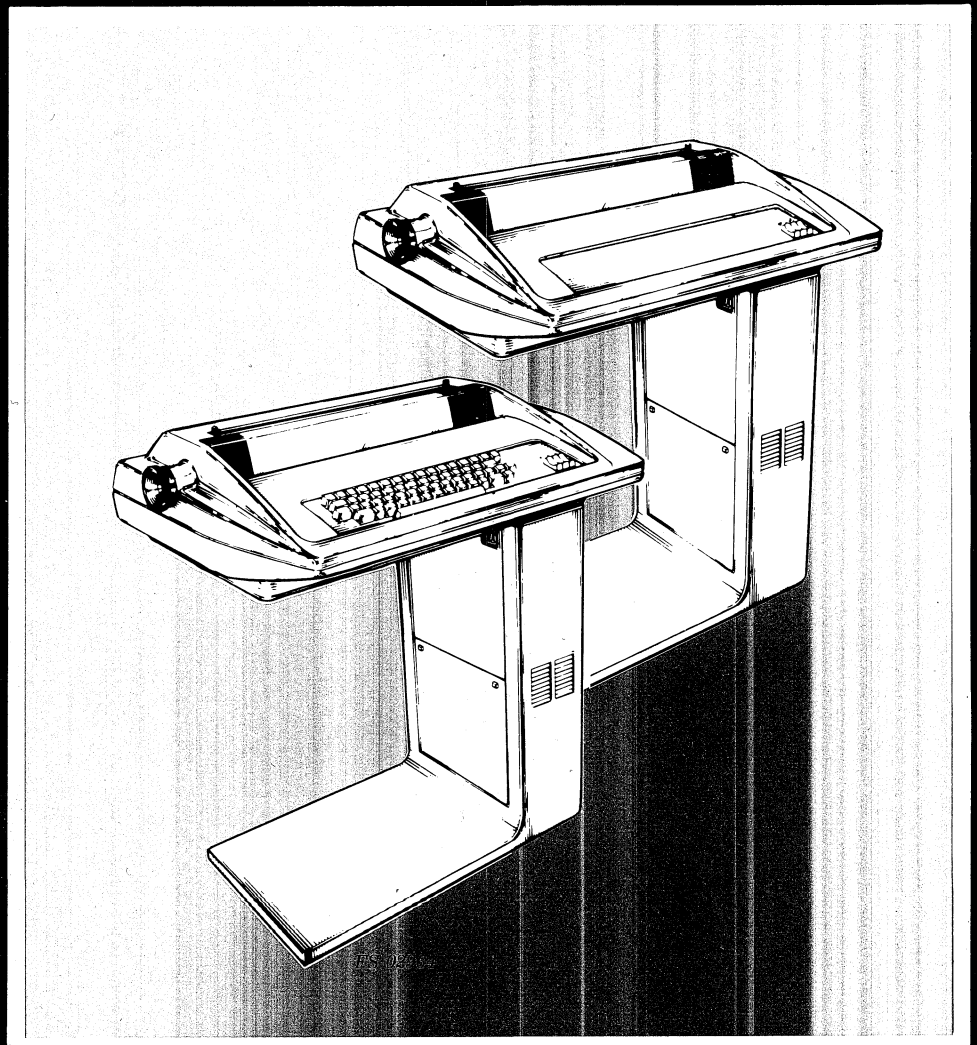


Maintenance Service Guide

**Models 6190-6194
and 9610-9613**

**ENHANCED DASHER® LP2/TP2
PRINTERS**





MAINTENANCE
SERVICE GUIDE

MODELS 6190-6194 AND 9610-9613

ENHANCED DASHER® LP2/TP2
PRINTERS

Prepared by

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SECTION 1

INTRODUCTION

The major features, model numbers, hardware components, software and field replaceable units (FRUs) for the Enhanced DASHER® LP2/TP2 printers, Models 6190-6194 and 9610-9613, are described in this section.

1.1 PRODUCT OVERVIEW

Data General's Enhanced DASHER LP2/TP2 printers (Figure 1-1) are microprocessor controlled, dot matrix printers capable of printing at maximum burst rates of 180 characters per second (cps). Printing is bidirectional and incorporates a "logic seeking" algorithm. This algorithm determines the shortest route to a character, which reduces the number of carriage returns during printer operation.

1.1.1 Print Mechanism

The printing mechanism contains a 9-wire printhead that forms 7 by 9 dot-matrix characters. A leadscrew assembly moves the printhead to ensure precise printhead positioning. Movable, pin-feed tractors accommodate one to six part forms ranging from four to 15 inches in width.

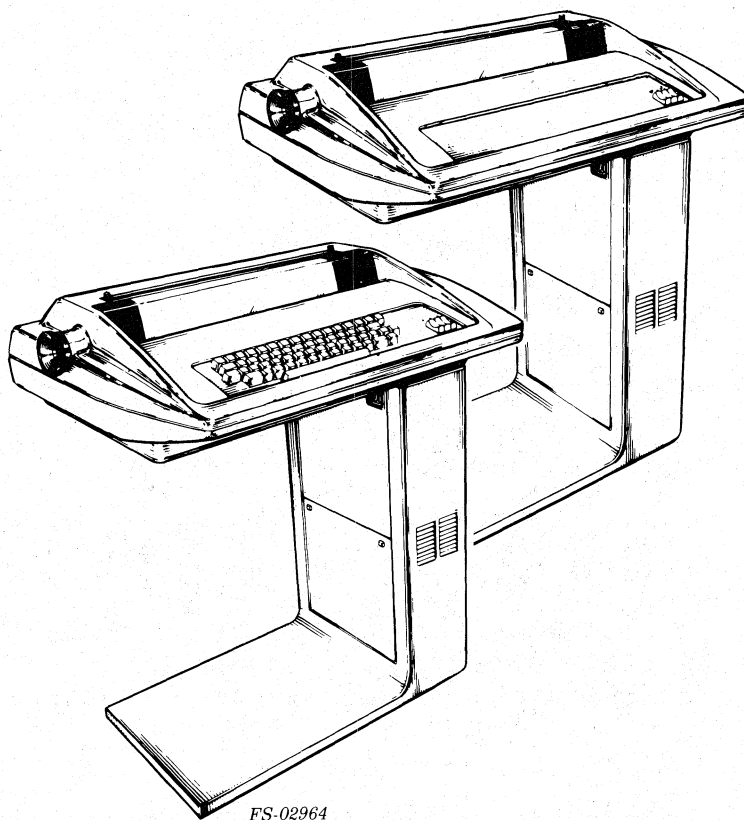


Figure 1-1. The Enhanced Dasher LP2/TP2 Printers

1.1.2 Interface

The printers are equipped with either a parallel or serial interface. Enhanced Dasher LP2 printers are equipped with a parallel interface that allows them to be attached to a system in place of a line printer. Enhanced Dasher TP2 printers are equipped with a serial interface that allows them to be attached to an asynchronous communications line. Both EIA RS-232-C and 20mA current loop connections are provided on serial interface models. In addition, these models can be used with Bell 103 and 212A compatible modems.

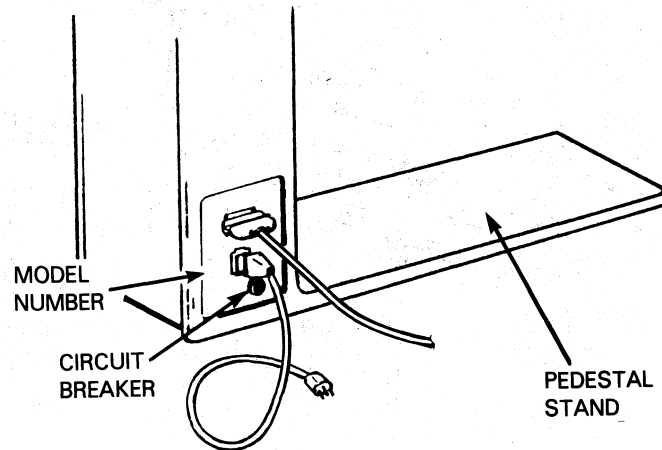
1.1.3 Fault Indicators

The printers are equipped with a fault indicator PCB which consists of a 7-segment LED display to indicate of faults in communications, movement, and hardware.

1.2 MODELS AND DESCRIPTIONS

The model number for an Enhanced Dasher LP2/TP2 printer is stamped on the plate located near the bottom of the pedestal, near the power cord connector (Figure 1-2).

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FS-11213

Figure 1-2. Model Number Location

The basic printer models are described in Table 1-1. The alpha suffix to the model number is described in Table 1-2, the beta suffix to the model number is described in Table 1-3, and the ac power suffix is described in Table 1-4. As described in Table 1-1, there are seven LP2 models equipped with parallel interfaces and two TP2 models equipped with serial interfaces. Of the TP2 printers, model 6193 is a receive only (RO) type printer and model 6194 is a keyboard send receive (KSR) unit. Table 1-5 lists the accessories available for all models.

Table 1-1. Enhanced DASHER LP2/TP2 Model Numbers and Descriptions

Model	Description
Prefix B Prefix E	Blue, EMI-hardened Earthtone, EMI-hardened
	PARALLEL MODELS (LP2)
6190	DASHER line printer with parallel interface without controller.
6191	DASHER line printer with parallel interface with NOVA / ECLIPSE PIO controller and paper holder.
6192	DASHER line printer with parallel interface with NOVA/ ECLIPSE DCH controller and paper holder.
	SERIAL MODELS (TP2)
6193	DASHER terminal printer receive only with serial interface.
6194	DASHER terminal printer keyboard send/receive with serial interface.
	COMMERCIAL SYSTEMS MODELS (LP2)
9610	DASHER line printer with parallel interface for CS-10 C1 systems.
9611	DASHER line printer with parallel interface for CS-10 C3 systems.
9612	6190 DASHER line printer with parallel interface for CS-30 systems.
9613	6190 DASHER line printer with parallel interface for CS-40/50/60/70 systems.

Table 1-2. Alpha Suffix to Model Numbers

Alpha Suffix	Description
A	ALPHA SUFFIX (CABLE) FOR MODELS 6193 AND 6194 NOVA 800, 1200, 830, 840, C150, S130, AP130, C330 S230, C300, S200, NOVA 3, 820, 1220, NOVA 2, NOVA 4 (4007/4010/4023/4029/EIA with model control) (4063 with 4083 EIA) (4075/4077/4078 EIA) (4241, 4243 ULM5-EIA and C.L.)
D	NOVA 800, 1200, 830, 840 (4060 C.L.)
F	microNOVA , NOVA 800, 820, 830, 840, 1200, 1220 NOVA 2, 3, 4, ECLIPSE C150, S130, AP130, C330, S230, C300, S200
G	NOVA 800, 820, 830, 840, 1200, 1220, 2, 3, 4; ECLIPSE C150, S130, AP130, C330, S230, C300, S200 (ALM-16, 4257, 4258, EIA and C.L.)
H	NOVA 800, 1200, 830, 840 (4062, EIA)
J	All ECLIPSE, NOVA, microNOVA systems. (D1, D2 printer interface) (modem async for remote operation)
K	CS systems (convenience panel) (RO)
L	NOVA 820, 1220, 2, 3, 4; ECLIPSE C150, S130, AP130, C330, S230, C300, S200 (console device for back panel P2)
M	ECLIPSE MV/8000 , M600, S250, C350, S140, NOVA 4 (AMI-8, 4340/EIA) (ATI-16, 4342/EIA) (ATI-16, 4342/C.L.) (ALM-8, 4255, 4256/EIA) (ALM-16, 4257, 4258, EIA and C.L.) (console EIA/C.L.) (ULM-5, 4241, 4243, EIA and C.L.) (ALM-16, 4257, 4258, EIA and C.L.) (ALM-8, 4255, 4256, EIA) (4075, 4077, 4078 EIA) (4007, 4010, 4023, 4029, EIA with modem) (CS10/C3 C.L.)
N	ECLIPSE S140, NOVA 4 (AMI-8, 4340, EIA) (ATI-16, 4342, EIA) (CS10/C3 EIA)

Table 1-2. Alpha Suffix to Model Numbers (Continued)

Alpha Suffix	Description
	ALPHA SUFFIX (CABLE) FOR TP2 MODELS 6193 AND 6194
P	All ECLIPSE, NOVA, microNOVA systems. (D3 printer interface, CS20)
Q	All ECLIPSE, NOVA, microNOVA systems. (D100/200 printer interface)
S	CS10/C1, EIA
T	MPT/80/83/87

Table 1-3. Beta Suffix to Model Numbers

Beta Suffix	Description
A	Standard font, United States ASCII
B	United Kingdom character font
C	French character font
D	German character font
F	Swedish/Finnish character font
G	Spanish character font
H	Danish/Norwegian character font

NOTE

The beta suffix represents the primary character set. The secondary character set is configured as the standard ASCII font. All character sets are ROM resident in all models, but the configuration allows the use of only two character sets (standard and alternate). Either character set can be changed at installation by the field service engineer.

Table 1-4. AC Power Suffix

Model Number	Description
0	115 Vac, 60 Hz (standard if suffix is omitted)
2	220 Vac, 50 Hz
4	240 Vac, 50 Hz

Table 1-5. LP2/TP2 Accessories (All Models)

Description	DGC Part No.
Paper Holder	1127A
Box of 12 ribbon cartridges	1285A
Quantity 5 of 1285A	1285B
Quantity 50 of 1285A	1285C

1.3 PERFORMANCE SPECIFICATIONS

Performance specifications for all printer models are described in Tables 1-6 through 1-9.

Table 1-6. Print Characteristics

Print rate:	Maximum burst rate of 180 characters per second (logic seeking, bidirectional)
Print method:	Serial 9-wire, impact through ribbon
Character style:	7 by 9 dot matrix, upper and lower character set (US ASCII) with true descenders, punctuation marks and underscore. Normal-elongated, compressed, and compressed-elongated character printing.

Table 1-6. Print Characteristics (Continued)

Character size	
Height:	2.67 mm (0.105 inches)
Width:	1.93 mm (0.076 inches) normal width character
Character Fonts:	Any two or the following seven international fonts can be configured as standard or alternate character sets: U.S.A British French German Swedish/Finnish Danish/Norwegian Spanish

Table 1-7. Paper Feed Characteristics

Paper forms:	Pin-feed, fan-fold, 1 to 6 part
Width:	10.2 to 38.1 cm (4 to 15 inches)
Hole spacing:	1.27 cm (0.5 inches) centers nominal
Maximum form thickness:	0.625 mm (0.025 inches)
Form weight	
Paper:	5.45 kg (12 lbs)
Carbon:	3.63 kg (8 lbs)
Form crimps:	Tab type only
Line density:	6 or 8 lines per inch (switch selectable)

Table 1-7. Paper Feed Characteristics (Continued)

Form length select:	1 to 99 lines per page (switch selectable)
Form length default	
6 lpi switch position:	66 lines
8 lpi switch position:	88 lines
Ribbon:	Fabric, cartridge type, continuous loop, (approximately 4 million characters)

Table 1-8. Electromechanical Characteristics

Printhead drive:	Leadscrew driven by permanent magnet stepping motor
Print wire pulse width:	400 +/-5% usec
Print wire initial turn-on:	105 +/-5% usec
Solenoid drive actuating voltage	
Primary:	16 Vdc
Secondary:	48 Vdc
Solenoid current:	4 Amps (maximum)
Ribbon drive:	Cable, bidirectional input, unidirectional output clutch box
Paper feed:	Pin-feed tractors driven by permanent magnet stepping motor and timing belt, eight 7.5 degree steps/line at 6 lines/inch spacing

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Table 1-9. Interface Characteristics

Parallel interface (LP2 printers):	Compatible with 8-bit line printer interface which includes STROBE, DEMAND and READY
Serial interface (TP2 printers):	Plug compatible with either 20 mA current loop or EIA RS-232-C voltage interface. Modem interface standard.

1.4 FIELD REPLACEABLE UNITS

The field replaceable units (FRUs) applicable to the non-EMI hardened and EMI hardened Enhanced DASHER LP2/TP2 printers are listed in Tables 1-10 through 1-12.

Table 1-10. Enhanced DASHER LP2/TP2 Field Replaceable Units (Non-EMI Hardened Only)

Description	DGC Part No.
Cable, Logic To Parallel I/O	005-009596
Cable, Logic To 20mA/EIA I/O	005-012942
Transformer Assembly	005-009523
AC Power Supply Harness	005-009516
Carriage Motor	005-009511
Capacitor (Line Filter Assy)	103-000288
Power Cord, 120 Vac	109-000238
Power Cord, 240 Vac	109-000240

Table 1-11. Enhanced DASHER LP2/TP2 Field Replaceable Units (EMI-Hardened Only)

Description	DGC Part No.
Cable, Logic to EIA/20 MA I/O	005-013392
Cable, Logic to Parallel I/O	005-013394
Carriage Motor Assembly	005-020924
Line Filter Assembly	005-020789
Transformer Assembly	005-020788
AC Power Supply Harness	005-020435
Power Cord, 120Vac	109-000249
Power Cord, 240Vac	109-000418

Table 1-12. Enhanced DASHER LP2/TP2 Field Replaceable Units (All Printers)

Description	DGC Part No.
Electronic PCBs, Cables, and Assemblies	
Driver PCB (REV 11+)	005-009505
Power Supply PCB (Rev. +9)	005-013887
Control Logic PCB	005-016362
Fault Indicator PCB	005-016358
Secondary Control Panel PCB	005-012975
Primary Control Panel PCB (RO)	005-006407
Speaker (w/cable logic to speaker)	005-012938
IC SYC6551, UART, Serial only, 28F	100-001692
Fan	115-000151
Internal Cables	
Cable, Printhead to Driver PCB	005-009575
Cable, Logic To Primary Control Panel	005-012944
Cable, Logic to Modem	005-009597
Cable, Power Supply to Driver PCB	005-009579
Cable, Logic to Keyboard	005-012940
Cable, Logic to Fault Indicator PCB	005-012943
Cable, Ribbon, Logic to Secondary Control Panel	005-009581
Cable, Logic To Secondary Control Panel (serial units only)	005-012945
Cable, Logic to Driver PCB	005-009580
Cable, Logic to Power Supply	005-012946

Table 1-12. Enhanced DASHER LP2/TP2 Field Replaceable Units for all Printers (Continued)

Description	DGC Part No.
Keyboards	
Assy, Keyboard U.S. Font (Blue)	118-000676
Assy, Keyboard Swedish Font (Blue)	118-000726
Assy, Keyboard German Font (Blue)	118-000735
Assy, Keyboard French Font (Blue)	118-000798
Assy, Keyboard French Font (Earthtone)	118-001931
Assy, Keyboard U.S. Font (Earthtone)	118-001941
Assy, Keyboard German Font (Earthtone)	118-001951
Assy, Keyboard Swedish Font (Earthtone)	118-001961
Carriage Parts And Assemblies	
Front Guide Rail (Linear or Plastic)	002-010272
Platen (Replaces 002-004110)	002-010237
Rear Guide Rail	002-004106
Detent Flange (Platen, Replaces 002-004132)	002-010255
Platen Adjustment Lever	002-004115
Coupling Adapter	002-006166
Motor Sector Disc	002-006148
Horizontal Motion Transducer (w/cable)	005-012939
Home Transducer (w/cable)	005-009588
Printhead (Replaces 118-00573)	005-009595
Coupling Clamp, Carriage Motor (w/dowels)	005-020946
Coupling Clamp, Leadscrew (w/dowels)	005-020947
Leadscrew and Anti-backlash Nut	118-001399
Bearing, Leadscrew	123-000842
Wavy Washer, Leadscrew	123-000843
Linear Bearing Carriage Parts/Assemblies (Early Model)	
Bearing Rear Top	002-006128
Bearing Rear Lower	002-006169
Retainer Rings for Linear Bearing	123-001264
Linear Bearing	123-001321
Springs for Lower Rail Bearing	123-001720

Table 1-12. Enhanced DASHER LP2/TP2 Field Replaceable Units for all Printers (Continued)

Description	DGC Part No.
Plastic bearing Carriage Parts/Assemblies (Late Model)	
Carriage Body (with permanent plastic bearings)	002-010252
Bearing, Rear	002-010231
Carriage Assembly	005-012981
Paper Feed Mechanism	
Paper Feed Vernier Knob	002-004146
Paper Feed Clutch Pulley	002-006549
Paper Feed Drive Pulley (on motor shaft)	002-006551
Paper Feed Clutch Plate, Vernier Knob	002-006548
Support Rail	002-004121
Paper Feed Drive Shaft	002-007016
Bearing, Flange (Paper drive shaft replaces 002-004133)	002-010256
Paper Guide (mylar strip)	002-026105
Paper Feed Motor Assembly	005-009508
Switch, Out-of-Forms (w/cable)	005-006406
Paper Feed Tractors, pair (Replaces 118-000699)	118-002025
Spring, Vernier Knob	123-000851
E-Ring	123-000858
Paper Feed Drive Belt	123-000946
Woodruff Key	123-000852
Shim Washer (for bearing flange)	123-000992
Ribbon Drive Mechanism	
Cable Keeper Bracket	002-006168
Ribbon Drive Gearbox	005-009509
Ribbon Cartridge Assembly	005-012924
Ribbon Drive Steel Cable	118-000696

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Table 1-13. Additional Assemblies

Description	DGC Part No.
Nylon Retainer Strip (for platen)	002-006458
Spring plunger (Platen adj. lever)	123-000867
Anti-static Wire	118-001168
Leadscrew Shim Washer	123-000992
AC Power Switch	110-000226
Home Flag (linear bearing carriage)	002-006135
Plastic Bearing Carriage Mechanisms	
Cable Clamp	002-010229
Home Flag	002-010234
"O" Ring Rubber	123-001267

SECTION 2

OPERATING CONTROLS AND PROCEDURES

This section describes the operating controls and procedures for the Enhanced DASHER LP2/TP2 printers.

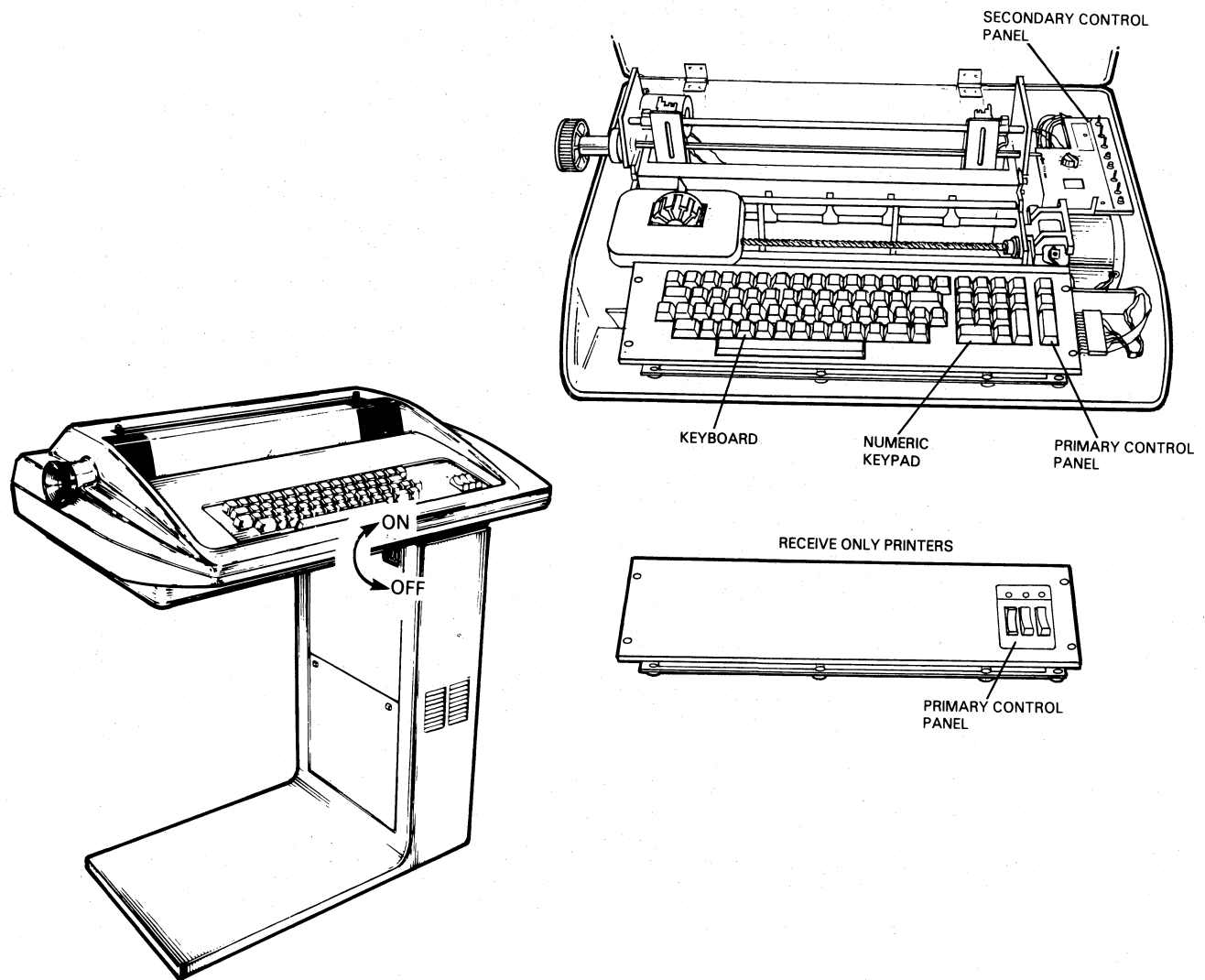
2.1 SWITCHES AND INDICATORS

The switches and indicators are located on the following assemblies:

- AC Power Switch Assembly
- Primary Control Panel
- Secondary Control Panel
- Fault Indicator Control Panel
- Keyboard Assembly

Switch and indicator locations are shown in Figure 2-1.

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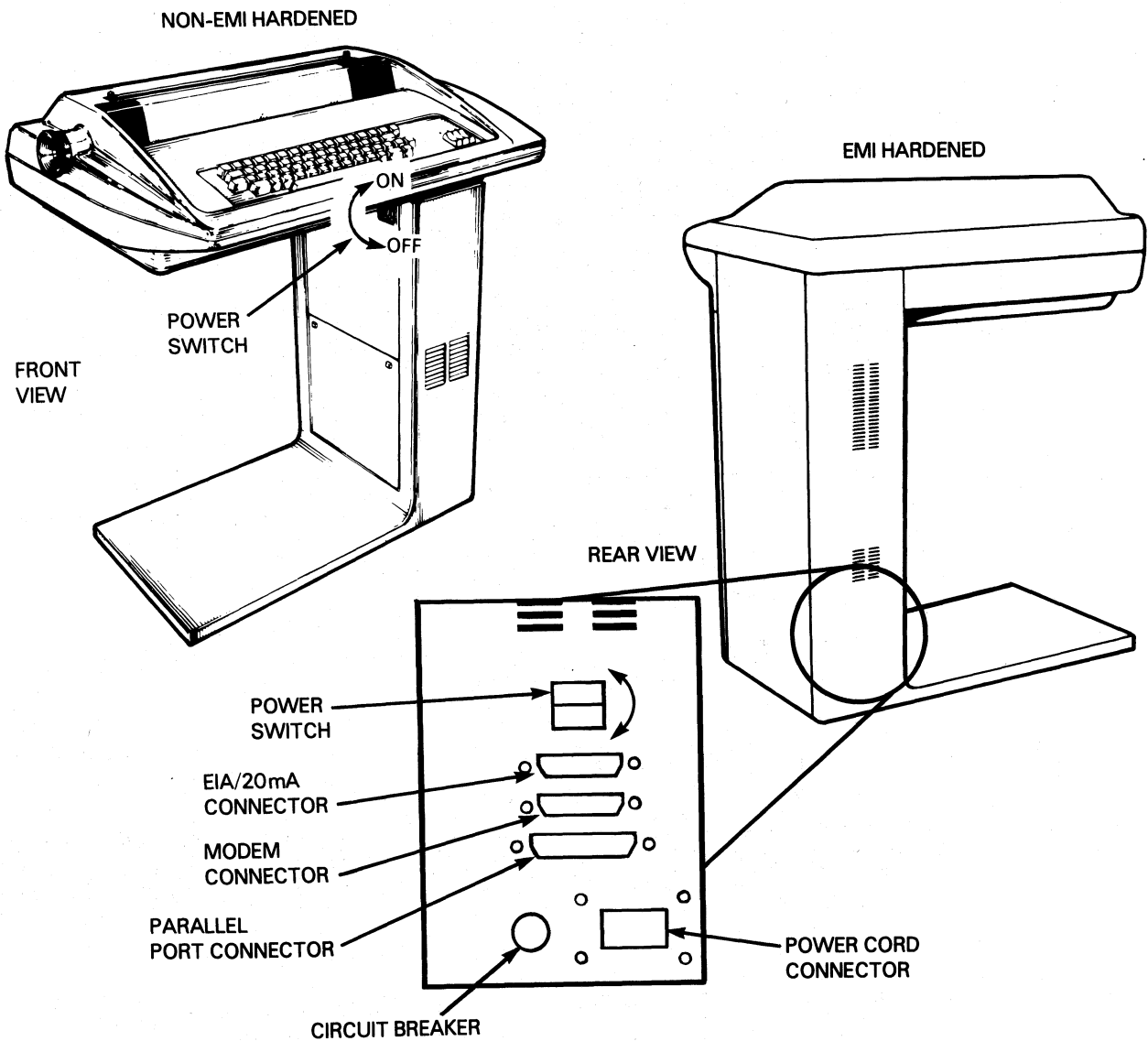
FS-11214

Figure 2-1. Printer Control and Indicator Locations

2.1.1 Main Power Switch

The 2-position POWER switch is located on the inner side of the printer pedestal as shown in Figure 2-2 in non-EMI hardened printers. On EMI hardened units, the power switch is on the lower back of the pedestal. When the switch is set in the up or ON position, ac power is applied to the unit. Setting the switch to the down or OFF position shuts off ac power to the printer.

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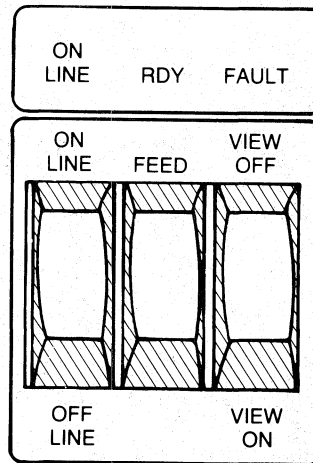
FS-11215

Figure 2-2. Power Switch Locations

2.1.2 Primary Control Panel

Receive Only (RO) controls and indicators for the RO printers are shown in Figure 2-3 and explained in Table 2-1.

Keyboard Send/Receiver (KSR) controls and indicators for the KSR printers are shown in Figure 2-4 and explained in Table 2-2.



FS-11216

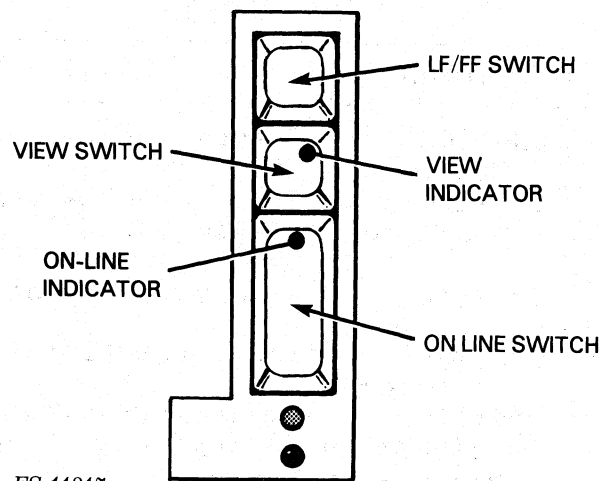
Figure 2-3. RO Primary Control Panel

Table 2-1. RO Primary Control Panel

Controls	Function
ON-LINE/OFF-LINE Power Switch	ON-LINE (up position) - data is printed from the buffer. OFF-LINE (down position) - signals BUSY to the host and stops printing.
FEED Switch	Position 1 (up position) - advances the paper one line. Position 2 (middle position) - normal printing position. Position 3 (down position) - advances the paper to the top of next form (operates in the OFF-LINE mode only).
VIEW-OFF/VIEW-ON Switch	VIEW-ON (down position) the view feature is enabled. The carriage quickly moves eight character positions to allow viewing of the most recently typed characters (operates in ON-LINE mode only)
ON-LINE	When illuminated, the printer is ON-LINE (under control of the computer).

Table 2-1. RO Primary Control Panel (Continued)

Controls	Function
RDY	<p>When illuminated the printer is able to accept input. When not illuminated one of the following is true:</p> <ol style="list-style-type: none"> 1. Printer is OFF-LINE. 2. A fault condition exists.
PAPER FAULT	<p>When lit, a fault condition exists. Faults can be one of the following:</p> <ul style="list-style-type: none"> - Out of paper - Paper feed mechanism is jammed - Ribbon cartridge is jammed - An error indicated by the 7-segment error code display on the Fault Indicator PCB (Figures 2-4 and 2-5).



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Figure 2-4. KSR Primary Control Panel

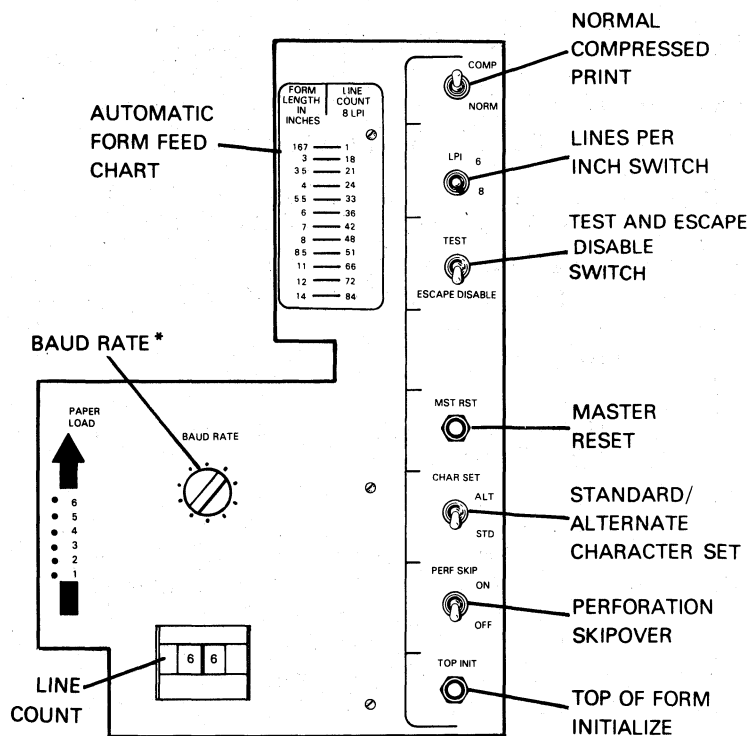
Table 2-2. KSR Control and Indicators

Controls	Function
LF/FF (Momentary Contact Switch)	When pressed for less than one second, the paper advances to the next line (line feed). When pressed longer than one second, the paper advances to the top of next form (form feed). (Operates in OFF-LINE mode only.)
VIEW (alternate Action Switch)	When pressed (and light glows) the view mode is enabled. The carriage quickly moves eight character spaces to allow viewing of the most recently typed characters (operates in ON-LINE mode only).
ON-LINE (alternate Action Switch)	When pressed (and light glows) the printer is connected to the computer or communications system.
Indicator	Function
VIEW	When illuminated, indicates that the printer is in the VIEW mode.
ON-LINE	When illuminated, indicates that the printer is on-line.
READY	When illuminated, the printer is ON-LINE and no fault exists. When not illuminated, the printer is either OFF-LINE or a fault exists.

2.1.3 Secondary Control Panel Controls and Indicators

The controls and indicators for the secondary control panel are shown in Figure 2-5 and explained in Table 2-3.

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Figure 2-5. Secondary Control Panel

Table 2-3. Secondary Control Panel Controls and Indicators

Controls	Function
NORM/COMP Switch	In NORM position the printer produces 132 characters per line. In COMP position the printer produces 220 characters per line.
LPI 6/8	In the 6 position the printer produces 6 lines per inch (LPI) vertical spacing. In the 8 position the printer produces 8 LPI vertical spacing.

Table 2-3. Secondary Control Panel Controls and Indicators (Continued)

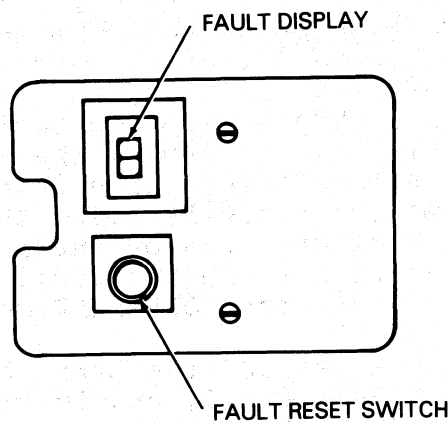
Controls	Function
<p>SELF TEST/ESC DISABLE switch</p>	<p>In the ESC DISABLE position (down position), escape codes are ignored and subsequent codes are printed.</p> <p>In middle position (normal position) enables decoding or escape codes.</p> <p>In the SELF TEST position (up position), the printer enables the 8 inch line length self test. The printing test begins when the ON LINE switch, on the primary control panel, is pressed. If the SELF TEST is repeated, the printer alternates between the 8 inch and 13.2 inch line lengths. If the switch is then put in the ESC DISABLE position, self test overprints the line 33 times before issuing a line feed.</p>
<p>MST RST Switch (Master Reset)</p>	<p>When pressed, this switch resets the printer (same function that is performed during initial power on). The printer mode of operation is reset to the mode set up on the secondary control panel switches.</p>
<p>CHAR SET STD/ALT Switch</p>	<p>In the STD position (down position), the printer uses the character set defined as standard via switches internal to the printer.</p> <p>In the ALT position (up position), the printer uses the alternate character set defined by switches internal to the printer.</p>
<p>PERF SKIP ON/OFF Switch</p>	<p>In the ON position (up position), the printer skips to the top of the next form if any line feeding action (line feed, vertical tab, etc.) would ordinarily space the paper into the bottom one inch of the form. In the OFF position (down position), no perforation skip is performed (OFF-LINE mode only).</p>
<p>TOF INIT Switch</p>	<p>When depressed, the current line of the form becomes line 1, and the form length is computed from the 6/8 LPI and the Line Count Thumbwheel Switch (OFF-LINE mode only).</p>

Table 2-3. Secondary Control Panel Controls and Indicators (Continued)

Controls	Function
Line Count Thumb-wheel Switch	<p>This thumbwheel switch is set to the total number of lines between perforations on the form currently being used.</p> <p style="text-align: center;">NOTE</p> <p>If LPI is in the 8 position, the line count equals the form length in inches multiplied by 8. If LPI is in the 6 position, use the form feed chart on the panel to convert from length to line count.</p>
BAUD RATE Rotary Switch	<p>This switch selects 1 of 8 possible transmission rates for serial communications.</p>

2.1.4 Fault Indicator Panel Controls and Indicators

The controls and indicators for the Fault Indicator Panel are shown in Figure 2-6 and explained in Table 2-4.



FS-11219

Figure 2-6. Fault Indicator Panel

Table 2-4. Fault Indicator Panel Controls and Indicators

Controls	Function
<p>FAULT RESET Switch</p>	<p>When depressed, the fault logic is reset.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If pressing this switch fails to restore normal operation, see Section 4.</p>
<p>Indicators</p> <p>ERROR CODE Display</p>	<p>Function</p> <p>The display indicates either a number between 1 and 9 or a small "c". The error codes are as follows:</p> <ol style="list-style-type: none"> 1. Hardware error - ROM self-test failure. 2. Hardware error - RAM self-test failure. 3. Hardware error - Serial Interface failure. 4. Parity error - The parity error fault indication is switch selectable on the Control Logic PCB. 5. Carriage Motor Stall - The fault can be caused by a ribbon cartridge jam, debris on the leadscrew or guide shafts, or similar problems. The printer attempts 1 retry if a stall is detected. If the carriage fails to recover a fault occurs. 6. Future Expansion. 7. Out of Forms - The fault indicates the printer is out of paper or that the paper is no longer feeding into the printer for some reason. 8. System OK - This indication is temporarily displayed after the completion of self-test. 9. Buffer Overflow - The fault indicates that the correct busy signal is not configured on the Control Logic, or that the host system PCB did not respond to the selected busy signal. 10. Power Failure Recovery - this fault indication informs the operator that a power failure has occurred and prevents going directly from a power failure to an ON-LINE condition.

2.1.5 Keyboard (KSR Terminals Only)

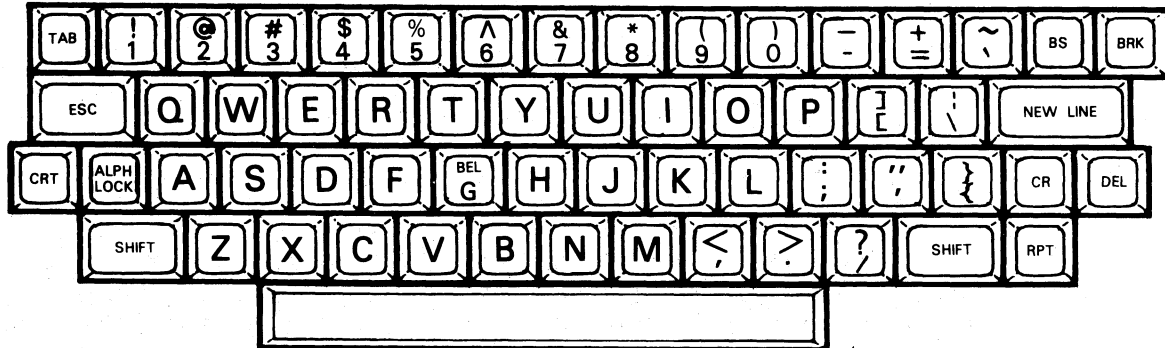
The DASHER KSR printer keyboard layout is similar to a standard office typewriter. However, unlike a typewriter it generates ASCII character codes. The printer responds differently in ON-LINE and OFF-LINE modes. In OFF-LINE, the printer operates very much like a typewriter. In ON-LINE, its functions vary. In ON-LINE mode, the printer's response to the keyboard depends on the task the computer has been programmed to do.

The keyboard contains a typewriter keyboard with standard typewriter keys and 11 function keys. The keyboard also has a 14-key numeric keypad.

2.1.5.1 Keyboard Function Keys - The typewriter keyboard and the 11 function keys are shown in Figure 2-7 and the function keys are explained in Table 2-5.

NOTE

For future use, observe that the ON-LINE function of a key can vary from system to system.



FS-11220

Figure 2-7. KSR Keyboard

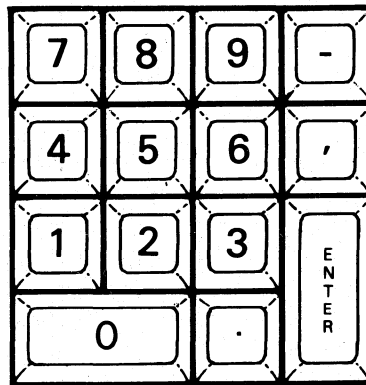
Table 2-5. Typewriter Function Keys

Key	Function	Description
ALPHA LOCK	Upper Case Alpha Lock Key	This key functions the same way the Shift Lock key does on a typewriter. Depressing it along with any alpha (letter) key generates the upper case character for that alpha. This upper case function continues until the ALPHA LOCK key is pressed again. Then lower case characters are resumed. The indicator light on the SHIFT key glows while this function occurs.
BRK	Break Key	Holding this key down prevents the transmission of any character codes.
BS	Back Space Key	OFF-LINE - pressing this key moves the carriage back one space.
CTRL	Control Key	OFF-LINE - holding this key down while pressing another key has no effect on the terminal with the following exceptions: DEL, BS, NEW LINE, CR.
DEL	Delete Key	OFF-LINE - pressing this key prints the rubout code.
ESC	Escape Key	OFF-LINE - this key has no effect on the terminal.
NEW LINE	New Line Key	OFF-LINE - pressing this key terminates the present line and advances the paper one line.
CR	Carriage Return Key	OFF-LINE - pressing this key moves the printhead carriage to the left-hand margin but does not advance the paper.
RPT	Repeat Key	Pressing this key by itself has no effect. If pressed with any other key, causes the terminal to repeat the action of the other key until either key is released.

Table 2-5. Typewriter Function Keys (Continued)

Key	Function	Description
SHIFT	Upper Case Key	This key functions as the Shift key does on a typewriter. Pressing it with another key generates the shifted mode function for that key. The light is lit when the ALPHA LOCK key has locked the keyboard in uppercase mode.
TAB	Tabulation Key	OFF-LINE - pressing this key has no effect on the printer.

2.1.5.2 Numeric Keypad (KSR Models Only) - The numeric keypad (Figure 2-8) is similar to a calculating machine keypad. It generates the numerals 0-9, periods, commas, and minus signs. It also has an ENTER key. When OFF-LINE, pressing this key returns the printhead to the left-hand margin without advancing the paper.



FS-11221

Figure 2-8. KSR Numeric Keypad

2.2 OPERATING PROCEDURES

Normal printer operating procedures include power-up, printer initialization, paper-loading, ribbon cartridge loading, and power-down.

2.2.1 Power-up Procedure

1. Switch the POWER switch to the ON position.
2. Make sure paper is correctly installed.
3. Make sure ribbon cartridge is correctly loaded.
4. Set ON-LINE/OFF-LINE switch on the primary control panel to ON-LINE.
5. Initialize the printer.

2.2.2 Printer Initialization

When the printer is powered-up, or the MST RST button on the fault indicator panel is pressed, the following initialization takes place:

1. Printhead moves to the left-hand margin.
2. The printer sounds an alarm.
3. The character buffer is cleared.
4. The printer is initialized according to the settings of the secondary control panel.

2.2.3 Paper Loading Procedure

1. The DASHER terminal uses standard pin-feed, fan-fold paper forms. These forms have from one to six parts and can be from four to 15 inches wide. The space between the printhead and platen can be adjusted for forms of different thickness, to ensure good print contrast. Different form widths can be obtained by moving the right and left paper tractors.
2. Depress the OFF-Line/ON-LINE to the OFF-LINE position.
3. Swing the top cover up until it latches.
4. Adjust the paper tractors for different widths, if needed, by loosening the levers locking them in place. When the tractors are in position, retighten the levers to lock the tractors in place.
5. Set a box of pin-feed paper under the printer.
6. Move the platen space lever to the widest position in order to slide the paper into place.

7. Swing the tractor gates open and feed the paper through the opening in the bottom of the terminal, under the vertical tension springs and onto the tractor pins.

NOTE

It may be necessary to reposition the right tractor to line the tractor pins up with the paper feed holes. Make sure the corresponding holes on either side of the paper are aligned so the top of the paper is horizontal. Otherwise, the paper may jam and/or tear in the tractors. There should be slight horizontal tension on the paper; however, too much tension can jam the paper. To increase the horizontal tension move the right tractor slightly to the right; to decrease the tension move the right tractor slightly to the left.

8. Close the tractor doors.
9. Move the platen space lever to the appropriate position for the form thickness used. The number of platen positions corresponds approximately to the number of forms used, but form thickness varies from supplier to supplier. For best results, adjust the platen lever to get the desired print contrast.
10. Adjust the paper to the desired vertical position using the FEED switch on the RO models or the LF/FF switch on the KSR models. Make fine adjustments by pulling out and rotating the paper feed vernier knob.
11. Set the line count switch on the secondary control panel for the length of the form being used, then press TOF INIT (initialize top of form).
12. Feed the paper through the large slot on the top cover as it is closed.
13. Switch the terminal to ON-LINE.

2.2.4 Ribbon Cartridge Loading

NOTE

The Enhanced DASHER LP2/TP2 printer uses a continuous cartridge type ribbon. The ends are connected together so that both the upper and lower parts are used. A new cartridge should be installed when printing becomes faint.

1. Depress the OFF-LINE/ON-LINE switch to OFF-LINE.
2. Swing the top cover up until it latches open.

3. Note the position of the platen space lever (located next to the secondary control panel), and move it away from the printhead to the widest position.
4. Grasp the sides of the cartridge with both hands and gently pull upward, removing it from the carriage assembly.
5. Turn the knob on the new cartridge clockwise until the ribbon is taut.

CAUTION

The knob on the ribbon cartridge should never be turned counter-clockwise. This can jam the ribbon.

6. Place the cartridge (knob side up) on the carriage assembly. Slowly turn the knob clockwise as the cartridge is pushed in place (this engages the ribbon drive spindle located at the top of the carriage assembly).
7. Set the platen lever for the desired print contrast.
8. Close the top cover.
9. Turn the power ON and switch the printer to ON-LINE.

2.2.5 Power-Down Procedure -

1. Set ON-LINE/OFF-LINE switch to OFF-LINE.
2. Switch the POWER switch to the OFF or down position.

SECTION 3

THEORY OF OPERATION

This section describes the theory of operation to the field replaceable unit (FRU) level.

3.1 FUNCTIONAL OVERVIEW

Figure 3-1 shows the major functional areas that make up the Enhanced DASHER LP2/TP2 printers. This subsection describes the functions of the major assemblies of the printers:

- Microprocessor and Memory
- Interface (parallel or serial)
- Printhead/Carriage Assembly
- Paper Feed Assembly
- Control Panel PCBs
- Keyboard and Numeric Keypad

3.1.1 Microprocessor and Memory

The 6502 8-bit microprocessor and its memory are located on the control logic PCB. The microprocessor controls the printer's various subsystems. Figure 3-1 shows how the microprocessor communicates to the various subsystems via a bidirectional 8-bit data bus.

The microprocessor is supported by two types of printer resident memory circuits: read only memory (ROM) and read/write random access memory (RAM).

The ROM is the primary control intelligence of the microprocessor which consists of a series of program routines (firmware). These programs monitor keyboard entries, monitor switch/transducer inputs from mechanical components and control panel PCBs, and coordinate communications to the host system.

The read/write RAM memory is used for temporary storage of variables generated by the ROM firmware and incoming data characters from the host system.

The microprocessor is also supported by the timing and control logic circuits which generate clock pulses for use by the microprocessor and other internal circuits. The timing and control logic circuits also decode commands to generate control signals for routing of data.

3.1.2 The Parallel Interface

A parallel interface is standard on the Enhanced DASHER LP2. Eight data lines transfer data from the computer to the interface 8 bits at a time. A DEMAND line informs the computer when the interface is able to accept data. A second status line, READY, informs the computer when the printer is powered up and no fault condition exists.

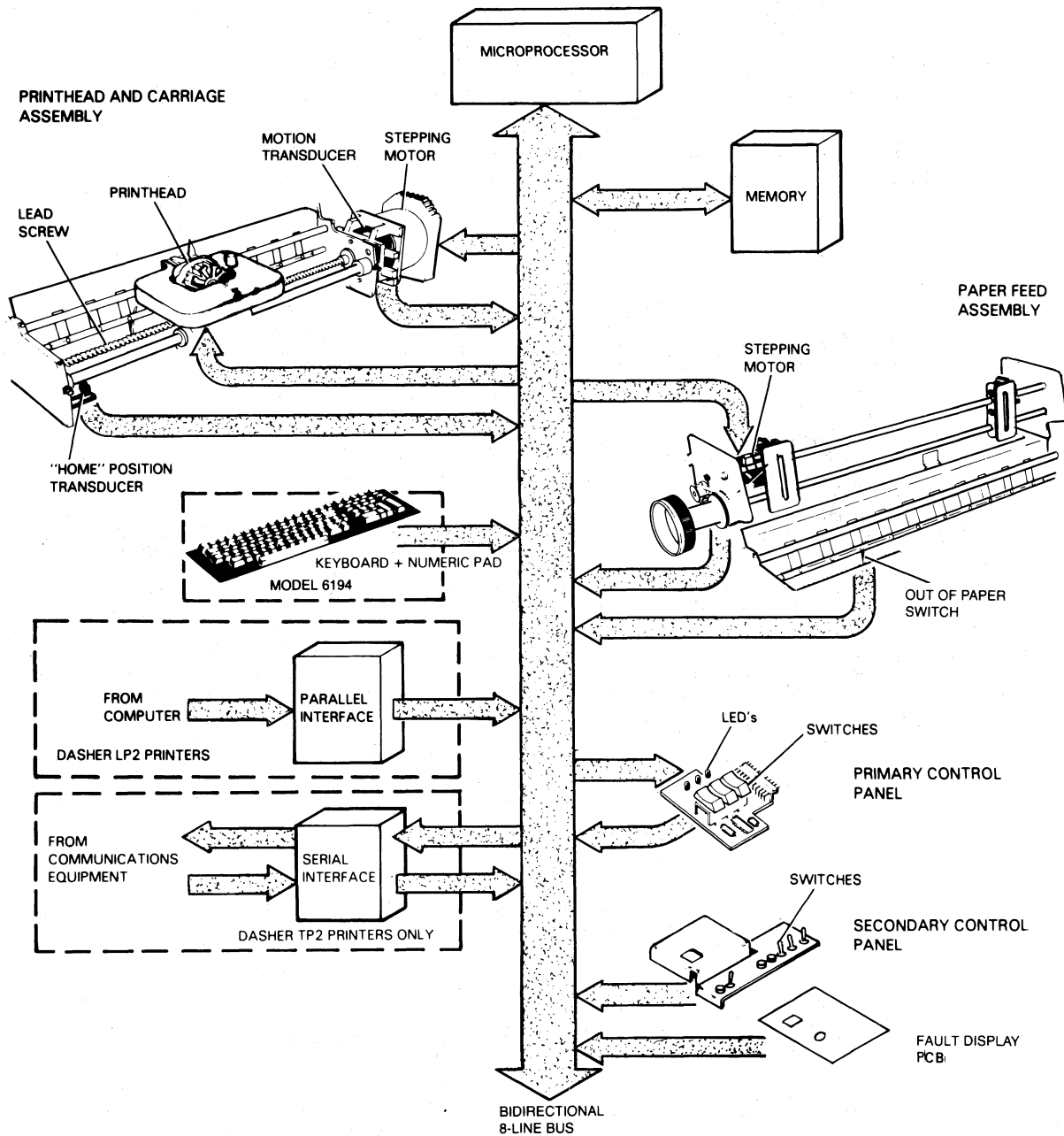
The microprocessor continually checks the interface to see if any data is present. If it finds that a byte (character) has arrived, the microprocessor retrieves this byte from the interface and stores it in memory for processing. The parallel interface can accept data at a rate of up to 5,000 characters/second until the allotted storage area in memory (2Kbytes) is filled. At this point, the microprocessor processes most of the stored characters before it accepts any additional characters.

3.1.3 The Serial Interface

The serial interface transfers data in either direction between the printer and a communications system. This interface is available on both RO and KSR Enhanced DASHER TP2 printers. Switches select a number of different serial formats. In addition, one of eight different information transfer rates may be selected: 110, 150, 300, 600, 1200, 1800, 2400, and 4800 baud.

The serial interface assembles data in an 8-bit buffer as it is received, notifying the microprocessor when the complete byte is present. The microprocessor retrieves the byte and stores it in memory for processing. When the microprocessor wishes to transmit a character, it first checks the serial interface to see if it is busy transmitting a character. When the interface is idle, the microprocessor transfers the byte to the interface.

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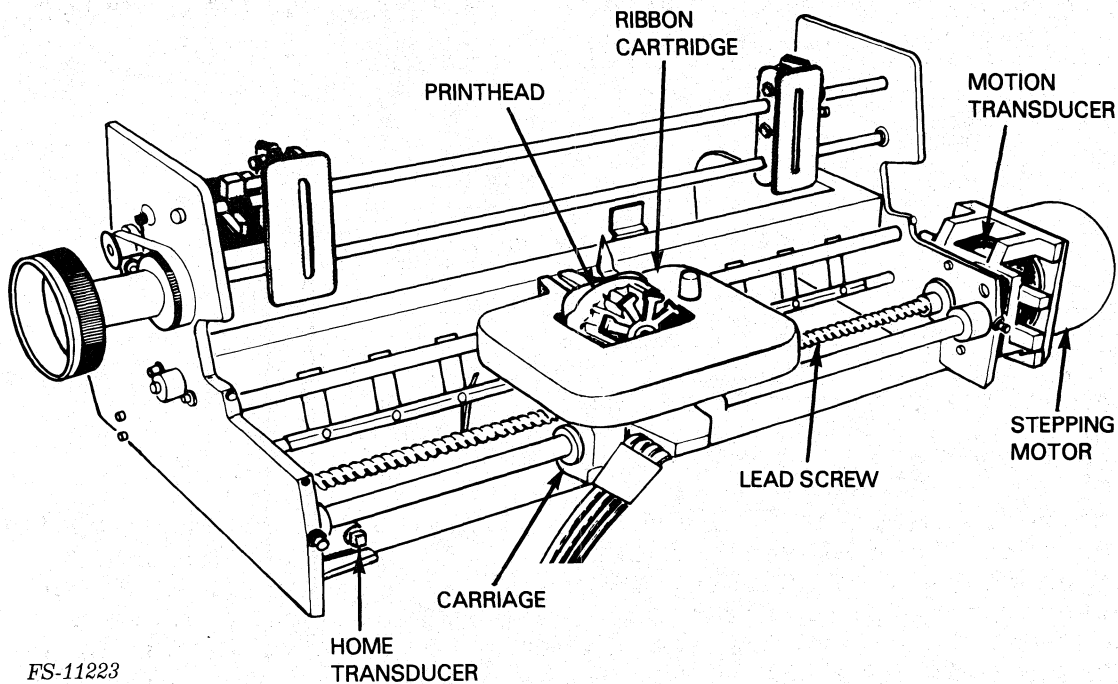
Figure 3-1. Functional Block Diagram

3.1.4 Printhead and Carriage Assembly

This assembly contains the mechanical and electrical assemblies which position the printhead and print characters on paper. The major parts of the printhead and carriage assembly are:

- A. Printhead
 - Ribbon cartridge
- B. Carriage
 - Stepping motor
 - Leadscrew
- C. Transducers
 - Home transducer
 - Motion transducer

Figure 3-2 shows the printhead and carriage assemblies.



FS-11223

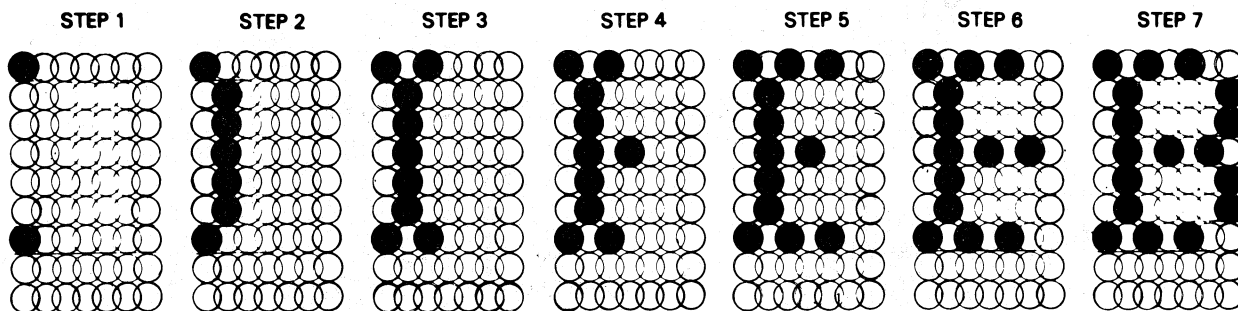
Figure 3-2. Printhead and Carriage Assemblies

A. The Printhead

A printed character is produced when the microprocessor routes a RAM stored data character through drivers to the printhead. The printhead is programmed, by the microprocessor's firmware, to fire its 9-wire head to impact a medium (usually paper) through the ribbon cartridge to form the correct character.

The printhead forms a character in seven segments as it moves across the paper. Each segment is formed by firing a subset of the nine printhead wires. These wires force the ribbon against the paper forming a 7 by 9 dot matrix character. The microprocessor fires these print wires by obtaining a 9-bit code from the firmware ROMs and transmitting that code to the driver PCB. The driver PCB generates the voltages to energise the appropriate print wire in the printhead. Figure 3-3 shows how a character is formed during a left to right print sequence.

FORMING A CHARACTER



FS-11224

Figure 3-3. Forming a Character

Since the printhead is bidirectional, a character may also be formed by starting with the right column. In this case, the microprocessor issues the firing codes in reverse order.

B. The Carriage

The microprocessor controls the horizontal motion of the printhead by issuing commands to the drive circuitry of the carriage mechanism. This mechanism consists of a stepping motor and lead screw assembly (to which the printhead carriage is attached). When the microprocessor steps the motor (tells it to rotate a fixed amount), the lead screw turns, moving the printhead a fixed distance. Since the stepping motor may be stepped clockwise or counterclockwise, the printhead may be moved either right or left.

C. Transducers

The home transducer signals the microprocessor when the printhead has reached the left-hand margin (home position). This transducer is used to initialize the printhead's horizontal alignment. The horizontal motion transducer is used to indicate when the carriage is moving and the motor has not stalled.

3.1.5 Paper Feed Assembly

The paper feed assembly (Figure 3-4) controls the vertical movement of the paper past the printhead. Like the carriage mechanism, the paper feed assembly uses a stepping motor. This motor turns the tractors which move the paper by the printhead. The microprocessor directly controls how much paper is fed through the printer by stepping this motor a selected number of lines. In fact, the difference between selecting 6 lines/inch or 8 line/inch spacing is reflected in the number of steps the microprocessor issues to the stepping motor for a line feed.

An out of paper switch informs the microprocessor when paper runs out. If this occurs, the microprocessor generates a paper fault.

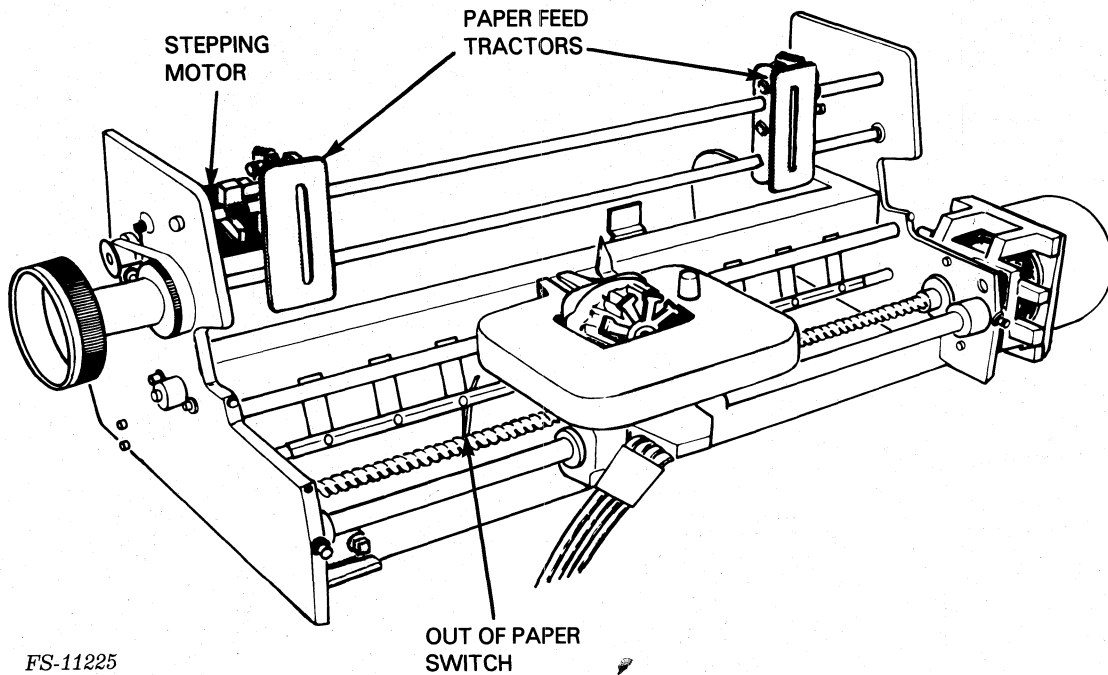


Figure 3-4. Paper Feed Assembly

3.1.6 The Control Panel PCBs

There are two control panel PCBs that can be used to control the printer. The primary control panel contains a number of LEDs and switches used to display status information and control commonly used functions. The secondary control panel contains switches which configure the printer and select its various options.

3.1.7 The Keyboard and Numeric Keypad

The keyboard and the numeric keypad are input devices which allow communication with the host system. Like other subsystems, the microprocessor monitors the keyboard and the numeric keypad. When the operator presses a key, the microprocessor retrieves the keyed character's 7-bit ASCII code. If the printer is offline, the microprocessor immediately processes the character. If the printer is online, the microprocessor transmits the 7-bit code to the communications line via the serial interface.

3.2 OPERATION

The basic operations internal to the enhanced DASHER LP2 and TP2 printers are as follows:

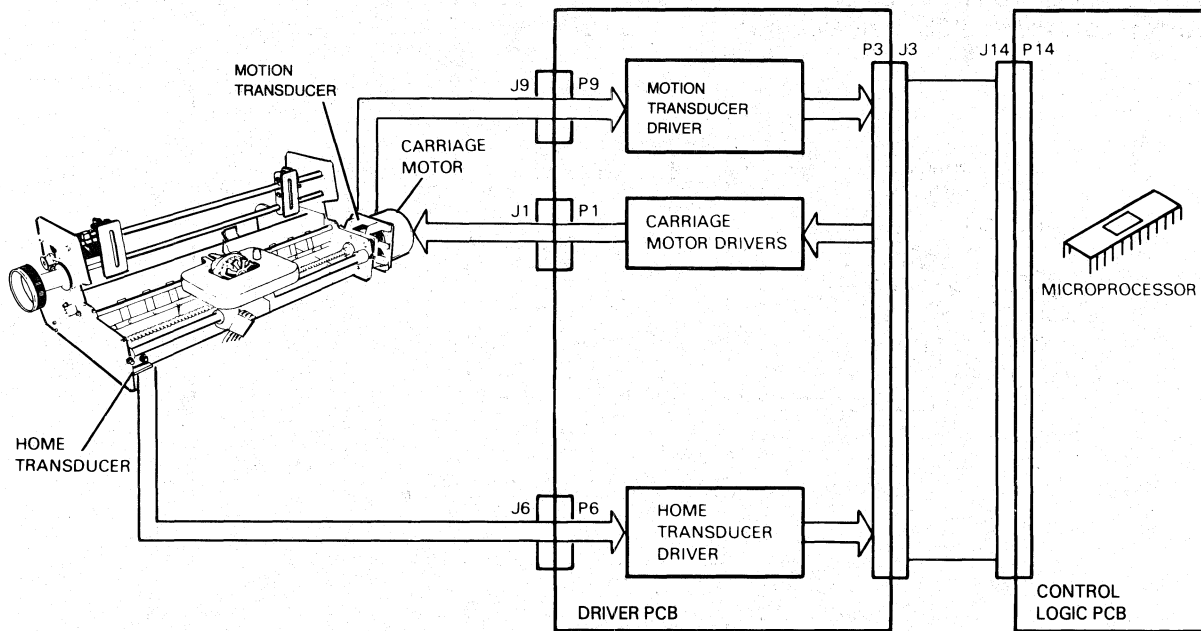
- Carriage Position Control
- Print Control
- Paper Feed Control
- Communication
- Power Supply Distribution
- Fault Detection

3.2.1 Carriage Position Control

Figure 3-5 shows a simplified block diagram of components associated with the carriage position control system. The microprocessor moves the carriage and the printhead assembly by controlling the motion of the carriage motor. Control signals, originating from the microprocessor on the control logic PCB, pass through the carriage motor drivers on the driver PCB and "step" (i.e., move) the carriage motor, thereby turning the leadscrew and moving the carriage. The carriage feed motor uses 16 Vdc as its primary (idle) voltage and increments of 48 Vdc as its boost (active) voltages.

Located on the motor's drive shaft is a timing disk with slots arranged around its periphery. The motion transducer detects these slots as they pass by when the motor turns. Signals informing the microprocessor of this motion are detected by the transducer drivers on the driver PCB and are passed back to the control logic on the logic control PCB. The control logic uses this information to check that the carriage moves.

A home transducer detects the presence of the carriage at the left-hand margin. It allows the control logic to determine exactly where the carriage is.



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Figure 3-5. Carriage Control Assembly, Simplified Block Diagram

If any part of this loop is broken or not functioning correctly, the microprocessor signals a problem by turning on the FAULT LED on the primary control panel and signalling a carriage stall fault (code 5) on the Fault Indicator PCB display (after attempting one retry).

3.2.2 Print Control

Figure 3-6 shows a simplified block diagram of the print control system. The microprocessor determines when it should fire the printhead according to the position of the carriage. The Home Transducer allows the microprocessor to locate the exact position of the carriage, while the timing circuitry helps the microprocessor keep track of its subsequent motion.

Print position timing is generated by circuitry on the control logic PCB. The microprocessor counts the print position pulses generated by this circuitry thereby keeping track of its position.

The microprocessor fires the printhead via control logic on the logic control PCB. This logic passes a 9-bit code to the driver circuitry on the driver PCB which in turn energizes the appropriate coils in the printhead. When a printhead coil is energized, it sets up a magnetic field forcing a print wire out of the printhead. The print wire forces the ribbon against the paper, forming one part of the dot matrix character.

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If for some reason a coil in the printhead is energized for too long a period, or a printhead winding shorts out, an overcurrent sensing circuit shuts down the power supply. In this case, a HEAD FAULT LED on the power supply PCB indicates the cause of the shutdown.

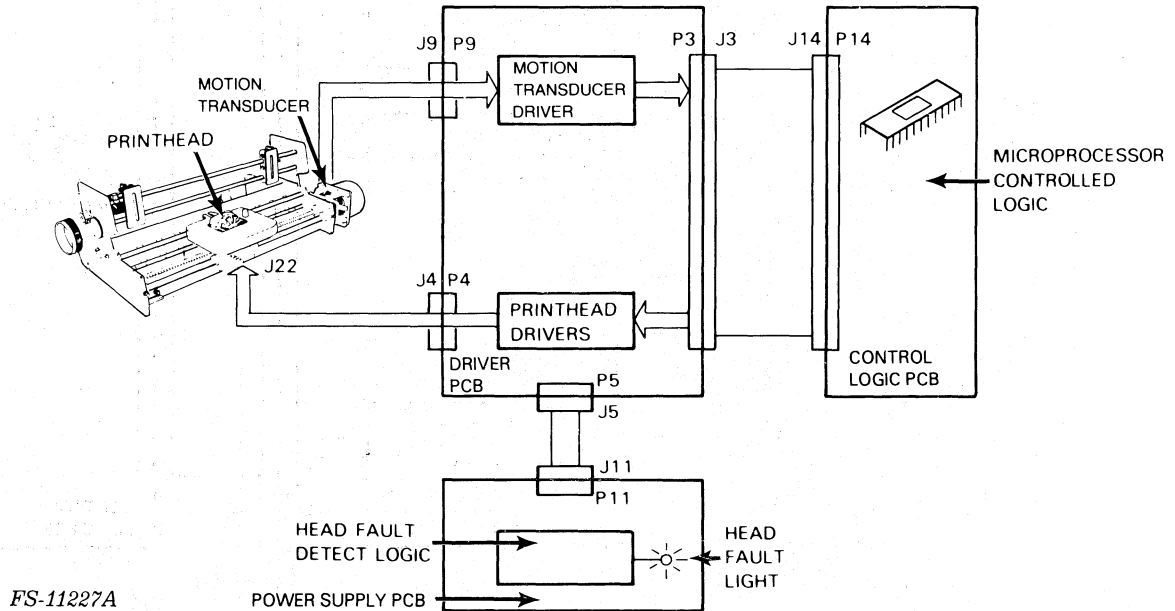


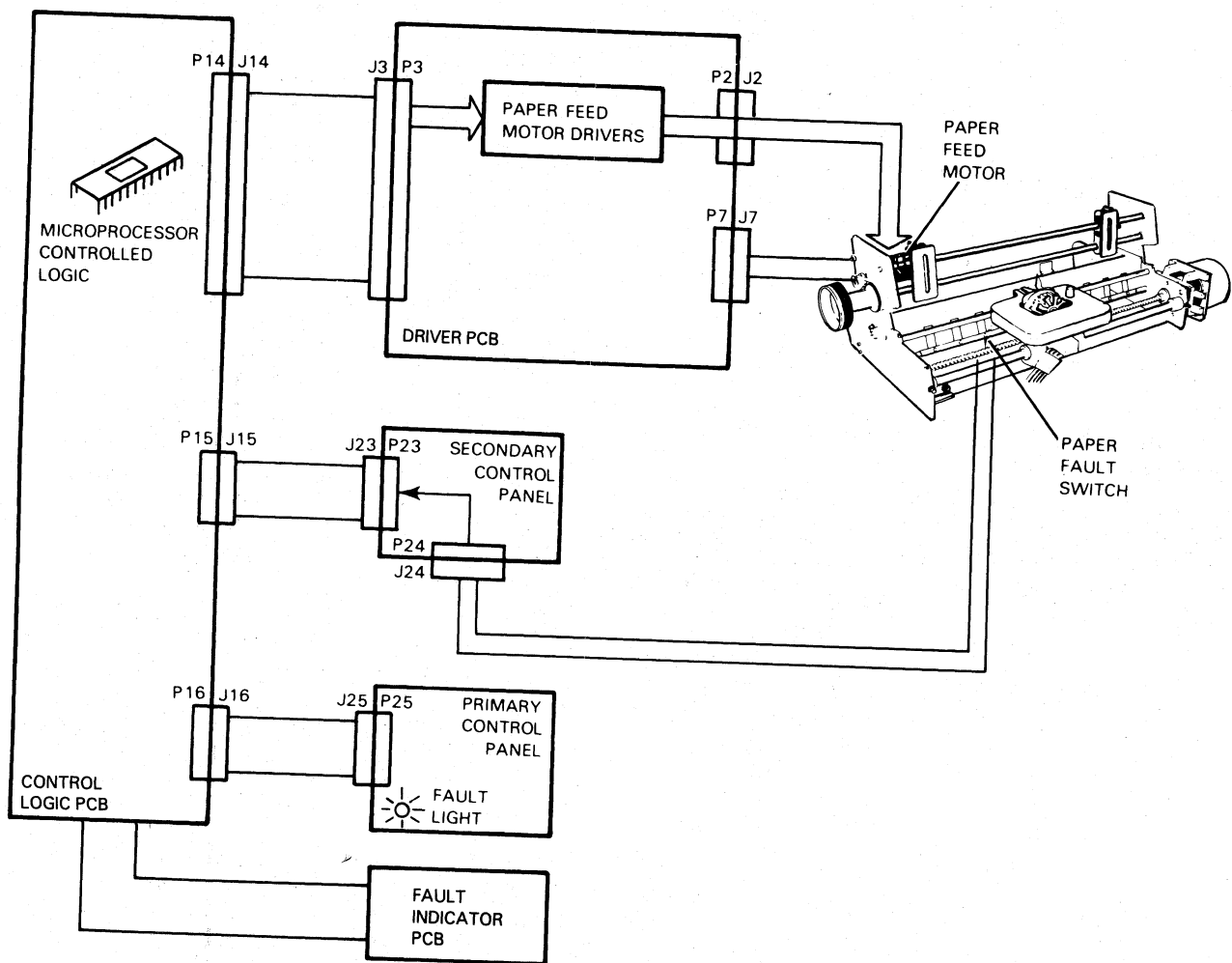
Figure 3-6. Print Control Assembly, Simplified Block Diagram

3.2.3 Paper Feed Control

Figure 3-7 shows a simplified block diagram of the paper feed control system. The microprocessor moves paper through the printer, passing it vertically by the printhead. Paper may be advanced in only one direction. Control signals, originating from the microprocessor on the logic control PCB, turn on the paper feed drivers on the driver PCB which step the paper feed motor. The paper feed motor uses 16 Vdc as its primary (idle) voltage and increments of 48 Vdc as its boost (active) voltages. The motor advances the paper via the remainder of the paper feed mechanism.

Another feedback mechanism is the Paper Fault switch, which determines the presence or absence of paper. The state of this two position microswitch is fed back to the microprocessor via the secondary control panel. When the Paper Fault switch detects an absence of paper, the microprocessor completes printing the present line, places the printer offline, turns on the FAULT LED, and displays an Out-of-Forms Fault (7) on the Fault Indicator PCB.

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Figure 3-7. Paper Feed Control Assembly, Simplified Block Diagram

3.2.4 Communication

The microprocessor controls the interface (serial or parallel) which communicates with external devices to the printer. The interfaces reside on the logic control PCB. Both serial and parallel interfaces notify the microprocessor when they receive data. The microprocessor then retrieves the data and processes it.

This data is represented by 7-bit ASCII codes. The 128 characters in the standard ASCII set consist of 96 upper and lower case alphanumeric characters, punctuation, graphic characters, as well as 32 control codes.

Printers respond to three types of information:

- (A) Printing Character Codes - These cause characters to be printed.
- (B) Control Codes - These are single codes that control special functions.
- (C) Escape Sequences - These are a sequence of codes (beginning with an escape) that control certain functions.

If a printer receives an alphanumeric code, it prints the corresponding character. If it receives a valid control code, it performs the specific function defined by the code. If the printer receives one of the control codes it does not use, it ignores that code.

NOTE

Octal numbers are represented by < > in this discussion.

A. Printing Character Codes

The printing characters include all the upper- and lower-case alphanumeric characters as well as graphic, punctuation, and space characters. Up to 132 characters can be printed on each line. If more than 132 characters are received without a line terminator, the line is shortened or a fault may occur, depending on the mode of operation. New Line <012>, vertical tabs <013>, form feeds <014>, and carriage returns <015> are all considered "line terminators."

B. Control Codes

The printer interprets some control codes it receives as commands to perform specific operations. These codes (i.e., New Line <012>, Form Feed <014>, or Carriage Return <015>) are used by the host computer to control the printing of a document.

C. Escape Sequences

A number of printer functions can be controlled by special sequences of codes called escape sequences.

- Horizontal and vertical tabbing
- Elongated characters
- Underscoring
- Plotting
- Resetting the printer
- Compressed printing
- Downline loading a character set

An escape code <033>, defines the beginning of these sequences while subsequent codes define the particular function to be performed. If no valid code follows the escape code, the escape code is ignored and subsequent codes produce the standard effect. If the ESCAPE DISABLE switch (on the secondary control panel) is in the DISABLE position, all escape codes are ignored and subsequent codes are printed.

On Communication Protocol:

A printer can store up to 2528 characters in its buffer. Characters enter the buffer from either a parallel interface (LP2) or a serial interface (TP2). Both types of interfaces can signal the computer or communication system that the buffer is full.

While receiving codes, the printer scans those codes already in the buffer to determine the fastest way to print each line. If the buffer becomes full, the printer uses one of the methods discussed below to stop the system from transmitting codes. When the buffer becomes half empty, the printer can accept additional codes.

The parallel interface controls a special hardware signal that tells the computer system when there is room in the buffer for a character. This is consistent with most line printer interfaces. As a result, the programmer need not worry about overflowing the buffer when programming the LP2 printer.

Enhanced DASHER TP2 printers can transmit as well as receive information. The keyboard on KSR terminals can generate all the ASCII codes from 0 to 177 (octal). The serial interface prevents the buffer from overflowing through the use of a hardware signal (for local connections), or by transmitting special control characters (software busy) using the DC1/DC3 protocol.

When software busy is enabled (via switches), the TP2 transmits two control codes which act as a software busy signal (see Table 3-1).

Table 3-1. DC1/DC3 Protocol Codes

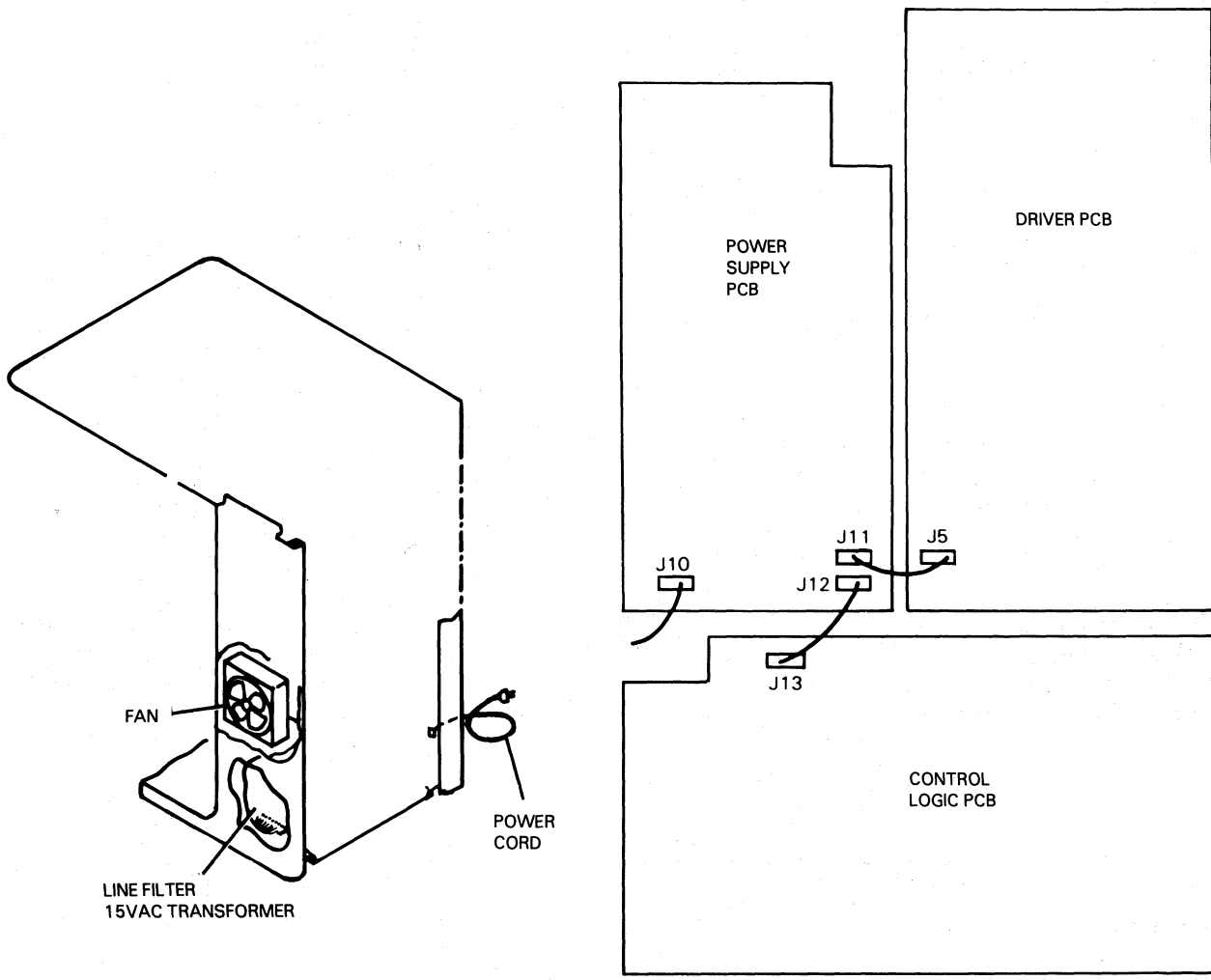
Code Name	Mnemonic	Control Code	Function
DEVICE CONTROL	DC1	<021> (CNTL-Q)	Indicates that the character buffer has room for more characters.
DEVICE CONTROL	DC3	<023> (CNTL-S)	Indicates that the character buffer is full.

3.2.5 Power Supply Distribution

Figure 3-8 shows the physical components for the power supply distribution and Figure 3-9 is a simplified block diagram. The power supply PCB distributes dc supply voltages to the logic control PCB, the driver PCB and the fault indicator PCB. It receives either 110 or 220 volt power from the line filter via the transformer located in the bottom of the cabinet.

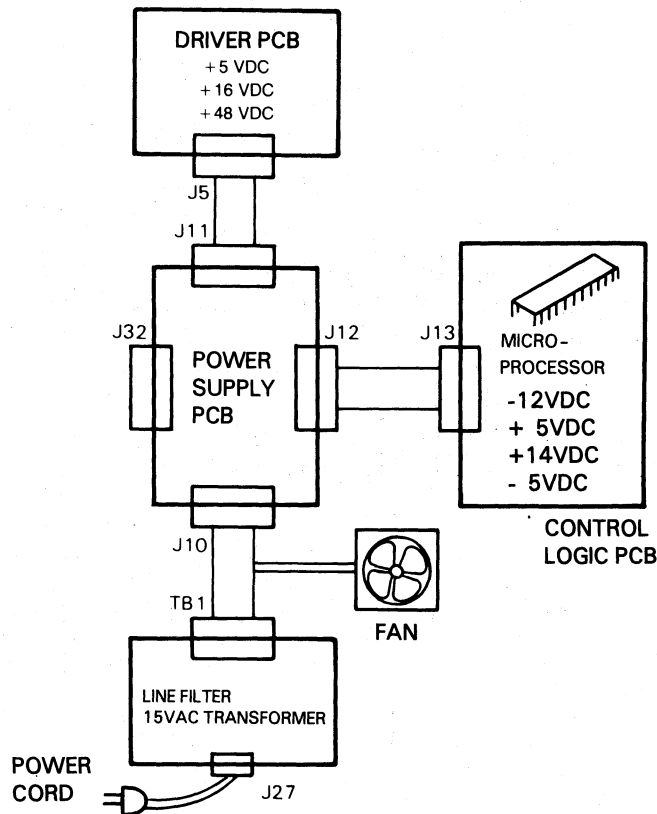
Two power cords are available for the Enhanced DASHER LP2 or TP2 printers: one for 120 volt operation and one for 220/240 volt operation. The wiring of the terminal block at the printer pedestal base selects the appropriate input wired to the power supply PCB.

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FS-11229

Figure 3-8. Power Supply Assembly, Physical Components Layout



FS-11230

Figure 3-9. Power Supply Assembly, Simplified Block Diagram

3.2.6 Fault Detection

The printers are protected by a system of fault interlocks which disable operation if error conditions occur (out of paper, carriage drag, etc.) or if components (ROM or RAM) fail. This system of fault interlocks includes:

- Power line circuit breaker
- FAULT LED
- HEAD FAULT LED
- Fault indicator PCB LED display

A. Power Line Circuit Breaker

The circuit breaker, located on the rear and near the base of the pedestal, protects the printer from overcurrent situations in the primary AC power line. A portion of the circuit breaker pops out in event of a short.

To reset the circuit breaker, power down the printer and press the popped out section back into its cylinder. If a circuit breaker does not reset, wait 5 minutes and try again.

CAUTION

DO NOT FORCE the circuit breaker as damage to the printer may result.

B. FAULT Indicator LED

The FAULT indicator LED on the primary control panel lights when a problem exists that requires operator intervention. The type of fault can be determined by observing the LED display on the fault indicator PCB (Table 3-2). Once corrective action is taken, the FAULT LED is reset by pressing FAULT RESET on the fault indicator PCB.

Table 3-2. Fault Indicator PCB Display Codes

Fault Code	Description
0	Continuous display indicates hardware failure
1	ROM Checksum Fault
2	RAM Test Fault
3	Serial Interface Fault (TP2 only)
4	Parity Error (when Parity is enabled)
5	Carriage Motor Stall
6	(Future Expansion)
7	Out of Forms
8	System OK (temporarily on)
9	Buffer Overflow Fault
c	Power Failure Recovery

C. HEAD FAULT LED

The microprocessor turns on the HEAD FAULT LED when excessive current in one or more of the printhead windings is detected. The power supply is shut down during this condition. To reset the circuit, turn the POWER switch OFF for 1 minute, then turn the POWER switch ON.

The cause of Head Faults can be a problem in the printhead drivers, a short in the printhead, or a short in the ribbon cable connecting the printhead to the driver PCB.

D. Fault Indicator PCB LED Display

The 7-segment LED display on the fault indicator PCB shows a numerical fault code (Table 3-2) anytime an operational or equipment fault occurs. Each time the display is updated, a bell is sounded to alert the operator.

SECTION 4

FAULT DIAGNOSIS

This section provides guidelines for diagnosing equipment problems to the field replaceable unit (FRU) level on the Enhanced DASHER LP2/TP2 printers.

The following troubleshooting information is included:

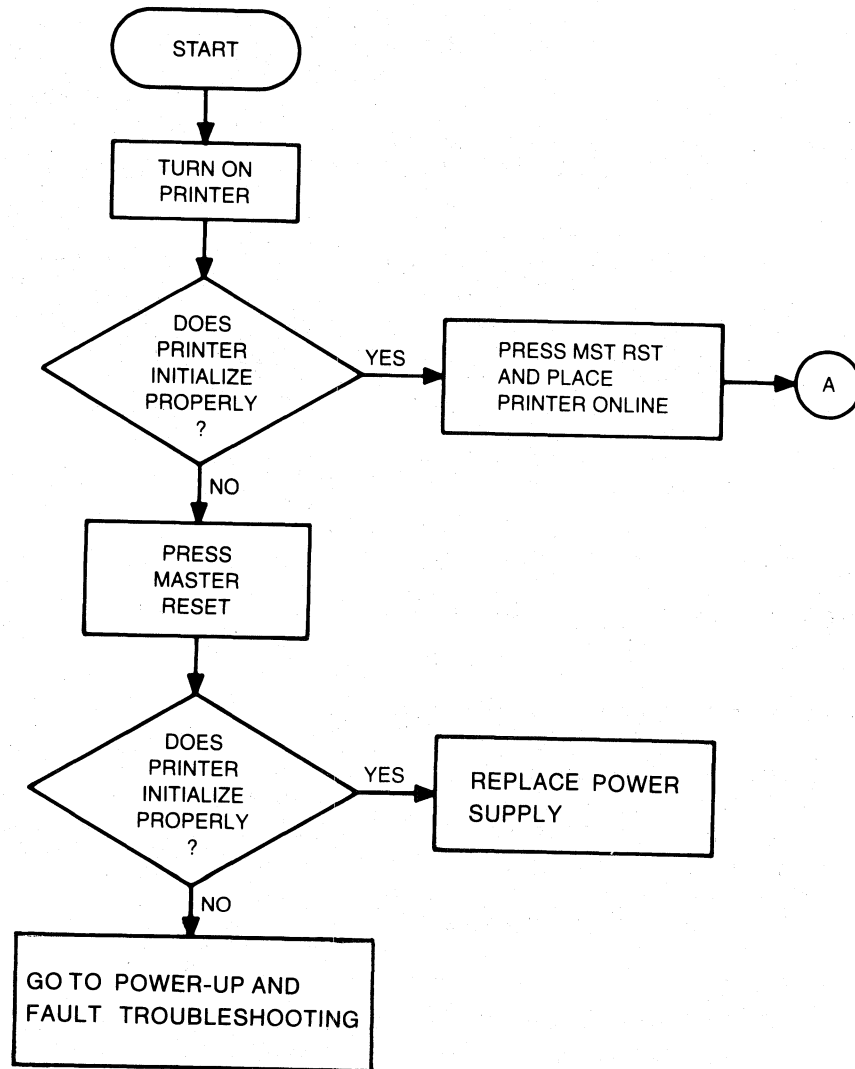
- Fault Isolation - explains the organization of this section and the sequence of troubleshooting procedures that should be performed.
- Power-up Fault Isolation
- Off-line Test Procedures
- On-line Diagnosis Procedures
 - a. Terminal Tester
 - b. Print-X Diagnostic Program

4.1 FAULT ISOLATION

Figure 4-1 illustrates the recommended approach to take to diagnose printer failures. Follow this flowchart to find detailed fault isolation procedures in this section.

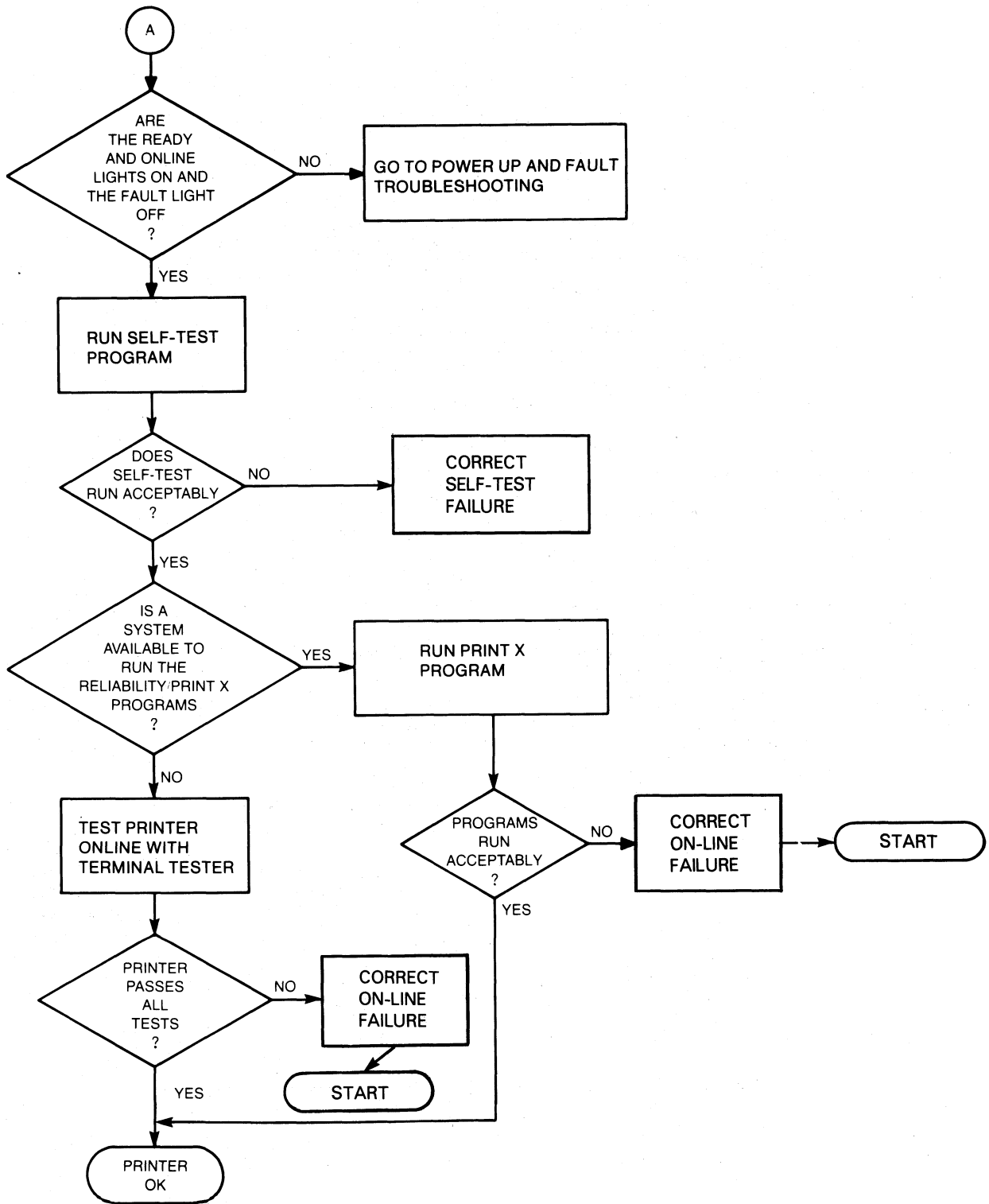
NOTE

A successful pass through the fault isolation flowchart is required when a FRU has been replaced.



FS-11231.

Figure 4-1. Fault Isolation Flowchart (Sheet 1 of 2)



FS-11231

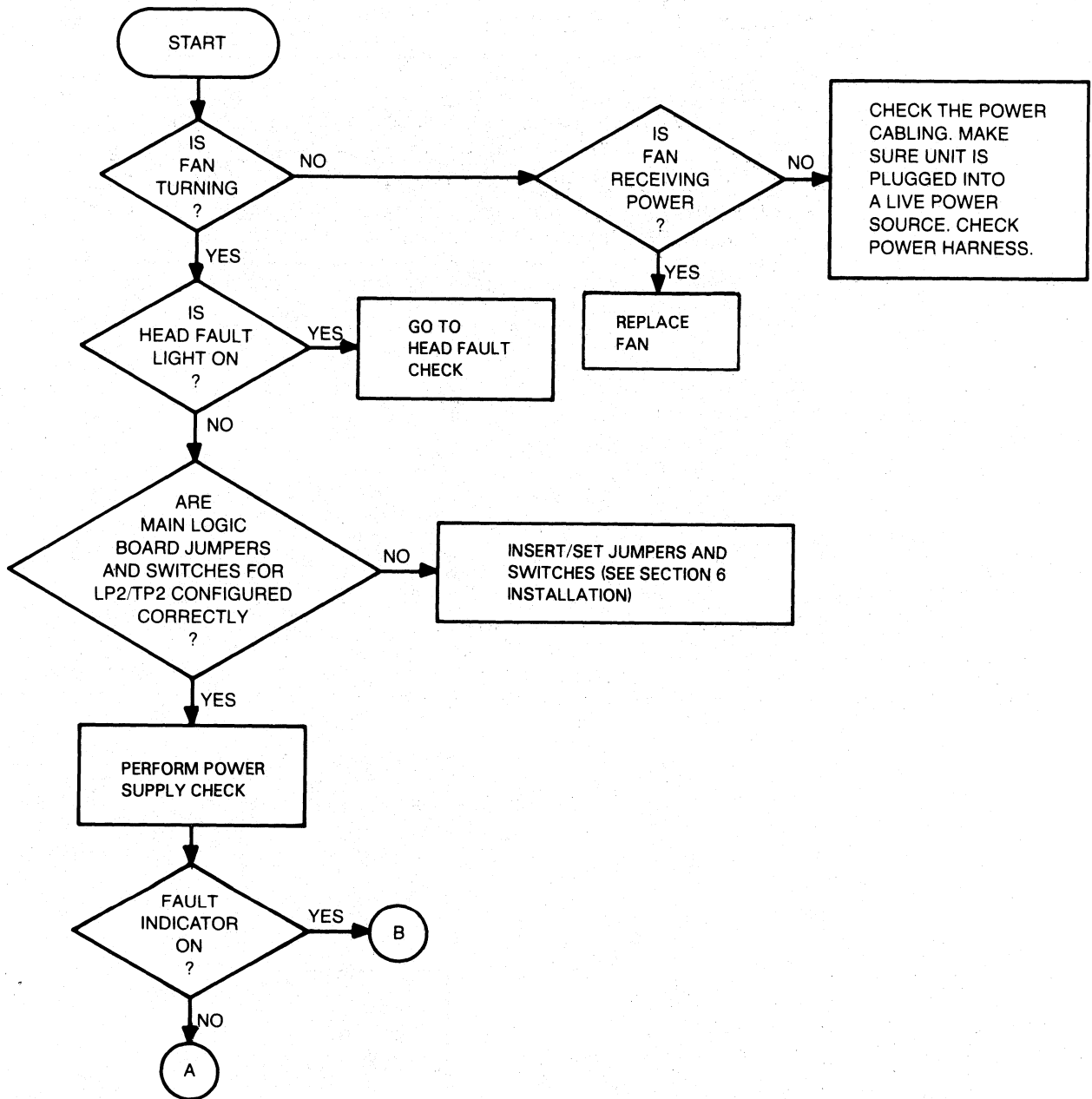
Figure 4-1. Fault Isolation Flowchart (Sheet 2 of 2)

4.2 POWER-UP FAULT DIAGNOSIS PROCEDURES

The power-up fault isolation procedure is illustrated in Figure 4-2. Follow this flowchart to diagnose printer failures during power up or when the printer fails to initialize properly when the MST RST, on the secondary control panel, is pressed. Figure 4-3 shows printer PCB test point locations referenced in Figure 4-2.

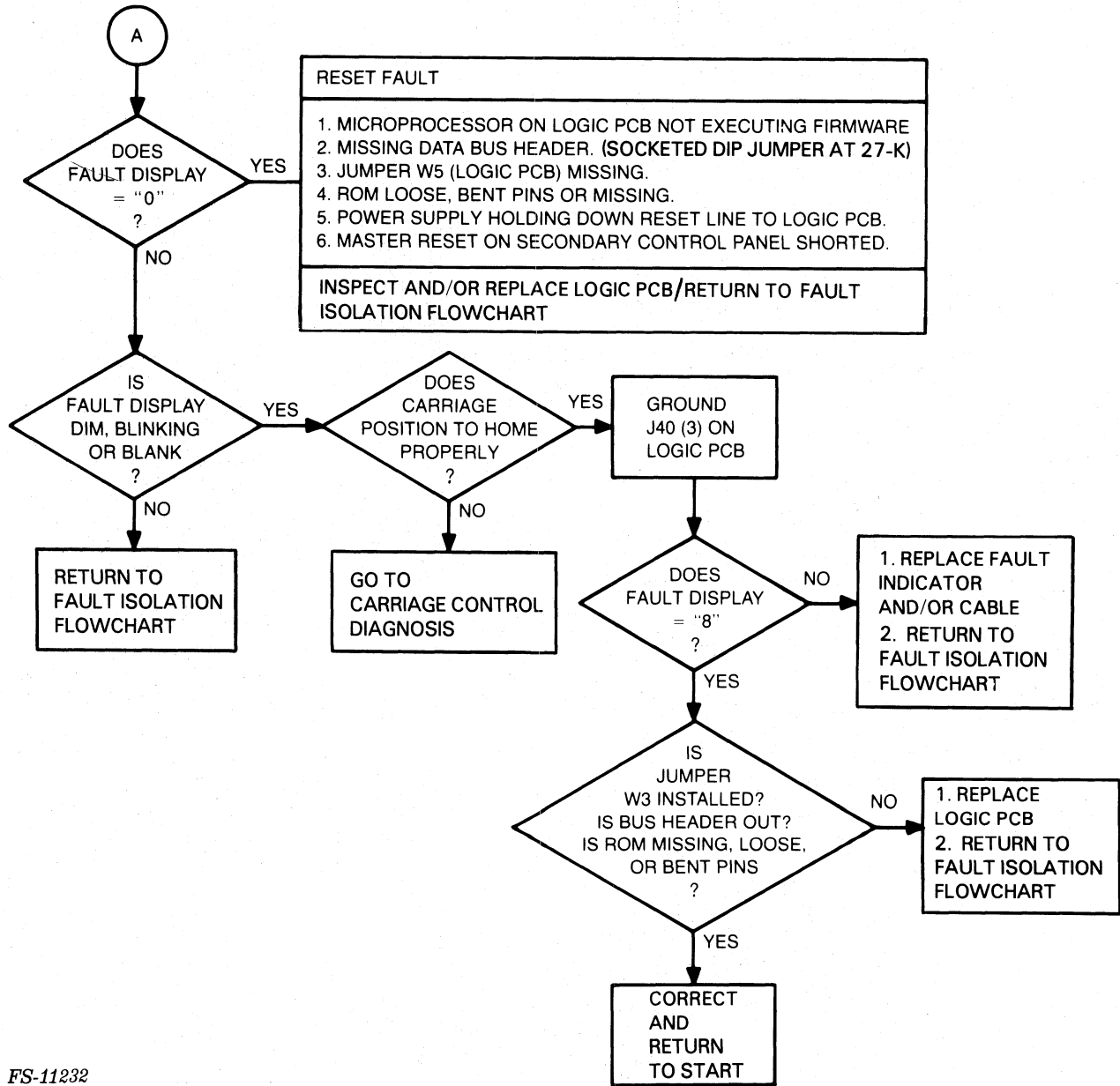
NOTE

Proper initialization includes: 1) the printhead moves to the left-hand margin, 2) the printer sounds a tone, 3) clears the character buffer and 4) initializes the print characteristics according to the settings on the secondary control panel.



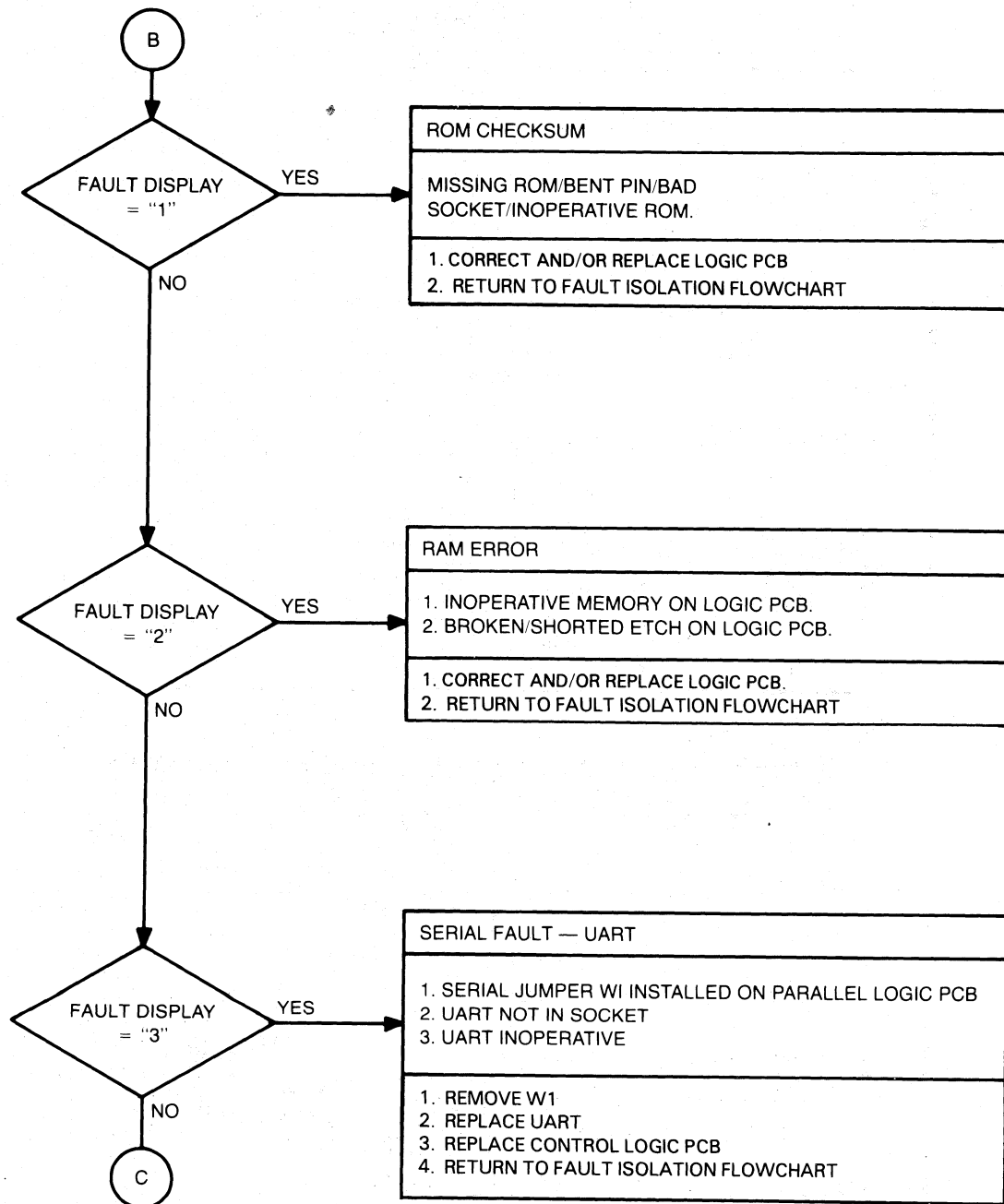
FS-11232

Figure 4-2. Power-up Fault Isolation Flowchart (Sheet 1 of 5)



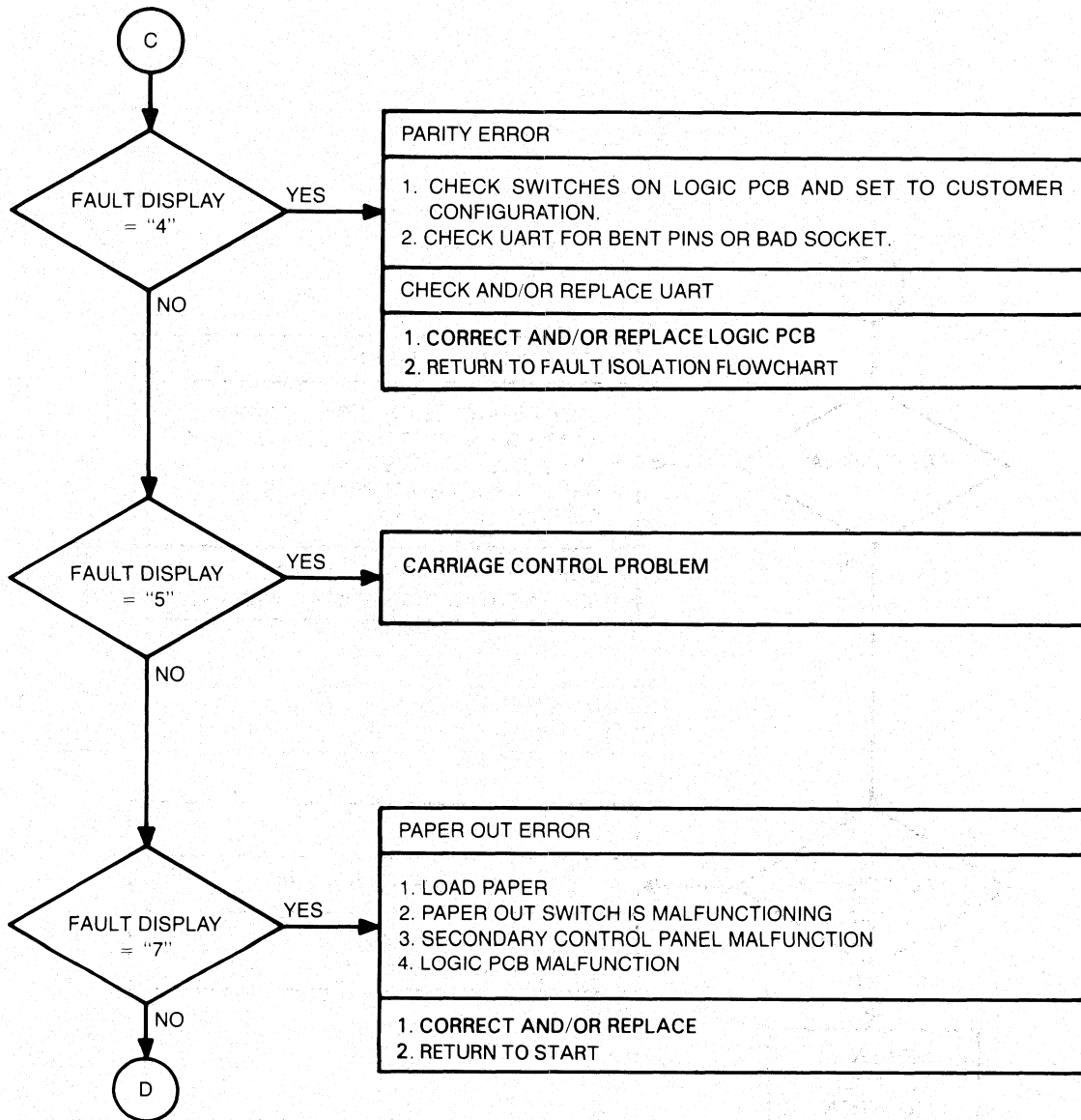
FS-11232

Figure 4-2. Power-up Fault Isolation Flowchart (Sheet 2 of 5)



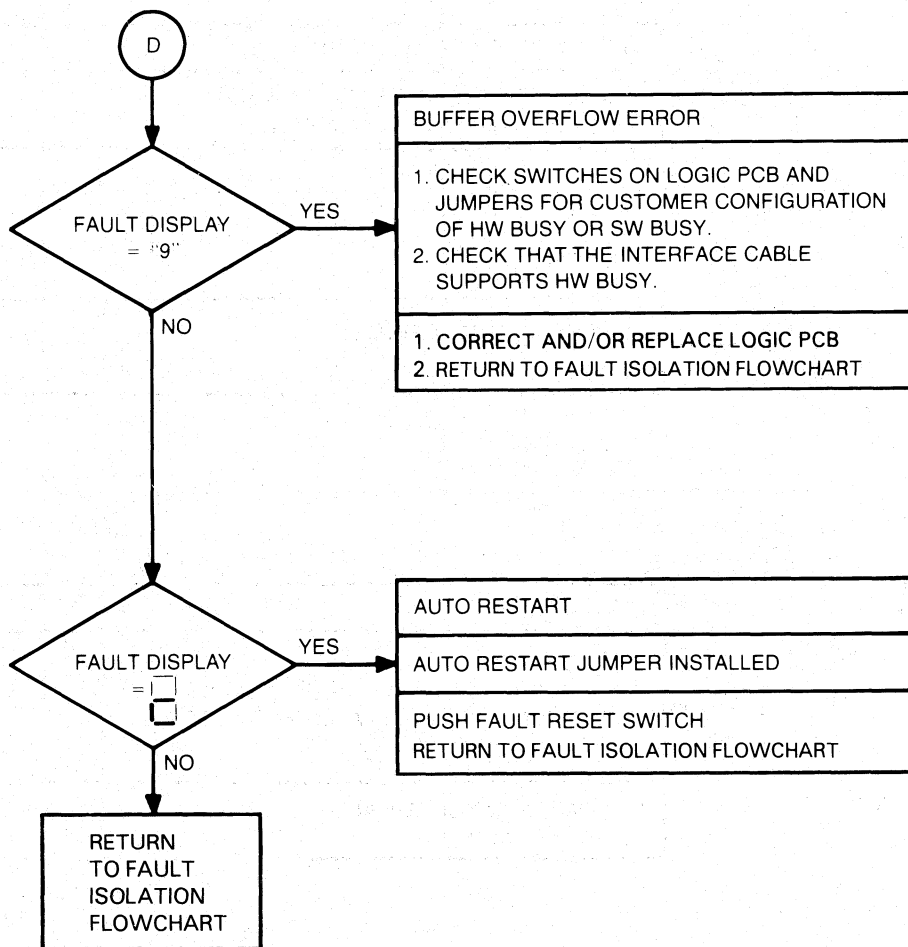
FS-11232

Figure 4-2. Power-up Fault Isolation Flowchart (Sheet 3 of 5)



FS-11232

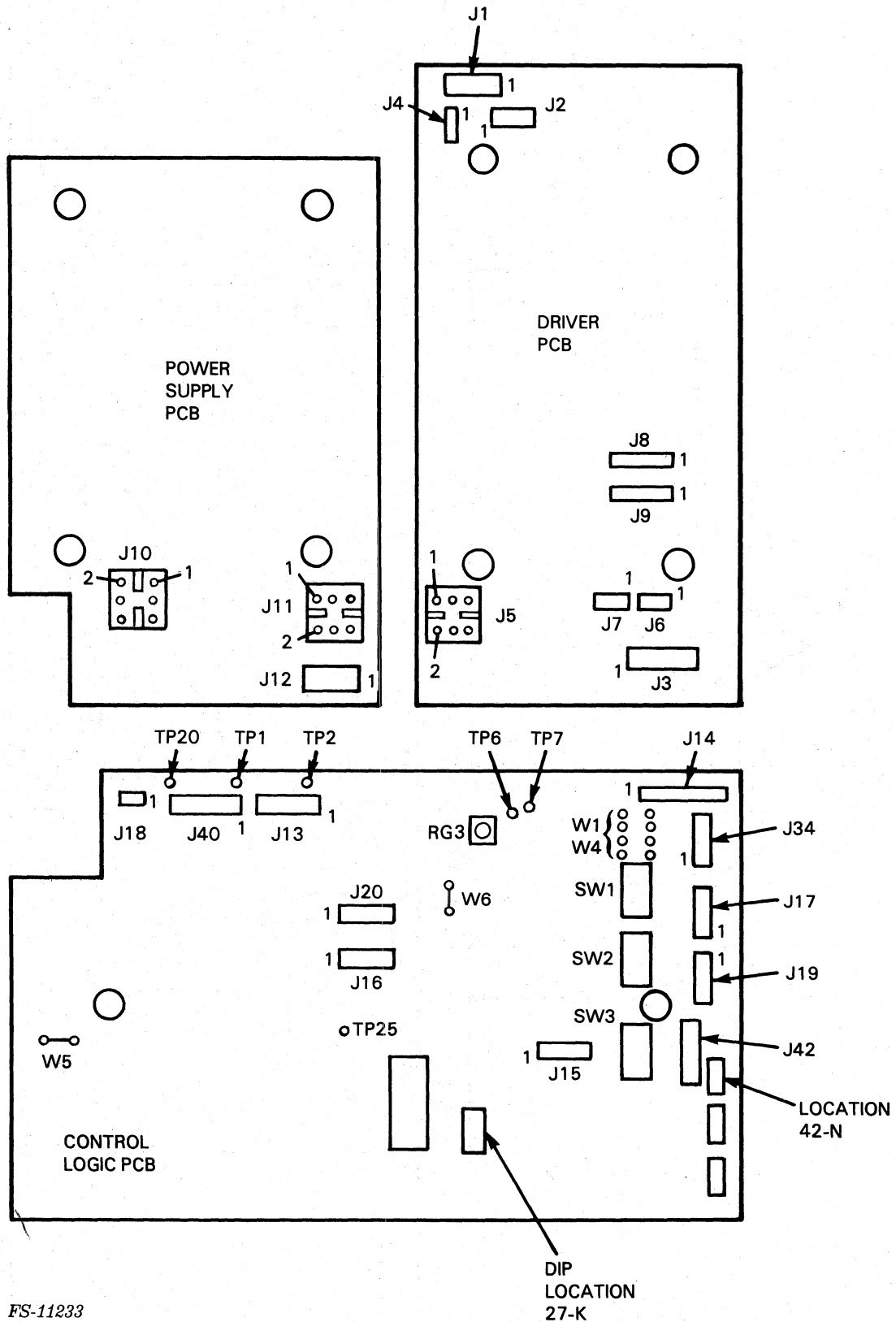
Figure 4-2. Power-up Fault Isolation Flowchart (Sheet 4 of 5)



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Figure 4-2. Power-up Fault Isolation Flowchart (Sheet 5 of 5)

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FS-11233

Figure 4-3. Printer PCB Test Points and Connectors

4.2.1 Power Supply Failure Diagnosis

Power supply fault isolation is illustrated in Figure 4-4. This procedure isolates power distribution and power supply faults. Tables 4-1 through Table 4-3 describe required voltages for connectors J10, J11, and J12, respectively.

Table 4-1. Connector J10 Power Supply Input Voltages

Pin	Voltage	Min	Max	Remarks
1	120 Vac (neutral)	--	--	Use 120 Vac line cord #109-000238 (non-comp.); DGC #109-000238 (comp.)
2	15 Vac	--	--	
3	120 Vac (neutral)	--	--	
4	15 Vac	12.8	16.5	
5	120 Vac (line)	102	132	
6	Ground	--	--	
1	220/240 Vac (line)	196	253	Use 220/240 line cord #109-000240 (non-comp); #109-000418 (comp.)
2	15 Vac	--	--	
3	Neutral	102	132	
4	15 Vac	12.8	16.5	
5	220/240 Vac (line)	196	253	
6	Ground	--	--	

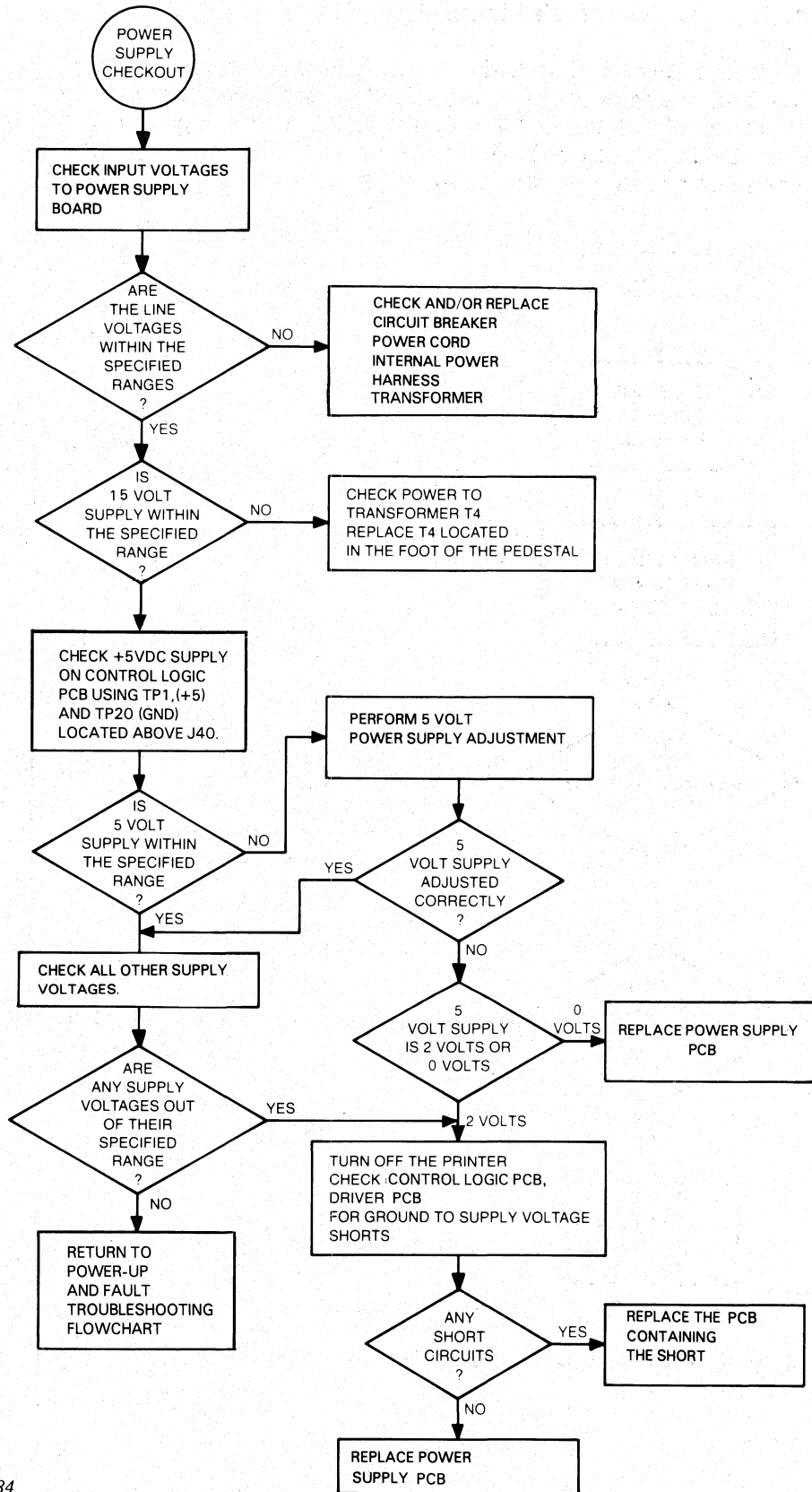
Table 4-2. Connector J11 to Driver PCB Voltages

Pin	Voltage	Min	Max
1	No connection		
2	+5 Vdc	+05.1	+05.2
3	+48 Vdc	+43.0	+53.0
4	Ground	---	---
5	+16 Vdc	---	---

Table 4-3. Connector J12 to Main Control PCB

Pin	Voltage	Min	Max
1	-12 Vdc	-12.4	-11.8
2	-5 Vdc	-05.2	-04.8
3	Power OK	+04.8	---
4	Ground	---	---
5	+5 Vdc	+05.1	+05.2
6	+14 Vdc	+13.0	+15.0

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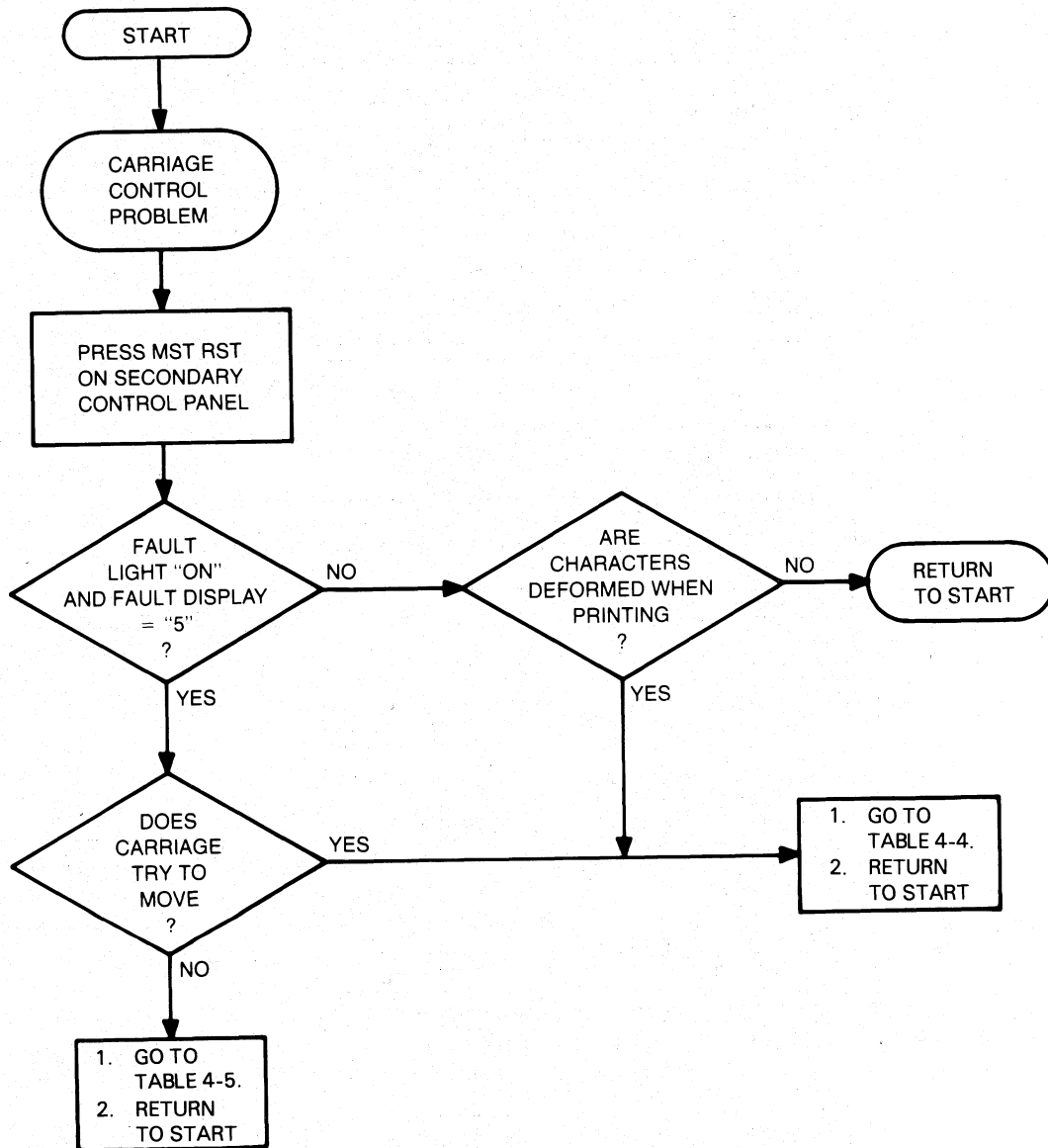


FS-11234

Figure 4-4. Power Supply Failure Diagnosis Flowchart

4.2.2 Carriage Control Failure Diagnosis

The carriage control fault isolation procedure is illustrated in Figure 4-5. This procedure is used to determine problems with the carriage assembly. Table 4-4 describes carriage motion faults symptoms and suggests fault isolation procedures for the carriage assembly. Table 4-5 describes carriage motor fault symptoms and appropriate actions.



FS-11235

Figure 4-5. Carriage Control Failure Diagnosis Flowchart

Table 4-4. Carriage Motion Fault Isolation

Symptom	Probable Cause	Corrective Action
Carriage moves in jerking motions	<ul style="list-style-type: none"> a. Carriage motion transducer and/or disk is dirty. b. Carriage motion transducer is out of adjustment. c. Carriage is binding. d. Cable connecting the motion transducer to the driver PCB is disconnected or bad. e. Transducer fails. f. Transducer logic on driver PCB fails. g. Transducer logic on control logic PCB fails. 	<ul style="list-style-type: none"> a. Clean motion transducer and code disk. b. Perform the motion transducer timing adjustment. c. Check to see if the following parts are jamming: <ul style="list-style-type: none"> - ribbon cartridge - ribbon drive gear-box - front/rear carriage bearings. d. Check and/or replace cable that goes to J9. e. Check/replace transducer. f. Replace driver PCB. g. Replace control logic PCB.
Carriage moves to right margin at a low speed. Carriage moves to left margin and generates a fault.	<ul style="list-style-type: none"> a. Home transducer is dirty. b. Home transducer cable is unplugged or bad. c. Home transducer is bad. d. Home transducer logic on driver PCB bad. e. Home transducer logic on control logic PCB is bad. 	<ul style="list-style-type: none"> a. Clean the home transducer. b. Check and/or replace cable attached to J6 on the driver PCB. c. Check transducer, replace if bad. d. Replace the driver PCB. e. Replace the control logic PCB.

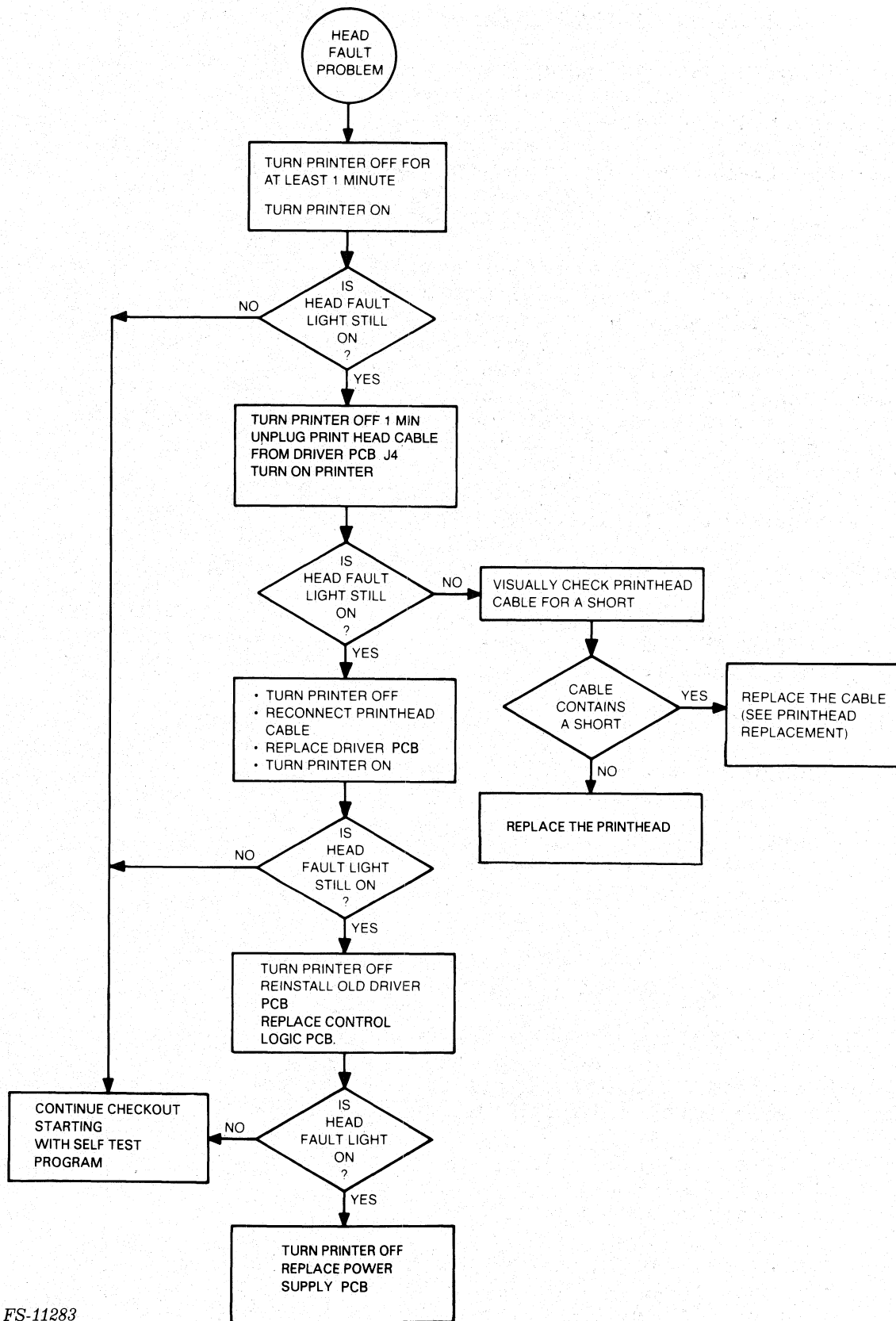
Table 4-4. Carriage Motor Fault Isolation (Continued)

Symptom	Probable Cause	Corrective Action														
Carriage motor does not move	a. Cable connecting the carriage motor to the driver PCB is unplugged.	a. Connect cable to J1 on driver PCB.														
	b. Power supply is not providing motor driving voltages (16 Vdc and/or 48 Vdc).	b. Check power supply for 16 Vdc and 48 Vdc; replace if necessary.														
	c. Driver PCB motor circuitry is bad.	c. Replace driver PCB.														
	d. Control logic PCB circuitry is bad.	d. Replace control logic PCB.														
	e. Carriage motor or cable is bad.	e. Remove J1 connector from driver PCB. Check motor resistance at J1 connector:														
		<table> <thead> <tr> <th>Pin</th> <th>Reading</th> </tr> </thead> <tbody> <tr> <td>2 to 5</td> <td>0.5 Ohm</td> </tr> <tr> <td>2 to 6</td> <td>0.5 Ohm</td> </tr> <tr> <td>1 to 3</td> <td>0.5 Ohm</td> </tr> <tr> <td>1 to 4</td> <td>0.5 Ohm</td> </tr> <tr> <td>3 to 4</td> <td>1.0 Ohm</td> </tr> <tr> <td>5 to 6</td> <td>1.0 Ohm</td> </tr> </tbody> </table>	Pin	Reading	2 to 5	0.5 Ohm	2 to 6	0.5 Ohm	1 to 3	0.5 Ohm	1 to 4	0.5 Ohm	3 to 4	1.0 Ohm	5 to 6	1.0 Ohm
Pin	Reading															
2 to 5	0.5 Ohm															
2 to 6	0.5 Ohm															
1 to 3	0.5 Ohm															
1 to 4	0.5 Ohm															
3 to 4	1.0 Ohm															
5 to 6	1.0 Ohm															
		Replace motor if bad.														

4.2.3 Head Fault Diagnosis

The head fault diagnosis procedure is illustrated in Figure 4-6. This procedure is performed when the Head Fault Indicator lights.

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FS-11283

Figure 4-6. Head Fault Isolation Flowchart

4.3 OFF-LINE DIAGNOSIS PROCEDURES

The off-line test procedures include the running of the printer self-test and the diagnosis of self-test failure symptoms as well as control logic PCB signal checks.

Refer to Figure 4-3 for PCB test point locations.

4.3.1 Off-Line Self-Test

The self-test feature of the printers allows the printing capabilities to be tested while the printer is off-line. Placing the printer in self-test mode causes the printer to print a rotating character pattern in either normal or compressed format. Correct printer operation can be verified via the printout. Since the characters are generated internally, self-test does not require an external device to generate the codes. However, this also means that the self-test feature does not test the printer's communications interface or the cabling to the controller.

To execute the off-line self-test:

1. Set the printer to off-line.
2. On the secondary control panel put the 6/8 LPI, NORM/COMP, and STD/ALT CHAR SET switches in position to test the desired characteristics.
3. Press MST RST.
4. Toggle the SELF-TEST/ESC DISABLE switch toward SELF-TEST according to the following:
 - Once for 9-inch wide paper;
 - Twice for 15-inch wide paper.

NOTE

If the switch is then placed in the ESC DISABLE position, the Self-Test overprints the line 33 times before issuing a Line Feed.

5. Set the printer to On-Line.
6. Self-Test starts as soon as the printer is On-Line. To get out of Self-Test mode, press the MST RST (master reset) button on the secondary control panel.

During self-test, all characters are printed. Printing characters begin with the space character (40 octal) and end with the tilde character (176 octal). Printing should be bidirectional and the sequence should repeat indefinitely until the MST RST (master reset) button is pressed.

In particular, look for:

- Even margins from line to line;
- Proper column alignment;
- Consistent spacing between characters;
- Consistent paper feed spacing.

7. If any problems are observed during printer self-test, find the symptoms and perform the corrective actions suggested in Table 4-6.

Table 4-5. Off-line Failure Diagnosis

Symptom	Probable Causes	Corrective Action
Margins do not line up from line to line; sloppy character positioning; or uneven character spacing	<ul style="list-style-type: none"> a. Margin alignment needs adjustment. b. Leadscrew or anti-backlash nut worn. c. The couplings between the leadscrew and the carriage motor are loose. d. The carriage mechanism is binding or dragging. e. Ribbon cartridge is binding or jamming. 	<ul style="list-style-type: none"> a. Perform margin alignment procedure (Section 5). This compensates for wear of the anti-backlash nut. b. Perform leadscrew replacement. c. Tighten clamp screws and/or replace the plastic coupling adapter. d. Perform the carriage bearing cleaning and adjustment procedure. Perform the ribbon cartridge drive cable adjustment. e. Replace the ribbon cartridge.

Table 4-5. Off-line Failure Diagnosis (Continued)

Symptom	Probable Causes	Corrective Action
Dark smudgy print	Printhead is too close to platen or printhead is dirty.	Adjust the platen space lever. If this does not solve the problem, perform the platen alignment procedure. Replace the platen if it is bent or too worn to be adjusted properly. Remove and clean printhead.
Light printing (or no printing) but printhead fires.	<ul style="list-style-type: none"> a. The ribbon is worn. b. Printhead is too far from the platen. c. Ribbon mechanism is not advancing ribbon properly. d. Ribbon cartridge is binding. e. Print time out is of spec. f. Print wire firing time out of spec. 	<ul style="list-style-type: none"> a. Replace the ribbon cartridge. b. Adjust the platen space lever. If this does not work adjust platen alignment adjustment. c. Perform the ribbon cartridge drive cable adjustment. d. Replace the ribbon cartridge. e. Check print time Replace Control PCB if bad. f. Adjust print wire firing time. (Section 5)
No printing (print wires do not fire)	<ul style="list-style-type: none"> a. Cable from printhead to driver PCB is loose or disconnected. b. Faulty printhead. c. Faulty driver PCB. d. Faulty main control PCB. e. Faulty power supply (48 Vdc). 	<ul style="list-style-type: none"> a. Reconnect ribbon cable. b. Replace printhead. c. Replace driver PCB. d. Replace main control PCB. e. Replace power supply PCB.

Table 4-5. Off-line Failure Diagnosis (Continued)

Symptom	Probable Causes	Corrective Action
Faulty printing (print wires misfire)	<ul style="list-style-type: none"> a. Printhead jewel is dirty, causing the print wires to jam. b. Print time out of spec. c. Print wire firing time out of spec. d. Faulty printhead wiring. e. Faulty driver PCB. 	<ul style="list-style-type: none"> a. Clean printhead jewel. b. Check print time. Replace Control PCB if bad. c. Adjust print wire firing time. (Section 5) d. Replace printhead. e. Replace driver PCB.
Improper paper feed spacing	<ul style="list-style-type: none"> a. Incorrect platen to printhead spacing. Paper is being pinched between printhead and platen. b. Paper tension bar is too tight. c. Bad paper feed motor/cable. d. Line/form feed timing out of spec. e. Faulty driver PCB. 	<ul style="list-style-type: none"> a. Change spacing via the platen adjustment lever. If necessary, perform the platen alignment adjustment. b. Perform the paper tension bar adjustment. c. Check motor ohm readings at J2 connector: <ul style="list-style-type: none"> Pin Reading 1 to 2 11.5 Ohms 4 to 5 11.5 Ohms Replace motor if bad. d. Check line/form feed. Replace main control PCB if bad. e. Replace driver PCB.

Table 4-5. Off-line Failure Diagnosis (Continued)

Symptom	Probable Causes	Corrective Action
Improper paper feed spacing (continued)	<p>f. Paper feed drive belt misadjusted.</p> <p>g. Woodruff key slot in vernier knob is worn.</p> <p>h. Paper feed drive shaft is bent.</p> <p>i. Paper feed drive shaft bearing flange worn.</p> <p>j. Tractors are worn.</p>	<p>f. Perform paper feed drive belt adjust.</p> <p>g. Check key slot/replace knob if worn.</p> <p>h. Replace drive shaft.</p> <p>i. Replace bearing flange.</p> <p>j. Replace tractors.</p>
Carriage moves in jerking motions	See Carriage Motion Fault Isolation (Subsection 4.2.2).	

4.3.2 Print Time Check

Use the P-MAT Test Set to perform the following procedure.

1. Configure P-MAT to measure pulse width (see P-MAT User's Guide). CHAN A GATE switch to RISING EDGE.
2. Connect CHAN A input to TP7 (Figure 4-3) on control logic PCB.
3. Connect GROUND to TP25 on control logic PCB.
4. Power up the printer and check for 100 usec +/-5% (5 usec).
5. If the print time is out of spec, replace the control logic PCB.

4.3.3 Line Feed/Form Feed Check

Use the P-MAT Test Set to do the following procedure. By using the P-MAT as an "events/pulse" counter, the number of pulses from the vertical motion one shot, required to execute a single line feed or form feed, can be confirmed.

NOTE

When the LPI switch is set to 6, a single line feed requires eight pulses from the vertical motion one shot chip (no adjustment possible). The total pulses required for a form feed equals the number of lines selected for a form multiplied by 8.

If any reading is found to be out of spec during this procedure, replace the control logic PCB.

1. Configure the P-MAT as an "events/pulse" counter (see P-MAT User's Guide).
2. Connect CHAN A input to pin 6 of 42-N (output of vertical motion one shot chip) and connect ground to TP25 on control logic PCB (Figure 4-3).
3. Execute a single line feed and observe eight pulses indicated on the P-MAT.

NOTE

Each time a single line feed is executed, the reading on the P-MAT increments by a count of 8.

4. Reset the P-MAT.
5. 66 lines per page on the secondary control panel and press TOF INIT switch.
6. Execute a form feed. P-MAT should display 528 pulses.

NOTE

Number of pulses = number of lines X 8 pulses
528 = 66 X 8

7. Configure the P-MAT to measure pulse width (see P-MAT User's Guide).
8. Execute a single line feed. The P-MAT should read approximately 2.5 msec per pulse.

4.4 ON-LINE DIAGNOSIS PROCEDURES

The following test procedures should be used to isolate communication failures between the host computer and the printer.

Perform these procedures in sequence.

1. Ensure that the printer passes power-up self-test successfully.
2. Ensure that the printer passes the off-line self-test.
3. Print a test file using the host computer. If failures occur, look up the symptoms and perform the corrective actions found in Table 4-7.
4. Test the printer with the terminal tester.
5. Test the printer using the PRINT X diagnostic program.

Table 4-6. On-line Failure Diagnosis

Symptom	Probable Causes	Corrective Action
Prints solid block of dots.	A parity error was detected upon receiving the character (TP2 printers). Fault indicator displays 4.	Make sure the parity selected by switches on the control logic PCB match the controller. Check the external cable for secure connections. Replace the control logic PCB.
Prints incorrect character.	<ul style="list-style-type: none"> a. Printer is printing a down-line loaded character set. b. Faulty character generator or switch settings. 	<ul style="list-style-type: none"> a. Press MST RST (master reset) switch to clear. b. Replace main control PCB.
Control codes or escape sequences do not work correctly.	<ul style="list-style-type: none"> a. Printer running from a data channel line printer controller or the commercial system's controller. (These controllers pass only 7-bit ASCII codes to the printer and intercept some control codes.) (LP2 printers.) b. Control logic PCB is faulty (firmware ROMs are bad). c. ESC disable switch on or faulty. 	<ul style="list-style-type: none"> a. Use a different line printer controller. b. Replace the control logic PCB. c. Check ESC disable switch position.

4.4.1 Testing With the Terminal Tester

This subsection explains how to test a printer's various print modes and escape sequences with a DASHER Terminal Tester. The user should be familiar with the basic setup and operation of a Terminal Tester. If not, see "How to Use and Service the DASHER Terminal Tester", (DGC P/N 015-000087).

The tester automatically inserts a line feed and carriage return code pair at an interval determined by the select line length switches. As a result, when the tester is reset, it transmits three line feed codes at the beginning of the test. The first two codes transmitted are actually these line feed and carriage return codes. The third code transmitted is the line feed code the user selected in the Character Selected switches. If the select line length is set for 80 characters per line, the tester can transmit 80 codes before another carriage return-line feed pair is inserted. If the tester is not reset, the user does not know when the code pair is inserted in the transmit data stream.

Table 4-8 lists a reference list of control codes and escape sequences that can be used with the printer.

NOTE

If a test appears to fail, try issuing the codes to the printer a second time. If the test does not produce any response and the printer stops printing or the FAULT light comes on, go to subsection 4.1. Otherwise, see Table 4-7.

All numeric values are in <octal>.

Use the following procedure to execute a rotating character pattern test:

1. Set up the terminal tester for normal operation.
2. Connect the appropriate terminal tester adapter cable to the printer.
3. Set printer configuration switches to match the tester parameters.
4. Print all characters from <40-176> in normal mode.
 - a. Set tester switches <64> and <16> to the up position to generate a continuous character pattern with a line length of 80.
 - b. Transmit the characters to the printer.
 - c. A continuous test pattern of characters should print in normal mode.
 - d. Reset the tester.

5. Print all characters from <40-176> in compressed mode.
 - a. Set the tester to generate <012> (3 times), <033>, <076>, and a continuous character with a line length of 80.
 - b. Transmit the characters to the printer.
 - c. A continuous pattern of the test character should print in compressed mode.
 - d. Reset the tester.
6. Print all characters from <40-176> in compressed elongated mode.
 - a. Set the tester to generate <012> (3 times), <033>, <074>, and a continuous character with a length of 40 (switches <32> and <8> up).
 - b. Transmit the characters to the printer.
 - c. A continuous pattern of the test character should print in compressed elongated mode.
 - d. Reset the tester.
7. Print all characters from <40-176> in normal elongated mode.
8. Set the tester to generate <012> (3 times), <033>, <077>, and a continuous character pattern with a line length of 40.
9. Transmit the characters to the printer.
10. The printer should print a continuous pattern of the test character in the normal elongated mode.
11. Reset the tester and the printer.
12. Restore the printer to its normal operating condition.

Table 4-7. Printer Control Codes and Escape Sequences

Control Codes		
Octal Codes	Description	
007	Bell	
010	Back Space	
011	Horizontal Tabs	
012	New Line (line feed)	
013	Vertical Tab	
014	Form Feed	
015	Carriage Return	
016	Shift Out (selects alternate character set)	
017	Shift In (selects standard character set)	
033	Escape (Begins an escape command sequence)	

Escape Sequences		
Escape Sequence	Octal Codes	Description
ESC 1	033 061	Set Horizontal Tab (current print location)
ESC 2	033 062	Clear Horizontal Tab (current print location)
ESC E CNTL-@	033 105 000	Clear all Horizontal Tabs
ESC 5	033 005	Set Vertical Tab (current print location)
ESC 6	033 066	Clear Vertical tab (current print location)
ESC F CNTL-@	033 106 000	Clear all Vertical Tabs
ESC <	033 074	Select Elongated Print
ESC=	033 075	Clear Elongated Print
ESC >	033 076	Select Compressed Print
ESC ?	033 077	Select Normal Print
ESC a	033 141	Select Underscore
ESC b	033 142	Clear Underscore
ESC c CNTL-@ CNTL-@	033 143 000000	Master Reset

4.4.2 Testing with PRINT X Diagnostic

The PRINT X diagnostic is normally performed during initial system installation. Execute this diagnostic program for difficult on-line diagnosis situations only.

NOTE

Ensure that the printer passes power-up, off-line, and terminal tester diagnosis procedures before running PRINT X.

The PRINT X diagnostic used for On-Line fault isolation can be ordered with the following DGC part numbers:

Program No. 095-001651
Listing No. 096-001651

The LP2/TP2 printer diagnostic program allows the user to test and verify the On-Line operation of the LP2/TP2. The PRINT X program provides I/O exercises and troubleshooting facilities for printers on a single controller subsystem. The subsystem must have the following equipment in order to run the diagnostic programs:

- A NOVA or ECLIPSE computer with at least 16 KB of read/write memory;
- Console teletype or equivalent;
 - a. Line Printer Controller (LP2)
 - b. Asynchronous Controller (TP2)



SECTION 5

REMOVAL, REPLACEMENT, AND ADJUSTMENT PROCEDURES

This section provides step-by-step procedures for the removal, replacement, and adjustment of field replaceable units (FRUs) that make up the Enhanced DASHER LP2/TP2 printers.

Figure 5-1 lists the replacement and adjustment guidelines for the printers. The following procedures are described in this section:

- Preparation for Maintenance
 - a. Side Panel Removal and Replacement
 - b. Service Panel Removal and Replacement
- Electronic PCBs, Cables, and Assemblies Removal And Replacement
 - a. Power Cord
 - b. AC Power Supply Harness
 - c. Transformer/Line Filter Assemblies
 - d. Fan
 - e. Electronic PCBs
 - f. Internal Signal Cables
 - g. Control Panels, Speaker, and Cover
- Ribbon Drive Assemblies Removal And Replacement
- Paper Feed Assemblies Removal And Replacement
 - a. Paper Feed Tractors and Associated Mechanisms
 - b. Paper Feed Motor and Associated Mechanisms
 - c. Out-Of-Forms Switch Removal and Replacement
- Carriage Drive Assemblies Removal And Replacement
 - a. Carriage Motor and Associated Mechanisms
 - b. Printhead Assembly
 - c. Printhead to Driver PCB Cable
 - d. Leadscrew and Associated Mechanisms
 - e. Carriage and Associated Mechanisms
 - Linear Bearing Carriage Mechanisms
 - Plastic Bearing Carriage Rear Bearing
 - f. Platen and Associated Mechanisms
 - g. Horizontal Motion Transducer
 - h. Home Flag Transducer

Adjustment Procedures

- a. Power Supply +5 Volt Adjustment
- b. Horizontal Motion Transducer Adjustment
- c. Home Transducer Check
- d. Linear Bearings Cleaning and Adjustment
- e. Leadscrew Adjustment
- f. Print Margin Adjustment
- g. Print Wire Firing Time Adjustment
- h. Front Guide Rail Adjustment
- i. Platen Alignment Adjustment
- j. Paper Tension Bar Adjustment
- k. Ribbon Cartridge Drive Cable Adjustment

5.1 TOOLS AND TEST EQUIPMENT

Table 5-1 lists the tools and test equipment required to perform removal, replacement, and adjustment procedures on the printer.

Table 5-1. Tools and Test Equipment

Item	DGC P/N
FE LEVEL 1 Tool Kit	005-012583
Grease	120-000753
Isopropyl Alcohol 91%	
Vacuum Cleaner	128-000734
Lint-free Tissue	119-000062
Belt Tension Hanger	128-000787
Terminal Tester	005-010682
PRINT X Diagnostic Program	096-001651
Digital Voltmeter	005-001413
PMAT Test Set	005-015328
Torque Watch (office level)	128-001550
Shims	123-000992
.005 inch Shim Stock	002-008288

5.2 SAFETY PRECAUTIONS

When performing the procedures described in this section, observe the following safety precautions:

WARNING

Primary disconnect from the "AC MAINS" is made by the removal of the ac power connector.

WARNING

Use caution when checking power supply voltages on live circuits. Dangerous voltages are exposed when the side panels are open for maintenance.

- Remove, replace, and adjust only those items described in the procedures.
- Cables and wiring should be disconnected only at the attached connector(s) and terminal(s). Do not pull on the cabling itself as this can damage the cable.
- When a FRU is replaced, make sure that all necessary adjustments are performed (Figure 5-1).
- After a FRU is replaced, verify that the assembly operates correctly before returning the printer to normal operation.

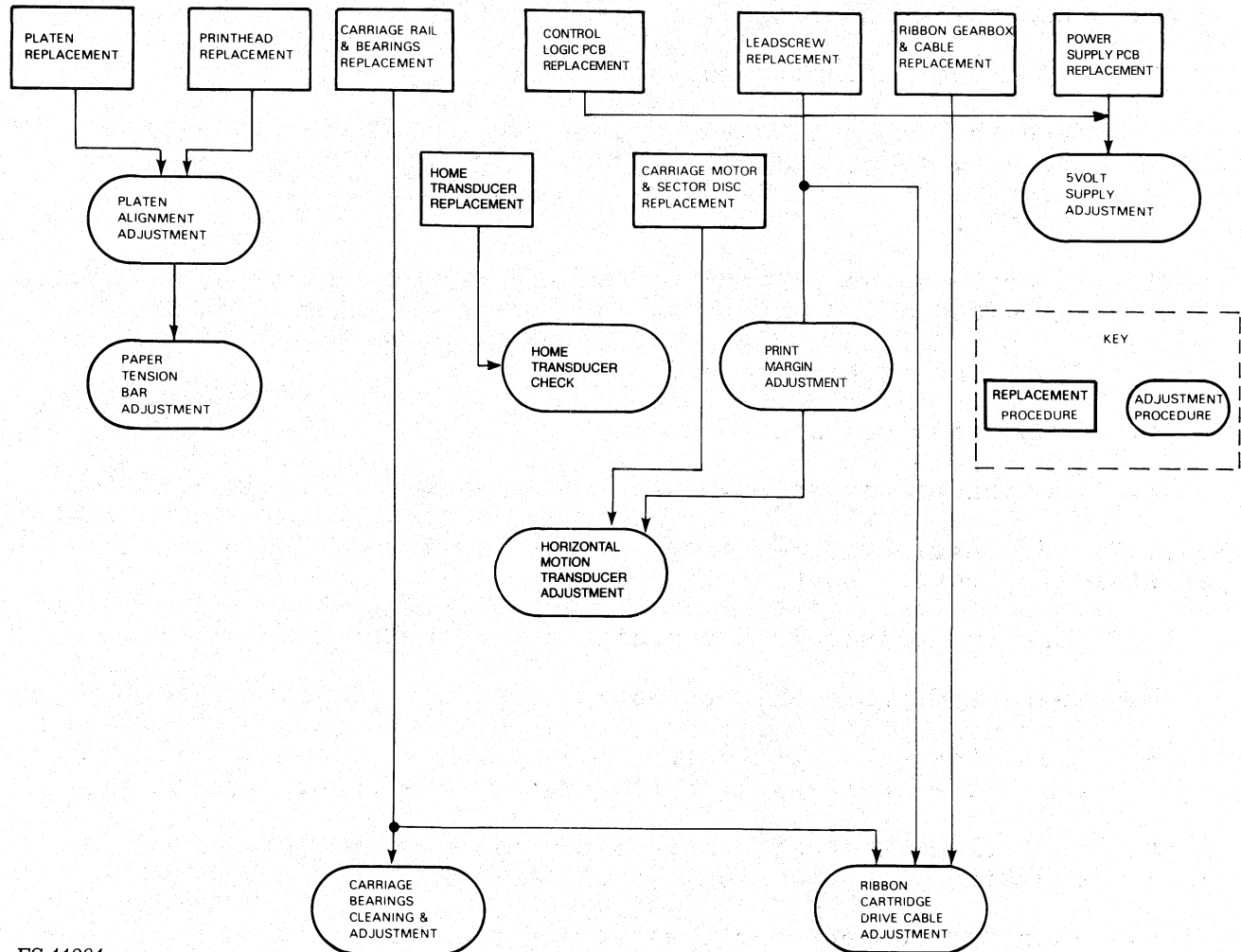
NOTE

The power switch on the EMI-hardened printer is located on the rear of the printer pedestal near the connector panel.

NOTE

All internal ground wires removed during the following procedures must be replaced in their original locations. This is essential to ensure that the printer remains FCC compliant and ESD protected.

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Figure 5-1. Replacement and Adjustment Guidelines

5.3 PREPARATION FOR MAINTENANCE

Use the procedures given here to remove and replace printer service panels. These panels must be removed to gain access to internal components.

5.3.1 Side Panel Removal and Replacement

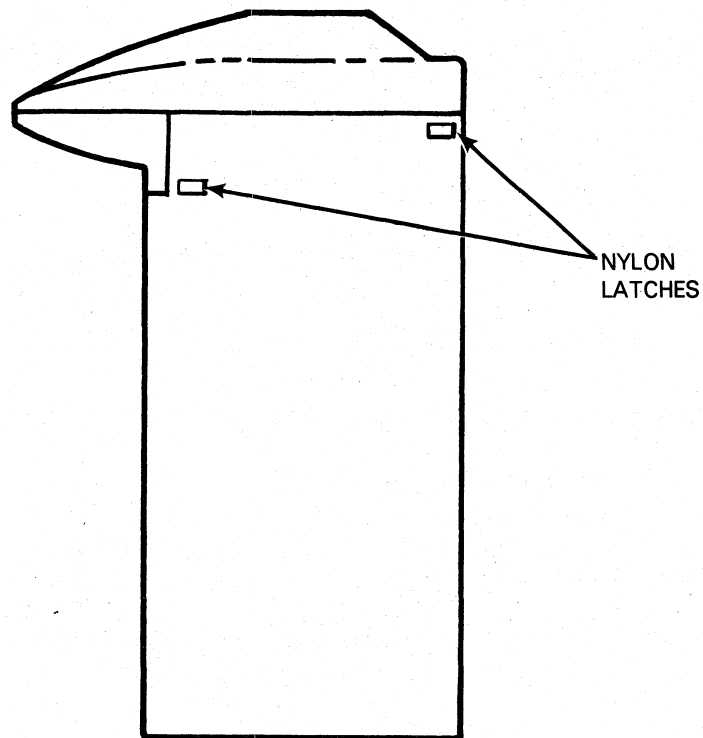
Use the following procedures to remove printer side panels.

5.3.1.1 Non-EMI-hardened Side Panel - To remove the non-EMI-hardened printer pedestal side cover, perform this procedure.

1. Turn the printer off and disconnect the ac power plug.
2. Raise and latch the top cover.
3. Turn the nylon latches that secure the side cover to the printer pedestal top (Figure 5-2). Lift the cover up and disengage the cover hinges from the two mounting holes on the bottom of the pedestal.
4. To replace the printer pedestal side cover, lower the cover into place and align the mounting slot with the cover hinges.
5. Close the nylon latches.
6. Close the top cover.
7. Re-connect the ac power plug and turn the printer on.

5.3.1.2 EMI-hardened Side Panel - To remove the EMI-hardened printer pedestal side cover, perform this procedure.

1. Turn the printer off and disconnect the ac power plug.
2. Raise and latch the top cover.
3. Grasp the cover at the top and slowly pull the cover straight up until it clears the top edge of the printer pedestal.
4. To replace the printer pedestal side cover, align the cover mounting brackets with the edge of the pedestal.
5. Push the connector cables toward the PCBs so that they are not bent or unplugged as the cover is put in place.
6. Slowly lower the cover into place and push down until the cover is aligned with the top edge of the pedestal.
7. Close the top cover.
8. Re-connect the ac power plug and turn the printer on.



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Figure 5-2. Non-EMI-hardened Side Panel Removal and Replacement

5.3.2 Service Panel Removal and Replacement

Follow this procedure:

1. Turn the printer off and disconnect the ac power plug.
2. To remove the printer pedestal service panel, turn the nylon latches on top of the panel that hold the panel closed (Figure 5-3). The panel can be tilted open.
3. Disconnect the ground wire connected to the panel.
4. Tilt the top of the panel away from the pedestal using the nylon latches, then lift the panel up and out of the pedestal base.

5. To replace the printer pedestal service panel, set the panel hinges in the mounting holes on the pedestal base.
6. Reconnect the ground wire.
7. Close the panel and turn the nylon latches to secure the panel to the pedestal.
8. Re-connect the ac power plug and turn the printer on.

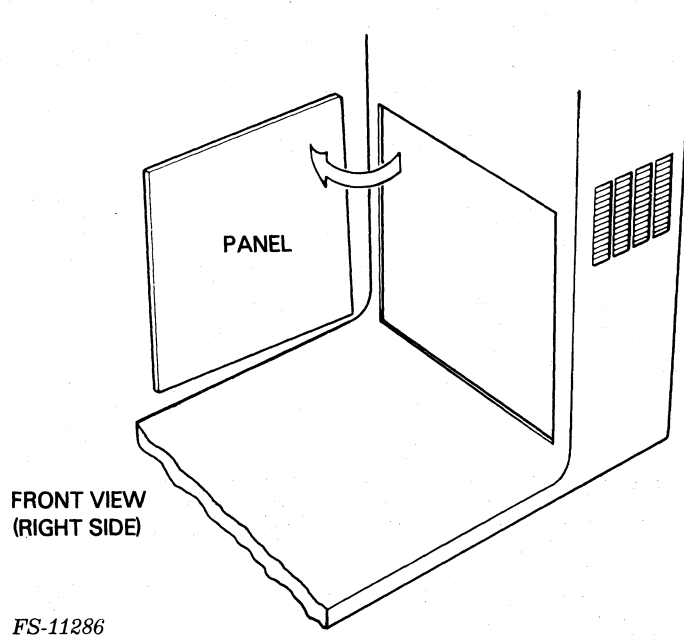


Figure 5-3. Service Panel Removal and Replacement

5.4 ELECTRONIC PCBs, CABLES, AND ASSEMBLIES REMOVAL AND REPLACEMENT

Use the following procedures to remove and replace the printer electronic components.

5.4.1 Power Cord

Use this procedure:

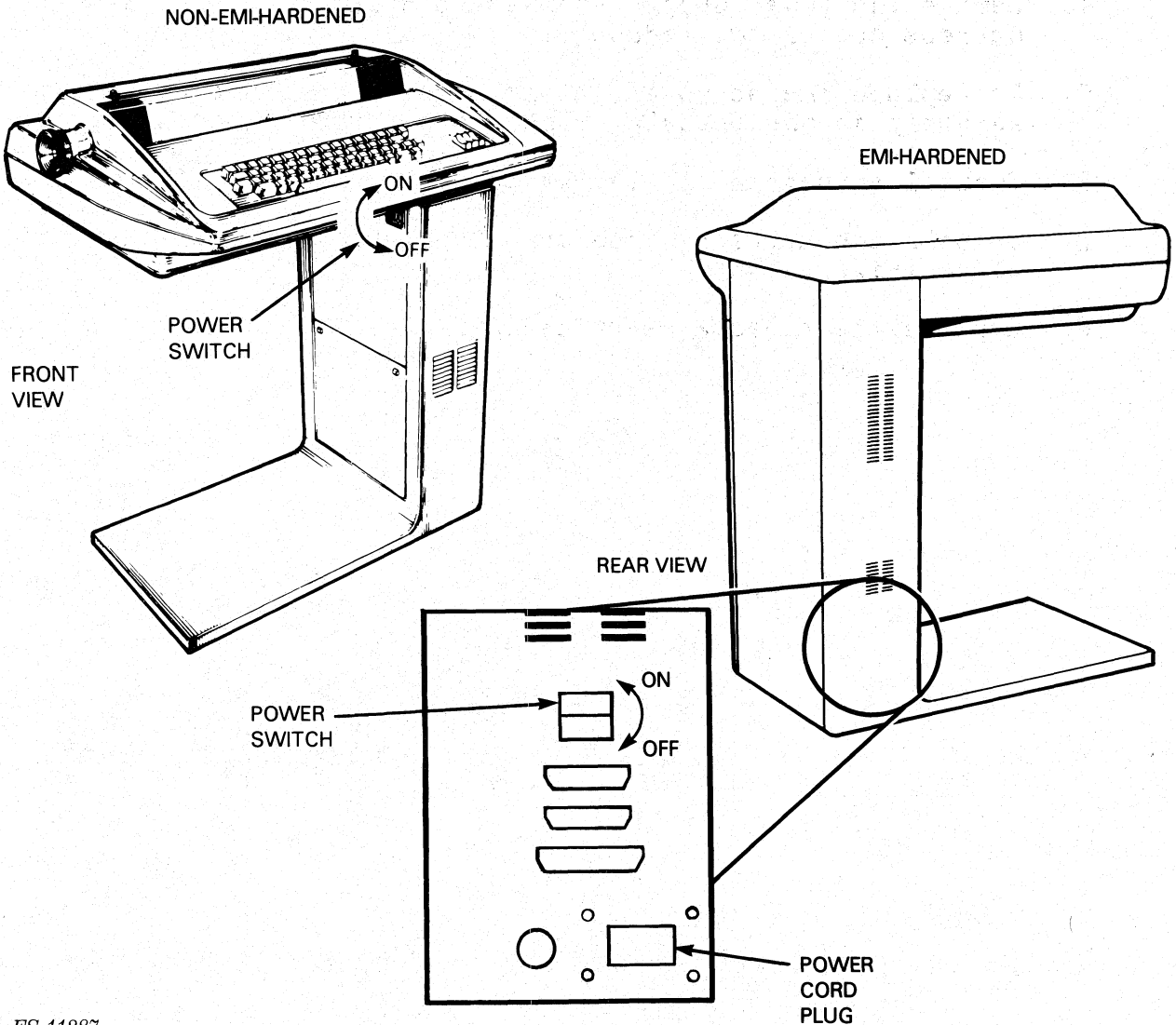
1. Set the power switch to the OFF or down position to turn the printer off.

2. Disconnect the power cord from the pedestal connector (Figure 5-4).

NOTE

Non-EMI-hardened printers use molex connectors. EMI-hardened printers use a 3-prong connector.

3. To replace the ac power cord, align the power cord plug with the pedestal connector.
4. For non-EMI-hardened molex connectors, squeeze the sides of the power cord plug so that the catches on the side can be pushed over the mounting bracket on the connector. Release the sides of the power cord plug and check that the plug is securely held onto the mounting bracket.



FS-11287

Figure 5-4. AC Power Cord Plug Locations

5.4.2 AC Power Supply Harness

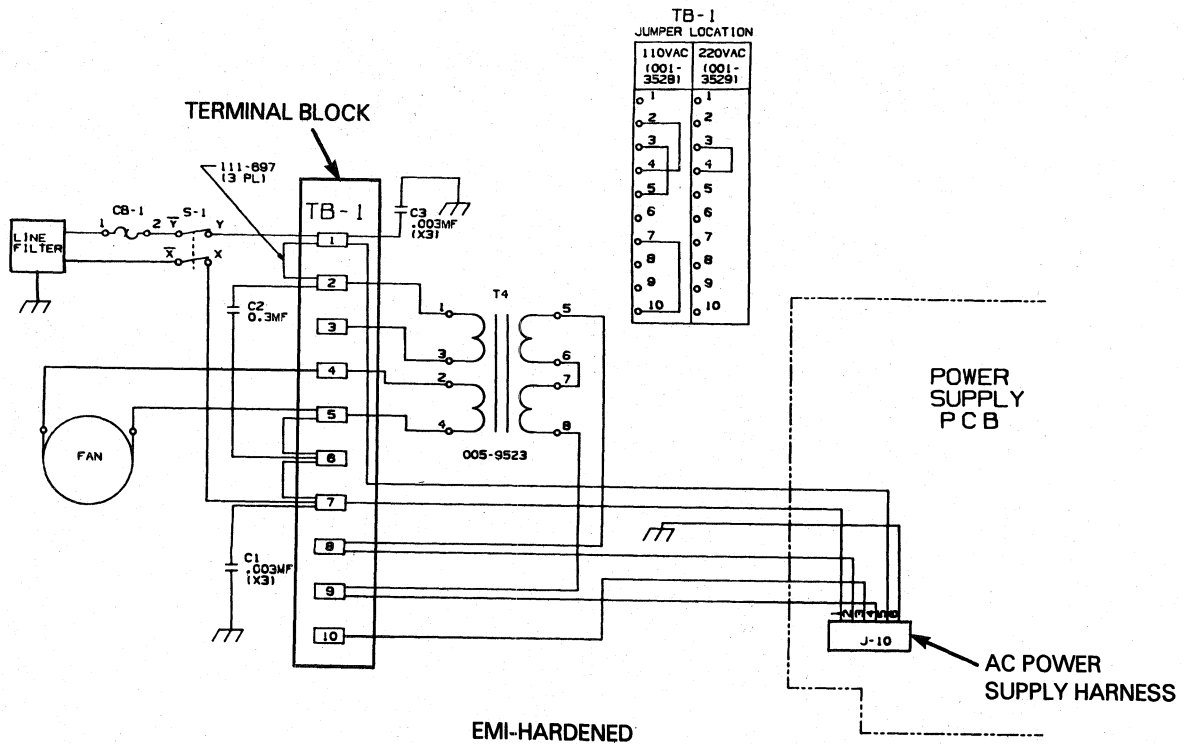
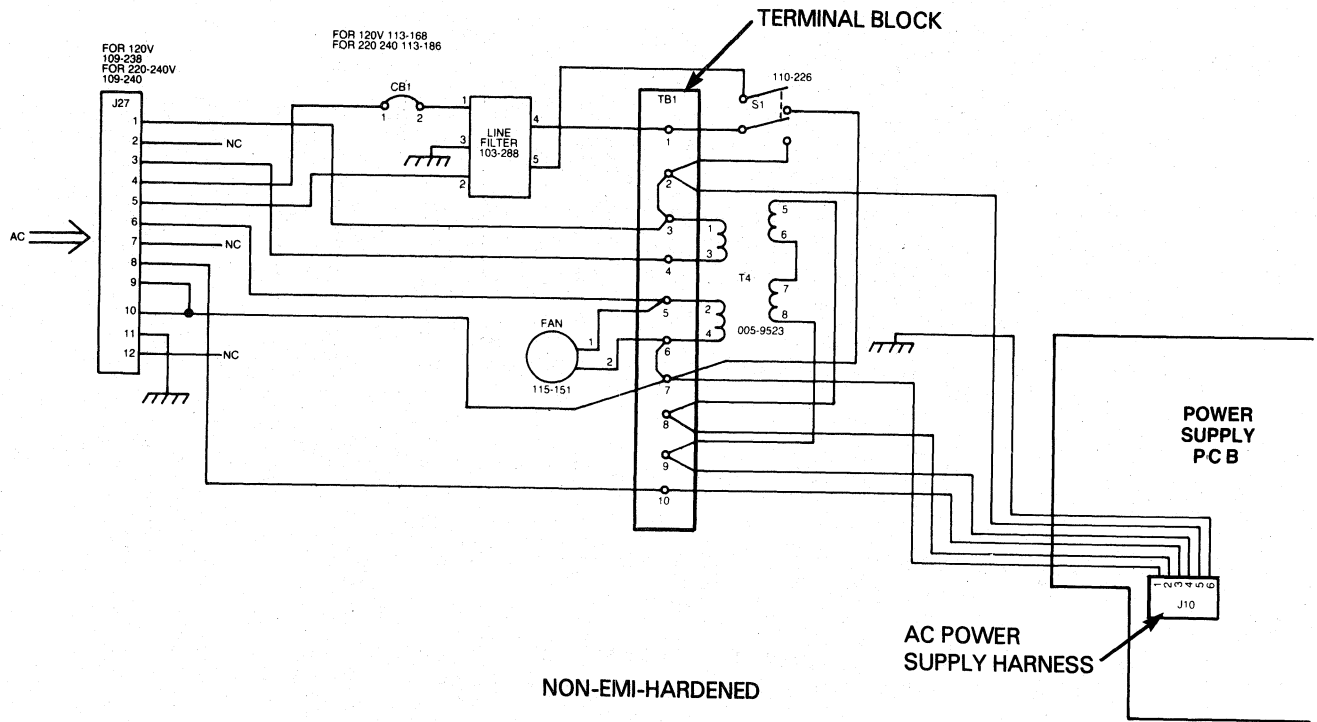
Use this procedure:

1. Turn the printer off, disconnect the ac power cord, and remove the printer pedestal service panel.
2. The ac power supply harness runs from a terminal block at the bottom of the pedestal to the power supply PCB J10. Figure 5-5 shows the ac power supply harness wiring diagrams for the printers.

Disconnect the ac power supply connector J10 from the power supply PCB.

3. Disconnect the ac power supply harness wires from the terminal block.
4. Remove the power supply harness mounting screws. Lift the harness out of the pedestal.
5. To replace the ac power supply harness, set the replacement assembly in the pedestal base and replace the mounting screws.
6. Install connector J10 to the power supply PCB.
7. Install the harness wires onto their positions at the terminal block (Figure 5-5).
8. Replace the pedestal service panel.

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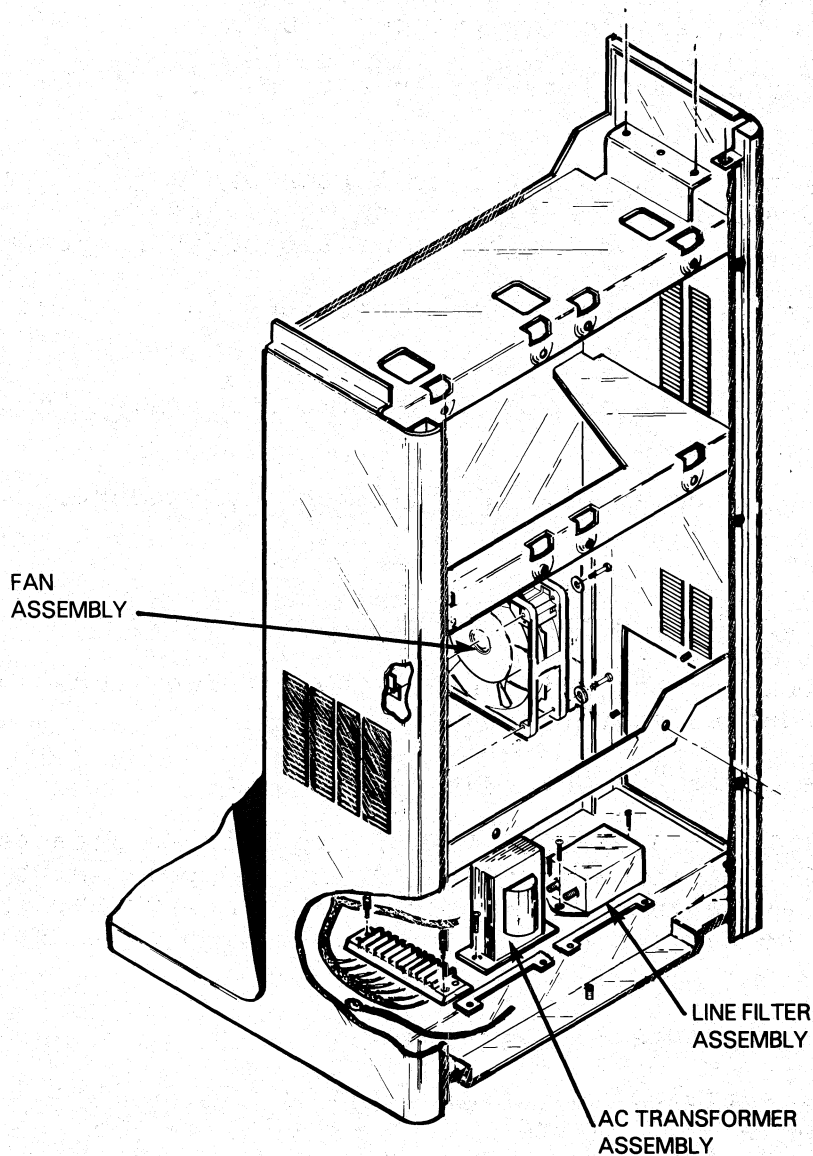
FS-11288

Figure 5-5. AC Power Supply Harness Wiring

5.4.3 Electronic PCBs

Perform the following procedures to remove and replace the following printer PCBs and component.

- Driver PCB (REV 11+)
 - Power Supply PCB (Rev. +9)
 - Control Logic PCB
 - IC SYC6551, UART, Serial only, (100-1692)
Location 28F on control logic PCB
1. Turn the printer off and disconnect the ac power cord.
 2. Remove the printer pedestal side cover. All PCB locations are shown in Figure 5-6.
 3. Disconnect and label the internal cable connectors from the PCB to be removed.
 4. To remove the PCB from the pedestal, pull the PCB release knobs until they open (they click when open). Carefully remove the PCB from the pedestal.
 5. If the IC SYC6551, serial UART (28F) (Figure 5-6) is to be replaced, remove the chip from the control logic PCB. Install the new chip and install the PCB in to the printer.
 6. Set the replacement PCB in place. Check that the internal cables are routed to the front of the PCB. Push on the release knobs until they snap closed.
 7. Reconnect the internal cable connectors to the PCB.
 8. Perform any necessary adjustments according to Figure 5-1.
 9. Replace the pedestal side cover and perform printer self-test to confirm operation.
 10. Return the printer to operation.



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Figure 5-6. Electronic PCBs Locations

5.4.4 Transformer/Line Filter Assemblies

Figure 5-7 shows the locations of the transformer and line filter assemblies.

1. Turn the printer off, disconnect the ac power cord and remove the printer pedestal service panel.
2. Remove the two mounting screws that hold the plastic shield to the transformer assembly. Remove the plastic shield.
3. Remove the mounting screws that hold the transformer/line filter assembly to the pedestal.

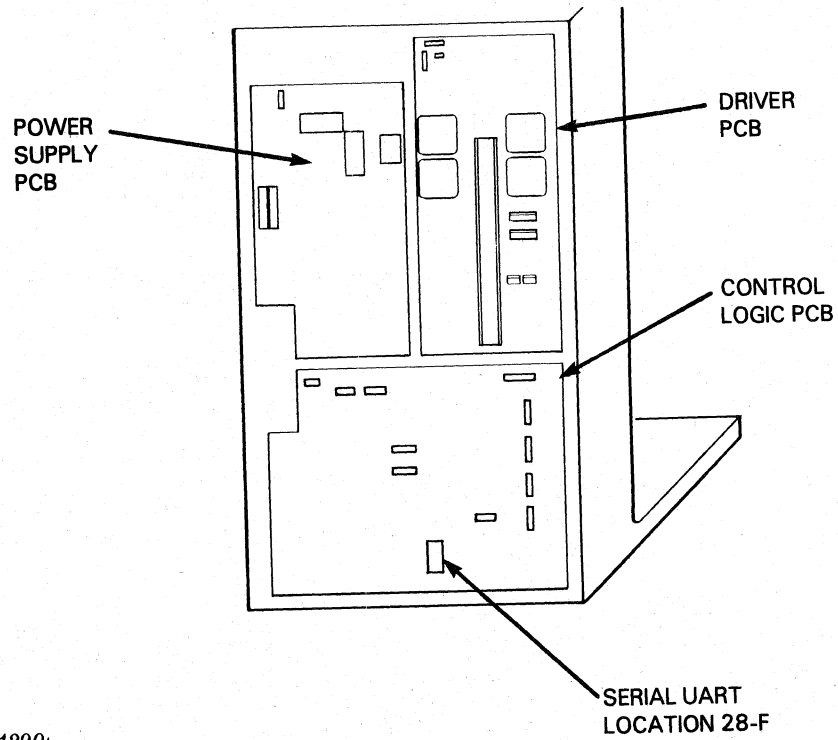
4. Disconnect the four wires connected from the transformer assembly to the line filter and the printer pedestal.
5. Lift the transformer/line filter assembly out of the printer pedestal.
6. To replace the transformer/line filter assembly, align the holes on the transformer/line filter assembly with those on the printer pedestal. Install and tighten the two mounting screws.
7. Connect the four wires to the connectors on the line filter and the printer pedestal.
8. Replace the plastic shield. Install and tighten the mounting screws.
9. Perform the power supply +5V adjustment procedure.

5.4.5 Fan Assembly

Figure 5-7 shows the location of the fan assembly.

1. Turn the printer off, disconnect the ac power cord and remove the printer pedestal service panel.
2. Remove the Logic PCB and Power Supply PCB.
3. The fan is located on the side of the printer pedestal. See Figure 5-7. It is secured to the printer pedestal by four screws. Remove the four screws. Note or mark the wires connected to the fan and note the direction that the fan blades are facing.
4. Remove the fan from the pedestal.
5. To install a replacement fan, align the fan with the mounting slot on the printer pedestal. Replace and tighten the screws and to secure the fan.
6. Connect the wire connectors on the new fan.
7. Replace the power supply PCB and logic PCB.
8. Power up the printer and ensure that the fan blows air into the printer.

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Figure 5-7. Transformer/Line Filter Assemblies and Fan Locations

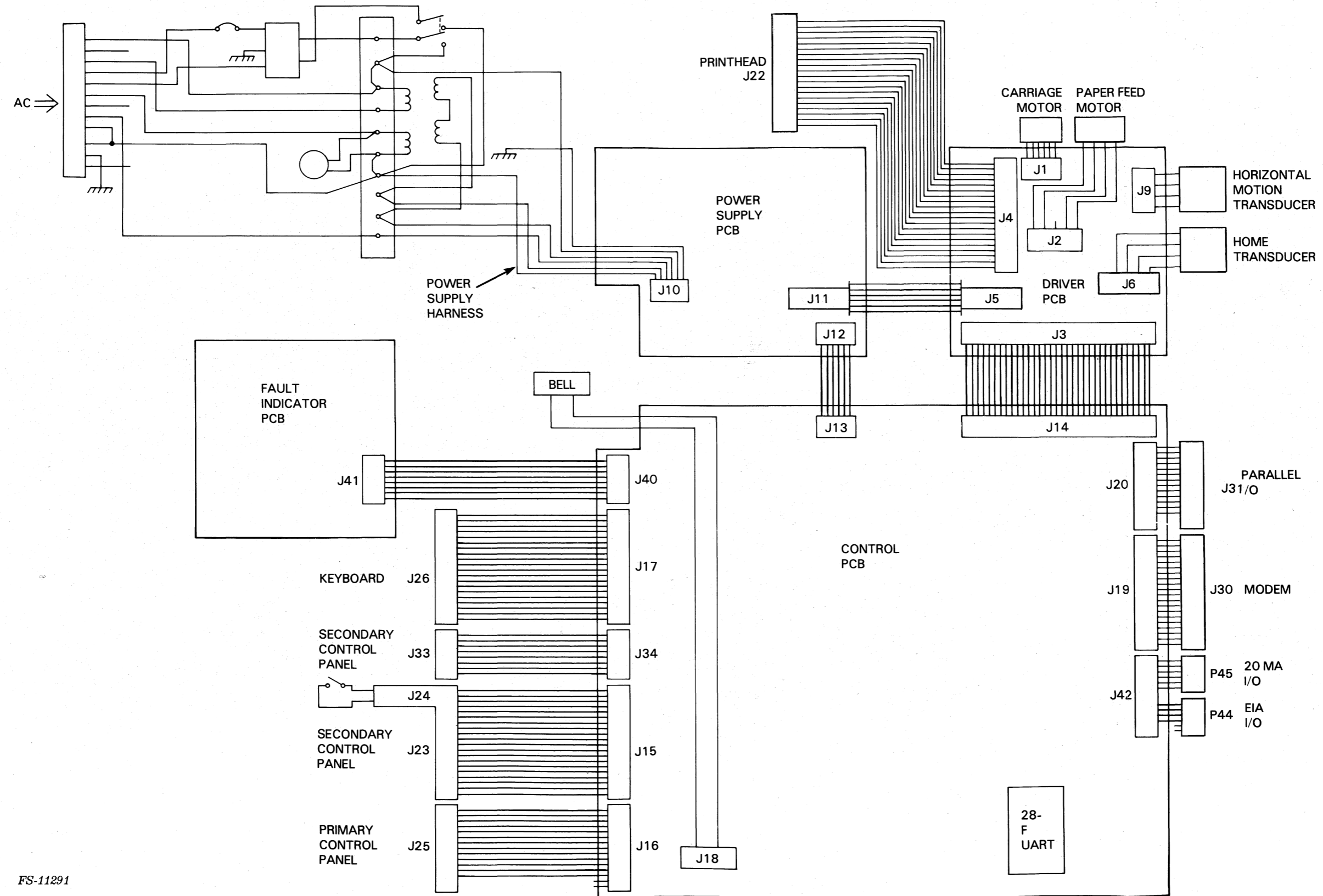
5.4.6 Internal Signal Cables

The following internal cables must be disconnected when other FRUs are removed or when the cable has failed.

- Cable, Logic To Primary Control Panel
 - Cable, Logic to Modem
 - Cable, Power Supply to Driver PCB
 - Cable, Logic to Keyboard
 - Cable, Logic to Fault Indicator PCB
 - Cable, Ribbon, Logic to Secondary Control Panel
 - Cable, Logic To Secondary Control Panel (serial units only)
 - Cable, Logic to Driver PCB
1. Turn the printer off and disconnect the ac power cord.
 2. Remove the pedestal side cover.
 3. To remove an internal cable, unplug the cable connector from the PCB to which it is connected. Grasp the connector to remove, not the wire. Figure 5-8 shows the locations of all the internal cable PCB connectors.
 4. To replace an internal cable assembly, connect the cable to the PCB and the appropriate FRU assembly. Check that the cable is routed through the printer pedestal the same way the replaced cable was routed.
 5. Replace the pedestal side cover and return the printer to operation.

Faint, illegible text at the top of the page, possibly a header or title.





FS-11291

Figure 5-8. Internal Cables Connection Diagram (Non-EMI-Hardened)



5.4.7 Control Panels, Speaker, and Cover

Use the following procedures to remove and replace the following covers and PCBs.

- Primary Control Panel PCB (RO)
- Secondary Control Panel PCB
- Cover, Secondary Control Panel PCB
- Fault Indicator PCB
- Cover, Fault Indicator PCB
- Assembly Keyboard

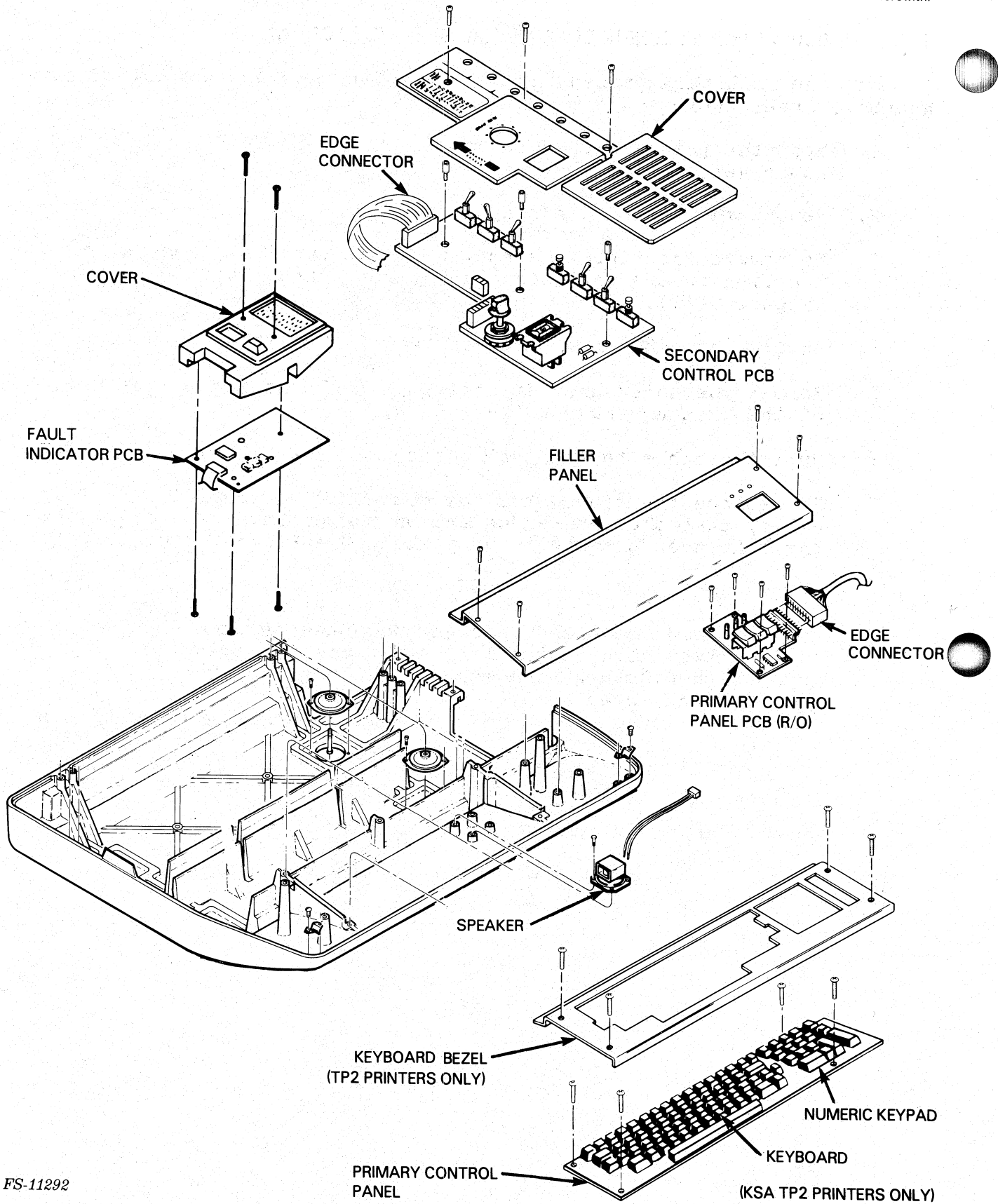
1. Turn the printer off and disconnect the ac power cord.
2. Open the printer top cover.
3. Remove the cover mounting screws. Lift the cover off the PCB assembly (Figure 5-9).

NOTE

Remove the keyboard (KSR) or filler panel (RO) to access the speaker for removal and replacement.

4. Unplug the cable connector from the PCB.
5. Remove the screws securing the PCB to the printer base.
6. Lift the PCB off of the printer base.
7. To install a replacement PCB, set the PCB on the printer base.
8. Connect the cable connector(s) to the PCB and secure mounting screws.
9. Replace the cover and mounting screws.
10. Close the top cover and return the printer to operation.

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FS-11292

Figure 5-9. Control Panel/Keyboard and Speaker Removal and Replacement

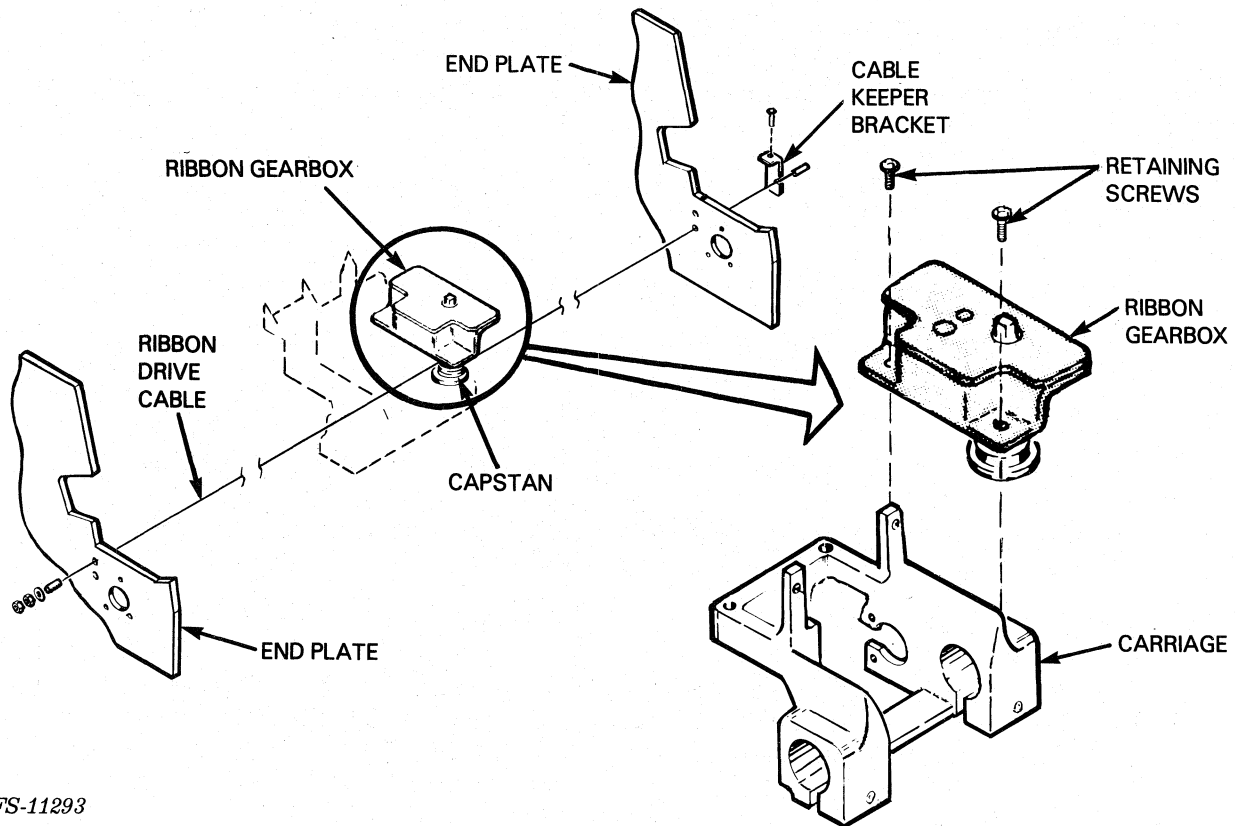
5.5 RIBBON DRIVE ASSEMBLIES REMOVAL AND REPLACEMENT

Use the following procedures to remove and replace the ribbon drive gearbox, steel cable and cable keeper bracket.

1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. Remove the ribbon cartridge.
3. To remove the ribbon gearbox from the carriage, remove the two mounting screws that hold the ribbon gearbox to the carriage (Figure 5-10).
4. Unwind the cable from the capstan of the ribbon gearbox.
5. Remove the screw that attaches the cable keeper to the right end of the printer frame (Figure 5-10).
6. Pull the cable to the left out of the frame.
7. To replace the ribbon gearbox cable, or to install a replacement cable, pass the unthreaded end of the cable to the right through the left then the right end plates. See Figure 5-10.

NOTE

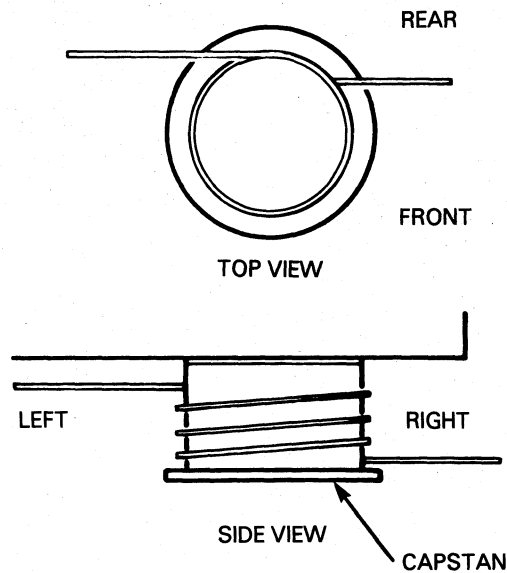
Feed the cable through the upper of the two holes in the left end plate first and then through the lower hole in the right end plate.



FS-11293

Figure 5-10. Ribbon Gearbox Removal and Replacement

8. Tighten the cable keeper bracket screw so that the cable does not slip through the end plate. Loosely tighten the cable drive adjustment nut on the left end plate.
9. Wind the cable three turns around the gearbox capstan (Figure 5-11).
10. Replace the two mounting screws that secure the ribbon gearbox to the carriage.
11. Move the printhead carriage back and forth a few times to ensure that the cable is secure.
12. Perform the ribbon cartridge drive cable adjustment procedure.
13. Replace the ribbon cartridge.
14. Execute printer self-test to ensure that the ribbon advances properly in both directions of its travel.
15. Return the printer to operation.



FS-11294

Figure 5-11. Ribbon Gearbox Cable Winding

5.6 PAPER FEED ASSEMBLIES REMOVAL AND REPLACEMENT

Use the procedures in this subsection to remove and replace the paper feed assemblies.

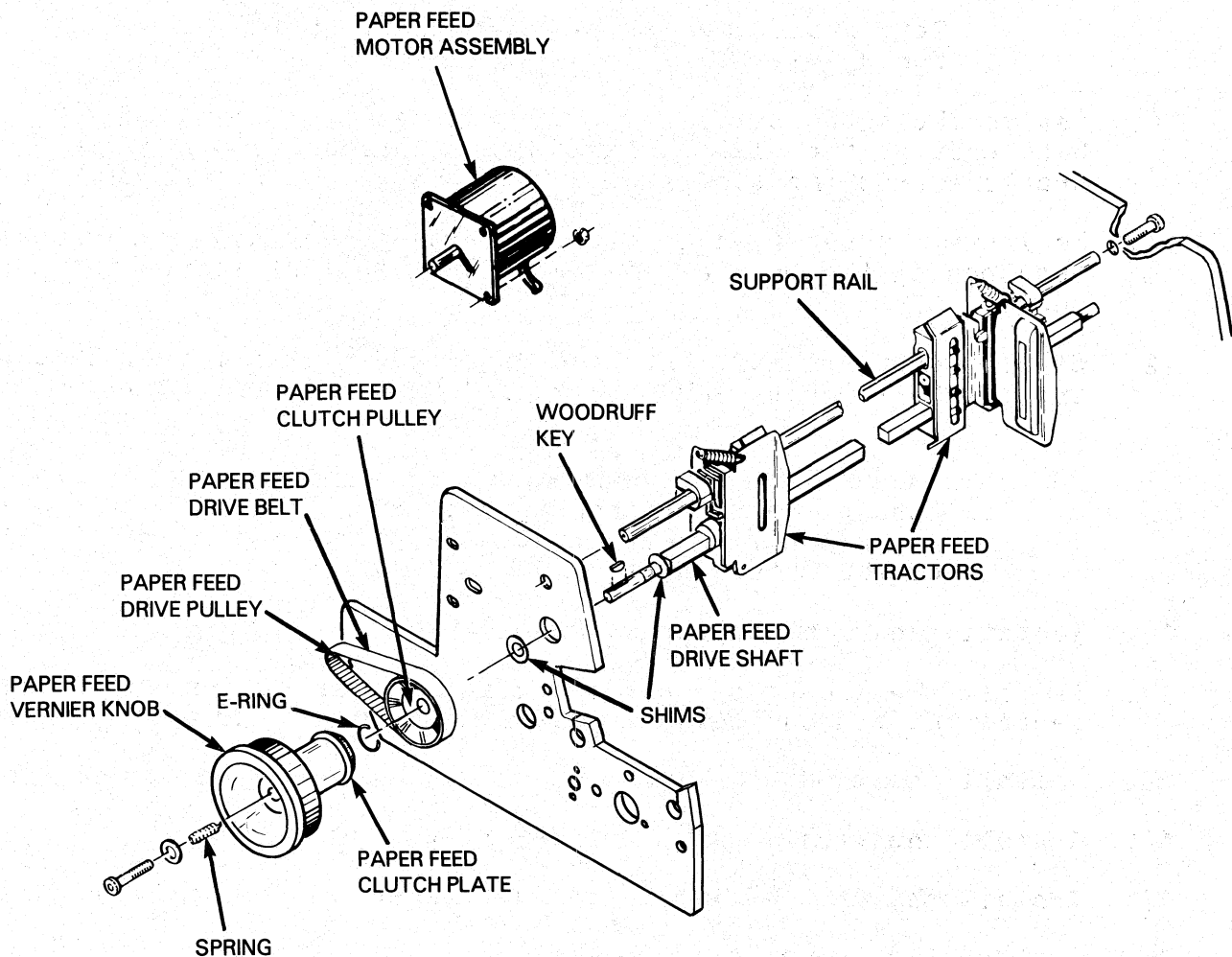
5.6.1 Paper Feed Tractors and Associated Mechanisms

The following paper feed FRUs can be replaced during this procedure.

- Paper Feed Tractors, pair
- Paper Feed Vernier Knob
- Paper Feed Clutch Pulley
- Paper Feed Clutch Plate
- Support Rail
- Paper Feed Drive Shaft
- Bearing, Flange (Replaces 002-004133)
- Spring, Adjustment Knob
- E-Ring
- Paper Feed Drive Belt
- Woodruff Key
- Shim Washer (for bearing flange)

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1. Turn the printer off, disconnect the ac power cord and open the top cover.
2. Loosen the four screws securing the paper feed motor to the left end plate to relax tension on the paper feed drive belt.
3. Remove the paper feed drive belt (Figure 5-12).
4. Remove the retaining screw and spring. Then pull the paper feed vernier knob off the drive shaft.



FS-11295

Figure 5-12. Paper Feed Mechanism Removal and Replacement

5. Remove the woodruff key from the left end of the drive shaft.
6. Unsnap the "E" ring and pull the clutch pulley off the drive shaft.
7. Loosen the paper feed tractor clamps.
8. Remove the flange bearing from the right end plate.
9. Slide the paper feed drive shaft to the right out of the frame.

NOTE

Retain the paper feed drive shaft shims for reassembly.

10. Remove the support shaft by removing the two screws located on both ends of the shaft. Remove and replace the paper feed tractors from the support shaft if they are a replacement item.
11. To install paper feed mechanisms install the support shaft with tractors in the printer and fasten the support shaft with the two screws.
12. Slide the drive shaft into the right end of the frame, through the tractors, drive shaft shim, and into the left frame bearing.

NOTE

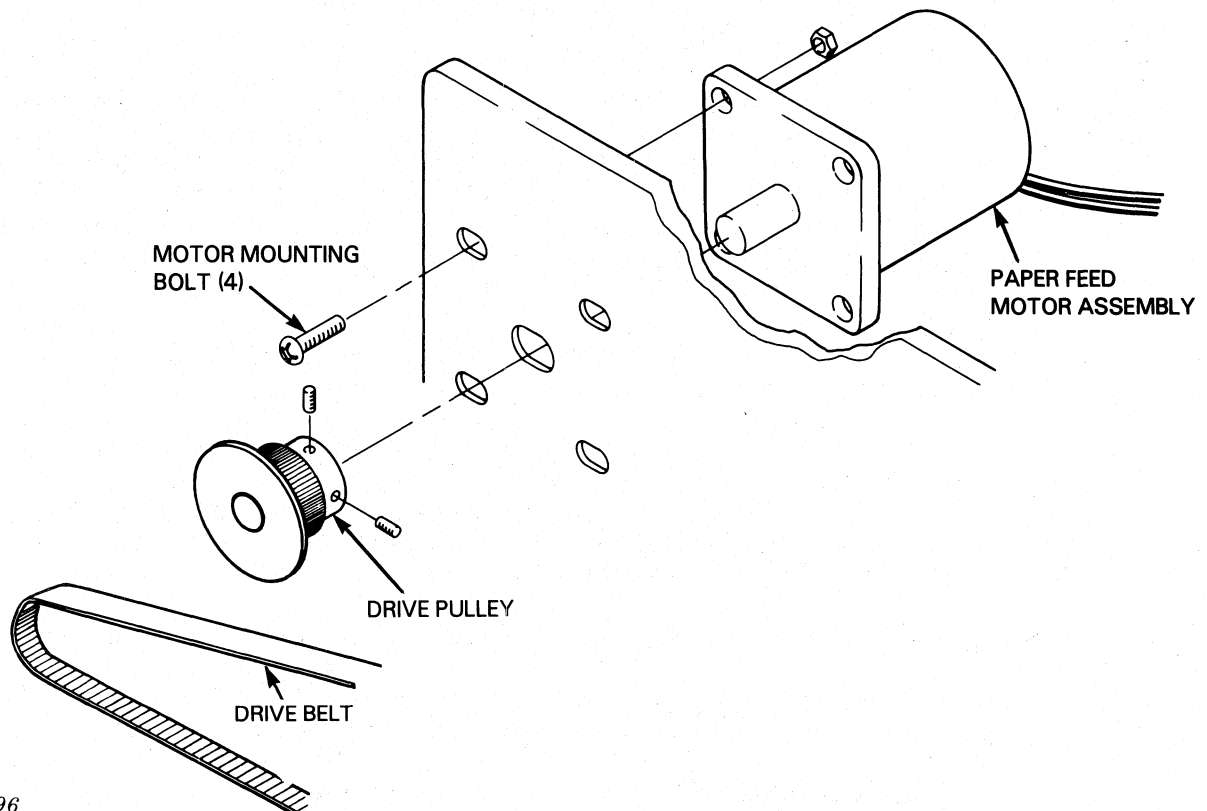
Ensure that the paper tractor alignment marks are aligned on the same flat surface of the drive shaft.

13. Install the right bearing flange.
14. Install the second drive shaft shim and the clutch pulley and secure the clutch pulley in place with the "E" ring.
15. Install the woodruff key.
16. Install the vernier knob on the drive shaft.
17. Install the knob retaining screw, washer and spring.
18. Replace the drive belt.
19. Perform the paper feed drive belt adjustment.

5.6.2 Paper Feed Motor and Associated Mechanisms

The following FRUs can be removed and replaced using this procedure.

- Paper Feed Drive Pulley (on motor shaft)
 - Paper Feed Motor Assembly
 - Paper Feed Drive Belt
1. Turn the printer off, disconnect the ac power cord, and open the top cover.
 2. Loosen the four paper feed motor mounting bolts (Figure 5-13).

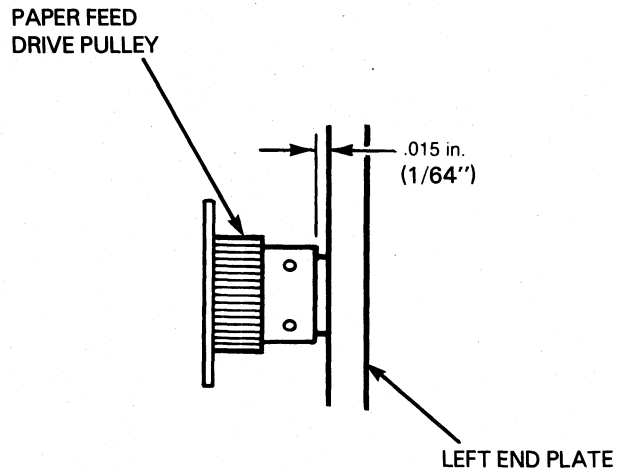


FS-11296

Figure 5-13. Paper Feed Motor and Drive Belt Removal and Replacement

3. Remove the drive belt.
4. Disconnect the Paper Feed Motor to Driver PCB internal cable from connector J2 on the driver PCB.
5. Remove the four bolts that hold the motor. Pull the motor out from the end plate and set in the printer frame.
6. Install the replacement motor with the four bolts. Do not tighten the mounting bolts.

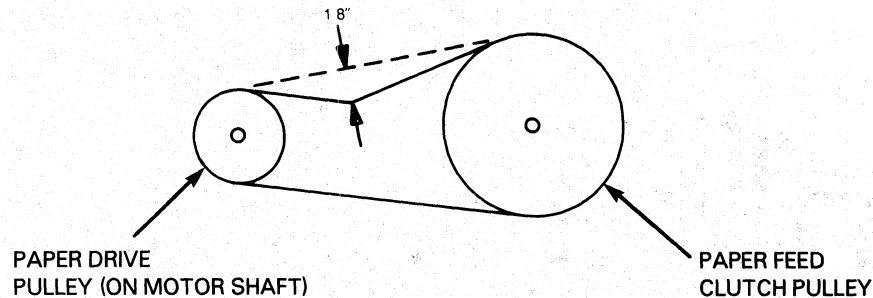
7. Install the drive pulley on the motor shaft so there is 1/64 inch clearance from the left end plate (Figure 5-14).



FS-11297

Figure 5-14. Paper Drive Pulley Clearance

8. Tighten the drive pulley set screws.
9. Replace the drive belt on the pulleys.
10. To adjust the drive belt tension, position the motor so that the drive belt moves only 1/8 inch when pressed down with a force of one pound. See Figure 5-15.
11. Tighten the four paper feed motor mounting bolts.
12. Reconnect J2 to the driver PCB.
13. Return the printer to operation.



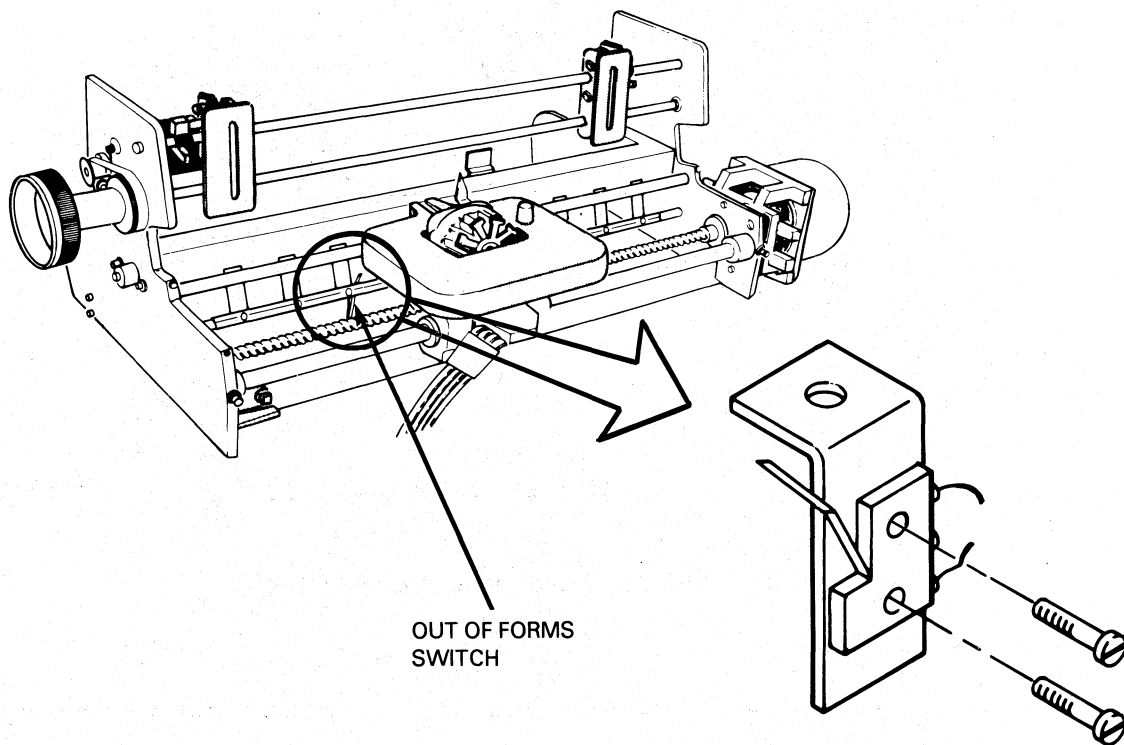
FS-11298

Figure 5-15. Paper Drive Belt Deflection

5.6.3 Out-Of-Forms Switch Removal and Replacement

Use this procedure:

1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. Unplug connector J24 from the secondary control panel. Cut any tie-wraps securing the cable.
3. Remove the two screws that hold the switch to the mounting bracket. Remove the switch from the bracket (Figure 5-16).
4. To install a replacement switch, secure new replacement switch to the mounting bracket and install the mounting screws.
5. Reconnect connector J24 on the secondary control panel. Tie it down and away from any moving parts.
6. In order to test the switch operation, install paper.
7. Reconnect the ac power cord and turn the printer on.
8. The fault display indicator should be off. If the switch is not operating properly, the fault indicator displays code "7".
9. Remove the paper from printer.
10. The fault indicator display should be on. If the switch is operating properly, the Fault Indicator PCB displays code "7".
11. If the expected results from the previous steps are not observed, the out of forms switch must be adjusted. To adjust the switch, loosen the mounting screws to reposition the switch and retest the switch operation. When paper is in place, no fault should be indicated. When paper is removed, the fault indicator should light and the Fault Indicator PCB displays code "7".



FS-11299

Figure 5-16. Out-of-Forms Switch Removal and Replacement

5.7 CARRIAGE DRIVE ASSEMBLIES REMOVAL AND REPLACEMENT

Use the procedures in this section to remove and replace the carriage drive FRU assemblies.

5.7.1 Carriage Motor and Associated Mechanisms

The following FRUs can be removed and replaced during this procedure.

- Carriage Motor Assembly
- Motor Sector Disc
- Coupling Clamp, Carriage Motor (with dowels)
- Horizontal Motion Transducer Assembly

1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. Remove the secondary control panel cover mounting screw and remove the cover.
3. Unplug the motor drive cable from connector J1 on the driver PCB and cut any tie wraps that hold the cable (Figure 5-17).

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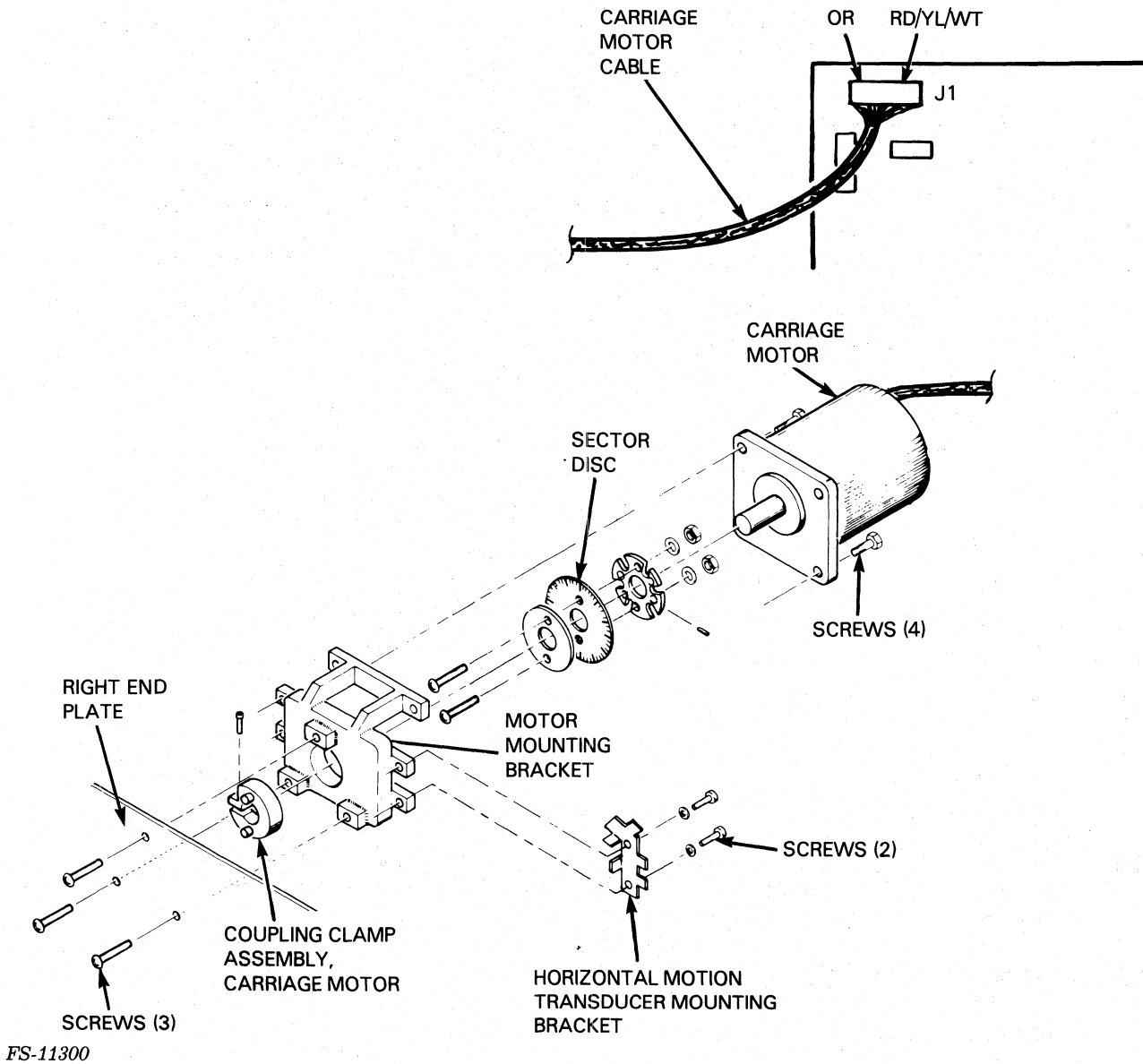


Figure 5-17. Carriage Motor and Sector Disc Removal and Replacement

4. Remove two screws and washers that hold the horizontal transducer assembly mounting bracket to the motor mounting bracket, slide the assembly away from the sector disk, and remove.
5. Remove the three screws that hold the carriage motor mounting bracket to the inside right end plate and remove.

6. Remove the four screws that hold the motor to motor mounting bracket.

CAUTION

The sector disc is very fragile. Hold the motor when removing the last screw. Be sure not to bend the sector disc when removing the motor from its mount.

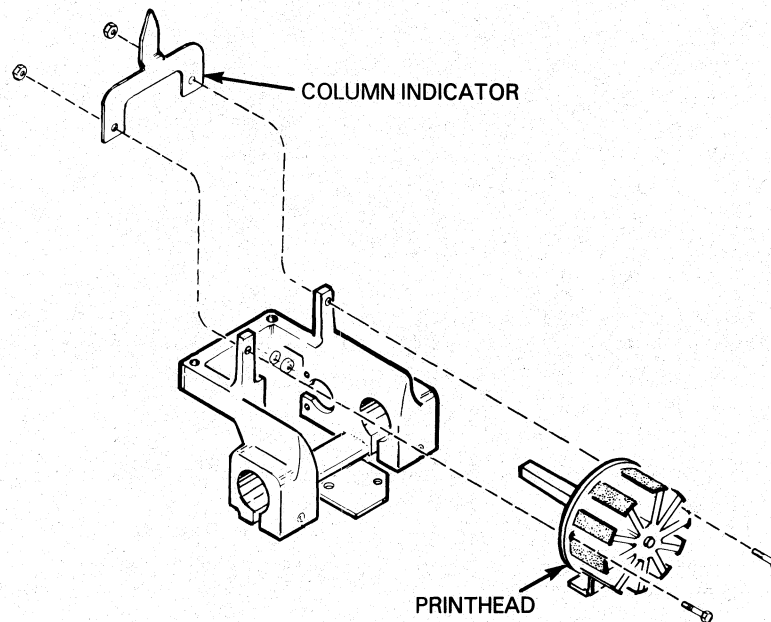
7. With a 3/32 inch Allen wrench loosen the coupling clamp and sector disc set screws. Slide them off the motor shaft.
8. To install the carriage motor, place the sector disc and coupling clamp loosely on the motor shaft. With the coupling against the end of the shaft, tighten the coupling clamp screw from 6.3 to 7.5 inch lbs. At this time, do not tighten the sector disc clamp screw.
9. Fasten the motor to the motor mounting bracket with the four screws.
10. Secure the horizontal transducer (with mounting bracket) to the motor mounting bracket with the two screws and washers so that the sector disc is between the horns of the transducer. Tighten the sector disk set screws.
11. Connect the motor bracket and motor to the right end plate with the three mounting screws.
12. Connect the carriage motor assembly cable to J1 on the driver PCB.
13. Replace the secondary control panel cover and mounting screw.
14. Perform the horizontal motion transducer adjustment procedure.
15. Execute printer self-test to ensure proper operation.
16. Return the printer to normal operation.

5.7.2 Printhead Assembly

Use this procedure:

1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. To remove ribbon cartridge, grasp the sides of the cartridge with both hands and gently pull upward, removing it from the carriage assembly.
3. Note the position of the platen space lever (located next to the secondary control panel), and move it away from the printhead to the widest position.

4. On linear carriages: remove the two screws and cable clamp. On plastic bearing carriages: the cable clamp clips out of the carriage; there are no screws.
5. Unplug the cable from the printhead.
6. Remove the two screws that attach the printhead and column indicator to the carriage (Figure 5-18).



FS-11301

Figure 5-18. Printhead Removal and Replacement

7. Remove the printhead from the carriage.
8. To install a replacement printhead, secure the new printhead and column indicator to the carriage with the two mounting screws. Position the column indicator to the right of the center of the printhead.
9. Plug in the printhead cable. Do not pinch the cable.
10. On linear carriages, secure the cable clamp with two screws. On the plastic bearing carriage, clip on the cable clamp.
11. Perform the platen alignment adjustment procedure.

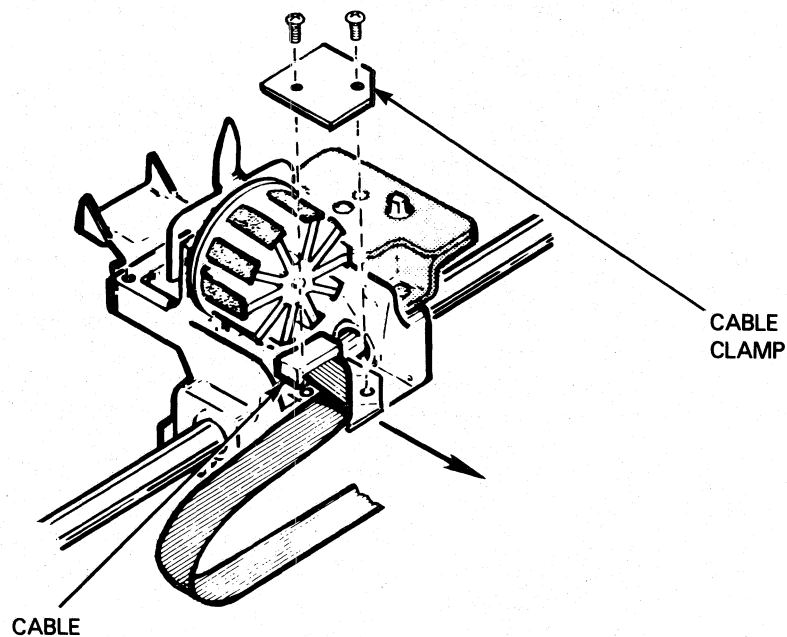
5.7.3 Printhead to Driver PCB Cable

Perform the following removal and replacement procedure:

1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. To remove the ribbon cartridge, grasp the sides of the cartridge with both hands and gently pull upward, removing it from the carriage assembly.
3. Note the position of the platen adjustment lever (located next to the secondary control panel), and move it back to the widest position.
4. Remove the printhead cable clamp from the carriage.
 - a. Linear-bearing carriages, remove the two screws holding the cable clamp (Figure 5-19).
 - b. Plastic-bearing carriages, remove the cable clamp that clips into the carriage.
5. Disconnect the cable connector J4 from the driver PCB (Figure 5-18).
6. Remove the cable retaining bracket (two screws) located on the bottom of the pedestal near the right end plate.
7. Remove the printhead to driver cable from the frame.
8. To replace the printhead to driver cable, plug the cable into the printhead connector.
9. Crease the cable over and to the left (Figure 5-19).
10. Install the cable clamp onto the carriage over the cable.
11. Route the cable on the frame bar at the bottom inside of the right end plate and down into the pedestal.
12. Secure the cable with mounting hardware.
13. Move the carriage back and forth several times to ensure that the cable does not rub against the the side of the printer base or carriage front rail.

CAUTION

Ensure that the printhead cable is installed so that it does not make contact with the printer base or carriage front guide rail.



FS-11302

Figure 5-19. Printhead to Driver PCB Cable Removal (Linear Bearing)

14. Reconnect J4 on the driver PCB.
15. Close the top cover and execute printer self-test.
16. Return the printer to operation.

5.7.4 Leadscrew and Associated Mechanisms

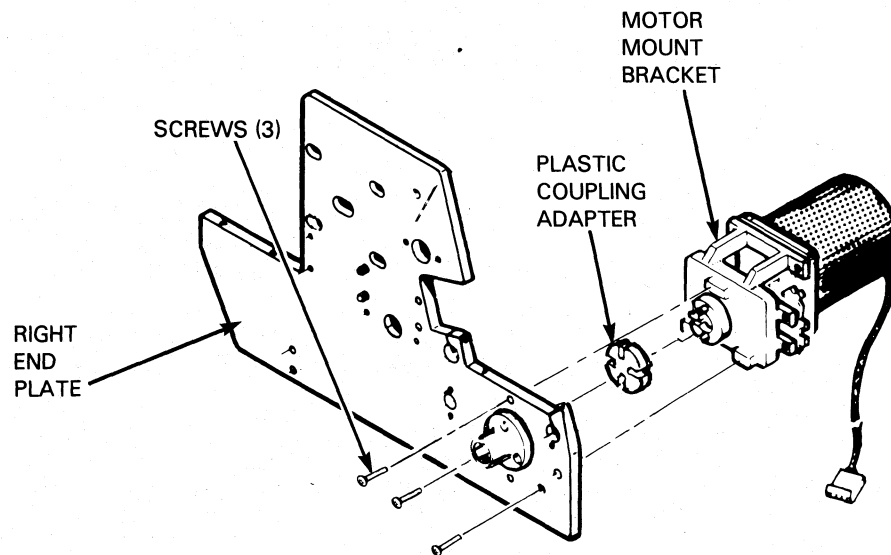
The following FRUs can be removed and replaced during this procedure.

- Leadscrew and Anti-backlash Nut Assembly
- Coupling Clamp, Leadscrew (w/dowels)
- Bearing, Leadscrew
- Wavy Washer, Leadscrew
- Coupling Adapter (Carriage Motor)

NOTE

The anti-backlash nut and the leadscrew come in a matched set. To ensure proper operation, replace them only in pairs.

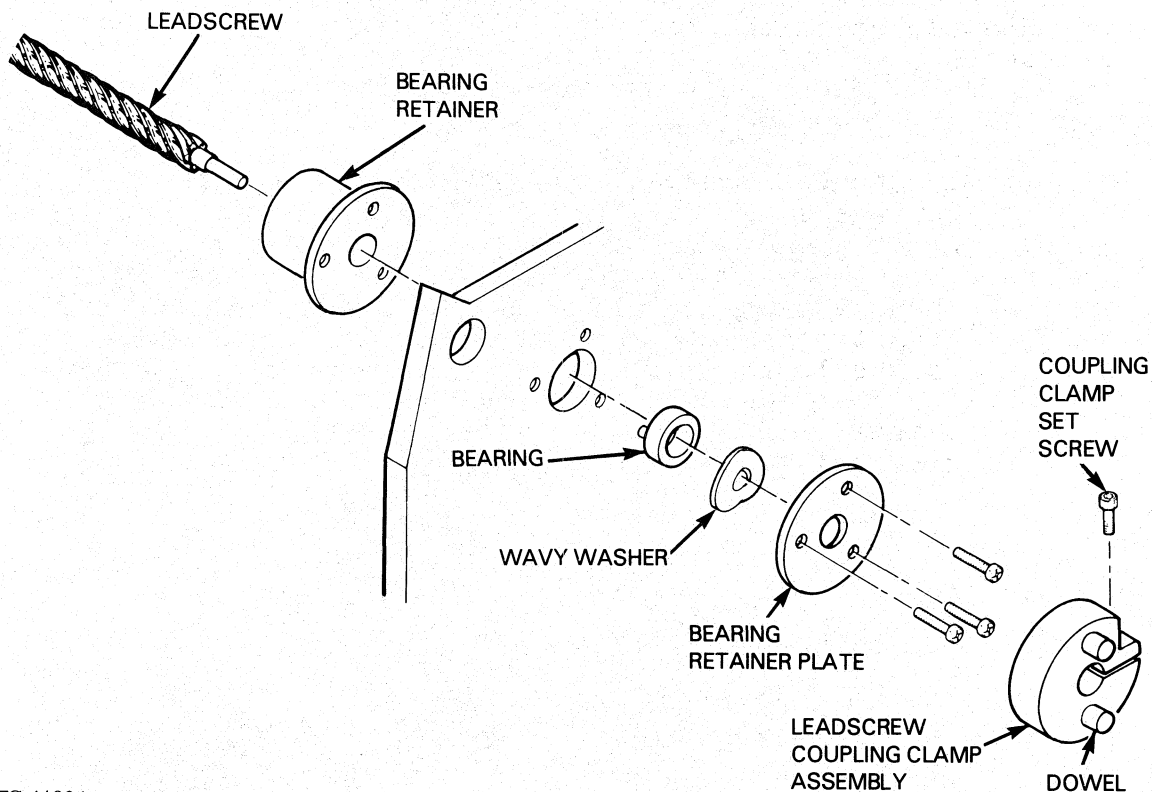
1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. Remove the ribbon cartridge and then remove the ribbon gearbox from the carriage assembly.
3. Remove the secondary control panel cover.
4. Remove the carriage motor assembly from the right end plate by removing the three screws that secure the motor mount bracket (Figure 5-20). There is no lock washer on the top screw.



FS-11303

Figure 5-20. Carriage Motor Removal and Replacement

5. Slide the plastic coupling adapter off of the leadscrew coupling clamp.
6. Slide the printhead carriage all the way to the left.
7. Loosen the leadscrew coupling clamp set screw with a 3/32 inch Allen wrench, and slide the coupling off the leadscrew (Figure 5-21).
8. Remove the three screws that secure the bearing retainer plate (Figure 5-21). Save the wavy washer for installation.



FS-11304

Figure 5-21. Leadscrew Removal and Replacement

9. Remove the three screws (linear carriage) or two screws (plastic bearing carriage) that secure the anti-backlash nut to the carriage (Figure 5-22).
10. Without allowing the anti-backlash nut to come off the leadscrew, pull the leadscrew through the right end plate until the left end of the leadscrew clears the carriage. Then pull the leadscrew and nut assembly to the left and out of the printer. Save the shims on the left end of the leadscrew for installation.
11. Examine the replacement leadscrew/anti-backlash nut assembly.

NOTE

There are two types of leadscrew/anti-backlash nut assemblies that are available under part number 118-001399. One has a white anti-backlash nut and is non-adjustable. The other has a blue anti-backlash nut with a silver band and is adjustable.

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12. If the replacement leadscrew/anti-backlash nut assembly is adjustable, check the torque by running the nut up and down the leadscrew.

NOTE

If the dots on the adjustable anti-backlash nut are aligned (Figure 5-22), the torque is set high.

These assemblies are normally shipped set to high torque. If the nut is moved to the end of the leadscrew, the top half pops into a lower torque position; the dots are no longer aligned. The torque can be set back to high once set to low torque.

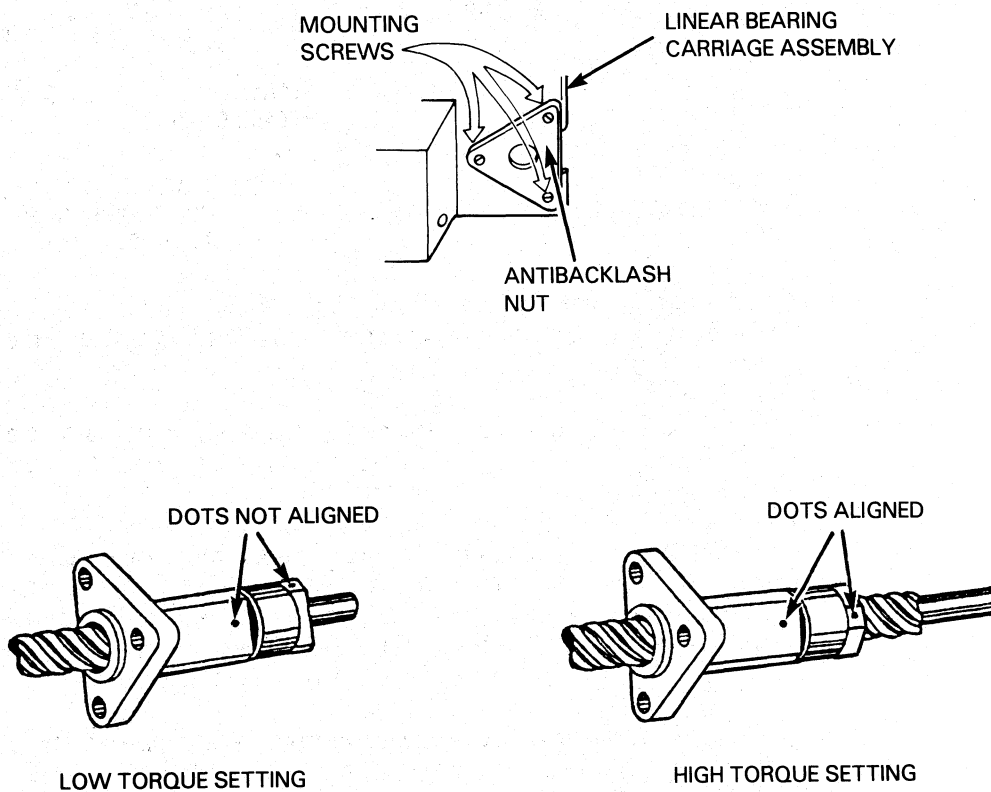


Figure 5-22. Anti-backlash Nut Removal and Replacement

NOTE

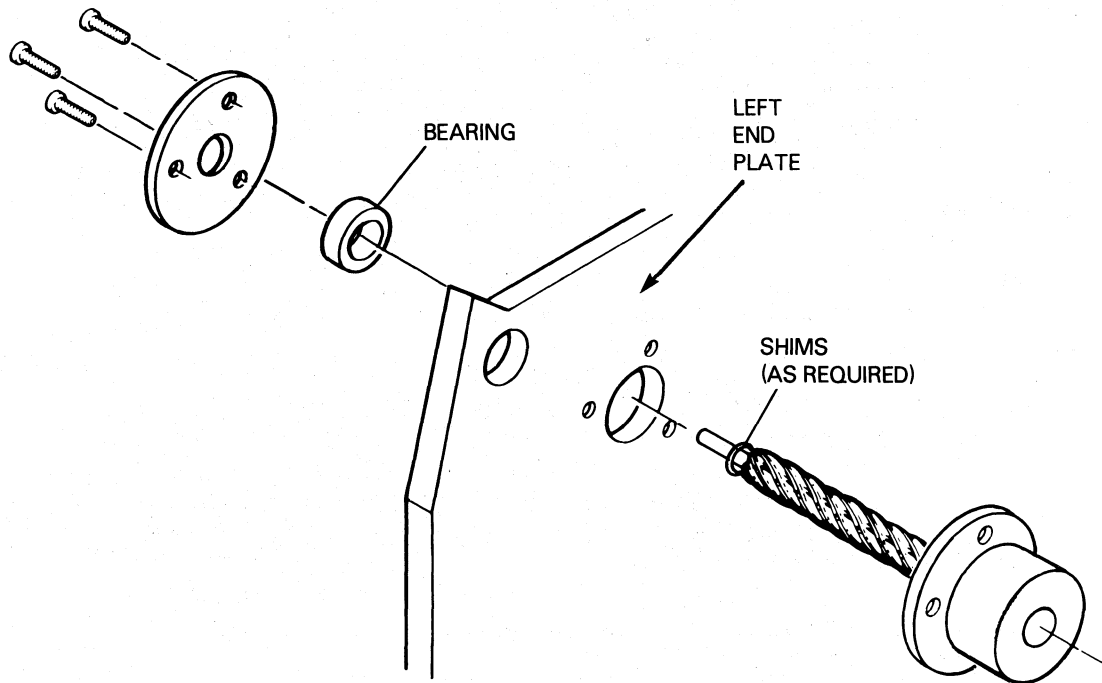
Do not install the shims until told to. The leadscrew must be installed without shims to check the preload fitting.

13. Adjust the anti-backlash torque according to the following criteria:
 - Normally, set the torque to the lower setting.
 - Low torque should always be used with a plastic bearing carriage.
 - High torque can be used with some linear bearing carriages if the anti-backlash nut is excessively low.
14. Insert the right end of the new leadscrew through the right hand bearing retainer and into the right end plate until the left end passes through the hole in the carriage.
15. Secure the bearing retainer, bearing wavy washer, and bearing retainer with the three screws (Figure 5-21).
16. Place the coupling clamp assembly onto the right end of the leadscrew until it is flush with the end plate.
17. Tighten the coupling clamp hex screw while pushing the leadscrew and the coupling clamp to the left.
18. Push the left end of the leadscrew to the right against the wavy washer.
19. After removing the pressure from the left end of the leadscrew, measure the play in the leadscrew assembly between the coupling clamp and one of the screws that hold the right bearing plate on (Figure 5-21) with a feeler gauge. Record the measurement.

NOTE

The desired leadscrew play is between .002 and .010 inch.

20. Calculate the number of shims required to install on the leadscrew to bring the play into specification. Each shim is .004 inch.
21. Remove the right bearing retainer, bearing wavy washer, and bearing with the three screws (Figure 5-21).
22. Place the calculated number of shims on the left side of the leadscrew between the left bearing and the leadscrew shoulder (Figure 5-23).



FS-11306

Figure 5-23. Leadscrew Adjustment Shim(s)

23. Insert the right end of the shimmed leadscrew through the right hand bearing retainer and into the right end plate until the left end passes through the hole in the carriage.
24. Secure the right bearing retainer, bearing wavy washer, and bearing with the three screws (Figure 5-21).
25. Recheck the leadscrew play to ensure that it is within the .002 to .010 inch requirement.
26. Attach the anti-backlash nut to the carriage with three (linear carriage) or two (plastic bearing carriage) #8 screws and flat washers. Tighten the screws alternately in approximately 1/8 turn increments.
27. Move the carriage over its full range of travel to allow settling of the guide rails.
28. Attach the carriage motor assembly to the right end plate with three screws. Make sure the plastic coupling adapter is in place (Figure 5-20).
29. Install the ribbon gearbox and ribbon drive cable.
30. Perform the ribbon drive cable tension adjustment.

31. Install the ribbon cartridge.
32. Replace the secondary control panel cover.
33. Install all cables and turn on power.
34. Perform the horizontal motion transducer adjustment.
35. Perform the print margin alignment.
36. Execute the print self-test.
37. Return the printer to operation.

5.7.5 Carriage and Associated Mechanisms

This subsection presents removal and replacement procedures for linear and plastic bearing carriages. Begin with the following procedure and refer to either Subsection 5.7.5.1 Linear Bearing Carriage Mechanisms or 5.7.5.2 Plastic Bearing Carriage Rear Bearing as indicated.

Use the procedure immediately following to remove and replace the following carriage mechanisms on all printers.

- Front Guide Rail
- Rear Guide Rail
- Plastic Bearing Carriage Assembly
- Plastic Bearing Carriage Body
- Plastic Bearing Carriage Rear Bearing

NOTE

If the plastic bearing carriage rear bearing is the only FRU to be replaced, go to subsection 5.7.5.2, otherwise begin the following procedure.

If plastic bearing carriage front bearings are bad, the entire carriage body must be replaced using the procedure below.

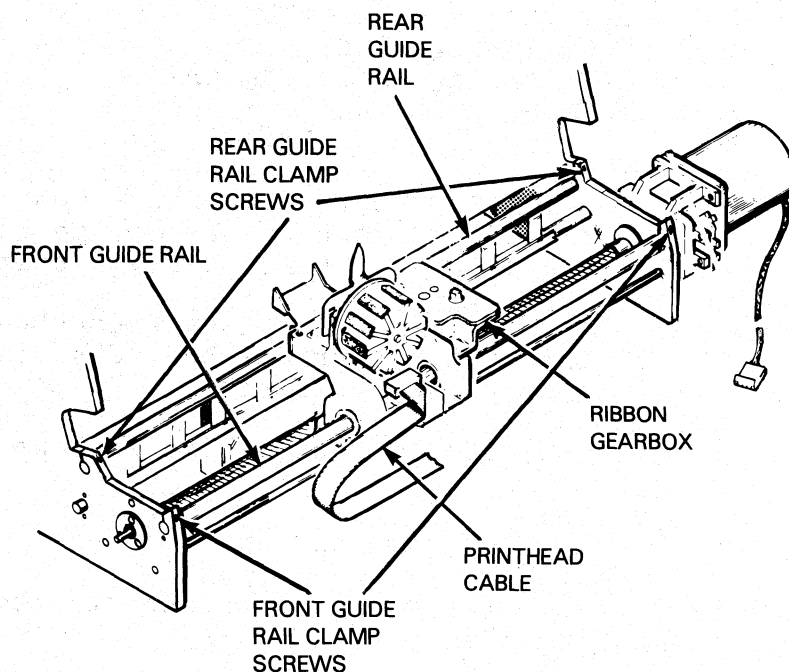
1. Turn the printer off, disconnect the ac power cord, and open the top cover.
2. Remove the secondary control panel cover.
3. Remove the ribbon cartridge and ribbon gearbox from the carriage assembly.
4. Remove the printhead cable connector J22 from the printhead.
5. Remove the printhead.
6. Remove the four bolts that hold the print mechanism to the shock mounts in the bottom of the print cavity.

7. Loosen the two clamp screws that hold the front guide rail to the end plates (Figure 5-24).
8. Using the end plates, lift the carriage assembly far enough out of the print cavity so that the front guide rail slides to the left and out of the carriage bearings.
9. While holding the carriage, slide the front guide rail to the left until it is clear of the left end plate.
10. Remove the screws securing the carriage to the leadscrew and anti-backlash nut assembly.
11. Remove the carriage assembly from the printer.

NOTE

Perform the next two steps only if the rear guide rail is to be replaced.

12. Loosen the two allen clamp screws that secure the rear guide rail to the printer end plates (Figure 5-24).



FS-11307

Figure 5-24. Carriage Assembly Removal and Replacement

13. Slide the rear guide rail to the left and out of the printer.

NOTE

Refer to the subsection 5.7.2.1 for linear bearing carriage mechanisms removal and replacement procedures. After performing those procedures, return to this point.

14. To install the rear guide rail, slide the rail into place from the left.
15. Tighten the two allen clamp screws to secure the rear guide rail in place.
16. Clean the front and rear carriage support rails with alcohol and a lint-free cloth.
17. To install the carriage assembly, position the carriage on the rear guide rail and slide the front guide rail in from the left through the bearings.
18. Install the leadscrew/anti-backlash assembly to the carriage with the screws removed earlier.

NOTE

Perform the next two steps only if the carriage assembly linear bearings have been replaced. Otherwise, skip them and continue.

19. Perform the linear bearings cleaning and adjustment procedure.
20. Check the adjustment of the rear bearing. With light finger pressure, pull up vertically on the rear bearing. Noticeable bearing movement should occur without rear rail movement. If no movement occurs, replace the rear bearing.
21. Replace the secondary control panel cover.
22. Replace the ribbon gearbox and ribbon drive cable.
23. Perform the ribbon drive cable adjustment.
24. Replace the printhead cable connector J22.
25. Replace the ribbon cartridge.
26. Close the top cover and return the printer to operation.

5.7.5.1 Linear Bearing Carriage Mechanisms

NOTE

This procedure assumes that the carriage and front guide rail have been removed from the printer.

The following FRUs can be removed using these procedures.

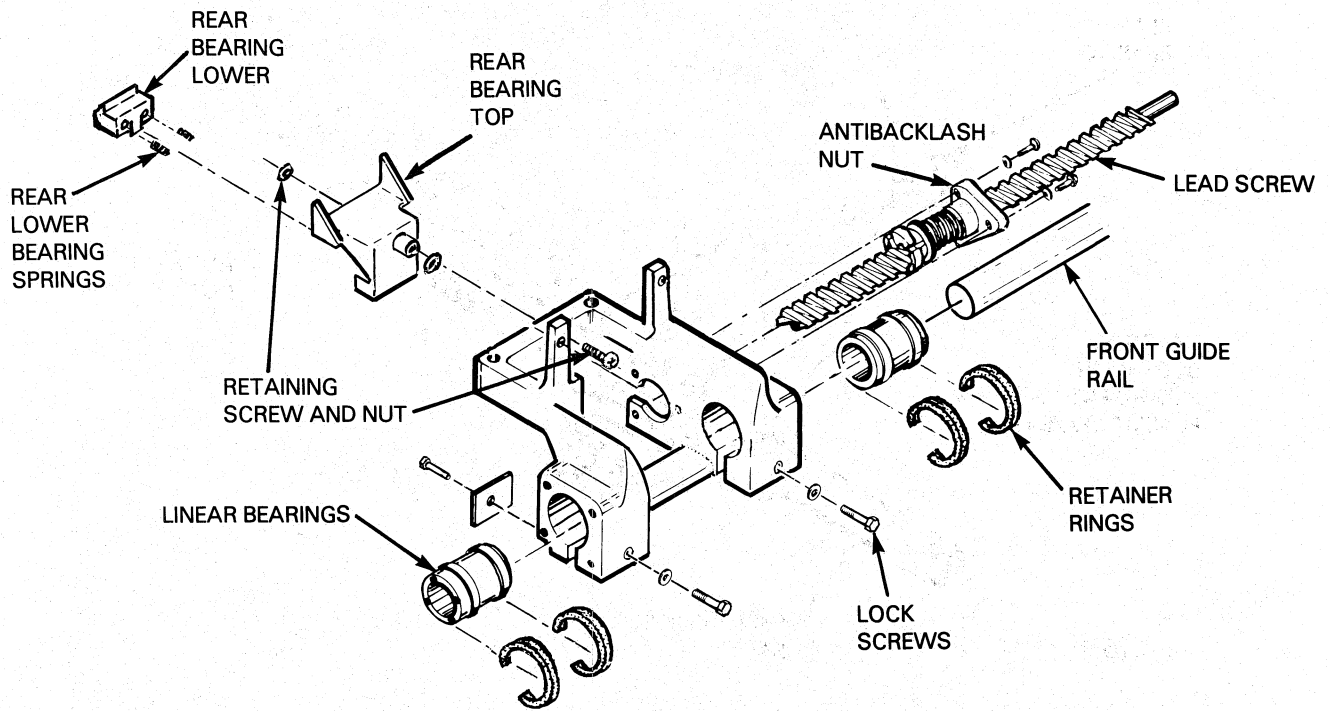
- Linear Bearing
 - Retainer Rings for Linear Bearing
 - Rear Bearing (Top)
 - Rear Bearing (Lower)
 - Springs for Lower Rear Bearing.
- Linear Bearings
 1. Remove the two linear bearings by loosening the lock screws and unsnapping the retainer rings (Figure 5-25).
 2. Clean the front guide rail.
 3. To install a replacement linear bearing(s), grease and pack the bearing(s) using grease part number 120-000753.
 4. Secure the new linear bearings in the carriage by snapping the retainer rings in place.
- Rear Bearings
 1. Remove the rear bearing retaining screw and nut (Figure 5-25).
 2. Remove the rear bearing (top and lower) and the lower rear bearing springs from the carriage.
 3. To install the rear bearings, assemble the top and lower rear bearings and lower bearing springs.
 4. Secure the rear bearings to the carriage with the retaining screw.
 5. Check the lower bearing springs by pushing the lower bearing toward the carriage. Bearing movement should be smooth and it should return to its normal position once pressure is relaxed. Otherwise replace the bearing springs.

NOTE

Do not over tighten the screw that secures the rear bearing. Over tightening moves the bearing out of line with the rear guide rail. Correct torque on the screw allows the rear bearing to be rotated slightly by hand.

NOTE

Return to step 14 in subsection 5.7.5.



FS-11308

Figure 5-25. Linear Bearing Carriage Mechanisms

5.7.5.2 Plastic Bearing Carriage Rear Bearing - Use this procedure to remove and replace the plastic bearing carriage rear bearing.

1. Turn off power and remove the AC power cord.
2. Remove the ribbon cartridge and printhead.
3. Remove the rear bearing retaining screw (Figure 5-26).
4. Remove the rear bearing from the carriage assembly.
5. Install the rear bearing onto the carriage assembly with its retaining screw (Figure 5-27).
6. Install the ribbon cartridge and printhead.
7. Install the AC power cord and turn on power.
8. Execute printer self-test to confirm proper carriage movement.
9. Return the printer to operation.

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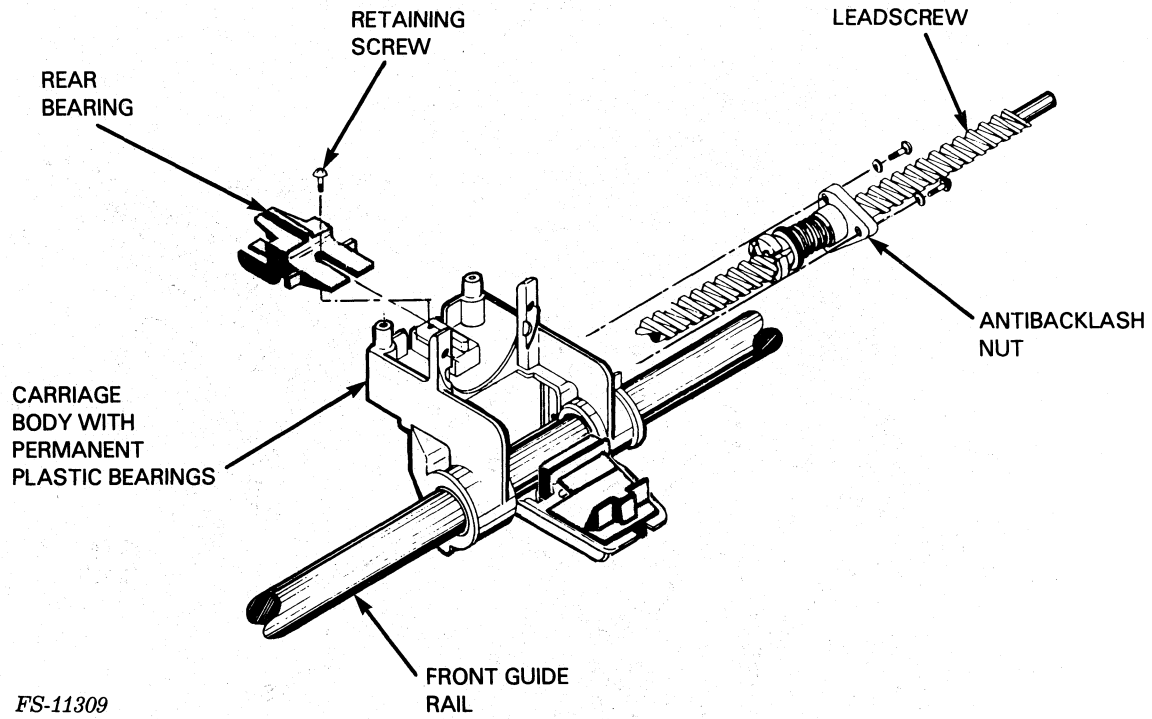
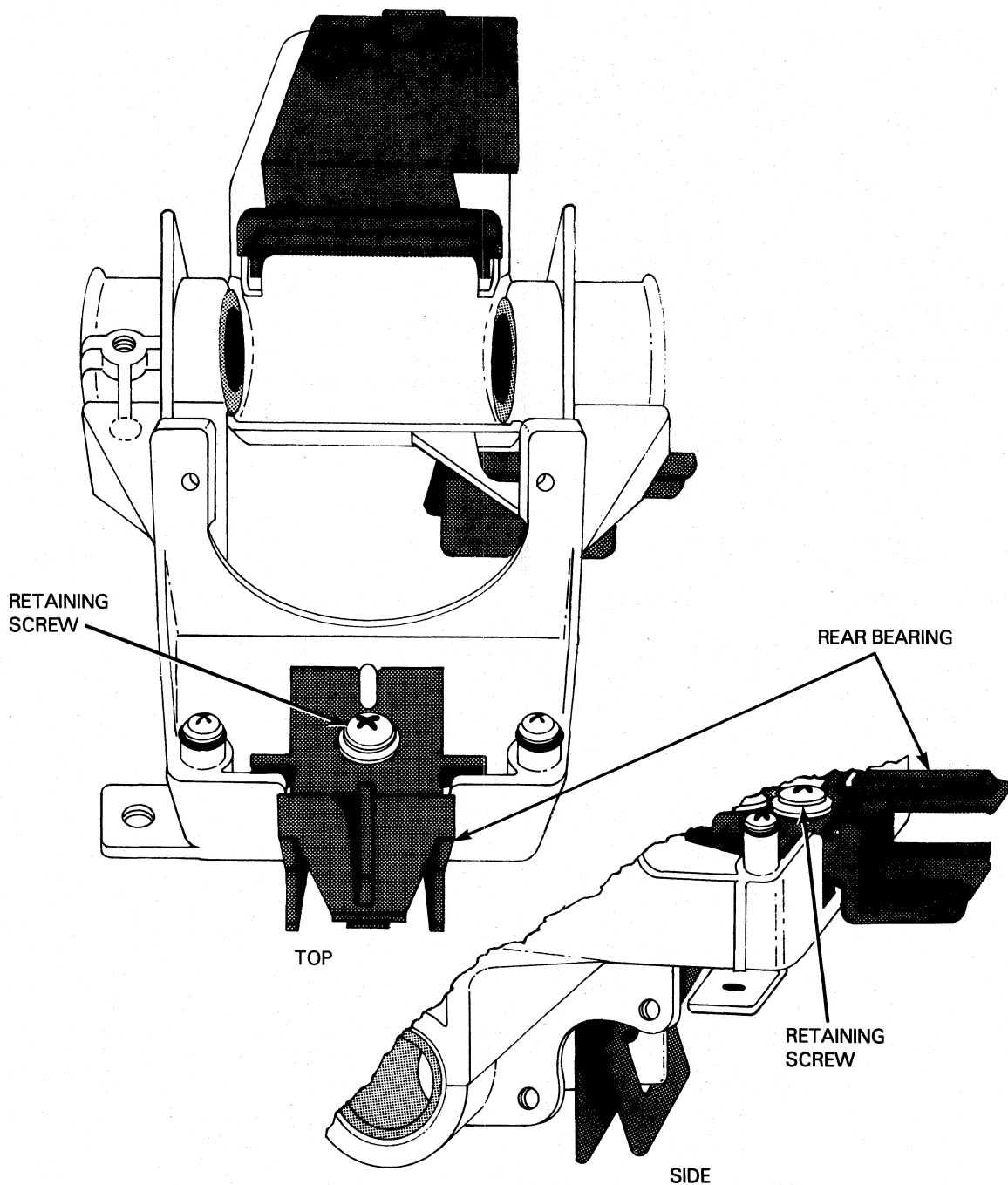


Figure 5-26. Rear Bearing Removal

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FS-11310

Figure 5-27. Plastic Bearing Carriage Assembly

5.7.6 Platen and Associated Mechanisms

The following FRUs can be replaced using this procedure.

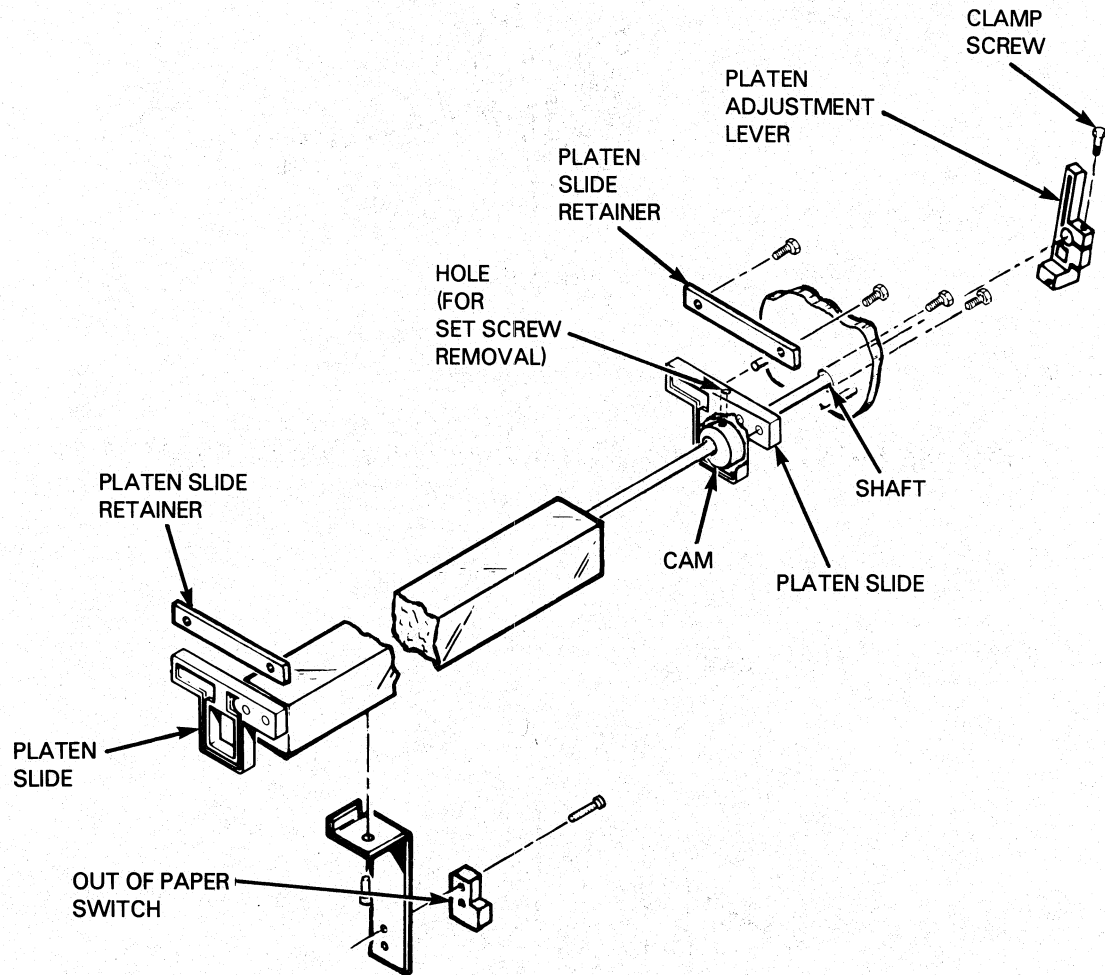
- Platen (Replaces 002-004110)
 - Slide Retainer Strip (for platen)
 - Platen Adjustment Lever
1. Turn the printer off, disconnect the ac power cord, and open the top cover.
 2. Remove the secondary control panel cover.
 3. Remove the paper feed motor.
 4. Remove the two platen slide retainers located above the platen slides inside each end plate (Figure 5-28).
 5. Push the platen adjustment lever back until the cam set screws are visible through the holes in the platen slides. Loosen each screw so that the cams can slide on the shaft.
 6. Remove the clamp screw of the platen adjust lever and slide the lever off the shaft.
 7. Slide the platen shaft to the right through the printer end plates.

CAUTION

Take care not to damage the out-of-forms switch during this next step.

8. Lift the platen (with platen slides) up and toward the rear of the printer until free (Figure 5-28).
9. Remove the platen slides from the platen.
10. Remove the out-of-forms switch with mounting bracket from the platen.
11. To install the platen, install the platen slides to each end of the platen.
12. Install the out-of-forms switch and mounting bracket on to the replacement platen assembly.
13. Let the platen (with platen slides) back down into the frame, until the platen slides rest on the dowels (Figure 5-29).
14. Place the adjusting cams into the platen slides with their set screws up (Figure 5-30).

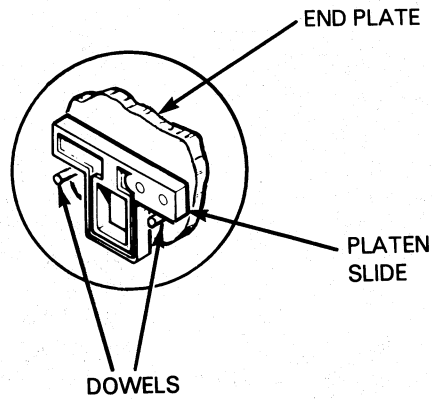
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FS-11311

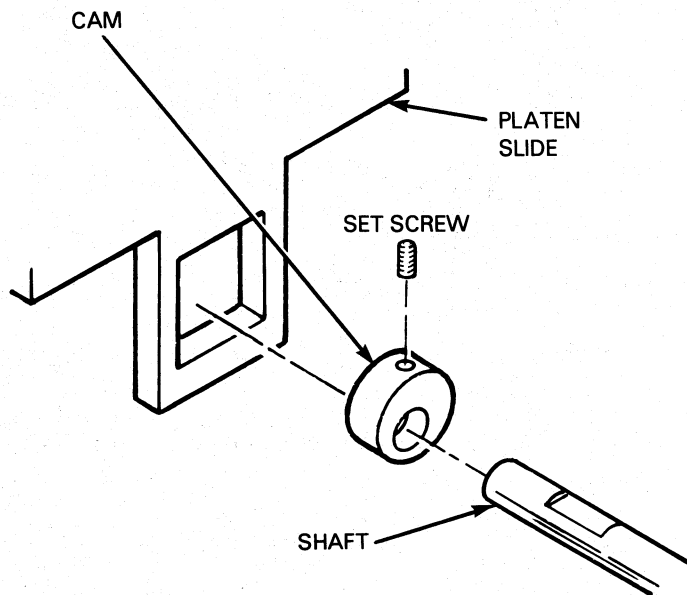
Figure 5-28. Platen Removal and Replacement

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FS-11312

Figure 5-29. Platen Slide Mounting Dowel Locations



FS-11313

Figure 5-30. Platen Adjusting Cams Location

15. Find the end of the platen support shaft with the flat surface closest to the shaft end. That end is inserted into the printer first. With the flat surfaces are up, slide the shaft through the right end plate and continue through the left end plate while holding the platen adjust cams in position while the shaft passes through.
16. Align the flat of the shaft with the set screw of each cam and tighten the screws using the hole in the platen slides.

CAUTION

The platen slide retainers and platen adjust lever may break if their mounting screws are installed to tightly.

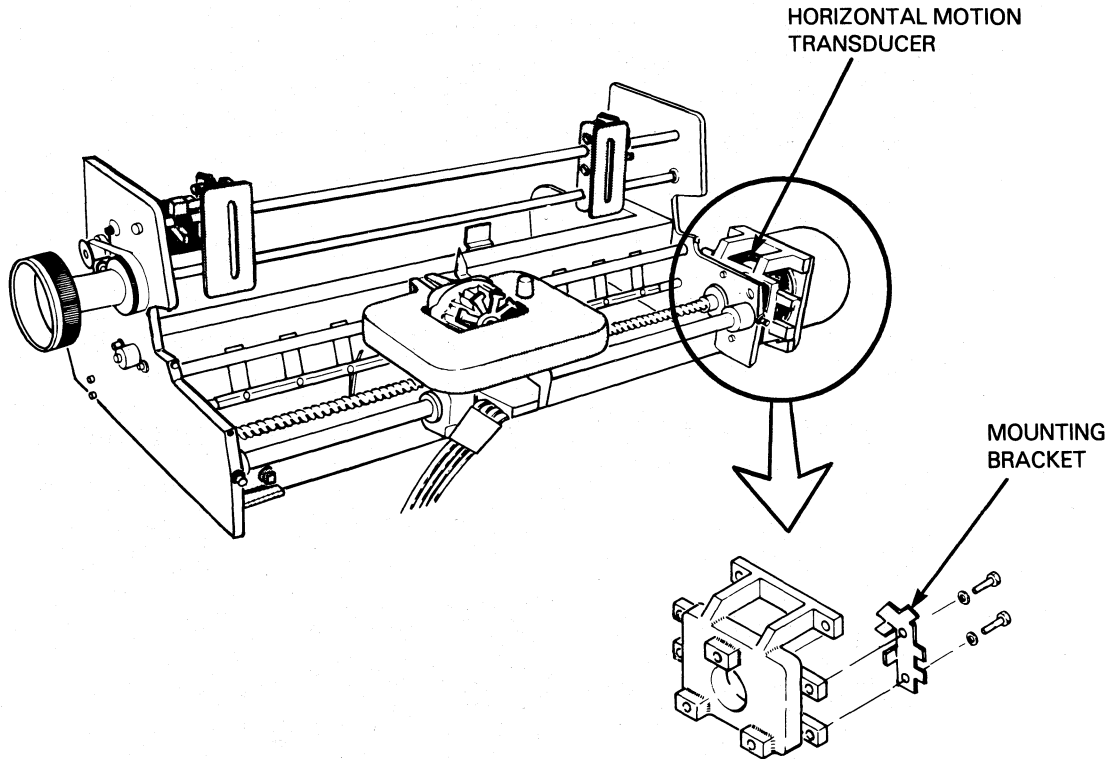
17. Attach the platen slide retainers on to the top of the platen slides.
18. Install the platen adjust lever on the shaft.
19. Replace the paper feed motor.
20. Perform the paper feed drive belt platen alignment, and paper tension bar adjustment procedures.
21. Install the secondary control panel cover.
22. Execute printer self-test and check for normal printing.
23. Return the printer to operation.

5.7.7 Horizontal Motion Transducer

Perform the following procedure:

1. Turn the printer off, disconnect the ac power cord.
2. Open the top cover and remove the side panel.
3. Unplug connector J9 from the driver PCB.
4. Remove the two transducer mounting bracket screws (Figure 5-31).
5. Slide the mounting bracket towards the front of the printer, taking care not to damage the slotted disk, and remove.
6. Remove the horizontal motion transducer from its mounting bracket.
7. To install a replacement transducer, install the new transducer in the mounting bracket and install the bracket on the motor mounting bracket with the mounting screws.

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FS-11314

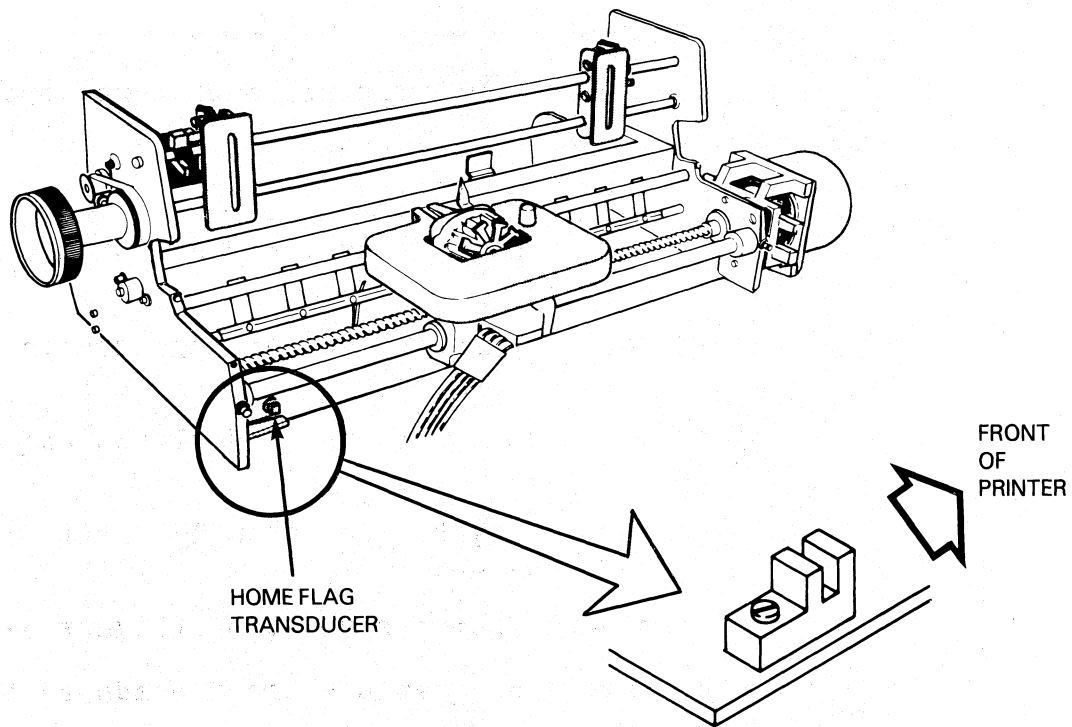
Figure 5-31. Horizontal Motion Transducer Removal and Replacement

8. Reconnect connector J9 to the driver PCB. Tie the cable down and away from any moving parts.
9. Perform the Horizontal Motion Transducer Adjustment.
10. Install printer covers and cables.
11. Perform printer self-test.
12. Return the printer to operation.

5.7.8 Home Flag Transducer

Perform the following procedure:

1. Turn the printer off, disconnect the ac power cord, and open the top and side covers.
2. Remove the secondary control panel.
3. Unplug cable connector J6 from the driver PCB. Cut any tie-wraps securing the cable.
4. Remove the four screws that secure the carriage mechanism to the printer pedestal.
5. Lift the entire mechanism up, using the end plates and prop in the up position.
6. Remove the transducer mounting bracket from the left end plate. Note the transducer wire routing.
7. Remove the home transducer from its mounting (Figure 5-32).
8. To install the home transducer, secure the transducer to its mounting bracket.
9. Install the transducer and mounting to the left end plate.
10. Route the transducer wires under the carriage mechanism and reconnect connector J6 to the driver PCB. Tie the cable down and away from any moving parts.
11. Place the carriage mechanism down onto the pedestal and install the four securing screws.
12. Move the carriage to the left hand position and ensure that the home flag does not contact the transducer physically.
13. Perform the Home Transducer Check.
14. Install the secondary control panel.
15. Install printer service panels and AC power cable.
16. Execute printer self-test.
17. Return the printer to operation.



FS-11315

Figure 5-32. Home Flag Transducer Removal and Replacement

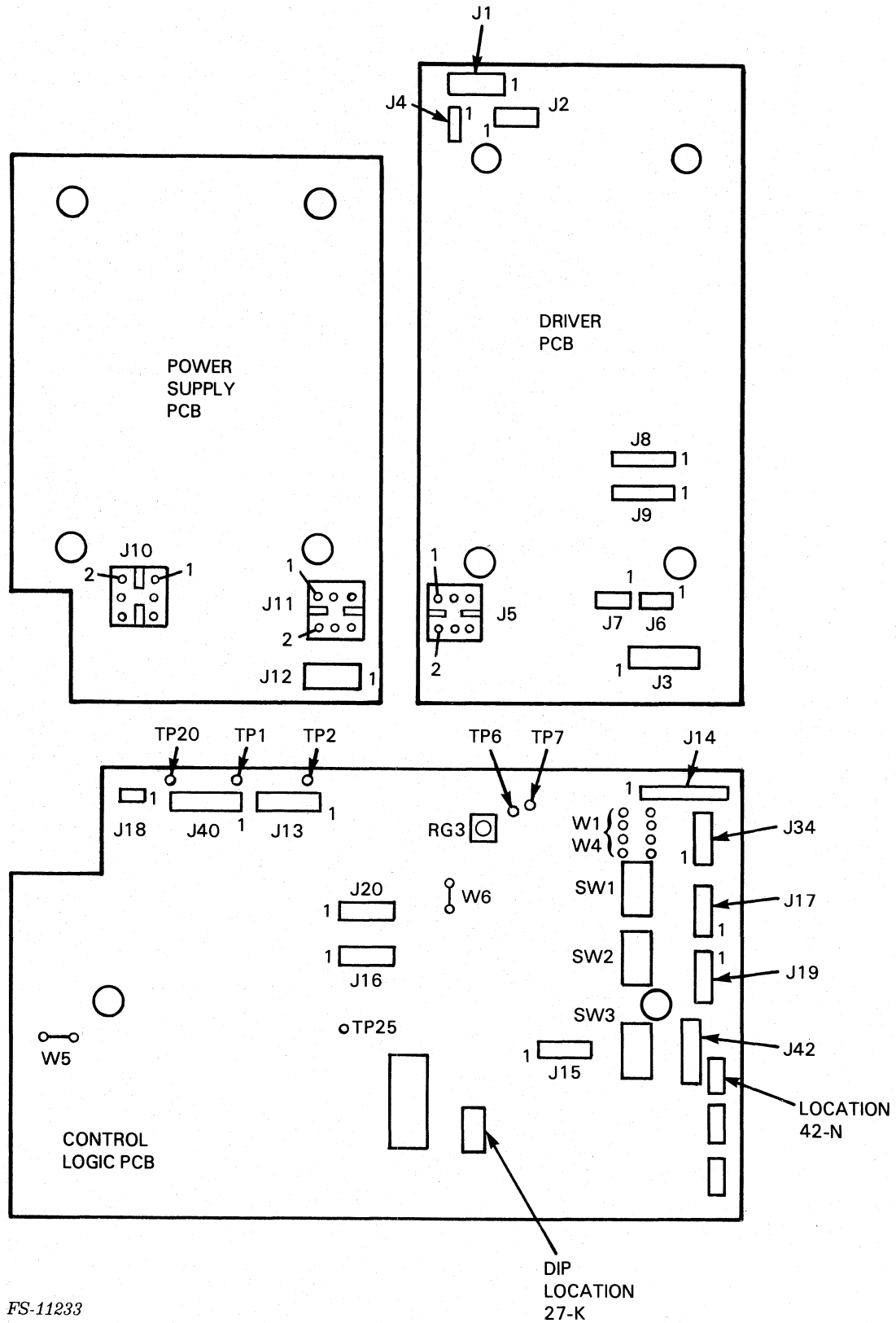
5.8 ADJUSTMENT PROCEDURES

This subsection contains the following adjustment procedures:

- Power Supply +5 Volt Adjustment
- Horizontal Motion Transducer Adjustment
- Home Flag Transducer Check
- Linear Bearings cleaning and Adjustment
- Leadscrew Adjustment
- Print Margin Alignment
- Print Wire Firing Time Adjustment
- Front Guide Rail Adjustment
- Platen Alignment Adjustment
- Paper Tension Bar Adjustment
- Ribbon Cartridge Drive Cable Adjustment

Figure 5-33 shows the PCB test points used to make printer adjustments.

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FS-11233

Figure 5-33. Printer PCB Testpoints and Connectors

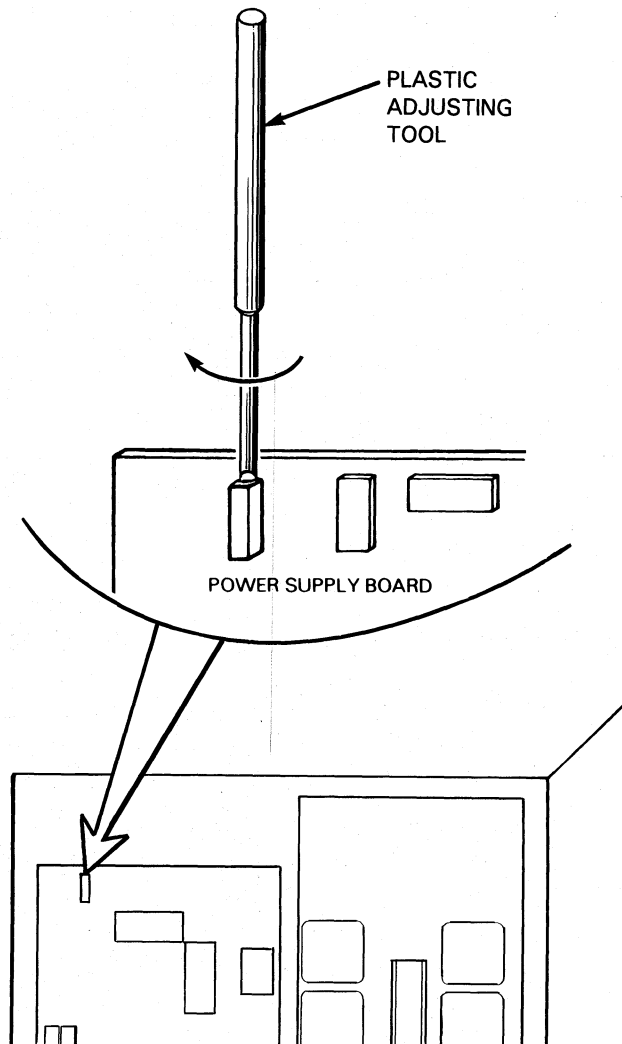
5.8.1 Power Supply +5 Volt Adjustment

Perform the following procedure to adjust the power supply +5 volt output. A voltmeter is required.

NOTE

This adjustment should be performed before any other adjustment.

1. Attach the positive lead of the voltmeter to TP1 and the negative lead of the voltmeter to GND TP20 near the top left corner of the control logic PCB (Figure 5-33).
2. Turn the printer on.
3. With the printer idle, adjust the 10-turn potentiometer on the power supply PCB until the voltmeter reads +5.1 volts \pm 0.1 volt. See Figure 5-34.



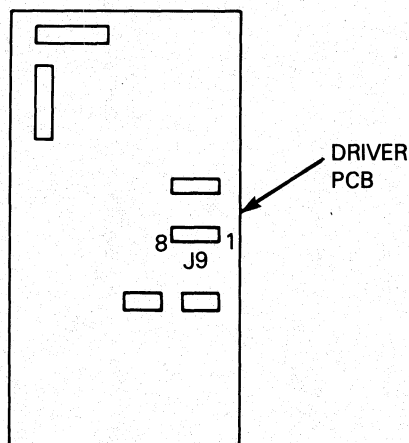
FS-11316

Figure 5-34. Power Supply +5V Adjustment

5.8.2 Horizontal Motion Transducer Adjustment

Use a Digital Voltmeter (DVM) and P-MAT Test Set to perform the following procedure.

1. Turn the printer off.
2. Remove the printer side panel.
3. Disconnect the carriage drive motor cable from the driver PCB (J1).
4. Set DVM to measure dc voltage greater than 5.0 volts.
5. Connect DVM positive lead to pin 8 (blue wire) of connector J9 on the driver PCB (Figure 5-35). Connect the ground lead to pin 6 (green wire) of connector J9 on the driver PCB.
6. Turn the printer on.



FS-11317

Figure 5-35. Driver PCB Connector J9 Location

7. Rotate the leadscrew until the maximum voltage is indicated on the DVM.
8. Loosen the horizontal motion transducer mounting bracket (Figure 5-36 and Figure 5-37) and adjust until the voltage on the DVM indicates 4.0 volts +/- 0.2 volts.
9. Rotate the leadscrew and ensure minimum voltage on the DVM is less than 0.5 volts.
10. Reconnect carriage drive motor to the driver PCB.

11. Configure the P-MAT as follows:

CHAN A gate to Rising Gate
CHAN B gate to Trailing Edge
GATE switch to "INT"
UNIT switch to "STOP" (toggle to
"START" in center of
carriage travel)
TI/PLS switch in "PLS" position
TRIG LEVEL TO 0
INPUT switch to "TTL"
Function switch to "TI/PLS" position
Sample rate to .01 sec

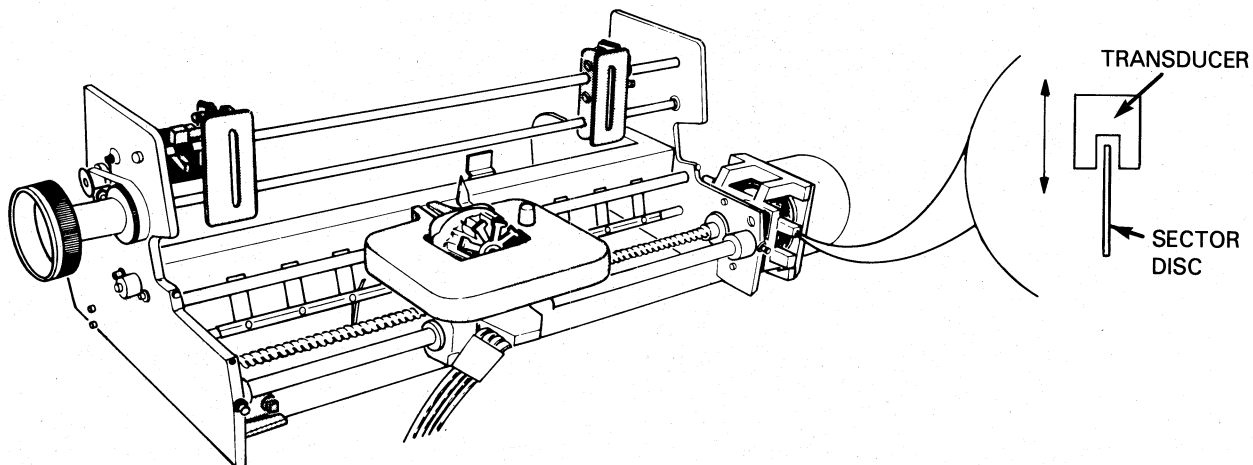
12. Connect CHAN A input to pin 12 of 42-N (input of motion detect one shot). Connect ground to TP-25.
13. Place the printer in SELF-TEST mode and toggle "UNIT" switch to START during middle of carriage movement.
14. Observe pulse width of 200 to 300 usec.
15. Change gate on CHAN A to trailing edge and observe pulse width of 200 to 300 usec.

NOTE

The sum of readings taken in steps 4 and 5 should be 550 usec. The correct readings confirm all horizontal drive logic on the control PCB and the driver PCB.

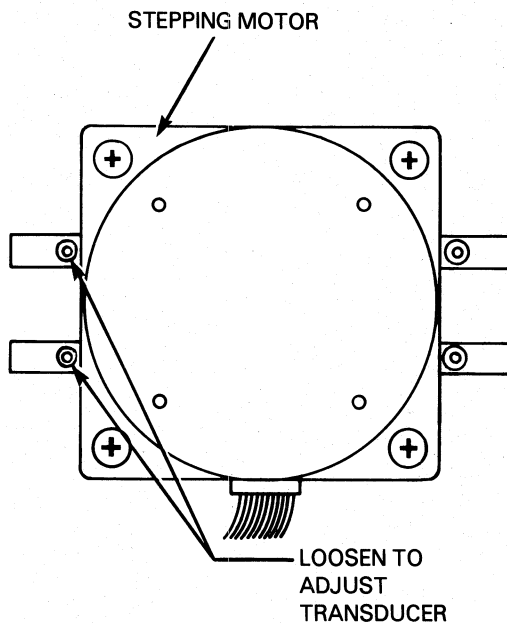
16. Replace the side cover.

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FS-11318

Figure 5-36. Horizontal Motion Transducer Location



FS-11319

Figure 5-37. Horizontal Motion Transducer Adjustment

5.8.3 Home Transducer Check

1. Take printer to OFF-LINE.
2. Set DVM to 20v range.
3. Connect negative (-) probe of the DVM to ground pin 4 of connector J6 (the green wire) and connect the positive (+) probe of the DVM to pin 1 of connector J6 (blue wire) on the driver PCB.
4. Move the print carriage to within a few inches of left-hand margin.
5. The DVM should read $= > 4$ volts.
6. Move the print carriage to the left and the DVM reading should drop to $< = 0.5$ volts.

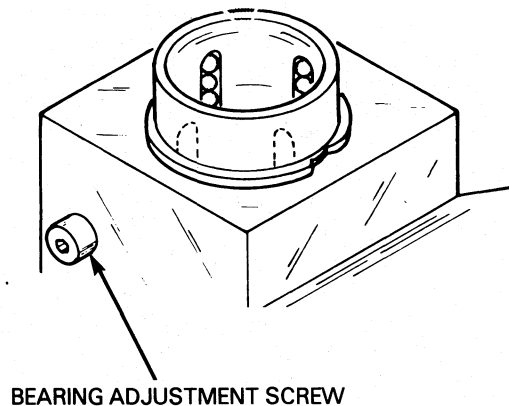
NOTE

If the above readings are not obtained, replace the Home Flag Transducer (DGC P/N 005-009588).

5.8.4 Linear Bearings Cleaning and Adjustment

Use the following procedure to clean and adjust the linear bearing carriage bearings.

1. Remove the carriage from the printer.
2. Apply grease to the four bearings in each of the two bearings. See Figure 5-38. Force grease into bearings.



FS-11320

Figure 5-38. Linear Bearing Adjustment Screw Location

3. Clean the front carriage rail with isopropyl alcohol and a lint-free cloth.
4. Coat a film of grease (DGC P/N 120-000753) on the front rail to prevent rust.
5. Install the carriage and the carriage rail in the printer.

NOTE

When installing the front carriage rail be sure that one rubber stop is on the left end and two rubber stops are on the right end.

6. Loosen the bearing adjustment screws on the carriage (Figure 5-39).
7. Slide the carriage from side to side while tightening the left bearing adjustment screw until a "drag" is noticeable (Figure 5-39).

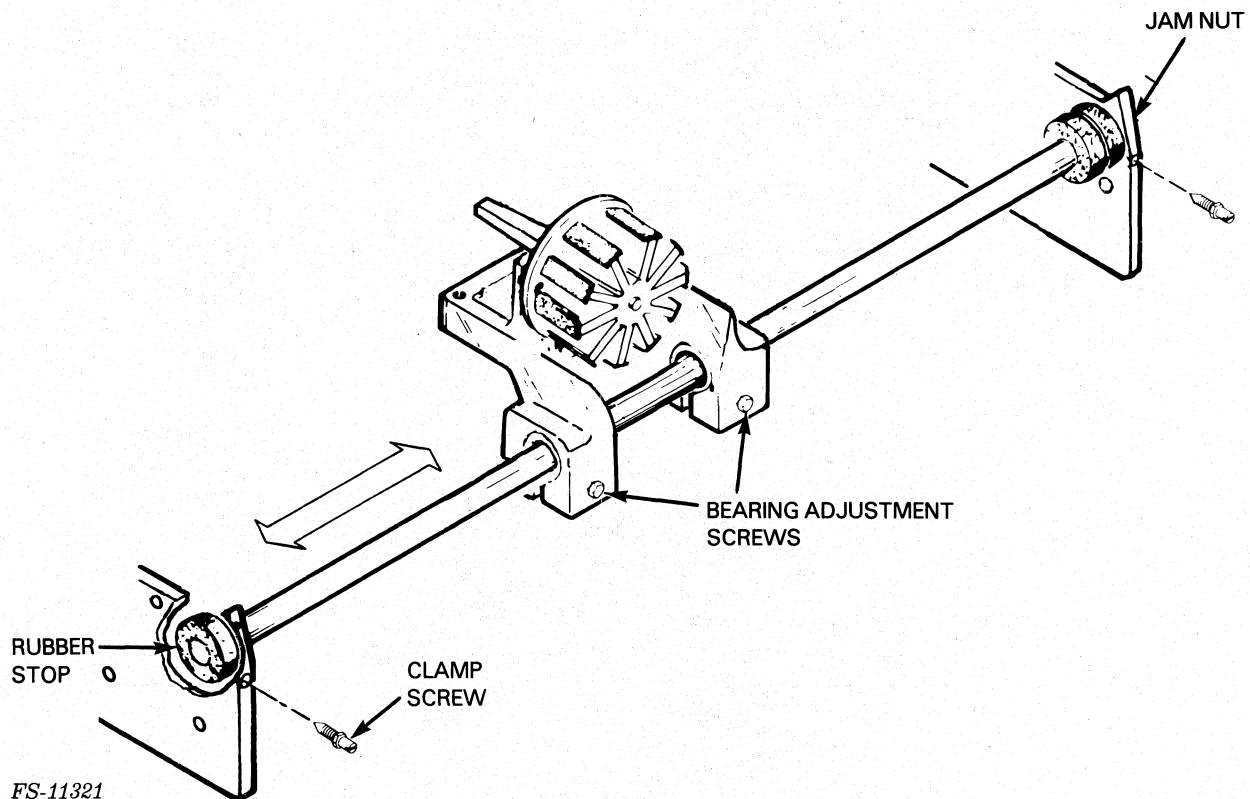


Figure 5-39. Linear Bearing Adjustment

8. Slide the adjustment screw out slightly, until drag is slightly detectable.
9. Repeat steps 7 and 8 of this procedure for the right bearing adjustment screw.
10. Slide the carriage back and forth to assure nothing binds.
11. Tighten the two front carriage rail clamp screws.
12. When the screws are tight, maintain torque with a screwdriver and tighten the jam nuts.
13. Replace the carriage motor assembly.
14. Replace the secondary control panel cover.

5.8.5 Print Margin Alignment

Perform the following procedure if the print margins are uneven from line to line.

1. Set the margin adjust switches on the main control PCB to no deflection. (SW1-7 ON, SW1-8 ON, and SW2-1 ON; see Table 5-2).

Table 5-2. Margin Alignment Switch Settings

SW1-7	SW1-8	SW2-1	ALIGNMENT INCREMENT SHIFTED		
			REGULAR	COMPRESSED	
ON	ON	ON	0	0	least
ON	ON	OFF	0	1	↓ most
ON	OFF	ON	1	2	
ON	OFF	OFF	1	3	
OFF	ON	ON	2	3	
OFF	OFF	ON	2	4	
OFF	OFF	OFF	3	6	
OFF	OFF	OFF	3	6	

2. Set the printer off-line.
3. On the secondary control panel place the NORM/COMP switch to the COMP position.
4. Press MST RST.
5. Toggle the SELF TEST/ESC DISABLE switch toward SELF TEST according to the following and then leave the switch in ESC DISABLE position.
 - Once for 9 inch wide paper;
 - Twice for 15 inch wide paper.

6. Set the printer on-line. The overprint self-test starts as soon as the printer is on-line.
7. Examine print quality of the overprint for character clarity.
8. Set the adjustment switches to gradually increase the amount of deflection and repeat the over print self-test. Repeat this step until the over print characters appear clear and aligned.

NOTE

Each increment of adjustment (Table 5-2) shifts printing .010 inches for normal printing and .006 inches for compressed printing.

9. On the secondary control panel put the NORM/COMP switch in position to test in the normal mode.
10. Toggle the SELF TEST/ESC DISABLE switch toward SELF TEST and then leave the switch in the ESC DISABLE position.
11. Set the printer on-line to start self test.
12. Check the over print character quality in the normal print mode.

5.8.6 Print Wire Firing Time Adjustment

Use the P-MAT Test Set to perform the following procedure.

NOTE

Always check the print time before performing this procedure.

1. Configure P-MAT for measuring pulse width (see P-MAT User's Guide) CHAN A GATE switch to RISING EDGE.
2. Connect CHAN A input to TP6 on the control PCB and connect ground to TP25 on the control PCB.
3. Press master reset.
4. Press SELF-TEST switch one time.
5. Switch printer ON-LINE, then OFF-LINE.
6. Adjust R63 (located on the top right of the logic PCB just to the left of TP6) for a P-MAT display of 400 usec +/- 20 usec (5% tolerance).

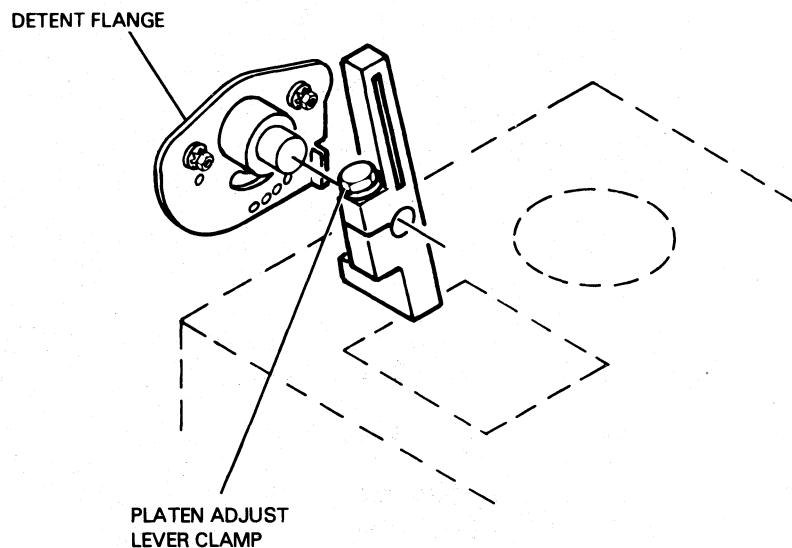
NOTE

CCW rotation on R63 increases firing time.

5.8.7 Platen Alignment Adjustment

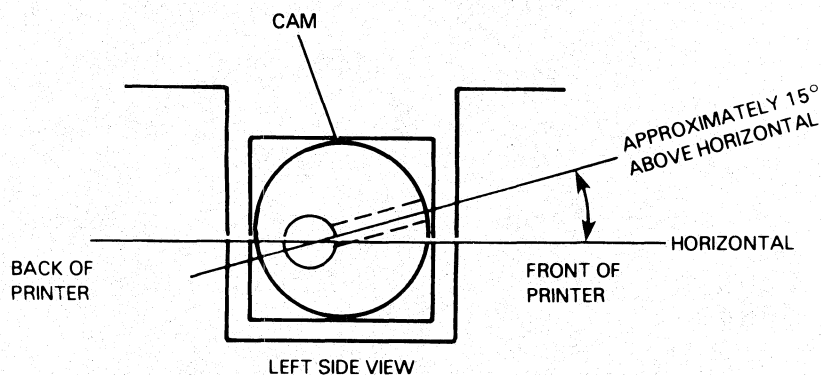
Perform the following procedure.

1. Remove the secondary control panel cover.
2. Move the platen to the position closest to the printhead using the platen adjustment lever.
3. Loosen the platen adjust lever clamp (Figure 5-40).
4. Slide the lever out to the end of the shaft and retighten the clamp.
5. Rotate the lever until the cams are in the position shown in Figure 5-41.



FS-11322

Figure 5-40. Platen Adjust Clamp Location



FS-11323

Figure 5-41. Cam Positioning

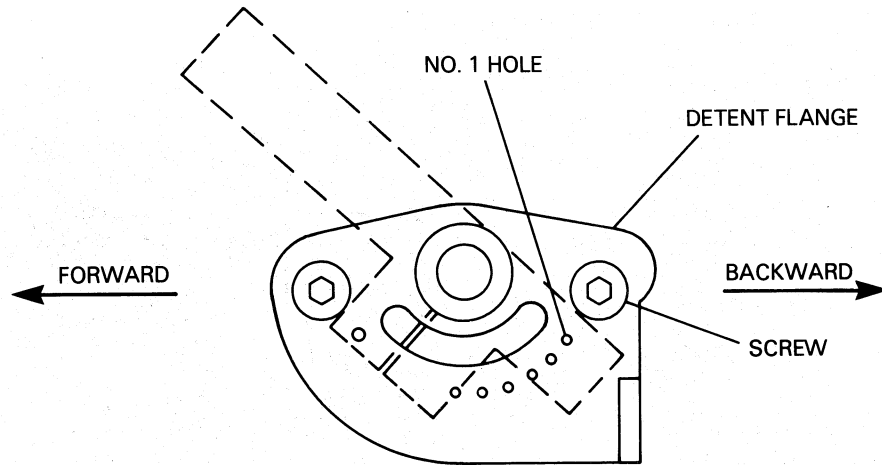
6. While holding the platen still, loosen the clamp of the platen adjust lever.
7. Position the lever so that the detent pin is in the #1 hole (Figure 5-42).
8. Tighten the clamp screw.
9. Remove the ribbon cartridge.
10. Move the carriage all the way to the left by manually turning the leadscrew.
11. Loosen the four screws that hold the two detent flanges. There are two screws on each side.

CAUTION

Take care not to damage the printhead while measuring the platen spacing.

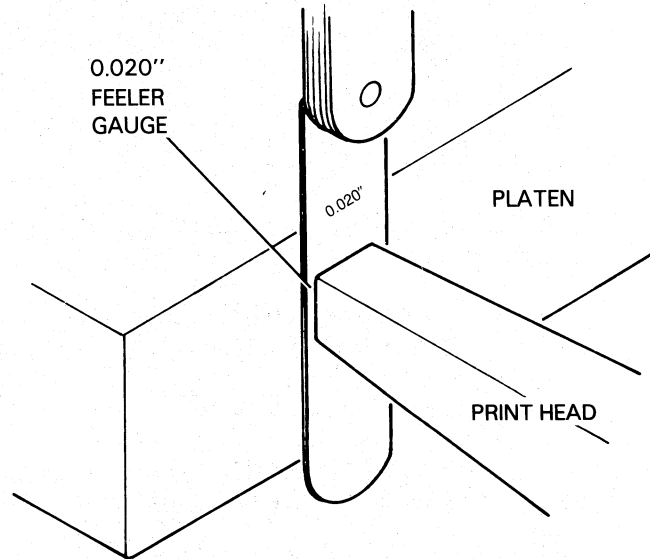
12. Set the gap between the printhead and the platen to 0.020 +/- .002 inches. Measure the gap with a .020 feeler gauge. Adjust the platen by sliding the detent flanges forward or backward. See Figure 5-42 and Figure 5-43.

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FS-11324

Figure 5-42. Platen Adjust Lever Positioning



FS-11325

Figure 5-43. Printhead-to-Platen Gap Setting

13. Move the carriage all the way to the right.
14. Repeat step 10 of this procedure.
15. Move the carriage back to the left, and check the gap spacing.
16. When the gap spacing is uniform at both ends (0.020 inch), tighten the four screws that hold the detent flanges.
17. Replace the ribbon cartridge.
18. Replace the secondary control panel.
19. Replace the printer panels and AC power cord.
20. Turn on power and execute printer self-test. Observe for normal print quality.

5.8.8 Paper Tension Bar Adjustment

Perform the following procedure to adjust the paper tension bar.

NOTE

The paper tension bar adjustment should be performed whenever the platen assembly has been replaced or adjusted.

1. Position the platen adjustment lever so that the platen is closest to the print head. (The platen adjustment lever is in the first detent hole).
2. Loosen the paper tension bar clamp on the left side of the printer end plate.
3. Turn the paper tension spring bar the all of the paper tension fingers touch the platen assembly equally.
4. Tighten the paper tension bar clamp.
5. Move the platen adjustment lever to the third detent position. All tension springs should not touch the platen assembly.
6. Repeat steps 1 through 5 (above) until all paper tension springs touch the platen when the platen adjustment lever is in detent one and do not touch when the lever is in detent three.

5.8.9 Ribbon Cartridge Drive Cable Adjustment

Use a 6-inch metal ruler and 5M Polyflex Belt Tension Hanger to perform the ribbon cartridge drive cable adjustment.

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1. Move the carriage all the way to the right.
2. Place a six inch metal rule underneath the carriage drive cable approximately eight or nine inches from the left end plate. Orient the ruler with the scale showing 1/4 inch or 1/8 inch divisions facing to the right (Figure 5-44).

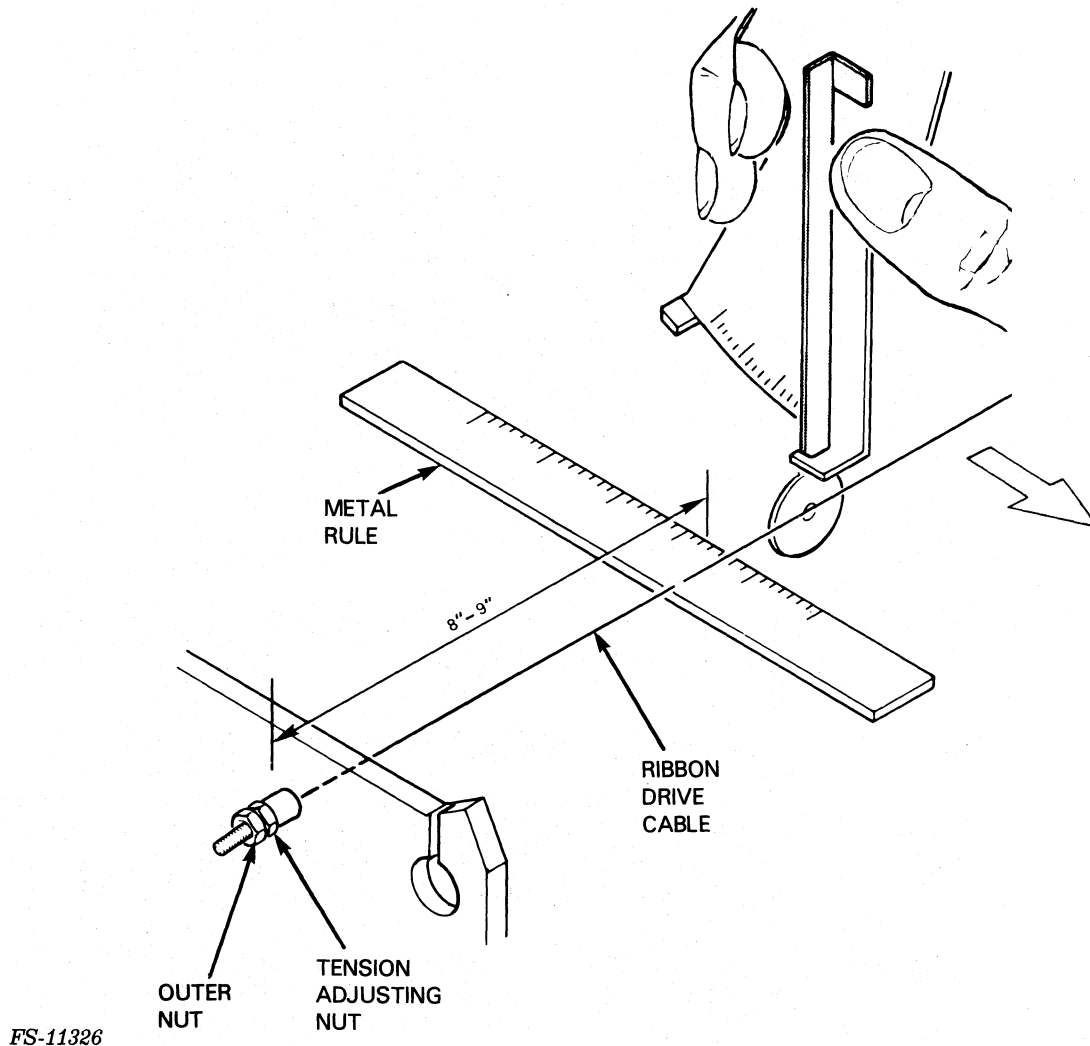
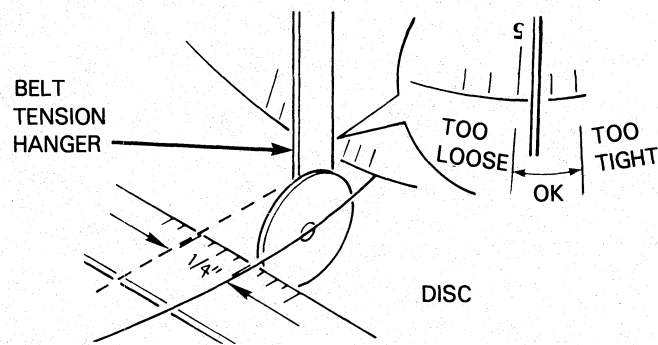


Figure 5-44. Ribbon Cartridge Drive Cable Adjustment Set-up

3. Hold the Belt Tension Hanger as shown in Figure 5-45. The scale should be facing to the left. Hold the ruler so that the cable is lined up with a division marking. Note which division.

4. With the Belt Tension Hanger held vertically and the scale facing left, pull forward on the cable with the disc of the Belt Tension Hanger (Figure 5-45).



FS-11327

Figure 5-45. Ribbon Cartridge Drive Cable Adjustment

5. Deflect the cable $1/4$ inch from its original position and check the reading on the Belt Tension Hanger. The arm should cross the scale between "3" and "5".
6. Tighten or loosen the cable, if necessary, using the ribbon cartridge drive cable tension adjusting nut on the printer left end plate (Figure 5-44). Remeasure cable tension (step 5).
7. When the tension is correct, lock the adjustment by tightening the outer nut. Be careful not to change the setting.

SECTION 6

INSTALLATION AND REMOVAL

This section provides the procedures used to install and remove the Enhanced DASHER LP2 (Models 6190-9192/9610-9613) and TP2 (Models 6193/6194) printers. Procedural instructions detail the various stages for major events performed during installation. Each phase of the installation depends on the preceding one. Therefore, perform the installation in the sequence presented in this section.

- Site Preparation Verification
- Unpacking
- Installation
 - a. Printer configuration
 - b. Cabling
- Power-On and Initial Checks
- Removal

Prior to the installation of the printer, the user should complete the following steps:

- Receive the DGC equipment from the carrier.
- Note any damage to the shipping carton and follow standard procedures for claims against the carrier.
- Move the shipping container from the receiving area to the installation site.
- Install and test the required facility electrical system to ensure correct ac power.
- If the printer is to be connected to the host computer over telephone lines, a printer-compatible modem is installed. Otherwise, an EIA RS-232-C or 20mA cable is installed from the host computer to the printer site.

6.1 SITE AND POWER VERIFICATION

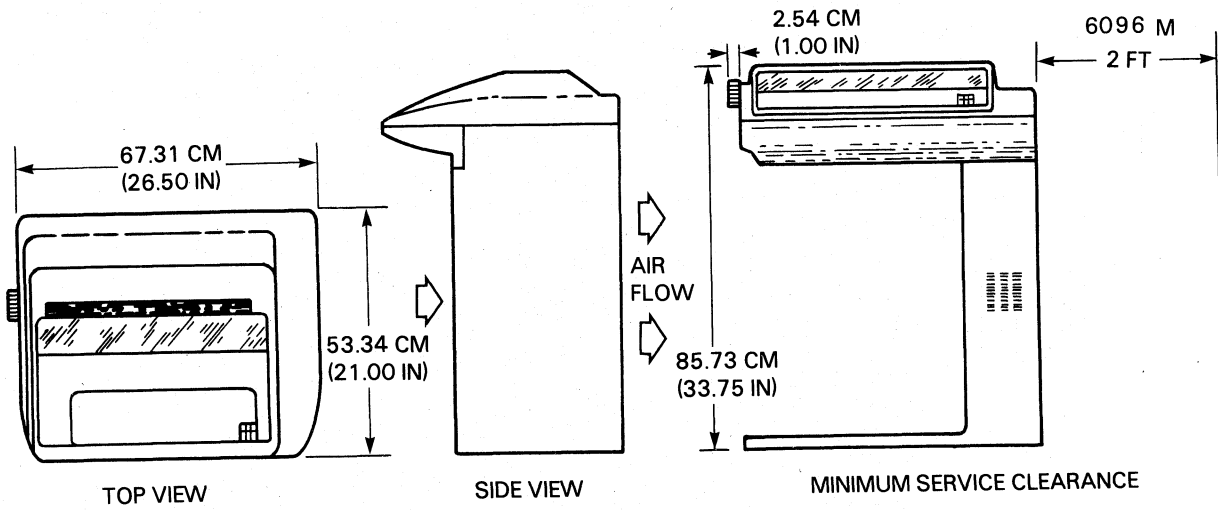
Before installing the printer, verify that the site meets the physical, environmental and electrical requirements. Table 6-1 and Figure 6-1 list printer physical specifications.

Table 6-2 lists printer power and environmental specifications. Use a digital voltmeter to test the ac power for compliance with power specifications. If the site fails to meet any of these specifications, follow current policies and procedures to assure that the installation meets all power requirements.

Table 6-1. Physical Specifications

DIMENSIONS	HEIGHT	WIDTH	DEPTH
Centimeters:	85.73	67.31	53.34
Inches:	33.75	26.50	21.00
WEIGHT			
Kilograms:	36.30		
Pounds:	80.00		
SERVICE CLEARANCES	REAR	RIGHT SIDE	
Centimeters:	30.48	12.00	
Inches:	60.96	24.00	

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NOTE
REAR OF UNIT MUST BE AT LEAST 6"
FROM WALL OR OTHER OBSTRUCTION
TO PROVIDE COOLING AIRFLOW.

FS-11328

Figure 6-1. Physical Dimensions

Table 6-2. Power and Environmental Specifications

U.S.A. POWER REQUIREMENTS Voltage: Frequency: Phase: Maximum Current:	120 Vac +10% -15% 47-67 Hz 1 1.2 Amps
INTERNATIONAL POWER REQUIREMENTS Voltage: Frequency: Phase: Maximum Current:	220 Vac +10% -15% 47-67 Hz 1 0.6 Amps
MAXIMUM OPERATING POWER: MAXIMUM STANDBY POWER:	120 Watts 40 Watts
OPERATING ENVIRONMENT Temperature: Relative Humidity: Acoustic Noise:	10 to 38 deg C (50 to 100 deg F) 20 to 80 percent (noncondensing) 67 dbA
NONOPERATING ENVIRONMENT Temperature: Relative Humidity:	-40 to +65 deg C (-40 to 150 deg F) 10 to 90 percent (noncondensing)

6.2 UNPACKING AND INVENTORY

Use the following procedure to unpack the printer and ensure that the shipping carton contains all materials it should.

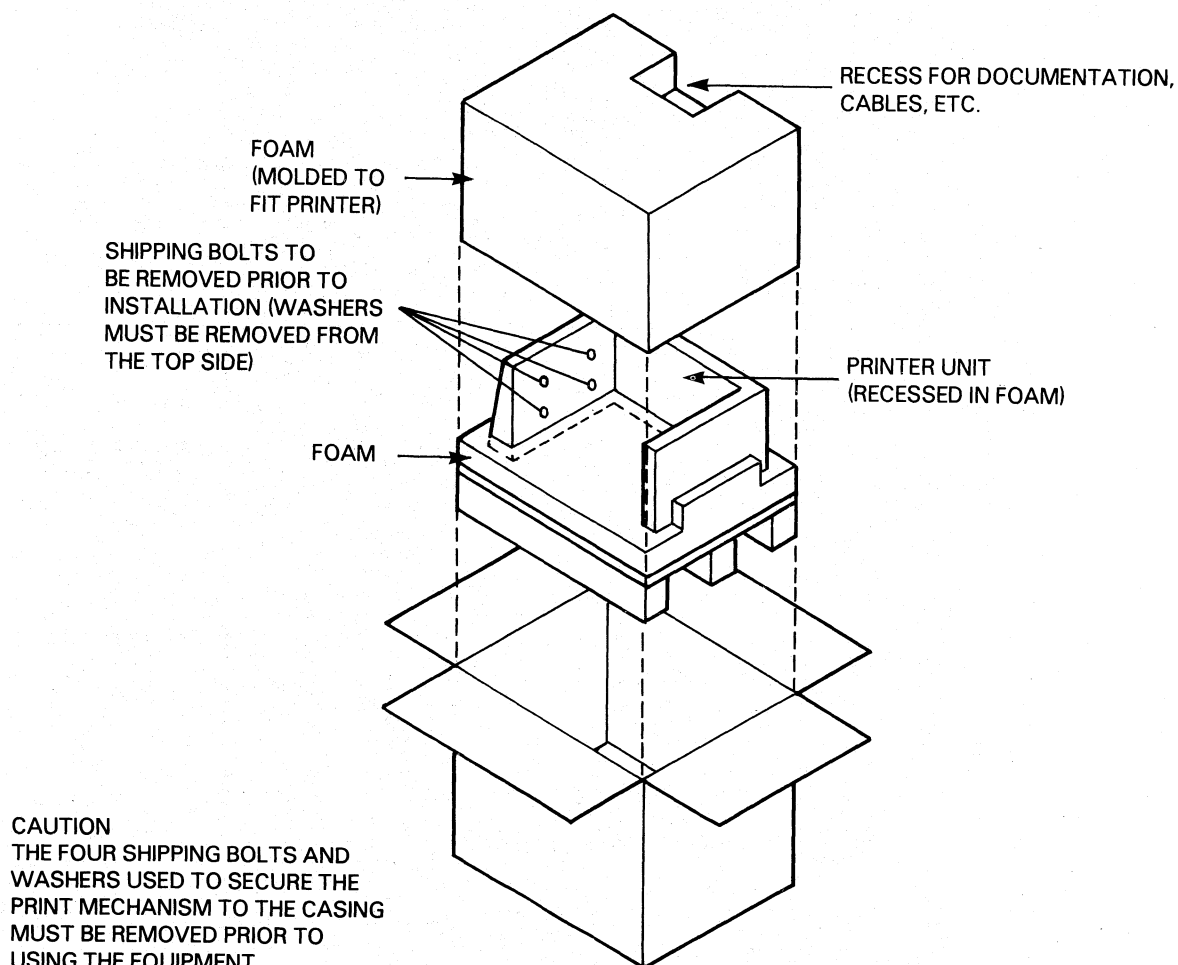
NOTE

It is the responsibility of the equipment user to negotiate with the carrier for any shipping damage noted during unpacking. For instructions on handling missing or damaged items, refer to the current policies and procedures.

1. Inspect the shipping carton for damage. If the carton or equipment has been damaged, notify the shipping carrier as soon as possible.
2. Move the printer to the installation site.
3. Remove (or cut) the sealing tape and open the shipping carton.
4. Remove the ac power cord and ribbon cartridge from the carton. Figure 6-2 shows the location of these accessories.

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5. Remove the document information package and give it to the customer.
6. Locate the printer identification label on the back of the printer. Verify that the model number and ac power configuration matches the number ordered.
7. Save all packing materials until after the printer and accessories have been installed and checked for proper operation.



FS-11329

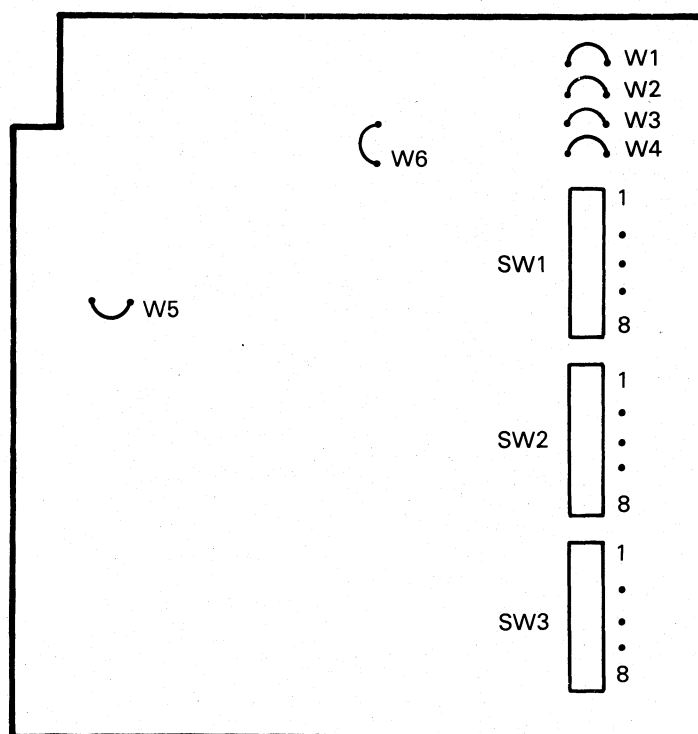
Figure 6-2. Unpacking the Printer

6.3 INSTALLATION

Perform the installation procedures listed in the following subsections in the sequence presented.

6.3.1 Enhanced DASHER LP2 Configuration

The jumper wires and DIP switches used for Enhanced DASHER LP2 (Models 6190-6192/9610-9613) printer configuration are located on the control logic PCB. See Figure 6-3. The PCB is equipped with six jumper wires (W1- W6) and three DIP switches (SW1-SW3). SW1 is used to configure the character set during installation. SW2 and SW3 are not used for installation configuration for LP2 (parallel) printers.



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Figure 6-3. Enhanced DASHER LP2 Control Logic PCB Switches and Jumpers

Use Table 6-3 and Table 6-4 to configure the Enhanced DASHER LP2 printer. Table 6-3 lists the Enhanced DASHER LP2 jumper wire assignments. Table 6-4 lists the Enhanced DASHER LP2 character set switch (SW1) settings.

Table 6-3. Enhanced DASHER LP2 Jumper Wire Assignments

JUMPER	IN/OUT	DESCRIPTION
W1	IN	Parallel interface
W2	IN	Power failure recovery enabled
W3	OUT	SA disabled
W4	OUT	APL disabled
W5	IN	Clock enabled
W6	IN	8-bit interface (OUT for 7-bit)

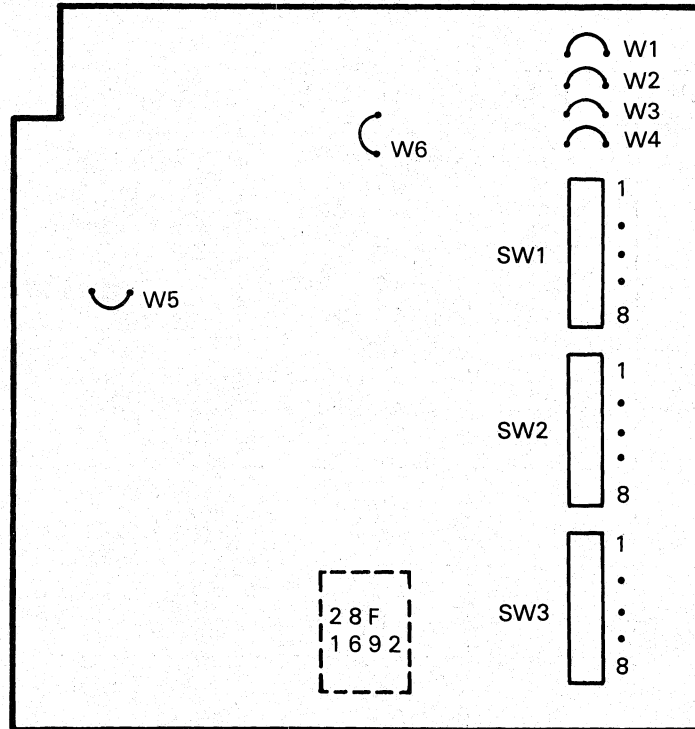
Table 6-4. Enhanced DASHER LP2 Character Set Selection

STANDARD SET			ALTERNATE SET			SELECTED SET
SW1 BITS			SW1 BITS			
1	2	3	4	5	6	
ON	ON	ON	ON	ON	ON	U. S. A.
ON	ON	OFF	ON	ON	OFF	United Kingdom
ON	OFF	ON	ON	OFF	ON	Germany
ON	OFF	OFF	ON	OFF	OFF	Spain
OFF	ON	ON	OFF	ON	ON	France
OFF	ON	OFF	OFF	ON	OFF	Denmark
OFF	OFF	ON	OFF	OFF	ON	Sweden
OFF	OFF	OFF	OFF	OFF	OFF	Optional**

**U.S.A. set if no optional set has been installed.

6.3.2 Enhanced DASHER TP2 Configuration

The jumper wires and DIP switches used for the Enhanced DASHER TP2 (Models 6193 and 6194) printer configuration are located on the control logic PCB (Figure 6-4). There are six jumper wires (W1-W6) and three DIP switches (SW1, SW2, SW3) located on the PCB. The DIP switch contains eight positions labeled 1 through 8.



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Figure 6-4. Models 6193 and 6194 Control Logic PCB Switches and Jumpers

Tables 6-5 through 6-7 describe the Models 6193 and 6194 DIP switch functions. Table 6-9 lists the standard switch settings used to configure the printer for its interface options. Use Table 6-8 to set jumper wires W1-W6.

Table 6-5. Models 6193 and 6194 Switch Bit Functions

SWITCH	BIT NO.	SETTING	DESCRIPTION
SW1	1-3	See Table 6-6.	Standard characters
	4-6		Alternate characters
	7-8	Used for maintenance only	Alignment switches
SW2	1		
	2-3	See Table 6-7.	Parity Selection
	4	ON OFF	Parity fault disabled Parity fault enabled
	5	ON OFF	8 data bit I/O 7 data bit I/O
	6	ON OFF	1 stop bit 2 stop bits
	7	ON OFF	HW busy low HW busy high
	8	ON OFF	HW busy enable SW busy enable
	SW3	1	ON OFF
2		ON OFF	EIA MODEM Current loop I/O
3		ON OFF	Busy to RTS connect Busy to RTS disconnect
4		ON OFF	RTS disabled high RTS enabled
5		ON OFF	DTR disabled DTR enabled
6		ON OFF	Current loop EIA MODEM
7		ON OFF	EIA MODEM Current loop
8		N/A	N/A

Table 6-6. Models 6193 and 6194 Character Set Select

STANDARD SET			ALTERNATE SET			SELECTED SET
SW1 BITS			SW1 BITS			
1	2	3	4	5	6	
ON	ON	ON	ON	ON	ON	U. S. A.
ON	ON	OFF	ON	ON	OFF	United Kingdom
ON	OFF	ON	ON	OFF	ON	Germany
ON	OFF	OFF	ON	OFF	OFF	Spain
OFF	ON	ON	OFF	ON	ON	France
OFF	ON	OFF	OFF	ON	OFF	Denmark
OFF	OFF	ON	OFF	OFF	ON	Sweden
OFF	OFF	OFF	OFF	OFF	OFF	Optional**

**U.S.A. set if no optional set has been installed.

Table 6-7. Parity Configuration

SW2 BIT POSITIONS		SELECTED PARITY
2	3	
OFF	OFF	None
ON	OFF	Marked
OFF	ON	Even
ON	ON	Odd

Table 6-8. Models 6193 and 6194 Jumper Wire Assignments

JUMPER	IN/OUT	DESCRIPTION
W1	OUT	Serial interface
W2	IN	Power failure recovery enabled
W3	OUT	SA disabled
W4	OUT	APL disabled
W5	IN	Clock enabled
W6	N/A	N/A

Table 6-9. Standard Enhanced DASHER TP2 Communication Switch Settings

HARDWARE BUSY CONFIGURATION			
SWITCH	BIT NO.	SETTING	DESCRIPTION
SW2	7	ON	HW busy low
SW2	8	ON	HW busy enabled
SW3	3	ON	Busy to RTS connected
SW3	4	OFF	RTS enabled
SOFTWARE BUSY CONFIGURATION			
SWITCH	BIT NO.	SETTING	DESCRIPTION
SW2	7	ON	HW busy low
SW2	8	OFF	SW busy enabled
SW3	3	OFF	Busy to RTS disconnected
SW3	4	ON	RTS disabled (high)
EIA CONFIGURATION			
SWITCH	BIT NO.	SETTING	DESCRIPTION
SW3	1	OFF	EIA MODEM
SW3	2	ON	EIA MODEM
SW3	6	OFF	EIA MODEM
SW3	7	ON	EIA MODEM
20 mA CURRENT LOOP			
SWITCH	BIT NO.	SETTING	DESCRIPTION
SW3	1	ON	20 mA Current loop
SW3	2	OFF	20 mA Current loop
SW3	6	ON	20 mA Current loop
SW3	7	OFF	20 mA Current loop

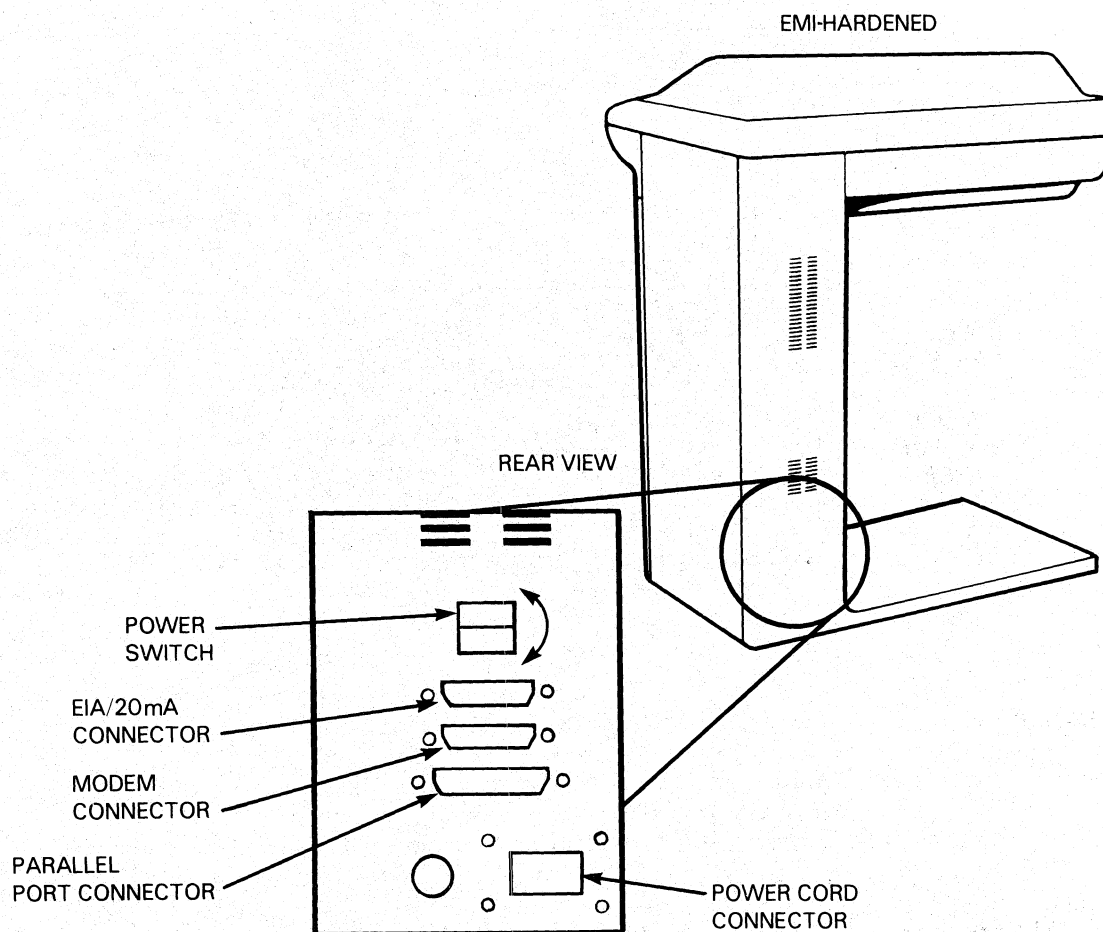
6.3.3 Enhanced DASHER LP2/TP2 Printer Cabling

The external cables required to install the printer include the interface cable between the printer and the host system or modem, and a power cable.

Install the appropriate power cable into its receptacle (Figure 6-5) from the list below.

- 120 Volt, 13A (DGC P/N 109-000249) EMI-hardened
- 120 Volt, 13A (DGC P/N 109-000238) non-EMI-hardened
- 240 Volt, 15A (DGC P/N 109-000418) EMI-hardened
- 240 Volt, 15A (DGC P/N 109-000240) non-EMI-hardened

The LP2/TP2 interface cable is attached to the printer at the rear base of the pedestal, above the power connector. See Figure 6-5. Install the appropriate serial, or parallel interface cable (see 010-00683) into its receptacle and secure the mounting screws.



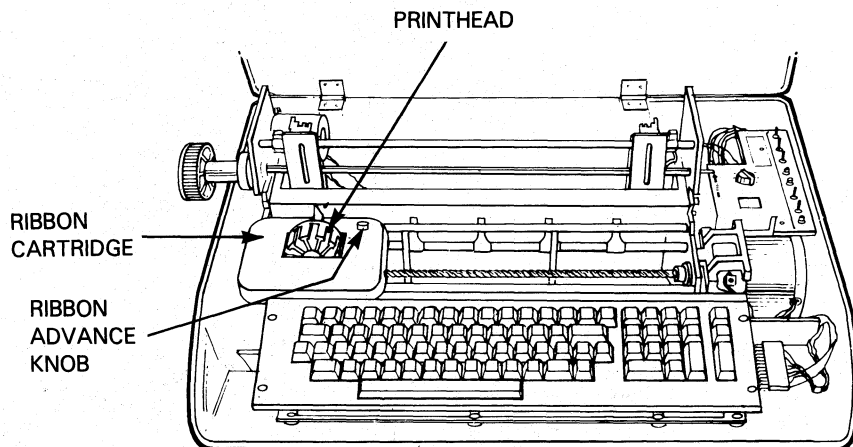
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Figure 6-5. Printer Cable Receptacle Locations

6.3.4 Ribbon Cartridge Installation

Use the following procedure to install the ribbon cartridge.

1. Open the printer top cover. This is done by grasping the sides of the top cover and lifting it up. The cover hinges then lock, holding the cover open.
2. Hold the ribbon cartridge with the ribbon tension knob on the top. Ensure that the ribbon is not twisted. Turn the ribbon tension knob clockwise to take up any slack in the ribbon (Figure 6-6).
3. Insert the ribbon cartridge over the printhead carriage (Figure 6-6).



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Figure 6-6. Ribbon Cartridge Installation

4. Align the ribbon cartridge onto the two bosses on the left and right ends of the printhead carriage. Press both sides of the cartridge to lock into place. Do not force the cartridge into place.
5. Turn the Ribbon Tension Knob clockwise to tighten the ribbon. Ensure that the ribbon is not twisted and moves freely.

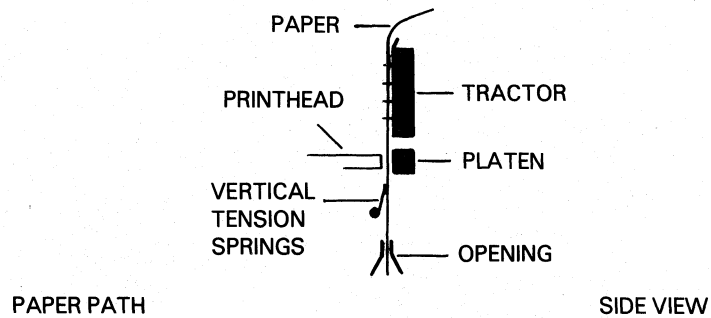
6.3.5 Fanfold Paper Installation

The enhanced printers use continuous fanfold paper. Perform the following procedure to install fanfold paper.

CAUTION

Improperly installed or paper out of alignment can cause paper jamming and subassembly failure.

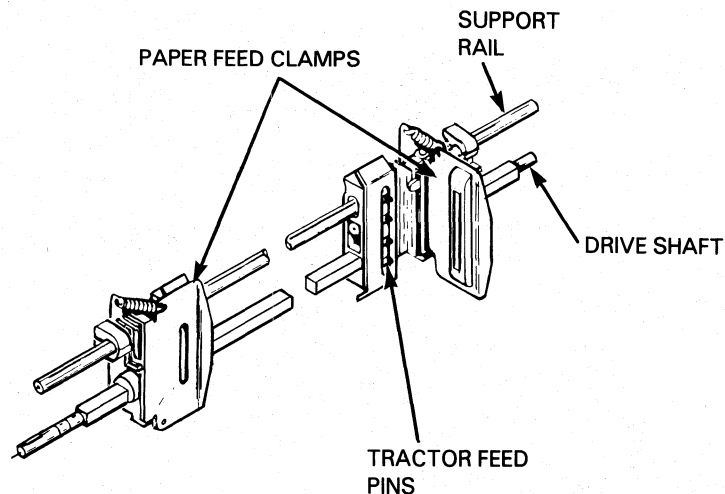
1. Turn the printer off.
2. Open the printer top cover. This is done by grasping the sides of the top cover and lifting it up until it rests on hinges.
3. Insert the paper through the bottom of the printer (Figure 6-7).



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Figure 6-7. Paper Feed Path

4. Pull the paper up (from the top) several inches.
5. Open both paper feed clamps, located on the paper feed tractors (Figure 6-8).
6. Move the left tractor to the left side of the mechanism.
7. Place the left side of the paper in the tractor so that the feed pin holes in the paper fit over the tractor feed pins (Figure 6-8).



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Figure 6-8. Tractor Feed Pins

8. Close the left paper feed cover over the paper.
9. Position the tractor and paper so that the perforated edge of the paper is approximately one-eighth of an inch from the left edge of the platen.
10. Lock the left tractor in place. Do not force the locking knob tighter than necessary to secure the tractor.
11. Move the right tractor to meet the right hand side of the paper. Hold the paper taut or count the feed holes to align the paper.
12. Close the right paper feed cover over the paper.
13. Lock the tractor in place. The paper should be secure but not stretched.
14. To realign the paper, if necessary, unlock both tractors and move the tractors and paper to the new position.

6.4 POWER-ON AND INITIAL CHECKOUT

After the subassemblies for the Enhanced DASHER LP2/TP2 printer are installed, perform the following off-line check and on-line check procedures.

6.4.1 Off-Line Check

Once the Enhanced DASHER LP2/TP2 printer is unpacked, perform the following steps:

1. Plug the power cord into the back of the printer and the ac outlet.
2. Install a ribbon cartridge (Subsection 6.3.4).
3. Install paper (Subsection 6.3.5).
4. Perform the off-line check procedure as described in Table 6-10.

NOTE

In the following off-line check, all switches are located on the Primary Control Panel unless noted otherwise.

Table 6-10. Off-Line Check Procedure

PROCEDURE	EXPECTED RESULT
<ol style="list-style-type: none"> 1. Turn the power ON. 2. Switch the unit OFF-LINE. 3. Switch VIEW to OFF. 	<p>The fan spins and the print-head returns to column 1.</p>
<ol style="list-style-type: none"> 4. Perform the following for KSR models only. <ol style="list-style-type: none"> a. Type a line of text without a NEW LINE. b. Press the CARRIAGE CARRIAGE RETURN (CR) key. c. Press the NEW LINE key. d. Type more test followed by a NEW LINE. 	<p>The text is printed as it is typed.</p> <p>The printhead moves to the left-hand margin of the same line.</p> <p>The paper advances one line.</p> <p>The text is printed as it is typed and the printhead moves to the left-hand margin of the next line.</p>
<ol style="list-style-type: none"> 5. Perform the following for all printer models. <ol style="list-style-type: none"> a. Toggle FEED switch to the UP position several times (for the KSR model, press the LF/FF key several times). b. Hold the FEED switch in the DOWN position for continuous Line Feed (for KSR models, hold the LF/FF in the FF position for at least one second). 	<p>The paper advances one line each time the switch is pressed.</p> <p>The paper is advanced to the top of the next form.</p>

Table 6-10. Off-Line Check Procedure (Continued)

PROCEDURE	EXPECTED RESULT
<p>6. Perform printer self-test.</p> <p>a. Toggle the test switch toward self-test. Place the printer on line.</p> <p>b. Toggle the test switch toward self-test twice. Place printer on line.</p> <p>c. Toggle the test switch toward self-test. Place test switch in ESC DIS. Place the printer on line.</p>	<p>80 column self-test.</p> <p>132 column self-test.</p> <p>Overprint self-test. (Rotating characters overprint on one line.)</p>

6.4.2 On-Line Check

Before performing the on-line check, the printer must be connected to a computer or the DASHER Terminal Tester. If a host system is available, execute the PRINT X diagnostic program to confirm printer operation. If no system is available use the terminal tester procedure as the on-line check procedure for both RO and KSR printers.

6.4.2.1 Testing With PRINT X Diagnostic - The LP2/TP2 printer diagnostic program allows the user to test and verify the on-line operation of the LP2/TP2. The PRINT X program provides I/O exercises and troubleshooting facilities for printers on a single controller subsystem. The subsystem must have the following equipment in order to run the diagnostic programs:

- A NOVA or ECLIPSE computer with at least 16 KB of read/write memory;
- Console teletype or equivalent;
 - a. Line Printer Controller (LP2)
 - b. Asynchronous Controller (TP2)

The PRINT X diagnostic can be ordered with the following DGC part numbers:

Program No. 095-001651
 Listing No. 096-001651

Load and execute the PRINT X diagnostic to confirm printer operation.

6.4.2.2 Testing With The Terminal Tester - Perform the terminal tester procedure in Table 6-11 if no system is available to confirm printer operation.

If the printer is an RO model, use the terminal tester to transmit ASCII characters to the printer. If the printer is a KSR model, use the terminal tester to return codes received from the keyboard back to the printer.

NOTE

In the following on-line check, all switches are located on the Primary Control Panel unless noted otherwise. In Table 6-11 "TYPE" indicates a KSR model and "TRANSMIT" indicates an RO model printer.

Table 6-11. On-Line Terminal Tester Procedure

PROCEDURE	EXPECTED RESULT
1. Connect the host or terminal tester cable to the printer.	
2. Switch the power ON. 3. Switch the printer ON-LINE.	The fan spins and the print-head returns to the lefthand margin. The ON-LINE and RDY indicators are lit.
4. Switch the printer OFF-LINE.	On-line LED is not lit.
5. Toggle the PERF SKIP switch to the ON position (on the secondary control panel).	
6. Set the line count thumbwheels on the secondary control panel to the number of lines corresponding to the length of the form being used.	
7. Adjust paper so that the top of form is 1/2 inch above printhead.	
8. Press and release TOF INIT (on secondary control panel).	

Table 6-11. On-Line Terminal Tester Procedure (Continued)

PROCEDURE	EXPECTED RESULT
<p>9. Switch the printer ON-LINE and perform the following.</p> <p>a. Type (or transmit) several lines of text.</p> <p>b. Type CTRL-L (or transmit a Form Feed character).</p> <p>c. Type (or transmit) the same number of lines as set by the line count thumbwheels.</p> <p>d. Type (or transmit)</p> <ul style="list-style-type: none"> - a few NEW LINES (012) - ESC-5 (033 065 - sets vertical tab) - CTRL (014 - form feed) - CTRL-K (013 - vertical tab) <p>e. Type (or transmit) a word or two, followed by:</p> <ul style="list-style-type: none"> - ESC-1 (033 061) (sets horizontal tab) - NEW LINE (012) - CTRL-I (011) <p>f. Type (or transmit)</p> <ul style="list-style-type: none"> - Some text - ESC < (033 074) - More text - ESC = (033 075) - More text <p>g. Type (or transmit)</p> <ul style="list-style-type: none"> - Some text - ESC a (033 141) - Some text - ESC b (033 142) - Some text 	<p>Text prints, paper advances to top of next form.</p> <p>Text is printed until the sixth line from the bottom is reached. The paper advances to the top of next form and the rest of text prints.</p> <p>Paper advances a few lines, proceeds to the top of the next form, and advances to the line in which the vertical tab is set.</p> <p>Text is printed, a horizontal tab is set at the end of the text, the printhead returns to the beginning of the next line and tabs out to the position where the tab was set (after the last character typed on the line above).</p> <ul style="list-style-type: none"> - Text is printed; - Nothing happens; - The text is printed in elongated width characters; - Nothing happens; - Text is printed in normal width characters. <ul style="list-style-type: none"> - Text is printed; - Nothing happens; - Text printed is underscored; - Nothing happens; - is printed without

Table 6-11. On-Line Terminal Tester Procedure (Continued)

PROCEDURE	EXPECTED RESULT
h. Type (or transmit) - ESC c CTRL-@ (033 143 000)	Printer re-initializes according to the settings of the secondary control panel. Printhead returns to lefthand margin.
i. Type (or transmit) - NEW LINE (012) - ESC > (033 076) - Some Text - ESC ? (033 077) - Some text	- Printhead returns to lefthand margin; - Carriage seeks home; - Compressed width characters - Carriage seeks home; - Normal width characters.

6.5 REMOVAL

Perform the following procedure to remove the Enhanced DASHER LP2/TP2 printer from service.

NOTE

Primary disconnect from the "AC MAINS" is made by the removal of the ac power connector.

1. Power off and disconnect the ac power cord and communication cable(s).
2. Open the top cover.
3. Remove the paper and ribbon cartridge.
4. To remove the ribbon cartridge, carefully pull the cartridge straight up.
5. Close the top cover.
6. Install the carriage shipping bolts to secure the carriage in the chassis.
7. Pack the printer in the shipping carton.



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