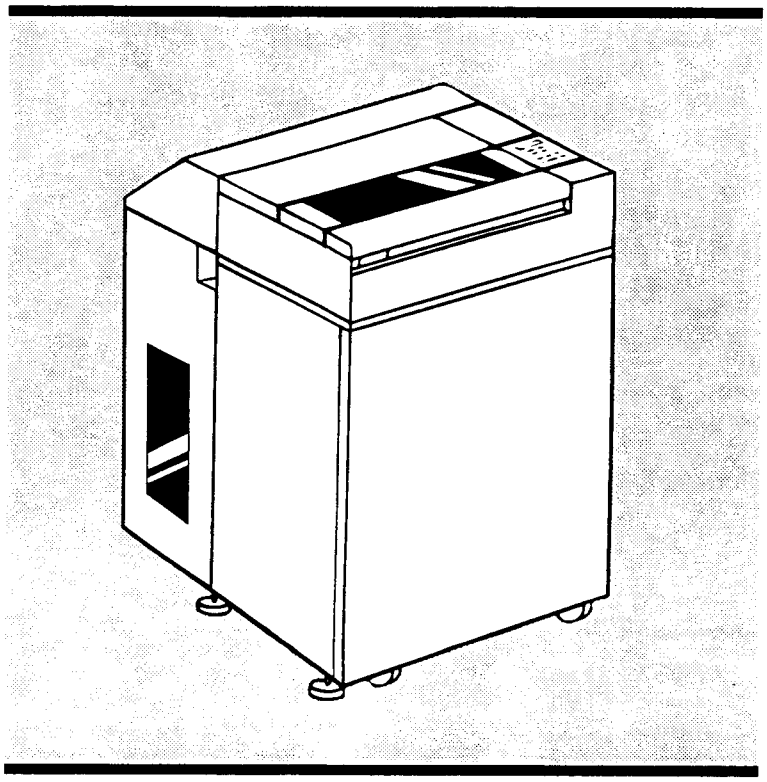
HEWLETT PACKARD

HP2300
Service Manual

Manual Part No. C2354-90901



PUBLICATION HISTORY

Changes in text to document updates subsequent to the initial release are supplied in manual update notices and/or complete revisions to the manual. The history of any changes to this edition of the manual is given below. The last update itemized reflects the machine configuration documented in the manual.

Any changed pages supplied in an update package are identified by a date centered at the bottom of each page.

First Edition, September 1992
Second Edition, December 1992
Third Edition, March 1994

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The following conventions are used throughout this manual:

NOTE

Notes contain important information that is set off from the text.

CAUTION

Caution messages appear before procedures which, if not observed, could result in damage to equipment.

WARNING

Warning messages indicate when a specific procedure or practice is not followed correctly, personal injury could occur.

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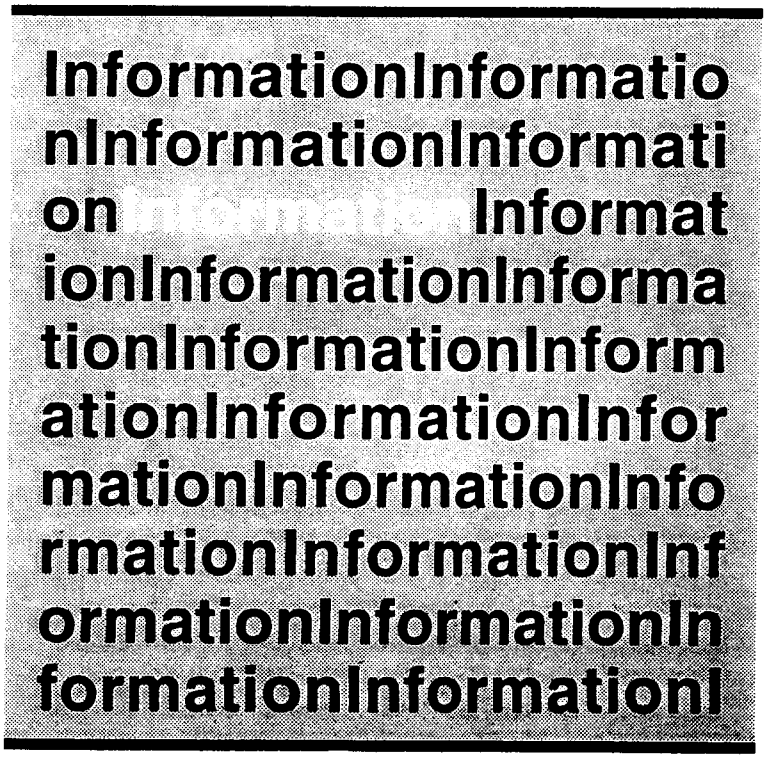
Chapter 1

Product Information
HP2300



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1-1 INTRODUCTION

This manual provides installation and servicing information for the HP 2300 family of printers, which is compound by the 840L and the 1100L models. A functional theory of operation provides a general overview of the electrical operation of the unit. The following information is included in this manual:

Chapter 1	Product Information
Chapter 2	Installation and Configuration
Chapter 3	Theory of Operation
Chapter 4	Configuration & Diagnostics
Chapter 5	Adjustments
Chapter 6	Removal and Replacement
Chapter 7	Parts & Diagrams

1-2 PRODUCT DESCRIPTIONS

The HP2300 is an impact line printer at the mid range of Hewlett-Packard's impact printer family. The PCL printer language ensures common feature access, software development protection and a smooth upgrade path. The 840L is used for volume printing needs of up to 230,000 pages per month and print speeds of up to 840 LPM (Lines Per Minute), and the 1100L for 280,000 pages per month and speeds of up to 1100LPM.

The HP2300 family of printers features a friendly Control Panel that displays alphanumeric messages instead of numeric codes. It has a 2 line by 16 character LCD alphanumeric display and a Key Pad Overlay

that can be selected in five different languages: English, German, French, Italian and Spanish. The Control Panel will display the Operator messages, Printer Configuration Menu and Self Test Menu in one of these available languages by selecting the desired language on the Control Panel. The CE Menu, I/O Menu and Graphics Menu messages are displayed in English only. The Key Pad Overlay language can be selected by choosing the appropriate localization option when ordering the printer, or ordered by the CE as necessary.

The printer is cabinet-mounted (free-standing) model with quietized printer cabinet. The HP2300 family incorporates a sound enclosure and an advanced design paper stacking aid to assist in trouble free output stacking and quiet operation (54 db for the 840L and 55 db for the 1100L).

1-3 IDENTIFICATION

The printer has an identification plate that lists the product and the serial number, it is attached to the rear panel next to the power switch. The product number is alphanumeric (C2354A for the 840L and C2356A for the 1100L). The serial number consists of a four digit prefix, a letter, and a five digit suffix (0000Y00000). The prefix is used to indicate design changes. The letter in the fifth location designates the country in which the printer was manufactured ("Y" = Mexico). The suffix is a sequential number which increments with each printer.

The identification plate also lists the factory installed options. The option numbers are three-digit numbers (such as 013) which, in combination with the product number, indicate the configuration of the unit.

Printed circuit assemblies (PCA's) are identified by a part number and an alphanumeric code consisting of a letter, series code, and a serial number stamped or etched on the assembly (for example A-1940-0000Y00000). The letter identifies the version of the etched trace pattern on the unloaded printed circuit board. The four digit series code pertains to the electrical characteristics of the loaded PCA. The prefix in the serial number indicates the manufacturing date of the PCA, the letter designates the country in which the PCA was manufactured ("Y" = Mexico) and the suffix is a sequential number which increments with each PCA.

The standard HP2300 printer includes the following characters sets:

STANDARD CHARACTER SET	SOCKET TYPE	FORMATTER SOCKET
10 & 16.7 CPI ROMAN 8 DP	ND	U83
12.0 & 15.0 CPI ROMAN 8	ND	U73
1 0 CPI HD ROMAN 8 (NLQ)	HD	U53
BAR CODES	HD	U43
10 CPI HS DRAFT ROMAN 8	HD	U33
10 CPI HS DRAFT USASCII & POSTNET	HD	U13

NOTES:
ND: Normal Density
HD: High Density
DP: Data Processing (Normal Density)
NLQ: Near Letter Quality (High Density)
HS: High Speed
CPI: Characters per Inch

Standard printers also include 16 channel programmable Vertical Format Control (VFC) using PCL II Escape Sequences. See the HP256X Technical Reference Guide, P/N 02564-90905, for further information.

1-4 OPTIONS

CHARACTER SET OPTIONS

CHARACTER SETS	OPTION NUMBER	SOCKET TYPE
LINE DRAW/LRGE BLOCK/MATH	#001	ND
HD ITALICS ROMAN 8	#005	HD
12 & 13.3 CPI ROMAN 8	#009	ND
13.3 & 15 CPI ROMAN 8	#013	ND
10 CPI HS DRAFT USASCII & OCR A	#102	HD
10 CPI HS DRAFT USASCII & OCR B	#103	HD
EUROPEAN LATIN 1 & 10 CPI HS DRAFT USASCII/OCR B	#104	HD & HD *
KATAKANA 8 DP & NLQ	#106	ND & HD **
CYRILLIC 8 ECMA 113/86 DP & NLQ	#126	ND & HD **
CYRILLIC 8 ECMA 113/88 DP & NLQ	#128	ND & HD **
ARABIC 8 & NLQ	#130	ND & HD **
TURKISH 8 DP & NLQ	#132	ND & HD **
GREEK 8 DP & NLQ	#134	ND & HD **
HEBREW 7 DP & NLQ	#138	ND & HD **
LATIN 2 ECMA 94 DP & NLQ	#144	ND & HD **

* This option (#104) has two EPROM's to be installed in the HD slots.
** These options have two EPROM's; the DP one, to be installed in a ND slot, and the NLQ one to be installed in a HD slot.

CHARACTER SET OPTIONS RULES:

The standard character sets occupy all the character set sockets available on the Formatter Board. If an optional character set is ordered, one or two standard character sets will be replaced by the optional character set. The optional character sets are divided into five groups, according to the standard character sets they replace, and according to the optional character sets that can not be ordered together:

Group A: Options #106, #126, #128, #130, #132, #134, #138 and #144.

Group B: Options #102 and #103.

Group C: Options #001, #009 and #013.

Group D: Option #005.

Group E: Option #104.

Rule 1: Only one option can be ordered from a group; e.g., options from a group, can not be ordered together.

Rule 2: No more than three optional character sets can be ordered.

Rule 3: The following are the group combinations allowed:
A & B B, C & D C & E
Other combinations are not possible.

Rule 4: Group A options replace: 12.0 & 15.0 CPI Roman-8 and 10 CPI HD Roman-8 (NLQ).

Group B options replace: 10.0 CPI HS Draft USASCII & POSTNET

Group C options replace: 12.0 & 15.0 CPI Roman-8.

Group D options replace: 10.0 CPI HD Roman-8 (NLQ).

Group E options replace: 10.0 CPI HD Roman-8 (NLQ) and 10 CPI HS Draft USASCII & POSTNET.

CONNECTIVITY, PROTOCOLS AND EMULATION OPTIONS

INTERFACE	OPTION #	SUPPORTED PROTOCOLS	MODES
HP-IB	#1A8	PCLII	
Centronics	#1AA	PCLII	**
Serial RS232	#1CW	PCLII	**
Serial RS422	#1C8	PCLII	**
Multiple I/O - RS-232 - Supercentronics - LAN Connector	#1AX	PCLII HEXDUMP	Printronics (P-Series) Epson(FX-80)
Multiple I/O - RS-422 - Supercentronics - LAN Connector	#ALZ	PCLII HEXDUMP	Printronics (P-Series) Epson(FX-80)
LAN Adapter Box (for HPUX)	#ALY *		
HP Label Card II	#400	QMS 4256+	Graphics

* To order LAN Adapter Box you must also order either option #1AX or #ALZ (multiple I/O with LAN connector) as well as one of the supported TCP/IP LAN PCA's:
- C2071S (twisted pair connection)
- C2071T (coax connection)

** RS-232/422 boards (P/N 5062-1703) and Centronics boards (P/N 5062-1754) with Date Code <3231 are configured in Compatibility Mode.

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CONVENIENCE OPTIONS

RIBBON THREE PACK #068
SERVICE MANUALS #0B3

LOCALIZATION

There are 19 Localization Options to select Control Panel Language and Power Cable.

COUNTRY	KEY PAD OVERLAY LANGUAGE	POWER CABLE	OPTION NUMBER
USA	ENGLISH	8120-2371	#ABA
EUROPE	ENGLISH	8120-1689	#ABB
AUSTRALIA	ENGLISH	8120-1369	#ABG
INTERCON	ENGLISH	8120-2371	#ABK
SPAIN	SPANISH	8120-1689	#AC5
UK	ENGLISH	8120-1351	#ACC
SWITZERLAND	ENGLISH	8120-2104	#ACD
DENMARK	ENGLISH	8120-2956	#ACE
JAPAN	ENGLISH	8120-4753	#ACF
AUSTRIA	GERMAN	8120-2371	#ACG
LATIN AMERICA	SPANISH	8120-2371	#ACH
INDIA	ENGLISH	8120-4211	#ACJ
SOUTH AFRICA	ENGLISH	8120-4211	#ACQ
GERMANY	GERMAN	8120-1689	#ACW
FRANCE	FRENCH	8120-1689	#ACX
EAST CENTRAL EUROPE	ENGLISH	8120-1689	#AKG
ITALY	ITALIAN	8120-1689	#AKK
RUSSIA	ENGLISH	8120-1689	#AR3
MEXICO	SPANISH	8120-2371	#AR9

Note: Control Panel Keyboard Overlay are available in:

LANGUAGE	P/N
English	C2356-40004
Spanish	C2356-40005
French	C2356-40006
German	C2356-40007
Italian	C2356-40008

1-5 AVAILABLE SUPPLIES

Supplies recommended for use in the HP2300 printer and available from Hewlett-Packard are listed below:

RIBBON CARTRIDGES

P/N 92162A	Box of three standard ribbon cartridges
P/N 92162M	Box of three for optical mark recognition ribbon cartridges for Barcode, OCR A & B, and Postnet character sets.

PAPER

The HP2300 printer can use continuous fan-fold edge-perforated paper varying in width from 3.0 to 16.75 inches. Although the printer accepts paper as wide as 16.75 inches, the furthest right it can print is 14.75 inches. The printer handles paper weights ranging from 15 to 100 pounds. In many cases, the printer successfully prints on paper lighter than 15 pounds, but the paper should be tested prior to use for satisfactory feeding and stacking ability.

Multi-part forms up to six-parts may be used, with a maximum pack thickness of .024 inches. Carbonless multipart forms up to 4 parts may be used. Forms should be tried at high and low humidity to determine if static buildup must be eliminated for proper stacking. For more information refer to the Appendix D Media Specifications.

The following paper types are recommended for use in the HP 2300 printers:

P/N 92157A	One-part, white, 9.5x11in, 18 pound bond	2400 sheets/box
P/N 9320-1515	One-part, blue bar 132 column, 18 pound	2400 sheets/box
P/N 92157C	One-part, white, 9.5x11in, 20 lb #1 bond	2400 sheets/box

1-6 RELATED MANUALS

The following manuals provide additional information on the HP2300 family of printers:

HP2300 Operator's Manual	P/N C2356-90902
HP256X Family Technical Reference Manual	P/N 02564-90905
HP Label Card Graphics	P/N 26062-90902
HP Label Card II Graphics	P/N 02563-90974
HP-IB Interface Manual	P/N 26067-90901
Centronics Parallel Interface Manual	P/N 26067-90906
Dataproducts Parallel Interface Manual	P/N 26067-90907
RS-232/422 I/F Manual	P/N 26067-90921
Supercentronics I/F Manual	P/N 26067-90957
Multiple I/O RS-232/422/Supercentronics	P/N 02563-90976

1-7 SPECIFICATIONS

The specifications for the HP2300 family are listed in Table 1-2.

Table 1-2. Specifications

PHYSICAL CHARACTERISTICS

Width:	59.5 cm (23.4 inches)
Depth:	83 cm (32.7 inches)
Height:	100 cm (39.4 inches)
Weight:	840L; 105.5 kg (232.5 pounds)
	1100L; 108 kg (238 pounds)

ELECTRICAL CHARACTERISTICS

Input Voltages

100, 120, 220 and 240 VAC (+5%, -10%), 50/60 Hz

Power Consumption

	100 VAC	120 VAC	220 VAC	240 VAC
Non-printing				
840L	120 W	120 W	110 W	110 W
1100L	160 W	160 W	160 W	160 W
Typcal				
840L	270 W	270 W	280 W	280 W
1100L	380 W	420 W	400 W	410 W

ENVIRONMENTAL

Temperature

Operating (printer plus ribbon) 10 to 50 degrees C (50 to 122 F)
Optimum: 70-80 degrees F
Storage (printer) -40 to 75 degrees C. (-40 to 167 F)
Survival (power-on) -20 to 65 degrees C. (-4 to 149 F)
Storage (ribbon) 10 to 50 degrees C. (50 to 122 F)

Relative Humidity

Non-Operating: 5% to 90% (non-condensing)
Operating: 30% to 80% (advised)
Optimum: 40-60%

Audible Noise (HP2300 standard)

	LpAm	LWAd
Printing		
840L	54 db	7 bels
1100L	55 db	6.9 bels
Non-printing		
840L	38 db	5.5 bels
1100L	38 db	5.5 bels

LpAm= Average sound pressure at 4 bystander
LWAd= Sound power

1-8 SAFETY COMPLIANCE

The HP2300 printer is listed by Underwriter's Laboratories, Inc. in the following categories with respective guide designations: Electronic Data Processing Equipment (EMRT), and Office Appliances and Business Equipment (QAOT).

The Canadian Standards Association has certified this printer as Data Processing Equipment.

In addition, this printer was designed to meet most European Safety and RFI/EMC standards for Electronic Data Processing Equipment. Any questions concerning regulatory compliance should be directed to the local Hewlett-Packard Sales Office.

1-9 FCC RFI STATEMENT

The Federal Communications Commission (In 47 CFR 15.818) has specified that the following notice be brought to the attention of users of this product.

Warning: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this

equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Any changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate this equipment.

NOTE

Use of a shielded cable is required to comply within the Class A limits in Subpart J of Part 15 of FCC rules.

1-10 SERVICE APPROACH

The basis for repair of the printer centers around modular level replacement of printed circuit assemblies and electro-mechanical subassemblies. The self-test and diagnostics features (explained in Chapter 4) serve as an aid in isolating problem areas of the printer. Once the problem is located, that assembly should be replaced without further attempts to identify component failures within the assembly.

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Chapter 2

Installation and Configuration HP2300

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2-1. INTRODUCTION

This section of the manual provides information concerning printer site selection, unpacking and inspection, and printer set-up and configuration.

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2-2. SITE REQUIREMENTS

ENVIRONMENTAL

The printer is designed for operation in a clean, traffic free environment, preferably in an area not subject to excessive shocks, vibrations, or a wide range of temperatures. Air conditioning is not required to ensure reliable operation, but the environmental specifications listed in Table 1-2 should not be exceeded.

PHYSICAL

The printer's location must provide adequate operator access to both the front and rear of the printer. The area around the printer should be kept clean and dust-free at all times.

2-3. UNPACKING AND INSTALLATION

Prior to unpacking the printer, examine the shipping container for any signs of damage which might indicate damage to the printer (broken pallet, holes in the container, etc.). If the shipping container is damaged, write a notation on the freight bill describing the damage before signing.

NOTE

The printer should not be unpacked unless a qualified service representative is present. Do NOT destroy or discard the shipping container or any packing materials. In case of a damage claim, the shipping container and packing materials will be needed for inspection by the carrier and possible reshipment of the printer to the factory.

UNPACKING: PRINTER

The following unpacking procedure describes the proper way to unpack the cabinet-mounted HP2300 printers.

WARNING

Protective glasses must be worn while cutting the strapping bands around the container. These straps are under tension and when cut may spring back, potentially causing serious eye injury.

a. Wearing protective glasses, stand to one side, and cut the banding straps around the outer cardboard carton (see Figure 2-1). Remove the outer carton.

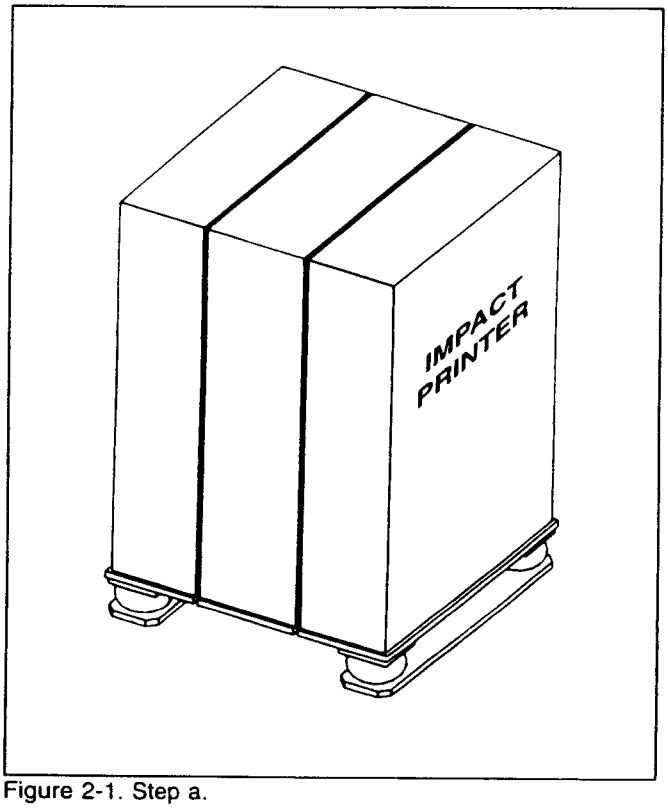


Figure 2-1. Step a.

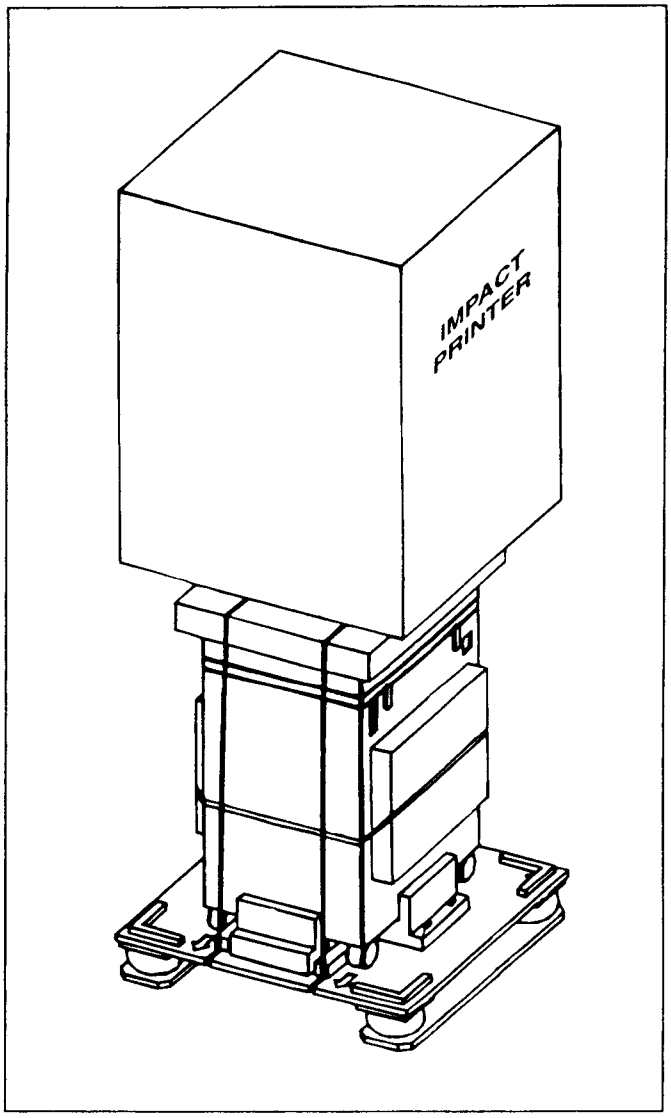


Figure 2-2. Step b.

WARNING

Two people are required to perform step "b" to prevent injury or damage to the printer.

b. Remove the outer carton, cut and remove all straps securing the printer to the base (Figure 2-2).

c. Remove accessories boxes, top pad, cushion skids screws and support block bolts (Figure 2-3).

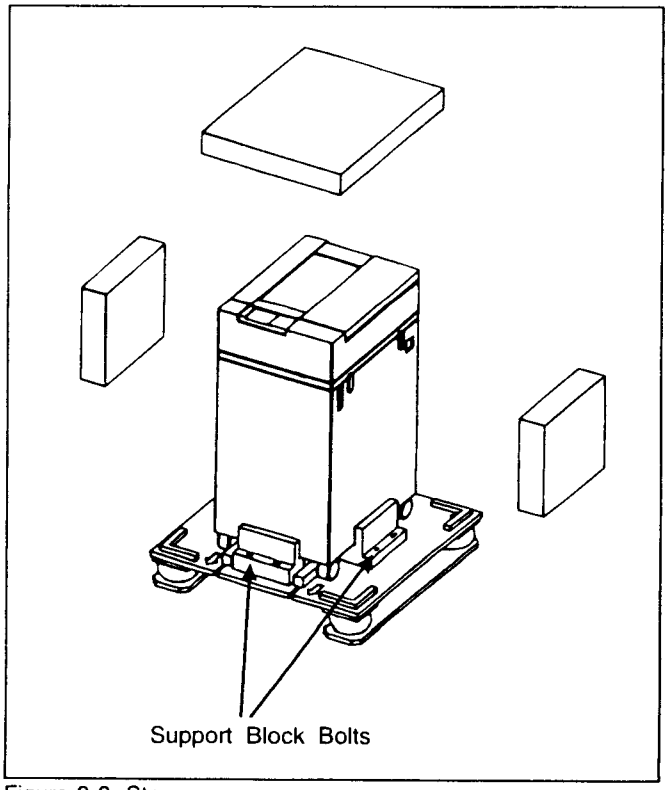


Figure 2-3. Step c.

d. Rotate wood slides by removing bolts. Remove front cushion skids and support blocks (Figure 2-4).

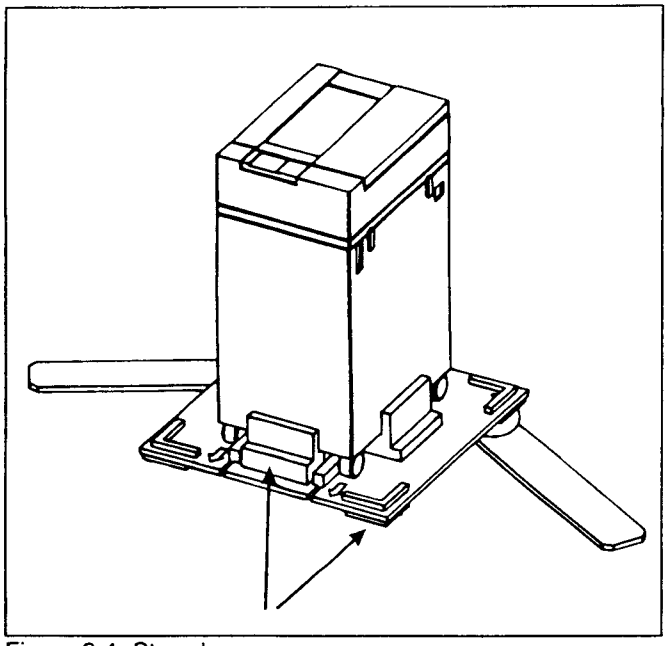


Figure 2-4. Step d.

WARNING

Two people are required to perform step "e" to prevent injury or damage to the printer.

e. Slide the printer down by holding it from its front (Figure 2-5).

f. Open the printer's top access cover, remove the four pink foam packing blocks in the order shown below. Blocks #1, #2, #3 & 4 are removed by grasping toward the rear and pulling up and out. (Figure 2-6).

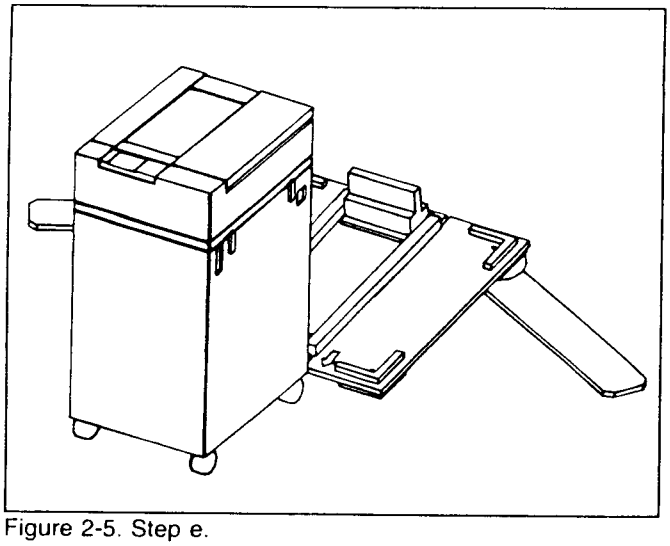


Figure 2-5. Step e.

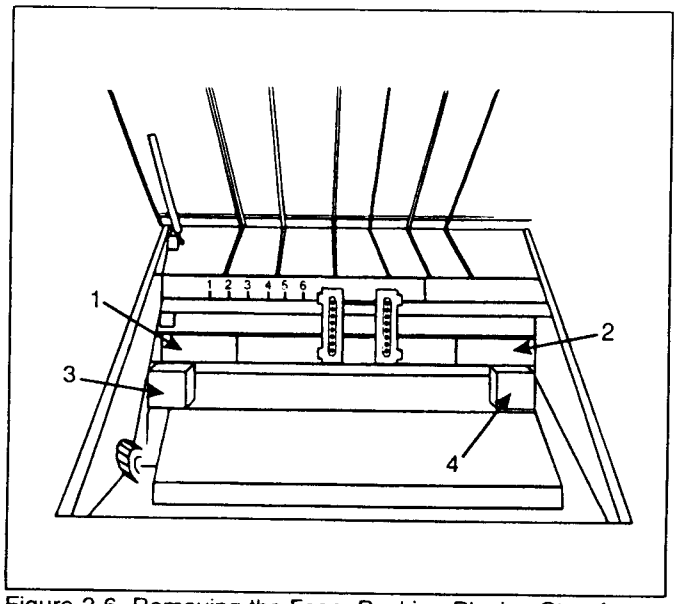


Figure 2-6. Removing the Foam Packing Blocks. Step f.

UNPACKING: SOUND ENCLOSURE

The sound enclosure supplied with the HP2300 printer is shipped in a separate container. It must be unpacked as follows:

a. Cut straps (2) and remove the outside plastic film. Remove the box as it is shown in Figure 2-7.

b. Push the foam corner protectors to the side and open the doors in the Main Weldment assembly (Figure 2-7).

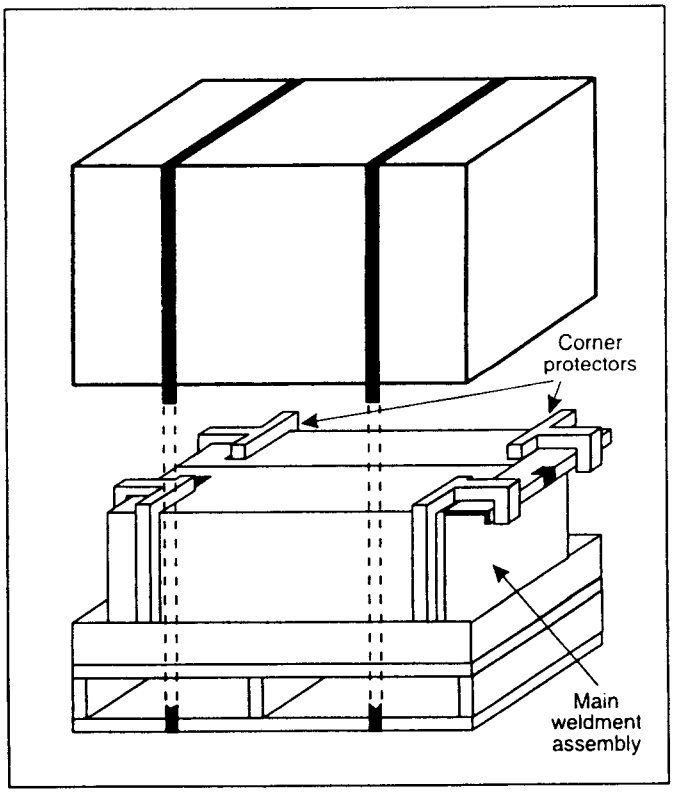


Figure 2-7. Remove box.

c. Lift out the paper tray and remove the two attached foam pieces (Figure 2-8).

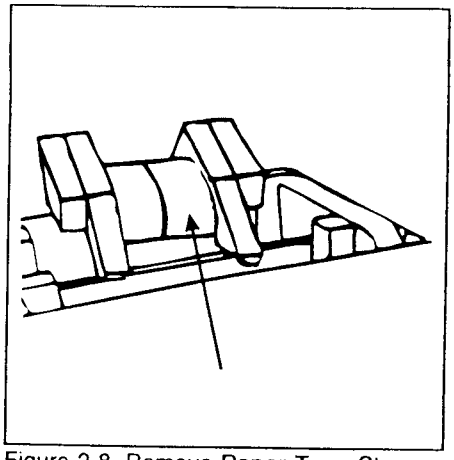


Figure 2-8. Remove Paper Tray. Step c.

d. Grasp the foam end caps and lift to remove the shroud and wire form assembly from the box. Place it on a flat surface to disassemble (see Figure 2-9).

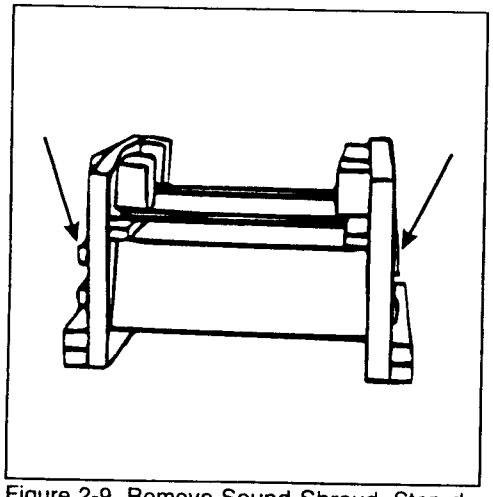


Figure 2-9. Remove Sound Shroud. Step d.

CAUTION

In the following step, when removing the wire form, be careful not to catch the plastic tabs on anything, as they may tear.

e. On the top of the sound shroud, pull the foam on either side of the wire form outward and carefully lift out the wire form (Figure 2-10).

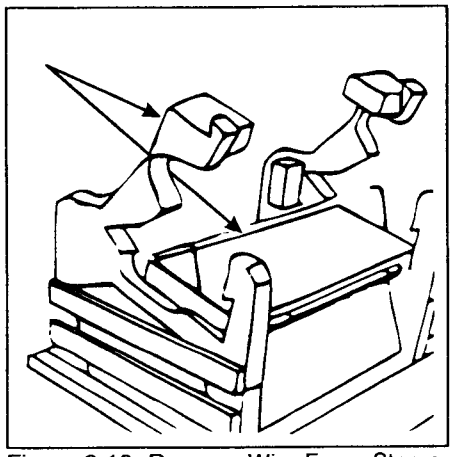


Figure 2-10. Remove Wire Form. Step e.

f. Remove the two foam end-caps from the shroud, then turn the sound shroud upside down so the cardboard is facing up. Remove the cardboard from the sound shroud (it fits tightly to the unit and may be hard to remove). Now, continue unpacking the main Weldment assembly, which was emptied in the previous steps (c to e).

g. Remove the foam corner protectors (Figure 2-7). Pull up the corners of the Weldment assembly to ease the remotion of the protectors.

h. Stand up the Weldment by pulling it up by its top brace (figure 2-11).

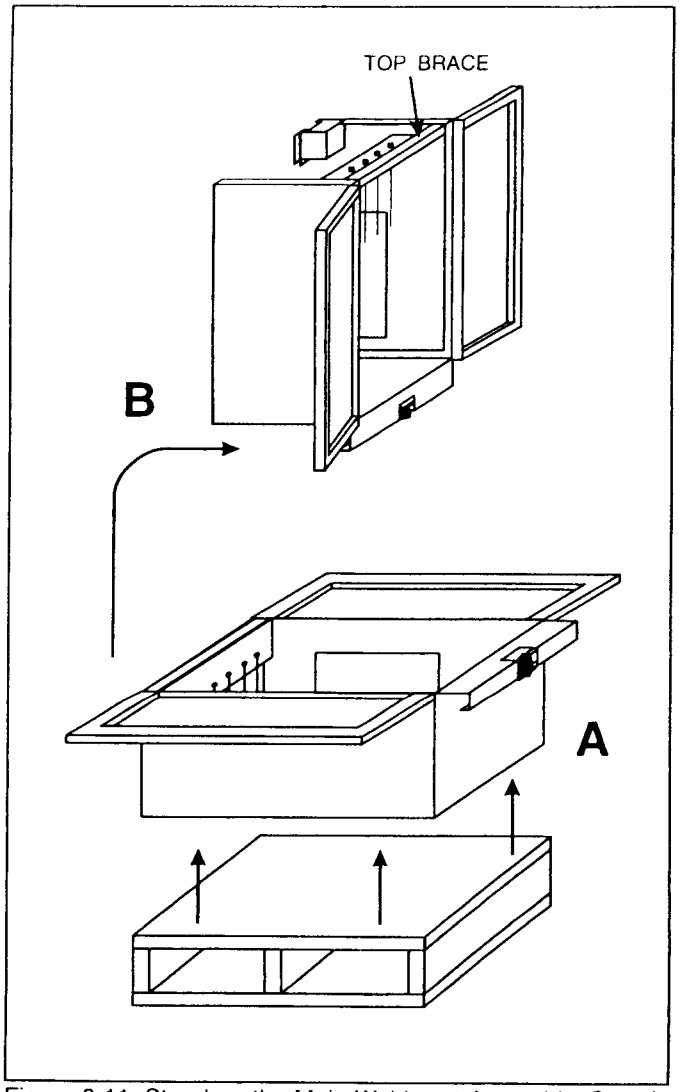
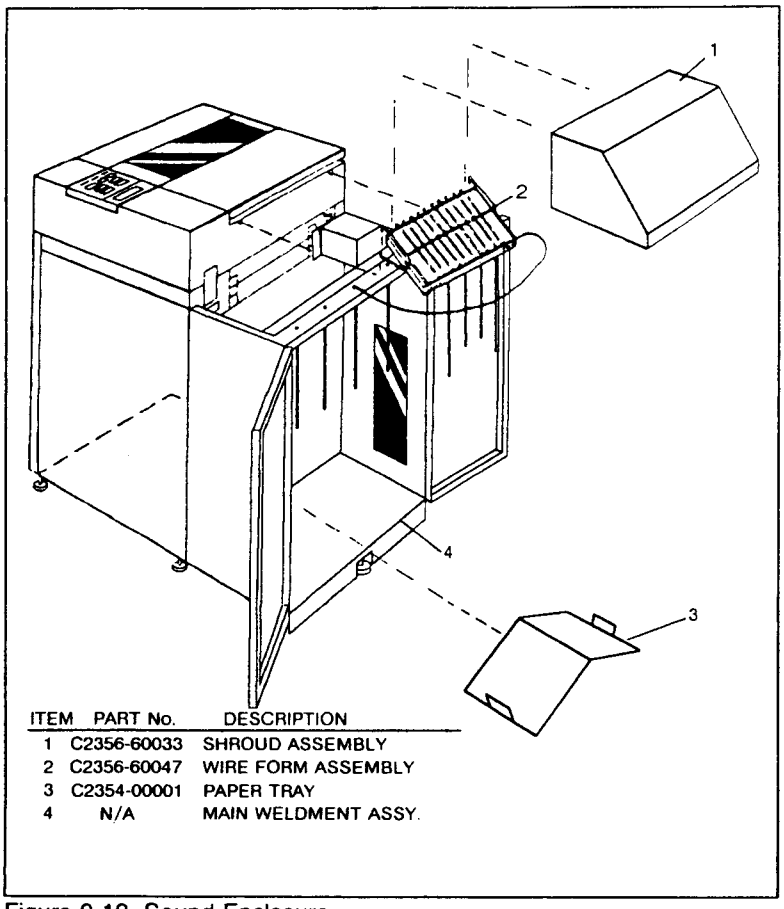


Figure 2-11. Stand up the Main Weldment Assembly. Step f.

INSPECTION

After unpacking, inspect the printer and Sound Enclosure for signs of physical damage (cracks, broken parts, etc.). Check all shipping documents and the identification plate on the back of the unit to ensure that all parts have been received (see Figure 2-12), and that the printer conforms to purchased specifications. If the printer or cabinet appear to have been damaged in shipment, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately.



ITEM	PART No.	DESCRIPTION
1	C2356-60033	SHROUD ASSEMBLY
2	C2356-60047	WIRE FORM ASSEMBLY
3	C2354-00001	PAPER TRAY
4	N/A	MAIN WELDMENT ASSY.

Figure 2-12. Sound Enclosure.

POWER CONFIGURATION

The printer set-up requires that the printer be configured to the local power source. All printers are shipped configured at 220 VAC for protection. The HP2300 can be configured to one of the following power sources: 100, 120, 220-230 or 240 VAC (+5%/-10%).

The voltage selector, the fuse holder and the power switch are located on the back of the printer. The voltage selector and the fuses are inside the fuse drawer right under the power switch (see Figure 2-13).

If a change in power configuration is required, proceed as follows:

a. Ensure the printer's ON/OFF switch (power switch) is set to the OFF (0) position and that the input power cable is disconnected from the printer.

b. Using a small flat-blade screw driver, pry open the fuse drawer by gently lifting the snap and then pulling it out.

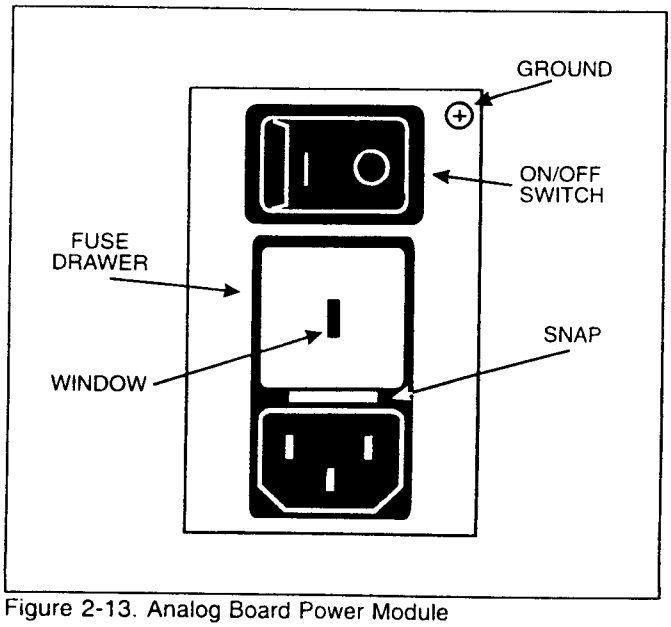


Figure 2-13. Analog Board Power Module

c. Pull out the voltage selector module with your index finger from inside of the fuse drawer. The voltage selector module has four faces (100V, 120V, 220V and 240V). Place the module back into the socket with the desired voltage showing on the side of the module facing you. Push it until well seated in its place.

d. Place the fuse holder back into its socket and push it until you hear a "click". The voltage chosen will show through the small window on the fuse drawer.

e. Connect the power cord and turn power on.

f. If the printer contains an HP-IB interface, the "Unit Loads" must be set to conform to overall system. Refer to the 26067A HP-IB interface manual (part number 26067-90901) for calculating the HP-IB load requirements for the printer.

INSTALLATION: SOUND ENCLOSURE

WARNING

Make sure the printer's power is OFF and the power cord is unplugged from the wall before assembling the Sound Enclosure. Installing the parts with the power on may cause injury to yourself or damage to the equipment.

The main weldment assembly gives stability. Install it before any other part of your Sound Enclosure.

a. Start the two screws in the bottom of the main weldment assembly, and the two in the top of the printer stand. Use a #2 Pozidrive screwdriver to start the four screws (Figure 2-14).

b. Route the power cable through the pocket slot and the clips in the Main Weldment assembly. One clip is located in the bottom of the pocket, and the two others are on the Weldment side panel, along the right door. Use the pocket sealing tape to hold the power cable.

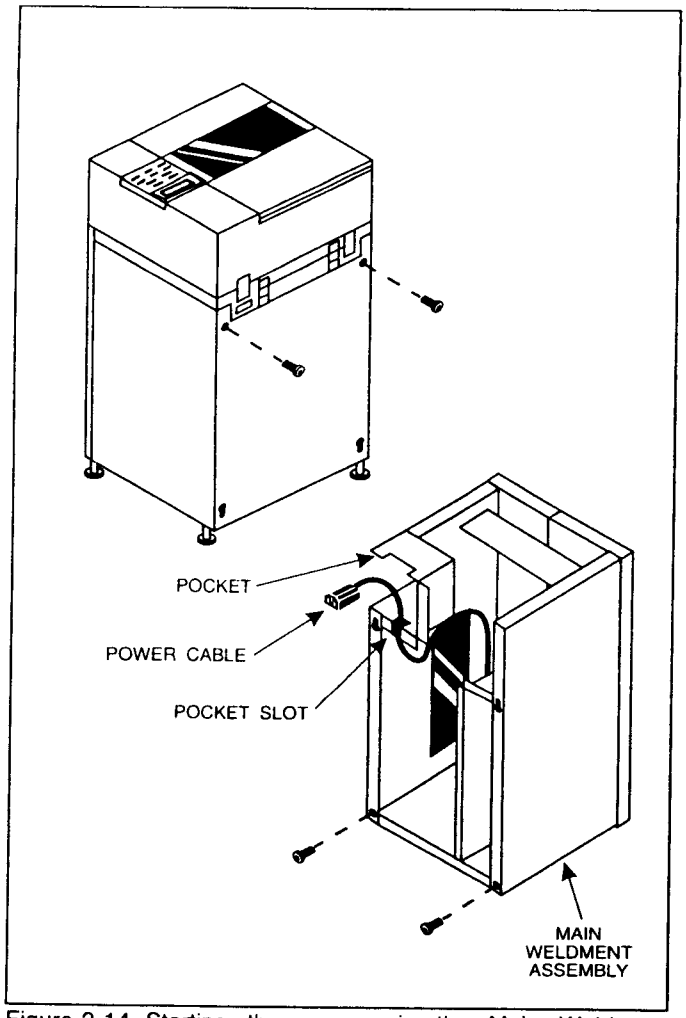


Figure 2-14. Starting the screws in the Main Weldment Assembly and the Printer.

c. Insert the screws into the key slots by holding the main weldment from its top brace with both hands first. Align the bottom screws to the holes in the back panel of the printer stand. Insert lower screws into the key slots. Then while holding the main weldment, repeat the operation with the top screws in the back of the printer. Lower the weldment into place. Ensure the weldment is well seated (Figure 2-15). Do not tighten the screws yet, in order to allow the power and ground cables be routed through the enclosure.

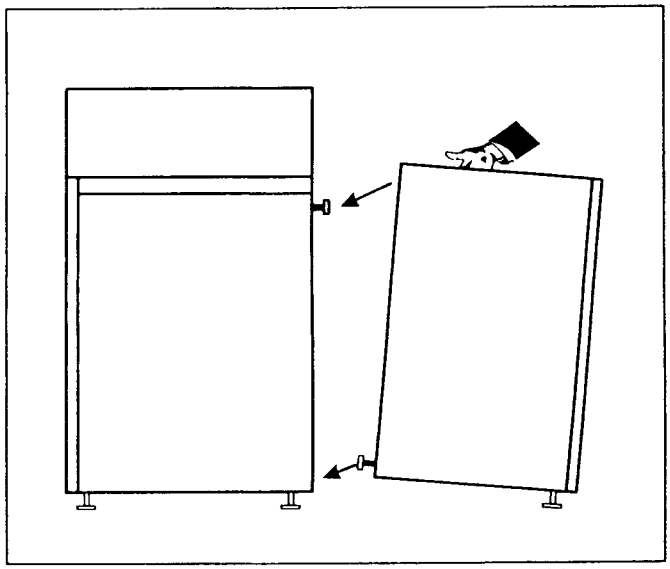


Figure 2-15. Attaching the Main Weldment Assembly.

d. Plug the power cable into the power module.

e. Attach the wire form. Hook the wire form into the holes on the top cover (Figure 2-16). Make sure the four chains hang freely.

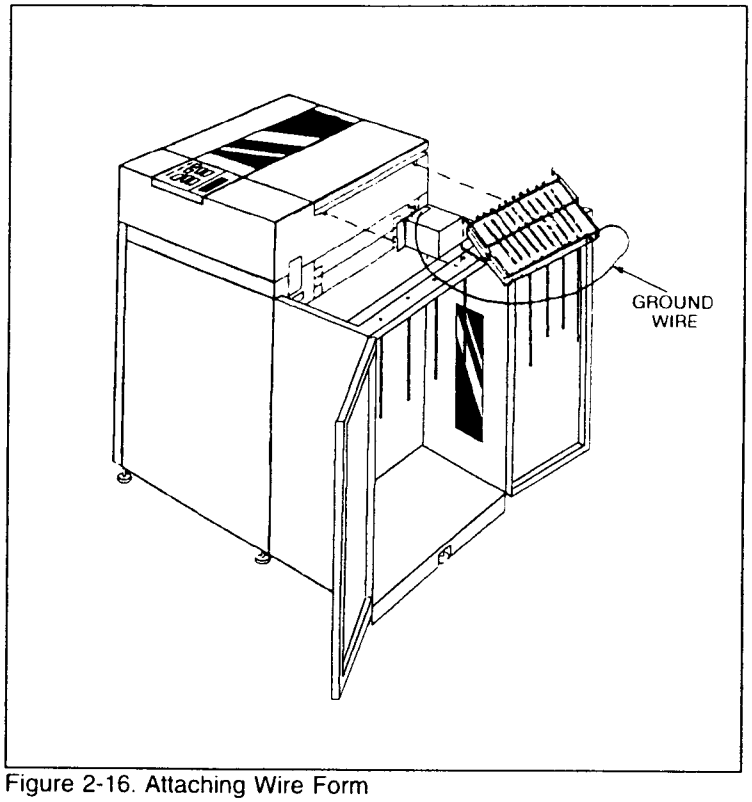


Figure 2-16. Attaching Wire Form

f. Connect the ground wire. Locate the small screw next to the power switch on the back panel of the printer. Insert the ground wire onto the spade lug underneath the screw (figure 2-17).

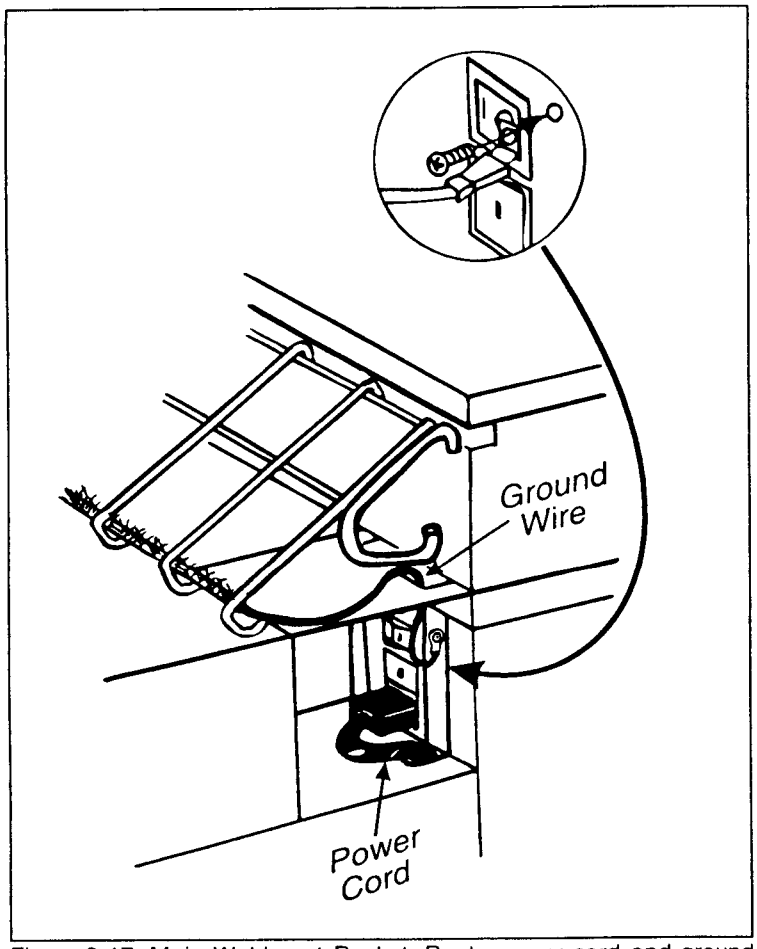


Figure 2-17. Main Weldment Pocket. Route power cord and ground wire.

g. Tighten the two bottom screws to the back panel from inside the printer stand. You will need to hold back the soundproofing foam in order to reach the screws (Figure 2-18).

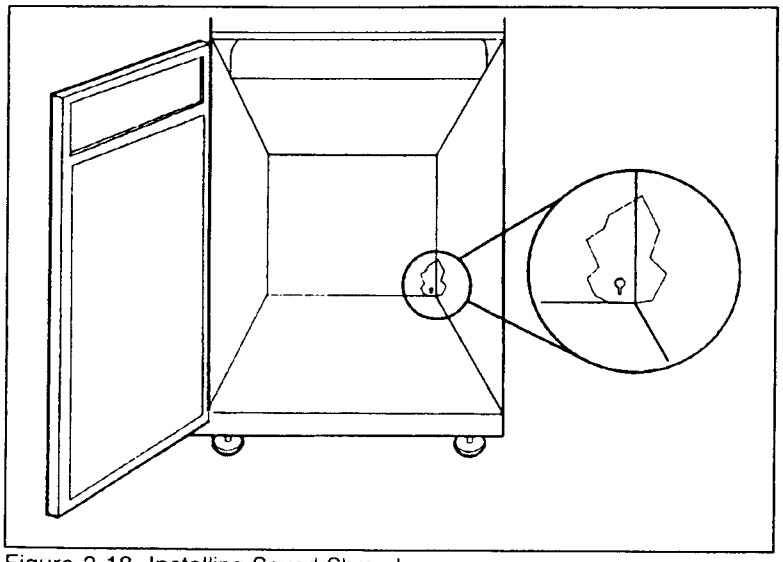


Figure 2-18. Installing Sound Shroud

h. Tighten the two top screws to the back panel from inside of the main weldment assembly. You will need to hold back the soundproofing foam in order to reach the screws (Figure 2-19).

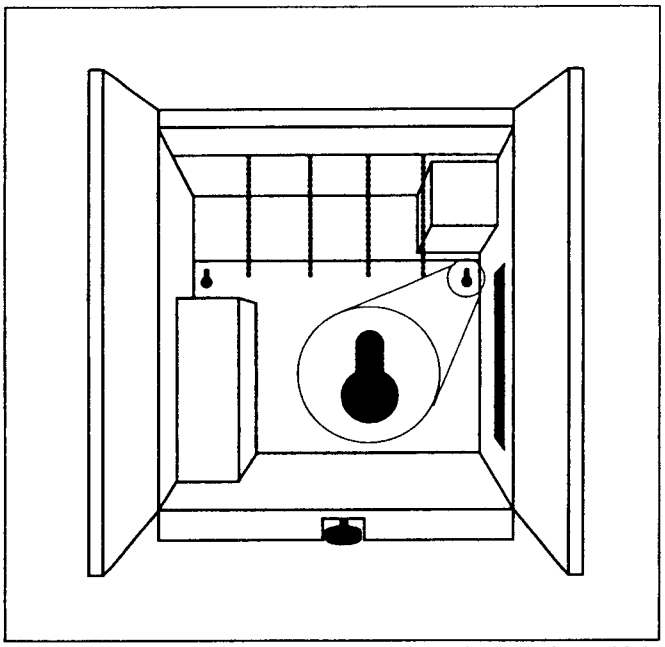


Figure 2-19. Tightening top screws from inside of the Main Weldment Assembly.

i. Install the Shroud Assembly. Slide the shroud directly over the wire form (Figure 2-20). Push firmly until it snaps into place. Make sure the shroud pins slide into the main weldment pin holes and the shroud fits tight against the back of the printer and flush with the top of the printer.

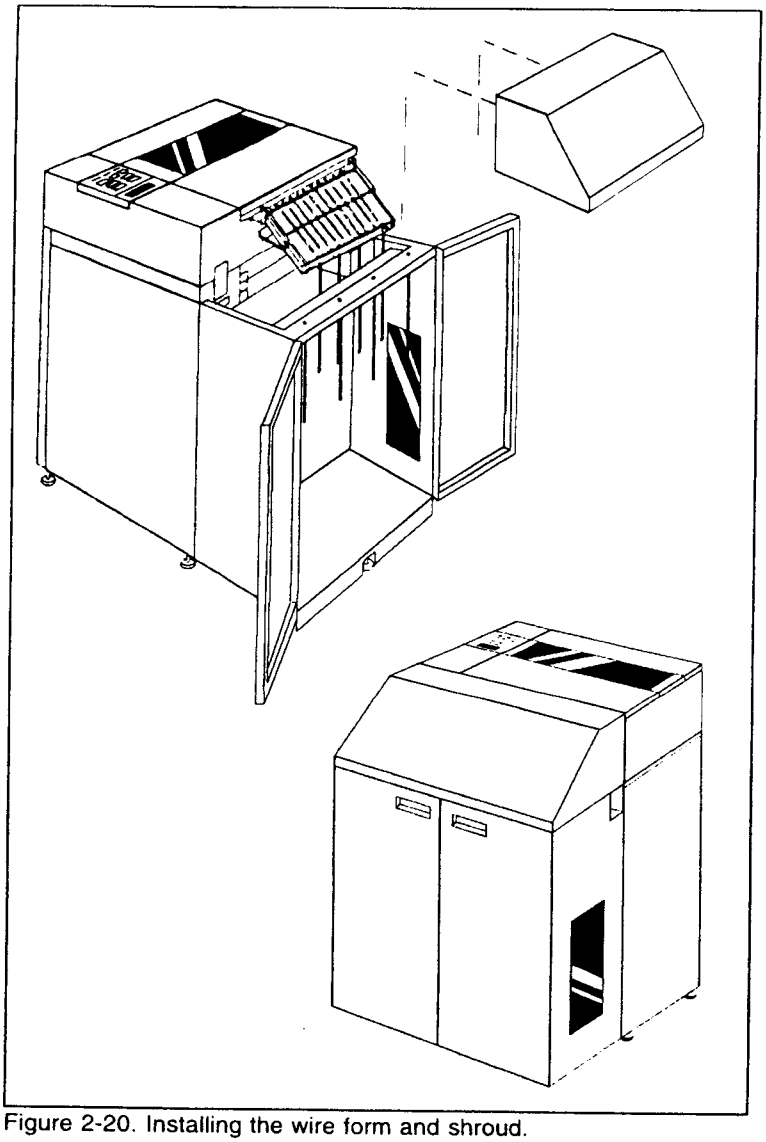


Figure 2-20. Installing the wire form and shroud.

j. Open the enclosure doors. Center the paper tray directly against the back of the printer and under the paper (Figure 2-21).

k. Make sure all eight chains hang freely inside the basket (Figure 2-21.

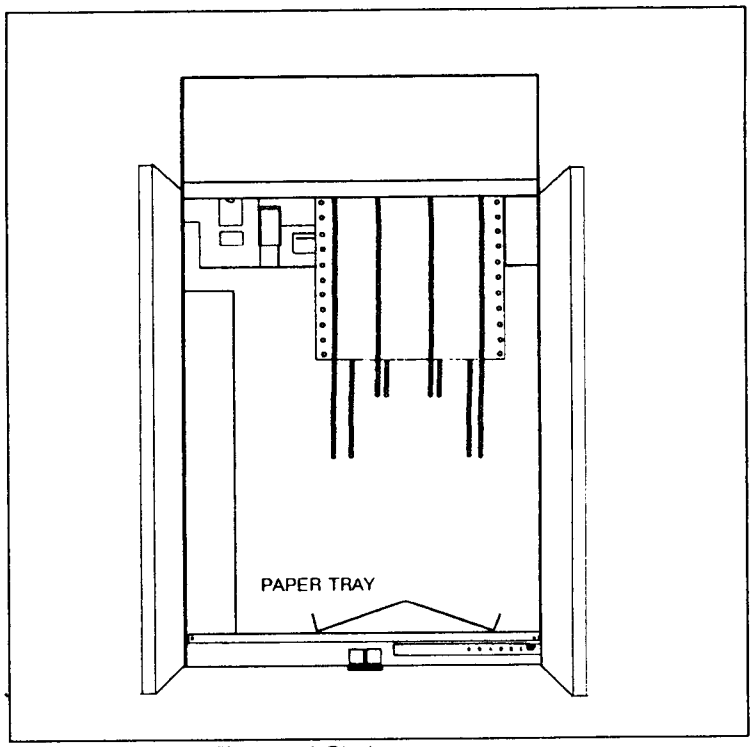


Figure 2-21. Paper Tray and Chains.

l. Roll the printer into its operating location, lower its five leveler feet until they contact the floor, applying a light pressure to the floor to help stabilize and level the printer. Use a 9/16" or 15 mm end wrench to turn the leveler jam nuts.

m. At the rear of the printer, set the ON/OFF Switch to OFF position and connect the power cord and system I/O cable. Route the I/O cable and the power cord through the cable clips inside of the sound enclosure.

COMPLETING THE INSTALLATION

a. Ensure the printer's operating location provides adequate operator access to both the front and rear of the printer (1 meter -3 feet- in the front and rear is recomended).

b. Refer to the appropriate Interface and Operator's Manual for step-by-step instructions in completing the printer installation, including ribbon and paper loading and adjustment, printer and I/O configuration, and initial verification self-test.

c. Install the ribbon and load the paper into the printer (see Operator's Manual).

2-4. SELF TEST

The printer must be OFFLINE to perform the self test function. Pressing the ONLINE key will bring the printer to an OFFLINE status. To perform the complete self test function press the menu key until you see the SELF TEST menu. Press SELECT to go into this menu (you can roll through all the tests by pressing the MENU key). Select CONTINUOUS or ONCE with the UP or DOWN keys, then press SELECT to perform the test.

When Self Test completes and no errors are detected, the printer returns to the status mode (see Table 4-5). If an error occurs during Self Test, an error number message is displayed, and the error led flashes on the printer's Control Panel. Refer to Chapter 4 of this manual for more information on Self Test.

2-5. PRINTER CONFIGURATION

The HP2300 is configured entirely from the Control Panel. Refer to Chapter 4 of this manual for more information on configuring the printer.

2-6. I/O CONFIGURATION

The HP2300 printer may be configured with several different interfaces. Each interface is configured differently and its interface self test function may be initiated differently. If the HP-IB interface is installed, refer to paragraph 2-7 "HP-IB Interface Configuration" for a quick reference. For other interfaces, refer to paragraph 2-8 "Compatibility Configuration Mode" for a quick reference and to the appropriate Interface Manual, listed below, for specific configuration and Self Test information.

NOTE

If the printer contains an HP-IB interface, the "Unit Loads" must be set to conform the overall system. Refer to the HP-IB interface Manual.

Centronics Parallel Interface Manual	P/N 26067-90906
HP-IB Interface Manual	P/N 26067-90901
RS232/422 Interface Manual	P/N 26067-90921
Dataproducts Interface Manual	P/N 26067-90907
Super Centronics I/F	P/N 26067-90957
Multiple I/O Manual, RS232/422/Supercentronics	P/N 02563-90976

2-7. HP-IB INTERFACE CONFIGURATION

If the HP-IB card is installed the following submenus within the I/O CONFIG menu will appear:

HP-IB I/O
The HP-IB interface has been identified by the printer.

HP-IB Address
Used to select the HP-IB address, it can be any number from 0 to 7. Factory default is: HP-IB ADDRESS 7.

HP-IB Protocol

There are 3 HP-IB protocols that can be used:

CIPER MODE
BLOCK MODE
CHARACTER MODE

Factory default is: HP-IB PROTOCOL CIPER MODE.

A message "Reconfigure to XXXXX mode" will appear followed by "INITIALIZING" for approximately 7 seconds whenever a new HP-IB protocol is selected.

Ciper mode is used for:

HP1000 A/E/F/M
HP3000 3X/4X/6X/7X
HP9000 SRM
HP9000 500 series direct
HP9845B/C SRM

Block mode is used for:

HP250/260
HP64000

Character mode is used for:

HP9000 (200 series direct connect).

NOTE

Character has no recovery mechanism and returns no status to the CPU, therefore the console will NOT report printer status errors such as paper out or transmission problems.

Refer to the *"HP-IB Installation and Operation Manual, P/N 26067-90901"* for more detailed information.

2-8. COMPATIBILITY CONFIGURATION MODE

This mode of operation is entered automatically when the installed Interface and/or Label Card is not identified by the formatter.

Upon entering this mode, the front panel will display either:

UNKNOWN I/O
or
UNKNOWN GRAPHICS

When either of these messages are displayed, the control panel keyboard is locked for a few seconds, after which the control panel message switches to either:

CONFIG. BYTE 20
(for the interface PCA)
or
LABEL CARD DISABLE
(for the graphics PCA)

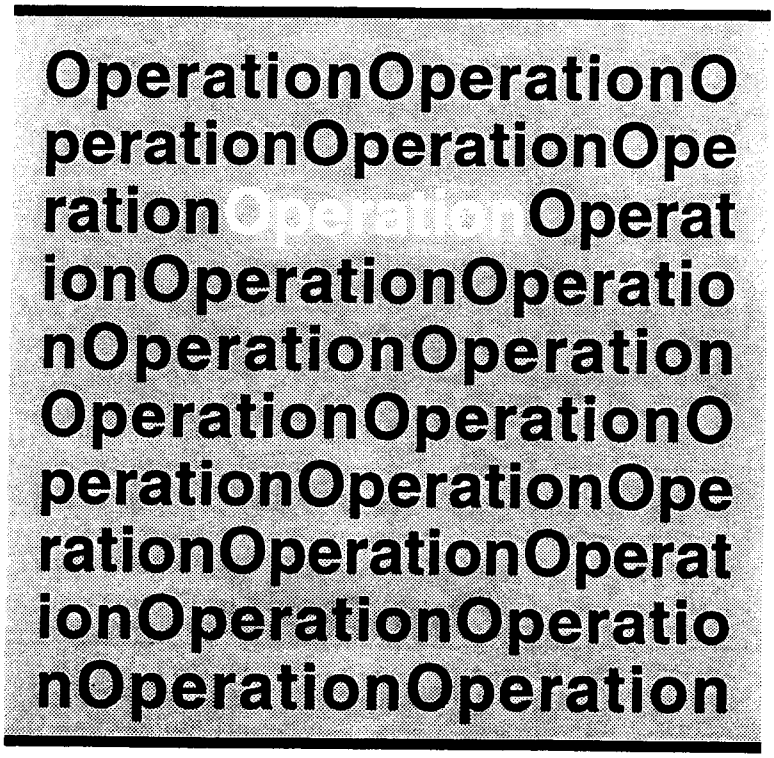
Use the UP and DOWN keys to move to the next configuration byte. Once you are on the appropriate byte to configure, enter the hexadecimal number as listed in the installed Interface or the appropriate Label Card Installation and Operation Manual.

A third message could be displayed if no I/O Interface or no Graphics Card was installed:

NO I/O FOUND
or
NO GRAPHICS CARD

Chapter 3

Theory of Operation HP2300



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3-1. INTRODUCTION

This section of the manual is intended to provide a generalized functional understanding of the HP2300 family of printers and provide the service representative with an understanding of the functions of the printing process. A generalized block diagram of the printer is shown in Figure 3-1. Each component (general block) of Figure 3-1 is further diagrammed and explained in this section of the manual. The following topics are discussed in this chapter of the manual:

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	HORIZONTAL MOTION OF THE PRINT BAR (MOGATION)	3 - 4
	DOT POSITIONING	3 - 4
	PRINT SPEED	3 - 7
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3-8.	STEPPER MOTOR CIRCUITRY (ANALOG PCA)	3 - 30
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3-2. FUNCTIONAL OPERATION

The HP2300 printer uses dot matrix printing to create printed characters and graphics. The dot matrix print concept is based on the positioning of combinations of dots within a matrix (see Figure 3-2); different matrices represent different characters. The basic functions in dot matrix printing are as follows:

ENERGIZING OF THE PRINT BAR HAMMERS

The print bar assembly contains 66 individual hammers (steel tines); each print bar hammer is responsible for printing across two character positions. When not printing, all hammers are drawn away from the paper by permanent magnets in the print bar assembly. To print a dot, an electromagnet behind each print bar hammer is energized. The electromagnet provides an opposing magnetic field which overcomes the field of the permanent magnet and releases the hammer allowing it to snap forward. A hardened stylus near the tip of the hammer strikes the ribbon against the paper and platen, printing a dot.

HORIZONTAL MOTION OF THE PRINT BAR (MOGATION)

To generate a horizontal row of dots, the print bar must oscillate back and forth. The lateral motion of the print bar is the result of a unique flexible crank system. As the DC motor rotates, the counterweights and the print bar are forced to move in opposite directions through the action of an eccentric crank and flexible connection rods, thus balancing the motion of the print mechanism. The print bar and counterweight are mounted to the printer frame through steel flexures. The print bar/counterweight/flexure system is designed to operate near resonance to decrease the motor current requirements. In the rest position, the print bar is positioned at the center of its travel.

DOT POSITIONING

The dot matrix data is printed one dot row at a time as the print bar moves from left to right or from right to left. After a dot row has been printed, the paper is advanced by the stepper motor and the next dot row is printed as the print bar moves in the opposite direction. Each dot row consists of a segment of all dot matrices associated with the line of print. All dot row data is generated during the print bar turnaround interval by the Formatter PCA's Dot Generation Logic.

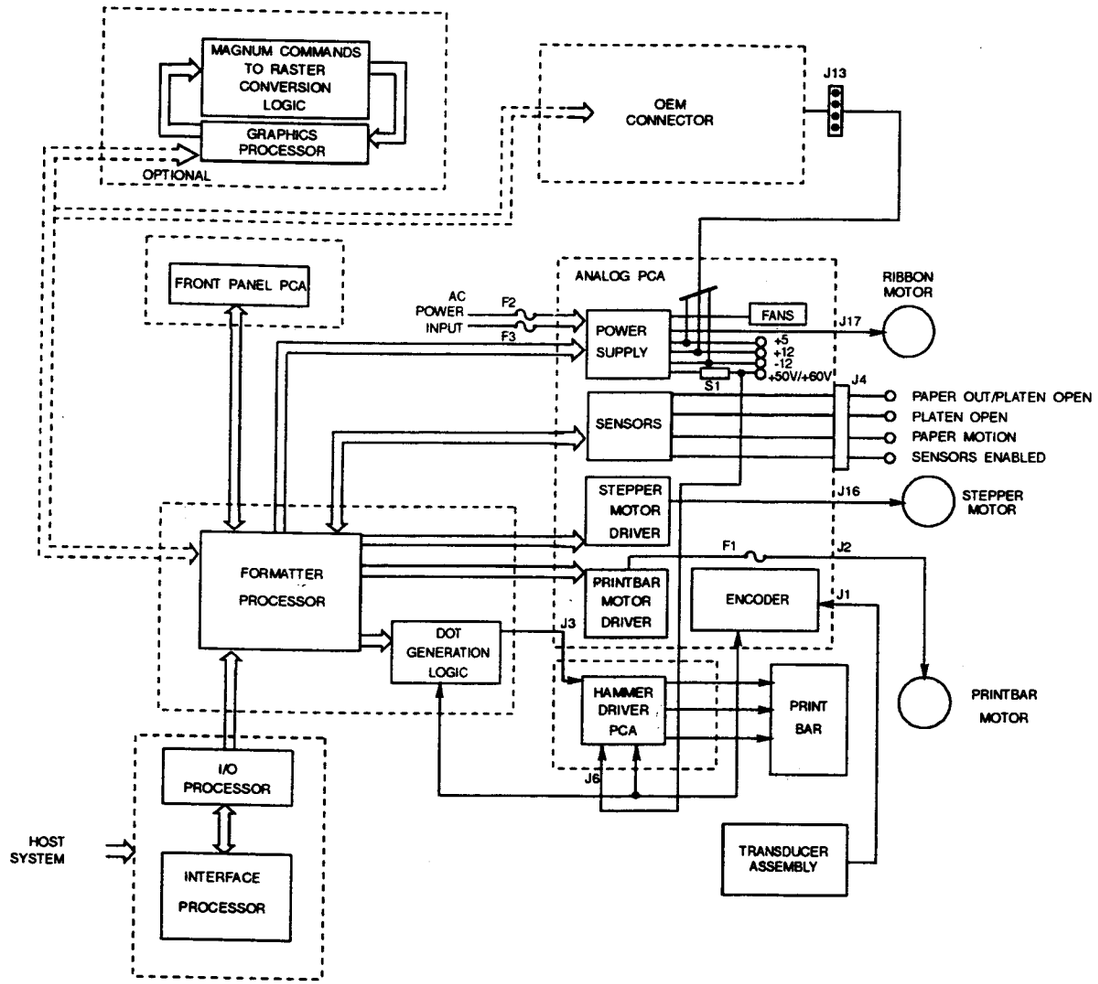

Figure 3-1 HP2300 Block Diagram

Horizontal dot placement

Each character cell has a total of 21 possible dot positions. Since each print bar hammer is responsible for covering two character cells, there are a total number of possible dot positions of 42 per hammer. Since the print bar is oscillating quite fast, the hammers can physically print in only one of every three positions during a single pass of the print bar. This allows for a maximum of 14 dots for the two character cells, or seven dots per cell.

The maximum number of dot positions per character cell equals 21; the total number of dot positions which a hammer could print equals 42 (two character positions times maximum 21 dots per character cell). Although 42 positions are available for printing, the print bar hammers can physically print in only one of every three positions during a single pass of the print bar (maximum of 14 dots) per hammer.

Vertical dot placement

To provide vertical dot columns, the paper must be advanced past the print bar assembly. The HP2300 uses a stepper motor to advance paper. Normal density printing requires that the stepper motor advance the paper a full step (1/72 inch) between dot rows. For high density printing (near letter quality) the paper is advanced one-half step (1/144 inch) between dot rows (see Figure 3-2).

PRINT SPEED

The printer has several different possible print modes which affect the horizontal placement of dots on the page. These include draft, normal and high density print in 10, 12, 13.3, 15 and 16.7 CPI. Other print modes include bar codes and raster graphics. When the printer is directed to run in one of these modes by the selection of a particular character set, the Formatter processor determines the appropriate number of passes in which to clock the dot data out to the hammer driver circuitry. The grid used for dot placement can range from 70 to 210 dots per inch (or 14 to 42 dots per hammer -see Figure 3-2). Since each print bar hammer is physically capable of printing only one of every three positions during a single pass of the printbar, characters that require more density than this (for instance a dot every other dot) will have to be printed by multiple passes of the printbar. This has a negative effect on print speed.

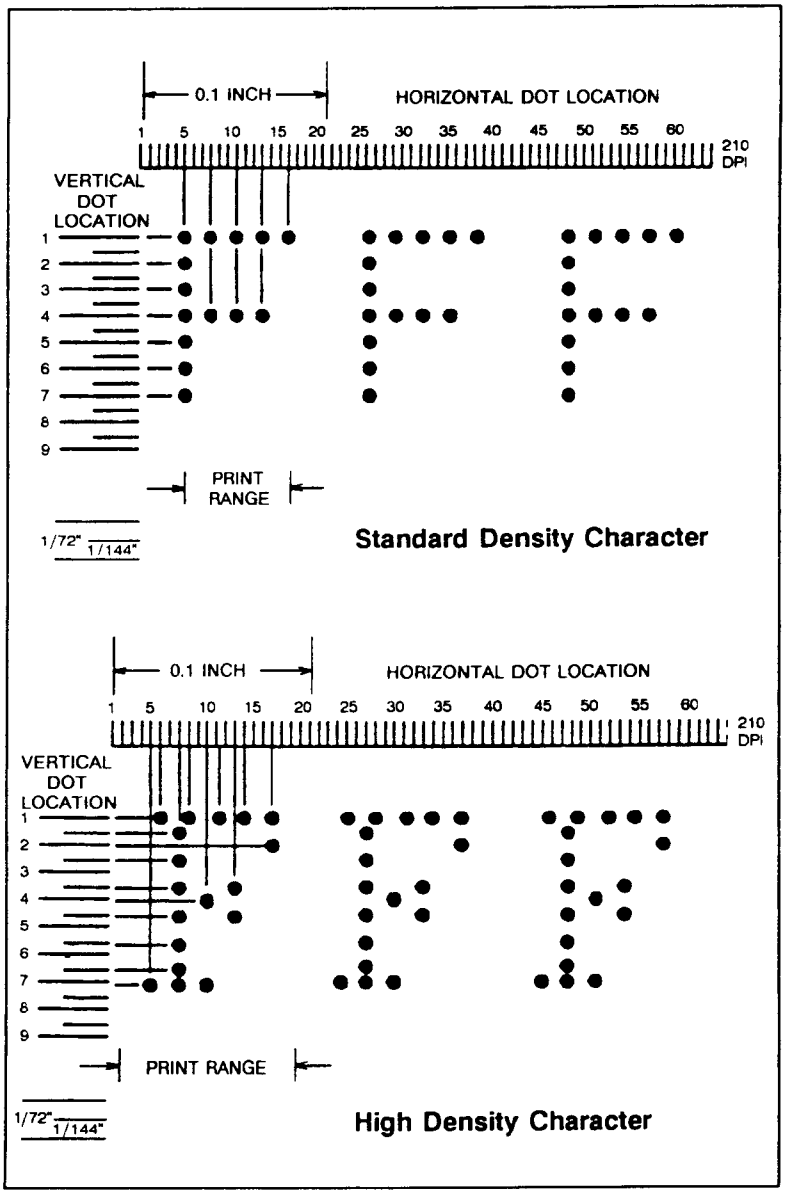

Figure 3-2. Dot Matrix Printing

Vertical dot placement is also affected by the print mode in a similar manner (see Vertical Dot Placement, above). In addition, the use of all upper case, or a mixture of upper and lower case characters also affects print speed. When printing all upper case characters, the printer addresses only 7 vertical dot rows (14 rows in high-density mode). When printing lower case characters, the character descenders (the portion of a lower case character that is below the base line, such as the lower portions of the letters "y" "g" and "p") require two extra vertical dot rows (four in high density mode). Therefore print speed is slowed when mixing upper and lower case characters.

To print text or graphics, all basic functions of dot matrix printing (hammers energizing, print bar moving, and paper advancing) must work synchronously. These functions are coordinated by the Formatter PCA's microprocessor.

3-3. FORMATTER PCA

The Formatter PCA is the "brains" of the printer, in that it directs all processes within the printer. This PCA consists of two major operational blocks: the Processor/Control circuitry and the Dot Generation Logic (DGL). The following section discusses the processor/control circuitry and then the Dot Generation Logic is discussed in Section 3-5. Figure 3-3 shows a layout of the Formatter PCA.

3-4. PROCESSOR/CONTROL CIRCUITRY

The Processor/Control circuitry consists of an 8086-1 microprocessor, 256kB of ROM (Read Only Memory), 16 kbytes of RAM (Random Access Memory), a Triple Timer Chip, buffers, decoders and a clock generator. The major functions of this circuitry are as follows:

Manage all memory.

Coordinate the activity of the other processors (Dot Generation Logic, Interface, and Graphics).

Process the data from the interface PCA and direct it to the appropriate sections of the printer.

Monitor all printer operations such as ribbon control and Control Panel functions.

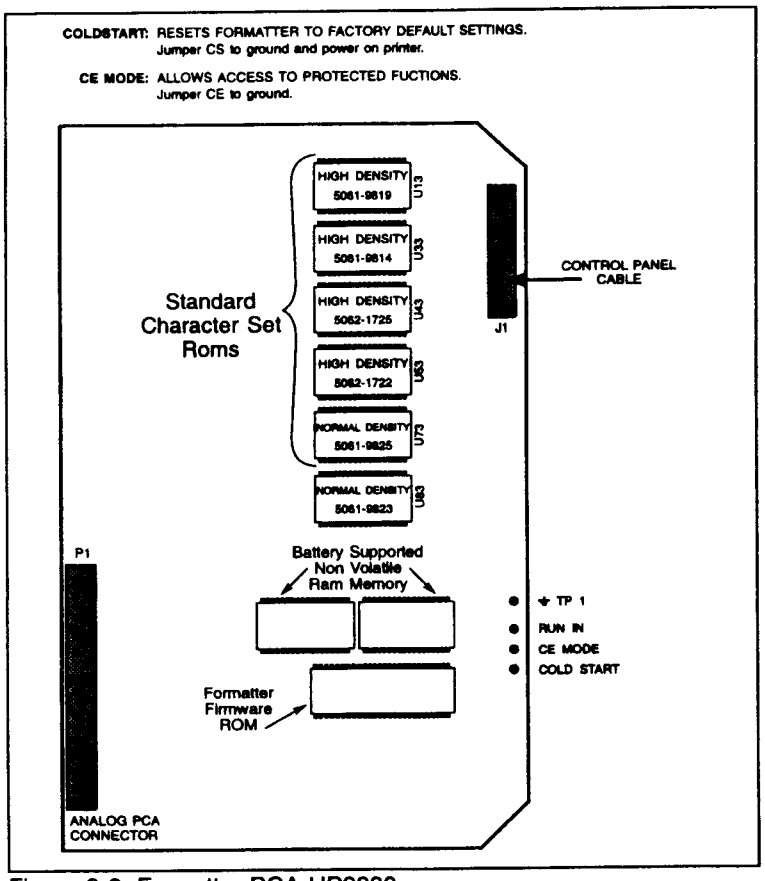

Figure 3-3. Formatter PCA HP2300

The 8086-1 microprocessor is used as the printer's main control processor, executing the printer functions as defined in the firmware (ROM). The 8086-1 also coordinates the activity of the other printer processors and digital subsystems.

MEMORY MANAGEMENT

The printer consists of several different processors that are responsible for unique operations (distributed processing). The Formatter PCA's processor communicates with the other processors via shared RAM, and is responsible for all memory management in the HP2300 This

responsibility requires that the Formatter processor communicate with the DGL (Dot Generation Logic), the interface, and (if installed) the Graphics PCA's RAM (Figure 3-4).

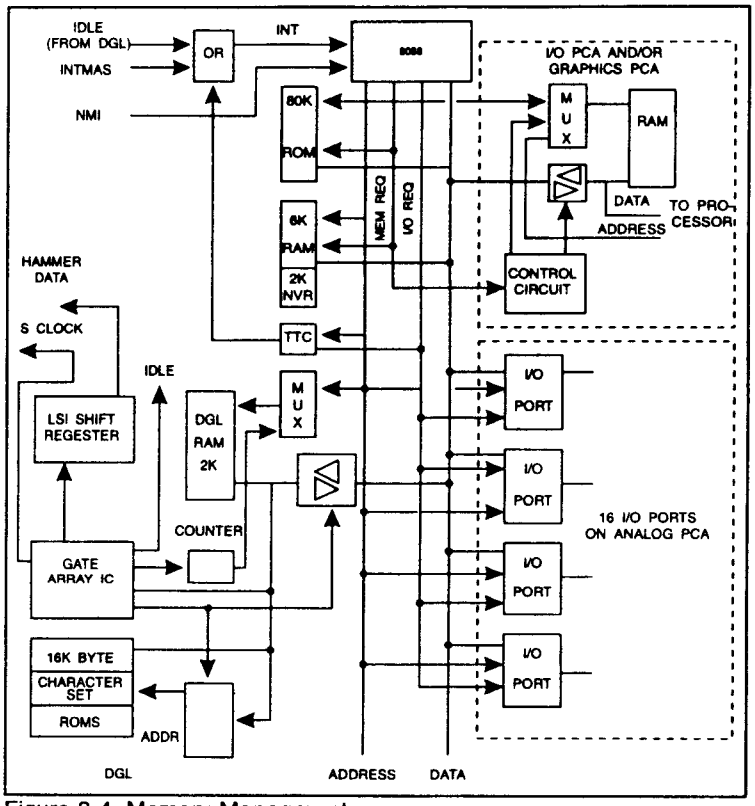

Figure 3-4. Memory Managment

The Formatter processor must access 282 kbytes of memory, which breaks down as follows:

ROM: 256kB, located in one 131,072x16-bit EPROM (Erasable Programmable ROM).

RAM: 16 kbytes, located on the Formatter PCA.
2 kbytes, also on Formatter PCA, but shared DGL RAM.
4 kbytes, located on the Interface PCA.
4 kbytes, on the optional Graphics PCA.

The Formatter's 16 kbytes of RAM are reserved as scratch memory, used by the processor for temporary storage purposes. All of this memory is non-volatile. This memory is used to store configuration information (on/print meters, interface configuration, primary/secondary languages, lines-per-inch, online/offline state, form length, etc.).

Memory mapped interface ports are used by the Formatter to communicate with the machine control hardware (all analog electronics, the DGL, the position encoder, the Control Panel, etc.). These are used in conjunction with the shared RAM.

PROCESSOR COMMUNICATION

The Formatter processor functions in conjunction with the other printer processors (Interface, DGL and Graphics), coordinating their activities. Each independent subsystem has RAM that is shared with the Formatter processor. The Formatter has the capability of accessing any address within the three shared memories (Figure 3-4).

Communication between the master (Formatter processor) and the slaves (other processors) is handled through these shared memories. Specific locations in the shared memories (except the DGL) are dedicated to the master and to the slave and are reserved for messages. At periodic intervals (or when directed by an interrupt) the master or the slave reads the messages placed in these locations. These messages direct either the master or the slave to a memory packet which provides specific instructions.

There are six possible interrupts to the Formatter processor: (1)timer 0, (2)timer 1, (3)timer 2, (4)DGL idle, (5)backplane, and (6)Non Maskable Interrupt. These are all channeled through discrete TTL logic, which serves as an interrupt controller. Interrupt priority is determined by vector addresses in a RAM based interrupt vector table. A triple timer chip with three independent timers allows high resolution, two millisecond, and one hundred millisecond timing capabilities respectively. The high resolution timer is primarily used for stepper motor timing. The Formatter processor services interrupts at the completion of its current instruction. In addition, the processor uses a Non Maskable Interrupt (NMI) through which the Analog PCA indicates that a valid dot position has been reached (refer to Section 3-7 for more detail).

CLOCKING

Clocking for the 8086-1 is provided by an 8284-1 Clock Generator IC which uses a 30 MHz crystal to generate an 10 MHz and a 5 MHz clock. The 10 MHz clock is used by the 8086-1. The 5 MHz clock is used by the Triple Timer Chip (to produce a 500 kHz clock).

3-5. DOT GENERATION LOGIC

The Dot Generation Logic (DGL) is responsible for calculating and buffering dot/bit image data for each row of print. The dot row consists of a cross-sectional segment of each character of the print line. All dot-image data is processed by the DGL during the printbar turnaround period (the time period, during printbar oscillation, when the printbar is changing direction).

The Formatter processor, using the turnaround period as an indicator, coordinates the flow of data to the DGL for processing. A scenario of the Formatter and DGL interaction follows:

The formatter processor recognizes that data is present on the interface PCA's 4 kbytes shared RAM. During the start of the next print line period, the Formatter processor moves the data from the interface RAM and puts it in the DGL's shared RAM via character identification bytes (at 2 bytes per printed character).

The first byte (see Figure 3-8) input into the DGL's shared RAM defines the ASCII character to be printed and whether or not the character is to be underlined. The second byte determines which character set is to be used (character set code) and the character width. All characters associated with a line of print (maximum of 220) are stored in the DGL RAM; any space remaining after the line data has been loaded is filled with ASCII blanks (20 hex).

As the printbar enters turnaround, the DGL begins generating the next dot row of data. The Formatter processor initiates DGL operation by sending four bytes to the DGL circuitry: Mode One Byte, Mode Two Byte, Mode Three Byte and the Command Byte.

Mode One Byte, bits zero through three, indicate which horizontal dot row is being printed (see Figure 3-9). Bits four and five indicate what block of shared RAM contains the data. Mode Two Byte defines the horizontal grid density at which the dot row of data is to be printed.

Mode Three defines the number of characters the DGL should access from the shared RAM buffer (maximum 220). The Command Byte specifies how the DGL is to process the data in RAM (e.g. expanded, variable grid, descender scan, alternate row, underline enable, text or graphics, and the printbar direction).

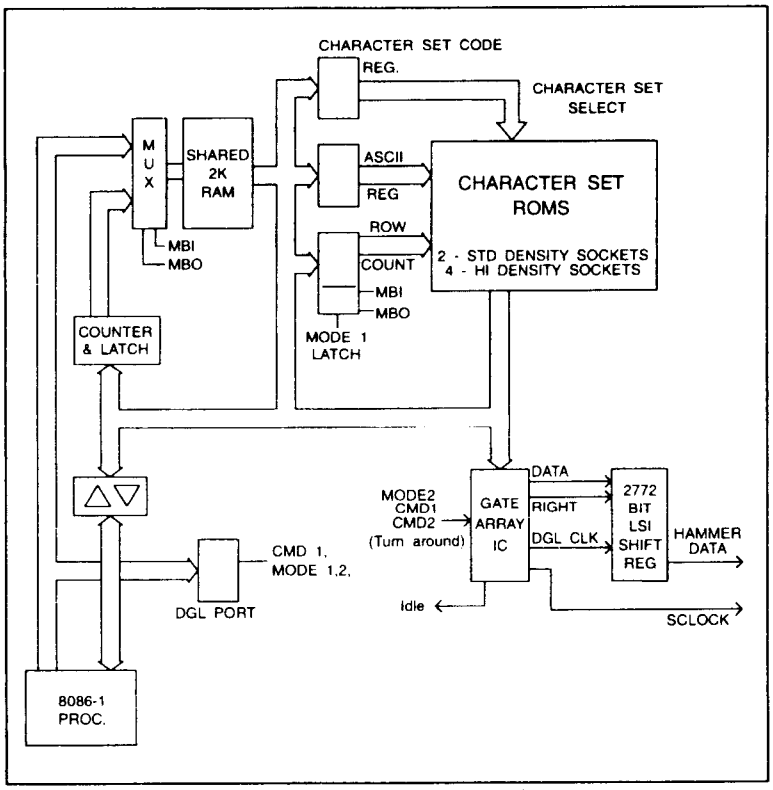

Figure 3-5. Formatter PCA Dot Generation Logic

Processing begins as the DGL removes the character identification data from the shared RAM. A gate array addresses the data in the shared RAM and uses it to address the appropriate section of the character set ROM bank. This gate array then takes the character set output and, in conjunction with the command byte, serializes the dot/image data and passes it to the 2772 bit LSI (large scale integration) shift register. These dot/image bits are input in an order representative of each bit's location in the dot matrix character cell. Each character pertaining to a line of

print is processed in a similar manner. The end result of the DGL's processing is the inputting of a cross-sectional segment of each character in the next line of print into the 2772 bit shift register. This data represents one horizontal dot row which is to be printed by the printbar.

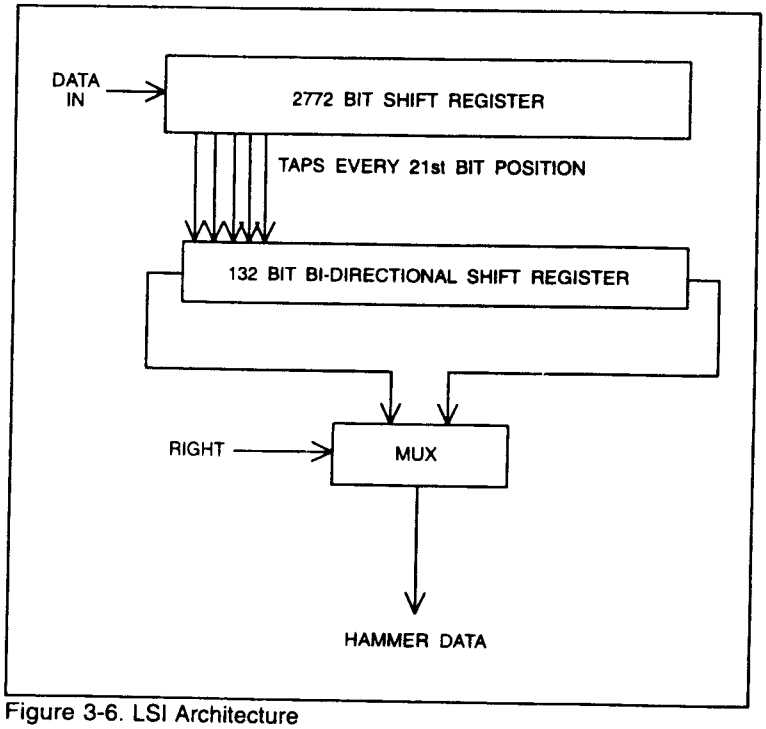

Figure 3-6. LSI Architecture

All data must be processed during printbar turnaround. At the completion of DGL processing, the DGL IDLE line interrupts the Formatter processor. It should be understood that the shared 2 kbytes RAM is filled only once for every line of data; however, the DGL processes the data one dot row at a time. The Formatter processor must issue a new Mode One, Mode Two and Command byte after each pass of printbar to update the dot image for the next row.

During one pass of the printbar, the Formatter processor strobes the DGL shift and load signal lines. The DGL shift line allows the Formatter processor to select the appropriate 132 dot/image bits (one bit for each column position) to be sent to the Hammer Driver PCA while the DGL load line actually initiates the sending of the dots.

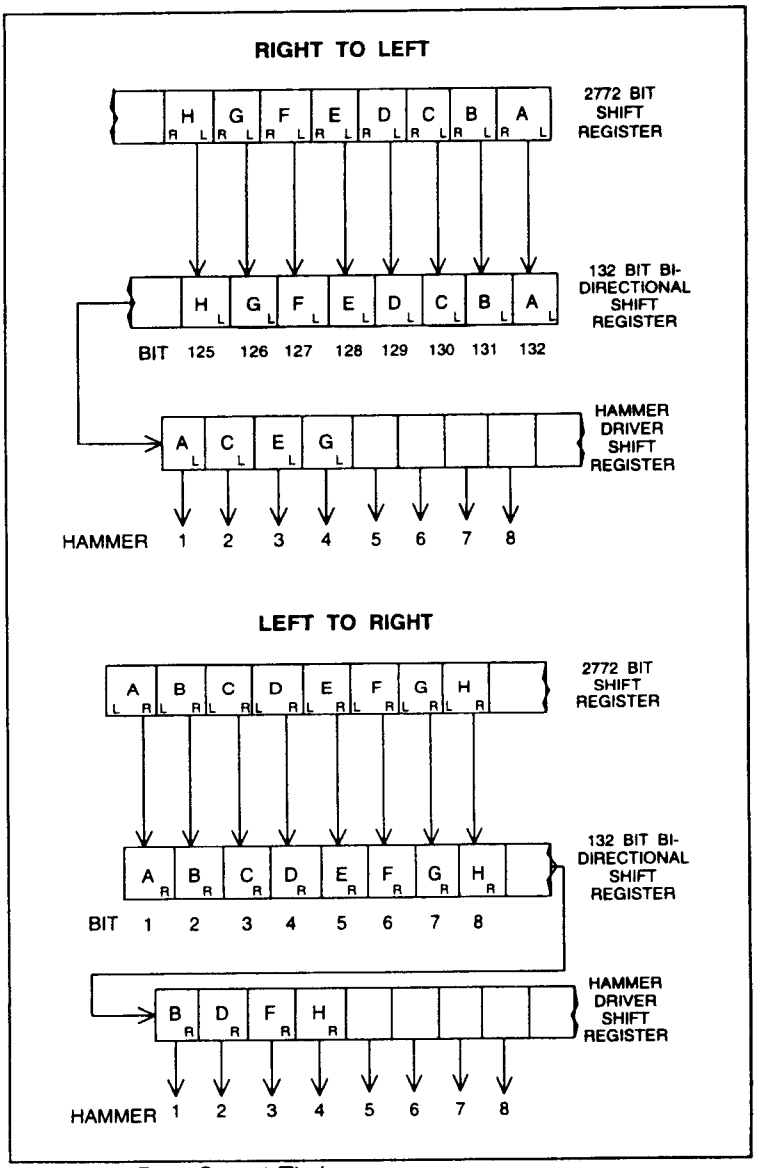

Figure 3-7. Data Output Timing

This technique is useful during "multipass" in which one dot row is printed during multiple passes of the printbar, each single pass selecting which dots are to be printed from the 2772 bit shift register. The 2772 bit shift register must be reloaded after every printbar pass.

The Formatter processor is interrupted after every hammer fire. After the printbar hammers have fired, this shifting process is repeated. The DGL shift line allows the Formatter processor to select the next dot column in the character cell while the DGL load line allows the Formatter processor to send this column of 66 dots to the Hammer Driver PCA. During this time, the printbar (and thus the hammers) have also moved to the next dot position. The entire process is repeated until all dot/bit data (maximum of 42) for each printbar hammer has been selected. During the next printbar turnaround, the next dot row is loaded into the 2772 bit shift register.

As mentioned, the processed DGL data is placed into a 2772 bit shift register during printbar turnaround. This register is within a large scale integration (LSI) circuit on the Formatter PCA and contains a dot storage position for every possible dot that could be printed during a single pass of the printbar (maximum 132 characters per line X maximum 21 dots per character). The 2772 bit shift register is designed so that every 21st bit (i.e., 1, 22, 43 ... 2751) may be tapped and loaded in parallel into a 132-bit bi-directional shift register (output register) that is also located within the LSI integrated circuit.

To utilize the data in the Output Register, the data must be shifted from the Output register to the Hammer Driver shift register in between each occurrence of the hammer fire pulse.

Character identification byte definitions

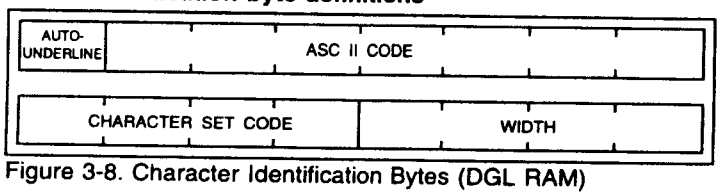

Figure 3-8. Character Identification Bytes (DGL RAM)

BYTE 0: Auto Underline Bit (AU)

The Auto Underline Bit, when set, indicates to the DGL that the ASCII character corresponding to the bit is to be underlined (provided the Underline Enable Bit (ULE) is set in the Command byte). If ULE and AU are set the DGL then sets row 9 (16 if high density is selected) to be an underline.

ASCII Code

These bits are the 7 bit ASCII code for the desired character. They are used to address the appropriate section of the desired character set ROM. In graphics mode (TEXT bit set to 0 in the command port), byte 0 is not used.

BYTE 1: Character Set Code

The HP2300 may contain up to 16 different character sets on the Formatter PCA. They are selected when the 8086-1 directs the DGL, through the Character Set Code, which character set to use. Recall that all 16 character sets are contained within the 6 128 kbit EPROMs.

WIDTH

The width bits are used by the DGL to serialize the dot data from the character set EPROMs. The width bits correspond to the desired cell density (21, 20, etc.).

In graphics mode, byte 1 contains the raster data for each successive printer dot position. Since there are 924 possible dots in a raster line, 115.5 bytes are required to hold the raster data (924/8 = 115.5).

Mode 1, mode 2 and mode 3 byte definitions

MODE 1: MB0, MB1, MB2

The common DGL RAM is divided into four 512 Byte blocks each containing the 2 character identification bytes for each line of print.

The first 512 bytes contain the first print line, the second 512 contain the overstrike character line for the first line of print. The other two 512 byte

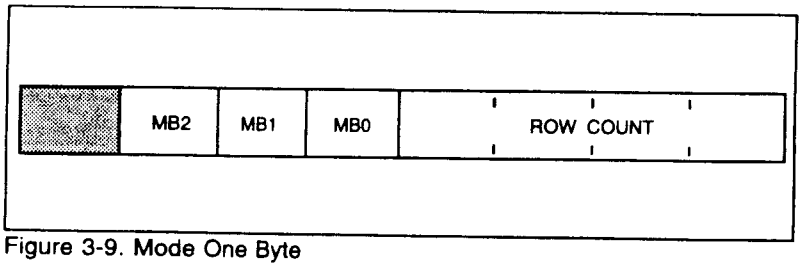

Figure 3-9. Mode One Byte

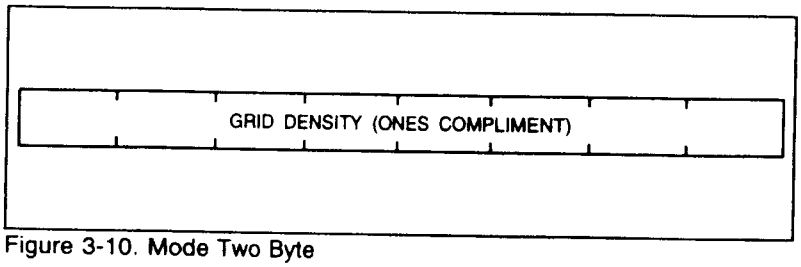

Figure 3-10. Mode Two Byte

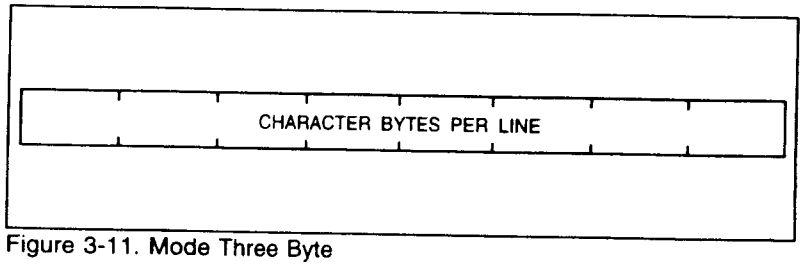

Figure 3-11. Mode Three Byte

blocks contain the same information for the second line of print. MB0 and MB1 are used by the DGL to identify on which block the character data resides. MB0 and MB1 are only used to access the shared DGL RAM buffers.

ROW

ROW indicates which dot row of the current character code the DGL is processing. The DGL uses ROW to address the correct area of the character set ROM.

MODE 2: Grid Density

When the EGRID bit of the command byte is set, the DGL reads the Mode 2 byte into the gate array. This byte indicates the grid density at which the line is to be printed. If the grid density is other than 210 dots per inch (DPI), the gate array "pads" the data it inputs to the LSI chip so the data is then printed correctly. For example, if the grid density is 200 DPI the gate array must pad every twenty-first bit with a zero. If the EGRID bit is not sent the density is assumed to be 210 DPI.

MODE 3:

Character bytes per line. Value 0 (zero) if left direction in command byte, Mode 3 value if right direction in command byte.

Command byte definitions

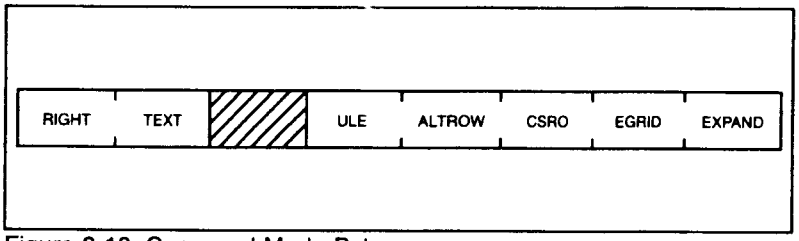

Figure 3-12. Command Mode Byte

RIGHT:

The RIGHT bit indicates which direction the printbar will be moving on the next pass. This information is used by the DGL to put the data in the LSI shift register in the correct orientation. 0=left-to-right direction, 1=right-to-left direction. Note that RIGHT means the printbar is moving toward the left!

TEXT:

The TEXT bit indicates if the data in the DGL RAM is raster data (TEXT=0) or ASCII characters, (TEXT=1).

CSR0:

If the CSR0 (0 = zero) bit has been set in conjunction with other bits, this indicates to the gate array one of two activities:

The processor wishes to read a particular address in the character set ROM and the address is specified in the first two locations of the shared RAM.

The DGL is to read through the characters specified in the shared RAM and then indicate to the processor if any descenders are in the line.

ULE:

When the Formatter processor sets the Auto Underline (AU) bit in Byte 0, this indicates to the DGL that the corresponding character is to be underlined. If the Underline Enable (ULE) is not set, the DGL ignores the AU bit. This method of underlining transfers the burden of underlining from the Formatter processor to the DGL.

ALTROW:

The ALTROW (Alternate Row) bit, when set, indicates to the DGL that the current character line is high density and that 18 dot rows per character are to be processed instead of 9. (High density character sets can have twice as much information as normal density. ALTROW is used to select this other information.)

EXPAND:

When double width characters are desired, the EXPAND bit is set. Then, as data is being sent to the 2772 bit shift register, the DGL's gate array state machine switches the output through shift register and logic circuitry. This circuitry duplicates the actual dot/bit image data, and then interleaves the duplicated dot/image data with the original data stream.

EGRID:

When the EGRID bit is set, the DGL is directed to read the MODE 2 byte. If it is not set, the DGL is to use 210 dots per inch as the dot density in its grid circuitry.

Status byte definitions

The DGL Status Byte allows the Formatter processor to determine the results of a DGL descender scan.

DOT ROW 8:

0 = No descenders in dot row 8.
1 = Descenders in dot row 8.

DOT ROW 9:

0 = No descenders in dot row 9.
1 = Descenders in dot row 9.

EXCURSION:

0 = Character does not have active dots outside the center 13 in a 21 dot wide cell.
1 = Character does have active dots outside the center 13 in a 21 dot wide cell.

SRO:

When set, shift register output is used for self-test purposes.

3-6. ANALOG/BACKPLANE PCA

The Analog PCA contains the following functional printer circuits: the control interface, the stepper motor drive, the printbar motor drive, the position encoder and the printer power supply. Each functional block of this PCA is discussed in the remainder of this section of the manual. Figure 3-13 illustrates functional blocks of the Analog PCA. There is a switch located on the middle front edge of the Analog PCA to select the correct DC voltage level for the model number of the printer. Switch S1 should be positioned so that the switch tab is towards the rear of the printer (in the CEDAR/+50V position) for the 840L and towards the front of the printer (in the GUAYACAN/+60V position) for the 1100L.

FUSES

The Analog PCA has all three fuses in the printer. Fuse F1 protects the printbar motor and the printbar motor circuitry (See paragraph 3-9). It is located close to connector J2 (Figure 6-6). F2 and F3 are powerline overvoltage AC fuses (Figure 3-13). These are located inside the fuse drawer under the power switch (Figure 2-14).

PCA CONNECTOR'S

The Analog PCA also functions as the printers motherboard. It has connectors for:
- Formatter PCA
- Graphics Card
- Interface PCA
- OEM PCA's (ANZAC)

A power connector is provided for OEM PCA's (Figure 6-5).

NOTE

If the formatter PCA is not plugged in connector J10 (Figure 6-5), the printer will not work properly. The I/O and Graphics PCA's are normally connected as shown in Figure 6-5, however, some OEM's may use different slots for the I/O and Graphics PCA's.

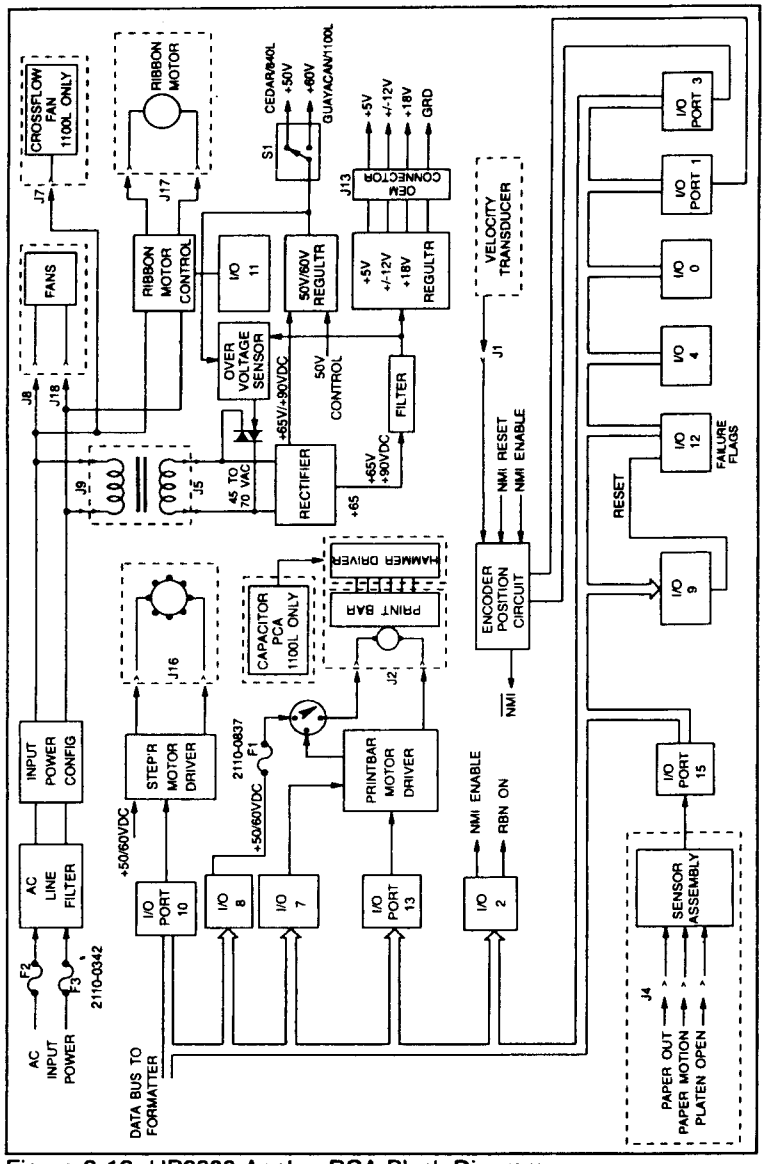

Figure 3-13. HP2300 Analog PCA Block Diagram

3-7. I/O PORTS (ANALOG PCA)

The Formatter PCA's microprocessor controls and monitors all machine control functions of the HP2300 printer. All tasks are defined in the Formatter PCA's firmware and executed by the microprocessor through the input/output control circuitry contained on the Analog PCA. The port selection and command and status information are transferred between the formatter processor across the data bus. Input/output port selection is determined by decoding of the processor address bits A0, A1, A3, and A4. All processor/backplane interface functions are summarized on the following pages.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 0	HAMMER DRIVER CLEAR	(Write) (or) (Read)	-	-	-	-	-	-	-	-

Writing to this port clears the shift registers on the Hammer Driver PCA.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 1	ENCODER RANGE D/A	(Write)	MSB							LSB

This byte controls the maximum voltage swing of the encoder position D/A. This adjustment is necessary to compensate for the variation in velocity transducer gains.

00 = +/-3.0 V Range
80 = +/-5.0 V Range
FF = +/-7.0 V Range

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 2	POWER FAIL RESET	(Read) (or) (Write)	-	-	-	-	-	-	-	-

Accessing this I/O address resets the Power Fail Interrupt Flip-Flop. This flip-flop is set active by the power fail sensing circuit which pulls the /INTMAS line low. When the processor interrogates the

backplane by lowering the /INTACK line, D0 of the data bus is pulled low, indicating that the powerfail warning is active. After the interrupt is serviced, Port 2 should be strobed to clear the interrupt signal. Note that at power up, the Power Fail Flip-Flop needs to be initialized (reset).

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 3	ENCODER POSITION D/A	(Write)	MSB							LSB

Writing this byte to this port sets the voltage to which the position signal is compared against. When the two compared voltages are equal, an NMI and a Print Strobe are generated. Note that the position NMI is enabled by setting bit D2 of port 11.

00 = - Range Set by Encoder Range D/A
80 = 0 (see port 1)
FF = + Range Set by Encoder Range D/A

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 4	POSITION (NMI) RESET	(Read) (or) (Write)	-	-	-	-	-	-	-	-

Access of this address resets the NMI flip-flop. This tri-states the buffer which drives the NMI line. The input of the buffer is controlled by bit D2 of port 11. Therefore, interrupts are disabled when this bit is set low.

PORT 5&6	NOT USED									

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 7	PRINTER DRIVE ENABLE	(Write)	-	-	-	-	-	-	-	1/0

Bit 0 of this port controls the printbar drive motor. When this bit is high the drive is enabled. Note that the supply must be enabled in order for this drive to operate.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 8	POWER SUPPLY ENABLE	(Write)	-	-	-	-	-	-	-	1/0

Bit zero of this port controls the +50/+60 volt power supply. When this bit is high the supply is enabled. Note that the Hardware Failure Latch must be free from errors before this supply can be enabled. Once enabled there can be up to a 1.5 second delay before the voltage builds up to the operating level.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 9	FAILURE LATCH UPDATE	(Read) (or) (Write)	-	-	-	-	-	-	-	-

Access to this port strobes the latch which samples the hardware failure lines. These latched lines are read through port 15. Any failure will automatically clock this latch and disable the +50/+60 volt supply.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 10	STEPPER MOTOR CONTROL	(Write)	-	-	OvB	OvA	B+	B-	A+	A-

This port is used to control the paper motion stepper motor. Bits D0 through D3 control which one of the motor coils is energized. The overdrive bits D4 and D5 are used when changing phases.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 11	MECHA-NISM CONTROL	(Write)	-	-	-	-	-	NmE	-	RbE

Bit D0 of this port controls the ribbon motor. When it is set high, power is applied to the ribbon motor. Bit D2 enables the encoder

position circuit to drive the NMI line low. This bit must be set high to allow the NMI to occur.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 12	MECHANISM STATUS	(Read)	HDC	HDF	SMF	PMF	PSE	EMF	PSV	CD

Bit 0 indicates the direction of travel of the printbar. This bit reads high when the motion is from right-to-left and low for left-to-right.

Bit 1 reads high to indicate that the power supply voltage is above 40 volts. The supply takes approximately 1.5 seconds to reach this voltage.

Bit 2 indicates the direction of the printbar motor drive shaft. When the printbar motor is enabled this bit will always read high. When the drive is disabled however, this bit will read high with forward direction or low for reverse direction. This bit is necessary for the printbar motor starting algorithm.

Bit 3 shows the state of power supply control bit (D0 of port 8). This allows the processor to read whether or not the supply is enabled at any time. Also, this feedback path can be used by the self-test to check that the I/O path is operating properly. When this bit reads high, the supply is enabled.

Bit 4 is high when the printbar motor drive circuit has sensed a hardware failure.

Bit 5 is high when the stepper motor drive circuit has sensed a hardware failure.

Bit 6 is high when the hammer driver circuit has sensed a hardware failure. When either of bits 4, 5, or 6 are high, the power supply is switched off, and D6 of port 15 is set high indicating a hardware failure has taken place.

Bit 7 will be set when the hammer driver cable is not plugged in.

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 13	PRINTBAR SPEED D/A	(Write)	MSB							LSB

This byte controls the DC voltage to the printbar drive motor.

00 = Slowest speed
FF = Fastest speed

PORT 14	NOT USED									

			D7	D6	D5	D4	D3	D2	D1	D0
PORT 15	FAILURE FLAGS	(Read)	PF	HdF	HF	TMD	SC	P10	PM	PPO

Bit 0 reads high for either paper-out or platen open condition.

Bit 1 toggles with the movement of the paper.

Bit 2 reads high when the platen is open.

Bit 3 indicates whether or not the sensor cable is plugged in. When this bit reads low the sensors are not plugged in and default values should be assumed.

Bit 4 is a warning flag indicating that too many dots are being printed. When this bit reads high the printing duty cycle must be reduced to prevent the printer printbar from overheating.

Bit 5 reads low whenever current flows through at least one hammer coil on the Hammer Driver PCA. This bit is used in self-test to check for open printbar coils.

Bit 6 reads low when a hardware failure has occurred. To determine which of the three drive circuit areas has failed port 12 must be read. The latch which holds these failure status bits must be updated after power up by accessing port 9.

Bit 7 indicates the status of the Power Fail line. If it reads low, then the power is failing.

3-8. STEPPER MOTOR CIRCUITRY (ANALOG PCA)

The HP2300 uses dot matrix print where printed characters are formed by a series of dots within a matrix (see Figure 3-2). Printing occurs as the individual hammers of the printbar assembly strike the print ribbon creating a .014 inch diameter sized ink impression (dot) on the paper. Vertical dot rows (direction of paper motion within the dot matrices) are created as the paper is advanced by the stepper motor. Each full step from the stepper motor advances the paper 1/72 of an inch (.0139 inches).

The HP2300 stepper motor is a four-phase stepper motor with the phase selection and timing controlled by the formatter processor. During normal printing the stepper motor rotates in two degree increments (one step); one step corresponds to a printed dot row (1/72 of inch).

A block diagram of the stepper motor circuitry is shown in Figure 3-14. The formatter processor outputs the following signals to control the stepper motor circuitry:

PHASE A+	PHASE B+
PHASE A-	PHASE B-
OVERDRIVE A	OVERDRIVE B

The stepper motor circuitry is divided into two sections; each section drives one phase of the stepper motor. Paper motion occurs when current is alternately applied to each phase of the stepper motor. The stepper circuitry is arranged so that both phases A+ and A- (or, B+ and B-) cannot be energized at the same time. If this were to occur the net result would be the cancellation of phase torque at the stepper motor.

The overdrive signals (OVERDRIVE A and B) apply +50/+60 volts to the stepper motor windings. The +50/+60 volts is needed to provide additional current for the stepper motor during paper slewing. When current through either phase reaches a pre-set reference level, the overdrive lines are reset (OA and OB RESET).

When paper motion is not required, the five volt potential provides current for holding torque.

If current through either phase exceeds the reference level, the PAPER DR FAIL signal is activated. The activation of this signal results in the disabling of the +50/+60 volt supply via the resetting of the +50V/+60V CONTROL latch.

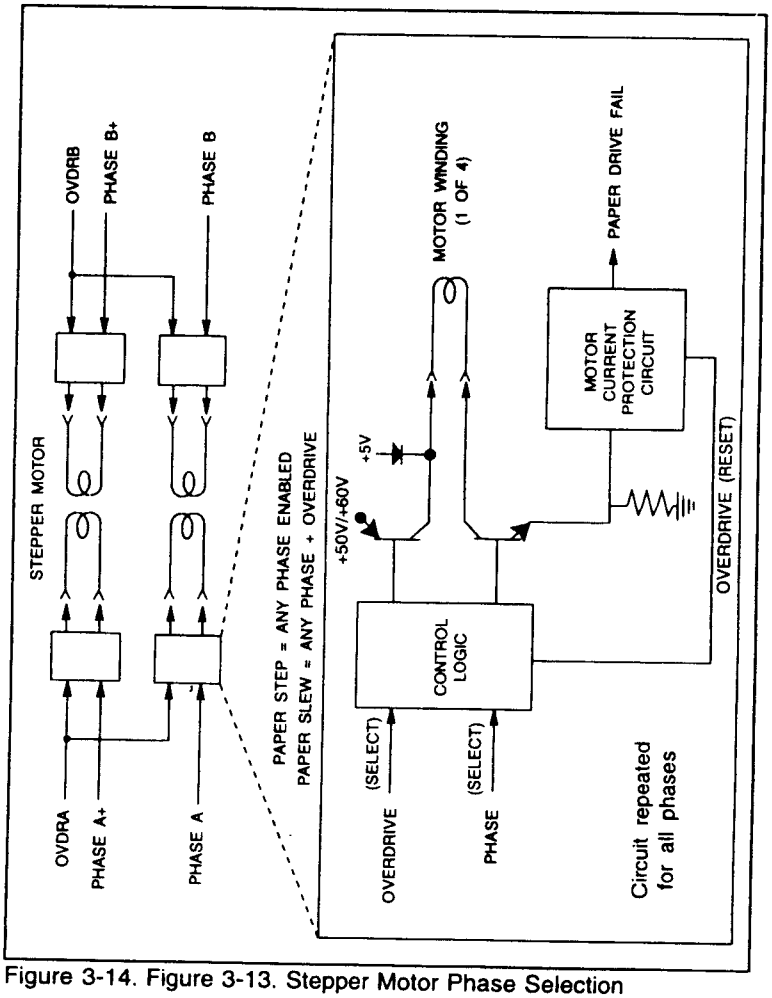

Figure 3-14. Figure 3-13. Stepper Motor Phase Selection

3-9. PRINTBAR MOTOR DRIVE CIRCUITRY (ANALOG PCA)

Horizontal dot rows in the character cell matrices are created as the Printbar assembly moves from right-to-left and from left-to-right (mogates). The print mechanism is responsible for providing this lateral motion. The HP2300 print mechanism is powered (driven) by a DC motor. A crankshaft driven by this motor provides for the printbar's lateral motion.

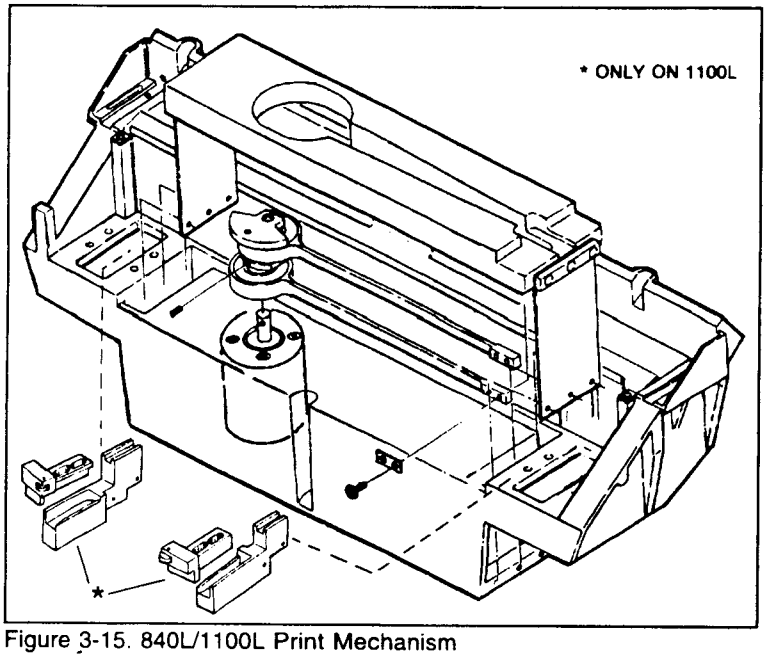

Figure 3-15. 840L/1100L Print Mechanism

The print mechanism is illustrated in Figure 3-15 for clarity purposes only. Please consult Section 6 for removal and replacement. The heart of the print mechanism is the printbar assembly. The printbar consists of 66 individual hammers. Each hammer prints across two character cell positions (total of 42 possible dot positions). At the rest position, the printbar is positioned at the center of its travel. Printbar motion is closely monitored by the formatter processor so that the printbar motor speed may be regulated. The printbar motor control system is shown in Figure 3-16.

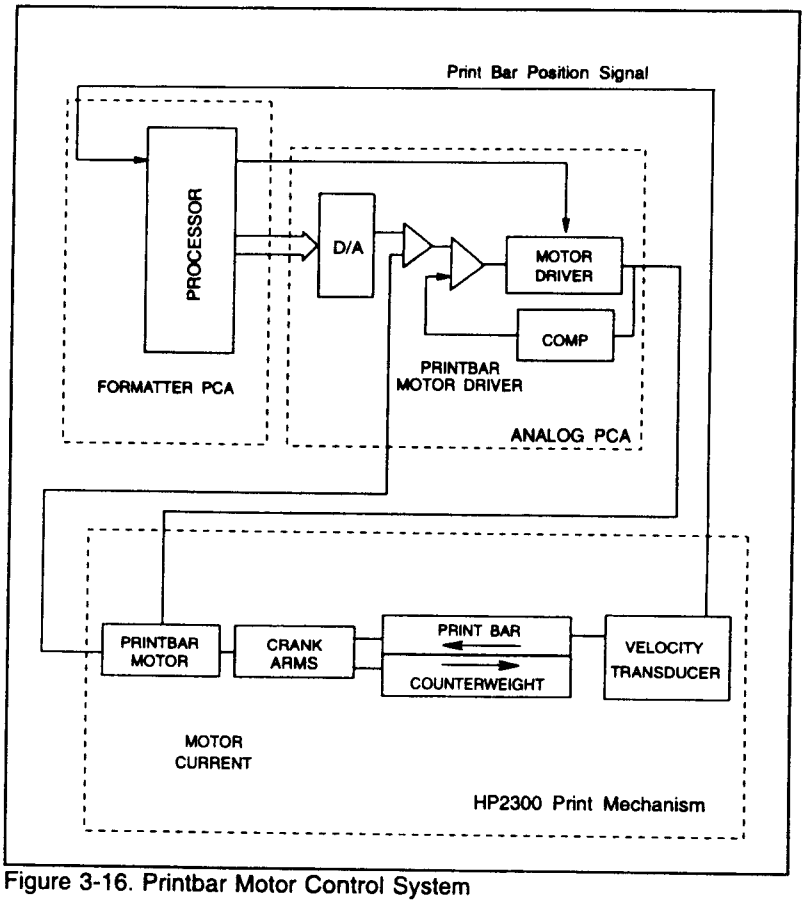

Figure 3-16. Printbar Motor Control System

The printbar drive circuitry is responsible for providing current to the printbar drive motor. The drive motor motion, through a mechanical linkage arrangement, provides for the linear motion of the printbar assembly. The printbar motor drive circuitry is shown in Figure 3-17.

Printbar motion is initiated and monitored by the formatter processor. The processor initiates printbar motion by writing a digital word, representing the desired drive voltage, to a digital-to-analog converter in the printbar motor circuitry and by activating the printbar MOTOR (CB MTR) ENABLE signal. The D/A's output, the command reference voltage, is proportional to the desired printbar voltage. This reference

voltage is input to a summing amplifier along with the inverse of the scaled printbar motor voltage (feedback). The output from the summing amplifier is then compared with the regulated ramp from the power supply section of the Analog PCA. The comparison of these signals result in the generation of a pulse width modulating drive signal. This drive signal is used to drive the printbar switching transistors. Current is limited only by the maximum duty cycle of the switching driver.

A comparator network monitors printbar motor drive for excessive motor current and excessive motor voltage. If either of these conditions are detected the PRINTBAR MOTOR DRIVE (CB MTR DR) FAIL signal is enabled which disables the +50 or +60 DCV supply (depending on the position of S1 on the Analog PCA, S1 switch tab is positioned towards the rear -CEDAR/+50V- position for the model 840L printer and towards the front -GUAYACAN/+60V- position for the 1100L). Fuse F1 (Figure 3-17) is an additional protection for the printbar motor and the printbar drive circuitry if current exceeds 3 amperes.

To overcome the peak torque requirements of the printbar flexure mass system, an algorithm is used to start the printbar motor. To implement the starting algorithm, the formatter processor monitors the BACK EMF signal. The BACK EMF signal is derived from a comparator network which monitors the printbar motor voltage. The BACK EMF signal is a logic high when the drive is enabled or the printbar motor is rotating forward, and is logic low when the printbar motor is either stopped or is rotating in the reverse direction.

The starting algorithm requests that the formatter processor provide a high level of starting torque to the printbar drive motor via the motor speed port while concurrently switching the printbar drive ON/OFF. This action induces a "rocking" motion in the printbar drive motor. During the intervals of time when the printbar drive circuitry is disabled, the formatter processor monitors the BACK EMF signal. The BACK EMF signal indicates the direction (rotation) of the printbar drive motor. When the formatter processor has determined that the printbar motor is rotating forward after the printbar changes direction, the printbar drive circuitry is permanently enabled.

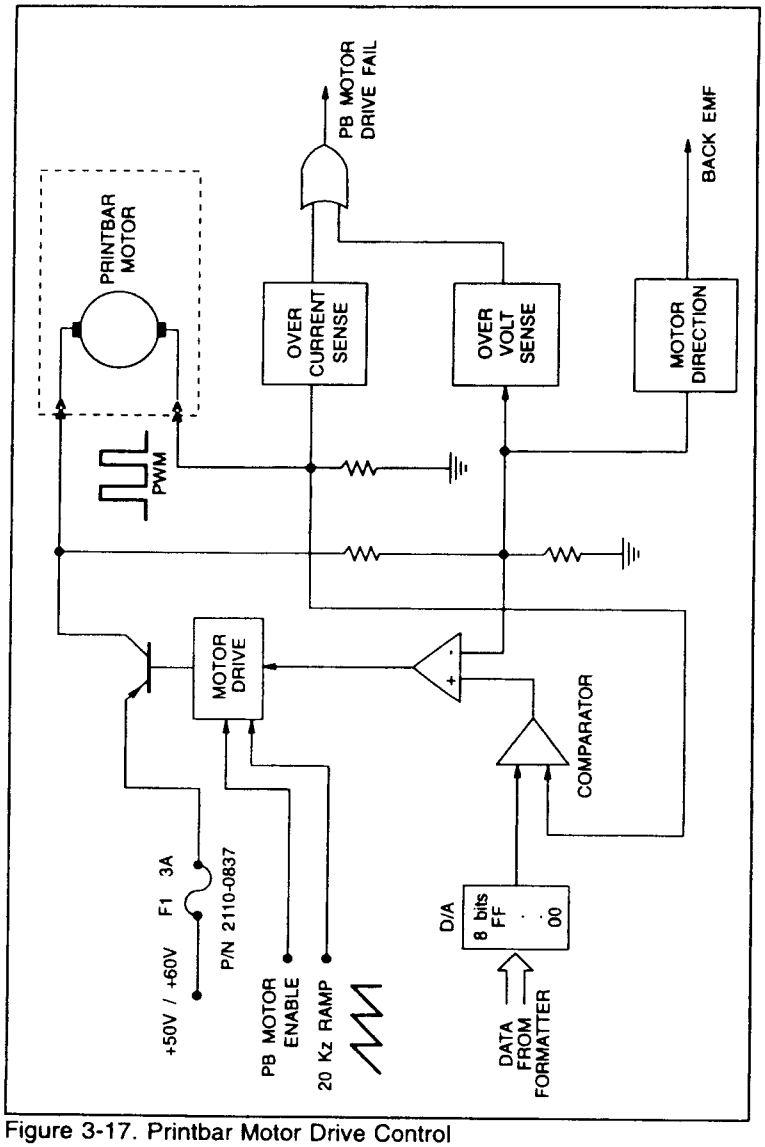

Figure 3-17. Printbar Motor Drive Control

3-10. POSITION ENCODER CIRCUIT (ANALOG PCA)

The purpose of the position encoder is to monitor the printbar's motion via the velocity transducer. It provides accurate information regarding the position of the printbar relative to the print mechanism casting (and thus the paper).

The Position Encoder circuit provides the following:

1. A NMI (NOT) signal that indicates a valid dot position has been reached (and the hammer should be fired).

2. A direction signal to the Formatter processor (indicates printbar direction).

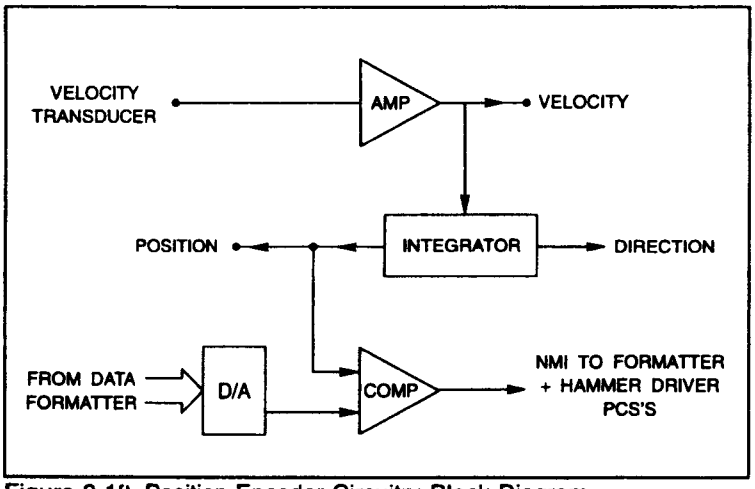

Figure 3-18. Position Encoder Circuitry Block Diagram

The Position Encoder consists of the following functional blocks:

1. Position Generator
2. Position Interrupt

The position generation circuitry integrates the velocity signal to derive a position signal which is then combined with a direction signal to produce a position output signal. The direction signal is derived by monitoring the sign of the velocity signal. The position output signal is then fed to the position interrupt circuitry.

The position generation circuitry compares the position output signal with the position comparison setting to create the NMI signal pulse. The NMI pulse indicates to the Hammer Driver PCA that the hammers should be fired. The NMI is sent to the processor so that it may then update the position comparison setting.

FIRE Generation: To generate the NMI pulse, the processor uses a table in memory (one entry for each dot density) that has all position comparison settings and their corresponding dot column shift values. Upon receipt of a direction change from the position signal, the processor sets a pointer to the top of the table and sends the initial value of the position comparison setting to the position interrupt circuitry. The processor also shifts the DGL 2772 bit shift register to the proper dot column. When the position output signal exceeds the setting, NMI pulses are generated. Upon receipt of the NMI, the processor sends the next comparison setting (dot column value) and updates the pointer.

3-11 HAMMER DRIVER PCA

3-11.1 HP2300/840L PRINTER

Printing occurs in the HP2300/840L as the printbar hammers strike the ribbon, paper and the platen forming a dot. This printing technique requires the energizing and releasing of steel tines (hammers) on the printbar assembly. The hammer driver circuitry is responsible for energizing and releasing of the printbar hammers.

To determine how the hammer driver circuit operates, it is important to review how the Formatter PCA's Dot Generation Logic (DGL) processes and shifts data to the hammer driver circuitry; a scenario of its operation follows:

The dot generation logic receives ASCII data from the host system via the data bus. Each ASCII character is represented in Read Only Memory (the Character Set ROMs) as a dot matrix image of the character. Data is processed one dot row at a time from all ASCII character cell matrices associated with a print line. Data processed by the Dot Generation Logic is placed into a 2772 bit wide shift register. The 2772 bit shift register contains a storage position for all possible dots which could be printed on a horizontal dot row (one pass of the printbar).

The 2772 bit register, a large scale integration (LSI) circuit on the Formatter PCA, is designed so that every 21st bit (i.e., bits 1, 22, 43, ... 2751) is parallel-loaded into a 132-bit wide bi-directional shift register, the Output Shift Register (see Dot Generation Logic scenario in Section 3-5).

The heart of the hammer driver circuitry is a 66-bit wide shift register. This register, the Input Shift Register, is comprised of nine 8-bit wide shift registers serially configured. The shift register contains a serial input section and a parallel latched output section. The separate sections of the shift register operate semi-independently; new information can be input to the register without disturbing the information stored in the latched section of the register.

Data from the 132-bit Output Register is input to the 66-bit Input Register in a manner such that every other bit is ignored. This is accomplished by using different clocks. Data is clocked (shifted out) from the 132-bit Output Register with the Dot Generation clock (DGCLK); data is clocked into the 66-bit Input Register with SCLOCK. The SCLOCK signal is generated from every second DGCLK. Because of this different clock rate, only every other bit from the Output Register is clocked into the Input Register.

It should be understood that each of the 66 printbar hammers prints across two character positions. The bit which is ignored during the first loading of the input register represents the first dot position of the second character position. These dot positions will eventually be utilized as the contents of the 2772 bit shift register is shifted through the shift register "taps" (total of 42 shifts).

The Position Strobe (PSTROBE), a buffered NMI signal, is generated by the Encoder Circuitry (see Section 3-10) and specifies when the printbar hammers are to be fired. Exactly 66 SCLOCKs occur between PSTROBEs. Hammer Data is clocked into the Input Register on the rising edge of SCLOCK. Data which was shifted into the Input Shift Register is latched into the Input Shift Register Latch on the rising edge of PSTROBE (see Figure 3-19).

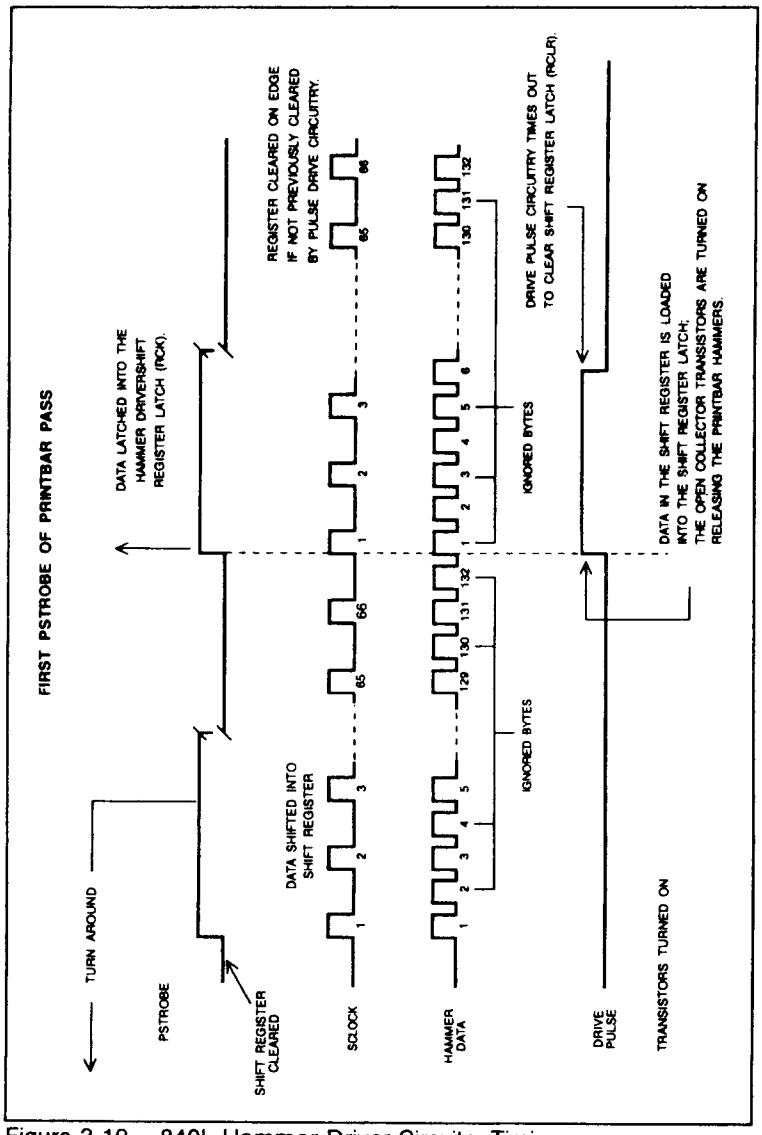

Figure 3-19. 840L Hammer Driver Circuitry Timing

When the Input Shift register is latched by the rising edge of PSTROBE, the hammer driver transistors are turned on if a dot is to be printed. The gating of the drive transistors allows current to flow through the individual electromagnetic coils (one for each hammer in the printbar assembly). The current flow through the coils produces a magnetic field which is opposite to that of the permanent magnet and allows the hammer to snap forward, printing a dot. When the coil is de-energized, the permanent magnet recaptures the hammer.

After the printbar hammers have fired, the process is again repeated; however, this time the data in the 2772 bit shift register is shifted one position over so that new data is tapped (the next dot position for each hammer). Concurrently, the printbar (and thus the hammers) have moved to the next dot position. The entire process is repeated until all dot/bit data (maximum possible 42) for each printbar hammer has been selected. At this time the next dot row is loaded into the 2772 bit shift register.

It should be noted that the data may be output from the 132-bit shift register from either the most significant bit or least significant bit positions. This is done so that the dot-image data from the shift register may be loaded into the hammer driver shift register in the correct orientation with respect to the direction of the printbar (either right to left or left to right).

PRINTBAR THERMAL PROTECTION CIRCUIT

Three clamping zener diodes form a voltage flyback protection circuit to drain off the energy stored in the hammer coils when the hammer drive transistors are turned off. Three thermistors, positioned adjacent to the zeners, are used to monitor the zener diode's temperature. The diode's temperature is proportional to that of the printbar assembly. If the diode's temperature is too high (and thus the printbar's), the TOO MANY DOTS signal is activated. The Control processor uses the TOO MANY DOTS signal as a an indicator to slow the rate at which data is shifted to the hammer driver circuitry, and thus the printer print speed. When the temperature returns to normal, the printer returns to its normal print speed. The "too many dots" signal is activated when a heavy print pattern is run.

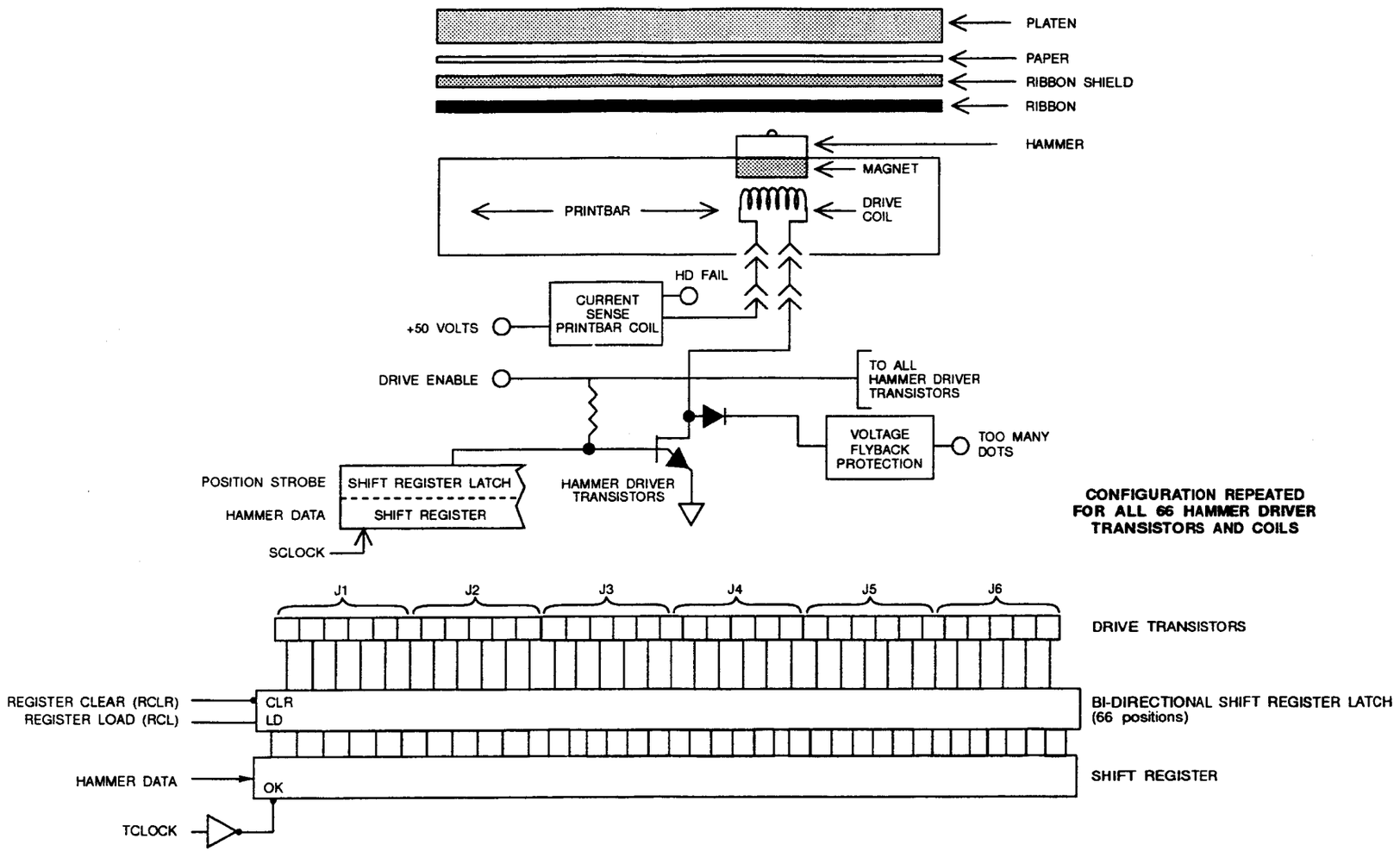

Figure 3-20 840L Hammer Driver Circuitry

3-11.2 HP2300/1100L PRINTER

Printing occurs in the HP2300/1100L as the printbar hammers strike the ribbon, paper and the platen forming a dot. This printing technique requires the energizing and releasing of steel tines (hammers) on the printbar assembly. The hammer driver circuitry is responsible for energizing and releasing of the printbar hammers.

To determine how the hammer driver circuit operates, it is important to review how the Formatter PCA's Dot Generation Logic (DGL) processes and shifts data to the hammer driver circuitry; a scenario of its operation follows:

The dot generation logic receives ASCII data from the host system via the data bus. Each ASCII character is represented in Read Only Memory (the Character Set ROMs) as a dot matrix image of the character. Data is processed one dot row at a time from all ASCII character cell matrices associated with a print line. Data processed by the Dot Generation Logic is placed into a 2772 bit wide shift register. The 2772 bit shift register contains a storage position for all possible dots which could be printed on a horizontal dot row (one pass of the printbar).

The 2772 bit register, a large scale integration (LSI) circuit on the Formatter PCA, is designed so that every 21st bit (i.e., bits 1, 22, 43, ... 2751) is parallel-loaded into a 132-bit wide bi-directional shift register, the Output Shift Register (see Dot Generation Logic scenario in Section 3-5).

The heart of the hammer driver circuitry is a 66-bit wide shift register. This register, the Input Shift Register, is comprised of nine 8-bit wide shift registers serially configured. The shift register contains a serial input section and a parallel latched output section. The separate sections of the shift register operate semi-independently; new information can be input to the register without disturbing the information stored in the latched section of the register.

Data from the 132-bit Output Register is input to the 66-bit Input Register in a manner such that every other bit is ignored. This is accomplished by using different clocks. Data is clocked (shifted out) from the 132-bit Output Register with the Dot Generation clock (DGCLK); data is clocked into the 66-bit Input Register with SCLOCK. The SCLOCK signal is generated from every second DGCLK. Because of this different

clock rate, only every other bit from the Output Register is clocked into the Input Register.

It should be understood that each of the 66 printbar hammers prints across two character positions. The bit which is ignored during the first loading of the input register represents the first dot position of the second character position. These dot positions will eventually be utilized as the contents of the 2772 bit shift register is shifted through the shift register "taps" (total of 42 shifts).

The Position Strobe (PSTROBE), a buffered NMI signal, is generated by the Encoder Circuitry (see Section 3-10) and specifies when the printbar hammers are to be fired. Exactly 66 SCLOCKs occur between PSTROBEs. Hammer Data is clocked into the Input Register on the rising edge of SCLOCK.

The hammer driver board has two control pulses, one 90us wide and the other of 210us. The 90us pulse controls the turn on time of the FET transistors and the 210us controls the turn on time of the bipolar hammer drive transistors. The rising edge of PSTROBE triggers the circuits that generates both control pulses.

The rising edge of the 210us pulse latch out the data in the serial input shift registers to the parallel outputs, the bipolar hammer drive transistors are turned on if a dot is to be printed (the parallel output has a logical "one"); at the same time the 90us pulse turns on the FET transistors allowing current to flow through the individual electromagnetic coils (one for each hammer in the printbar assembly). The current flow through the coils produces a magnetic field which opposite to that of the permanent magnet and allows the hammer to snap forward, printing a dot. When the coil is de-energized, the driving pulses turn off the transistors in sequence. This allows the hammer to complete its trip to the paper before it is pulled back by the permanent magnet and at the same time, a flyback circuit is formed to drain off the energy stored in the coil returning it to the +60V supply.

After the printbar hammers have fired, the process is again repeated; however, this time the data in the 2772 bit shift register is shifted one position over so that new data is tapped (the next dot position for each hammer). Concurrently, the printbar (and thus the hammers) have moved to the next dot position. The entire process is repeated until all dot/bit data (maximum possible 42) for each printbar hammer has been selected. At this time the next dot row is loaded into the 2772 bit shift register.

It should be noted that the data may be output from the 132-bit shift register from either the most significant bit or least significant bit positions. This is done so that the dot-image data from the shift register may be loaded into the hammer driver shift register in the correct orientation with respect to the direction of the printbar (either right to left or left to right).

PRINTBAR THERMAL PROTECTION CIRCUIT

Two thermistors, positioned adjacent to the FET transistors, are used to monitor the transistors temperature; this temperature is proportional to that of the printbar assembly. There is also another thermistor located on the left hand side of the printbar; this thermistor directly monitors the printbar temperature in that area. The reason to have two thermistor locations is because the thermistor on the bar can only monitor temperature on part of the bar, the area most frequently used, while the thermistors on the FETS monitor an average temperature. It could happen that the cross-flow fan fails and the FETs temperature will no longer represent the printbar temperature; in this case the printbar thermistor will protect the bar from being damaged. If the FETS temperature is too high (and thus the printbar), or the printbar thermistor sense a very high temperature, the TO MANY DOTS signal is activated. The Control processor uses the TOO MANY DOTS signal as a an indicator to slow the rate at which data is shifted to the hammer driver circuitry, and thus the printer print speed. When the temperature of the FET's returns to normal, the printer returns to its normal print speed. The TOO MANY DOTS signal is activated when a heavy print pattern is run.

CURRENT SENSING

The HAMMER CURRENT signal is active whenever current is sensed flowing through the hammer coils. The HAMMER CURRENT signal is used while performing the formatter processor diagnostics which verify the operation of the hammer driver transistors and the printbar coils.

The HMR DRV FAIL is active whenever current is flowing from the +50/+60 volt line to any of the printbar hammer coils for more than 1 msec. The activating of this signal disables the +50/+60 volt switched supply. HD CLEAR is strobed high to clear the 66 bit shift register to prevent spurious dots from firing during slewing.

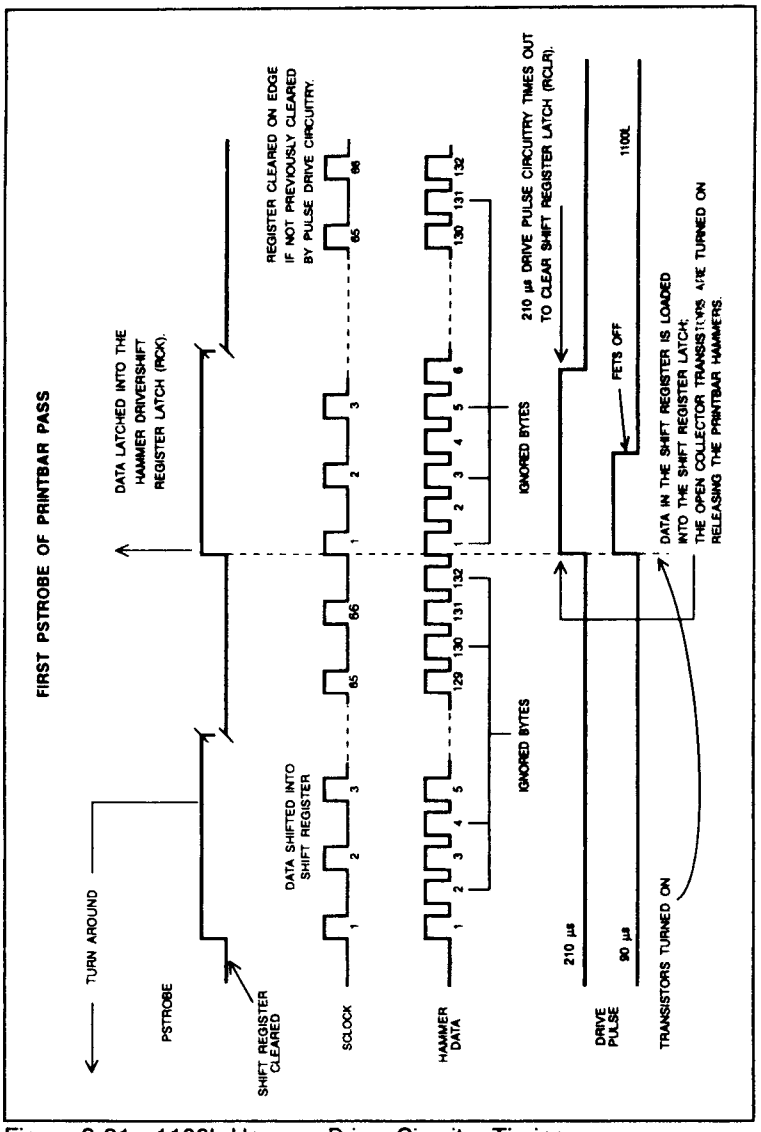

Figure 3-21. 1100L Hammer Driver Circuitry Timing

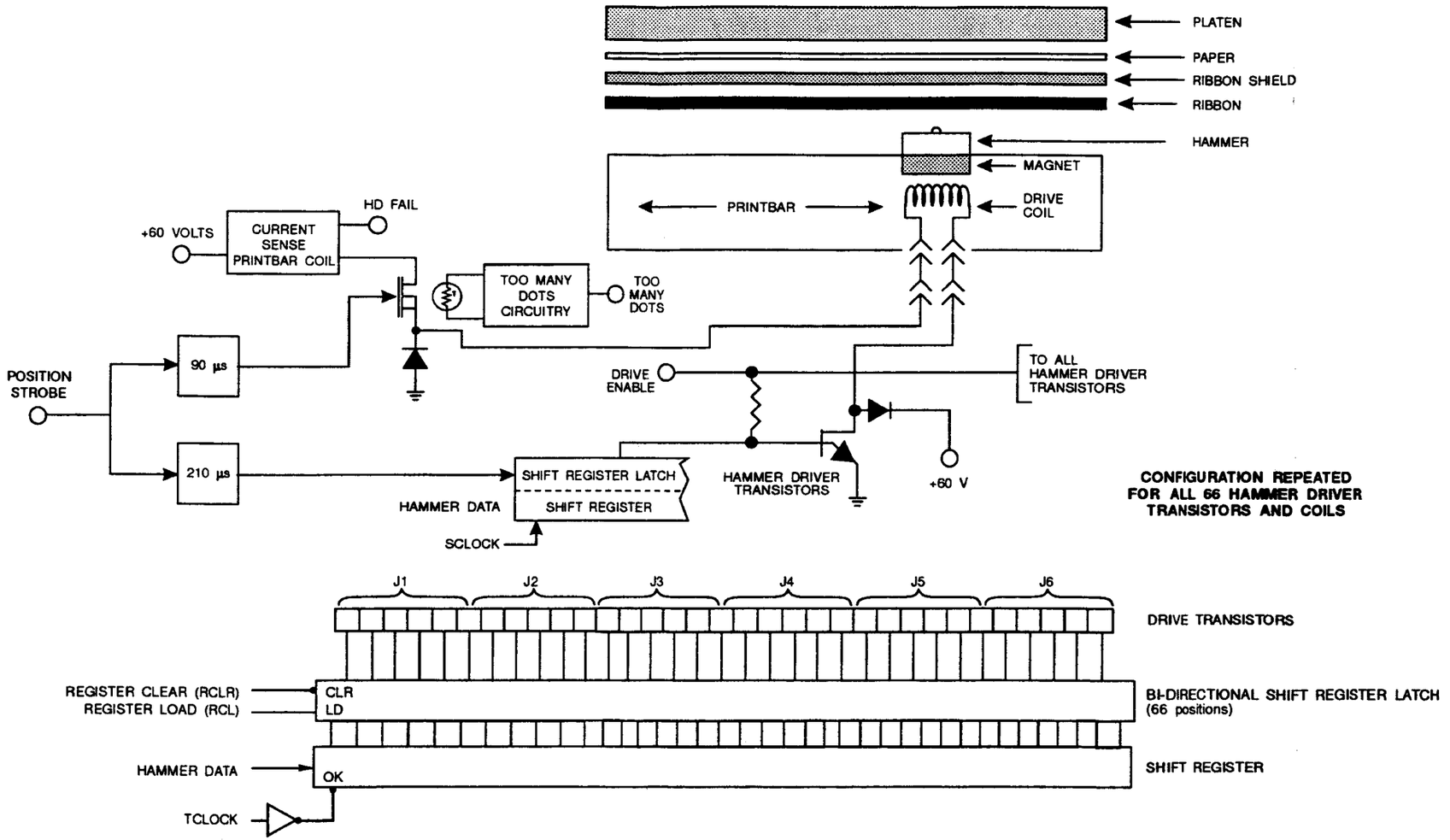

Figure 3-22 1100L Hammer Driver Circuitry

3-12. CONTROL PANEL PCA

The Control Panel PCA provides for operator interface to the HP2300 printer. The Control Panel consists of 9 keys; a two line by 16 character alphanumeric display, and a green (when on) ON LINE indicator, as well as an orange (when on) flashing ERROR indicator. Table 3-1 provides a summary of the keyboard functions. The two line by 16 character display is used for printer configuration, self test results, and error status. A summary of the display's Status and Error Codes may be found in Section IV of this manual. For more detailed information on the Control Panel keys, refer the HP2300 Operator's Manual, P/N C2356-90902, for complete Control Panel operation sequences.

All communications between the Control Panel PCA and the Control processor occur over the data bus and four input/output ports (physically the 26-pin ribbon connector between P1 of the Control Panel PCA and J7 of the Formatter PCA). The interface between the two PCA's is summarized in Table 3-2. Input/Output ports A0 through A2 are output ports from the processor; port A3 is an input port from the front panel and indicates which keys have been pressed.

Table 3-1. HP2300 Keyboard Functions

ONLINE	This key places the printer ON/OFFLINE. All other keys are disabled when the printer is ONLINE.
FORM FEED	Advances the paper to the next Top Of Form position.
LINE FEED	Advances the paper to the next line position.
PRINT 1 LINE *	Causes the printer to go ONLINE, print one line, and return OFFLINE. When pressed in Self Test mode, a special one line test pattern is printed.
FINE ADJ UP/DOWN	Advances the paper in the direction indicated in small increments. When within a submenu, this key also scrolls through the available parameters within the submenu.
SET T.O.F. *	The pressing of this key along with the SELECT * key establishes the current paper position as Top of Form.

Table 3-1. HP2300 Keyboard Functions

L.P.I. ADJ *	When pressed the printing lines per inch is displayed.
PAGE L. ADJ. *	When pressed the physical page length is displayed.
RESET	When the SHIFT key is held down and the SELECT * key is pressed, a Power On Reset is begun. The Control Panel will display "INITIALIZATION..." for approximately 7 seconds.
MENU	Scrools through the different menu's and options.
SELECT *	Makes the selected menu option active on chosen value.

* These are dual-function keys. The SHIFT key must be held down for those keys to operate in its secondary function.

3-13. SENSORS (CONNECTED TO ANALOG PCA)

The following conditions are sensed in the HP2300 printer:

Platen Open
Paper Out
Paper Motion (Paper Jams)
Sensor Cable Installed

All sensed conditions are monitored by the formatter processor (see I/O Port 7 in table 3-2). Figure 3-23 illustrates sensor wiring. The Paper Out and Platen Open microswitches and the Paper Motion sensor are located on the rear, left-hand wall of the print mechanism underneath the platen. All three sensors are attached to one field-replaceable unit (FRU).

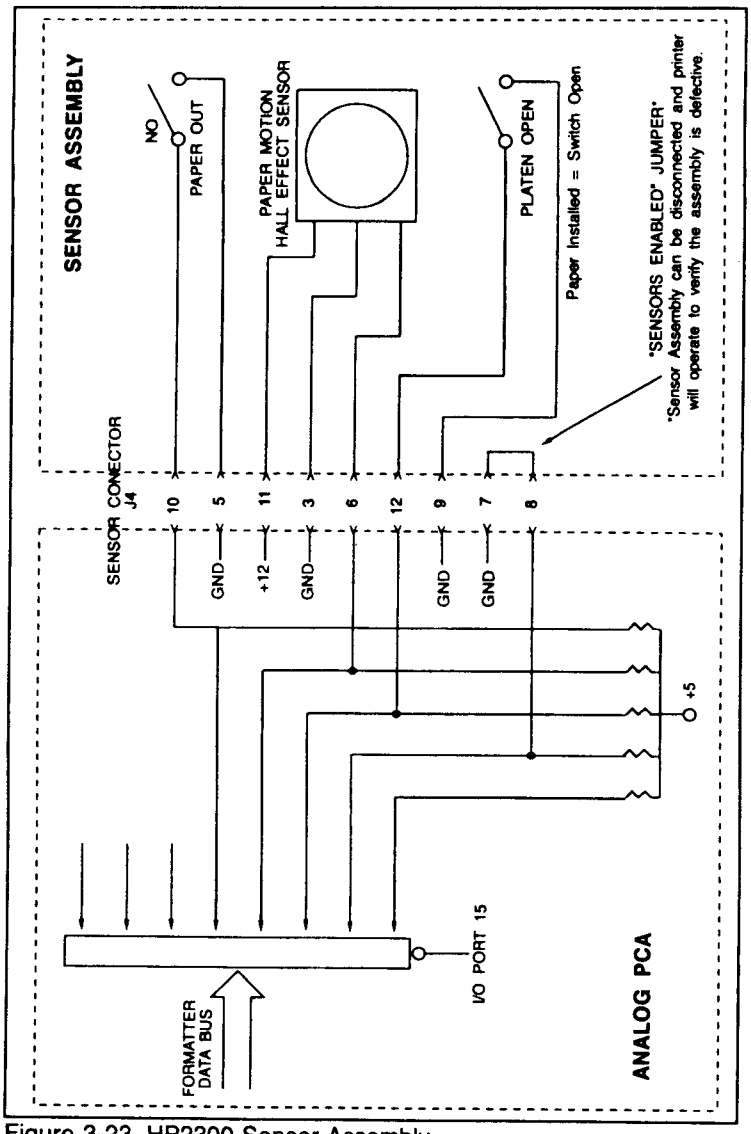

Figure 3-23. HP2300 Sensor Assembly

The Paper Motion sensor, a "Hall Effect" device, is used for paper jam detection. The movement of paper through the printer results in the rotation of the Paper Motion sensor. The rotation of the sensor results in the toggling of the Paper Motion bit every 45 steps (approximately .6 inch). If the processor does not detect a change of state within a specified number of paper steps, a Paper Jam message is displayed in the Control Panel display.

The Sensors Enabled bit (bit 3 of I/O Port 15) is a logic low when the sensor cable, J4 of the Analog PCA, is disconnected. When the sensor cable is disconnected from the Analog PCA, the sensors are disabled. This allows printing to verify the Sensor Assembly is defective.

CAUTION

Do not leave the sensor cable disconnected. Damage to the printbar hammers may occur if an undetected paper out condition occurs causing the hammer to impact the platen unprotected.

3-14. POWER SUPPLY (ANALOG PCA)

The HP2300 Power Supply is located on the Analog PCA and consists of the following circuits:

Input Power and Power Configuration
AC Fuses F2 and F3
Ribbon Motor Control
+50 / +60 Volt Controlled Supply
(switch selectable by HP2300 model number).
DC Voltage Regulators (+5, +12, -12, and +18)
Power-On-Reset
Power Fail Warning

INPUT POWER AND POWER SELECTION

Line voltage is applied to the Analog PCA via the Input Power Assembly connector. A line filter providing for radio frequency interference (RFI) protection is placed between the J19 and main AC power switch S2 (see Figure 3-22).

Enabling the line switch provides AC voltage to the fan assemblies through connectors J8 and J18, to the ribbon motor circuitry, and to the transformer assembly through connector J9. The voltage selector PCA must be configured to the correct line voltage before connecting the printer to the AC line. The secondary of transformer T1 provides 45/70 VAC to the rectifiers.

Rectifiers provide +65 / +90 volts, from the secondary of transformer T1, to the remaining DC regulation circuits and to the +50 / +60 volt switch selectable DC power (S1 in the Analog PCA).

RIBBON MOTOR CONTROL

The ribbon motor control circuitry consists of a triac switching circuit. The gate of the triac is enabled by RIBBON ON which is generated by the formatter processor. The gating of the triac provides 120 Vac to the ribbon motor (see Figure 3-23).

+50/+60 VOLT SWITCH SELECTABLE SUPPLY

The +50 / +60 volt switch selectable DC power is the primary voltage source for the hammer driver, printbar motor, and the stepper motor circuitry. This supply is monitored by the formatter processor (+50V / +60V Status) and may be disabled by the processor, via the +50V / +60V CONTROL signal, if a overcurrent condition is detected (see Figure 3-23).

The +50 / +60 volt Switched Supply is a triac regulated power supply. The output of a comparator is used to gate the triac. The comparator's inputs are sawtooth wave generated off the secondary of the transformer and a voltage sense line off the triac's output. The less voltage sensed at the triac's output, the sooner the triac is gated on.

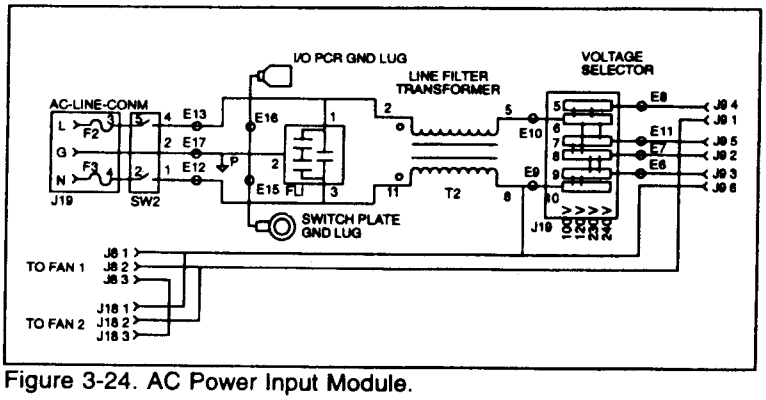

Figure 3-24. AC Power Input Module.

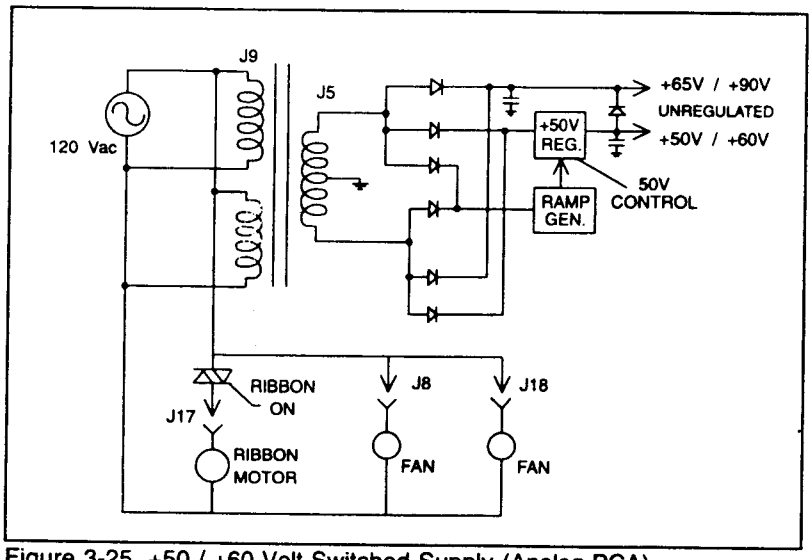

Figure 3-25. +50 / +60 Volt Switched Supply (Analog PCA)

The +50V / +60V STATUS signal is used to indicate to the formatter processor that the +50 / +60 volt supply has come up. This signal is active at approximately +42 volts. The +50V CONTROL is normally inactive, thus permitting the +50V / +60V supply to be gated on. If an overcurrent situation occurs (see Figure 3-23), this signal becomes active disabling the power supply, but allowing the 12v, 18v and 5v

power supplies to remain active. This allows the error condition to be displayed on the control panel and logged into the error logs.

DC VOLTAGE REGULATORS

The following DC voltage regulators are used in the HP2300 printer:

+ 5 VDC
+ 12 VDC
- 12 VDC
+ 18 VDC

All DC voltage regulators receive their voltage from the +65 volt source off the bridge rectifier. The +18 Vdc regulator consists of a simple linear regulator circuit. The inputs of the +5, +12, and the -12 regulators is supplied from the secondary windings of the transformer shown in the Figure 3-24. The current through the primary winding is regulated (by switching) to produce 5 volts on the 5 volt secondary winding. There are also secondary windings for the +12v and the -12v supplies. The voltage on these windings depends on the current in the primary winding (which in turn depends on the +5v load), plus the load on the +12v and -12v supplies. To prevent load variations from causing voltage variations, the +12v and -12v lines are regulated linearly down from their respective secondary winding voltages. The Hammer Driver Enable signal (which provides base current to the hammer driver transistors on the Hammer Driver PCA) has its own regulator for the +12v winding because of the high current required.

POWER-ON RESET

Power-On Reset (RESET) goes to a logic one several hundred milliseconds after the +5 V supply is operational. Reset is used throughout the printer to reset (clear) all latches on power-up except the non-volatile RAM.

DRIVE ENABLE is also generated coincident with the setting of RESET. This signal enables the phase select transistors in the stepper motor circuitry.

POWER-FAIL WARNING

The power-fail warning circuitry monitors the +65/+90 volt unregulated supply voltage for line dropouts/failures. If the supply voltage drops below +39 volts, the POWER-FAIL signal is set. The activating of POWER-FAIL interrupts the Formatter PCA's microprocessor causing the processor to stop processing and jump to the error handling routine. The NMI (fire hammers) signal can be enable when the voltage rises above +44 volts.

Chapter 4

Configuration & Diagnostics HP2300

DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics DiagnosticsDiagnostics

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4-1. INTRODUCTION

The HP2300 printer can be configured and problems can be diagnosed largely from the Control Panel. The diagnostics provide the Service Representative a useful tool for detection of printer problems. All diagnostic, error, and status conditions are displayed on the LCD display on the printer's Control Panel.

The control panel displays all messages in the LCD display. If there is an error, the ERROR indicator will blink and a message will appear. There is also on ON LINE indicator that shows the status of the printer. Also there is an overlay that can be changed to have the legends in a different language. The control panel can be configured to support the desired language (although some messages will remain in English, like ERRORS or CE MENU. See page 1-7 for keyboard overlay part numbers.

In this chapter we intend to cover all the functions of the control panel. The following information is explained in this chapter:

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4-2. PRINTER CONFIGURATION AND STATUS INFORMATION

The HP2300 printer is configured entirely from the Control Panel. Once established, the printer's configuration is stored in the Formatter PCA non-volatile random access memory. Once established the printer configuration does not need to be altered unless a parameter change is desired or necessary for a special print job (i.e., change in page length, etc.) or if the Formatter PCA is replaced (see Section 5-9, Cold Start). Table 4-1 shows the configurable printer functions and their associated configuration numbers and parameter ranges. The configuration settings are organized in a MENU TREE, where the user can easily move through.

To configure a printer function perform the following steps:

1. Enter the MENUS.

   Make sure the printer is "off Line". Press the MENU key, and you will be in the MAIN MENU. To move within the menu press the MENU key again.

2. Enter the SUBMENUS.

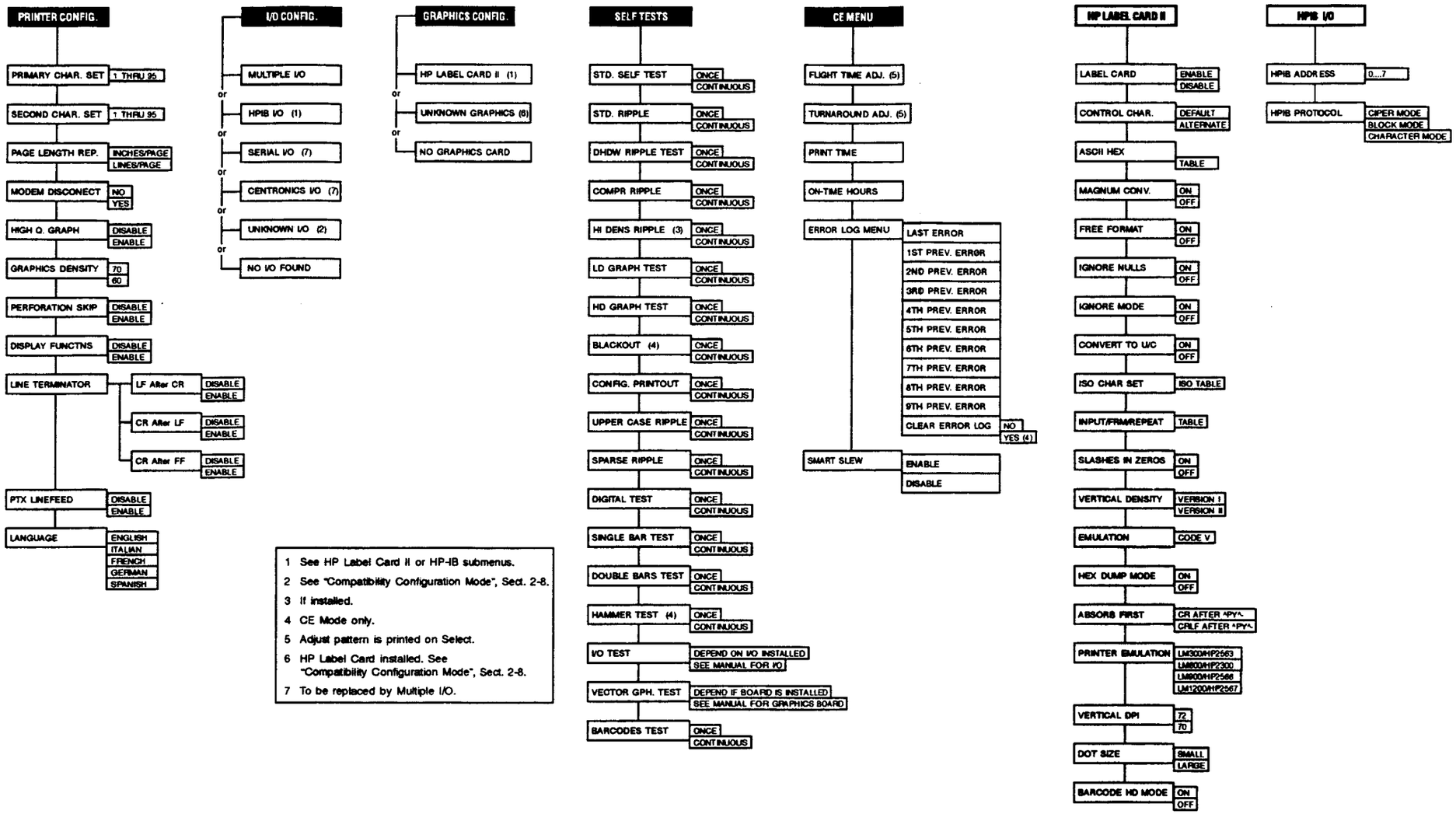
   Once you have found the desired menu, press SELECT to go into that menu. To move trough the submenus, press the MENU key.

3. Change a PARAMETER.

   To change a particular parameter, you press either the UP or DOWN keys, until you find the desired value. To select that particular value, you simply press the SELECT key. (an asterisk will be displayed on the control panel to the right of the selected value.

NOTE

If you do not want to change the parameter, press the MENU key and you will continue moving through the submenus, or you can press ON LINE to exit to an OFF LINE status. All these retain the original configuration for that function.



1 See HP Label Card II or HP-IB submenus.
2 See "Compatibility Configuration Mode", Sect. 2-8.
3 If installed.
4 CE Mode only.
5 Adjust pattern is printed on Select.
6 HP Label Card installed. See "Compatibility Configuration Mode", Sect. 2-8.
7 To be replaced by Multiple I/O.

Figure 4-1 Printer Menus

4. Selection of the new parameter.

   Pressing SELECT within a submenu, means that you are selecting new value, except if you are within a Self Test Submenu. In that case, that particular test will be performed.

5. Record all configuration values. Refer to table 4-1 for Printer Menus.

PRINTER CONFIGURATION MAIN MENU

PRIMARY CHARACTER SET: (DSPLY=Primary Char Set)

Go to the printer config menu to access the Primary Character Set function. The character sets and their associated parameter values are listed on your self-test print out. Figure 4-1 shows an example of the top portion of a self-test printout. The arrows in the figure point out the assigned character set parameter values. Note that the assigned values vary from printer to printer. Check your printer's self-test for the character set values.

SECONDARY CHARACTER SET: (DSPLY=Second Char Set)

Select the secondary character set from the printer's self-test. Go to PRINTER CONFIG MENU and set the parameter associated with that set.

REMOTE CHARACTER SET SELECTION

Character sets in the self-test printout may also be selected remotely if performed under program control. Character set selection commands override the Control Panel configuration setting (except under power-on or reset conditions). When taken "off-line," the printer remains in the character set last commanded. See the HP256X Printer Family Technical Reference Manual, P/N 02564-90905, for information on remote character set selection.

Standard ASCII SHIFT-IN and SHIFT-OUT codes may be used to select primary and secondary character sets. SHIFT-OUT selects the secondary set and SHIFT-IN returns the printer to the primary set. Any number of character sets may be used within one print line if they are

the same pitch. Additionally, bar codes and line draw can be printed on the same line as 10 character-per-inch (cpi) character sets. (Compressed character sets and the double-high/double-wide character sets cannot be printed on the same line with each other or with 10 cpi text.)

SELECT PAGE LENGTH REPRESENTATION: (DSPLY=Page Lenght Rep.)

Page length can be selected in either lines-per-page or in 1/2 inch increments. The default setting of inches/pg, sets form length representation at 1/2 inch increments. A value of lines/pg sets form length representation in lines-per-page.

DISCONNECT MODEM: (DSPLY=Modem Disconnect)

If a serial interface is installed in the printer and is connected to a modem, it is possible to disconnect the modem from the printer's Control Panel setting MODEM DISCONNECT to YES and then pressing SELECT makes the Data Terminal Ready line go to the "OFF" state for two seconds. If the modem Data Terminal Ready line is connected, this action should disconnect (hang-up) the modem.

GRAPHICS SPEED SELECTION: (DSPLY=Graphic Hi Spd)

In normal graphics, the printer has two print speeds. The printer prints at 14.5 or 29 inches/minute. Graphics speed is selected by setting function GRAPHIC HI SPD (within the printer CONFIG MENU) to DISABLE for the slower print speed and to ENABLE for the higher print speed. The print speed may NOT be set programmatically. The slower print speed provides higher quality print, and therefore is recommended for applications requiring higher-quality graphics.

HORIZONTAL GRAPHICS DENSITY SELECTION: (DSPLY=Graphics Density)

Horizontal graphics density (60 or 70 dots-per-inch) is selected via Graphics Density in the display window function 60 or 70 shows up. Programmatically setting the density overrides the operator control panel setting except under power-on or reset conditions. The default value is 70 dots-per-inch (dpi).

PERFORATION SKIP MODE: (DSPLY=Perforation Skip)

When perforation skip mode is enabled, and automatic page eject occurs when the perforation skip region is entered. This is to prevent printing too close to the page perforations. You can turn this automatic page eject "ON" by setting Perforation Skip to parameter ENABLE. The default value is DISABLE. VFC control is not affected by perforation skip mode.

DISPLAY FUNCTIONS MODE: (DSPLY=Display Functns)

Turn on the display functions mode by setting Display Functions to parameter ENABLE. In the display functions mode, the printer prints representative character symbols for the control code or escape sequence characters instead of actually executing the commands. For example, if the printer encounters the SHIFT-OUT command (to access the secondary font), the command will not be executed. The symbol SO will be printed instead. Two exceptions to this are the carriage return command and the escape sequence to DISABLE display function mode (ESC Z). The carriage return control character will cause a CR symbol to be printed and an actual carriage return and line feed to be performed. Function Inline Converter (within Graphics Config Menu) must be set to parameter DISABLE if the display function mode is ENABLE. The default parameter for display functions mode is DISABLE.

LINE TERMINATOR

There are 3 different line terminators that can be selected depending on the type of host. One way to determine how this should be set is by setting display functions to enable, print something from the host and look in the print page which is the line terminator. If the line terminator is only LF and you have a diagonal text you need to enable CR after LF.

The line terminator are:

LF after CR
CR after LF
CR after FF

For example a 9000 computer running HP-UX, uses CR as the line terminator, so the options CR after LF and CR after FF should be enable.

LANGUAGE

The language in which the messages will be displayed can be selected in this menu. There are 5 languages: English, Spanish, French, German and Italian. The CE menu messages and non-user correctable errors will be displayed in English, no matter which language is selected. See page 1-7 for localized keyboard overlays.

VERTICAL LINE SPACING

Vertical line spacing (6 or 8 lines per inch) is selected via the [LPI ADJ] key on the Control Panel or by program control or escape sequences. Programmatically setting the line spacing overrides the Control Panel setting except under power-on or reset conditions.

PRINTER CE MENU

The CE Menu allows users to perform the following functions:

- Flight Time Adjustment; Refer to sections 4-5 and 5-8.
- Turnaround Time Adjustment; Refer to sections 4-5 and 5-9.
- Print Time and On-Time Hours; Refer to sections 4-5 and 5-10.
- Error Log; Refer to sections 4-5 and 4-7.
- Smart Slew Function.

The Smart Slew Function is a feature that improves the throughput of printers, by doing paper slew instead of line feed. It is possible to Enable-Disable the Smart Slew Function by going into the CE-MENU (not CE-MODE required).

The Factory Default Setting for the Smart Slew is ENABLED, but some restrictions must be considered for the proper Smart Slew Functionality and Performance:

1) The Smart Slew needs at least, 2 LF between a "Text Sandwich".

2) The Control Panel could be blocked, if the printer is switched OFF-LINE/ON-LINE repeatedly.

3) The Control Panel could be blocked too, if the printer runs out of paper. This problem occurs when:

   a. The T.O.F. has been incorrectly selected.

   b. The Smart Slew is going beyond the limit of one page.

4) For all those cases using the Line Feed beyond the page limit, it is recommended to DISABLE the Smart Slew.

4-3. OPERATIONAL STATUS CODES

PRINTER STATUS CODES

Under the most conditions the printer displays its current condition in the Control Panel display. The followings status messages can be displayed:

Status Code	Description
Off Line	Printer is off line
On Line	Printer is on line
Off Line *	Modem Connected
On Line *	Modem Connected
Recovering	Silent run/data recovery for Ciper Protocol HP-IB interface
Print One Line	Print one line activated

4-4. SELF TEST AND SELECTABLE SUBTESTS

Diagnostic routines are used for troubleshooting the printer. They are performed from the printer's Control Panel (some may also be performed using escape sequences, refer to the HP 256X Printer Family Technical Reference Manual, part number 02564-90905). Diagnostic self tests

provide the service representative a tool for the detection and isolation of printer malfunctions. The Standard Self Test executes a series of subtests which verify the operation of specific sections of the printer hardware. In addition to the Standard Self Test, subtests can be selected and executed individually.

To perform any diagnostic from the Control Panel, the printer must be off-line. In addition, some of the selectable subtests require that the printer first be placed in CE Mode. If a paper-out or platen open (or paper jam) fault condition exists, none of the printing subtests will execute.

NOTE

In addition to the diagnostics which can be performed from the Control Panel, the printer also performs certain test routines to look for printer errors which might occur during normal printer operation. These tests are not selectable; they are performed continuously by the printer. If a failure is detected, an error will be displayed, in flashing mode, on the Control Panel display (refer to Appendix A, for error message descriptions).

STANDARD SELF TEST

To perform the Standard Self Test (I/O tests are not performed), press the MENU key until you reach SELF TEST MENU, go into the menu by pressing SELECT and then press SELECT again to perform STD SELF TEST (you can choose continuous test or once by pressing the UP or DOWN keys). One copy of the self test printout should be printed and retained for future reference (Figure 4-2).

If the printer is placed in CE Mode, some additional CE mode tests are performed by the Standard Self Test (refer to Section 4-5, CE Mode Operation).

Figure 4-2a Character Set Self-Test Example

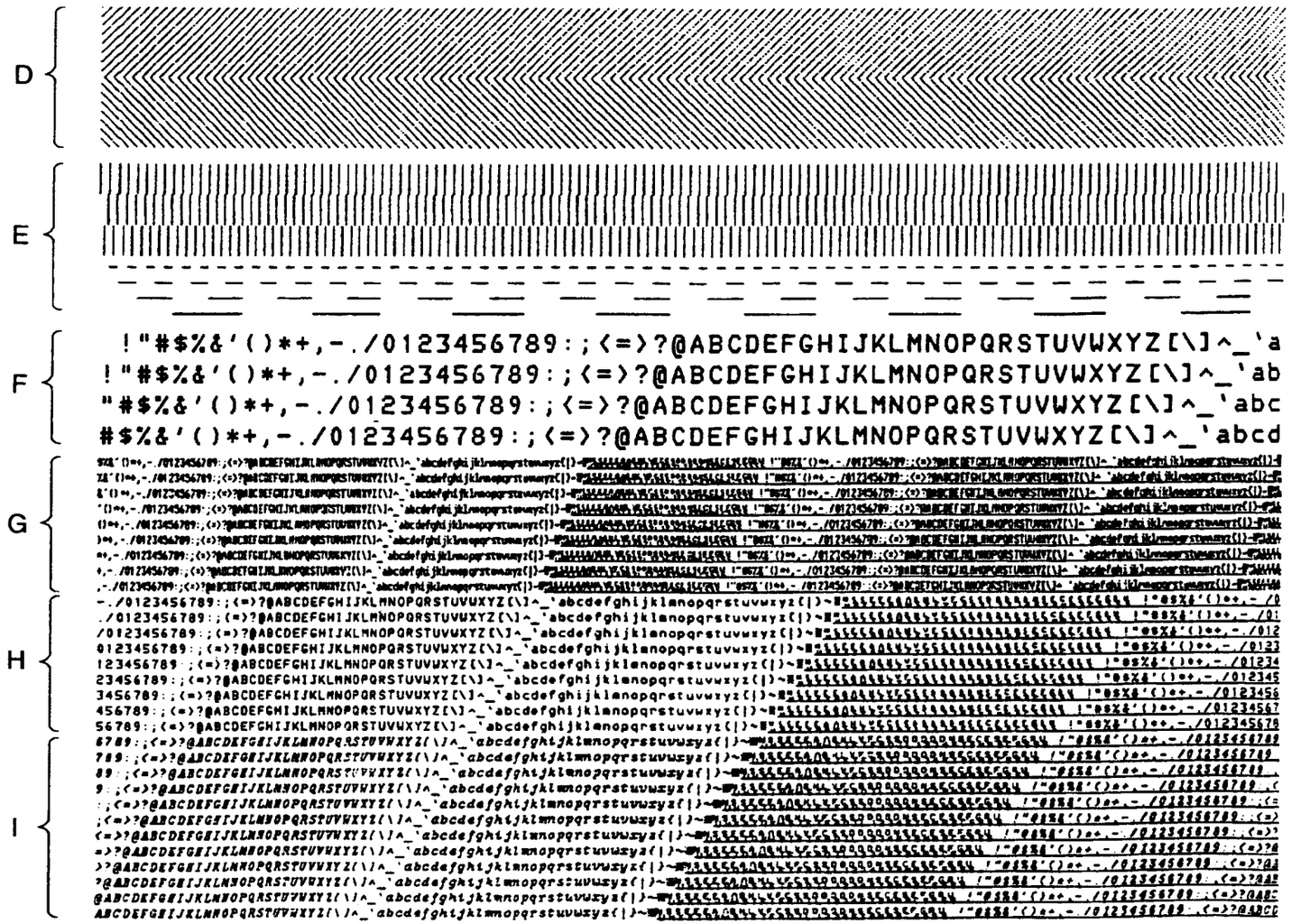


Figure 4-2c Character Set Self-Test Example

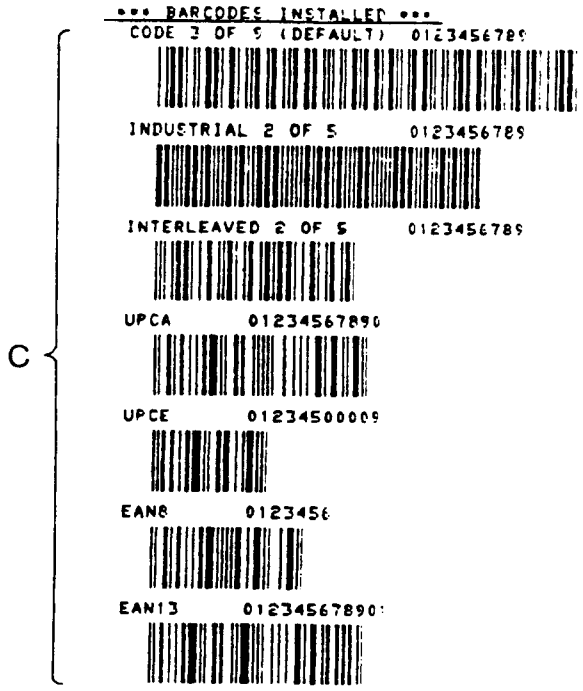


Figure 4-2b. Character Set Self-Test Example

For error information which occurred as a result of a self test refer to Appendix A. The test routines listed in Table 4-3 are performed when the Standard Self Test is executed.

Table 4-3. Standard Self Test Routines

Digital	This test is designed to test the Formatter PCA. It checks the CTC channels and performs a ROM CRC on all firmware ROM. A non-destructive read/write test is performed on both volatile and non-volatile RAM. Also a DGL test is performed to check the DGL logic and a CRC check is performed on all character set ROMS installed.
Graphics PCA (if installed)	This test performs a read/write operation on the Graphics PCA's dynamic and static RAM. The test performed on the static RAM is non-destructive (the original data is not destroyed). A CRC test is performed on all Graphics ROM. A diagnostic is performed by the Graphics PCA Controller to verify overall operation.
[THE PRINTED PORTION OF THE SELF TEST FOLLOWS - REFER TO FIG. 4-2]	
A. Configuration Print Out	A description of the I/O configuration as well as firmware datecodes and print time hours. If Label Card is instaled, the date code and configuration will be displayed
B. Character Set Samples	Sample printouts of each character set, with associated selection numbers.
C. Bar Codes	Bar code print samples (if any installed).
D. Raster Graphics	A raster graphic print sample (diagonal lines) is printed.
E. Print Quality	A sample of vertical and horizontal lines are printed; these may be used to evaluate print quality.
F. Double Size Ripple Print	A sample of double size print.
G. Compressed Ripple Print	A sample of compressed print.
H. High Density Ripple Print	A sample of high density print. (If high density ROM is installed)
I. Standard Ripple Print	A sample of standard ripple print.

SELECTABLE DIAGNOSTIC SUBTESTS

Individual subtests may be executed in the HP2300 printer to verify the operation of specific functions of the printer's circuitry. Any one of the tests listed in Table 4-4 can be selected. Some of the tests require that the printer be in CE Mode (refer to Section 4-5, CE Mode Operation).

Table 4.4 Selectable Diagnostic Test

TEST TITLE	DISPLAY MESSAGE
Standard Self Test	Std Self Test
Standard Ripple	Std Ripple
Double Size Ripple	Dbl Size Ripple
Compressed Ripple	Compr Ripple
High Density Ripple (if installed)	Hi Dens Ripple
Raster Graphics Print (herring bone)	LD Graph Test
High Density Raster Graphics (herring bone)	Hi Dens Graph Test
Raster Graphics (black out pattern) *	Blackout *
Printer Configuration Printout	Config Printout
600 LPM Ripple Print (upper case)	Upper Case Ripple
Draft character set ripple print (2564C only)	Sparse Ripple
Digital Formatter Test	Digital Test
Alternate Flight Time Adjustment Pattern	Single Bar Test
Flight Time Adjustment Pattern	Double Bar Test
Open Hammer Test *	Hammer Test *
Interface tests (I/O dependent, see specific I/O manual for test descriptions)	Refer to I/O Manual
Label Card Tests (if installed)	Refer to the Graphics Board Manual
Graphics print quality test	

* CE Mode jumper required

4-5. CE MODE OPERATION

The printer must be placed in CE Mode for the configuration of CE Mode configuration functions (identified in Table 4-1) and to perform the CE Mode diagnostic tests (identified in Table 4-4).

To place the printer in CE Mode complete the following steps:

a. Set the printer's ON/OFF switch to the OFF (0) position and unplug the power cord from the printer.
b. Remove the printer's top cover as follows:

    1. Open the printer's access cover and loosen the two captive pozidrive screws recessed below the top front edge of the top cover (see Figure 6-3).

    2. Loosen the two pozidrive screws which secure the printer's Control Panel to the top cover. Slide the panel toward the left of the printer approximately one-half inch.

    3. Unlatch the two top cover latches securing the top cover at the rear of the printer (see Figure 6-3) by gently lifting the gray tabs, and then pry open the latches.

    4. Carefully lift-up on the top cover to remove it from the printer using a small flat-blade screwdriver.

c. On the Formatter PCA, install a jumper from the "CE MODE" test point to TP1 (GND) test point.

d. Set the printer's ON/OFF switch to the ON (1) position.

e. Perform the CE Mode configuration or diagnostic.

    A CE Mode configuration is performed just like a regular (non-CE mode) configuration.

f. Set the printer's ON/OFF switch to OFF (0) and remove the jumper from the "CE MODE" pin. With the CE Mode jumper installed, the printer can not be placed on-line; an "19 CE_MODE ON" message will be displayed where "19" is the error number.

g. Replace the printer's top cover.

4-6. ERRORS

Whenever a diagnostic routine detects an error, an error message is displayed on the Control Panel. This error message is alphanumeric and will include a 4 digit number.

Descriptions of the error numbers are provided in Appendix A along with a suggested course of action following the error.

In addition to displaying the current error, the printer contains an error log which can store, not only the current error, but the previous eight errors which have occurred. This allows the service representative to identify the chain of events (errors) which may have occurred as a result of a malfunction (refer to Section 4-7, Printer Error Log).

4-7. PRINTER ERROR LOG

To aid in troubleshooting, the printer is designed to store up to nine error messages. These error messages are written to the printer's error log. The error log (error messages) can be read to obtain a "history" of the type of errors which have occurred, in order to provide additional insight as to the nature a problem.

Error logs are read from the printer's Control Panel Display. These errors are read in a similar manner as a configuration parameter. Two procedures, one for reading the error log and for clearing the error log, are provided below.

NOTE

Paper-Out, Paper Jam, and Platen Open errors are not logged in the error log.

READING THE ERROR LOG

To read the error log, complete the following steps:

a. With the printer OFF LINE, press the menu key and press it again until you find the CE MENU.

b. Press SELECT to go into the CE MENU.

c. Press the MENU key until you get the ERROR LOG message.

d. Press SELECT to go to the ERROR LOG submenu.

e. Press MENU to move through all the errors.

To exit from this submenu press ON LINE to return to an OFF LINE status.

CLEARING THE ERROR LOG

It is also possible to clear the contents of the error log. Clearing the error log provides the service representative a "fresh start" for recording printer errors.

To clear the error log complete the following steps:

a. Place the printer in CE MODE, refer to Section 4-5.

b. Follow the instructions to read the ERROR LOG.

c. By moving with the MENU key through the ERROR LOG, you will get the CLEAR ERROR LOG message.

d. With the ARROW key set its value to YES, the press SELECT to confirm clearing the ERROR LOG. To exit from this submenu press ON LINE to return to an OFF LINE status.

4-8. INTERFACE CONFIGURATION

All interface functions are programmed from the Control Panel. When the correct values are set, write them down for future reference; there may be instances when these values need to be re-entered. Each interface has its own set of configuration parameters which are set by accessing the I/O CONFIG MENU within the main menu. For additional configuration or cabling information, refer to the appropriate Interface manual listed below:

RS-232/422 Interface Manual	P/N 26067-90921
HP-IB Interface Manual	P/N 26067-90901
Centronics Interface Manual	P/N 26067-90906
Dataproducts Interface Manual	P/N 26067-90907
Super Centronics I/F Manual	P/N 26067-90957
Multiple I/O RS232/422/Supercentronics	P/N 02563-90976

NOTE

The procedure for setting all I/O parameters is the same for setting any of the printer configuration values.

4-9. LOCKING THE CONTROL PANEL

All the printer settings can be locked by holding down the SHIFT and ON LINE keys at the same time, then pressing the SELECT key. Release the SELECT key without releasing the SHIFT and ON LINE keys. The "INITIALIZING...." message will appear for approximately 7 seconds. Now if you go in to the menus you will see a lock symbol next to every setting replacing the asterisk. To unlock the printer repeat this procedure.

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Chapter 5

Adjustments HP2300

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5-1. INTRODUCTION

This chapter provides the adjustment procedures for the HP2300 printer. The following procedures are discussed in this section of the manual:

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5-3.	SEQUENCE OF ADJUSTMENTS	5 - 4
5-4.	CRANK ARM PHASE ADJUSTMENT	5 - 5
5-5.	VELOCITY TRANSDUCER ADJUSTMENTS	5 - 7
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	DEPTH ADJUSTMENT	5 - 9
5-6.	PLATEN GAP ADJUSTMENT	5 - 10
5-7.	TIMING ADJUSTMENTS	5 - 12
5-8.	FLIGHT TIME	5 - 13
5-9.	TURNAROUND TIME	5 - 15
5-10.	COLD START	5 - 15

5-2. REQUIRED TOOLS

The following tools are required to perform the adjustments on the HP2300 printer:

#1 and #2 Pozidrive Screwdrivers	
Metric Hexagonal Driver, 3mm (Allen wrenches)	(recommended: straight drive handle with extension and replaceable 3mm bit).
.013 Inch Feeler Gauges (two each)	Part Number 02563-00081
Phasing Adjustment Tool	Part Number 02566-20129

5-3. SEQUENCE OF ADJUSTMENTS

Perform the adjustments in the sequence listed in Table 5-1. Always perform the adjustments in correct sequence or erratic print quality may be experienced

Table 5-1. HP 840L Adjustments Summary

ADJUSTMENT	VERIFY ADJ USING TEST	TYPE OF ADJUSTMENT	COMMENTS
PHASING	N/A	Mechanical Adj.	See Section 5-4
VELOCITY TRANSDUCER CLEARANCE ADJ	N/A	Mechanical Adj.	See Section 5-5
VELOCITY TRANSDUCER DEPTH ADJ	N/A	Mechanical Adj.	See Section 5-5
PLATEN GAP	N/A	Mechanical Adj.	See Section 5-6
FLIGHT TIME	Single Bar or Double Bar	CE Menu Flight Time (Range 0-35)*	See Section 5-8 (Figure 5-1)
TURNAROUND TIME (Crank Phase)	LD Graphic or Black Out	CE Menu Turn Around (Range 40-64)*	See Section 5-9 (Figure 5-2)
			Check Flight Time and Turnaround Time adj.
* CE Mode required to adjust the parameter value			

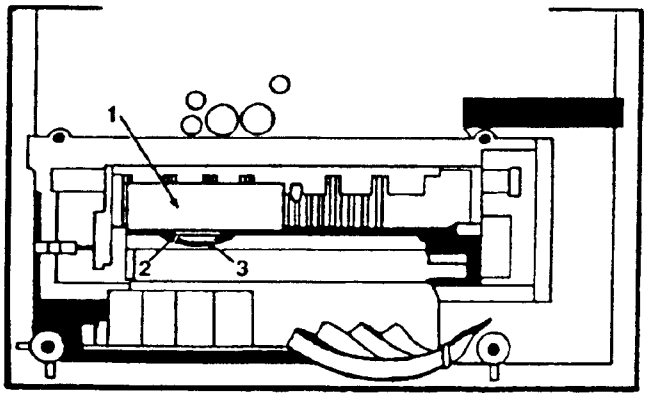
5-4. CRANK ARM PHASE ADJUSTMENT

The Crank Arm Adjustment procedure should be performed whenever the printbar is removed. This adjusts the position or phase of the crank arms in relation to the printbar flexures to allow proper mogation of the printbar. The printer top cover, printer weldment, and Hammer Driver PCA must be removed to perform this adjustment.

To adjust the crank arms complete the following steps:

a. If the counter balance is not visible, then it will be necessary to rotate the counter balance form under the printbar so that it can be seen.

b. Place the phasing tool (P/N 02566-20129) against the printbar fins, with the edge of the tool resting on top of the counter balance (see Figure 5-1, item 1).



TOP VIEW OF PRINTER

1 ALIGNMENT TOOL
2 ALIGN COUNTER BALANCE SCRIBE LINE WITH THE LOWER EDGE OF ALIGNMENT TOOL.
3 COUNTER BALANCE SCRIBE LINE

Figure 5-1. Crank Arm Phasing

c. Place the Platen Lever in the "open" position.

d. Check the alignment of the counter balance weights to see if the scribed reference line is parallel with the edge of the tool (see Figure 5-1, item 2). If the line is parallel, no adjustment is needed. If the line is not parallel, proceed to step e.

e. Loosen all four crank arm screws (see Figure 5-2). Move the counter balance weight until the scribed line is parallel with the edge of the adjustment tool.

f. Snug down first, then tighten the four crank arm screws in the following sequence: upper left, lower right, upper right, lower left.

g. Slap the printbar once or twice. The line on the counterbalance should remain parallel with the tool. If not, readjust as necessary.

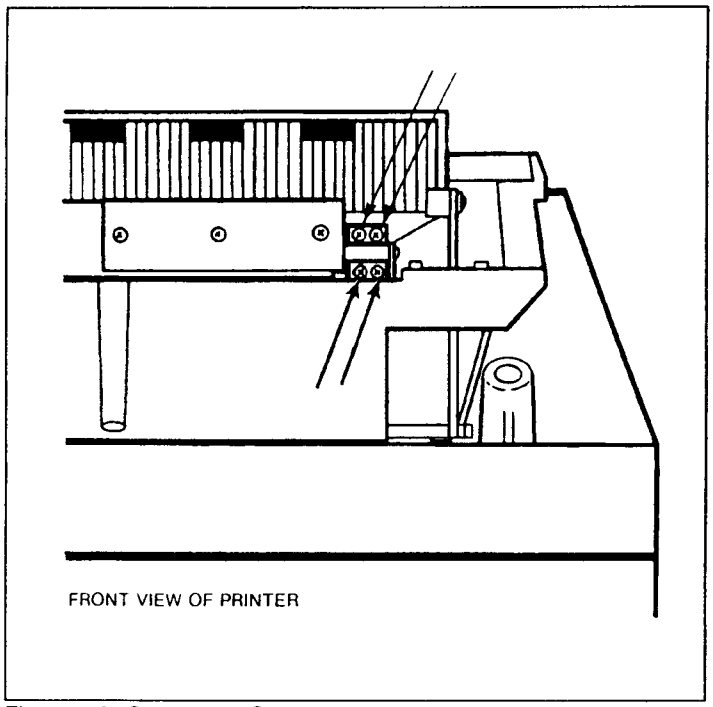


Figure 5-2. Crank Arm Screws

5-5. VELOCITY TRANSDUCER ADJUSTMENTS

There are two velocity transducer adjustments: the Magnet Clearance Adjustment and the magnet Depth Adjustment. These adjustments need to be performed whenever the velocity transducer has been disconnected from the printer. The Clearance Adjustment should be made first, followed by the Depth Adjustment. These adjustments are described in the two sections below.

CLEARANCE ADJUSTMENT

The Clearance Adjustment centers the magnet in the center of the velocity transducer body (see Figure 5-4) so that as the magnet moves in and out of the transducer body it does not scrape the sides. The clearance adjustment can be completed with or without the special centering tool (P/N 02566-20152) as described in steps c and d, below.

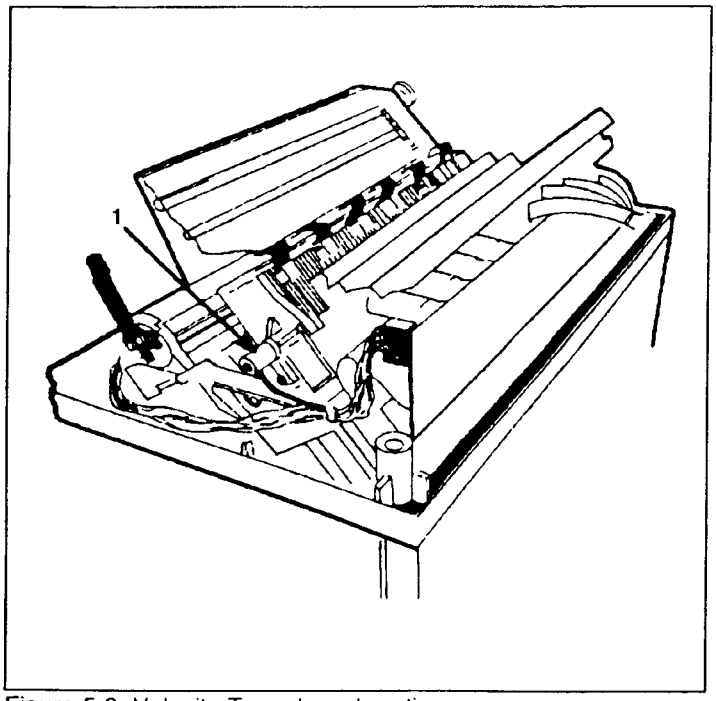


Figure 5-3. Velocity Transducer Location

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Loosen the clearance adjustment screw (see Figure 5-4).

c. If using the special centering tool (02566-20152), slide the tool inside the coil and over the magnet, then skip directly to step e.

   If not using the centering tool, view down the velocity transducer shaft to see the position of the magnet with respect to the shaft sides (see Figure 5-4).

d. Move the velocity transducer body until the magnet appears to be centered in the hole (see Figure 5-4).

e. Tighten the clearance adjustment screw.

Proceed to Transducer Depth Adjustment following:

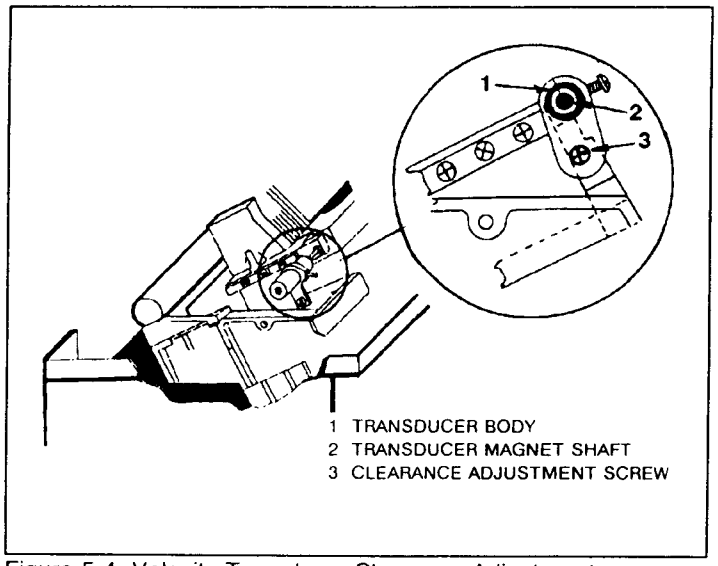


Figure 5-4. Velocity Transducer Clearance Adjustment

DEPTH ADJUSTMENT

The Depth Adjustment positions the velocity transducer magnet in the center of the linear range of the velocity transducer body (coil). This centers the range of corebar motion in the center of the transducer range. The printer top cover and printer weldment must be removed to perform this adjustment.

To make the Depth Adjustment complete the following steps:

a. Loosen the plastic adjustment screw (see Figure 5-5). (Note, the velocity transducer magnet should be secured to the printbar.)

b. Position the velocity transducer body by moving it in and out of the frame until the front edge of the body is aligned with the scribe line on the magnetic pin (see Figure 5-5).

c. Tighten the plastic screw.

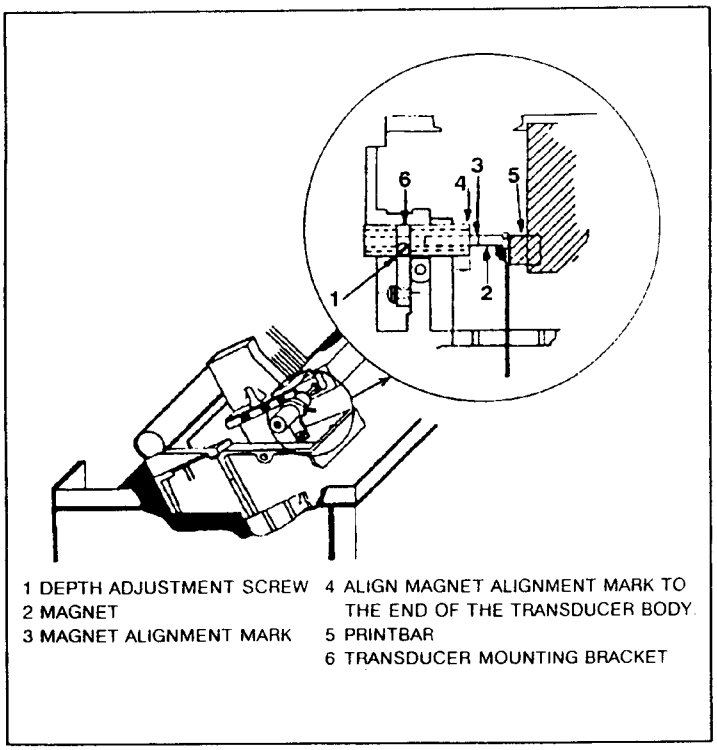


Figure 5-5. Velocity Transducer Adjustment

5-6. PLATEN GAP ADJUSTMENT

The Platen Gap is the space between the platen and the print bar hammer tines #1 and #66. This gap should be 0.013 +/- .001 inches with the Platen Adjustment Knob set to "B". This adjustment should be performed each time the print bar assembly, platen or weldment assemblies are removed.

To adjust the platen gap, perform the following steps:

NOTE

If the printer's top cover is not already off, you only need to remove the top access door only. If the top cover has already been removed, skip step "a", and proceed directly to step "b". See Figure 5-6.

a. Remove the printer access door from the top cover as shown in Figure 5-6 (see NOTE above).

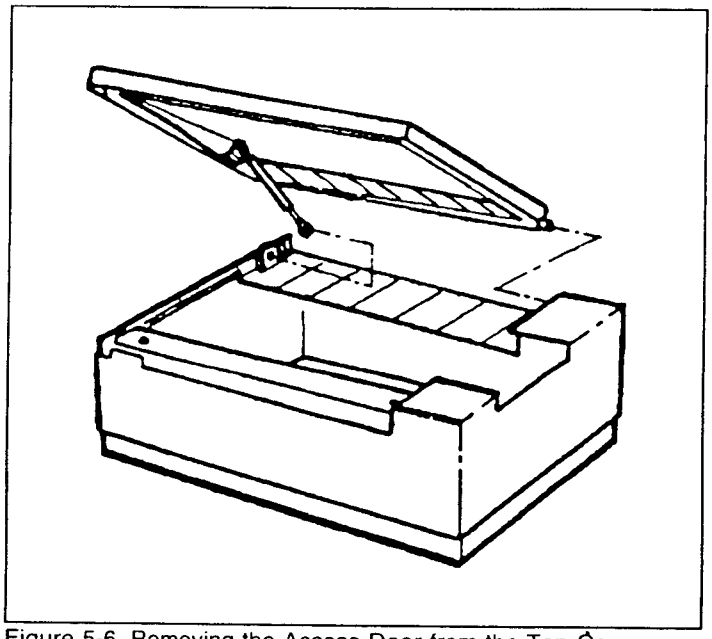


Figure 5-6. Removing the Access Door from the Top Cover

b. Rotate the Form Thickness Adjustment Knob to its "B" position.

c. Using a straight drive handle with an extension and a 3mm hex driver bit, loosen the two screws which secure the platen mounting feet to the print mechanism (see Figure 5-7, item 2).

d. Adjust the platen by placing the 0.013 inch feeler gauges (part number 02563-00081) between the ribbon shield and the platen, one

at each end of the platen, one under hammer #1 (first hammer) and one under hammer #66 (last hammer) as shown in Figure 5-7, items 4 & 5. Grasp the platen and the print bar with one hand, squeezing them firmly together so that the platen is held snug against the gauges. Tighten the screws.

NOTE

To more easily view the positions of hammers #1 and #66, it may be necessary to push the ribbon shield back and visually observe the hammer positions on the print bar. A 0.013" gap is measured between the Ribbon Shield and the platen. Place gauge between Ribbon Shield and Platen on a hammer stylus.

e. Verify that the Forms Thickness Adjustment Knob is still set at "B". Re-check the gap and repeat step "d" as necessary, until confident it is set precisely.

NOTE

The platen gap is critical for maintaining good print quality. Re-check after tightening to be certain it is correct.

5-7. TIMING ADJUSTMENTS

There are two timing adjustments, the Flight Time Adjustment and the Turnaround Time Adjustments which adjust the hammer dot placement for optimum print quality. These adjustments change circuit timing parameters and are made from the printer Control Panel (with the printer in CE Mode). The Flight Time Adjustment should be performed first and then the Turnaround Time Adjustment. Both should be performed whenever the platen, printbar, printbar drive motor, crank arms, Analog PCA, or Formatter PCA have been adjusted or removed.

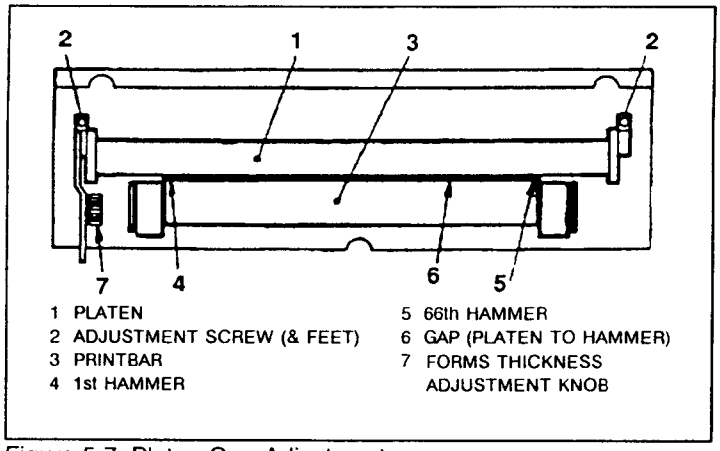


Figure 5-7. Platen Gap Adjustment

NOTE

The crankarm phasing, transducer clearance and depth, and platen gap MUST be set correctly in order for the Flight Time and Turnaround Time adjustments to be accurately made.

5-8. FLIGHT TIME

The Flight Time Adjustment adjusts the printer hammer driver circuitry so that the hammers are fired at the proper time in order to place dots at the same position (in a vertical line) on the paper.

To determine if the flight time is adjusted correctly, observe the dot pattern produced by diagnostic subtest single bar (see Figure 5-8, below). The vertical lines of this test should have the dots placed directly beneath each other. Any sawtooth effect indicates the flight time is out of adjustment.

Subtest double bar can also be used to verify flight time. The vertical bars should all have the same width. If one bar in each pair is wider than the other, then the flight time needs adjustment.

To adjust the flight time, complete the following steps:

a. Place the printer in the CE Mode (refer to Section 4-5, CE Mode Operation).

b. Place the printer into CE MENU by scrolling the MENUS. Press SELECT key when the display shows CE MENU. In the first line of the display, FLIGHT TIME is shown and the current value in the second one (an asterisk indicates it is the current value). Use UP or DOWN arrow keys to select the new value. Any number from 0 to 35 (840L) and 2 to 15 (1100L) can be selected, however the normal value for this parameter are approximately 6 (840L) and 8 (1100L). When the desired parameter is displayed, press SELECT to enter the value and the print quality verification test will automatically begin printing. Press SELECT or ON LINE after the first page prints (the complete test is 4 pages).

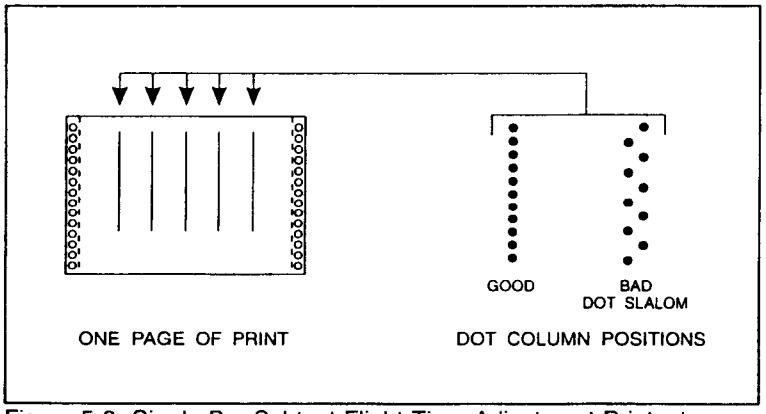


Figure 5-8. Single Bar Subtest-Flight Time Adjustment Printout

c. Check the results of the adjustment on the first page of the automatic printouts. You may also check the adjustment by performing Single Bar Test; refer to Section 4-4, Selectable Diagnostic Subtests) and observe the vertical lines of the test printout for any slalom effect (see Figure 5-8). If the slalom effect is still evident, return to step "b" and increase the parameter; or, if the slalom effect appears to have increased, try varying the parameter in the opposite direction. The current value is printed in the lower right corner of the automatic alignment printouts first page.

5-9. TURNAROUND TIME

The Turnaround Time Adjustment is designed to compensate for variations in the printbar turnaround time. If this adjustment is off, it causes the dots at the edges of the character cells to either leave a gap or to overlap into the next hammer's print area.

To determine if the turnaround time is adjusted correctly, observe the dot pattern created by diagnostic subtest LD Graphic Test (see Figure 5-9) or the first page of the Automatic Alignment Printout.

If it is not adjusted correctly either faint white lines or slightly darker lines can be seen running vertically through the herring bone pattern (see Figure 5-9).

To adjust the turnaround time complete the following steps:

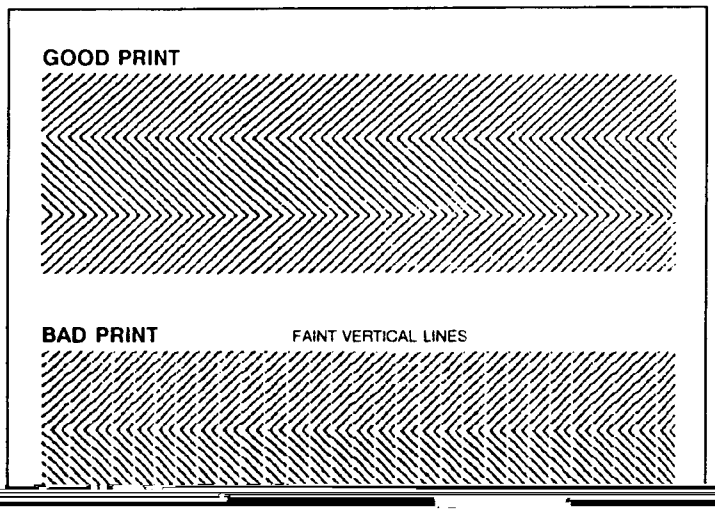
a. Place the printer in CE Mode (refer to Section 4-5, CE Mode Operation).

b. Place the printer in CE MENU by holding down on the MENU key. Use SELECT key when CE MENU is displaying. Use MENU key to display TURN AROUND ADJ. Use UP or DOWN key to select the desire value. Any number from 40 to 64 (840L) or 30 to 48 (1100L) can be selected, however the default values for this parameter are 56 (840L) and 35 (1100L). When the desired parameter has been selected, press SELECT to enter the value and the automatic alignment printout (4 pages) will begin print.

c. Check the results of the adjustment. To check the adjustment perform Subtest LD Graphic Test (or Blackout test). If faint vertical lines, either light or dark, can still be seen running through the pattern (see Figure 5-9), return to step "b" and either increase the parameter value or vary the value in the opposite direction until the lines disappear.

5-10. COLD START

A cold start procedure initializes all configuration parameters to their factory default values. The cold start functions as a hard reset and is helpful in cases when the printer's self test will not run or when the Formatter PCA is replaced. The printer should be COLD STARTED whenever the Formatter board or the firmware is replaced.


GOOD PRINT
BAD PRINT
FAINT VERTICAL LINES

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6-1. INTRODUCTION

This chapter provides removal and replacement procedures for the HP2300 printer. Each procedure should be read thoroughly since some procedures refer to steps from previous procedures and to specific adjustments in other sections of the manual.

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Figures 6-1 and 6-2 illustrate the main assemblies discussed in this chapter of the manual.

6-2. TOOLS REQUIRED

The following is a list of tools required to replace the assemblies discussed in this section of the manual.

Pozidrive screwdrivers #1 and #2

Small and medium size flat-blade screwdrivers

7 mm nut driver (ground wire Analog PCA)

Metric hexagonal drivers allen wrenches (2.5, 3, 5 and 7 mm)

(Recommended: straight drive handle with extension and replaceable bits. "L" shaped allen wrenches not recommended for platen and printbar motor replacement procedures.)

Pozidrive screwstarter or Petrowax (P/N 0470-1675)

Needle-nose pliers

1/4 inch (6.3mm) hex socket, 2 inches (50mm) deep

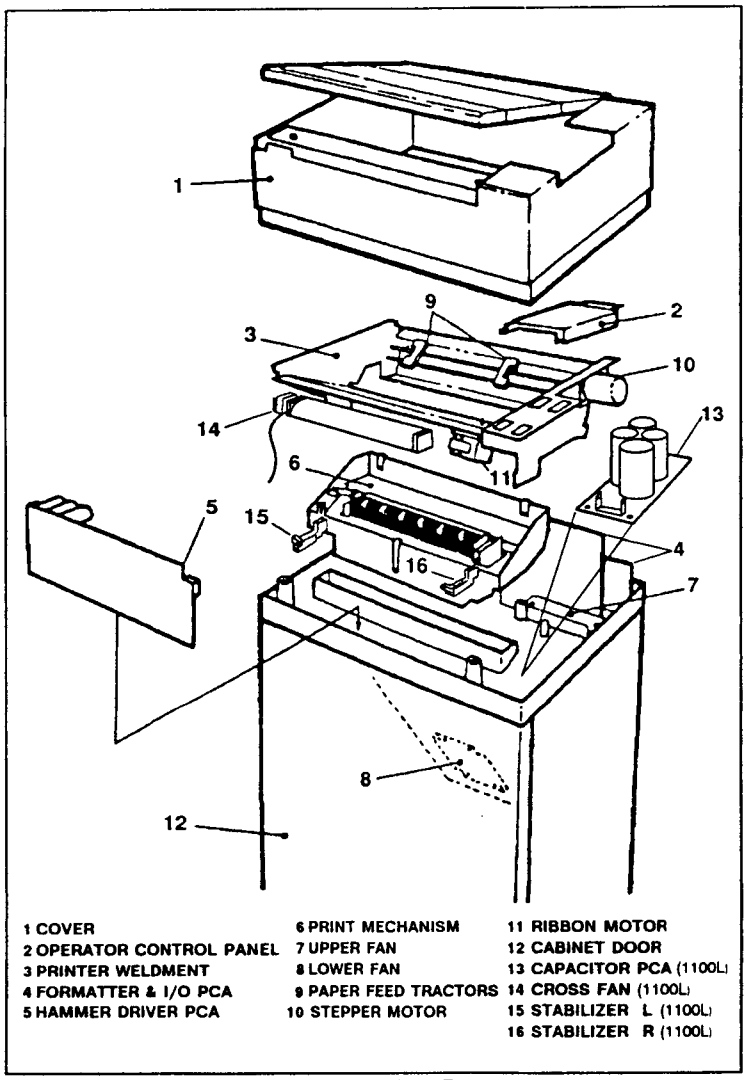

Figure 6-1. HP2300 Printer Assemblies, Front View

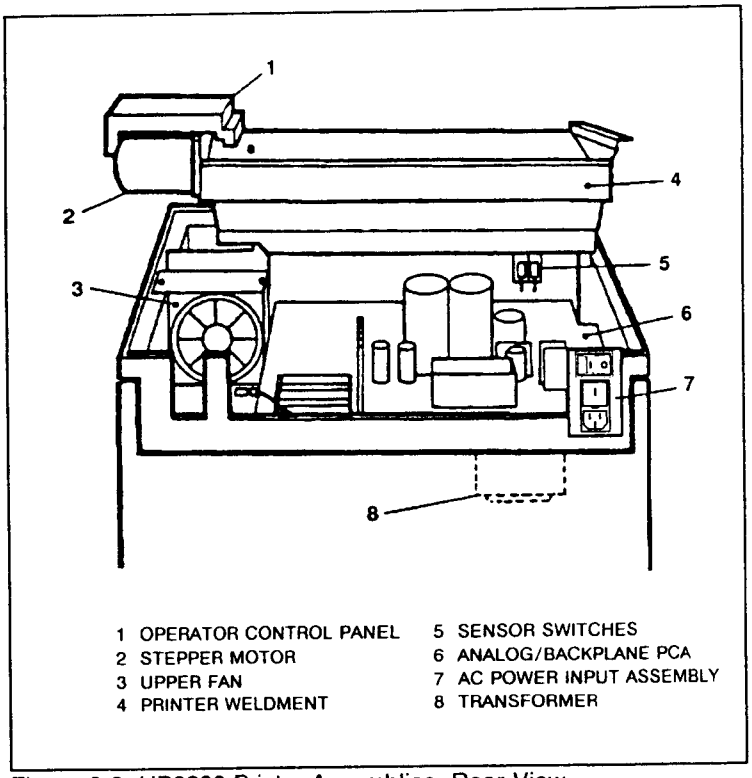

Figure 6-2. HP2300 Printer Assemblies, Rear View

6-3. TOP COVER

Removal of the printer top cover provides access to all printer PCA's and the print mechanism except for the lower fan (accessed from inside the cabinet).

To remove the printer top cover complete the following steps:

WARNING

The HP2300 Printer does not contain any operator-serviceable parts. Any operation requiring removal of the printers protective covers must be performed by a trained Hewlett-Packard Service Representative.

Removal of protective covers by untrained personnel may result in serious personal injury.

REMOVAL:

a. Place the printer OFFLINE and disconnect the interface I/O cable from the I/O PCA at the rear of the printer.

b. Set the printer's ON/OFF switch to the OFF (0) position and disconnect the input power cable.

c. Open the printer's top access door. Using a #2 Pozidrive screwdriver, loosen the two captive screws recessed below the upper front edge of the printer (see Figure 6-2, item 1).

d. A ribbon cable connects the printer's control panel to the top cover. Remove the control panel from the top cover by loosening the two pozidrive screws securing panel to the cover (see Figure 6-3, item 2). Slide the control panel toward the center of the printer approximately one-half inch to separate the control panel from the top cover.

WARNING

Be careful when using a flat blade screwdriver to pry open the printer's top cover latches. Don't allow the screwdriver to slip and cause injury.

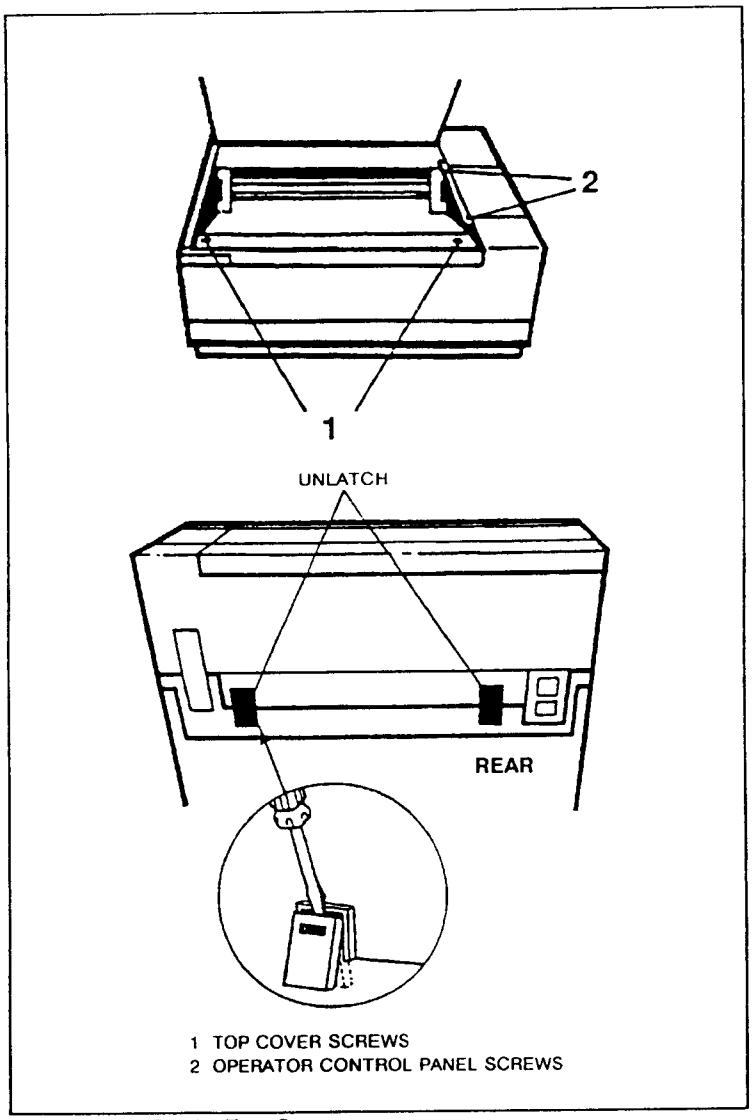

Figure 6-3. HP2300 Top Cover

e. Using a flat blade screwdriver, unlatch the two top cover latches securing the top cover at the rear of the printer. On printers with a grey locking tab, push the grey tab up while prying downward and

out on the top of the black part of the latch to release (see Figure 6-3).

NOTE

Do not remove the top cover by grasping the opened top access door. This may damage the access door.

f. From the front of the printer, grasp the right rear and left front corners of the top cover and wiggle the cover while lifting upward to remove.

REPLACEMENT: Top Cover

Reverse the removal procedure to replace the printer's top cover. When replacing, be sure to check the following:

a. Check the ground wire that connects to the lower portion of the I/O PCA to be sure the wire is not pinched by the top cover.

b. Re-seat all backplane PCA's firmly into the backplane.

c. Check the ribbon cable that is routed along the right end of the printer weldment to be sure it is firmly secured by all of the ribbon cable mounting clips and is centered between the clips.

CAUTION

Failure to secure and center the ribbon cable to the end of the weldment may result in damage to the cable due to vibration of the print mechanism.

6-4. CONTROL PANEL

If replacement of the Control Panel is required, remove the printer top cover (refer to Section 6-3). Then, disconnect the ribbon cable from the edge connector on the rear of the Control Panel PCA. Slide the Control Panel PCA slightly to the left while lifting to remove.

6-5. FORMATTER, GRAPHICS AND INTERFACE PCA

The backplane PCA's (Formatter, Graphics, and I/O) may be replaced after the printer top cover has been removed (see Section 6-3). To remove any of the backplane PCA's remove the holding bracket, unplug any cables (on I/O PCA, remove ground wire) and lift upward to unplug from backplane connectors.

NOTE

If removal of the Formatter PCA is required, the printer must be Cold Started. Refer to Chapter 4 of this manual.

When re-installing the PCA's, care should be taken not to bend the connector pins on the Analog PCA. Ensure that the ground wire on the I/O PCA is properly connected and routed so that it is not pinched by the printer top cover.

NOTE

If the formatter PCA is not plugged in connector J10 (Figure 6-5), the printer will not work properly. The I/O and Graphics PCA's are normally connected as shown in Figure 6-5, however, some OEM's may use different slots for the I/O and Graphics PCA's.

6-6. UPPER FAN

The upper fan is located on the right rear of the printer (left side as viewed from the rear), behind the Formatter PCA.

REMOVAL:

a. Verify that the printer is OFFLINE and is disconnected from the power source.

b. Remove the printer top cover and Backplane PCA's as described in Section 6-3.

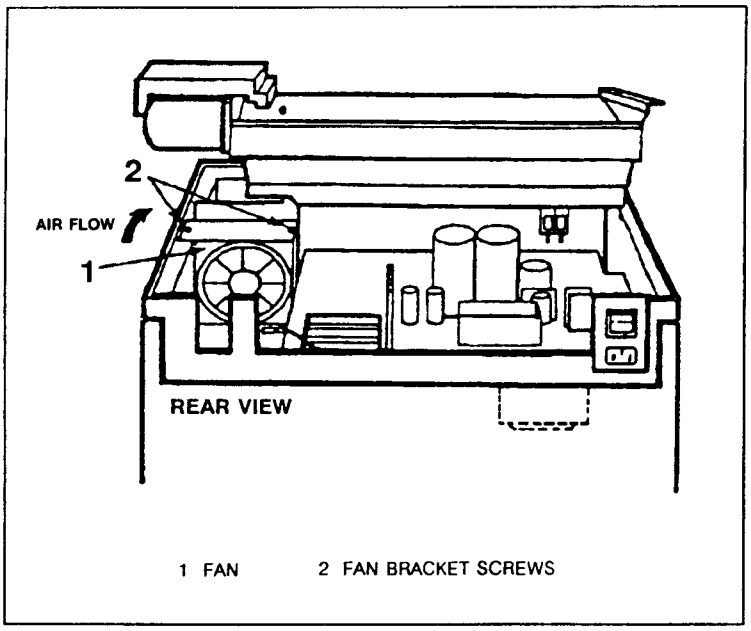

Figure 6-4. Upper Fan (Rear View of Printer)

c. Remove the two screws from the fan bracket and remove the bracket (see Figure 6-21).

d. Pull the fan upward and disconnect the power connector and the ground wire from before pulling it from the printer.

REPLACEMENT: Upper Fan

Reverse the above to replace. When replacing the fan ensure the airflow direction is as indicated (arrows on fan). Position the fan as far forward as possible.

6-7. ANALOG PCA

CAUTION

Static sensitive devices. Use proper ESD prevention procedures.

The Analog PCA is located at the rear of the printer.

To remove the Analog PCA complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove the Formatter, Graphics and Interface PCAs as described in Section 6-5.

c. Disconnect all (11) cables from the connectors on the PCA (see Figure 6-6).

d. Use a 7 mm nut driver or box wrench to remove the ground wire connecting the power input plate to the printer base. Remove from the stud on the plate, not from the printer base. (The ground wires for the printer fans are also connected to this stud.)

e. Pull up on the six (6) plastic fasteners on the PCA (see Figure 6-5) to release the PCA from the printer base.

CAUTION

Do NOT flex (bend) the Analog PCA when either removing or installing it. Flexing the PCA may cause excessive stress at the circuit connections resulting in defective PCA.

f. Position all cables and wires out of the way and lift the PCA from the printer.

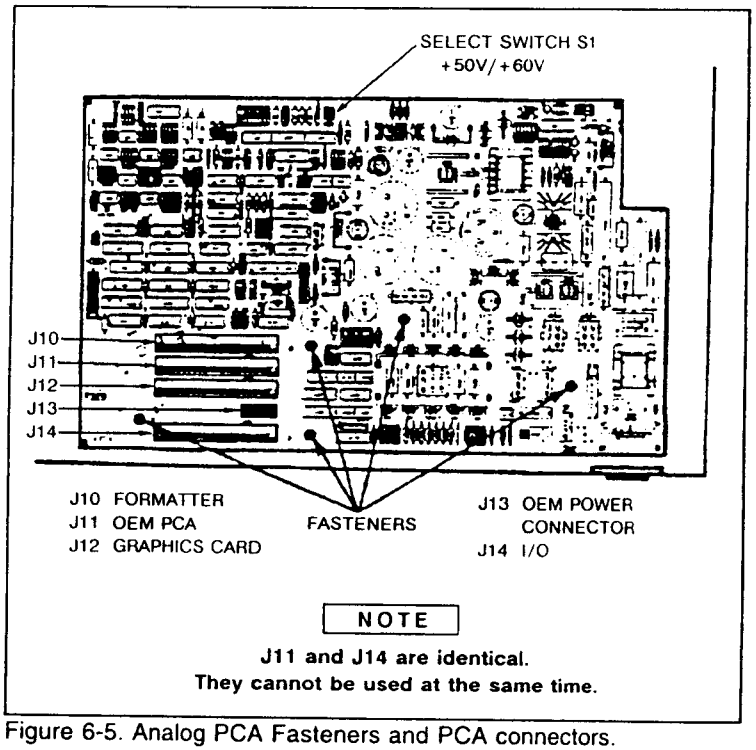

Figure 6-5. Analog PCA Fasteners and PCA connectors.

Replace the Analog PCA by reversing the removal procedure. Note, that all cable connectors are designed (keyed) so that they fit only their respective connectors, except for two fan cables and the transformer cable. The two fan cables may be placed on either of the fan connectors (J8 and J18). The transformer cable must be placed on the appropriate connector. The analog PCA has a switch for selecting either +50VDC or +60VDC. Be sure switch S1 is in the right position for your model: +50V for the 840L and +60V for the 1100L.

CAUTION

Static sensitive devices. Use adequate ESD prevention procedures.

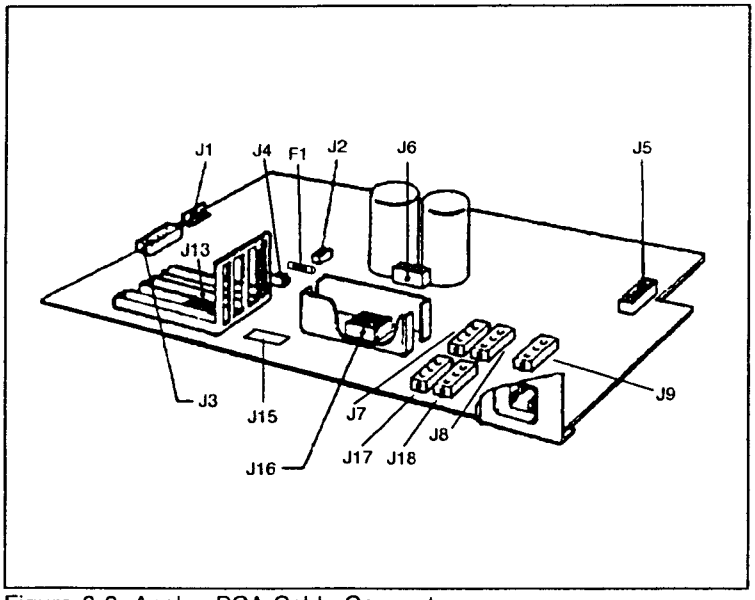

Figure 6-6. Analog PCA Cable Connectors

J1= Velocity Transducer
J2= Printbar Motor
J3= Hammer Driver Data
J4= Sensor Connection
J5= From Transformer
J6= Hammer Driver PC Power Cable
J7= Cross-Flow Fan (1100L)
F1= Printbar Motor Fuse
J8= Fan
J9= To Transformer
J13= OEM Power connector
J15= Test points
J16= Stepper Motor
J17= Ribbon Motor
J18= Fan

6-8. HAMMER DRIVER PCA

The Hammer Driver PCA is located in the front of the printer.

To remove the Hammer Driver PCA complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. From each end, remove the screw which holds the PCA bracket to the printer base (Figure 6-7, item 4).

c. Tilt the PCA outward at the top, away from the print mechanism and remove the eight cables, which include: the six ribbon cables from connectors J1 through J6, the power cable from J7 (840L) or J9 (1100L), the driver logic cable from J8 (840L) or J10 (1100L), thermistor cable from J8 (1100L) and capacitor cable from J7 (1100L).

d. Remove the PCA. (Note, the brackets should remain with the PCA.)

e. Inspect the large capacitors for leakage; replace the PCA if leakage is detected (840L).

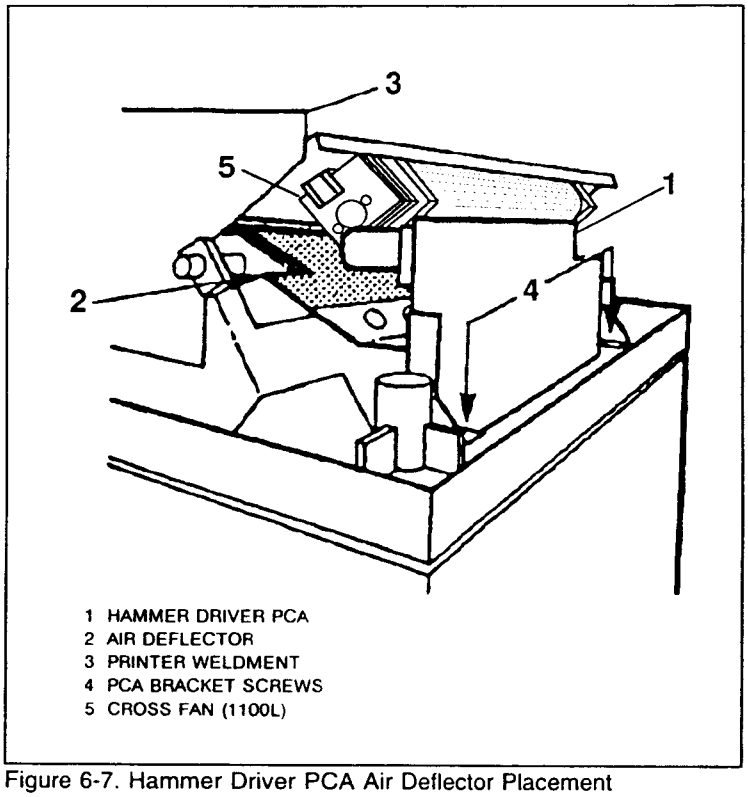

Figure 6-7. Hammer Driver PCA Air Deflector Placement

When replacing the PCA, it is IMPORTANT that the plastic shield (Air Deflector) be positioned as shown in Figure 6-7. This shield is required to direct air flow over the printbar to maintain proper cooling (840L).

6-9. CAPACITOR PCA (1100L)

The capacitor PCA is located in right front side of the printer (Figure 6-1). To remove the Capacitor PCA complete the following steps:

a. Remove printer top cover as described in section 6-3 (Ensure that power to the printer is disconnected).

b. Disconnect the power cable from the Capacitor PCA.

c. Pull up the three plastic fasteners on the PCA, to release the PCA from the printer base.

d. To replace the Capacitor PCA perform the preceding steps in reverse order.

6-10. RIBBON MOTOR

The ribbon motor is located under the ribbon cartridge on the right side of the printer.

To remove the ribbon motor complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove Hammer Driver PCA as described in section 6-8.

c. Remove the ribbon cartridge.

d. Disconnect the ribbon motor cable from connector J17 on the Analog PCA and remove the wire from the cable fasteners at the side and rear of the printer weldment.

e. Remove the ribbon motor ground wire from the motor (cut the tie wrap).

f. Remove the four pozidrive screws which secure the ribbon motor assembly to the printer weldment housing (see Figure 6-8).

Install the new ribbon motor assembly by reversing the removal procedure. Replace the ground wire and tie wrap to motor. Ensure that the Hammer Driver ribbon cable connector, located directly beneath the ribbon motor, has not been dislodged.

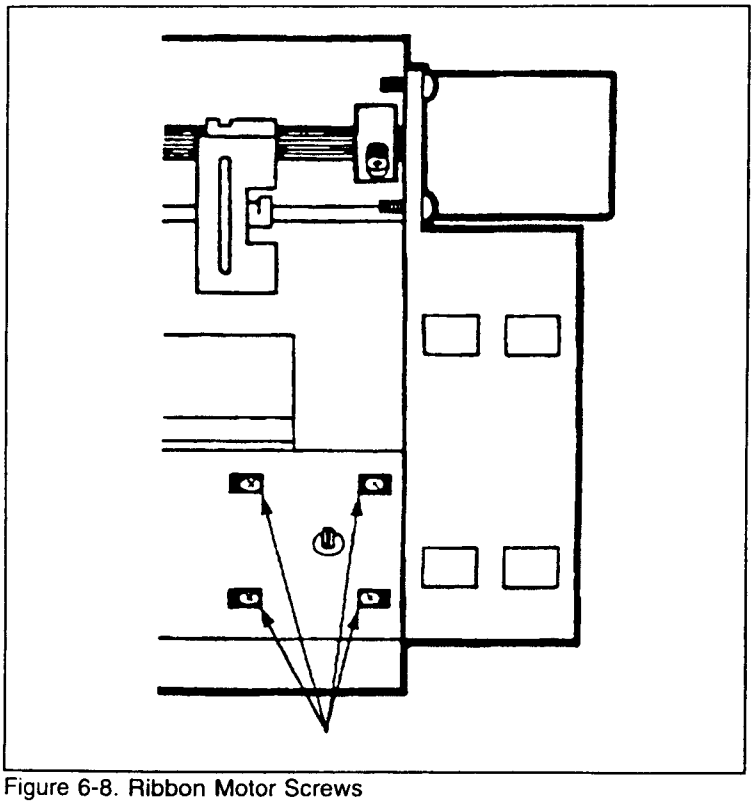

Figure 6-8. Ribbon Motor Screws

6-11. STEPPER MOTOR

The stepper motor drives the paper feed tractors and is located on the right side of the printer weldment. The stepper motor may be removed with or without prior removal of the weldment assembly from the printer.

REMOVAL:

a. Verify that the printer is OFFLINE, is disconnected from the power source, and the top cover has been removed from the printer (see Section 6-3).

b. Disconnect connector J16 (Stepper Motor) on the Analog PCA (see Figure 6-6).

c. Using a 3mm internal hex driver (allen wrench), loosen the set screw on the locking collar at the stepper motor tractor drive shaft (see Figure 6-9).

d. Remove the three 3 mm hex head screws on the stepper motor and carefully slide the stepper motor off the stepper motor drive shaft.

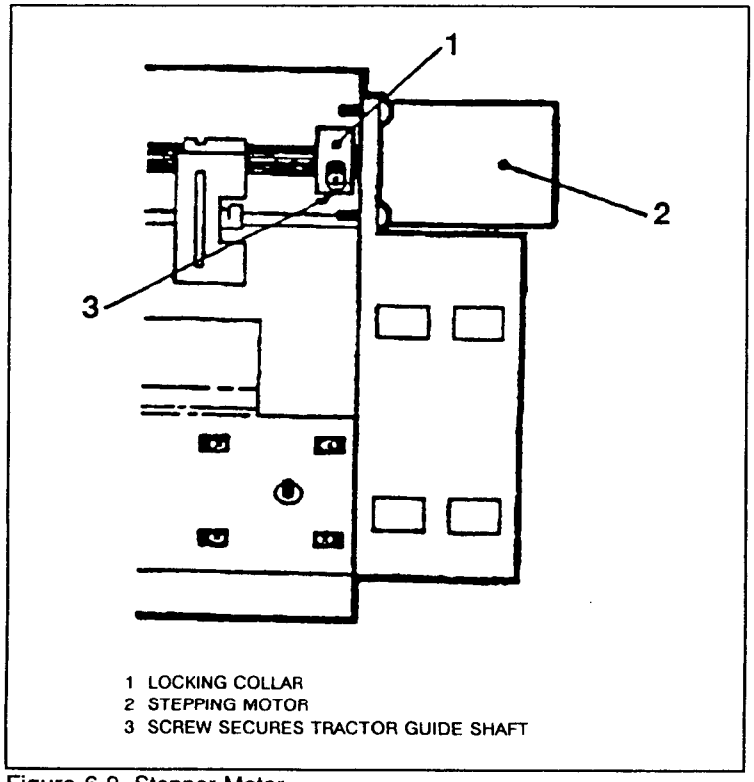

Figure 6-9. Stepper Motor

REPLACEMENT: Stepper Motor

a. Slide the stepper motor onto the drive shaft.

b. Hold the drive shaft as far as possible toward the left end of the printer, away from the stepper motor.

c. Locate the split collar approximately 2 to 3 mm away from the stepper motor, aligning the slot in the collar with the slot in the drive shaft (see Figure 6-10).

d. Tighten the split collar set screw.

NOTE

Ensure that the locking collar is aligned with the slot on the tractor drive shaft and is tightened securely.

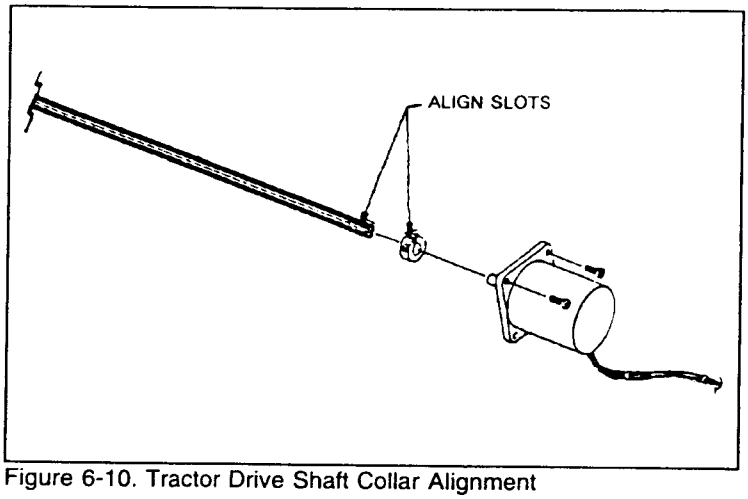

Figure 6-10. Tractor Drive Shaft Collar Alignment

6-12. PAPER FEED TRACTORS

The paper feed tractors may be removed with or without the printer weldment being removed from the printer.

NOTE

Before replacing the tractors, be certain that the tractors to be installed are correct for the printer. Refer to Figure 7-6 in Chapter 7 for a comparison of old Vs. new tractor assemblies.

REMOVAL:

a. Verify that the printer is disconnected from the power source. (The top cover and operator panel should have been removed from the printer - see Section 6-3.)

b. Remove the three 3 mm hex head screws securing the stepper motor to the printer weldment (see Figure 6-11, item 3).

c. Loosen the set screw in the split collar and slide the motor off the shaft. Lay the motor in the printer base (no need to disconnect motor cables).

d. Slide the splined tractor drive shaft toward the right and through the tractors to remove. Make sure the left weldment bearing stays in place.

e. From the left of the printer, remove the one 3 mm hex head (or pozidrive) screw securing the tractor guide shaft to the side of the weldment (see Figure 6-11, item 1).

f. Remove the tractors and the tractor guide shaft together from the printer. Slide the tractors off the guide shaft.

REPLACEMENT: Paper Feed Tractors

a. Slide the new tractors onto the end of the tractor guide shaft, making sure the locking levers are facing outward.

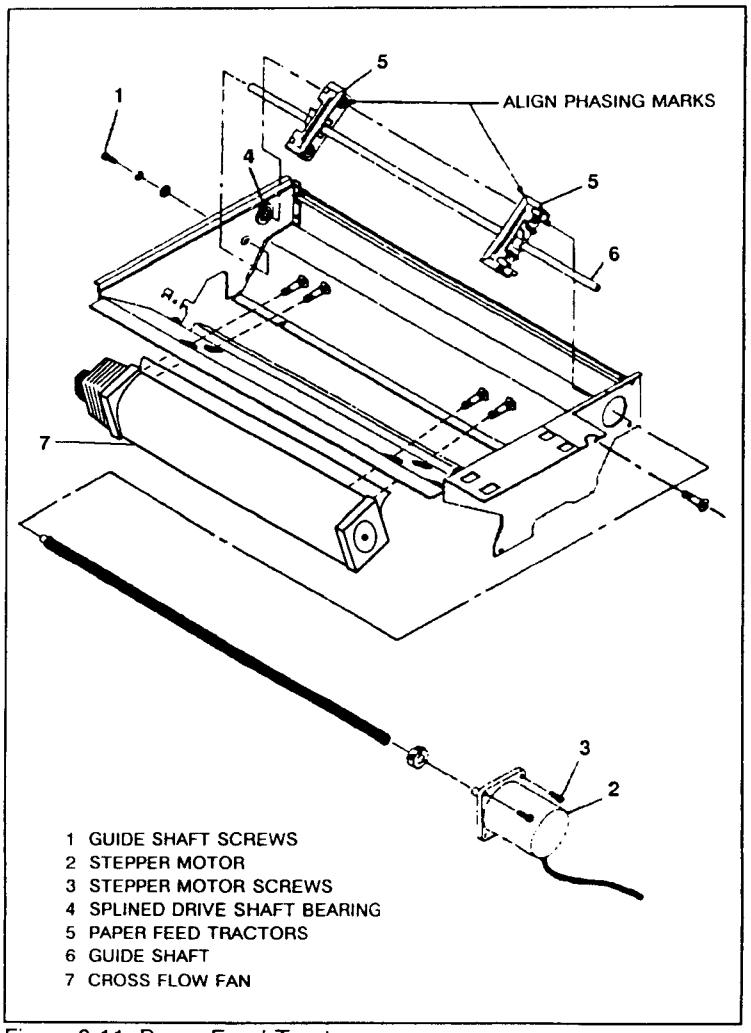

Figure 6-11. Paper Feed Tractors

b. Align the rubber alignment mark on the splined hole of each tractor with the top mark on the tractor body (see Figure 6-12). Slide the splined tractor drive shaft through each tractor, making sure that the marks are aligned with the same groove on the shaft on both tractors.

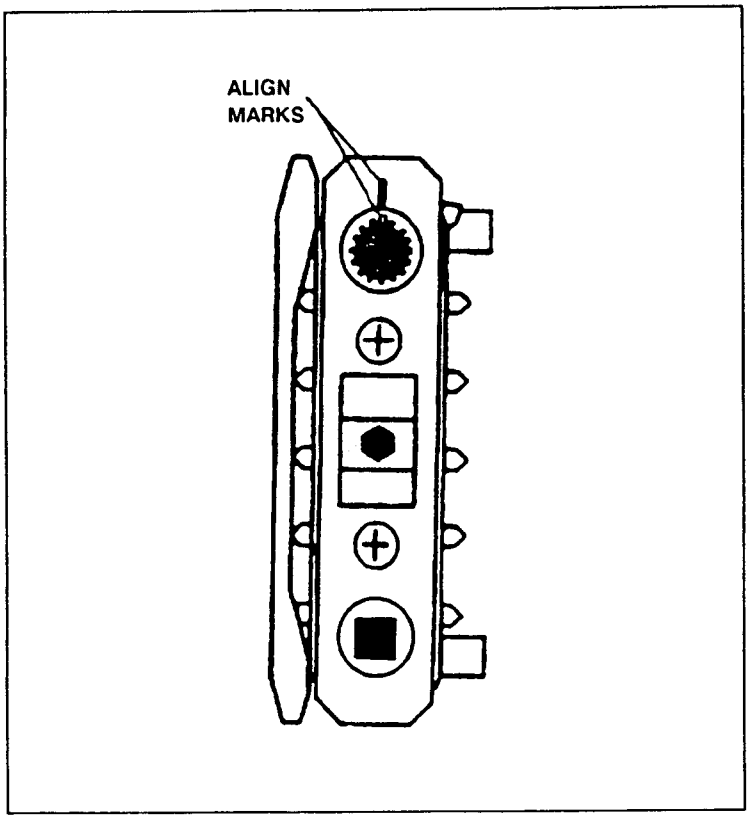

Figure 6-12. Tractor Alignment Marks

c. Holding the tractor and two shafts together as an assembly, slide the notched end of the splined drive shaft through its hole in the right end of the printer weldment.

d. At the left end of the weldment, align the tractor guide shaft with its detent.

e. Insert the 3 mm screw through the left end of the printer weldment. Do not tighten yet.

f. At the right end of the weldment, visually align the right end of the guide shaft with its hole and insert the 3 mm screw. While holding the guide shaft, tighten this screw and the left end screw securely.

g. Slide the splined drive shaft toward the left and into the bearing in the printer weldment.

h. Hold the stepper motor with the wires at the bottom. Insert the motor shaft into the splined drive shaft until the motor's shoulder is securely seated.

i. Replace the motor mounting screws. Do not tighten until all screws are in place.

j. Slide the splined drive shaft all the way toward the left and into the bearing in the printer weldment.

k. Align the slot in the split collar with the slot on the drive shaft. Slide the collar approximately 2-3 mm from the shoulder of the stepper motor and tighten the collar set screw.

l. Check the paper feed tractors on their drive and guide shafts to be sure they slide freely. There should be no binding as the tractors slide back and forth across the length of the shafts.

6-13. CROSS-FLOW FAN (1100L)

top of motor
Continuity = center

The Cross-Flow Fan is located at bottom of the printer weldment (Figure 6-1). To remove the Cross-Flow Fan complete the following steps:

a. Remove printer top cover as described in section 6-3 (Ensure that power to the printer is disconnected.

b. Remove the ribbon cartridge.

c. Remove the Hammer Driver PCA as described in section 6-8.

d. Remove the four self-threading screws securing the Cross-Flow Fan to the printer weldment (Figure 6-11).

e. Open the two wire clips securing the Cross-Flow Fan cable and withdraw it.

f. Disconnect the Cross-Flow Fan cable (J7) from the Analog PCA.

g. To replace the Cross-Flow Fan perform the preceding steps in reverse order. Pay attention to the fan position and verify that air flow is directly over the printbar in order to achieve proper cooling.

6-14. PRINTER WELDMENT

The printer weldment is the metal frame which holds the ribbon cartridge, ribbon motor, and the paper feed tractors. Removal of the weldment provides access to the print mechanism and the printbar (see Figure 6-13).

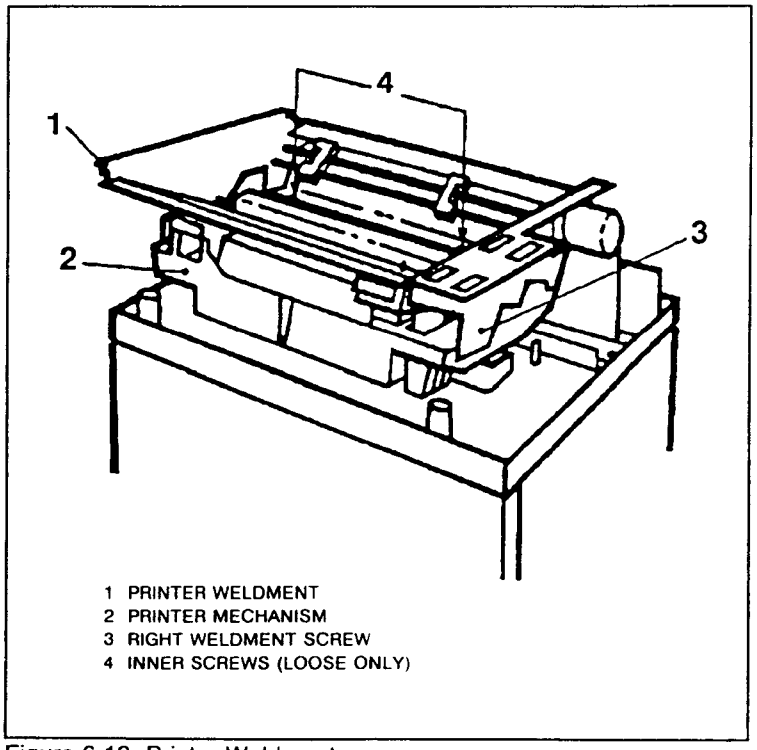

Figure 6-13. Printer Weldment

To remove the printer weldment complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove the Control Panel (refer to Section 6-4).

c. Remove the ribbon cartridge.

d. Loosen the two pozidrive screws located inside the printer weldment, below the paper feed tractors (see Figure 6-13, items 4 & 5). (These screws do not need to be removed, just loosened.)

e. Remove the screws, one at each end of the printer weldment (see Figure 6-14).

f. Disconnect the ribbon motor cable (J17), the stepper motor cable (J16), and Cross-Flow Fan Cable (J7) if you have a 1100L, from the Analog PCA. (See Figure 6-6).

g. For the 1100L, remove the hammer driver PCA following instructions in section 6-8.

h. Remove the six ribbon cables (printer cable assembly) from the printer.

i. Slide the platen lever backward to the open position, then slide the printer weldment back to clear screws loosened in step d. Carefully lift the weldment off the printer.

When the printer weldment is removed from the printer, be careful not to allow the platen to slam closed, damage may result.

REPLACEMENT: Printer Weldment

Reverse the above procedure. Note that the platen must be re-adjusted after printer weldment removal. Refer to the platen gap adjustment procedure, Chapter 5, Section 5-7. While replacing the hammer driver assembly in the 1100L, ensure the ribbon cables are routed underneath the weldment assembly and over the Cross-Flow Fan. Also ensure the cables are secured by the clips located on the right side of the Cross-Flow Fan and weldment, below the ribbon motor. Make sure the cables DO NOT touch the ribbon motor.

CAUTION

If the ribbon cables are left under the Cross-Flow Fan, or if they are touching the ribbon motor, a short circuit may

eventually (a few hours) result in the ribbon cables due to printer vibration, generating an error 1403 or 1412 and damage to the printer may result.

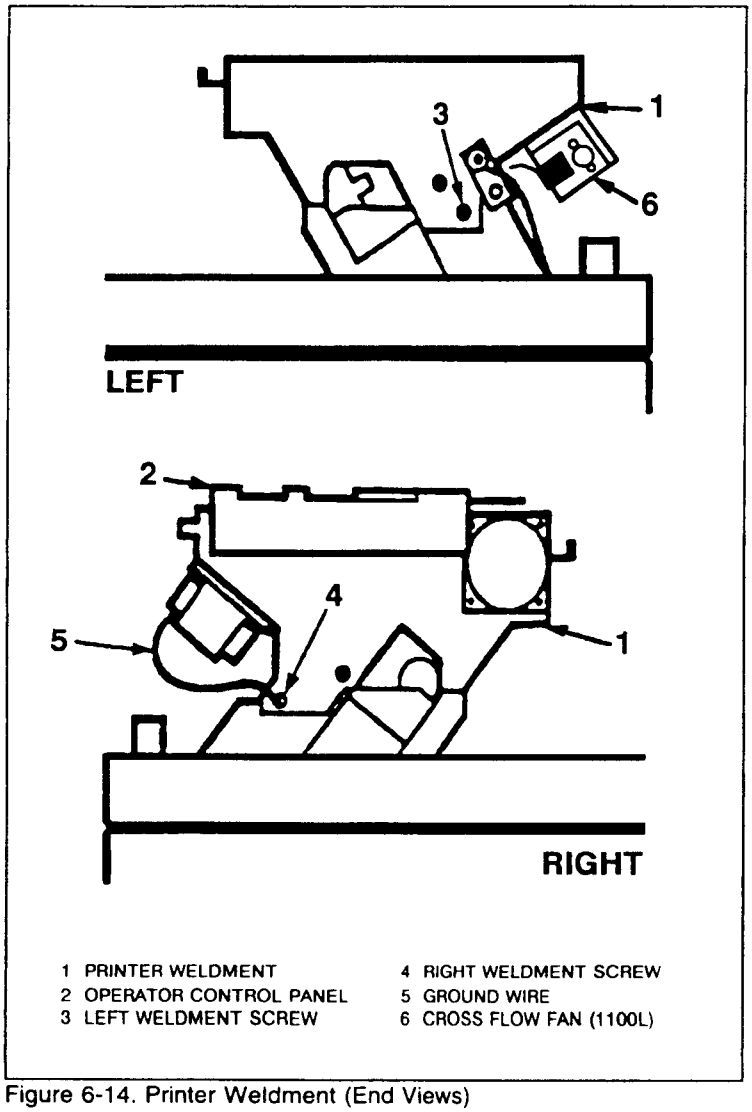

Figure 6-14. Printer Weldment (End Views)

6-15. VELOCITY TRANSDUCER

The velocity transducer is located on the left side of the print mechanism. When the transducer is replaced the Velocity Transducer Adjustments must be also be performed (refer to Section 5-6).

To remove the velocity transducer complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Disconnect the velocity transducer cable from the Analog PCA connector J1.

CAUTION

The velocity transducer magnet is not connected to the body of the velocity transducer; use care when adjusting or removing the transducer so that the magnet does not drop out of the unit. The magnet is fragile, and if dropped, will break.

c. Remove the velocity transducer by loosening the screw in the transducer (see Figure 6-15).

d. Being careful not to bind the fragile magnet, pull the transducer to the left to remove it from the printer.

e. To disconnect the transducer magnet from the printbar assembly, loosen the magnet nut using a 1/4" hex socket - 2" deep (see Figure 6-15).

Install the velocity transducer by reversing the removal procedure. Replacement of the velocity transducer requires the Velocity Transducer Adjustments be performed (refer to Section 5-6).

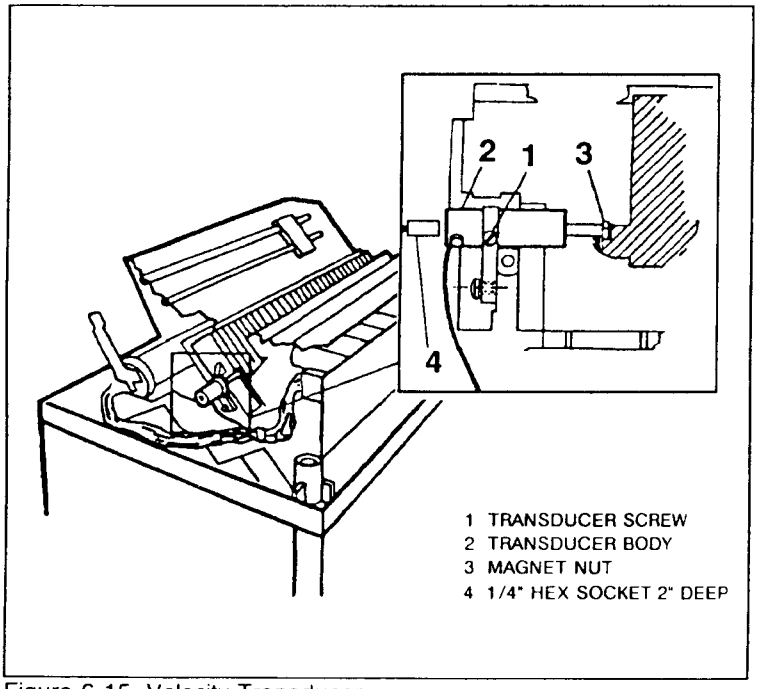

Figure 6-15. Velocity Transducer

6-16. PLATEN

To remove the platen complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove the printer weldment as described in Section 6-12.

c. With the platen lever towards the front of the printer (closed), use a needle-nose pliers or spring removal tool to remove the springs from the right side of the printer (see Figure 6-16).

d. Using a 3mm hexagonal driver (allen wrench), remove the two screws (one at each end of the platen) which secure the platen mounting feet to the print mechanism for the 840L model (see Figure 6-17). For 1100L models, the mounting feet are located on the support blocks.

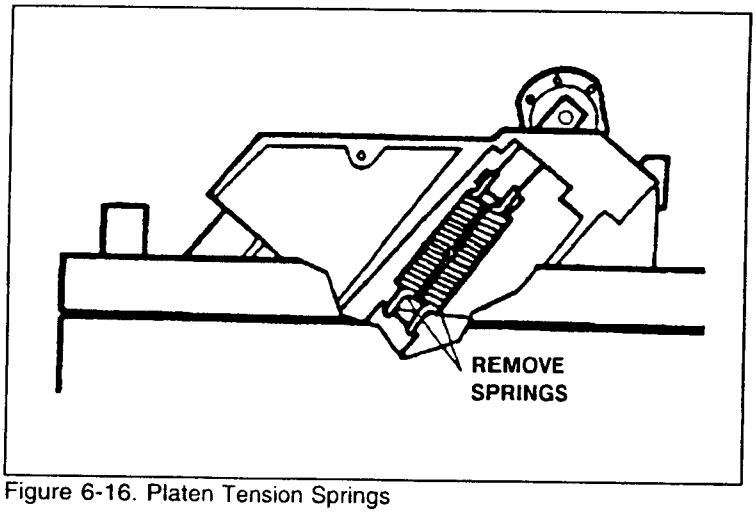

Figure 6-16. Platen Tension Springs

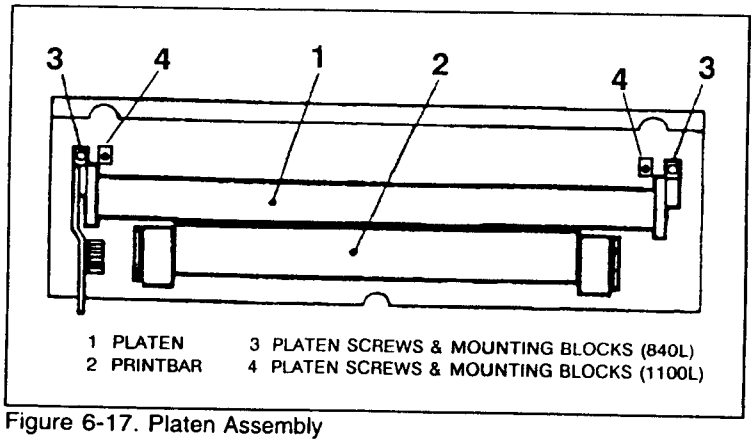

Figure 6-17. Platen Assembly

e. Carefully lift up on platen to remove it from the printer.

f. Observe how the platen mounting feet and white spacer washers (shims) are attached to the platen and slide the feet off of the platen.

g. Install the feet onto the new platen, and re-install the platen onto the print mechanism.

To install the platen, complete the removal procedure in reverse order. After the platen has been installed the Platen Gap Adjustment must be performed (refer to Section 5-7). The Flight Time and Turnaround Time Adjustments must also be verified to be correct (refer to Section 5-3).

6-17. STABILIZER BLOCKS (1100L)

The Stabilizer Blocks are located on the print mechanism (Figures 6-18 and 6-24). These blocks prevent undesirable backward movement of the printbar.

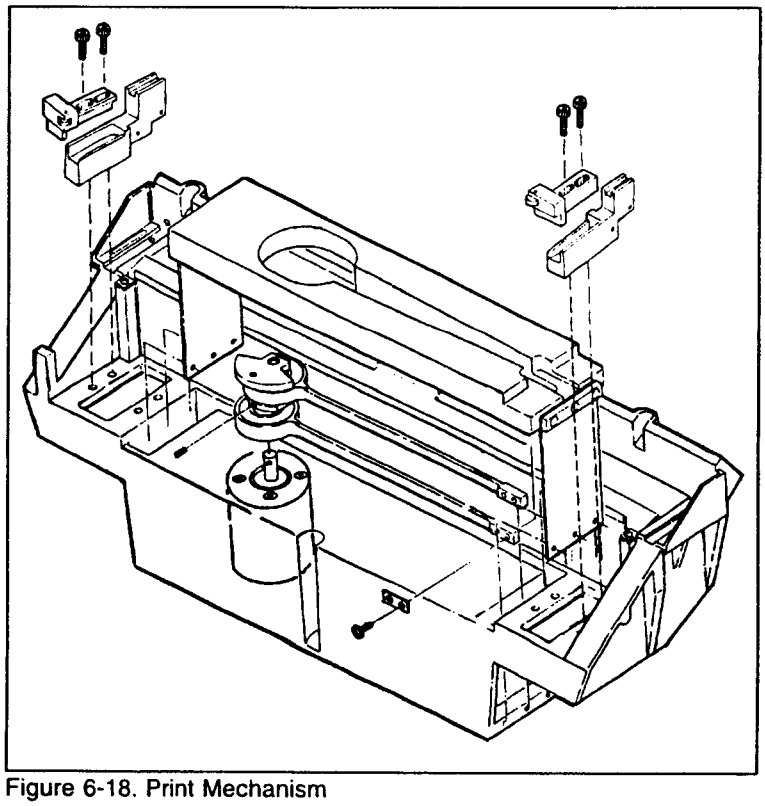

Figure 6-18. Print Mechanism

To remove the Stabilizer Blocks complete the following steps:

a. Remove the printer top cover as described in Section 6-3.

b. Remove Hammer Driver PCA as described in Section 6-8.

c. Remove the printer weldment as described in Section 6-14.

d. Remove the velocity transducer magnet from the printbar using a 1/4" hex socket - 2" deep, as described in section 6-15 step e.

e. Remove the four 4mm hex head screws (two for each stabilizer).

f. Remove the stabilizers from their supports by sliding these out.

g. To replace the Stabilizers, place these on their support and push them with your thumb while tightening the 4mm hex screws (2 for each stabilizer) to ensure they contact the printbar. Move the printbar with your hands to make sure the stabilizer's bearings ride on the printbar.

NOTE

If one or both bearings are not riding on the printbar, print quality problems will appear such as intermittent dot drop-out.

h. Check the platen gap and adjust if needed (see section 5-6).

6-18. PRINTBAR

The printbar assembly contains the print hammers and is located on the print mechanism.

CAUTION

When replacing the printbar, be certain to order the correct part number. See Chapter 7, Table 7-7 for correct part numbers.

When handling the printbar, be careful not touch the hammers with your fingers. Also, do not wipe or clean the hammers with any liquid solvent. New printbar hammers are coated with a material that helps to prevent ink buildup. This material is not abrasion or chemical resistant, and can be easily removed or damaged.

To remove the printbar complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove the printer weldment as described in Section 6-12.

c. Remove the two screws (#1 pozidrive) which secure the hammer driver cable/bracket (see Figure 6-19).

d. Disconnect the six-hammer driver ribbon cables from the printbar assembly and set the cable/bracket assembly aside.

e. For 1100L printers, remove the thermistor screw by retaining the spacer with your fingers, then remove the thermistor.

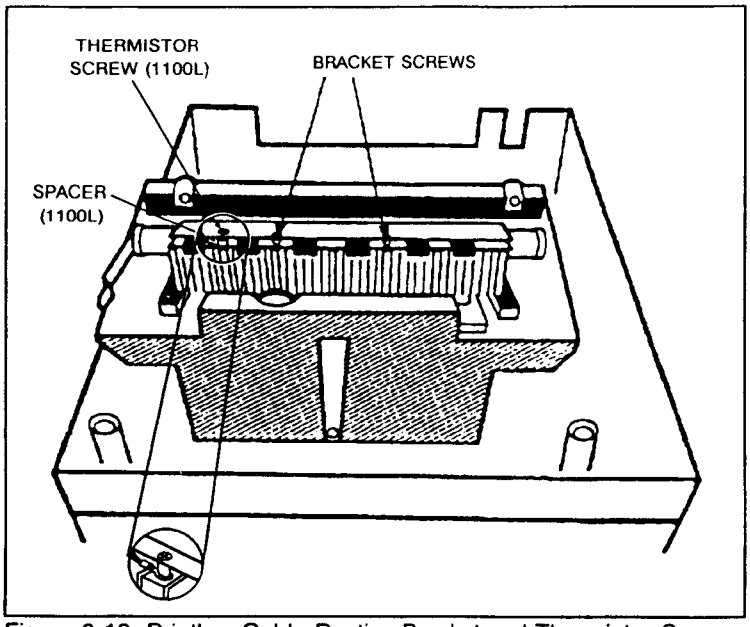

Figure 6-19. Printbar Cable Routing Bracket and Thermistor Screws

f. Loosen the velocity transducer magnet from the printbar using a 1/4" hex socket - 2" deep (see Figure 6-15, item 4) and push the magnet as far as it will go into the transducer body (this is to protect the magnet from possible breakage).

g. Loosen the four 4mm hex head screws securing the stabilizers and push these back as far as possible.

h. Remove the three screws (3mm socket cap screws) and the clamp block plates at both ends of the printbar (see Figure 6-20).

i. Remove the two screws (3mm socket cap screws) from the upper crank arm of the print mechanism (see Figure 6-21).

j. At each end of the printbar assembly, carefully pull outward on the flexures until the printbar guide pins are clear, then lift up to remove the printbar from the print mechanism.

REPLACEMENT: Printbar

The printbar is installed in the print mechanism by reversing the removal procedure. The friction pads (02564-00145) between the crank arms and the printbar and counter weight should be replaced when the printbar is changed. Before tightening the bolts, pull the printbar toward the front of the printer to take up the slack between the platen and the printbar. To reinstall the stabilizers, pull them forward with your fingers until they touch the pads on the printbar. Tighten the four 4mm hex screws and make sure bearings have no play. After a new printbar has been installed, the Crank Arm, Velocity Transducer, Platen Gap and Front Panel Timing adjustments must be performed (refer to Chapter 5). For 1100L printers, also ensure the thermistor is installed underneath the spacer contacting the printbar.

CAUTION

If the thermistor is not contacting the printbar, damage to printbar may result.

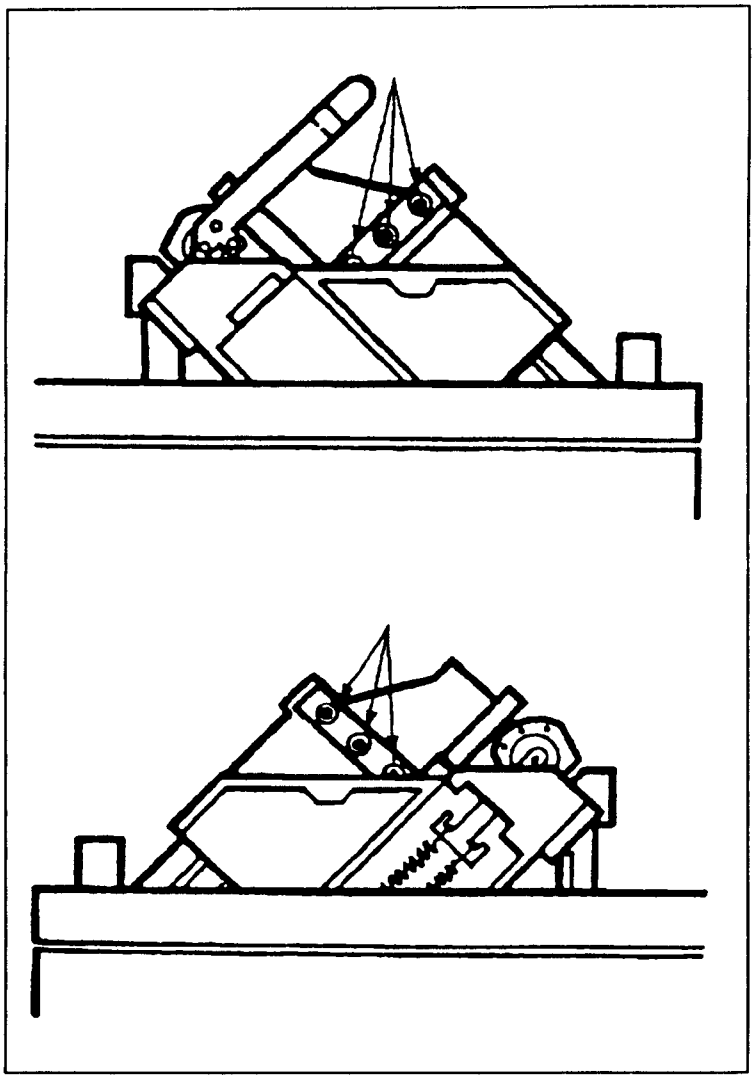

Figure 6-20. Printbar Flexure Screws

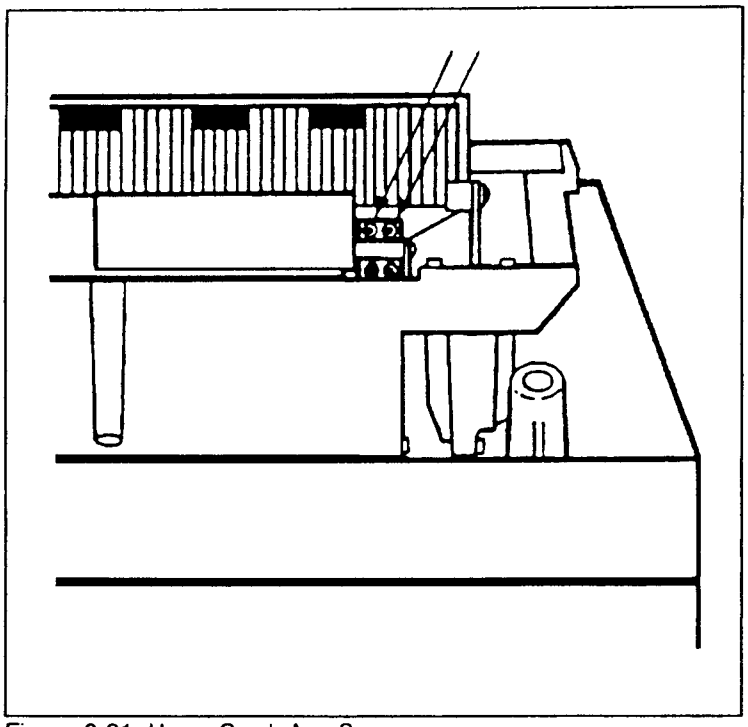

Figure 6-21. Upper Crank Arm Screws

6-19. RIBBON SHIELD

The ribbon shield can only be replaced after the printbar has been removed from the printer (refer to Section 6-18). To replace the shield, remove the four screws and flat washers which secure the shield to the printbar. When installing the shield ensure that the shield holes align with the hammer styli and the fold at the top is toward the platen. Be careful not to bend or wrinkle the shield when tightening the screws.

6-20. PRINT MECHANISM

The print mechanism consists of the printbar assembly, printbar drive motor, crank arms/casting, spring flexure assembly, and paper/platen sensors.

To remove the print mechanism complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b Remove the printer weldment as described in Section 6-14.

c. Remove the Hammer Driver PCA as described in Section 6-8.

d. Disconnect the cables from these connectors on the Analog PCA: J1, J2, J3, J4, J6, J7 (not used in 840L), J16 and J17 (see Figure 6-6).

e. Remove the screw securing the print mechanism-printer base ground wire. This screw is located by the power switch and screws into the printer base.

f. Using a 5mm internal hexagonal driver (allen wrench), remove the three screws, lock washers, and flat washers securing the print mechanism to the printer base (see Figure 6-22).

g. Carefully lift up on the print mechanism to remove it.

NOTE

Be careful when removing the print mechanism not to bend or damage the microswitches located at the bottom of the mechanism.

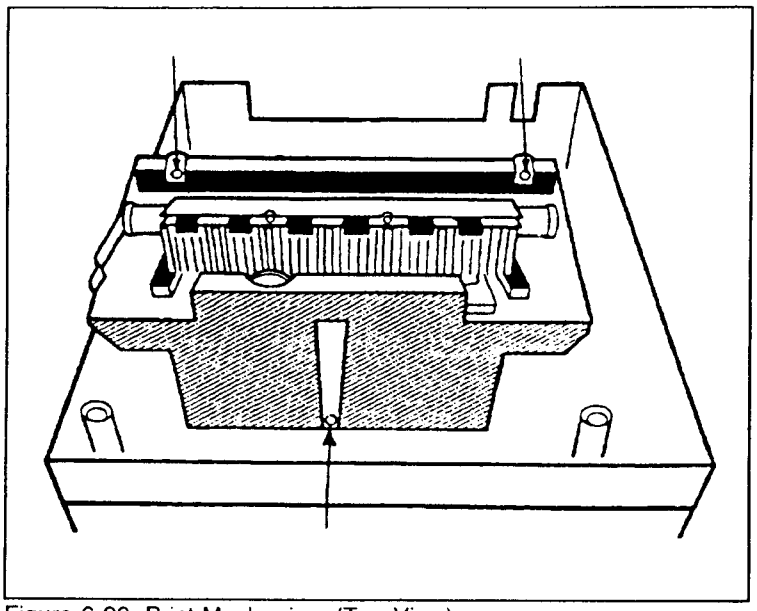

Figure 6-22. Print Mechanism (Top View)

6-21. PRINTBAR DRIVE MOTOR

The printbar drive motor is located inside the print mechanism. Access to the motor requires removal of print mechanism.

To remove the printbar drive motor complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)
b. Remove the printer weldment as described in Section 6-14.

c. Remove the Hammer Driver PCA as described in Section 6-8.

d. Remove the printbar assembly as described in Section 6-18.

e. Remove the two screws (3mm socket cap screws) and the flat plate which secure the end of the lower crank arm to the print mechanism (Figure 6-23).

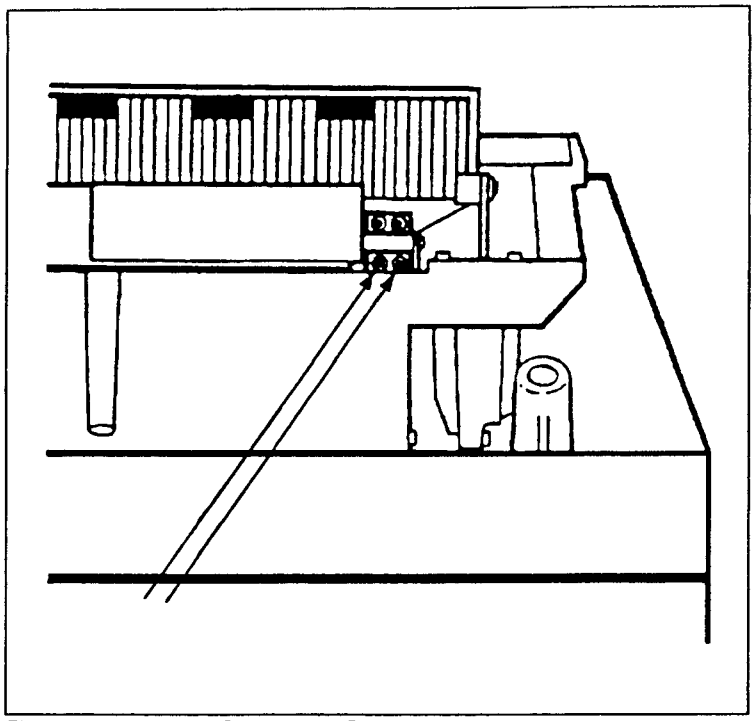

Figure 6-23. Lower Crank Arm Screws

f. Rotate the crank assembly until the set screw securing the crank assembly to the drive motor is accessible from the opening (access hole) in the print mechanism (see Figure 6-24, item 2). Using a 2.5 mm allen wrench, loosen the set screw.

g. Rotate the crank assembly until the top crank arm is in the rightmost position (bottom crankarm in leftmost position). Positioning the crankarms in this manner aids in removal.

h. To remove the crank assembly from the motor shaft, use your right hand to lift up on the right end of the crank arm, applying a light upward pressure on it; with your left hand grasp the left edge of the crank counter weight assembly and lift up. The crank assembly should slide off the motor shaft.

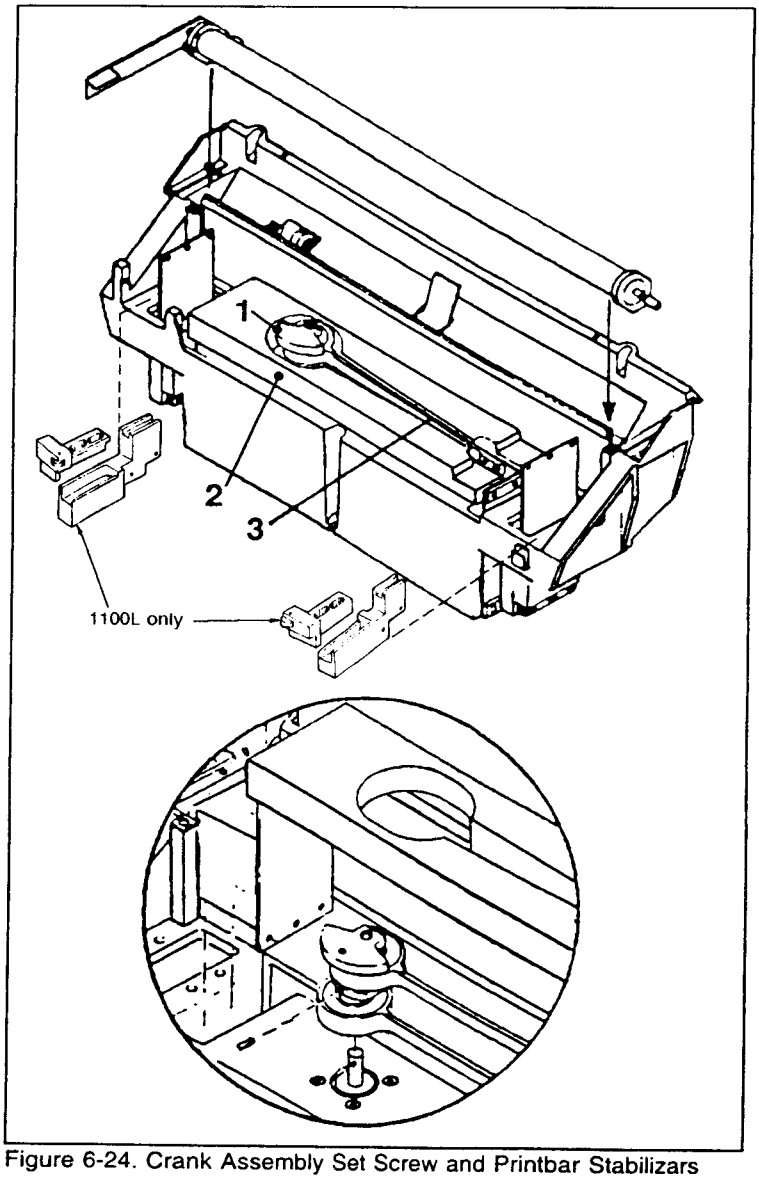

Figure 6-24. Crank Assembly Set Screw and Printbar Stabilizars

i. Remove the three 5 mm hexagonal screws which secure the print mechanism to the base of the printer (see Figure 6-22), and remove the print mechanism from the printer.

j. Note the positions of the wires on the printbar motor and disconnect them from the motor.

k. Remove the motor from the print mechanism by removing the four motor screws.

REPLACEMENT: Printbar Motor

To install the printbar drive motor complete the following steps:

a. Secure the new printbar drive motor in the print mechanism with the four motor screws and re-connect the printbar motor wires. Position the motor so that the wire connector lugs point outward, away from the casting. The motor must be positioned in this way to allow the wires to be connected.

b. Rotate the drive motor shaft so the set screw hole in the shaft is approximately in line with the access hole in the print mechanism (see Figure 6-24).

c. Slide the crank arm assembly onto the drive motor shaft. Ensure that:

   1) the set screw hole in the crank arm assembly is aligned with the access hole in the counter weight and with the set screw hole in the motor drive shaft, and

   2) the cut-out portion of the crank arm assembly faces up.

CAUTION

If the set screw holes are not aligned with the detent in the motor shaft, this will damage the motor shaft, making removal difficult.

d. With the printbar drive motor drive shaft, crank arm assembly, and casting access opening aligned, install the set screw into the flexure arm assembly.

NOTE

The printbar drive shaft can be easily rotated from the bottom of the printbar drive motor. This action may be required when aligning the shaft and the assembly for installation of the set screw. While rotating the drive shaft with the set screw slightly tightened, you can feel the detent in the drive shaft.

e. Attach the lower crank arm to the counter weight using the flat plate and two screws, but do not tighten the screws at this time (see Figure 6-23).

f. Install the print mechanism into the base of the printer (see Figure 6-22).

g. Install the printbar back onto the printer with the three screws at each end (see Figure 6-20). Use Loctite 242 on the screws.

h. Install the upper crank arm to the printbar with the flat plate and two screws. Do NOT fully tighten these screws at this time. These screws will be fully tightened after the crank assembly phase adjustment is completed.

i. Perform the Crank Arm Phasing adjustment as described in Chapter 5, Section 5-8.

CAUTION

The Crank Arm Phasing adjustment must be correct or excessive vibration will occur, causing premature failure of the print mech assembly, as well as print quality problems.

j. Install both stabilizers on the supports and make sure their bearings are touching the pads on the printbar.

k. Attach the velocity transducer to the print mechanism and the velocity transducer magnet to the printbar. Perform the Velocity Transducer adjustments (refer to Chapter 5, Section 5-6).

l. Replace the Hammer Driver PCA, the printbar cable bracket and associated cabling (see Figure 6-7).

m. Reconnect all cables from the Analog PCA (see Figure 6-6).

n. Replace the printer weldment (see Figures 6-13 and 6-14).

o. Check the platen gap (refer to Section 5-7).

p. Perform the Flight Time and Turnaround Time Adjustments (refer to Section 5-3).

6-22. SENSOR SWITCHES

If any of the sensor switches fail (Paper Out, Platen Open, and Paper Motion), replace the entire sensor assembly. The sensor switches can be replaced by tilting the entire print mechanism with the printer weldment still attached. This saves the adjustment of the platen gap.

The sensor switches are located on the paper guide chute under the printer weldment attached to the print mechanism. Replace as follows:

a. Remove the printer top cover as described in Section 6-3. (Ensure that power to the printer is disconnected.)

b. Remove the Hammer Driver PCA as described in Section 6-8.

c. Disconnect J1, J2, J3, J4, J6, J16 and J17 from the Analog PCA (see Figure 6-6).

d. Remove the three bolts from the print mechanism (see Figure 6-22). (The print mechanism is not going to be removed from the printer, only tilted in a later step).

NOTE

The platen should be closed at this time.

e. Remove the two springs connected between the rear paper guide and the print mechanism (see Figure 6-25 below). These springs tension the paper guide to the print mechanism.

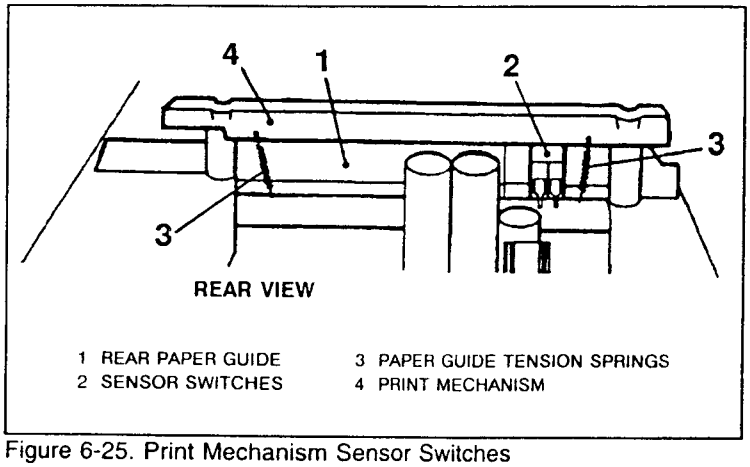

Figure 6-25. Print Mechanism Sensor Switches

f. Observe how the mylar shield on the paper guide is installed. It must be installed in this position when the paper guide is reinstalled.

g. Remove the paper guide chute by tilting the print mechanism back and slide the paper guide chute down until it clears the print mechanism. Pull it free of the print mechanism.

h. Remove the two screws which secure the paper sensor bracket to the paper guide. If the paper motion sensor is defective, replace the sensor bracket assembly. If either of the microswitches are defective (paper-out or platen open), replace the paper sensor bracket assembly.

Install the paper guide chute to the print mechanism by reversing the removal procedure. Ensure that the mylar shield on the paper guide is installed in its proper position.

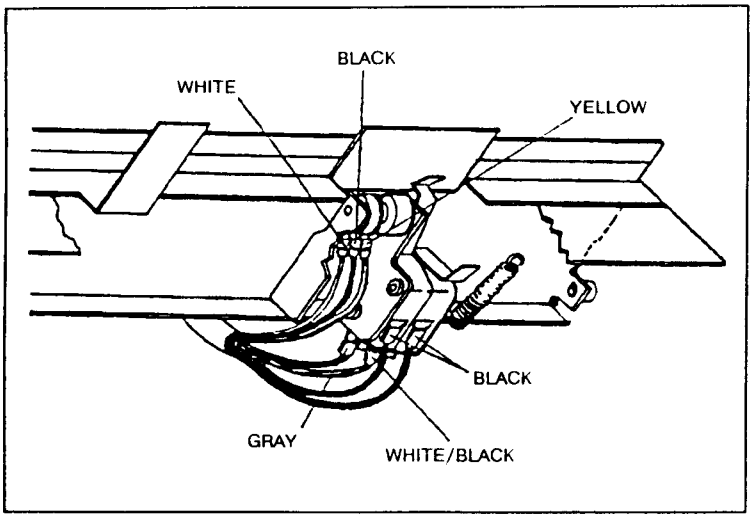

Figure 6-26. Sensor Switch Wiring Connections

6-23. LOWER FAN

The lower fan is located inside the cabinet under the printer (see Figure 6-27).

To remove the lower fan complete the following steps:

a. Disconnect power to the printer by setting the Main Power Switch to "OFF 0" and unplugging the power cord.

b. Open the front cabinet door (see Figure 6-27).

c. Remove the screw from the lower fan cover/bracket (see Figure 6-27) and pull out on the four plastic fasteners to release the fan.

d. Pull the fan from the printer. The power connector and ground wire must be disconnected from the fan to allow its complete removal.

e. Remove the fan from the bracket by removing four screws (see Figure 6-28).

When reinstalling the fan, ensure that the ground wire (green wire with the yellow stripe) is connected securely to the fan.

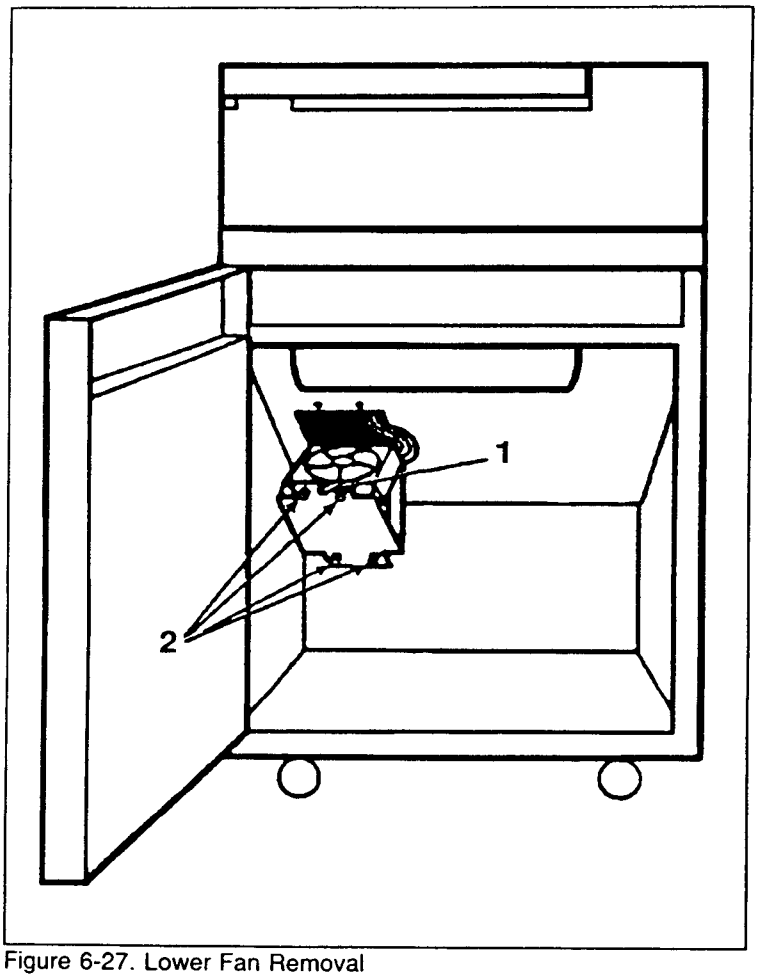

Figure 6-27. Lower Fan Removal

6-24. TRANSFORMER

The transformer is located under the printer base. To access the transformer the printer base must be removed. This requires the removal of all the PCA's, the printer weldment, and the print mechanism.

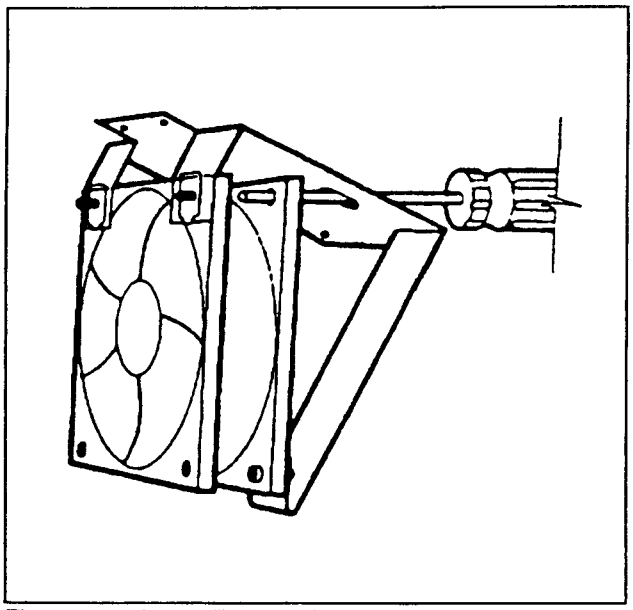

Figure 6-28. Lower Fan Bracket

To remove the transformer complete the following steps:

a. Remove the printer top cover as described in Section 6-3. (Ensure that the power is disconnected from the printer.)

b. Remove the printer weldment as described in Section 6-12.

c. Remove the Analog PCA as described in Section 6-7.

d. Remove the Print Mechanism as described in Section 6-17.

e. Remove the six screws from the base of the printer base (see Figure 6-29).

f. Lift the printer base from the printer cabinet (two people) and set the base upside down.

g. Remove the four 1/4 inch bolts from the transformer and remove the transformer. (Disconnect any tie-wraps securing the transformer cables prior to removing.)

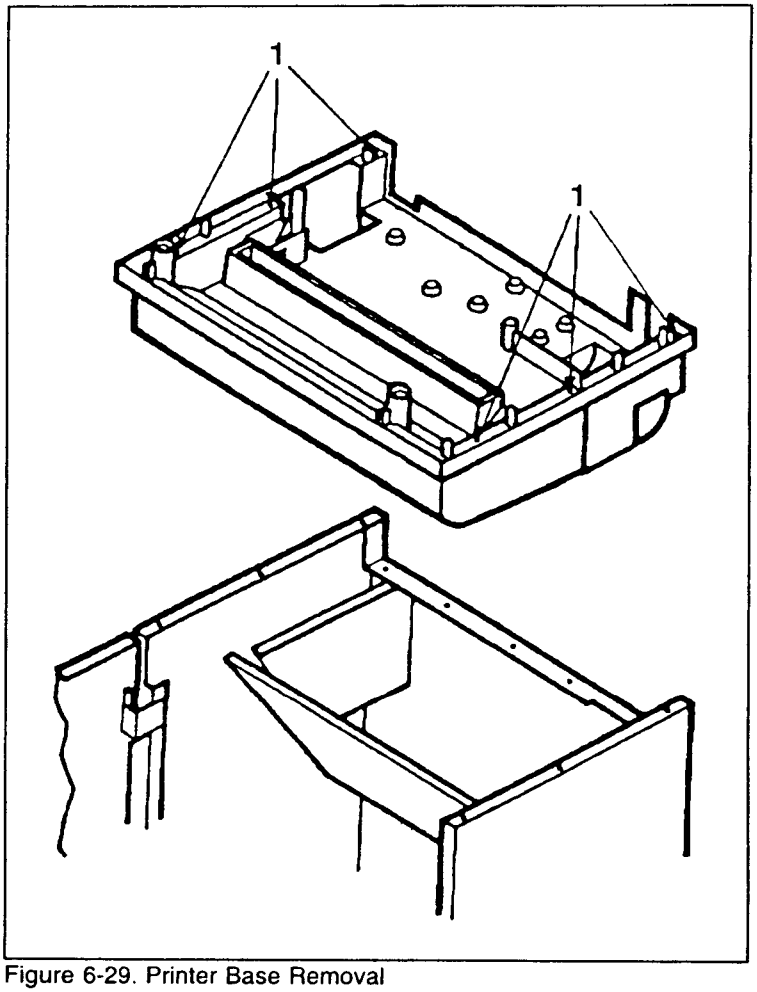

Figure 6-29. Printer Base Removal

To replace the transformer perform the above removal procedure in reverse order.

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Chapter 7

Parts & Diagrams HP2300

DiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams DiagramsDiagramsDiagramsDiagramsDiagramsDiagrams

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7-1. INTRODUCTION

This chapter contains illustrated parts breakdowns (IPBs), parts location diagrams, schematics, and replacement parts lists for the standard configurations of the HP2300 Line Printers.

This chapter contains the following sections:

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7-1.	INTRODUCTION	7 - 3
7-2.	USING THIS CHAPTER	7 - 3
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7-3.	PARTS ORDERING PROCEDURE	7 - 4
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7-2. USING THIS CHAPTER

Parts location diagrams, parts lists, IPBs, and schematics for an assembly are located on the same or following pages.

It is important to properly match the diagrams and parts lists with the unit needing repair. Each printed circuit assembly (PCA) is labeled with an assembly number, other printer assemblies are not labeled but can be identified from the IPBs (exploded view diagrams).

DESCRIPTION OF PARTS LIST.

The columns in the parts lists provide the following information:

a. REFERENCE DESIGNATOR - This column lists the reference designator which identifies the particular part on the IPB or the parts location diagram.

b. DESCRIPTION - This column gives the name or a brief description of the part.

c. HP PART NO. - This column lists the Hewlett-Packard part number for each item.

7-3. PARTS ORDERING PROCEDURE

To order parts from Hewlett-Packard or obtain further information call the nearest Hewlett-Packard Sales and Service Office and provide the following information:

a. Printer model and serial number.

b. Hewlett-Packard part number.

c. Description of the part.

d. The series code for the PCA.

7-4. DIAGRAMS AND PARTS LISTS

The illustrated parts breakdowns, parts location diagrams, and replacement parts lists are provided on the following pages.

TABLE 7-1. MAIN PRINTER ASSEMBLIES

REF. DES.	DESCRIPTION	HP PART NO.
1	TOP COVER-CABINETIZED	C2356-60009
2	BASE ASSY	C2356-60503
3	STAND ASSEMBLY	C2356-60006
N/S	PAINT: DOVE GRAY PAINT: PARCHMENT WHITE	6010-1146 6010-1148
N/S	PAPER POSITION LABELS: - UPPER WELDMENT - PAPER INPUT AREA - SOUND ENCLOSURE TOP COVER TOF LABEL FORMS LABEL (ON WELDMENT)	 5181-9102 5181-9103 5181-9104 C2356-80110 C2356-80109
	NOTE: See the tables referenced in Figure 7-1 for component parts. N/S = not shown	

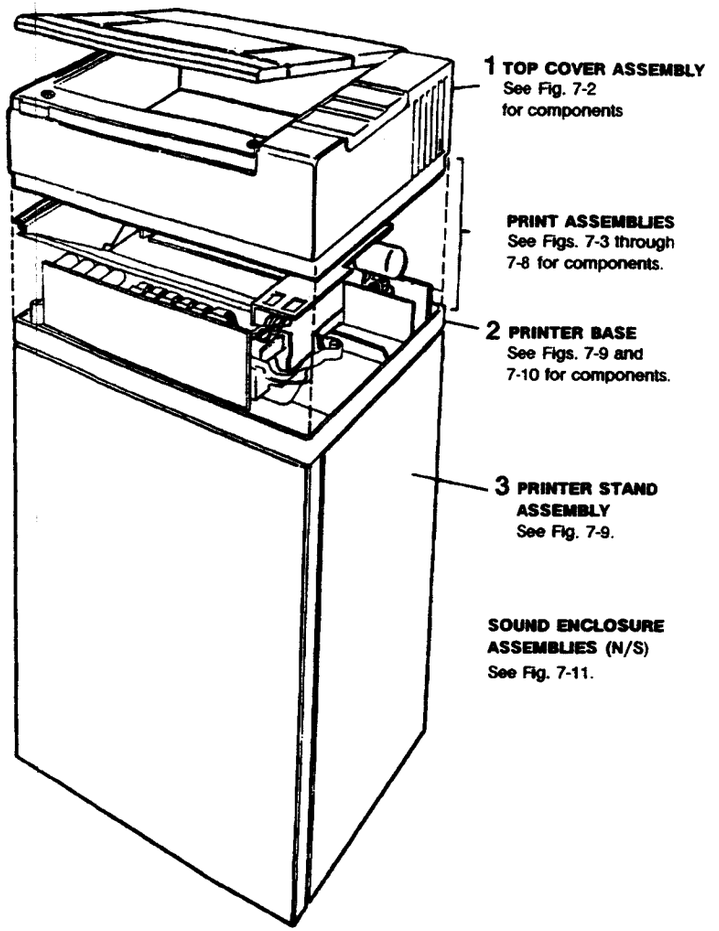


Figure 7-1. Main Printer Assemblies

TABLE 7-2. TOP COVER AND OPERATOR CONTROL PANEL

REF. DES.	DESCRIPTION	HP PART NO.
1	TOP COVER ASSY.	C2356-60009
2	USER MENU	C2356-80101
3	NAMEPLATE LABEL 840L NAMEPLATE LABEL 1100L	C2354-00003 C2356-00003
5	SCREW: M4x0.7	0515-2075
6	WINDOW, Cover	C2356-40012
7	GAS SPRING	02564-60005
8	BUCKLE, HINGE	1390-0809
9	WASHER, FLAT #10	3050-0002
10	SCREW	0515-0077
12	SCREW: Mach M3x14lg	0515-1074
13	WINDOW BEZEL (19)	C2356-40002
21	BEZEL: PAINTED	C2356-40001
23	PCA: CONTROL PANEL	5061-9812
24	CLIP: INTERLOCK	02563-40027
25	SCR-THRD RLG	0624-0668
27	CABLE: Front Panel	5062-0476
28	SCREW: 4MM-LG SHLDR	0515-0931
29	LIGHT PIPE	C2356-40003
30	KEYBOARD OVERLAY - ENGLISH - SPANISH - FRENCH - GERMAN - ITALIAN	 C2356-40004 C2356-40005 C2356-40006 C2356-40007 C2356-40008
31	TOF LABEL	C2356-80110

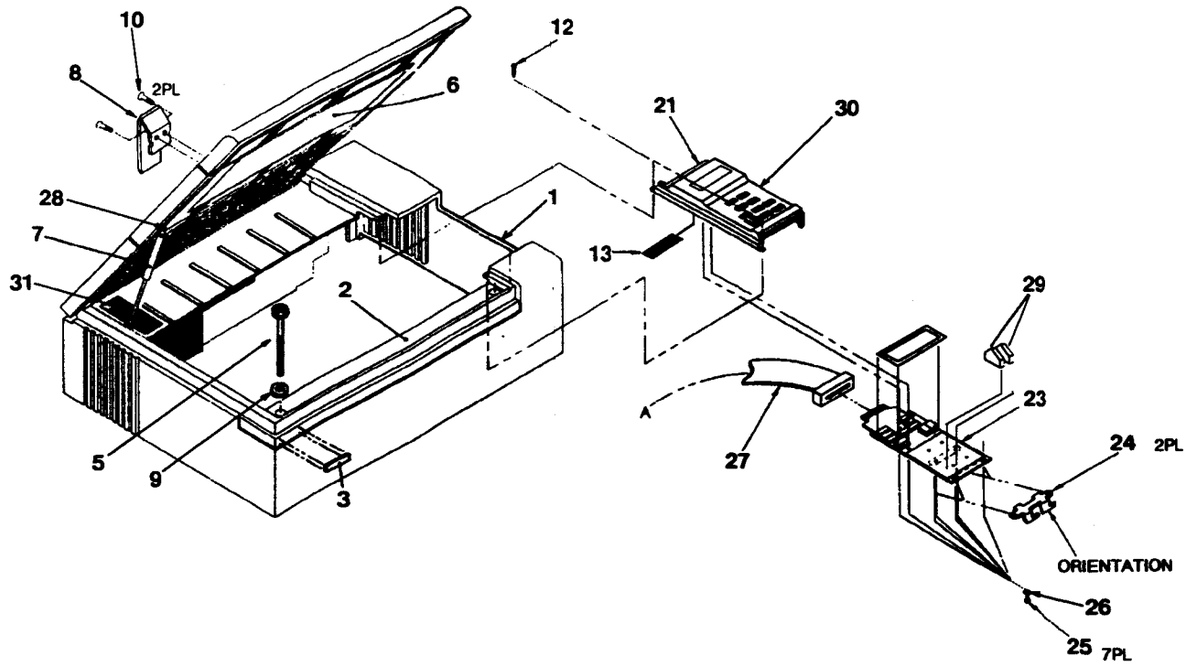


Figure 7-2. Top Cover and Operator Control Panel Assemblies

TABLE 7-3. PRINTER & PCA's

REF. DES.	DESCRIPTION	HP PART NO.
1	LEVELER FOOT	0403-0492
2	CASTOR	1492-0108
3	CABLE: CONTROL PANEL	5062-0476
4	ASSY: CROSS-FLOW FAN	C2356-60506
5	SHDCSCR: M6X12 LG	0515-0501
6	WSHR: M6 SPL LOCK	2190-0592
8	SCREW: PH M3X8 CW	0515-0866
9	PCA: CAPACITOR	C2356-60021
11	PCA: HAMMER DRVR 840L PCA: HAMMER DRVR 1100L	02564-60003 C2356-60003
12	SCREW	02563-20005
14	CABLE: HAMMER DRIVER ASSY.	02564-60113
15	CABLE: HAMMER DRIVER POWER ASSY.	02564-60114
20	FORMATTER PCA 840L FORMATTER PCA 1100L FORMATTER PCA ANZ5080-2 FORMATTER PCA AN5011	C2354-60006 C2356-60005 33422-60001 C3206-60002
21	ANALOG PCA 840L/1100L - F1 FUSE, 3A - F2/F3 AC INPUT FUSE, 8A (840L) - F2/F3 AC INPUT FUSE, 10A (1100L)	C2356-30104 2110-0837 2110-0342 2110-0051
22	INTERFACE PCA - CENTRONICS - HPIB - RS232/422 - SUPER CENTRONICS - MULTIPLE I/O (RS232/422/SUPERCENTRONICS)	 5061-1708 5062-0477 5062-1703 5062-1754 C2356-30101
23	LAN ADAPTOR BOX	C2356-60029
10	WIRE: CAPACITOR	C2356-61005
N/S	HP LABEL CARD	4175006-QMS
N/S	HP LABEL CARD II	4382022-QMS
N/S	HOLDING BRACKET (FORMATTER PCA)	02563-00162
N/S	HOLDING BRACKET (I/O PCA)	02563-00161

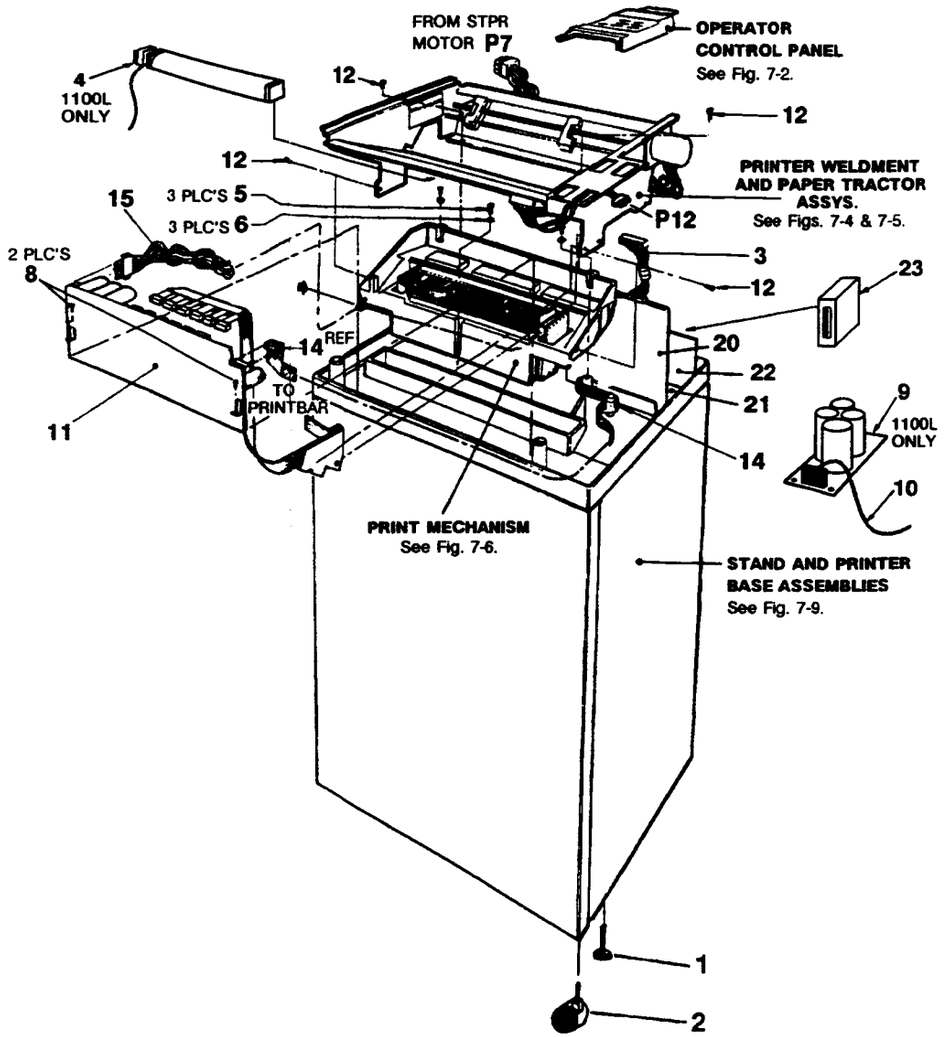


Figure 7-3. Printer & PCA's

TABLE 7-4. PRINTER WELDMENT ASSEMBLY

REF. DES.	DESCRIPTION	HP PART NO.
1	MT: RBN DRV 115V, 840L MT: RBN DRV 115V, 1100L	02564-60203 C2356-60052
2	KNOB: PLATEN ADJ	02564-60237
3	CLIP: CABLE	1400-0611
4	SHAFT: PLTEN KNOB	02563-20008
5	PLGR: M4 BALL	02564-00173
6	CLIP: CABLE	1400-1169
7	ASSY: CROSS-FLOW FAN	C2356-60506
8	SCREW: SELF THREADING	0624-0632
9	SCREW	02563-20005
11	SCREW	02563-20005
12	WSHR: M4 FLAT	3050-0893
13	SCR: M5 X 12 PAN SEM PG03	0515-0758
14	UPPER PAPER POSITION LABEL	5181-9102

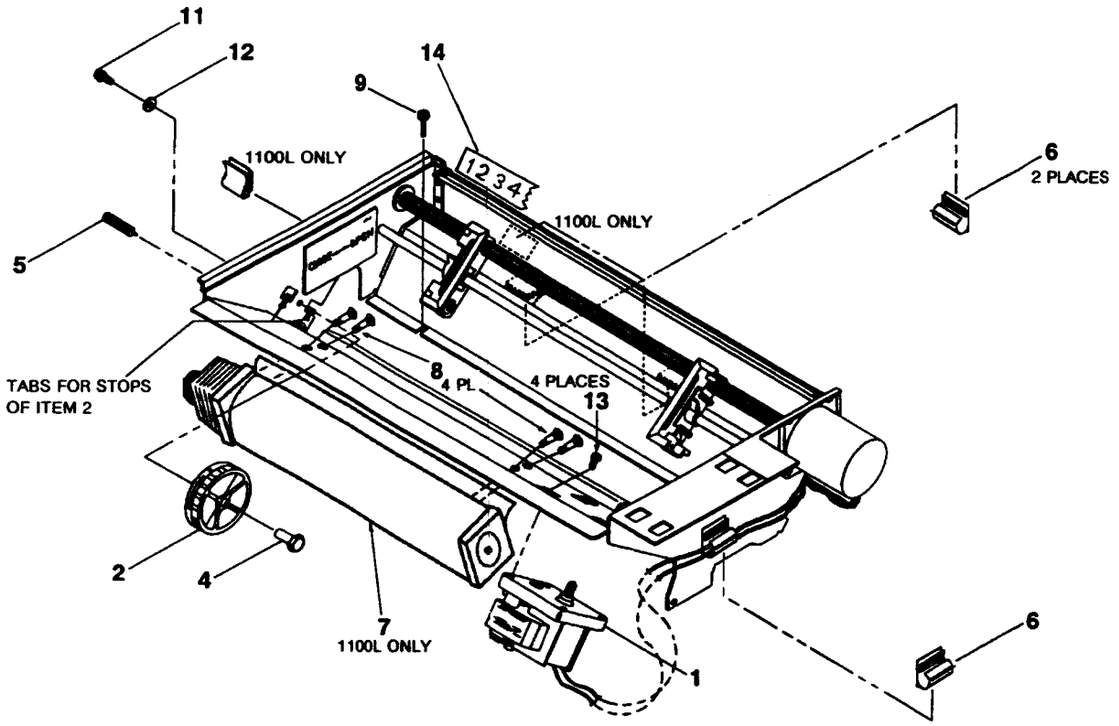


Figure 7-4. Printer Weldment Assembly

TABLE 7-5. PAPER TRACTOR ASSEMBLY

REF. DES.	DESCRIPTION	HP PART NO.
1	ASSY: STRUC WELD 55 dba	C2356-60502
2	BRG: FLG BALL	1410-0632
3	SHAFT: TRCT GUIDE	02563-20003
4*	TRACTORS RH & LH	5062-4612
6	SHAFT: TRACTOR DR	02563-20002
7	COLLAR	0510-0598
8	ASSY: MOT STPR 2	3140-0690
14	F2/F3 AC INPUT FUSE, 8A (840L)	0515-1834
15	SCREW: M4X12	0515-1834
	* High performance tractors - shipped as a pair.	

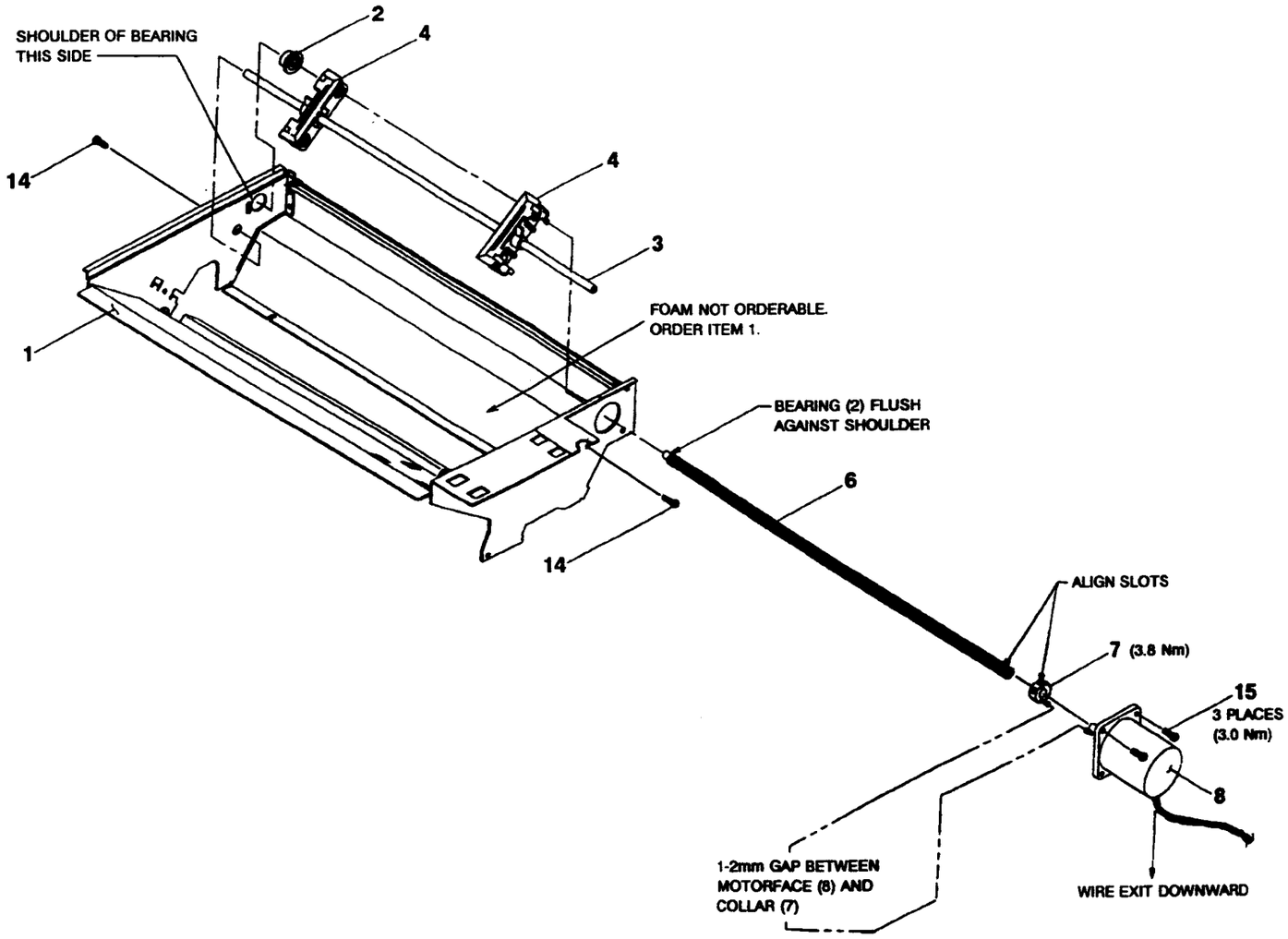


Figure 7-5. Paper Tractor Assembly

TABLE 7-6. PRINT MECHANISM ASSEMBLY

REF. DES.	DESCRIPTION	HP PART NO.
1	ASSY: PRINTBAR, 840L ASSY: PRINTBAR, 1100L	02564-60004 (new) C2356-60002 (new)
2	SCREW: MACH ASSY	0515-1680
5	BLOCK: CLAMP, 840L BLOCK: CLAMP, 1100L	02564-40008 C2356-40022
7	ASSY: CABLE PRINTBAR, 840L ASSY: CABLE PRINTBAR, 1100L	02564-60135 C2356-60504
12	ASSY: PLATEN	C2356-60505
13	PLATE: SPRNG HOOK	02564-00023
14	PLATEN: SPRING	02563-00090
15	SCR-MACH ASSY M4X12	0515-1834
20	ASSY: STAB LEFT	C2356-60042
21	ASSY: STAB RIGHT	C2356-60043
22	SUPPORT: LEFT	C2356-20018
23	SUPPORT: RIGHT	C2356-20019
25	SCR: MCH M4X10SLT	0515-0241
26	CLIP: CABLE	1400-0611
27	SCREW: M4X20	0515-1833
28	SCR-MACH ASSY M4	02563-20037
29	SCREW: M4X16	0515-1827
30	FRICTION PAD	02564-00145
31	NUT: PLATE	02563-00075
34	PIVOT: PLATEN, 840L PIVOT: PLATEN, 1100L	02564-40013 C2356-40014
37	SCR-MACHINE ASSY	0515-0803
38	SPACER: LONG	02564-20014
39	SCR: MACHINE ASSY	0515-1541
40	MNT: VEL XDUCER	02564-20012
41	SET SCREW	0515-1741
98	WSHR-FL MN	3050-0180
99	ASSY: VEL XDUCER	02564-60189
100	CRANK ARM ASSEMBLY	02564-60136
101	SCREW	0515-0495
102	WASHER	3050-0894
N/S	RIBBON SHIELD	02564-00002
N/S	COVER PLATE, SLOTTED	02564-00001

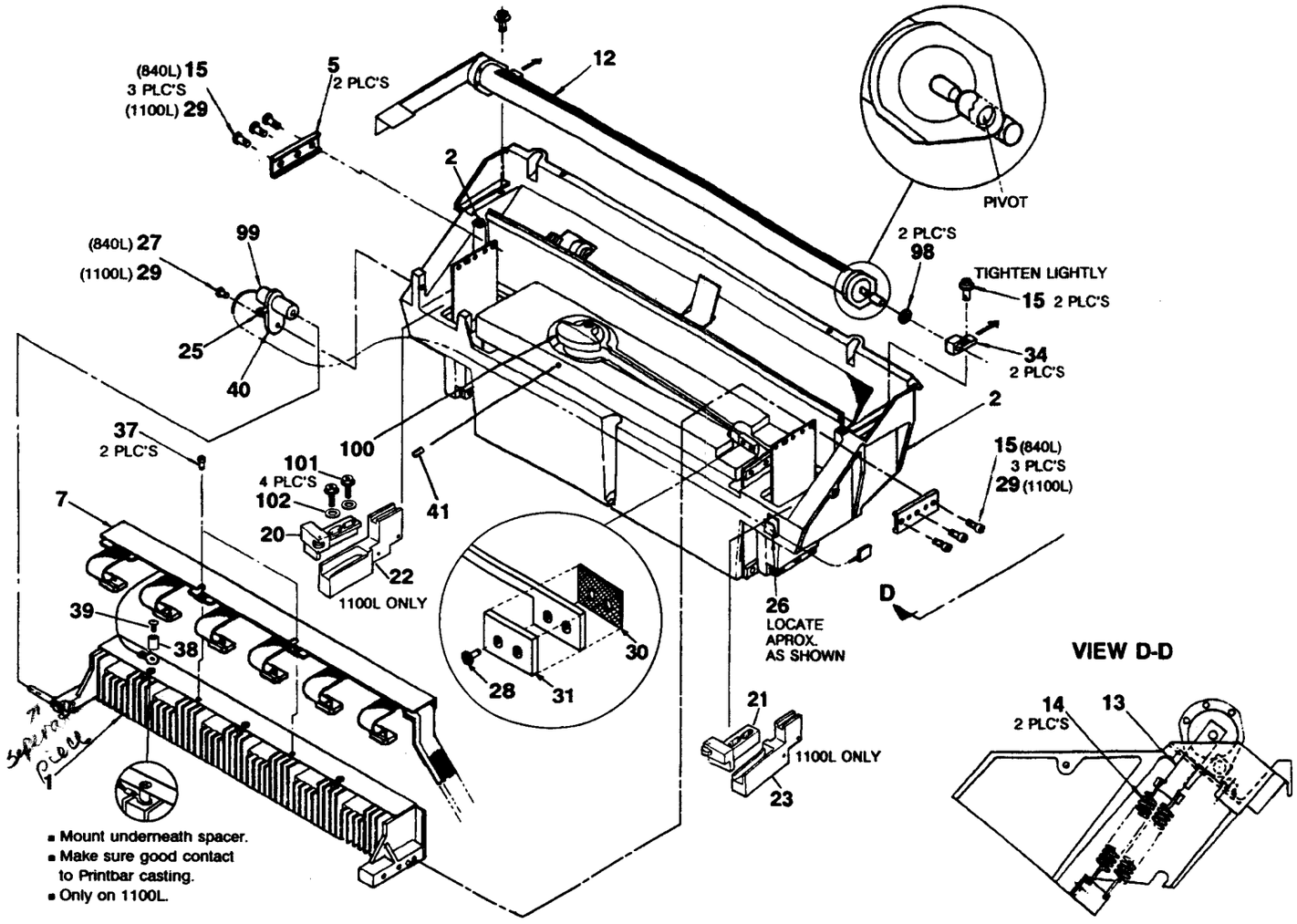


Figure 7-6. Print Mechanism Assembly

TABLE 7-7. PRINT MECH PAPER PATH ASSEMBLIES

REF. DES.	DESCRIPTION	HP PART NO.
2	MOTOR: D.C. = Printbar motor	3140-0678
3	ASSY: PAPER GUIDE	C2356-60501
4	PPR GUIDE: FRONT	C2356-00038
7	SPRING: PPR PATH	02564-00053
10	CBL: DC MOTOR	02564-60123
13	TIE: CBL SMALL	1400-1015
20	SCR-MACH M4X0.7	0515-1013
22	SCR M4X12 SEM	0515-1834
23	SCR BTTN HD M4	0515-1680
24	WSHR: M4 FLAT	3050-0893
31	PLATE: SPRG HOOK PG11	02564-00020

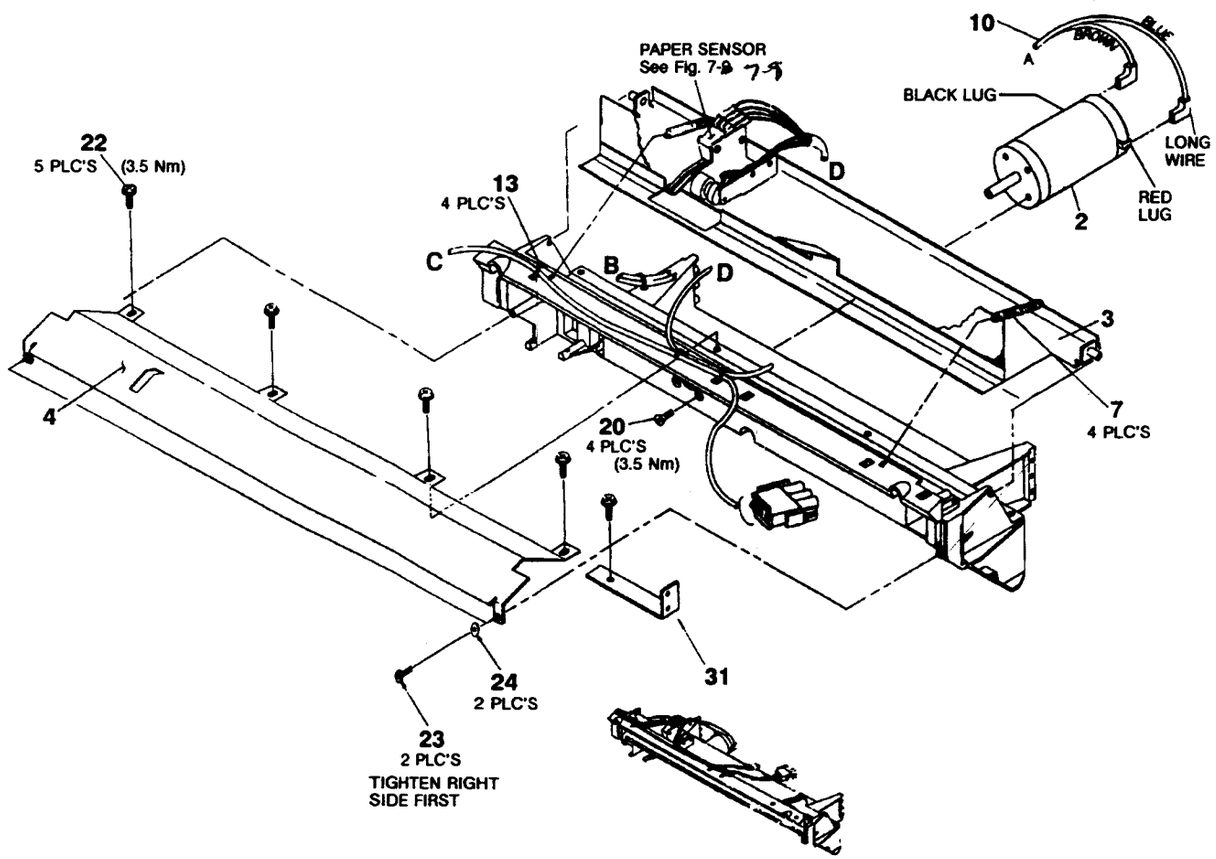


Figure 7-7. Printer Mech Paper Path Assembly

TABLE 7-8. PAPER SENSOR ASSEMBLY

REF. DES.	DESCRIPTION	HP PART NO.
1	PAPER MOTION SENSOR	02564-60170
16	PAPER GUIDE ASSY	C2356-60501
17	SCR MACH M3X6 LG	0515-0924
19	WSHR: M3 SPL LOCK	2190-0584
20	SHIELD: PAPER DUST	02564-00082
21	SHIELD: PAPER DUST CMPLTS	C2356-80603

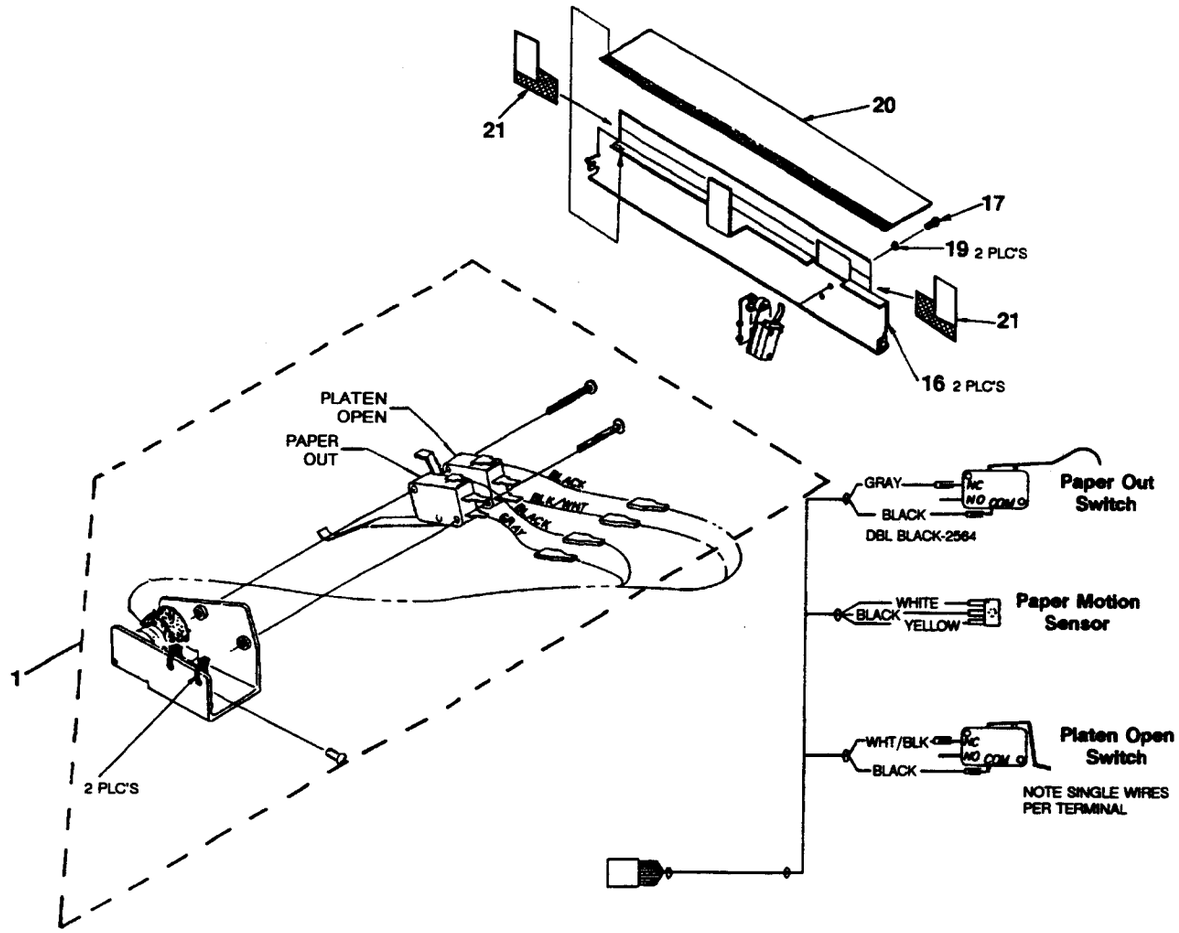


Figure 7-8. Sensor Assembly

TABLE 7-9. STAND AND PRINTER BASE ASSEMBLIES

REF. DES.	DESCRIPTION	HP PART NO.
1	FAN TBAX 120FM	3160-0513
2	BRKT: FAN MTG	02564-00015
3	BRKT: LWR FAN MNT	C2356-00004
5	ASSY: STAND FAN CBL	02564-60120
6	ASSY: STAND (55 dba)	C2356-60006
7	ASSY: PAPER GUIDE	02564-00055
	QUIET SURPIN (55dba)	02564-60153
8	SCR: TPG 10-16	0624-0585
14	FOAM: FAN	02564-00058
15	NUT-SHMET-U-TP	0590-0760
16	SKT HD CAP	3050-0893
19	SCR: POZ6-19X.5"	0624-0400
20	SCR: M5X12PAN SEM	0515-0904
22	TIE: CBL SMALL	1400-1015
24	FSTNR: SNP-IN	1390-0635
25	FSTNR: SNP-IN	1390-0634
26	WSHR: L DAMPER PG15	02564-00096
27	FRONT DOOR	C2356-60046
28	MAGNETIC STRIP	9164-0250
29	INSULATION TAPE	0330-0393
30	STAND HINGE	C2356-00042
31	HINGE SCREWS	0515-0758
32	SCREW: FIX FAN-BRACKET (order 4 items only when replacing this fan)	3030-0064

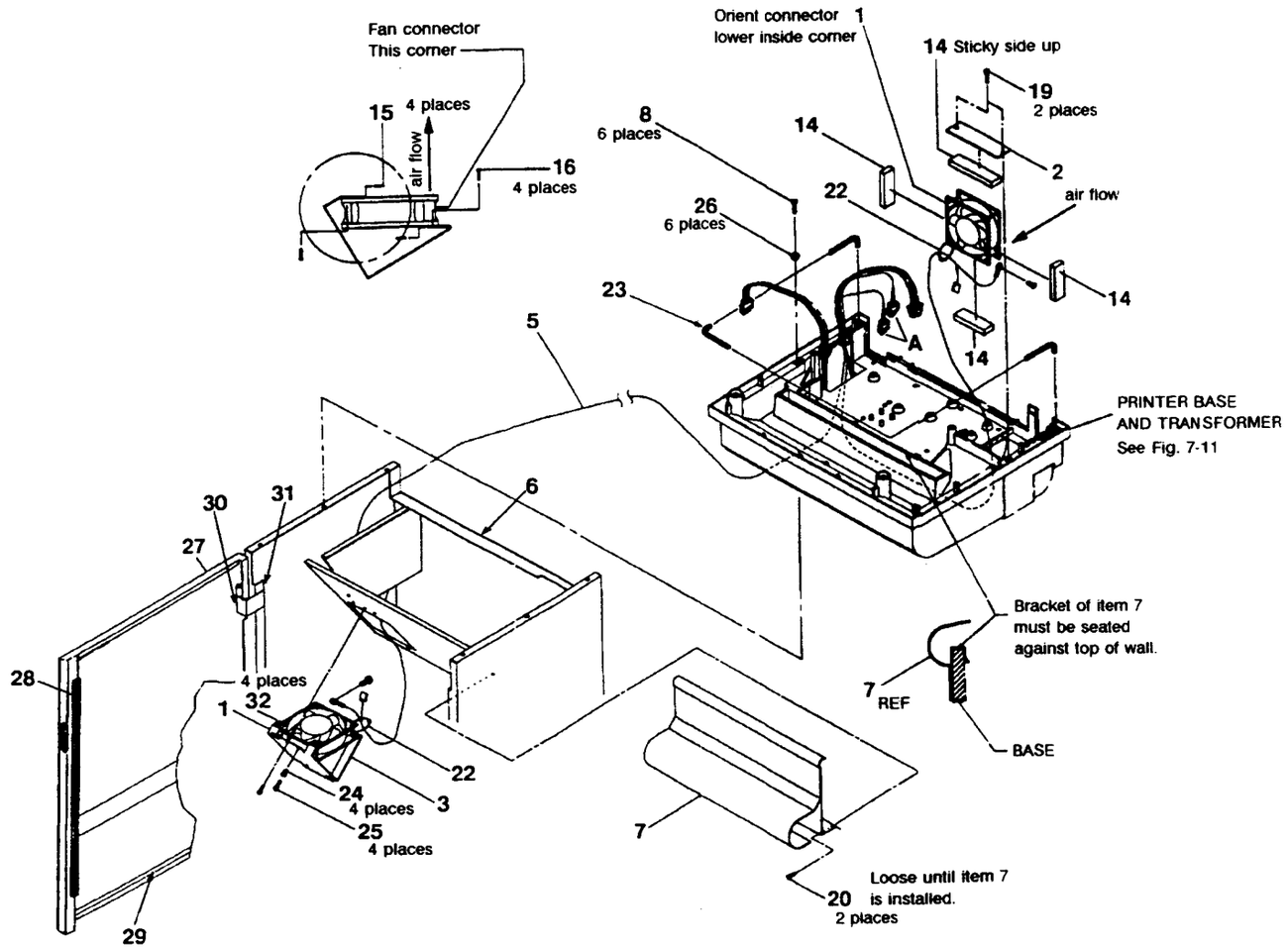
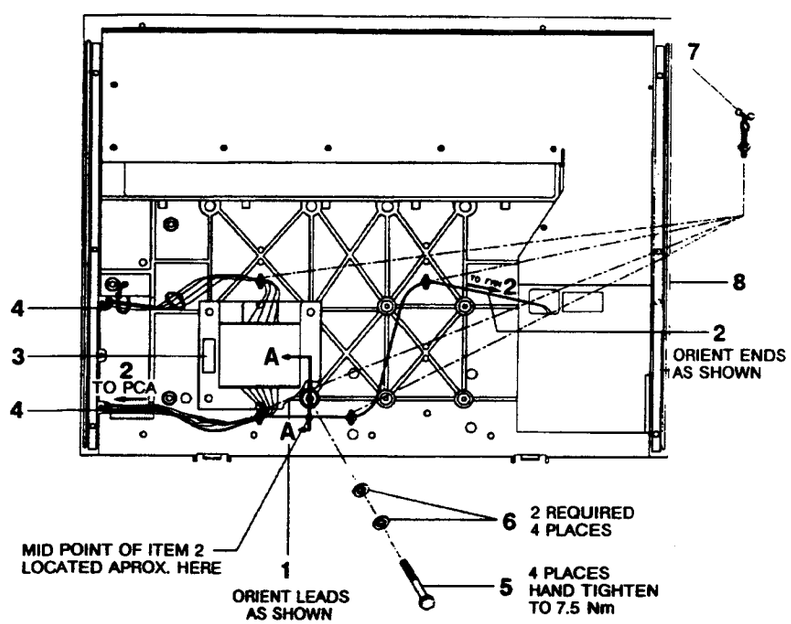


Figure 7-9. Stand and Printer Base Assembly

TABLE 7-10. PRINTER BASE AND TRANSFORMER

REF. DES.	DESCRIPTION	HP PART NO.
1	ASSY: TRANSFORMER, 840L ASSY: TRANSFORMER, 1100L	9100-4468 9100-5019
2	ASY: BASE FAN CBL	02564-60121
4	TIE: CBL LRG	1400-0493
5	SCR-CAP 1/4-28 (840L) SCR-CAP 1/4-20 (1100L)	3030-0971 3030-0717
6	WSHR: FL1/4X.265"	3050-0225
7	STDOFF PURSE LCK	1400-1366
8	ASSY: BASE	C2356-60503



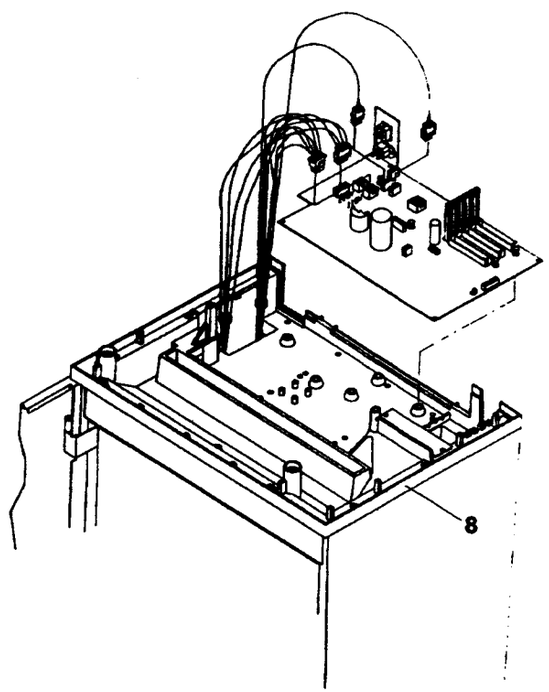


Figure 7-10. Printer Base and Transformer

TABLE 7-11. SOUND ENCLOSURE

REF. DES.	DESCRIPTION	HP PART NO.
1	SHROUD ASSY	C2356-60510
2	WIRE FORM ASSY	C2356-60513
3	ENCLOSURE WINDOW	C2356-60515
4	CLIP: RIGHT (THIN)	1400-1169
5	PAPER TRAY	C2356-60516
6	ASSY: MAIN WELDMENT	C2356-60509
7	PAPER INPUT AREA PAPER POSITION LABEL	5181-9103
8	SOUND ENCLOSURE PAPER POSITION LABEL	5181-9104
9	M5 SCREWS (4 EA)	0515-0904
10	FRICTION PADS	02682-00864
11	STAND LEVELER FOOT	0403-0492
12	CASTER	1492-0108
13	ASSY: DOOR LEFT	C2356-60511
14	ASSY: DOOR RIGHT	C2356-60512
15	ENCLOSURE LEVELER FOOT	C2356-60508
16	HINGE	C2356-60507
17	CLIP: LEFT (FLAT)	C2356-40025
N/S	STATIC BRUSH	02564-60210
N/S	STATIC BRUSH SCREWS	0624-0618
N/S	PAPER POSITION LABEL	5181-9102
N/S	CABINET RUBBER STRIP	02682-00864

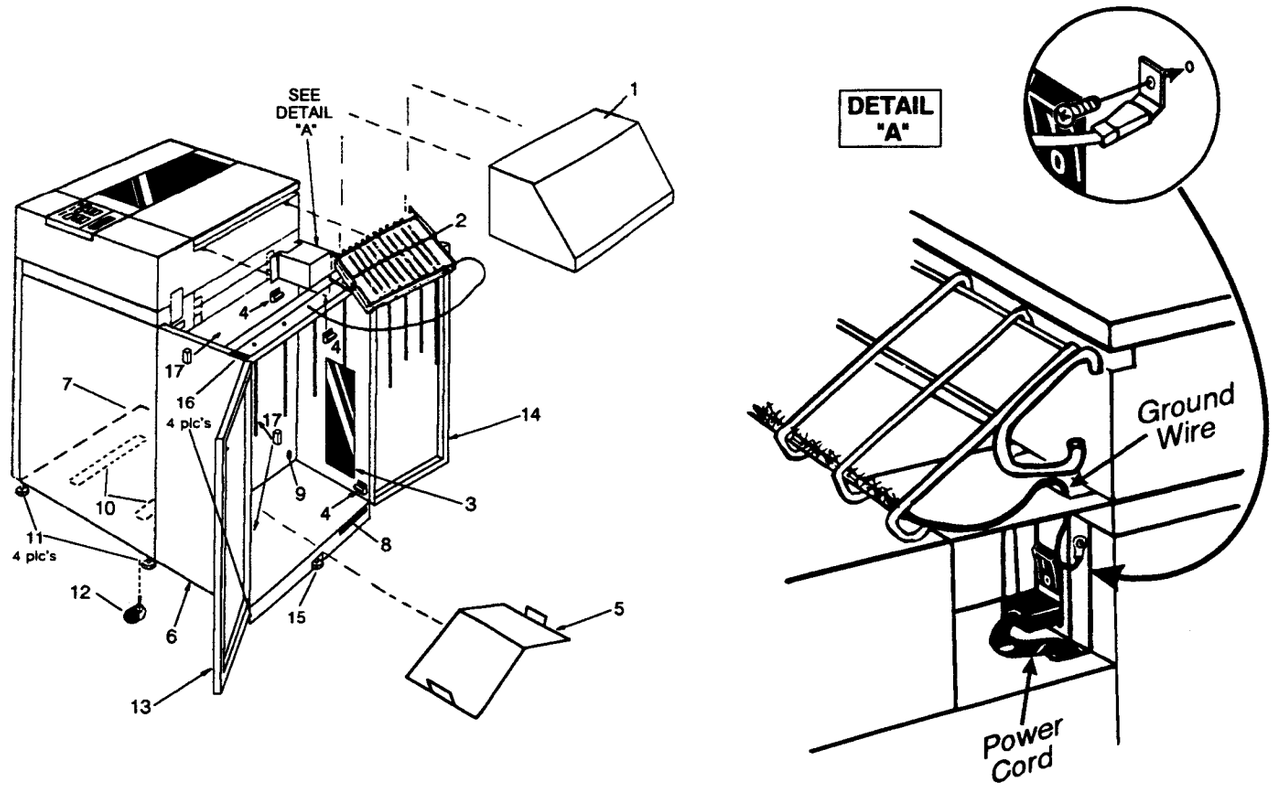


Figure 7-11. Sound Enclosure Assemblies

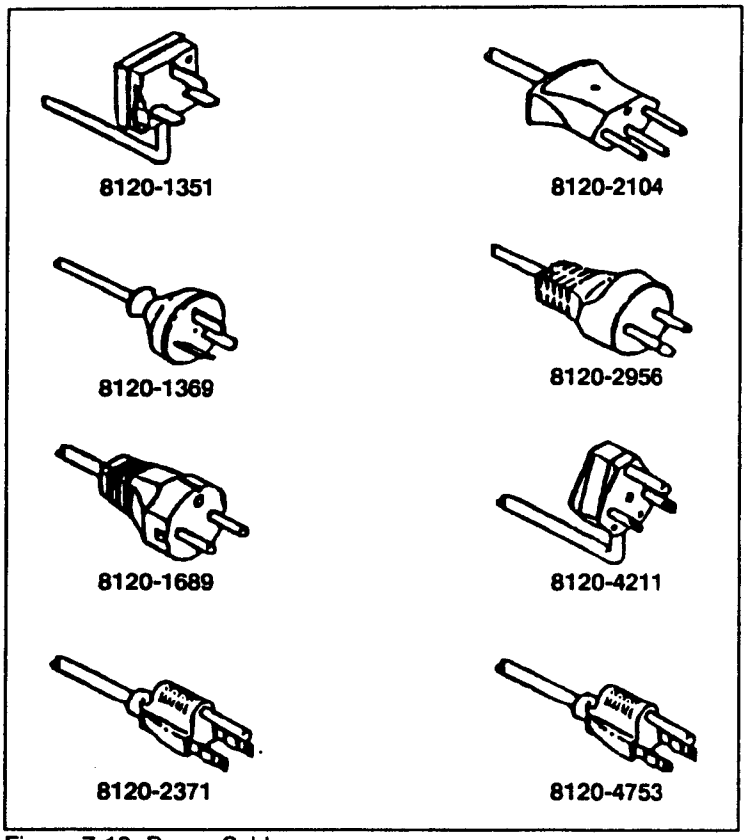


Figure 7-12. Power Cables

Appendix A

Diagnostics Errors HP2300

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INTRODUCTION

All the errors will be displayed in the next format:

PARTICULAR # GENERAL MESSAGE

For example a 1401 error (Printbar Driver Fail) will be displayed as follows:

1401 PRINT MECH
CALL YOUR CE

All printer failure codes are described in this appendix. In addition, the most common print quality problems are discussed. The suspected cause of the problems are listed, from most likely to least likely. When two suspects are of similar likelihood, the least expensive or simplest repair is listed first. The tests should be performed before undertaking any major repair. They are intended to help locate the problem when there are multiple suspects.

Error 14: PRINT MECH PROBLEMS

1400 HARDWARE FAILURE

Implications: The hardware signaled that an error condition exists, but does not indicate which subsystem is at fault.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Analog PCA

Tests: Perform Standard Self Test.

1401 PRINTBAR DRIVER FAIL

Implications: Over current or over voltage to the printbar motor.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Analog PCA
3) Printbar Motor Cable
4) Printbar Motor

Tests: Perform Standard Self Test.

1402 PAPER DRIVER FAIL

Implications: Over current to the stepper driver.

Suspects:
1) Analog PCA
2) Stepper Motor Cable
3) Stepper Motor

Tests: Unplug the stepper motor cable. If the error recurs, the Analog PCA is at fault. Expect a paper jam indication with the stepper disconnected.

1403 HAMMER DRIVER FAIL

Implications: Current has flowed through any coil for more than 1 msec.

Suspects:
1) Hammer data cable unplugged
2) Hammer cable assembly
3) Hammer Driver PCA
4) Printbar
5) Analog PCA
6) Input Power

Tests:
1) Check that the hammer data cable is connected.

2) Unplug the hammer cables from the Hammer Driver PCA and run a printing test. If the failure recurs the Hammer Driver PCA, most likely, the Analog PCA is at fault.

3) Examine the hammer cables where they round the sheet metal. Any signs of wear or rubbing increase the likelihood that the cable assembly is shorting to the sheet metal requiring that the cable assembly be replaced.

4) Try to isolate the failure by plugging in only one hammer cable at a time and running a printing Self Test. If a particular cable causes the error, try

plugging it into one of the other connectors (J1-J6). If the failure follows the cable, the printbar is at fault. If the failure occurs on a particular connector (no matter which of the six hammer cables is plugged into it), the Hammer Driver PCA is at fault.

1404 MULTIPLE HARDWARE ERRORS

Implications: All three of the above failures have been detected.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Analog PCA

Tests: Perform Standard Self Test.

1407 PRINTBAR MOTOR START FAULT

Implications: The printbar will not start mogating after five tries.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Print Mechanism binding
3) Analog PCA
4) Velocity Transducer
5) Printbar Motor

Tests:
1) Open the platen gap as far as possible with the adjustment knob and run the Standard Self Test. (or any printing test).
2) Check for debris in the gap between the printbar and the platen.
3) Check crankarm phasing.

1408 PRINTBAR SPEED OUT OF SPEC.

Implications: The printbar speed is out of spec.

Suspects:
1) Print Mechanism
2) Analog PCA
3) Formatter PCA
4) Printbar Motor

Tests:
1) Open the platen as far as possible with the adjustment knob and run Standard Self Test. Too small a platen gap can restrict the printbar.

1409 PRINTBAR DRIVER OVERLOADED (OR UNDERLOADED)

Implications: The firmware must overdrive or underdrive the printbar motor to obtain the proper print speed.

Suspects:
1) Mechanism binding
2) Analog PCA
3) Printbar Motor

Tests:
1) Open the platen as far as possible with the adjustment knob and run Standard Self Test (or any printing subtest).
2) Check for debris in the gap between the printbar and the platen.
3) Check that nothing obstructs the printbar motion. Try pushing the printbar back and forth by hand and look for rubbing.

1410 POWER UP FAULT PRINTBAR DRIVER FAIL

Implications: Over voltage or over current to the printbar motor when the power first comes up after a reset.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Analog PCA
3) Printbar Motor Cable
4) Printbar Motor

Tests: Perform Standard Self Test.

1411 POWER UP FAULT PAPER DRIVER FAIL

Implications: Over current on the paper driver when the power first comes up after a reset.

Suspects:
1) Analog PCA
2) Stepper Motor Cable
3) Stepper Motor

Tests: SAME AS 1402

1412 POWER UP FAULT HAMMER DRIVER FAIL

Implications: Current is flowing through the printbar for more than one print pass.

Suspects:
1) Hammer Data Cable
2) Printbar Cable Assembly
3) Hammer Driver PCA
4) Printbar
5) Analog PCA

Tests: SAME AS 1403

1413 POWER UP FAULT MULTIPLE ERRORS

Implications: All three of the above failures were reported by the hardware.

Suspects:
1) Fuse F1 in the Analog PCA (Figure 6-6)
2) Analog PCA

1414 50/60 VOLTS DID NOT POWER UP

Implications: The 50 volt supply will not rise above 35 volts ('50V STATUS' does not go high).

Suspects:
1) Analog PCA
2) Transformer

Tests: Check for proper line voltage and input power selected.

1415 50/60 VOLTS LOOP BACK STATUS SHOWED DISABLED.

Implications: The 50 volt supply enable line will not go active.

Suspects:
1) Analog PCA

1421 MISSING NON MASKABLE INTERRUPTS (NMI)

Implications: The processor has timed out while waiting for a NMI.

Suspects:
1) Velocity transducer cable
2) Velocity transducer
3) Stuck printbar

Tests:
1) Check that the transducer cable is connected to the Analog PCA.

1422 MISSING TRANSDUCER SIGNAL

Implications: The velocity transducer signal is missing.

Suspects:
1) Velocity transducer cable/connector
2) Velocity transducer

Tests:
1) Check that the transducer cable is connected to the Analog PCA.

1453 PRINTBAR FREQUENCY OUT OF SPEC.

Implications: The Formatter PCA measured a printbar mogation frequency that was not within the specified range on power up or reset.

Suspects:
1) Binding printbar
2) Velocity transducer disconnected
3) Velocity transducer rubbing
4) PRINTBAR motor is disconnected
5) Analog PCA
6) Bad printbar motor

Error 15: GRAPHICS RUN TIME FAIL

1500 UNRECOGNIZED NONPACKET REQUEST OR RESPONSE

Implications: The Graphics PCA has sent a communication pattern that the processor cannot recognize.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Perform Standard Self Test.
2) Perform Graphics PCA Self Test.

1501 RETURN STATUS INDICATES FAILURE FROM THE GRAPHICS BOARD

Implications: The Graphics PCA detected a failure while attempting to execute a particular function.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Perform Standard Self Test.
2) Perform Graphics Self Test.

1502 UNDEFINED RETURN STATUS

1503 UNDEFINED OR UNEXPECTED GRAPHICS COMMAND

1505 UNDEFINED BUFFER TYPE

Implications: There was a communication protocol error while the processor was attempting to communicate with the Graphics PCA.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Perform Standard Self Test.
2) Perform Graphics Subtest.

1507 RESET RESPONSE TIMEOUT

Implications: The Graphics PCA is installed, but failed to communicate within a given time window.

Suspects:
1) Graphics PCA
2) Formatter PCA

Tests:
1) Perform Graphics digital Self Test.
2) Perform Standard Self Test.

1508 FAILURE TO DELINK PACKET

Implications: The Graphics PCA is not communicating correctly with the Formatter PCA.

Suspects:
1) Graphics PCA
2) Formatter PCA

Tests:
1) Perform Graphics subtest 40 (destructive) or 41 (non-destructive).
2) Perform Standard Self Test.

1509 FAILURE REPORTED BY GRAPHICS BOARD.

Implications: The Graphics PCA has reported a hardware error.

Suspects:
1) Graphics PCA
2) Formatter PCA

Tests: Perform Graphics Subtest 40 (destructive) or 41 (non-destructive).

1510 GRAPHICS BOARD DEAD

Implications: The Graphics PCA failed to communicate with the Formatter PCA.

Suspects:
1) Graphics PCA

Tests:
1) Reseat Graphics PCA and perform digital Graphics Self Test.

Error 16: I/O RUN TIME FAILURE

1600 UNRECOGNIZED NONPACKET REQUEST OR RESPONSE

Implications: Communication protocol error between the Formatter PCA and the I/O PCA.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

1601 RETURN STATUS INDICATES FAILURE FROM I/O

Implications: I/O detected a failure while attempting to execute a particular function.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

1602 UNDEFINED RETURN STATUS

Implications: there was a communication protocol error while the processor was attempting to communicate with the I/O PCA.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

1603 UNDEFINED OR UNEXPECTED I/O COMMAND
04 UNEXPECTED DATA PACKET RECEIVE WHEN NONCIPER
05 UNDEFINED BUFFER TYPE

Implications: Communication protocol error.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

1606 POWER ON SELF TEST FAILURE

Implications: The I/O PCA fails its power on self test when power first comes up or after a reset.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

1607 RESET RESPONSE TIMEOUT

Implications: The I/O PCA is installed but failed to initiate communication with MCP within the 2 second limit.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Error 17: PRINTER TIMED OUT

1701 ERROR LOCATION IS IN DATA PROCESSOR

Implications: Printing timeout.

Suspects: Formatter PCA

1702 ERROR LOCATION IS IN QPRINT

Implications: Printing timeout. The physical machine did not complete the printing of a line within 15 seconds of initiation.

Suspects: Formatter PCA

1703 PRINT ONE LINE EXTERNAL TIMEOUT

Implications: Timeout when print one line is being done with data from the host.

Suspects: Formatter PCA

1705,06 PRINT ONE LINE INTERNAL TIMEOUT

Implications: Timeout when print one line is done with data from Self Test.

Suspects: Formatter PCA

Error 19: ATTEMPT TO GO ONLINE IN CE MODE

19 ATTEMPTED TO GO ON LINE IN CE MODE

Implications: The CE Mode line is low when attempting to put the printer On Line.

Suspects: Jumper between CE mode test point and ground on the Formatter PCA.

Tests: Be sure the CE Mode strap is remove from the Formatter PCA before attempting to put the printer online.

Error 29: CONFIGURATION PRINTOUT

2901 PRINTER TIME OUT

Implications: The printing of configuration parameters has not been started in 5 seconds.

Suspects: 1) Formatter PCA

2940 FAILED TO DELINK I/O PACKET POINTER FOR STATUS

Implications:

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

2941 COULD NOT SEND I/O PACKET POINTER FOR STATUS.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

2942 FAILED TO DELINK I/O POINTER FOR CONFIGURATION.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

2943 COULD NOT SEND I/O PACKET POINTER FOR CONFIGURATION.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

2945 FAILED TO DELINK GRAPHICS PACKET FOR STATUS.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

2946 COULD NOT SEND GRAPHICS PACKET FOR STATUS.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

2947 FAILED TO DELINK GRAPHICS PACKET FOR CONFIGURATION.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

2948 COULD NOT SEND GRAPHICS PACKET FOR CONFIGURATION.

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

2950 CAN'T FIND A CHARACTER SET ROM IN SLOT 0

Implications: The character set ROM is missing or defective.

Suspects:
1) Character set ROM
2) Formatter PCA

Tests: Verify that the character set ROM is correctly installed.

Error 3037: PRINTING SELFTEST TIMEOUTS

3001 STANDARD RIPPLE PRINT TIME OUT.

Implications: Printing has not begun 5 seconds after a ripple print test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3101 DOUBLE SIZE RIPPLE PRINT TIME OUT

Implications: Printing has not begun 5 seconds after a double size ripple print test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3201 COMPRESSED RIPPLE PRINT

Implications: Printing has not begun 5 seconds after a compressed ripple print test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3301 HIGH DENSITY RIPPLE PRINT TIME OUT

Implications: Printing has not begun 5 seconds after a high density ripple print test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3401 RASTER GRAPHICS PRINT TIMEOUT.

Implications: Printing has not begun 5 seconds after a raster graphics test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3501 RUBOUT TEST TIME OUT.

Implications: Printing has not begun 5 seconds after a printing test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3601 BLACKOUT PRINT TIME OUT.

Implications: Printing has not begun 5 seconds after a black out test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3701 PRINT QUALITY TEST TIME OUT.

Implications: Printing quit in the middle of Print Quality testing. This is not a selectable Self Test. It only prints during Standard Self Test.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

3900 600 LPM RIPPLE PRINT TIME-OUT.

Implications: Printing has not begun 5 seconds after a ripple print test was initiated.

Suspects:
1) Formatter PCA
2) Analog PCA
3) Print Mechanism

Tests: Perform the Standard Self Test.

Error 40: DGL ROM TEST

4001 CHARACTER SET SOCKET 1 FAILURE.
(U81 IN 60008 BOARDS)

Implications: The check code for the ROM in socket 1 is not correct.

Suspects:
1) Character set ROM in socket 1
2) Formatter PCA

4002 CHARACTER SET SOCKET 2 FAILURE
(U91 IN 60008 BOARDS)

Implications: The check code for the ROM in socket 2 is not correct.

Suspects:
1) Character set ROM in socket 2
2) Formatter PCA

4003 CHARACTER SET SOCKET 3 FAILURE
(U101 IN 60008 BOARDS)

Implications: The check code for the character set ROM in socket 3 is not correct.

Suspects:
1) Character set ROM in socket 3
2) Formatter PCA

4004 CHARACTER SET SOCKET 4 FAILURE
(U121 IN 60008 BOARDS)

Implications: The check code for the character set ROM in socket 4 is not correct.

Suspects:
1) Character set ROM in socket 4
2) Formatter PCA

4005 CHARACTER SET SOCKET 5 FAILURE

(U131 IN 60008 BOARDS)

Implications: The check code for the character set ROM in socket 5 is not correct.

Suspects:
1) Character set ROM in socket 5
2) Formatter PCA

4006 CHARACTER SET SOCKET 6 FAILURE
(U141 IN 60008 BOARDS)

Implications: The check code for the character set ROM in socket 6 is not correct.

Suspects:
1) Character set ROM in socket 6
2) Formatter PCA

Error 41: RAM test

4100 SELFTEST TIME OUT

Implications: The self test timed out while waiting for the RAM test to complete.

Suspects: Formatter PCA

4101 RAM 1 FAILURE (U14)

Implications: The processor is unable to write and read data correctly to RAM 1 (U14).

Suspects: Formatter PCA

4102 RAM 2 FAILURE (NONVOLATILE, U24)

Implications: The processor cannot write and read back data from the CMOS RAM (U24).

Suspects: Formatter PCA

4103 RAM 3 FAILURE (U34)

Implications: The processor cannot write and read back data from RAM 3 (U34).

Suspects: Formatter PCA

4104 RAM 4 FAILURE (U54)

Implications: The processor cannot write and read back data from RAM 4 (U54).

Suspects: Formatter PCA

4105 RAM 5 FAILURE (SHARED DGL, U71)

Implications: The processor cannot write and read back data from the shared DGL RAM (U71).

Suspects: Formatter PCA

Error 42: FIRMWARE ROM CRC TEST

4200 SELF TEST TIME OUT

Implications: Self test timed out while waiting for the ROM test to complete.

Suspects: Formatter PCA

4201 FIRMWARE ROM FAILURE (U13,U23,U33,U53,U63)

Implications: The CRC calculation failed, indicating that the firmware ROMS may be corrupted.

Suspects: Formatter PCA

Error 43: TIMER TEST

4301 INTEL 8253 TIMER FAILURE (U55)

Implications: The Intel 8253 timer chip has failed.

Suspects: Formatter PCA

Error 44: DOT GENERATION LOGIC (DGL) TEST

4401 NO DESCENDER SCAN "A" FAILURE

4402 EXCURSION SCAN "A" FAILURE

4403 SINGLE DESCENDER SCAN "," FAILURE

4404 EXCERSION SCAN "," FAILURE

4405 DOUBLE DESCENDER SCAN "NULL" FAILURE

4406 EXCURSION SCAN "NULL" FAILURE

Implications: The DGL gate array is not properly extracting the descender/excursion bits from the character sets during status read-back.

Suspects: Formatter PCA (DGL gate array)

4411 70 DPI LEFT DIRECTION GRAPHICS FAILURE

4412 70 DPI RIGHT DIRECTION GRAPHICS FAILURE

4413 100 DPI LEFT DIRECTION GRAPHICS FAILURE

4414 100 DPI RIGHT DIRECTION GRAPHICS FAILURE

4415 140 DPI LEFT DIRECTION GRAPHICS FAILURE

4416 140 DPI RIGHT DIRECTION GRAPHICS FAILURE

Implications: The DGL gate array is not transferring the graphics image in the DGL RAM buffer to the LSI shift register properly for the indicated dot density and direction.

Suspects: Formatter PCA

4417 10.0 DPI LEFT DIRECTION TEXT FAILURE

4418 10.0 DPI RIGHT DIRECTION TEXT FAILURE

4419 12.0 DPI LEFT DIRECTION TEXT FAILURE

4420 12.0 DPI RIGHT DIRECTION TEXT FAILURE

4421 15.0 DPI LEFT DIRECTION TEXT FAILURE

4422 15.0 DPI RIGHT DIRECTION TEXT FAILURE

4423 16.7 DPI LEFT DIRECTION TEXT FAILURE

4424 16.7 DPI RIGHT DIRECTION TEXT FAILURE

4425 17.0 DPI LEFT DIRECTION TEXT FAILURE

4426 17.0 DPI RIGHT DIRECTION TEXT FAILURE

Implications: The DGL gate array is not creating the proper dot image in the LSI shift register based on the ASCII text in the DGL RAM buffer. The DGL gate array may be incorrectly accessing the character set ROMs.

Suspects: Formatter PCA

Error 46: PRINTBAR COIL TEST

4600 SELF TEST TIME-OUT

Implications: Self test timed out while waiting for the open hammer test to complete.

Suspects: Formatter PCA

4601 through 66 OPEN CIRCUIT ON HAMMER COIL

Implications: The controller attempts to fire each of the 66 hammers in turn while measuring the printbar current. If no current is sensed, an error is flagged. If more than one

hammer is faulty, the one with the lowest number (left-most) is indicated.

Suspects:
1) Printbar to Hammer Driver PCA ribbon cable
2) Hammer Driver PCA
3) Printbar has an open coil
4) Analog PCA

Tests: Swap the hammer cables at the Hammer Driver PCA end. Run the hammer test again. If the faulty hammer number changes by a multiple of 11, then the printbar or cable is at fault. Otherwise the Hammer Driver or Analog PCA is at fault.

Error 50 I/O ERRORS: HP-IB INTERFACE

There are several types of #50 Errors. Please se the following sections, depending on the I/O installed.

The following errors only apply if the HP-IB interface is installed.

5001 RAM FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5002 ROM FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5003 HP-IB HARDWARE FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5004 MULTIPLE ERRORS (2 OR MORE)

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

■

Error 50 I/O ERRORS - CENTRONICS INTERFACE

The following errors apply only if Centronics Interface PCA is installed.

5001 RAM FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5002 ROM FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5003 RAM and ROM FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

■

Error 50 I/O ERRORS: RS-232 INTERFACE

The following errors apply only if the serial interface is installed.

5001 RAM ERROR

Implications: The RAM on the I/O PCA cannot be written to, or read from.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5002 ROM ERROR

Implications: The check code in the I/O ROMs is not correct.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5003 SERIAL HARDWARE FAILURE

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5004 MULTIPLE FAILURES

ımplications: More than one of the above errors has occurred.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Error 50: I/O ERRORS: MULTIPLE I/O INTERFACE

The following errors only apply if the Multiple I/O PCA is installed.

5001 SHARED RAM ERROR

Implications: The shared RAM on the I/O PCA cannot be written to, or read from.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5002 LOCAL RAM ERROR

Implications: The local RAM on the I/O PCA cannot be written to, or read from.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5003 ROM ERROR

Implications: The check code in the I/O ROM's is not correct.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5004 XIO MALFUNCTION

Implications: An error was detected in the LAN PCA, or the LAN PCA is not installed.

Suspects:
1) LAN PCA
2) I/O PCA
3) Formatter PCA
4) Analog PCA

5005 SERIAL HARDWARE ERROR

Implications: Hardware error detected in the serial I/O.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

5006 MULTIPLE FAILURES

Implications: More than one of the above errors has occurred.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Error 60-66: VECTOR GRAPHICS ERROR CODES

All these failures imply a defective Graphics PCA.

60 FILED COMPLETE NONDESTRUCTIVE TEST

61 FAILED COMPLETE DESTRUCTIVE TEST

62 NONDESTRUCTIVE ROM TEST

63 NONDESTRUCTIVE STATIC RAM TEST

64 DESTRUCTIVE GRAPHICS CONTROLLER TEST

65 DESTRUCTIVE DYNAMIC RAM TEST

66 FAILED TO CREATE SELF TEST IMAGE

Error 80-83: FRONT PANEL OPERATION ERRORS

8000 THROUGH 8095 CHARACTER SET ERRORS AT POWER ON

Implications: The quotient of the Fail Point divided by six will derive the character set number. The remainder points to the problem:

0) Character set flags
1) Excursion
2) PPLT Tables Full
3) PPLT Undefined
4) PPLT RAM space full
5) Invalid frequency,i.e., no PPLTs

Suspects:
1) Character set ROM
2) Formatter PCA

Tests:
1) Perform Self Test 11.
2) Be sure character sets are loaded in the sockets correctly. Especially look for high density character sets in U81 or 91.

8096 NO CHARACTER SET ROM IN ROM SOCKET 1

Implications: Character set ROM in socket 1 (U81 in 60008 PCA) is missing or bad.

Suspects:
1) Character set in socket 1 (be sure all pins are in the socket).
2) Formatter PCA

Tests: Be sure there is a normal density character set ROM in socket 1.

81 SLAVE SELFTEST SELECT ERROR USING UP BUTTON

Implications: Communication error with the slave when the processor asks if the Self Test number reached by the up button exists.

Suspects:
1) Slave Board (I/O or Graphics)
2) Formatter PCA

Tests:
1) Perform the I/O subtest #30.
2) Perform the Graphics subtests #40 (if the Graphics PCA is installed).
3) Perform the Formatter PCA Self Test (test 11).

82 SLAVE SELFTEST SELECT ERROR USING DOWN BUTTON

Implications: Same as 81 except the Self Test code was reached using the DOWN key on the front panel.

Suspects:
1) Slave Board (I/O) or Graphics)
2) Formatter PCA

Tests:
1) Perform the I/O Self Test (CE Mode test 3039).
2) Perform the Graphics Self Test (CE Mode test 4049) if the Graphics PCA is installed.
3) Perform the Formatter PCA Self Test (CE Mode test 11).

83 INTERNAL FIRMWARE SELFTEST TABLE PROBLEMS

Implications: The table used to decode the Self Test numbers is not set up properly in the machine control ROMS.

Suspects:
1) Firmware ROMS (be sure all pins are in the socket)
2) Formatter PCA

Error 86: MODEM DISCONNECT FUNCTION

8601 COULD NOT DELINK A PACKET

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Try Self Test 11 (CE Mode).
2) Try the appropriate I/O Self Test.

8602 COULD NOT SEND THE PACKET

Implications:

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Try Self Test 11 (CE Mode).
2) Try appropriate I/O Self Test.

8603 ERROR ENCOUNTERED ON I/O

Implications: The I/O PCA reported a problem.

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Tests:
1) Try I/O subtest 40.
2) Try subtest 11.
3) Try subtest 14.

Error 90: I/O SLAVE TIMEOUTS

9050 FAILED TO RETURN SELFTEST DESCRIPTION

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

9051 FAILED TO RETURN FROM A SELFTEST IN THE PRESCRIBED TIME

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

9052 RETURNED WITH AN INCORRECT COMMAND

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

9053 FAILED TO DELINK A PACKET

Suspects:
1) I/O PCA
2) Formatter PCA
3) Analog PCA

Error 91: GRAPHICS SLAVE TIME OUTS

9150 FAILED TO RETURN SELF TEST DESCRIPTION

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

9151 FAILED TO RETURN FROM A SELFTEST IN THE PRESCRIBED TIME

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

9152 RETURNED WITH AN INCORRECT COMMAND

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

9153 FAILED TO DELINK A PACKET

Suspects:
1) Graphics PCA
2) Formatter PCA
3) Analog PCA

PROTOCOL ERRORS

Protocol errors are communication errors between the HP 2564B/C and the host system. The problem is as likely to be in the host system as in the printer. These errors are very hard to repair and are, fortunately, rare.

Suspects (HP 2564B/C only):

1) Formatter PCA
2) I/O PCA

Tests:
1) Formatter PCA Self Test (Self Test 11).
2) I/O PCA Self Test (Self Test 3039 depending on I/O).

C6 DATA OVERRUN
C7 TRANSPORT SERVICE ERROR
C8 ILLEGAL BLOCK LABEL
CA ILLEGAL DEICE DEPENDENT FORMAT NUMBER...
CB UNDEFINED DATA TYPE

CC UNDEFINED RECORD CODE
CD ILLEGAL HOST/PERIPHERAL FIELD
CE INCORRECT HOST TO PERIPHERAL RECORD NUMBER
CF ILLEGAL RECORD HEADER LENGTH

FIRMWARE ERRORS

The firmware errors were put in to catch catastrophic system errors during firmware development. They were not really designed to aid in debugging the machine and should also be seen very rarely. Some of the failure codes can be caused by the system. These are noted in the failure code list below.

Suspects (Unless otherwise noted):

1) Formatter PCA
2) Machine control firmware

Tests:
1) Formatter PCA Self Test (Self Test 11).

C0 UNRECOGNIZED PROTOCOL ERROR

D1 NEGATIVE SLEW COUNT

D2 CONTROL MASK TOO SMALL - The host system and I/O PCA are also suspect. Try I/O Self Test (30-39).

D3 LEFT OVER DATA IN CONTROL MASK - The host system and I/O PCA are also suspect. Try I/O Self Test.

F0 SPURIOUS INTERRUPT DECODE

Suspects:
1) I/O PCA
2) Analog PCA
3) Formatter PCA

Tests:
1) I/O Self Test (3039).
2) Power on Self Test (20 in CE mode).
3) Formatter PCA Self Test (11).

F8 NEGATIVE PAGE LENGTH

This Page Intentionally Blank

Appendix B

Determining Poor Print Quality HP2300

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DROPPED DOTS

Implications: When the platen gap is too large the dots in the middle dot columns for each hammer may be lighter than surrounding dots. The problem is most severe when printing dots between the two characters covered by each hammer, since this is where the hammers must be fired at the highest frequency.

Dropped dots

Suspects:
1) Platen gap is too large
2) Printbar is worn out
3) Hammer Driver PCA
4) Stabilizer bearings not riding on printbar (1100L).

Tests:
1) Try closing down the platen gap with the adjustment knob. As the gap is closed, the number of light dots should decrease. The platen gap should be set so that the dots are uniform for underlines all across the page. The flight time may need to be adjusted to reduce the dot slalom in vertical lines, especially if the platen gap was moved several clicks. If the hammers rub on the paper before the dots are uniform, go on to test 2. If the platen is in as far as the adjustment knob will allow and the center dots are still faded, the platen gap should be adjusted.

2) Look more carefully at the print, especially underlines and double size. If the dropped dots tend to all occur on one side of the page, check the platen gap with a feeler gauge. One side of the printbar may have a smaller gap than the other. If so, adjust the platen gap. If the dropped dots appear on every fourth hammer, the problem is the Hammer Driver PCA. If one or a group of hammers (other than those cases discussed above), are the only ones that drop dots, the

printbar is probably the problem. If all (or nearly all) of the hammers drop dots, even after the platen gap has been closed down to where the hammers are rubbing (or nearly rubbing), go on to test 3.

3) Use a feeler gauge to measure the platen gap. If there are hammers that stick out much farther than the others, the printbar is probably the problem. Otherwise, the Hammer Driver PCA is probably bad.

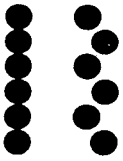
4) For the 1100L, check the stabilizer bearings. Move the printbar sideways with your hands and make sure the stabilizer's bearings ride on the printbar. If not, adjust the stabilizers per instructions in section 6-17.

DOT SLALOM

Implications: The pulses that fire the hammers are started when the printbar has not yet reached, or has gone past the position where the dot is supposed to be on the printer. This is done to allow a delay in the firing circuitry and for the time it takes the hammer to fly from its rest position to the platen.

If the flight time of the hammer is different than the value set in the nonvolatile memory, the dots in vertical lines will not line up, as shown below.

Ideal Dot slalom



Suspects:
1) Platen gap improperly adjusted.
2) Flight time compensation value is not set correctly.
3) Printbar is out of spec.

Tests:

1) Change the platen gap using the adjustment knob. There should be a gap where there is very little dot slalom without the hammers rubbing or dropping dots. Check using a thick form to assure no smear occurs.

2) If the platen adjustment doesn't work, the flight time compensation may be incorrect. Remove the paper and ribbon and set the platen gap to .013 inches. Use a feeler gauge and the adjustment knob to set the gap. Change the flight time compensation value through the front panel as outlined in Section 5-4 in this manual.

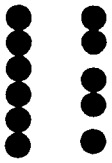
3) If the flight time compensation cannot be set for an acceptable amount of dot slalom, the turnaround value may need to be changed. Change it according to Section 5-5.

4) If the printbar is replaced, be sure to set the flight time compensation and turnaround values. It's probably easiest to start with the turnaround and flight time values set as they were before you changed them.

DOT BUNCHING

Implications: If the paper stepper does not move the paper the same distance between every dot row, the dots in vertical lines will appear bunched and then widely spaced, as shown below.

Ideal Dot bunching



Suspects:
1) Paper tension is too high
2) Analog PCA
3) Stepper motor

Tests:
1) Check the paper tension. If it is too high try backing out the platen using the adjustment knob and check the tension again. If the paper tension is still too high, loosen the paper tension as outlined in the Operator's Manual.

The paper tension can be checked in two ways:

1) Check the holes in the paper for excessive deformation.

2) Remove the paper from the tractors and pull the paper through the printer by hand. Compare the tension of the printer with dot bunching to a printer that is working properly.

Be sure to check the paper path for obstructions before taking the mechanism apart to adjust the paper tension. Its not uncommon for debris (especially sticky labels to plug the paper path.

DOT UNIFORMITY

Implications: Some dots appear lighter or smaller than those around them. This is similar in many ways to the dot dropout problem.

Suspects:
1) Platen is not aligned properly
2) Analog PCA
3) Print mechanism (printbar mogation is not parallel to the platen)

Tests: Examine the print for the following:

1) Dots fading from light to dark over the entire length of the printbar (as opposed to fading over the two character range of each hammer) indicates that the platen gap is wider on one side of the printbar than on the other side. This can be fixed by

aligning the platen gap as described in Section 5-7 of this manual.

2) Bands of light print .2 inch wide (2 characters printed by one hammer) on every fourth hammer implies a Hammer Driver PCA failure.

3) Dots fading from light to dark over the .2 inches (2 characters) printed by each hammer implies that the printbar is not moving parallel to the platen. This can be repaired only by replacing the print mechanism.

VERTICAL CHARACTER COMPRESSION (SCRUNCH)

Implications: Characters are shortened, especially after a long skew or at top-of-form.

Suspects:
1) Foreign substance in paper path.
2) Paper Motion/Paper Out switch dragging.

Tests:
1) Remove serpentine and re-evaluate print. If problem improves, check for abnormalities.
2) Test with different weight paper.
3) Check paper tension - if too high, consult factory.

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Appendix C

Test Points
HP2300

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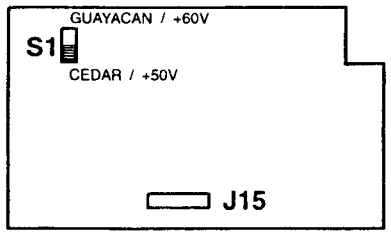
INTRODUCTION

This appendix identifies the test points located at connector location J15 on the Analog PCA.



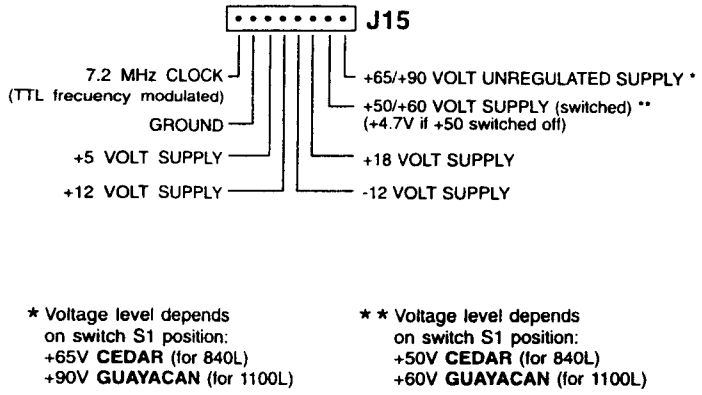


Figure C-1. Analog Board Test Points

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Appendix D

Anzac Support Supplement HP2300

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ANZAC SUPPORT SUPPLEMENT

Anzac Computer Equipment Corp. is one of Hewlett-Packard strategic partners. They OEM (original equipment manufacture) the Guadalajara family of printers (256X & HP2300) and resell them into the IBM system environment. The Anzac printers are designed to emulate an IBM 4214 model 2 printer or IBM 5225-1 printer and connect to the IBM System AS/400 and IBM systems 34, 36, 38. Anzac changes the HP front panel logo and inserts two IBM twinax boards (interface and backpanel) into the 256X & HP2300 transforming the HP printer into the "Anzac Shuttle Matrix Printer." Anzac also uses the HP Super Centronics PCA not the standard HP Centronics PCA. The Anzac 5080-2 and the Anzac 5011 are being shipped with the Super Centronics PCA or the Multiple I/O depending on the customer's needs.

All Anzac printers come with a 90 day on site warranty from GPR. The response time in a warranty call is next day for travel zones 1, 2 and 3 or more for other zones (see Worldwide Customer Support Travel and Office Directory, P/N 5091-2356E). All warranty is coded 02N and billed back to GPR (DO NOT use 02Y or bill to DIV 5060). The warranty does not cover installation; customers will be charged for this. Technical assistance for printer problems is available through the response centers. Technical assistance for the Anzac/IBM interface is available through the Anzac support desk at 1-800-223-9673, or, if outside the USA, you can dial Anzac direct at (415)475-4600 and ask for the support desk.

NOTE

You must call the Anzac support desk before going on site and you must close the call with the Anzac support desk before leaving the customer's site. Always keep the Anzac support desk informed of the customer's status. Anzac is your customer not the end user. Address all customer issues to the Anzac support desk.

THE ANZAC SUPPORT DESK IS MANNED 0500 hrs to 1700 hrs MONDAY THRU FRIDAY PACIFIC COAST TIME.

For Anzac support issues or Anzac escalations you can contact the Anzac Account Team, for USA accounts only:

Anzac Account Manager: Don Robinson, 510/460-1667, telnet 460-1667
Anzac Escalations: Larry Brasesco, 415/694-2118, telnet 694-2118

The Hewlett-Packard/Anzac printer comparison is listed below in table 1.

Table 1. Hewlett-Packard/Anzac printer comparison list

HP Printer	Anzac Printer	Product Description
2562C	ANZ5030	300 LPM
2563B/C	ANZ5040	420 LPM
2564B/C	ANZ5080	840 LPM
2566B/C	ANZ5012	900/1200 LPM
2567B/C	ANZ5016	1200/1600 LPM
C2354A	ANZ5080-2	840LPM
C2356A	ANZ5011	1100LPM

Unique Anzac PCA switch setting and parts are listed in the following sections.

Table 2. Anzac Formatter master firmware list.
All PROMS must be labeled as shown below

5030/5040	5080	5012/5016	5080-2	5011
63-250 U125 3305 8E6D	64-231 U13 2938 EBC7	66-406 U12 2928 7889	33422-67901 U191 3322 E7FB	C3206-67901 U191 3322 E716
63-251 U115 3305 660A	64-232 U33 2938 6CDC	66-407 U11 2938 E322		
63-252 U105 3305 F291	64-233 U63 2938 EFF5	66-408 U32 2938 4231		
63-253 U95 3305 18EA		66-409 U31 2938 3050		

Table 3. Unique Anzac parts breakdown

ANZAC P/N	DESCRIPTION	MODELS
ANZX0310003	Anzac Twinax I/F PCA	All except 5080-2 / 5011
ANZ-0310003FMKT	Firmware for interface. **The Anzac Twinax I/F and the interface firmware must be ordered together**	All except 5080-2 / 5011
ANZX0310042	Anzac Twinax I/F PCA. * No firmware on new interface. IBM printer model number is downloaded from the host.	5080-2 / 5011
ANZ-0300016	5 position power harness for Analog revision 3046 and below. Wires must be soldered to Cap on Analog Board.	5030/5040/5080
ANZ-0300046	5 position power harness for Analog revision 3046 and above. Plug-in connector.	5030/5040/5080
ANZ-0300018	36 pos cable assy	all
ANZ-0300028	Backpanel assy	5012 / 5016
ANZ-0300015	Backpanel assy	5030/5040/5080
ANZX0300059	Backpanel assy	5080-2 / 5011
ANZ-1300010	Mounting plate	5030/5040/5080
ANZ-1300084	Mounting Plate	5080-2 / 5011
ANZ-1200007	3/16" Adj. standoff	all (4)
ANZ-0300023	Power harness	5012 / 5016
ANZ-2400025	Label, Anzac	5040
ANZ-2400026	Label, Anzac	5016
ANZ-2400027	Label, Anzac	5012
ANZ-2400028	Label, Anzac	5080
ANZX2400037-5080-2	Label, Anzac	5080-2
ANZX2400037-5011	Label, Anzac	5011
ANZ-0300019	60 pin assy (QMS opt. only)	5040 /5080

Table 3. Unique Anzac parts breakdown

ANZAC P/N	DESCRIPTION	MODELS
ANZ-1300064	CKT board spacer 5/8" (x2), QMS	5040 / 5080
ANZ-1300065	Nylon 632 hex nut (x4), QMS only	5040 / 5080
5062-1754	HP Super Centronics (new)	all
26067-69081	HP Super Centronics (rebuilt)	all
C2356-30101	Multiple I/O PCA	5080-2 / 5011
02566-60036	Anzac Formatter PCA. This PCA is loaded with Anzac firmware less character sets.	5012 / 5016
02566-69030	HP Formatter PCA See Table 2 for unique firmware	5012 / 5016 2566/67B
02563-69021	Anzac Formatter PCA. This PCA is loaded with Anzac firmware less character sets.	5030 / 5040
02563-69015	HP Formatter PCA See Table 2 for unique firmware	5030 / 5040 2563B
02564-69021	Anzac Formatter PCA. This PCA is loaded with Anzac firmware less character sets	5080
02564-69012	HP Formatter PCA See Table 2 for unique firmware	5080 / 2564B
4175006-QMS 4382022-QMS 02563-90974 26062-90902	HP Label Card (NEW) HP Label Card II (NEW) Label Card II Handbook Label Card Handbook	all (obsolete) all all all
26062-69101	HP Label Card (rebuilt)	all
33422-60001 C3206-60002	Anzac Formatter Anzac Formatter	5080-2 5011

Table 4. HP Label Card. Anzac typical configuration.

ORIGINAL HP LABEL CARD 256X & HP2300		FUNCTION NUMBER	HP LABEL CARD II 256X only *
JUMPER SETTING	FUNCTION SETTING		FUNCTION SETTING **
JW1 2,3	0 (No HP Label Card Installed)	80	0 (No HP Label Card Installed)
JW2 2,3	1 (HP Label Card installed)	80	1 (HP Label Card installed)
JW3 2,3	1	81	1
JW5 2,3	0	85	0
JW7 1,2	04	86	0
	10	87	0
	13	88	10
	11	89	00 5030/5040 01 5080/5080-2 10 5012 11 5016

* To configure HP Label Card II on the HP2300 refer to the proper manual, P/N 02563-90974. Anzac typical configuration for HP2300 in next edition.

** No jumpers on Label Card II.

Table 5. HP Super Centronics 5062-1754 / 26067-69081
Hardware 8 Pin Dip Switch Setting and Front Panel Configuration

Dip Switch #	Dip Switch Setting	Function Settings
1	on	20 = 0
2	off	21 = 0
3	off	22 = 0
4	off	23 = 0
5	off	24 = 0
6	off	25 = 0
7	off	26 = 11
8	off	27 = 0
		28 = 0
		29 = 0

NOTE: Anzac typical configuration for the Multiple I/O will be included in the next edition.

TROUBLESHOOTING THE ANZAC INTERFACE

Twinax basics:

The Anzac printer is connected to the IBM System via the twinax interface and cable. Anzac printers use two type of cable assembles from the IBM System:

1. Twinax cables daisy chained from the IBM channel through a maximum of seven devices (0 thru 6) not to exceed 5000 ft.

2. Twisted Pair (phone lines), connected from the IBM channel via a balun (transformer) into a .5 foot twinax cable to the back panel of the Anzac printer. The twinset will only support 7 devices (0 thru 6). This configuration may be daisy chained together, but it is usually in a star configuration from a patch panel.

The specific device number is setup through the Anzac back panel switch (0 thru 6). Switch position #7 is used to select the Anzac interface selftest.

CAUTION

It is very easy to bump the back panel device select switch and change the printers configuration. Always check the position of the switch with the printers position on the daisy chain to avoid unnecessary troubleshooting time.

System commands: IBM vs. HEWLETT-PACKARD

In the Hewlett-Packard system environment you can ask the operator to down a particular device (down 6), Or, you can ask the operator to stop the spooler (stopspoolfile 6). In the Anzac / IBM environment you can do the exact same thing by using the IBM terminology (Table 6).

Table 6. System Commands

Hewlett-Packard	IBM
Down (#)	Vary Offline (#)
UP (#)	Vary Online (#)
Stopspoolfile (#)	Endwtr (#or discpt)
Startspoolfile (#)	Strprtwtr (#or discpt)

CAUTION

Never disconnect the printer's twinax or twisted pair without making sure the operator has ended the writer and varied the printer offline. Failure to insure that the printer is offline and the writer is stopped will result in taking down the rest of the devices on that channel. The operator will have to up all the devices on the daisy chain, not a pleasant task.

RUNNING PRINTER SELFTEST:

You have available to you two types of selftest:

1. Front Panel Selftest
2. Anzac Back Panel Selftest.

The front panel test is run with the printer in the Offline position. There are several printing and non-printing selftests available. The front panel selftest can be run anytime as long as the printer is in the offline position.

NOTE

Before running the Anzac selftest mark down the present device address and make sure the operator has stopped the IBM system writer (Endwtr).

The Anzac back panel selftest is enabled by turning the printer off, setting the printers back panel device select switch to #7 (refer figure 1) and turning the printer on. This will test 90% of the Anzac interface back into the printer.

The test will also give you the following information:

1. Provide you with a sliding alpha test pattern for print quality issues.
2. Firmware revision

HP41.D = IBM 4214 model 2 emulation
HP51.D = IBM 5225-1 emulation

You can then use this information to make sure the IBM system configuration matches the Anzac printer emulation. The operator or system administrator should have the system configuration.

ANZAC BACKPANEL ASSEMBLY

The Anzac back panel assembly can give you a quick snapshot of what is going on with the IBM system. The Parity, Sync, and the Printer lights (refer figure 1) will help you determine the present state of the printer.

Parity light: Parity light must be off for proper operation. If the parity light is illuminated then the Anzac printer is having trouble seeing the system. If parity light is on look away from the printer back to the system. The printer is receiving or has received an incorrect packet. Possible bad data cable (twinax cable or phone line). Possible poor connection between Anzac backpanel and Anzac interface board in the printer.

Sync light: The sync light must be illuminated for proper printer operation. If the sync light is flashing the Anzac interface has looked for a poll and has not received it. With sync light flashing look for a bad cable connection in the daisy chain path back to the IBM channel or patch panel.

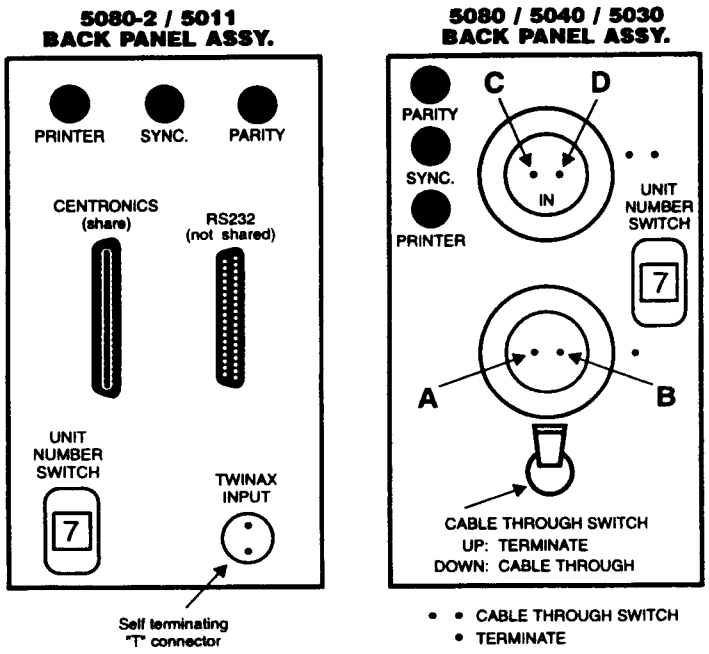
Printer light: The printer light must be off for proper printer operation. The printer light is tied to the printers fault line. The printer light will be lit if the printer is out of paper, or a fault condition exists (error12, 14-50). Correct the printer fault condition.

Cable thru switch

If the Anzac printer is device #6 or the last device on the channel the switch must be up (terminated). If the Anzac printer is not the last device on the channel then the switch must be down (cable thru).

Power on:

On power-on all three back panel lights will illuminate for ~ 1 second. If any of the lights fail to come on within that brief moment you have a defective LED.



CAUTION

It is easy to bump the switch while moving the printer. If you change the switch setting you will down all the devices past yours. Again the operator will have to up all the devices you have downed.

You can check the Anzac back panel assembly for continuity. This test will check out the continuity between the back panel and the Anzac interface board and cable. Figure 1 shows all the test points needed for this final test. Compare the values with table 6 below.

Table 6.

TEST POINTS	TERMINATE	CABLE THROUGH
A - B	OPEN	OPEN
A - GND	OPEN	OPEN
B - GND	OPEN	OPEN
A - C	OPEN	<2 ohms
B - D	OPEN	<2 ohms
C - D	110 ohms	OPEN
C - GND	54.9 ohms	OPEN
D - GND	54.9 ohms	OPEN

DEVICE ADDRESS SEVEN TEST

To enter the Device 7 test, turn the printer off, change the device switch to address 7, and turn the printer on again. The Device 7 test should be used when installing printers for the first time. Successful completion of a Device 7 test indicates that the Anzac Interface PCA is receiving power, and that the board is communicating with rest of the printer. It DOES NOT mean that the printer is receiving data from the computer system(s).

A successful Device 7 test also indicates the following:

1. **The Firmware Revision Number and Checksum.**
   The firmware revision number identifies the type of code on the Anzac Interface PCA. The checksum identifies the code based on numeric characteristics. Unless the code has been write protected, the printer's checksum will change whenever the printer is used.

2. **Config Bytes.**
   The configuration byte settings are used to make changes to the printer's setup. Due to the constant changes in functionality, access to these configuration bytes is limited to programming support. Customers may be given information about the configuration bytes only in very special cases.

3. **Page Count And Line Count.**
   This option is enabled or disabled based on whether or not the Anzac Interface PCA's firmware has been write protected.

4. **The System Emulation.**
   This is the emulation which the minicomputer system uses to identify the printer. System emulations commonly being used are 3812, 5225 and 4214.

5. **Virtual Printer Type And Protocol.**
   This identifies the printer language used by the printer engine. Commonly used printer types are HP Laser and 9/18 pin, which respectively use PCL5 and Epson FX protocol. Advanced programmers may want to access such protocols in order to utilize special printer functions.

6. **The Character Set.**
   A description of the accessed printer character set.

7. **Available Fonts According To GFID.**
   Fonts listed according to their GFID numbers vary according to the amount stored inside the printer. Repetition of font styles is common and often intentional, because many fonts have more than one GFID number assigned to them.

VOYEUR MODE

Printers with the Anzac Interface PCA include a self diagnostic tool called Voyeur mode. It is similar to Hex Dump provided by many printers. However, Voyeur mode allows the user to analyze the data being sent to the printer, instead of the data that has been converted by the Anzac Interface PCA. Voyeur mode prints the exact IBM system commands being used, as well as their Hexadecimal equivalents.

Retrieving a Voyeur Mode Test is often the first step in diagnosing a problem unit. If possible, retrieving a Voyeur along with an equivalent Hex

Dump test will provide Programming Support the clues to determine whether a problem is hardware or firmware related. Whereas entering Hex Dump mode is a different process from printer to printer, entering Voyeur Dump Mode requires the following steps:

1. Turn the printer off and on.

2. Change the device setting switch using one of the switch's buttons until the device switch is again at its original value.

3. The system operator must now send the file or print job which needs to be analyzed.

To exit Voyeur mode, make sure the device switch setting is still set to its original value. Turn the printer off and on.

Appendix E

Paper Specifications

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This appendix provides specifications for selecting continuous form paper appropriate for use in the HP2300 Printers. This section also identifies ribbon specifications. These specifications are intended to ensure that the highest quality print and reliability of the printer are maintained and are not intended to recommend a specific brand of paper or ribbon.

PRINTER OVERVIEW

The HP2300 Printers use dot-matrix technology which allows a high degree of printing flexibility. The printing mechanism in this family of printers is a printbar containing 66 hammers; one hammer printing 2 characters (at 10 characters per inch). The printbar oscillates horizontally to allow dot placement in any allowable dot positions across the page. Dot-matrix technology provides flexibility to adjust character formation, allowing multiple languages, line draw characters, special characters and graphics images to be printed.

DOT-MATRIX VS. FULL-FONT PRINTERS

A major difference between dot-matrix printers and full-font printers is the print gap, the distance between the print hammer in its retracted position and the platen. While the hammers of full-font printers fire only once to form an entire character, the hammer of a dot-matrix printer fires an average of 13 times per character and as many as 26 times to form a standard-density character. The high-repetition rates that dot-matrix hammers are required to operate at requires a significantly small print gap. Figure D-1 gives a comparison of typical dot-matrix and full-font print gaps.

For most standard paper and multi-part forms, the smaller print gap of dot-matrix printers does not present any problems. However, some specialty forms may cause unacceptable paper jam rates and/or print smearing even though they perform satisfactorily in full font printers. This paper specification guide will help you identify and purchase paper that will perform well in your Hewlett-Packard Printer. This guide will help you work with your forms vendors in designed and or purchasing forms that will give you optimum print quality and stacking in your printer.

NOTE

Always test your paper and forms prior to purchasing a large quantity for proper print quality, feeding and stacking.

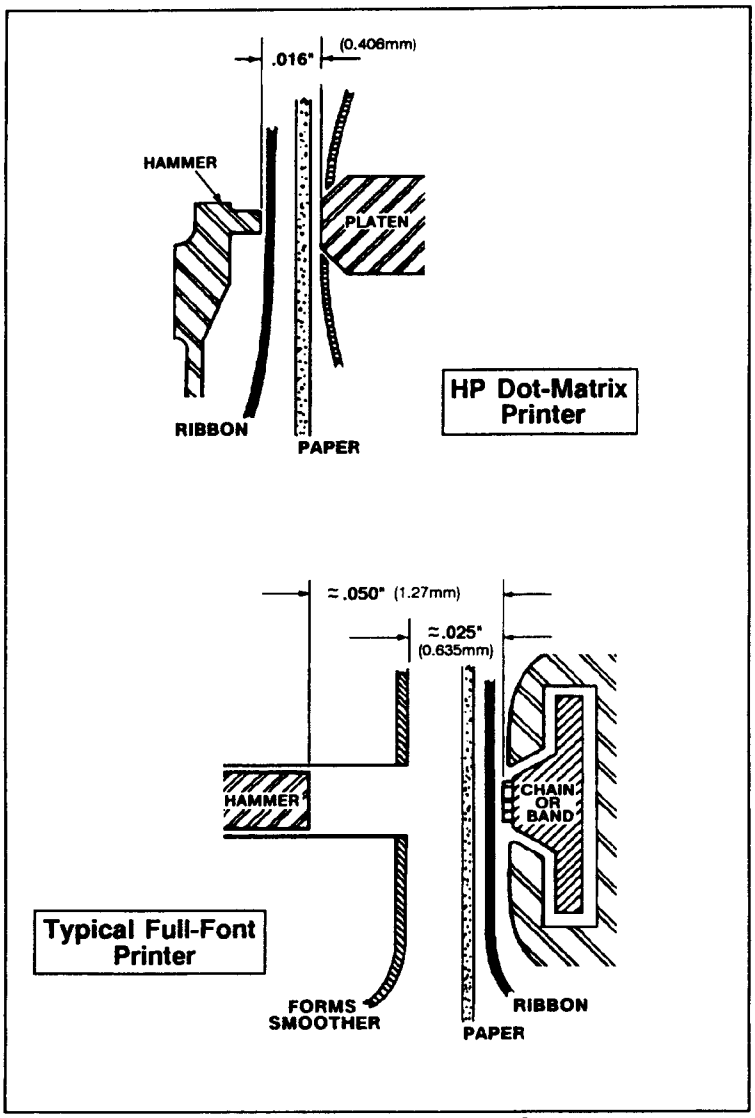

Figure E-1. Dot-Matrix and Full-Font Print Gap Comparison

GENERAL PAPER REQUIREMENTS

The printer uses continuous fan-fold edge-perforated paper varying in width from 3.0 inch (7.62 cm) to 16.7 inch (42.4 cm). Although the printer accepts paper as wide as 16.7 inches, the farthest right it can print is 14.6 inch (37 cm). It will handle paper weights in the range of 15 to 100 pound (18 - 60 pound optimum). Multi-part forms up to six parts may be used with a maximum overall pack thickness of 0.024 inch (0.61 mm). Carbonless forms are limited to 4 parts.

If paper is to be used in humidity extremes (greater than 55% or less than 20%) it should first be tested. Paper to be used at high humidity should be tested for satisfactory feeding, handling and stacking. Paper to be used at low humidity should be tested to determine if static buildup must be eliminated for proper stacking.

In general, any special application paper, such as multi-part forms, labels, etc. should be tested in the printer prior to purchase.

PAPER SPECIFICATIONS

This section describes the paper specifications which must be met to ensure optimum performance of the printer.

Hewlett-Packard conforms to ANSI standard X3.96-1983, "American National Forms Information Systems for Continuous Business Forms," and ISO Recommendation No. 2784, which cover common form widths and depths, standards for sprocket feed holes and margins, as well as other basic tolerances.

All measurements should be made at 20 to 26 degrees C (68 to 78 degrees F) and 45 to 55 percent relative humidity.

STANDARD FORMS SPECIFICATIONS

The Hewlett-Packard HP2300 Printers were found to perform adequately with forms that meet the following specifications:

Paper Sizes:

Maximum form width	16.7 in (42.4 cm) edge-to-edge
Minimum form width	3.0 in (7.6 cm) edge-to-edge
Maximum left margin	1.4 in (3.5 cm)
Maximum right margin	1.4 in (3.5 cm)
Maximum printing width	13.2 in (33.5 cm)
Maximum form length	12.0 in (30.5 cm)
Minimum form length	2.0 in (5.0 cm)

Paper Weights:

- **Single Part:**

Standard	15 to 100 pound	(57 - 380 gm/sq meter)
Optimum print quality	18 to 80 pound	(68 - 304 gm/sq meter)
Optimum paper stacking	20 to 80 pound	(76 - 304 gm/sq meter)

- **Multipart forms:**

Paper:	12 pound (46 gm/sq meter) up to 6 total pages
Carbons:	8 pound (30 gm/sq meter) up to 6 total pages
Pack Thickness:	Maximum .024 inches (0.61 mm) total
Carbonless:	Up to 4 part forms

Standard line printer paper purchased from Hewlett-Packard meets the above specifications and will perform well in the printer. Many other papers purchased from other sources will also provide satisfactory results. For forms other than single-part or simple carbon-type multipart forms, refer to the next paragraph, "Specialty Forms Specifications". The forms used in the printer should not vary in thickness across the printable surface. If paper is to be used in humidity extremes (greater than 80% or less than 20%), it should first be tested. Paper to be used at high humidity should be thoroughly tested for satisfactory feeding and handling. Paper to be used at low humidity should be tested to determine is static buildup must be eliminated for proper stacking.

SPECIALTY FORMS SPECIFICATIONS

Due to the variations in manufacturing processes, quality, and composition of forms, Hewlett-Packard cannot guarantee satisfactory performance with all paper and forms. This section of paper specifications is intended to familiarize and alert the user to some of the characteristics of specialty forms which may cause unsatisfactory performance of the printer. This paper specification is NOT intended as a substitute for actual testing.

NOTE

All specialty forms, including special single-part paper, multipart forms, forms with glue strips, carbonless forms, card stock, and labels should be tested for satisfactory feeding, registration, and print quality prior to purchase.

FORM THICKNESS UNIFORMITY

Because of the small print gap in dot-matrix printers, they are less tolerant of form thickness variations than are full-font printers. Sometimes these thickness variations can be caused by defects such as bubbles or wrinkles. Other times they are due to varying paper composition or the number of parts within the form.

Nominal differences in thickness and compressibility make it impossible to specify allowable thickness variations exactly. The following cases are intended to serve as a guide, but all forms with thickness variations must be tested for satisfactory performance. (In the following cases, T = maximum thickness.)

Case 1: Form Defect

In order to avoid hammer dragging, the overall thickness of a form plus any defects should be no more than as shown in Figure E-2 (.015+T/2) inch.

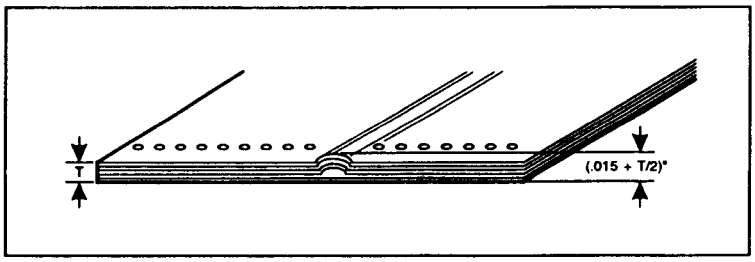

Figure E-2. Maximum Height of Form Defects

Case 2: Varying Thickness Forms: Printing on All Areas.

In order to ensure satisfactory print quality on all areas of the form, the difference in thickness between the thickest and thinnest section of the form should be no more than .008 inch (as shown in Figure E-3). The print gap should be adjusted to optimize print quality on all thicknesses of the form. Since dot-matrix printing is optimized when printing at one gap size, print quality can in some cases be compromised when printing on forms of varying thickness. This is especially true on the copy sheets of multipart forms. When printing on forms of varying thickness, the maximum depth of depression defects on the thick part of the form is also .008 inch.

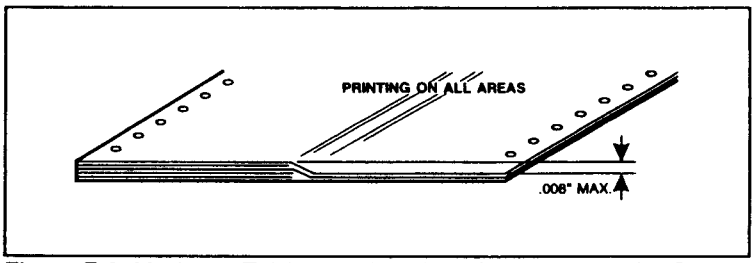

Figure E-3. Maximum Thickness Variations for All Areas of a Special Form

Case 3: Varying Thickness Forms: Printing on Thin Area.

In order to avoid smearing on the thickest area of the form when printing on the thin area only, the difference in thickness between the thinnest area and the thickest should be no more than as shown in Figure E-4 (.015-T/2) inch. For forms with larger variations in thickness, the print gap may be opened beyond the optimum gap to reduce smearing, but print quality on the thinner areas will degrade accordingly.

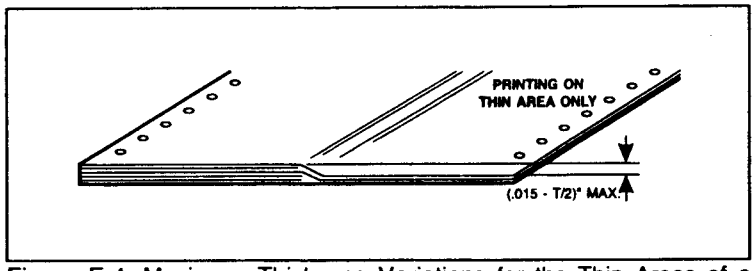

Figure E-4. Maximum Thickness Variations for the Thin Areas of a Special Form

Case 4: Varying Thickness Forms: Printing on Thickest Areas.

In this case, as long as the thickest area of a form does not exceed the specifications listed (see "Paper Weights" page E-6), there is no lower limit to the thickness of the thinnest area as long as it is sufficient to support the form as it is fed through the printer.

PERFORATION PROJECTION

The perforation projection (perforation tent) is measured by laying the form on a flat surface as shown in Figure E-5. Perforation projections exceeding the value shown (.015+T/2 inch) can result in excessive smearing at the perforations and/or an unacceptable jam rate. This is because the perforations may snag on the hammers as the paper slews through the print area. Opening the print gap will reduce smearing or jamming, but may also degrade print quality.

Paper crimps should not come loose and tails should not be showing. If these occur they will catch on the inward fold and cause paper jams.

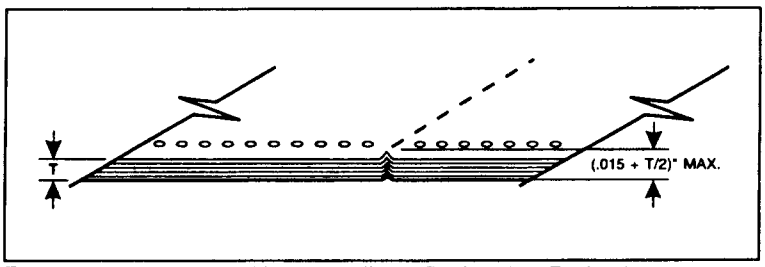

Figure E-5. Maximum Allowable Form Perforation Projection

OTHER SPECIAL FORMS

Forms with windows, cutouts, flaps, or attached cards, and other specialized forms may jam excessively in the printer. The only way to ensure satisfactory performance of these forms is to test them thoroughly before purchase.

LABELS

Most standard labels work well in the printer as long as they meet the specifications outlined in the section "Standard Forms Specifications." However, due to variations in the label products offered, all labels should be tested for satisfactory performance before purchase.

CARBONLESS FORMS

When using carbonless forms, poor print quality can be a result of the forms. The following considerations can result in poor print quality:
If shelf life of the form is past, if the chemical coating on the form is not distributed evenly, and certain chemicals have longer developer times. A 24 hours developement time is usual for carbonless forms after printing.

CONCLUSION

Since it is impossible to test all possible form types available for use in the printer, Hewlett-Packard recommends that paper conform to the specifications outlined in this document for optimum printer performance.

Table E-1. Recommended Printer Paper

Part No.	Description	Quantity
92157A	One-part, white, 9.5 x 11 in 18 lb bond	2400 sheets/box
92157C	One-part, white, 9.5 x 11 in 20 lb #1 bond	2400 sheets/box
9320-1515	One-part, blue bar, 14.9 x 11 in 18 lb, 132 column	2400 sheets/box

Once again, this paper specification is NOT intended as a substitute for actual testing. ALL SPECIALTY FORMS, INCLUDING SPECIAL SINGLE-PART PAPER, MULTI-PART FORMS, FORMS WITH GLUE STRIPS, CARBONLESS FORMS, CARD STOCK, AND LABELS SHOULD BE TESTED FOR SATISFACTORY FEEDING, AND PRINT QUALITY PRIOR TO PURCHASE. For the best results in selecting standard or specialty forms, consult a forms vendor who can ensure conformance to these specifications and can recommend cost-effective purchases.

PAPER STORAGE AND HANDLING

Since the performance of the printer is dependent on the condition of the paper used, the following recommendation for packaging, handling and storing are included in this document.

PACKAGING

To avoid damage during handling, top and bottom fillers should be used in continuous paper cartons to hold the stack firmly in place. Because the physical condition of the paper affects printer reliability, proper packaging ensures that the paper remains flat and is not damaged along the edges.

STORAGE

Do not store cartons directly on the floor, and do not stack more than six high. Each carton should be set upright squarely on the one underneath. Placing additional weight on top of the stack of cartons can damage the paper.

ENVIRONMENTAL CONSIDERATIONS

Since performance is affected by environmental conditions, paper should be protected from temperature and humidity extremes (as listed in the next section).

PRECONDITIONING FORMS

Paper should be stored in an environment similar to the printer's controlled environment for 48 hours prior to use. This conditioning allows moisture content in the paper to stabilize. HP2300 Printers are intended for operation in a controlled environment. This environment consists of temperatures 10 to 50 degrees C (50 to 122 degrees F) with a relative humidity of 30% to 80% non-condensing. For best results, however, the cartons should be stored and used at 18 to 24 degrees C (65 to 75 degrees F), with a relative humidity of 40 to 50 percent.

In the event the printer is in an environment subject to extremes of relative humidity or temperature, it may be necessary to store the forms in a controlled environment and withdraw them on an as-needed basis.

SHIPPING

When paper is shipped through different environments, the entire stack of cartons on the pallet should be plastic wrapped. When shipping across bodies of water, individual cartons should be wrapped as well.

Appendix F

Service Notes

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