LaserJet IIP Printer (HP 33471)
and
LaserJet IIIP Printer (HP 33481)
Combined Service Manual

HEWLETT PACKARD

HP Computer Museum
www.hpmuseum.net

Printing History

The printing history of this manual is given below. The last edition date shown reflects the machine configuration documented in the manual. Product changes subsequent to the initial release are documented in new editions of the manual.

Edition 1 .... March 1991

NOTICE

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Note	There is a more detailed Table of Contents located in the front of each chapter.

CHAPTER 1

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Product Information

Introduction

The HP LaserJet IIP (HP 33471) and LaserJet IIIP (HP 33481) are non-impact printers based on electrophotographic and laser technologies. Following are standard printer characteristics:

- The *LaserJet Toner Imaging System* is contained in the customer replaceable **EP-L Cartridge**. EP-L Cartridges include a photosensitive drum, developing cylinder, charging roller, toner chamber, and drum cleaning unit.
- The **charging Primary and Transfer rollers** replace the traditional corona system, improving reliability and reducing ozone production.
- **User expandable memory** from 1 to 5 Mbytes (0.5 to 4.5 Mbytes on LaserJet IIP).
- **Printer-generated Cleaning Paper** designed to remove excess toner from the paper path.
- **Standard Multi-Purpose (MP) Tray** capable of handling any size paper within the following range: Width = 96 through 216 mm (3.75 through 8.5 inches). Length = 170 through 356 mm (6.7 through 14 inches). The MP Tray can also handle other types of print media, such as overhead transparencies, envelopes, and labels.
- **Optional Lower Cassette (LC) Base** assembly increases total input capacity and allows software selection of print media. The LC Base supports A4, letter, legal, executive, and envelope trays.
- **Standard serial and parallel interface,** with optional AppleTalk® I/O available.
- **PCL 4** (LaserJet IIP) or **PCL 5** (LaserJet IIIP - includes scalable type, HP-GL/2 support, and Resolution Enhancement technology).
- **Compact design,** requiring **less maintenance** than previous HP LaserJet printers, at a **lower list price.**

Identification

The model and serial number are listed on identification labels located on the rear of the printer. The model number is an alphanumeric such as: 33471A, 33481A, 33471AB, or 33481AB.

The serial number consists of a four-digit prefix, a two letter code, and a four-place alphanumeric suffix (*e.g.* 0000JA4101). The prefix indicates the manufacturer's datecode. The two letter code indicates the manufacturing location. The alphanumeric suffix is incremented for each printer.

Note	Due to regulatory issues, Model A printers **cannot** be converted into Model AB. Model AB printers **cannot** be converted into a Model A. Any such conversion voids the warranty.
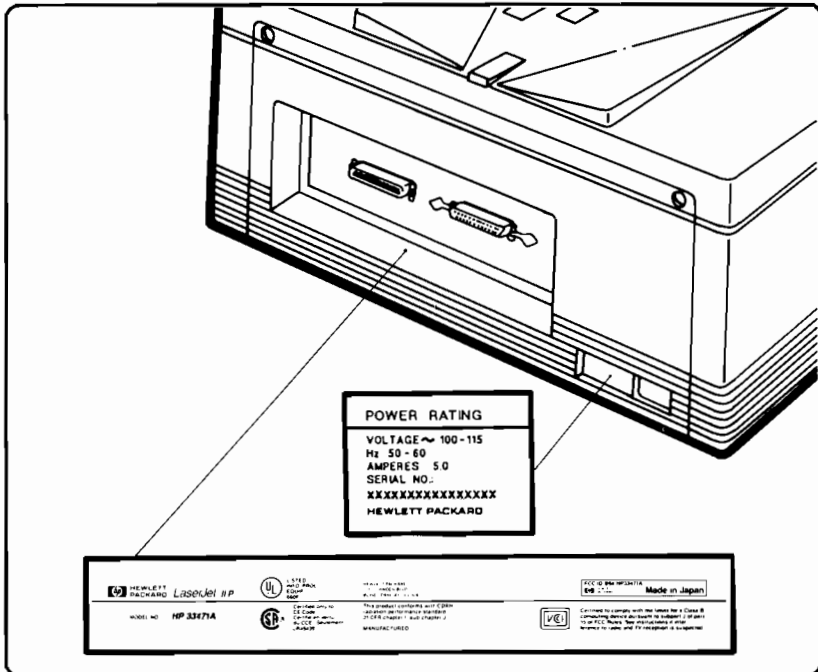
Figure 1-1. Printer Identification and Power Rating

Specifications

Table 1-1. Printer Dimensions

Width:		35.0 cm (13.75 inches)
Depth:	MP Tray closed	40.5 cm (16 inches)
	MP Tray opened	64 cm (25.25 inches)
Height:	Standard	20.8 cm (8.25 inches)
	With Optional Lower Cassette	26.1 cm (10.25 inches)
Weight:	Standard	10.0 kg (22 pounds)
	With Optional Lower Cassette	12.6 kg (28 pounds)

Table 1-2. Performance Specifications

CATEGORY	SPECIFICATION
Print Speed:[1] (both printers)	Up to 4 pages per minute.
Monthly Usage: LaserJet IIP LaserJet IIIP	 Up to 6000 pages. Up to 8000 pages.
Life Expectancy: EP-L Cartridge Other consumables	 Approximately 3500 pages.[2] Approximately 100,000 pages. (Refer to Table 4-1 in Chapter 4.)

Notes:

1. Actual speed depends on data complexity and software data handling efficiency.
2. Based on Letter or A4 size prints with an average of 5% toner coverage, and with print density slide set in middle (detented) position. A typical business letter without graphics represents about 5% coverage.

Table 1-3. Electrical Specifications

MODEL	VOLTS	FREQ	AMPS	WATTS
A	115 V ac ±10% 100 V ac ±10%	60 ±2 Hz 50 ±2 Hz	5.0 A[1]	574 W[2]
AB	220 V ac ±10% 240 V ac ±10%	50 ±2 Hz 50 ±2 Hz	2.3 A[1]	507 W[2]

Notes:

1. Maximum amperage while printing. Amperage in standby mode:
   Model A = 0.36 A. Model AB = 0.2 A.

2. Maximum wattage while printing. Average power consumption in
   standby mode at nominal line voltage and 20° C = 44 watts.

Table 1-4. Environmental Specifications - Printer & Cartridge

STATUS	TEMP	HUMIDITY	ALTITUDE
In Use	10 to 32.5° C (50 to 91° F)	20 to 80% RH	LaserJet IIP: 0 to 2,500 meters (0 to 8,200 feet) LaserJet IIIP: 0 to 3,100 meters (0 to 10,000 feet)
Power off (unpackaged)	0 to 35° C (32 to 95° F)	10 to 80% RH	0 to 15,000 meters (0 to 49,200 feet)
In Transit (packaged)[1]	Printer: −20 to 60° C (−4 to 140° F) EP-L Cartridge: −20 to 45° C (−4 to 113° F)	10 to 95% RH	0 to 15,000 meters (0 to 49,200 feet)

Notes:

1. Upper and lower limits shown are for severe conditions, not to exceed 10%
   of storage period. Normal conditions (≥90% of total storage period): 0 to
   35° C (32 to 95° F), 35 to 85% RH, 0 - 2,500 meters (8,200 feet).

Related Documentation

Table 1-5. Related Documentation

Document[1]	HP Part Number	
	LaserJet IIP	LaserJet IIIP
SHIPPED WITH PRINTER:		
Getting Started Guide	33471-90908[2]	33481-90905[2]
User's Manual[3]	33471-90901[2]	33481-90901[2]
Software Application Notes (U.S. Only)	33471-90922	33481-90918
SHIPPED WITH ACCESSORIES:		
Optional Lower Cassette Installation Guide	33472-90901[2]	33472-90908[2]
Memory Board Installation Guide	33474-90902[2]	(in User's Manual Appendix F)
ADDITIONAL INFORMATION:		
LaserJet Family Paper Specification Guide[3]	5002-1801	
Technical Reference Manual[3]	33471-90905	33481-90969[5]
Hardware Training Kit (SMO)[4]	33481A+49A-00	
Video Training Kit (for experienced techs)[4]	33481B+49A-00	
Peripheral (CE) Handbook	33471-90906	N/A

Notes:

1. Titles are not exact. Order by part number.
2. English version only - other translations available.
3. Can be ordered from HP Direct Marketing (DMK).
4. Must be purchased from HP's Support Materials Organization (SMO).
5. Includes PCL 5 Comparison Guide.

Safety Information

Laser Safety

The HP 33471/33481 printer is UL 478 listed, CSA 22.2 220 certified, and manufactured in accordance with DIN IEC 950. This printer is certified as a "Class 1" laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the *Radiation Control for Health and Safety Act* of 1968. This means that the printer does not produce hazardous laser radiation.

Since radiation emitted inside this printer is completely confined within protective housings and external covers, the laser beam cannot escape during any phase of normal user operation.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. The label shown below indicates compliance with CDRH regulations and must be attached to laser products marketed in the United States.
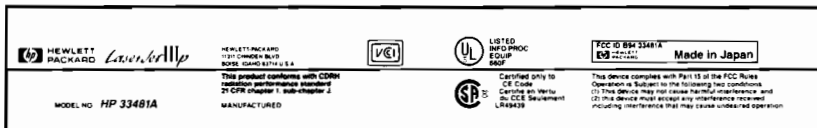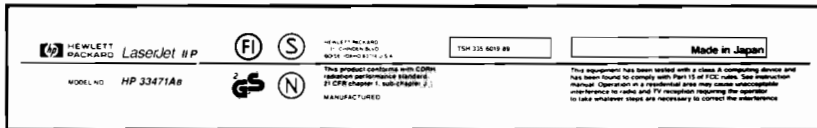
Since the invisible laser beam can cause eye damage, the following label is attached to the protective Laser Cover, which is inside the printer.

DANGER-INVISIBLE LASER RADIATION WHEN OPEN.
AVOID DIRECT EXPOSURE TO BEAM.

VORSICHT-UNSICHTBARE LASERSTRAHLUNG,
WENN ABDECKUNG GEÖFFNET UND
SICHERHEITSVERRIEGELUNG ÜBERBRÜCKT
NICHT DEM STRAHL AUSSETZEN.

CAUTION-INVISIBLE LASER RADIATION WHEN OPEN.
AVOID EXPOSURE TO BEAM.

ATTENTION-RAYONNEMENT LASER EN CAS
D'OUVERTURE EXPOSITION DANGEREUSE
AU FAISCEAU.

VARO!-AVATTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE
LASERSÄTEILYLLE ÄLÄ KATSO SÄTEESEEN.

注　意 - ここを開くとレーザー光がでます。
レーザー光を直接見たり、触れたりしないでください。

Ⓚ K-6   RS1-8854

Figure 1-2. Laser Safety Label

Laser Statement (Finland)

The following notice is required to be printed in Finnish and applies to printer operation and servicing in Finland.

TURVALLISUUSYHTEENVETO

LASERTURVALLISUUS

LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT

HP 33471AB ja HP 33481AB laserkirjoitin on käyttäjän kannalta turvallinen luokan 1 laserlaite. Normaalissa käytössä kirjoittimen suojakotelointi estää lasersäteen pääsyn laitteen ulkopuolelle.

Kirjoittimen on tarkastanut Suomessa laserturvallisuuden osalta Työterveyslaitos. Tarkastuksessa laitteen turvallisuusluokka on määritetty valtioneuvoston päätöksen N:o 472/1985 ja standardin SFS-IEC 825 mukaisesti.

VAROITUS!

Laitteen käyttäminen muulla kuin käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

VARNING!

Om apparaten används på annat sätt än i bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.

HUOLTO

HP 33471AB ja HP 33481AB kirjoittimen sisällä ei ole käyttäjän huollettavissa olevia kohteita. Laitteen saa avata ja huoltaa ainoastaan sen huoltamiseen koulutet henkilö. Tällaiseksi huoltotoimenpiteeksi ei katsota väriainekasetin vaihtamista, paperiradan puhdistusta tai muita käyttäjän käsikirjassa lueteltuja, käyttäjän tehtäväksi tarkoitettuja ylläpitotoimia, jotka voidaan suorittaa ilman erikoistyökaluja.

VARO!

Mikäi kirjoittimen suojakotelo avataan, olet alttiina näkymättömälle lasersäteilylle laitteen ollessa toiminnassa. Älä katso säteeseen.

VARNING!

Om laserprinterns skyddshölje öppnas då apparaten är i funktion, utsättas användaren för osynlig laserstrålning. Betrakta ej strålen.

Tiedot laitteessa käytettävän laserdiodin säteilyominaisuuksista:

Aallonpituus 770-795 nm
Teho 5 mW
Luokan 3B laser

ZZF Declaration (Germany)

The following notice is required to be printed in German and applies to printer operation and servicing in Germany.

Funkenstörung Deutschland
Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät HP 33471AB oder HP 33481AB in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkenstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Wird des Gerät innerhalb einer Anlage betrieben,

- so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der oben genannten Genehmigung entsprechen.

- die mit einer FTZ-Serienprüfnummer gekennzeichnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

Toner Safety

Toner is a non-toxic substance composed of plastic, carbon black
(provides color), and iron oxide (provides magnetism). Hewlett-
Packard's toner is classed as non-toxic and non-carcinogenic
by OSHA, the National Toxicology Program (NTP), and the
International Agency for Research on Cancer (IARC).

In case of toner spills, skin and clothing are best cleaned by
removing as much toner as possible with a dry tissue, then washing
with cold water. Hot water causes toner to permanently fuse
into clothing. Toner will be affected by certain plastics, such as
the vinyl used on some binder notebooks; such contact should be
avoided.

A material safety data sheet (MSDS) for toner or any other
chemical used in the HP LaserJet IIP/IIIP printer is available
through Hewlett-Packard's Customer Information Center.

Hewlett Packard
Customer Information Center
MSDS Department, MS 49AS
19310 Pruneridge Ave.
Cupertino, CA 95014

800-752-0900 (U.S. only)

When requesting an MSDS, provide your name and mailing
address, and the part number of the chemical or the product
number of the unit containing the chemical. For example, to obtain
an MSDS for toner you must include the product number **92275A**
for the EP-L Cartridge.

Ozone Emission

The high voltage supplies found in laser printers and photocopiers generate ozone gas (O_3) as a by-product of the electrophotographic process. Ozone is only generated while the printer is printing.

UL Standards for Ozone

The only current existing standard for ozone emission is established by Underwriters Laboratory (UL). All HP LaserJet family printers meet this standard when shipped from the factory.

Employer Responsibilities

Because ozone can be an irritant, various regulatory agencies have established limits to the amount of ozone to which employees may be exposed. The work place specifications are:

- A person may not be exposed to an average concentration of greater than 0.1 part per million (PPM) of ozone within a period of eight hours.

- At this time, the ACGIH has proposed a ceiling limit of 0.1 PPM for ozone.

Note	The employer is responsible for providing a work environment that meets these standards.

The LaserJet IIP and IIIP printers produce unmeasurable quantities of ozone, far below the 0.1 PPM figure proposed by UL/ACGIH. This is because they use *charging rollers* rather than the conventional wire *coronas* in the electrophotographic process (see Chapter 5 for more information).

FCC RFI Statement

NOTE: This equipment has been tested and found to comply
with the limits for a Class B digital device, pursuant to Part
15 of the FCC Rules. These limits are designed to provide
reasonable protection against harmful interference in a residential
installation. This equipment generates, uses, and can radiate radio
frequency energy and, if not installed and used in accordance
with the instructions, may cause harmful interference to radio
communications. However, there is no guarantee that interference
will not occur in a particular installation. If this equipment does
cause harmful interference to radio or television, which can be
determined by turning the equipment off and on, the user is
encouraged to try to correct the interference by one or more of the
following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from
  that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for
  help.

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

Note	Use of a shielded interface cable is required to comply within the Class B limits of Part 15 of FCC rules.

Service Approach

Repair of the printer normally begins with use of the printer's
internal diagnostics in conjunction with the troubleshooting
procedures in Chapter 7. Once a faulty part is located, repair
is accomplished by assembly level replacement of PCAs and
mechanical sub-assemblies. PCA component replacement is not
supported by HP.

Ordering Parts

Field replaceable part numbers are found in Chapter 8 of this
manual. Replacement parts may be ordered from HP's Support
Material Organization (SMO) or Parts Center Europe (PCE).

Hewlett-Packard Co. Support Materials Organization 8050 Foothills Blvd. Roseville, CA 95678 **800-227-8164** (U.S. Only)	Hewlett-Packard Co. Parts Center Europe Wolf-Hirth Strasse 33 D-7030 Boeblingen Germany

Other local phone numbers may also be available.

Ordering Consumables

Consumables may be ordered from the Direct Marketing Division
(DMK/DMO) of Hewlett-Packard. The phone numbers for ordering
consumables are:

U.S.:	**800-538-8787**
Canada:	**800-387-3154**
(Toronto)	**416-671-8383**
United Kingdom:	**0734-441212**
Germany:	**0130-3322**

Other local phone numbers may also be available.

Technical Assistance

For further technical assistance, service-authorized HP and dealer service personnel should contact the nearest Hewlett-Packard Customer Response Center (**800-633-3600** in North America). The HP Personal Peripherals Assist Line, (**208-323-2551**) is available to answer technical user questions regarding software applications, configuration, etc. The Assist Line is available weekdays from 7 AM to 6 PM Mountain Time (Wednesdays until 4 PM).

CHAPTER 2

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2

Operating Requirements

Introduction

The correct location and placement of the printer is extremely important in maintaining the best performance. It is the **customer's responsibility** to select and maintain a suitable environment for the printer. Media selection and EP-L Cartridge handling are also customer responsibilities. This information is provided here as a reference for the Service Representative.

Site Requirements

The environmental specifications listed under "Specifications" in Chapter 1 must be maintained to ensure the proper operation of this printer. Consider the following points before installing the printer:

- Install in a well-ventilated area.

- Install on a hard, flat and continuous surface, with all four printer feet level. *Do not install on a carpeted or other soft surface.*

- Install where the temperature and humidity do not change abruptly (such as near water sources, humidifiers, air conditioners, refrigerators, or other major appliances).

- Do not expose the printer to direct sunlight, dust, open flames, or ammonia fumes. If the printer is placed near a window, make sure the window has a curtain or blind to block any direct sunlight.

- Install away from walls or other objects. There must be enough space around the printer for proper access and ventilation (see Figure 2-1).
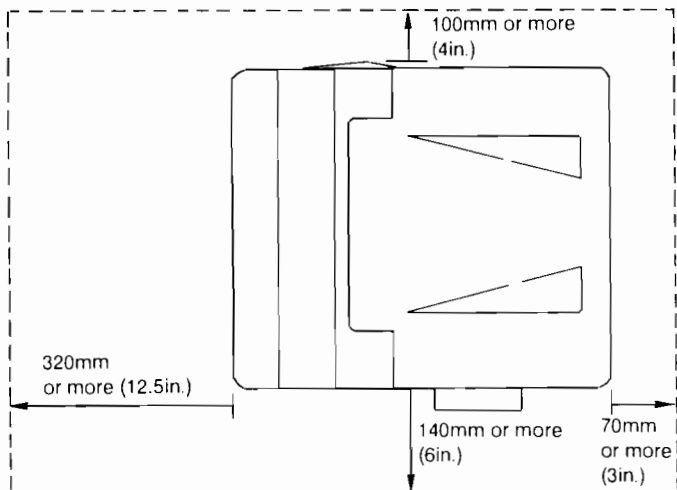

Figure 2-1. Printer Space Requirements

Storing and Handling the EP-L Cartridge

Storage Conditions

The EP-L Cartridge is affected by its environment. Packaging protects the EP-L Cartridge from light and increases its storage life. It is important to store the cartridge in its original packaging until the cartridge is ready to be installed in the printer.

In Original Packaging

When storing the EP-L Cartridge in a warehouse or work area, make sure the storage place meets the conditions specified in Table 2-1.

Table 2-1.
EP-L Cartridge Storage Conditions (in original packaging)

CATEGORY	TEMP	HUMIDITY	ALTITUDE
Normal Conditions	0° to 35° C (32° to 95° F)	35 to 85% RH	0 to 2,500 meters (0 to 8,200 feet)
Severe Conditions (18 days max)	-20° to 45° C (-4° to 113° F) max change=25°C in 3 minutes	10% to 95% RH	0 to 15,000 meters (0 to 49,200 feet)

Note The expiration date of the EP-L Cartridge is stamped on the cartridge box. This date allows for $2\frac{1}{2}$ years of storage in the original packaging plus a reasonable amount of time for use. After the cartridge has been removed from its storage bag or the bag's seal has been broken, the cartridge's life (storage+usage) is reduced to six months.

After Removing Packaging

Because the cartridge does not have a shutter to cover the laser beam access slot, it should be kept inside the printer until empty. If the EP-L Cartridge must be removed from the printer, always store the cartridge in:

- The protective bag in which it was originally packaged.
- A dark cabinet, away from direct sunlight.
- A horizontal position (**not** standing on end).
- A temperature between 0° and 35° C (32° - 95° F).
- An isolated area, away from ammonia or other organic solvent fumes.

Caution	**Never** expose the EP-L Cartridge to direct sunlight, or to room light for more than a few minutes. The EP-L Cartridge uses a developing process similar to the process used for film in a camera. Bright light and direct sunlight (which measures between 10,000 and 30,000 lux) can permanently damage an EP-L Cartridge.

Handling Suggestions

- Before installing a cartridge, distribute the toner evenly by holding the cartridge horizontally and slowly rocking it from end to end about five times (see Figure 2-2). This action also helps to extend the life of the cartridge when the tomer begins to run low.
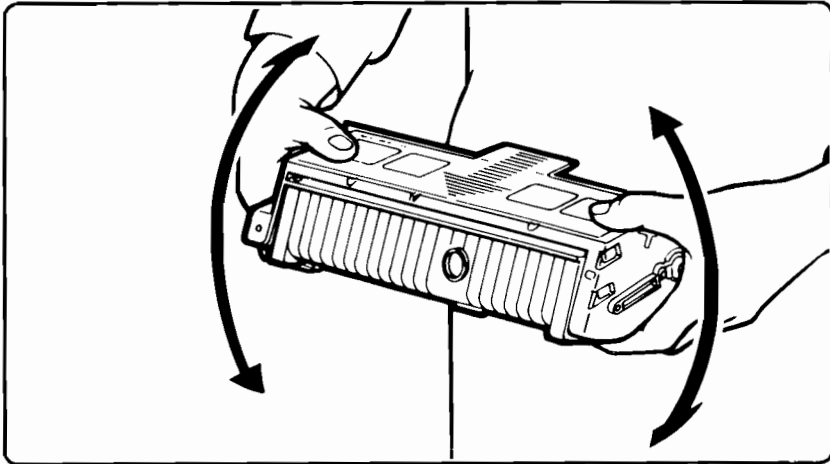
Figure 2-2. Distributing Toner in the EP-L Cartridge

- Do not store an EP-L Cartridge upright (on end).

- Do not touch the surface of the photosensitive drum in the cartridge. The drum's shield should remain closed to protect the drum from dirt and light.

- Do not disassemble or refill an EP-L Cartridge.

- Do not expose the cartridge to unnecessary vibrations or shock.

- Do not expose the photosensitive drum to strong light. White areas on the page may indicate that the drum has been exposed to light for too long. If white areas appear, stop the printer and wait a few minutes. This process should eliminate most defective images. If not, the EP-L Cartridge may be placed in a dark environment for an extended period of time, which may restore some life to the drum.

- Never rotate the drum in the reverse direction; internal damage and toner spills may result.

Refilled EP-L Cartridges

Hewlett-Packard EP-L cartridges have been designed to maximize the reliability of the printers by including all of the imaging components that require frequent replacement or adjustment.

Since the toner cartridge is designed to be disposable, the parts within the cartridge (photosensitive drum, gears, drum cleaning blade, etc.) are not designed to wear beyond the supply of toner contained in each new cartridge. Due to uncertain print quality, reliability, and potential impact on other printer parts, **HP does not recommend the use of refilled toner cartridges** in HP LaserJet printers. The use of non-HP toner alone does not affect the printer warranty or service contract. However, if an HP LaserJet is serviced, and the problem is found to be directly attributable to the use of a non-HP toner cartridge, HP will not repair the printer free of charge.

Media Specifications

Several types of print media can be used with the Hewlett-Packard
LaserJet IIP/IIIP printers, provided the media specifications are
met. Using media that does not meet the specifications listed
in this section may increase the incidence of paper jams, cause
premature printer wear, and contribute to repair costs.

Note	More detailed media specifications are available in the *HP LaserJet Printer Family Paper Specification Guide*, part number 5002-1801.
	HP neither warrants nor recommends the use of any particular media brand. Properties are subject to change by manufacturers and HP has no control over such changes. The operator should test particular media prior to large purchases.

Caution	Use only media recommended for use in laser printers. Printer damage resulting from use of incompatible media will not be covered by HP warranty or service agreements.

Paper Specifications

Use conventional white xerographic paper (*e.g.* Xerox 4024 or
Canon NP) for most printing applications. The paper should
be of good quality and free of cuts, nicks, tears, grease spots,
loose particles, dust, wrinkles, voids, and curled or bent edges.
Xerographic paper, also called "photocopy" or "laser printer paper,"
is usually made from chemical wood pulp and is characterized by a
smooth surface, controlled electrical properties, heat stability, and
cleanness. These characteristics will ensure good image transfer
and toner fusing without excessive curl.

Cotton bond paper may be preferred for some applications. Several
cotton bond papers are manufactured for use in laser printers.
HP has tested many cotton paper products designed for laser
printing with satisfactory results. Paper that is textured, such as
woven finished paper, or paper that is wrinkled may not perform
satisfactorily.

When using paper with perforations or cutouts, do not attempt to print closer than 4 mm to any perforation or cutout. Ensure any perforations are cleanly made from the print image side to prevent edge trimmings from damaging the EP Drum.

When purchasing paper for the printer, the supplier should be informed it will be used in a laser printer. Preprinted papers, such as letterhead stock, must use ink that can withstand the temperature of the printer's fusing process (200° C - 392° F).

Table 2-2. Paper Specifications

CATEGORY	SPECIFICATIONS
Basis Weight	16 to 28 lb. (60 to 105 g/m^2).
Composition	100% chemical wood pulp and/or cotton fiber.
Grain	Long grain.
Moisture Content	4% to 6% by weight.
Caliper	3.0 to 7.0 mils.
Curl	In-ream: flat within 0.2 inch (5 mm).
Cut Edge	Cut with sharp blades with no visible fray.
Finishing	Cut sheet within ±0.0313 inch of nominal, corners 90° ±0.2%.
Fusing Compatibility	Must not scorch, melt, offset, or release hazardous emissions when heated to 200° C (392° F) for 0.1 second.
Packaging	Moisture-proof ream wrap.
Smoothness	100 to 250 Sheffield.

Adhesive Label Specifications

An adhesive label is paper with a pressure-sensitive adhesive backing. *Always use the face-up output tray when printing labels, or damage may result.* Note the following elements of label stock:

- **Top or face sheet:** The top sheet, which is the printing surface, is usually composed of photocopy paper (see Paper Specifications).
- **Carrier sheet:** The carrier sheet must be compatible with the fusing temperature (200° C for 0.1 second), and be silicon-coated for easy release of the face sheet.
- **Adhesive:** The adhesive should be stable at the 200° C temperatures encountered in the printer's fusing process and must not give off emissions that exceed exposure limits established by OSHA and other safety agencies.

Adhesives should not come in direct contact with any part of the printer because the label stock may stick to the photoconductive drum or the rollers, causing printer damage. No adhesive should be pressed out the edges between the die cuts. To test this, press a sheet of plain paper on top of a sheet of the label stock. The plain paper should not adhere at all.

Note	Individual labels should not be removed from the label sheets prior to printing, nor should a label sheet be run through the printer more than once. Doing so may loosen the label material, causing it to peel off the carrier sheet and become lodged in the printer. This may cause damage to the printer requiring repair.

- **Label arrangement:** Labels should be so arranged on the carrier sheet that they cover the entire page. If the carrier sheet is exposed at all, it must **only be exposed lengthwise down the sheet** (see Figure 2-3). Using label stock with spaces between the horizontal rows of labels can often result in labels peeling off during printing, causing serious jamming and possible printer damage.

  Labels may be specially manufactured to leave a margin around the outside edges corresponding to the outer margins of the printable area. If this special arrangement is used, the excess top sheet material **should not be removed** from the carrier sheet prior to printing.
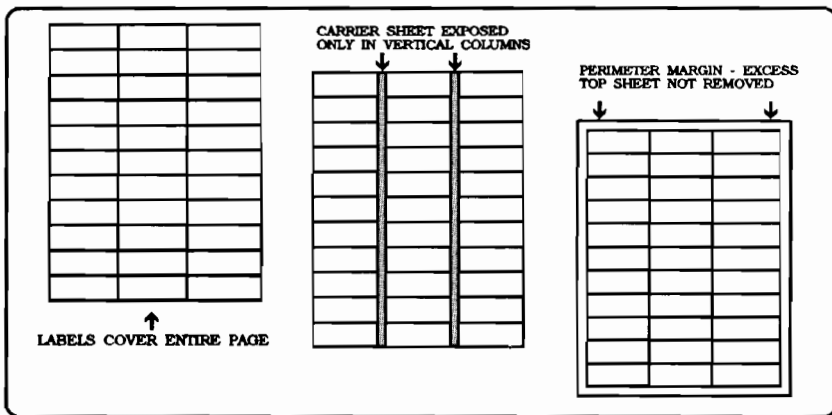

Figure 2-3. Adhesive Label Arrangements

Hewlett-Packard supplies adhesive labels through its Direct Marketing Division. See "Ordering Consumables" on page 1-13 for phone numbers. Following are a few of the recommended labels (call DMK for other sizes):

- 1 x $2\frac{5}{8}$ inches (HP P/N 92296A)
- $1\frac{1}{3}$ x 4 inches (HP P/N 92296B)
- 1 x 4 inches (HP P/N 92296C)

Overhead Transparency Specifications

Hewlett-Packard has tested and found acceptable overhead transparency film able to withstand the printer's 200° C (392° F) fusing temperatures. When printing on overhead transparencies, *always use the face-up output tray* to avoid excessive curling of the sheets, severe paper jams, and potential damage to the printer. Always remove each sheet from the output tray before the next sheet of film is printed to avoid jams.

Overhead transparencies should meet the specifications provided in Table 2-3.

Table 2-3. Transparency Specifications

Thickness:	0.100 to 0.110 mm (3.9 to 4.3 mils)
Cutting Dimension Tolerance:	± 0.8 mm (0.03 inch)
Cutting Angle:	90° ± 0.2°
Heat Tolerance:	200° C (392° F) for 0.1 second

Hewlett-Packard supplies overhead transparencies through its Direct Marketing Division. See "Ordering Consumables" on page 1-13 for phone numbers. The following HP overhead transparency sizes are available:

- 8.5 x 11 inches, US Letter (HP P/N 92296T)
- 210 mm x 297 mm, Metric A4 (HP P/N 92296U)

Envelope Specifications

Purchase envelopes only from a reputable envelope supplier who has been informed that the envelopes will be used in a laser printer. Envelopes should lie flat, have folds that are accurate and sharp, be free of nicks, wrinkles and other damage, and be packaged in a protective box.

Samples of envelopes should be tested before purchasing. Consistent, long-term performance requires quality control from the envelope manufacturer, and proper handling until use.

Envelopes should be stored where they will not be damaged. Keep them away from extremes in temperature and humidity. Envelopes should be allowed to reach room temperature before use.

When printing on envelopes, *always use the face-up output tray* to avoid excessive curling, wrinkling, and paper jams.

Hewlett-Packard has tested a variety of envelopes in the LaserJet family of printers. Many envelope types have tested acceptably, however, some envelopes will not feed reliably because of their construction. Consider the following points when choosing envelopes:

- The edge that enters the printer should be straight, with a sharp, well-creased fold and not have more than two thicknesses of paper at the leading edge.

- Envelopes with thick or curved leading edges will not feed reliably.

- "Baggy" envelopes may wrinkle and cause jams.

- An envelope that is poorly constructed may be folded smaller than the standard size. This causes the leading edge to be thicker than normal, especially near the corners.

- Even though most envelopes of a given brand may feed without problems, folding inconsistencies by the manufacturer may cause some envelopes to jam.
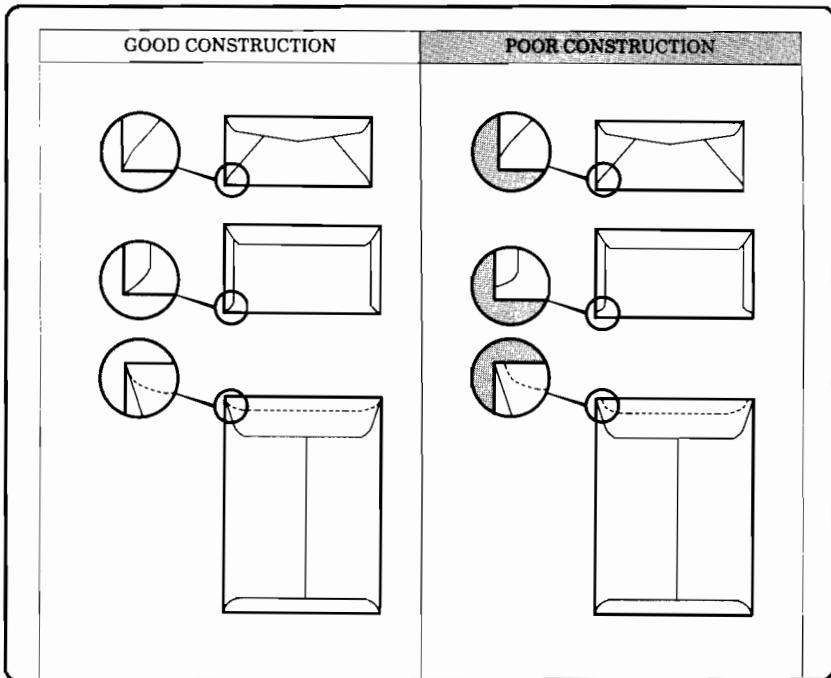

Figure 2-4. Good and Poor Envelope Construction

Use only envelopes within the following size limits:

- Minimum size: 3.5 x 7 inches (86 mm x 178 mm)

- Maximum size: 7.4 x 10.5 inches (188 mm x 267 mm)

Table 2-4. Envelope Specifications

CATEGORY	SPECIFICATIONS
Paper	Paper used for envelope construction must meet all the paper specifications listed in Table 2-2, "Paper Specifications," with the following additional requirements.
Basis Weight (single layer)	20 to 24 pounds (75 to 90 g/m^2).
Caliper	3.3 to 5.5 mils (0.084 to 0.14 mm) single layer thickness.
Curl	Envelope must lay flat with no more than 0.25 inch curl across the entire surface.
Finishing	Envelopes must not have any adhesive exposed to the printer. Each envelope must be accurately folded ($\pm$0.04 in.) so there are no more than two thicknesses of paper anywhere along the leading edge. All folds must be sharply creased and construction must be tight (not baggy).
Fusing Compatibility	All inks, adhesives, and other materials of the envelope must be compatible with the heat and pressure of the fusing process. Materials must not discolor, melt, offset or release hazardous emissions when heated to 200° C (392° F) for 0.1 second.

Envelopes to Avoid

Some specific types of envelopes may not perform well or may even damage the printer.

Envelopes that may cause jams or other problems and are **not recommended** for use in the printer include:

- Envelopes that do not meet the specifications listed in Table 2-4.

- Extremely smooth or shiny envelopes.

- Very rough, highly textured, or deeply embossed envelopes.

- Damaged, wrinkled, irregularly shaped envelopes, or envelopes that do not lie flat.

- Envelopes that use encapsulated types of adhesive that do not require moistening but instead rely on pressure to seal them.

- Envelopes that have previously been printed using a laser printer or photocopier.

Envelopes that will cause **printer damage** and **must be avoided** include:

- Envelopes with clasps, snaps, or tie strings.

- Envelopes with transparent windows, holes, perforations, or cutouts.

- Envelopes having an open flap with the adhesive seal exposed (closing the flap seals the envelope).

- Envelopes using paper, inks, adhesives, or other materials that discolor, melt, offset, or release hazardous emissions when exposed to 200° C for 0.1 second.

Caution	Printer damage that results from the use of incompatible envelopes (ties, clasps, etc.) will not be covered by HP warranty or service agreements.

CHAPTER 3

Contents

Figures

Tables

3

Installation and Configuration

Introduction

The Service Representative should understand the site
requirements of the printer and verify that the printer is placed in
a proper location. Each printer is tested and carefully inspected
before leaving the factory. In order to maintain its design
performance levels, the printer must be properly installed.

Note	Printer installation and configuration is the customer's responsibility. The information given in this chapter is provided for reference.
	See Appendix A for interface cabling information.

Unpacking and Installation

Before unpacking the printer, inspect the shipping container for
signs of physical damage. Since a damaged shipping box is an
indication of improper handling during shipping, the printer may
also be damaged.

Note	If the shipping container has any sign of damage, unpack and power the printer ON with the carrier's agent present. If the printer appears damaged or fails self test, do not accept it.

Replacement packaging material (P/N 33471-00908) is available
through SMO **800-227-8164**, or PCE in Europe.

The following unpacking and installation instructions follow the same general order of the *LaserJet IIIP Printer Getting Started Guide* that is shipped with each printer.

A. Choose the best location.

- Continuous, hard and flat surface (especially critical when Optional Lower Cassette is installed). Do not install on carpeted or other soft surface.
- Adequate clearances (see Chapter 2, Figure 2-1).
- Temperature between 50° and 90.5° F (10° to 32.5° C).
- Relative humidity between 20% and 80%.
- No abrupt temperature or humidity changes.
- No direct sunlight or exposure to strong chemicals.
- Line voltage within ± 10% of listing on nameplate.
- Well ventilated room.

B. Unpack the printer.

1. Remove the accessories box.
2. Remove the printer from its box.
3. Remove the packing material from the printer.

C. Check package contents.

- Printer
- *User's Quick Reference Card*
- *User's Manual*
- *Software Application Notes* (US Only)
- *Supplies & Accessories Brochure*
- Power cord
- Face-up output tray
- Enhanced MP tray extender
- EP-L cartridge (in separate box)
- Control Panel Overlay (optional, depending on model number ordered)

D. Identify printer parts.

(Refer to Figures 9-1 and 9-2 in Chapter 9.)

E. Remove the internal packing material.

1. Locate the Multi Purpose (MP) tray.
2. Pull down the MP door to open.
3. Push up the release button on right to open paper path door.
4. Squeeze and remove the orange packing spacer(s) from inside the printer. (The LaserJet IIIP has one spacer, the LaserJet IIP has two – see Figure 3-1.)
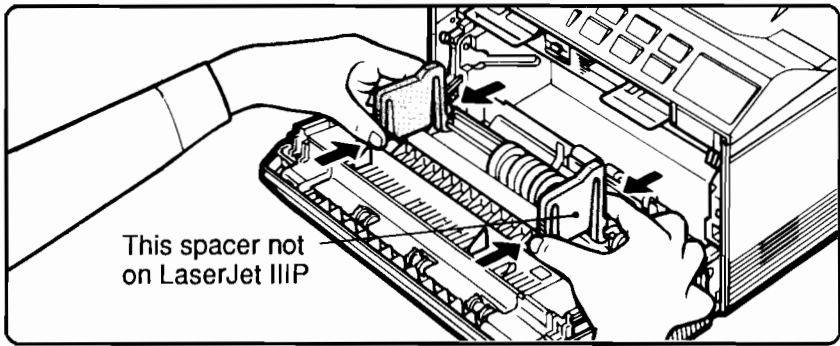

Figure 3-1. Removing the Packing Spacer(s)

F. Unpack the toner cartridge.

1. Locate and remove the cartridge from its box.
2. Remove the cartridge from its bag (use scissors). Save the bag for possible storage.
3. Slowly rock from end-to-end five times to distribute toner.

G. Install the toner cartridge.

1. Grasp the orange tab on the end of cartridge.
2. Pull firmly to remove the 18" (46 cm) strip of tape. Discard the tape. (If the tab separates from the tape, pull the tape out.)
3. Line up the green arrow on the cartridge with the green arrow inside the printer.
4. Slide the cartridge into the printer.
5. Close the paper path door, and open the MP tray door.

H. Attach the Enhanced MP Tray Extender (optional step).

The Enhanced MP Tray Extender can be used in place of the built-in tray extender in the MP tray door. The Enhanced Extender provides additional support, especially for longer media sizes (such as legal). Use the Enhanced Extender unless the MP Tray door will be closed frequently.

1. Make sure the built-in tray extender on the MP tray door is pushed all the way in.
2. Remove the Enhanced MP Tray Extender from its plastic wrap.
3. Fit the Extender onto the MP Tray door with the center tab below the door.
4. Slide the Enhanced Extender in against the MP Tray door.

I. Select paper and load into the MP tray.

Refer to "Paper Specifications" in Chapter 2 for paper selection information.

1. Place the paper forward in the tray and firmly against the right guide.
2. Fill the MP tray no higher than the arrow point on the left edge.
3. Slide the media width adjuster lightly against the left edge.
4. On top of the printer, flip up the appropriate paper stop and snap into place.

J. Select output tray for paper.

If printing on paper, the top output tray is recommended. Make sure the Output Tray Deflector is up.

K. Select output tray for other media.

If printing on envelopes, labels or transparences, the Face-up (front) Output tray must be used.

1. Locate the Face-up tray.
2. Gently squeeze the tray into the top notches located just below the Output Tray Deflector.
3. Push the Output Tray Deflector button down to select face-up output.

L. Attach the power cord.

1. Make sure the printer is OFF (switch on lower right side).
2. Connect the power cord into its receptacle on rear of printer.
3. Turn power switch ON. The display will show 05 SELF TEST,
   02 WARM UP, then 00 READY LETTER (A4 on Model "AB"
   printers).

M. Attach the Control Panel Overlay (optional).

If using an optional international overlay, attach to the control
panel, as follows:

1. Clean the control panel with a dry, lint-free cloth.
2. Remove the adhesive tape backing from the overlay.
3. Press the overlay down onto the control panel, using the printer
   seam as a guide.

N. Choose display message language (optional).

The printer's control panel can be localized to display one of ten
languages (first five only for LaserJet IIP): English (default),
French, German, Italian, Spanish, Swedish, Danish, Norwegian,
Dutch and Finnish. If English is desired, skip this step and go
directly to step "O."

1. Turn printer OFF. Hold down the (ENTER) key while powering
   back ON.
2. Wait until CONFIG LANGUAGE appears. Release (ENTER) key. 05
   SELF TEST appears.
3. Wait for LANGUAGE ENGLISH to appear. Click (+/-) key to choose
   a language.
4. Click the (ENTER) key to save the language selection. An asterisk
   (*) appears by the selection.
5. Click the (ON LINE) key. Display messages will now appear in
   selected language.

Note	Failing to press (ENTER) to save a language selection will cause the printer to repeat the CONFIG LANGUAGE power-on sequence until a specific language is selected.

O. Change MP SIZE to match paper size (optional).

MP SIZE is the only way the printer can determine which physical paper size is loaded in the Multi-Purpose (MP) tray. LETTER is the default on Model "A" printers, or A4 on Model "AB" printers. Skip to step "R" if using the default media size.

1. With the printer off line, the display should read 00 READY LETTER (or A4).
2. Click the (MENU) key. The display shows MP SIZE LETTER (or A4).
3. Click the (+/-) key until the desired paper size is displayed.
4. Click the (ENTER) key to save the selection. An asterisk (*) appears by the selected size.
5. Click the (ON LINE) key. The display should show the size just selected.

P. Determine Job Size (optional).

Available job sizes include: Letter, Legal, Exec, A4, Com-10, Monarch, DL, C5. Skip to step "R" if using Letter (Model "A" printers) or A4 (model "AB" printers).

Q. Set Job (Image) Size (optional).

JOB SIZE determines the image size that will be formatted by the printer. LETTER (or A4) is the default. Skip to step "R" if using the default size paper.

1. With the printer off line, click the (MENU) key until JOB SIZE LETTER * (or A4) appears.
2. Click the (+/-) key until the job size that matches your MP SIZE setting is displayed.
3. Click the (ENTER) key to save the selection. An asterisk (*) appears.
4. Click the (ON LINE) key. The first line of the display should now read 00 READY, with the selected MP SIZE listed on the second line.

R. Print a Self Test and generate Cleaning Paper.

1. Take the printer off line.
2. Hold down the (Alt) key and click the (Test) key. The display will first read 05 SELF TEST, then 06 PRINT TEST. Two pages will print. The first page is a self test printout, the second page is the printer-generated Cleaning Paper.

S. Use the Cleaning Paper.

A sheet of Cleaning Paper is produced when the printer runs a self test and should be used to clean the printer's internal components whenever the EP-L cartridge is replaced.

1. Place the Cleaning Paper face-up in the MP tray, on top of the paper stack.
2. Run another SELF TEST (see step "R"). Two pages will print. The first page of the new SELF TEST will print on the back side of the initial Cleaning Paper page.
3. Discard the SELF TEST and the Cleaning Paper sheets.
4. Turn the printer OFF.

T. Choose an interface cable.

- Parallel is preferred, and should be used if the cable length can be three meters (ten feet) or less.
- Serial must be used if the cable length must be greater than three meters (ten feet).
- Cable lengths greater than 15 meters (50 feet) require RS-422 (serial) communications. See "RS-422 Configuration" on page 3-26.

U. Connect the interface cable.

1. Make sure the computer and printer are turned OFF.
2. Plug the cable into the computer and printer. ("Rock" connectors securely into place to ensure reliable connections.)

   Serial and parallel ports are clearly labeled on the printer. On most computers, 25 pin parallel ports are female, requiring a male connector, and 25 pin serial ports are male, requiring a female connector. However, on some computers, the serial and parallel ports look the same. Check the computer documentation if necessary.

V. Select the Control Panel I/O settings.

1. Take the printer off line.
2. Click the (MENU) key repeatedly until DEVICE CONFIG appears.
3. Click the (ENTER) key. AUTO CONT appears.
4. Use the (MENU), (+/-) and (ENTER) keys to select the correct interface, and, if serial, to select the baud rate. (An asterisk (*) appears when clicking the (ENTER) key to save a selection.)
5. Click the (ON LINE) key. The first line of the display should now read 00 READY, with LETTER or another selected MP SIZE listed on the second line.

W. Configure the host computer (MS-DOS/PC-DOS systems only).

1. Check for existence of MODE.COM file on the hard disk. If MODE.COM is not present, copy it from DOS diskettes.
2. Edit the AUTOEXEC.BAT file.

Note	Any editor that can create a "clean" (unformatted) ASCII file can be used to modify or create AUTOEXEC.BAT. Be sure to re-boot the computer for the changes to take effect.

a. For **parallel** configuration, add or modify the MODE command:

```
MODE LPT1:,,P
```

(Substitute the appropriate LPT designator as necessary.)

b. For **serial** configuration, add or modify the MODE commands:

```
MODE COM1:9600,N,8,1,P
MODE LPT1.=COM1
```

(Substitute the appropriate COM designator as necessary.)

The default baud rate is 9600, however, other baud rates up to 19,200 are available. The baud rate in the MODE command must match that selected on the printer's control panel.

X. Verify printer communication (MS-DOS/PC-DOS systems only).

1. Make sure the printer is on-line, with paper in the MP tray.
2. At the DOS prompt, type DIR >PRN (ENTER). The printer's FORM FEED indicator should come on, indicating it has received data.
3. Take the printer off line, and click the (FORM FEED) key. The printer should print a directory listing from the computer.

Y. Install options, if necessary.

If an accessory memory board or the Optional Lower Cassette was purchased, it should be installed at this time. To install, refer to the directions that are provided with the product, or in the User's Manual.

Z. In case of difficulty.

- Is the printer working properly? *Check by running self test.*
- Is the computer working properly? *Run an application known to work.*
- Is the software working with the printer? *Software commands will override any page formatting control panel selections. Check the software documentation, the Software Application Notes, and the printer User's Manual.*
- Is the interface cable correct and connected correctly? *Check steps "T" and "U," as well as the computer manual.*
- Is the AUTOEXEC.BAT file correct? *Check step "W."*
- If using serial I/O, is baud rate correct? *Baud rate in* MODE *statement must match baud rate set on control panel, see steps "V" and "W."*
- Is the designated port correct (as defined in AUTOEXEC.BAT MODE statement)? *If printer is connected to port other than COM1 or LPT1, substitute the correct port designator in AUTOEXEC.BAT.* Note also that PRN is associated with LPT1 unless specified otherwise.
- Is the printer configured to the correct JOB SIZE and MP SIZE? *Check steps "O," "P" and "Q."*

Control Panel Usage

To use the control panel, the printer must be *off-line*. Except for the ⌨️ key, each of the control panel keys have two basic functions. The primary function is printed on the top half of each key, and the secondary function is printed on the bottom half. To access the primary function, momentarily press, then release (called "clicking") the key. To access the secondary function, first press and **hold down** the ⌨️ key while clicking the desired key.

Figure 3-2 shows the layout of the printer's Control Panel. (Note that some LaserJet IIIP printers may have a Control Panel Overlay to support languages other than English.)
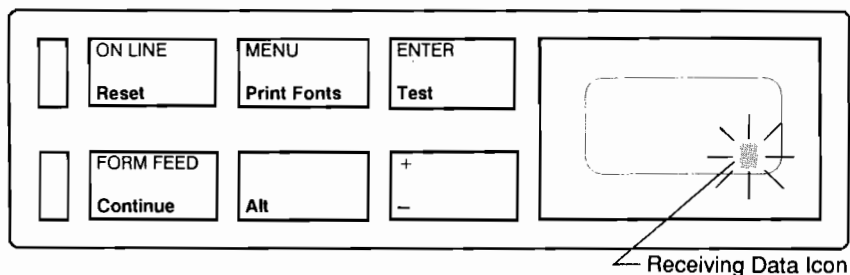

Receiving Data Icon

Figure 3-2. The Printer Control Panel

Display Window

The display window presents messages two rows deep, and each row is eight characters wide. Some messages have been abbreviated to fit within the display window. The current status of the printer can be monitored by reading the message that appears in the display window. For example, if the display window shows 00 READY and the On Line Indicator is lit, then the printer is ready to receive data.

When the printer is receiving or processing data, the receiving data icon in the display window will flash ON and OFF (see Figure 3-2).

Localizing the Messages

The control panel can be localized to display one of ten major languages (first five only for LaserJet IIP): English, French, German, Italian, Spanish, Swedish, Danish, Norwegian, Dutch or Finnish. See installation step "N," page 3-5, for the localizing procedure. Refer to Appendix C for the translated text of the various display messages.

Indicators

On Line Indicator

When the indicator lamp to the left of the [ON LINE] key is lit, the printer is *on-line* and ready to receive data. This indicator flashes if the printer is attempting to go *off-line* while a print job is printing. When the On Line Indicator is not lit, the printer is *off-line.*

Form Feed Indicator

When the indicator lamp to the left of the [FORM FEED] key is lit, page data is stored in the printer's memory.

This indicator flashes when the buffered data is being printed, and when macro or soft font data is being downloaded. If you turn the printer OFF or perform a control panel reset when the Form Feed Indicator is lit, the data stored in the print buffer will be lost.

Table 3-1. Control Panel Usage Summary

KEYS	DESCRIPTION
(ON LINE)	Turns the printer off-line and on-line. The printer is on-line and can receive data when the on-line indicator is lit. When the printer is off-line you can perform other control panel functions. ((ON LINE) is also used when responding to a manual feed prompt.)
(Alt)-(Reset)	**07 RESET** - Clears the printer buffer and returns the printer to Printing Menu defaults. (Hold down for **09 MENU RESET** - returns to factory default settings.)
(MENU)	Provides access to the Printing Menu and the Configuration Menu items, described in Table 3-2 and Table 3-3.
(Alt)-(Print Fonts)	Prints one or more pages, showing samples of the installed and permanently downloaded fonts.
(ENTER)	Selects the menu item choice displayed when using the Printing or Configuration Menus.
(Alt)-(Test)	Performs a **05 SELF TEST** and prints two pages. The first is a self test page and the second is a Cleaning Paper page. (Hold down for continuous **04 SELF TEST**.)
(FORM FEED)	Prints all print data in the printer's buffer. The printer must be off-line. Data is in the print buffer when the indicator is lit.
(Alt)-(Continue)	Directs the printer to continue printing after an error or attendance message is displayed and the printer is off-line.
(Alt)	Allows access to the secondary functions of the control panel keys.
(+)	**Plus** - Scrolls (hold down) or steps ("click") **forward** through the Printing and Configuration Menu item choices.
(Alt)-(−)	**Minus** - Scrolls (hold down) or steps ("click") **backward** through the Printing and Configuration Menu item choices.

Printing Menu Item Descriptions

Unless stated otherwise, Printing Menu items can be overridden by software commands. Note however, that any software overrides in effect are not reflected (marked with "*") on the display panel.

Choices specified by the user in the Printing Menu go into effect whenever the printer is reset (control panel or software reset). Printing Menu choices are returned to factory default settings by a 09 MENU RESET or 08 COLD RESET, unless stated otherwise.

Table 3-2. Printing Menu Item Descriptions

Item	Description
MP SIZE	The printer has no automatic way to determine the size of the media loaded into the MP Tray. This menu item must be set to reflect what size media is loaded into the MP Tray or unexpected **MP LOAD** [*size*] error messages will result. Once set, it need only be changed when different size media is loaded in the MP Tray. This menu item is not available when **TRAYS** menu item is set to **LC ONLY** (default with Optional Lower Cassette installed), and is not reset by **08 COLD RESET** or **09 MENU RESET**. Unlike all other Printing Menu items, this item can not be overridden or even specified by software applications. [Default=**LETTER** (model A) or **A4** (model **AB**)].
COPIES	This item sets the number of copies of each page printed. The printer prints the specified number of copies of page 1, followed by the same number of copies of page 2, etc. [**Default=1**].
FONT SRC	Selects location (Internal, Cartridge, or Soft font) of the default font. This has no direct software equivalent. Application software selects fonts by characteristic or by software-assigned "font ID number," not by location. [**Default=I(nternal)**]
FONT NUM	In combination with **FONT SRC**, this sets the desired default font. The number used here is the "Font #" assigned on the Font Printout. This is not the same as a "font ID number" assigned through application software, and has no direct software equivalent. Fonts are selected by characteristic or by software-assigned "font ID number" from application software, not by the Font Printout's "Font #". [**Default=0**].
PT. SIZE (LaserJet IIIP)	Sets the default cell size in points (1/72 inch) if a scalable, proportional font has been selected. [**Default=12.00**].
PITCH (LaserJet IIIP)	Sets the default cell spacing, in characters-per-inch (CPI) if a scalable, non-proportional font has been selected. [**Default=10.00**].

Table 3-2. Printing Menu Item Descriptions (continued)

Item	Description
TRAYS	Only appears with the Optional Lower Cassette installed. This has no direct software equivalent, though either tray can be selected explicitly from the application unless this menu item is set to **LC ONLY**. The available choices are: ■ **LC ONLY** [Default]: Only the Optional LC tray is available. The MP Tray is used **only** when manual feed is requested. ■ **BOTH**: Either tray will be used based upon specified Job Size, though the Lower Cassette will be used if the tray size matches the current Job Size. ■ **LC TRAY**: The Lower Cassette tray will be used, unless the software **explicitly** selects the MP Tray, or a manual feed operation is requested. ■ **MP TRAY**: The MP Tray will be used, unless the software explicitly selects the LC Tray.
JOB SIZE	Sets the default print image size to "fill" the specified media size. Software applications often refer to this parameter as "paper size" or "page size," and can override this menu default. Changing or overriding the Job Size requires a change to the MP SIZE or LE SIZE settings, or a different Lower Cassette Tray, or unexpected **MP/LC/LE LOAD** messages will result. [Default=LETTER (model A) or A4 (model AB)].
ORIENT	Selects the default print orientation (P=Portrait / L=Landscape). Changing this setting will also affect the menu's **LINES OF TXT** setting. [Default=P(ortrait)].
LINES OF TXT	Sets the number of lines to be printed on a **full** page in the specified orientation (**ORIENT**). The default setting of 60 lines per page will result in approximately 6 lines of text per inch in portrait orientation (a setting of 45 has the same result in landscape orientation). Setting this value to 10 in portrait orientation, for example, will result in 1 line of text per inch with 10 lines printed on each page. Setting this value in either portrait or landscape mode will affect the setting for the other orientation as well. [Default=60 (model A) or 64 (model AB)].
MAN FEED	Allows manual feed operations from the control panel (normally specified by the software application). [Default=OFF].
SYM SET	Sets the default print symbol set (characters assigned to ASCII codes 0 through 255 decimal). Selecting a different choice will affect the default font (**FONT NUM**) setting. After selecting a new symbol set, perform a Print Fonts operation to re-select your default font as needed. [Default=ROMAN-8] (PC-8 may be more appropriate for MS-DOS applications.)
DEVICE CONFIG	Pressing (Enter) when this item is displayed will provide access to the Configuration Menu, described in Table 3-3.

Configuration Menu Items

Configuration Menu items can be altered by the user and remain in effect unless a 08 COLD RESET is performed, at which point settings are returned to factory defaults.

Table 3-3. Configuration Menu Item Descriptions

Item	Description
AUTOCONT	Setting this choice to **ON** will eliminate the need for user intervention (pressing Continue) following temporary data and print errors (2X and 4X Errors). Recommend setting to **OFF** to prevent errors going unnoticed (except on networked printers). [Default=**OFF**].
I/O	Selects which of the two interface ports to use for host communications. A current setting of **NONE** indicates the printer was powered on without the Dual I/O Interface Assembly installed. [Default=**PARALEL (Parallel)**].
BAUDRATE	Sets printer baud rate for serial communications and **only** appears when I/O is set to **SERIAL**. [Default=**9600**].
ROBUST XON	This item **only** appears when I/O is set for **SERIAL** communications. Setting this choice to **ON** sends an ASCII XON (DC1) handshake signal to the host at the rate of approximately once per second **if** the printer is on-line and able to receive data. An **OFF** setting sends this character only once whenever the printer is placed on-line or when it is once again able to receive data. Note that this does **not** affect the use of XOFF (DC3) which is sent only once whenever the printer is placed off-line, when it encounters an error condition, or when its I/O buffer becomes full. [Default=**ON**].
DTRPOLAR	This sets the polarity of the DTR (hardware handshake) signal line, and **only** appears when I/O is set to **SERIAL**. If DTR polarity is set to **HI**, pin 20 will drop from a positive to a negative voltage when the printer is unable to receive further data. When set to **LO**, pin 20 will remain at a negative voltage until the printer becomes "busy", at which time it will rise to a positive voltage. Normal setting is **HI**. [Default=**HI**].
RET (LaserJet IIIP)	Sets the desired Resolution Enhancement level to yield optimum print quality, or allows you to turn it off (see "Resolution Enhancement Adjustment" in Chapter 4). [Default=**MEDIUM**].
PAGEPRO. (LaserJet IIIP)	Sets aside additional RAM memory to format an entire page print image (**LETTER, LEGAL**, or **A4**) before actual printing begins. This prevents an **ERROR 21** and is only available with at least one accessory memory board. [Default=**OFF**].

Resetting the Printer

This **[Reset]** key is used to return the internal print parameters back to the Printing Menu or Factory Default Settings.

07 RESET

Hold down the **[Alt]** key and click the **[Reset]** key to perform a 07 RESET. This reset clears temporary soft fonts, temporary macros, stored page data, and any other temporary data stored in the printer's memory. It also returns the internal print parameters back to the Printing Menu settings.

09 MENU RESET

Hold down the **[Alt]** key and press the **[Reset]** key for more than 5 seconds to perform a 09 MENU RESET. This reset removes both temporary and permanent soft fonts and all other data stored in the printer's temporary buffer. It also returns the Printing Menu Settings back to the Factory Default Settings.

08 COLD RESET

Hold down the **[ON LINE]** key while powering ON the printer, until the message 08 COLD RESET is displayed. (Note that the Cold Reset does not take effect until the message changes to 00 READY.)

A 08 COLD RESET returns the Printing Menu and the Configuration Menu settings back to the Factory Default settings. A Cold Reset **will not** reset the page count, the MP Tray paper size (MP SIZE), the LC Envelope Tray size (LE TRAY), or the display language.

Changing Menu Item Choices

1. Click the [ON LINE] key to take the printer off line.
2. Click the [MENU] key to step through the menu items on the display. (To enter the Configuration Menu, click [MENU] until DEVICE CONFIG appears, then click [ENTER].)
3. Click the [+] key to advance through the choices available under a Menu item.
4. Click the [ENTER] key to save your selection.

* = Factory default settings.
† = Europe (Model AB) factory default setting.

Printing Menu

Display reads →	MP SIZE	COPIES	FONT SRC	FONT NUM	TRAYS	JOB SIZE	ORIENT	LINES OF TXT	MAN FEED	SYM SET	DEVICE CONFIG
Click →	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]
Choices →	LETTER* LEGAL A4† EXEC COM10 MONARCH C5 DL	1* TO 99	I* (internal) C (cartridge) S (soft font)	0* to 999	LC ONLY* BOTH LC TRAY MP TRAY	LETTER* LEGAL A4† EXEC COM10 MONARCH C5 DL	P* (portrait) L (landscape)	5 to 128	OFF* ON	ROMAN-8* ECMA-94 PC-8 PC-8 DN PC-850 LEGAL (IIIP Only) ISO-2 (Intl Ref. Ver.) ISO-4 (U.K.) ISO-6 (ASCII) ISO-10 (Swed/Finn) ISO-11 (Swed/Finn) ISO-14 (JIS ASCII) ISO-15 (Italian) ISO-16 (Portuguese) ISO-17 (Spanish) ISO-21 (German) ISO-25 (French) ISO-57 (Chinese) ISO-60 (Norwegian 1) ISO-61 (Norwegian 2) ISO-69 (French) ISO-84 (Portuguese) ISO-85 (Spanish-PC) GERMAN (HP) SPANISH (HP) VN MATH VN INTL PS MATH VN US PS TEXT MATH-8 PI FONT MS PUBL WINDOWS DESKTOP	Click the ENTER key to enter the Configuration Menu. See "Configuration Menu" below.
	MP SIZE appears only when TRAYS LC ONLY is not selected.		C and S appear only if a font cartridge or permanent soft font installed.	Upper range limited by number of fonts installed.	This menu item only appears when the Optional Lower Cassette is installed.			Factory default is 60* (64†) for portrait orientation.		LaserJet IIIP Only	

* = Factory default settings.
† = Europe (Model AB) factory default setting.

	PT SIZE	PITCH
Click →	[+/-]	[+/-]
Choices →	4 to 999.75	0.44 to 999.75
	Factory default is 12.00	Factory default is 10.00
	This menu item only appears when a proportional scalable typeface is selected.	This menu item only appears when a non-proportional scalable typeface is selected.

LaserJet IIIP Only

Configuration Menu

Display reads →	AUTOCONT	I/O	BAUDRATE	ROBUST XON	DTR POLAR	RET	PAGEPRO.
Click →	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]	[+/-]
Choices →	OFF* ON	PARALEL* SERIAL	300 600 1200 2400 4800 9600* 19200	ON* OFF	HI* LOW	OFF* LIGHT MEDIUM* DARK	OFF* LEGAL LETTER A4
			This menu item appears only when serial interface is selected.	This menu item appears only when serial interface is selected.	This menu item appears only when serial interface is selected.	This menu item appears only when additional memory is installed in the printer.	This menu item appears only when additional memory is installed in the printer.

LaserJet IIIP Only

* = Factory default settings.
† = Europe (Model AB) factory default setting.

Figure 3-3. Sample Font Printout (LaserJet IIIP)

Font Printout

A font printout is produced by holding down the **Alt** key and clicking the **Print Fonts** key. The message 06 FONT PRINTOUT appears in the display window and the printer produces a multiple page font list. Eleven columns of information are printed, as defined below (see Figure 3-3).

1. **Font #** is the printer identification number used to select internal fonts, cartridge fonts, or soft fonts from the control panel (not a soft font ID number). The letter preceding the font number indicates the source of the font.

   S = Soft fonts. These are downloaded from the host computer.

   Only **permanent** soft fonts appear in the font printout because the **Print Fonts** key causes all temporary fonts to be erased from memory.

   C = Cartridge fonts present in a font cartridge.

   I = Internal (factory installed) fonts in ROM.

2. **Font ID** is an identification number assigned to soft fonts when they are downloaded (for software selection).

3. **Symbol Set** refers to a specific collection of characters and symbols associated with a font (Roman 8, PC-8, etc.).

4. **Fix/PS** indicates whether the font has fixed (F) or proportional (P) spacing.

5. **Pitch (cpi)** shows how many characters per inch (horizontal). Used for fixed pitch fonts only. "Scale," in this column indicates a scalable typeface (LaserJet IIIP only).

6. **Point Size** refers to character height; 1 being the smallest point size. "Scale," in this column indicates a scalable typeface (LaserJet IIIP only).

7. **Style** indicates the *appearance* of the font (such as upright or italic).

8. **Stroke Weight** indicates character thickness, such as light, medium, or bold.

9. **Name or Typeface** is the name of the design of characters and symbols, such as Courier, Garamond, Prestige, etc.

10. **Default Orient** indicates that the font is defined in either portrait or landscape (can be rotated to either).

11. **Print Sample and Escape Sequence** shows actual samples of each font and the escape sequence used to select each.

Self Test Printout

Hold down the ⟨Alt⟩ key and click ⟨Test⟩ to print a Self Test. The message 05 SELF TEST appears in the display window and the printer produces a two-page printout. To produce continuous self test printouts, hold down the ⟨Test⟩ key until 04 SELF TEST appears. Click ⟨ON LINE⟩ to exit.

The first page of the self test printout contains useful information used to check the printer's control panel settings, page count, and installed options. The second page is the **Cleaning Paper, created by the printer using ordinary paper.**

Note

✍ Items 4, 9, 10 and 11 (below) will not appear on a LaserJet IIP standard Self Test printout.

1. **Printing Menu** shows the current user default settings.

2. **Configuration Menu** shows the current user configuration settings.

3. **Ram size** shows how much memory is installed in the printer.

4. **Page Count** shows how many pages have been printed. (Appears only on Service Mode Self Test for LaserJet IIP.)

5. **Firmware and Internal Font Datecodes** show the datecodes for the Formatter PCA. Use this information to verify the datecode in case of a mandatory factory firmware change.

6. **Font Cartridge Installed** shows if a cartridge is inserted.

7. **Installed Options** shows which options are currently installed in the printer (such as Optional Lower Cassette).

8. **Print Sample** can be used to check the print density for consistency. On the LaserJet IIP, the font used will be the selected control panel default font.

9. **Scalable Font Sample** verifies the printer's font scaling capability.

10. **Graphics Samples** (bar graph and pie chart) test the HP-GL/2 vector graphics capability. The pie chart also serves as a check for *RET* adjustment (Resolution Enhancement—see Chapter 4)

11. **Gray Scales and Cross Hatching Patterns** can be used to check print density and quality.
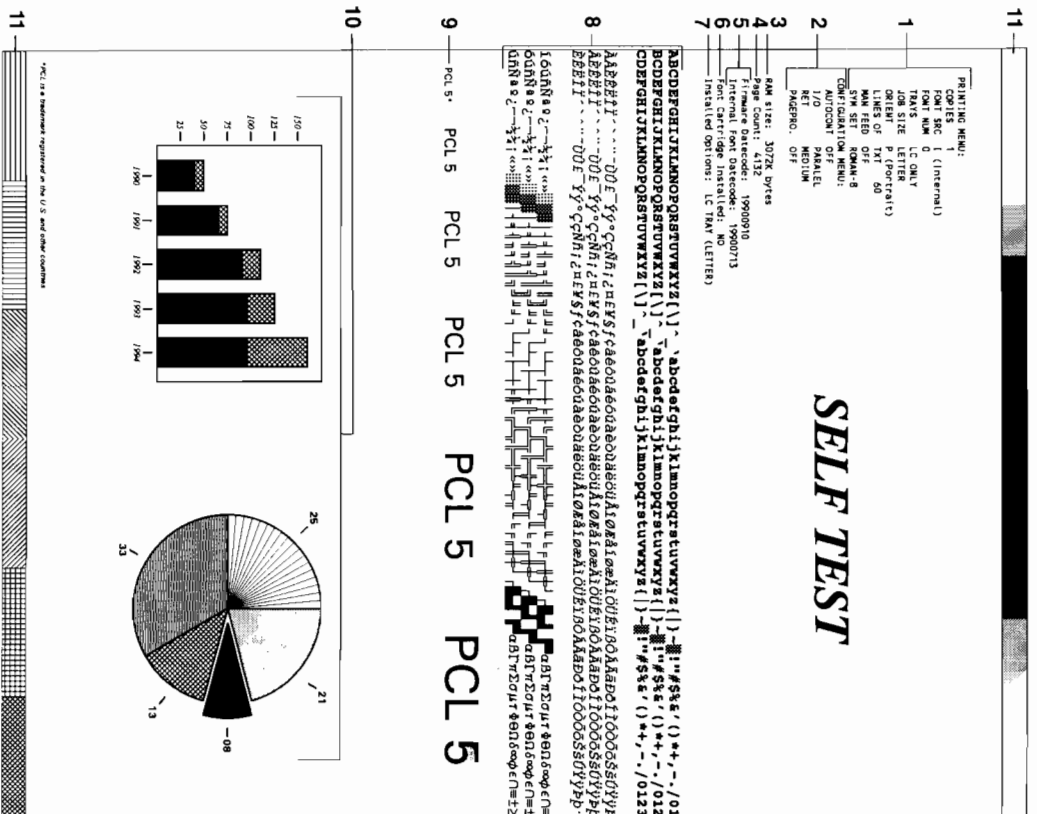
Figure 3-4. Self Test Printout - LaserJet IIP

Service Mode

The Service Mode should be used only by authorized service personnel. The following can be executed while in the Service Mode:

- Print a Service Mode Self Test.
- Verify the Page Count (LaserJet IIP). On the LaserJet IIIP, the page count is also displayed on the **standard** self test.
- Set the Page Count (LaserJet IIIP only).
- Print a "Chart A" Self Test (LaserJet IIIP only).

The following procedure is used to initiate the Service Mode.

1. Hold down the (ON LINE), (MENU), and (ENTER) keys while powering ON the printer, until the ON LINE and FORM FEED Indicators are both illuminated and **the Display Window is blank**. (If the Display Window reads 05 SELF TEST at this point, the keys were released too soon. Repeat this step until successful.)
2. Click the (FORM FEED) key, then the (ENTER) key. The message 00 SMODE is displayed briefly (or MF SMODE if the printer is in manual feed mode), then the printer automatically begins a 05 SELF TEST.

After several seconds, both Control Panel Indicators turn OFF. (The printer may display 02 WARMING UP if it has not warmed up completely.)

After the printer has warmed up and passed the self test, 00 SMODE is displayed. On the LaserJet IIP, the Page Count is displayed on the second line.

To exit the Service Mode click the (ON LINE) key.

Service Mode Self Test

A Service Mode Self Test printout provides some additional
information not available on the user's 05 SELF TEST printout. On
the LaserJet IIP, this information includes the firmware datecode
and page count. (If possible, the page count should be verified
before the Formatter PCA is replaced.) On the LaserJet IIIP, the
only additional information is a more detailed firmware datecode.

Note	**LaserJet IIP only:** The page count stored in Non-Volatile memory is only updated every 10 printed pages. Thus, the page count may be off by up to 9 pages each time the printer is powered OFF.

To print a Service Mode Self Test printout:

1. Invoke Service Mode as described on Page 3-21.
2. When 00 SMODE is displayed, hold down the 🔲 key and
   click the **Print Fonts** key (**Test** key on LaserJet IIP). 05 SELF
   TEST is displayed and a Service Mode Self Test is printed (see
   Figure 3-5).
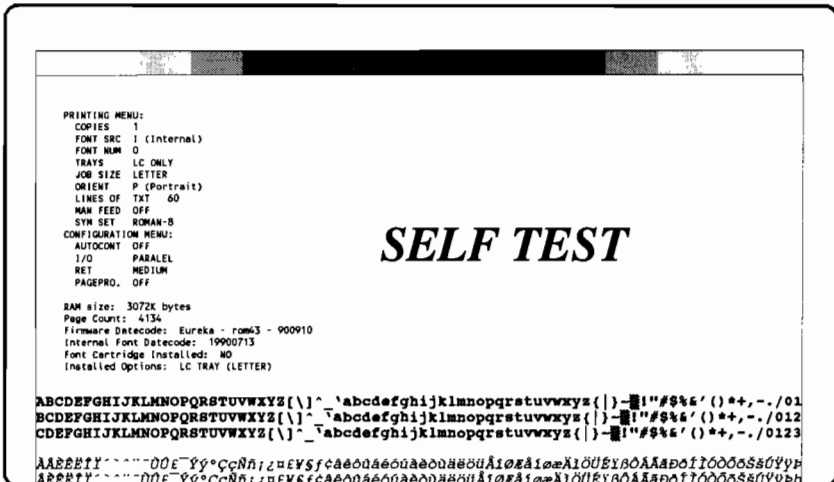
Figure 3-5. Sample Service Mode Self Test Printout

Setting the Page Count (LaserJet IIIP only)

The page count is stored in the printer's Non-Volatile Memory. If it becomes necessary to replace the Formatter PCA, the page count should be reset to the printer's original page count to reflect the age of the print engine. Use the following procedure to set the page count:

1. Before removing the old Formatter PCA, print a 05 SELF TEST, if possible, to verify the current page count of the printer (see "Self Test Printout" on page 3-19).

Note	If it is not possible to print a 05 SELF TEST, attempt to verify the current page count before replacing the Formatter PCA by following steps 3 through 5, below.

2. After verifying the page count from the old Formatter PCA, replace it with the new PCA as described in Chapter 6.
3. Invoke Service Mode as described on page 3-21.
4. When 00 SMODE is displayed, click the (MENU) key to modify the page count.
5. PAGES=*XXXXXX* will be displayed. *XXXXXX* represents the page count currently stored in the printer's Non-Volatile Memory. The underlined character denotes the cursor position.
6. Press (🔺) (or (Alt) (➖)) to scroll until the correct value is displayed for the underlined digit.
7. Click the (ENTER) key to select the correct value. The cursor will automatically move one place to the right.
8. Set each digit in the same manner. When the last digit's value has been selected, the display will return to 00 SMODE.
9. Click the (ON LINE) key to exit Service Mode.

Chart A Printout (LaserJet IIIP only)

The Chart A printout can be used to check print quality and print density. Use the following procedure to print a Chart A printout:

1. Invoke Service Mode as described on page 3-21.

2. Hold down the (Alt) key and click the (Test) key. 05 SELF TEST is displayed. A Chart A printout is generated (Figure 3-6).

   (To perform a **continuous** Chart A printout, hold down the (Alt) key and the (Test) key until 04 SELF TEST is displayed.)

   The Chart A printout can be printed either in portrait or landscape orientation.

3. Click the (ON LINE) key to exit Service Mode.
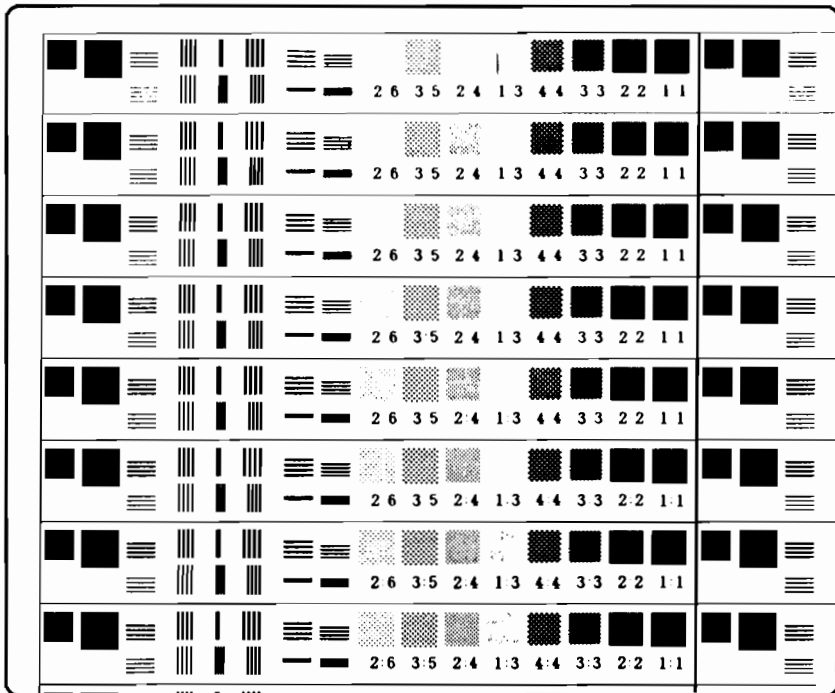
Figure 3-6. Chart A Printout

Engine Test

Pushing the Test Print button initiates a print engine test used to verify "DC Controller" print engine operation. The Test Print button bypasses the Formatter PCA and can be used to help pin-point printer failures.

The Test Print button access hole is located at the rear of the printer, underneath the rear cover. Unscrew the two screws that hold the rear cover in place and open the rear cover. The Test Print Button access hole will be visible on the interface plate.

Press the Test Print button using a non-metal object such as a pen or pencil (see Figure 3-7).
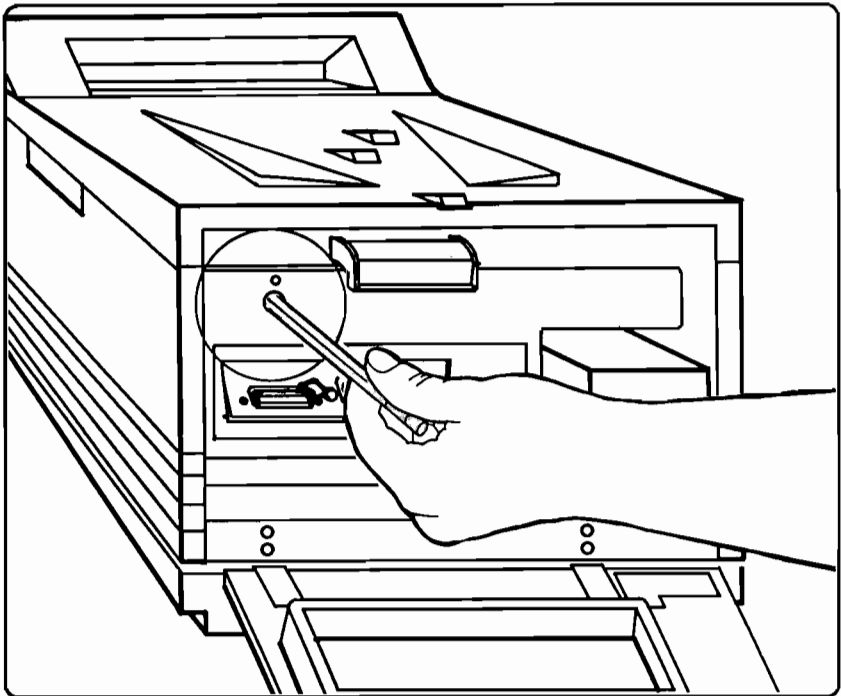
Figure 3-7. Test Print Button Location

Pressing the Test Print button will initiate a 15 ENGINE TEST.
This is an engine test only. The Formatter PCA is totally bypassed
while printing. A page of vertical lines will be printed if the print
engine is operating correctly (see Figure 3-8).
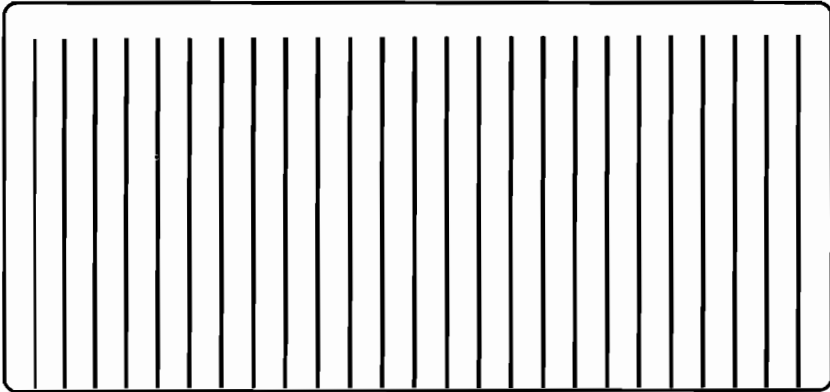
Figure 3-8. Test Print Pattern

RS-422 Configuration

Both printers support RS-422 interface, extending maximum
cable length to 1200 meters (4000 feet). Use the control panel
Configuration Menu to configure the interface for I/O SERIAL,
then follow the instructions in the following sections. (Refer to
Appendix A for pinouts and cabling information.)

Note   Although there is limited application support for
an RS-422 serial port, MS-DOS and PC-DOS (as of
this writing) do not support the RS-422 interface
protocol. Therefore, RS-422 is not a recommended
configuration for an MS-DOS or PC-DOS system.

Also note that although DTR is still available at
pin 20, hardware handshaking (using DTR) is
not a supported RS-422 protocol. XON/XOFF
handshake protocol is required.

LaserJet IIP RS-422

If serial **RS-422** configuration is required on the LaserJet IIP, remove the Dual I/O Interface from the printer and move the jumper on the Interface PCA from **RS 232** to **RS-422** (see Figure 3-9).
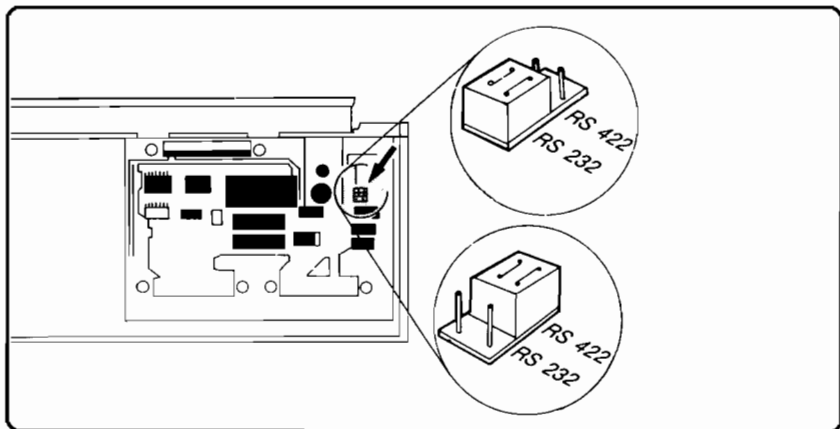
Figure 3-9. LaserJet IIP RS-422 Configuration

LaserJet IIIP RS-422

An accessory RS-422A serial interface adapter (HP part number 92270N) must be attached to the serial port on the back of the printer, as shown in Figure 3-10.
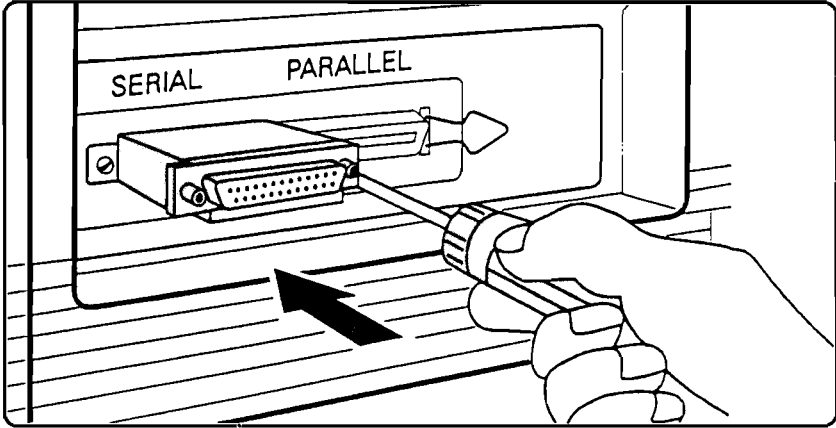
Figure 3-10. LaserJet IIIP RS-422 Adapter

CHAPTER 4

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4

Maintenance & Adjustments

Introduction

The HP LaserJet IIP/IIIP printers require very little routine
maintenance. Most maintenance and adjustment procedures
are carried out only when there is a print quality or paper feed
problem. It is the user's responsibility to keep the printer clean, to
clear paper jams, and to replace the EP-L Cartridge (running the
self-test generated "Cleaning Paper" through the printer whenever
replacing the EP-L Cartridge). Adjustments to print density and
Resolution Enhancement (LaserJet IIIP) are also performed by
the user. However, service personnel should refer to this section
as needed to assist the user with these tasks, and to ensure that
a serviced printer leaves the repair facility in the best possible
condition.

Life Expectancy of Consumables

Always inspect the components listed in Table 4-1 for wear when servicing the printer. Replace these components as needed, based on printer failures or wear, not strictly on usage.

Table 4-1. Selected Service Consumables

DESCRIPTION	PART NO.	QTY	EST. LIFE (pages)[1]	REMARKS
1. EP-L Cartridge	92275A	1	3500[2]	When print becomes faint, shake cartridge to redistribute remaining toner.
2. MP Pick-Up Roller Assembly[3]	RG1-1792-000CN	1	100,000	Look for glazing and cracks.
3. LC Pick-Up Rollers	RA1-7674-000CN RA1-7824-000CN	3 1	100,000 100,000	Look for glazing and cracks. Total of four rollers on shaft.
4. Separation Pad[3]	RG1-1912-080CN	1	100,000	Look for glazing and grooves.
5. Transfer Roller Assembly	RG1-1837-000CN	1	100,000	May affect print quality and/or paper jams.
6. Fusing Assembly (115 V, 50/60 Hz) Fusing Assembly (220 V, 50 Hz)	RG1-1788-000CN (new) RG1-1789-000CN (new)	1 1	100,000 100,000	May affect print quality and/or paper jams. Look for marks on rollers.

Notes:

1. The life spans shown are **ESTIMATES ONLY**. The service life of printer components may vary depending on the type of paper used, the print density setting, and the printer usage.
2. The estimated EP-L Cartridge life is based on A4 or letter size prints with an average of 5% toner coverage, and with the density slide set in the detented (middle) position. A typical mid-length business letter without graphics represents about 5% coverage.
3. Items 2 and 4 should always be replaced together.
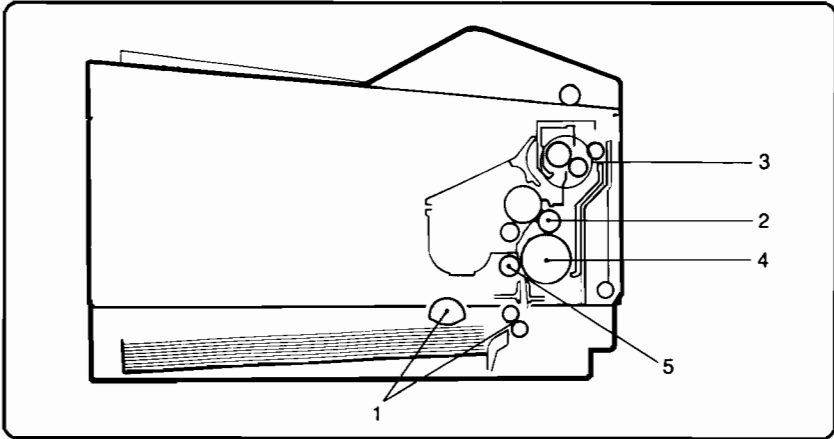
Service Checkpoints

Figure 4-1. Maintenance Checkpoints

1. **LC Pickup and Feed Rollers:** Inspect and clean with a water-dampened, lint-free cloth.
2. **Transfer Roller:** The Transfer Roller should not require cleaning unless toner or dust has scattered inside the printer. *Do not touch the roller surface or it will require replacement.* If the Transfer Roller needs to be cleaned, remove it from the printer (see page 4-10) and clean the roller with a **dry**, lint-free cloth. *Do not use cleaning solutions or the printer will be damaged.*
3. **Fusing Assembly:** If the Fusing Rollers are dirty, the pages printed will also be dirty, and there will be frequent paper jams. Use the printer generated Cleaning Paper to remove any toner buildup (see "Cleaning Paper Usage", page 4-4).
4. **MP Pickup Roller:** Inspect and clean with a water-dampened, lint-free cloth. Clean the separation pad with a **dry**, lint-free cloth only.
5. **Input Feed Roller:** Inspect and clean with a water-dampened, lint-free cloth.

Cleaning Paper Usage

The Cleaning Paper must be used each time a new EP-L Cartridge is installed or if the printer is experiencing frequent jams in the fuser area. The Cleaning Paper is used to remove toner buildup found on the Fusing Rollers.

Note	Cleaning paper is **not a special type of paper.** The Cleaning Paper is created by the printer's self test using ordinary printer paper.

The following procedure explains how to generate and use the Cleaning Paper.

1. If the Optional Lower Cassette Base is installed, enter the Printing Menu and change the TRAYS selection to MP TRAY.

2. Set the MP SIZE selection to LETTER (or A4).

3. Set the JOB SIZE selection to LETTER (or A4).

Note	If you are not familiar with the control panel functions, refer to "Control Panel Usage" in Chapter 3.

4. Install letter (or A4) size paper in the MP Tray.

5. While holding down the ⒜ key, click the ⒯ key. The display will first show 05 SELF TEST, then after several seconds, 06 PRINT TEST will appear in the display. Two pages will print. The first page is a self test printout, and the second page is the Cleaning Paper.

6. *Place the Cleaning Paper face-up in the MP Tray.* The blank
   side of the Cleaning Paper should be face-down in the tray (see
   Figure 4-2).
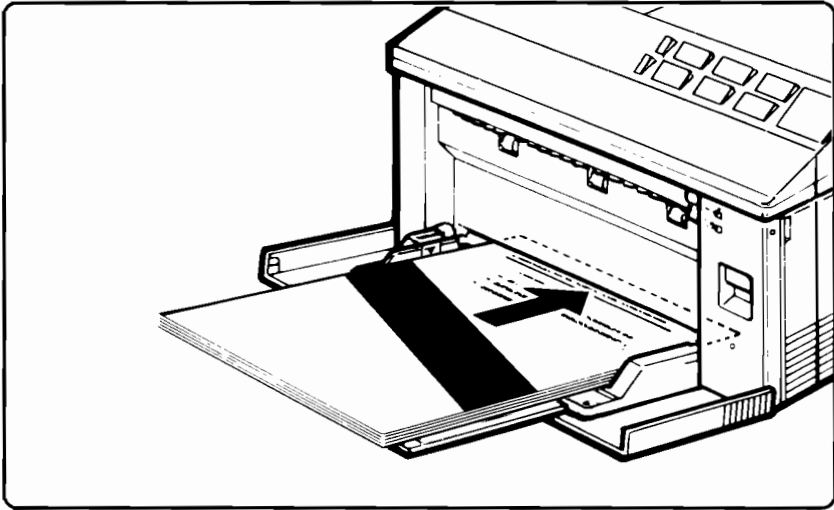
Figure 4-2. Loading the Cleaning Paper

7. Hold down the (Alt) key and click the (Test) key to run another
   self test.

Caution	If a Cleaning Paper is not used each time the EP-L Cartridge is replaced, frequent jams may occur in the fusing area.
	If toner has been allowed to accumulate inside the printer, it may be necessary to run several sheets of the Cleaning Paper through the printer. Use a fresh Cleaning Paper page each time.

8. Check to be sure the self test printout was printed on the back of the Cleaning Paper when it exited the printer (see Figure 4-3).

9. If the Cleaning Paper does not have a self test printout on the back, it was loaded incorrectly. Return to the beginning of this section, "Cleaning Paper Usage," and follow the instructions carefully.

10. After using the Cleaning Paper to remove the printer's toner buildup, discard all the self test and cleaning paper sheets.
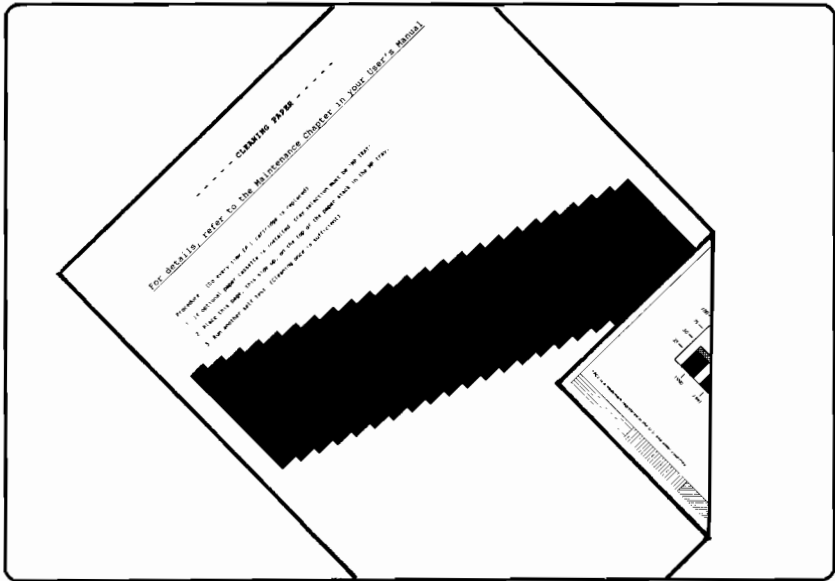
Figure 4-3. Correctly Used Cleaning Paper

Keeping the Printer Clean

The HP 33471/33481 printer is designed to require minimal cleaning. However, at times it may be necessary to clean the inside or outside of the printer. This section provides detailed cleaning instructions to maintain the printer. These cleaning procedures should be performed whenever the printer is serviced.

Cleaning the Inside of the Printer

The best way to correct print quality problems or frequent paper jams in the fusing area is to clean the printer using the Cleaning Paper. See the Section, "Cleaning Paper Usage" on page 4-4.

Various components inside the printer should also be cleaned, as described starting on the next page.

| Warning | ■ **Remove the printer's power cord from the power outlet before cleaning or injury may result.** |
| | ■ **Never use sharp objects when cleaning the printer.** |

Caution	■ Never use cleaning solutions to clean the inside of the printer! To prevent printer damage, use only a water-dampened cloth, unless otherwise directed in these procedures.
	■ Take ESD precautions when cleaning inside the printer. ESD discharge to the EP-L Cartridge contacts inside the Paper Path Door cavity will cause permanent damage to the High Voltage PCA.
	■ If toner gets on your clothes, wipe it off with a dry cloth and wash the clothes in **cold** water. Hot water sets toner into fabric.

1. Open the MP door and push up on the release button on the right to open the paper path door.

2. Look inside the printer for toner (black dust) and paper particles. Figure 4-4 shows areas where toner may collect.

3. Using a water-dampened, lint-free cloth, wipe toner and paper particles from the printer components. If available, use the special toner vacuum (HP P/N 92175D) to remove any loose toner. This vacuum has an extremely fine particle filter.
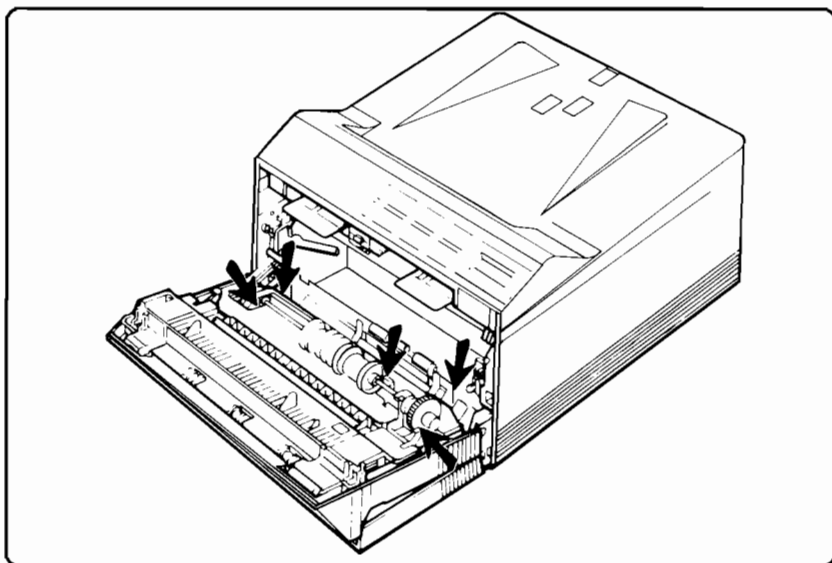

Figure 4-4. Toner Accumulation Areas

Separation Pad Cleaning

1. Remove the EP-L Cartridge.

2. Remove the Separation Pad (with its spring attached) by grasping the clear plastic strip and firmly pulling straight up (see Figure 4-5).

3. Inspect the pad and replace if worn. A shiny, glazed, or deeply grooved surface are signs of a worn Separation Pad.

4. If the pad is not worn, clean it with a **dry**, lint-free cloth.

5. Re-insert the Separation Pad (with its spring attached) and the EP-L cartridge.
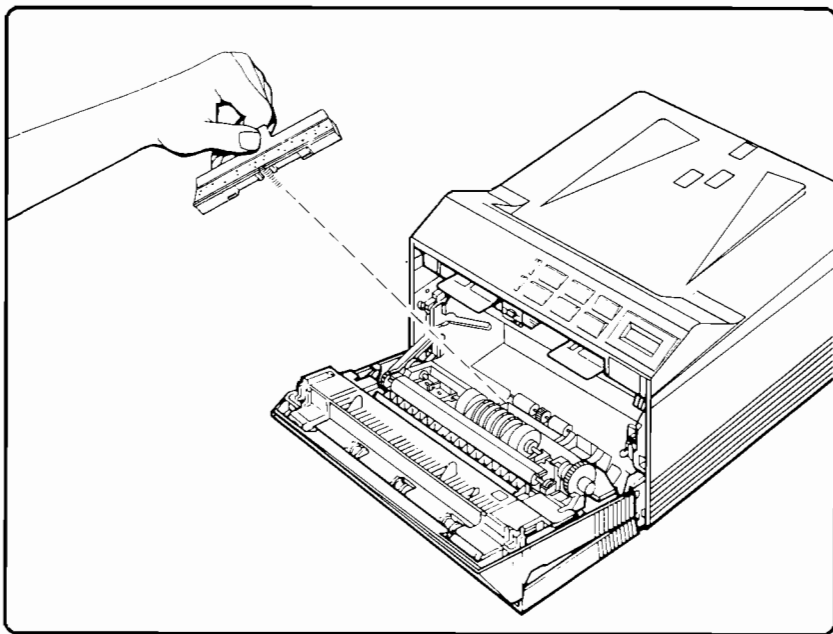
Figure 4-5. Inspecting the Separation Pad

Transfer Roller Cleaning

Caution	**Do not** touch the conductive surface of, or use cleaning solutions on the Transfer Roller. Natural skin oils or cleaning solutions can permanently damage the roller by changing its electrical characteristics.

1. Use a small flat head screwdriver to lift the left end of the Transfer Roller out of its bushings. Slide the assembly slightly toward the left and remove the Transfer Roller carefully. **Do not use force** (see Figure 4-6).
2. Clean the roller with a **dry**, lint-free cloth. Paper dust and other debris can insulate the surface of the Transfer Roller and prevent it from functioning correctly.
3. Re-insert the Transfer Roller, carefully positioning its ground path contact around the MP Pickup Roller shaft.
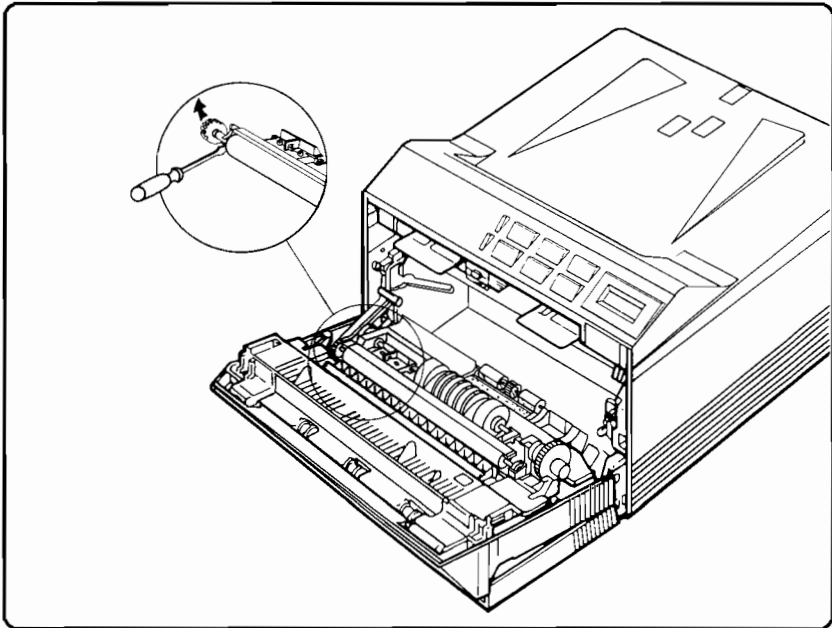
Figure 4-6. Removing the Transfer Roller for Cleaning

MP Pick-Up Rollers Cleaning

Rotate and clean the rubber rollers with a water-dampened,
lint-free cloth as shown (Figure 4-7).
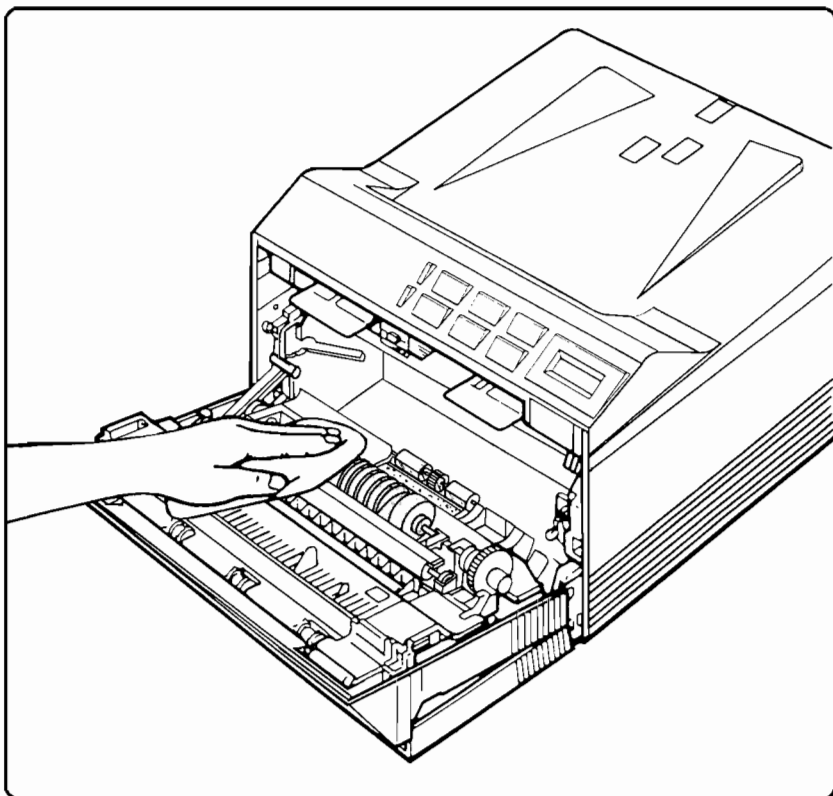
Figure 4-7. Cleaning the **MP Pick Up Rollers**

Cleaning the Outside of the Printer

Use only water or alcohol-based cleaning solutions to clean the outside of the printer. Test the cleaning solution on a small area of the printer to check its cleaning performance.

Caution	■ **Do not** use any other chemical-based cleaning solutions in the vicinity of the printer. The printer's components can be permanently damaged by exposure to certain chemicals, including their fumes (such as ammonia). ■ Never spray cleaning solutions directly onto the printer. Always spray the solution onto a cloth, and then wipe the printer.

Clearing Paper Jams

If 13 PAPER JAM appears in the display window, paper has jammed in the printer. Paper jams occur in either the paper pick-up area (**a**) or the fusing area (**b**), see Figure 4-8.

Note	The printer must be placed on a continuous hard, flat surface, large enough to accommodate all four printer feet. This is especially critical if the Optional Lower Cassette is installed. If the surface is uneven, frequent paper jams will occur.
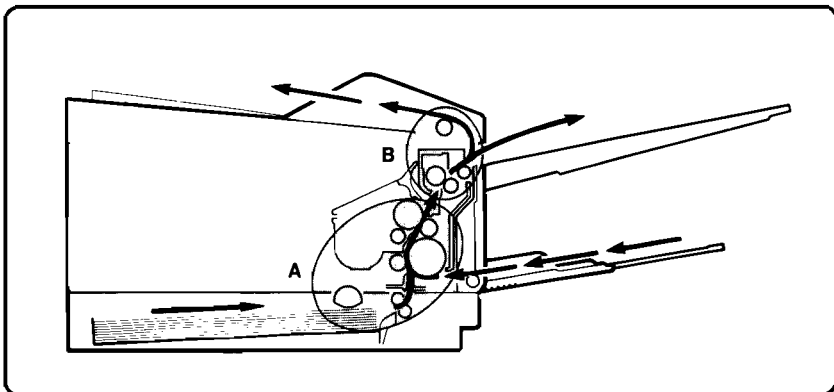
Figure 4-8. Paper Jam Locations

Warning	The fusing area is HOT! When clearing paper jams in the fusing area, DO NOT TOUCH the Fusing Rollers or injury may result.

Note	To clear the 13 PAPER JAM message, the Paper Path Door or the External Fuser Access Door must be opened. If the jammed paper is removed without opening either door, the message will remain.

Jams in the Paper Pick-Up Area

1. If paper is jammed in the Multi-Purpose (MP) tray or in the
    paper pick-up area for the Optional Lower Cassette (LC), open
    the paper path door and carefully remove the jammed paper,
    trying not to tear it (see Figure 4-9). Be careful of unfused toner
    on the paper.

    Check for and remove any paper fragments. If paper fragments
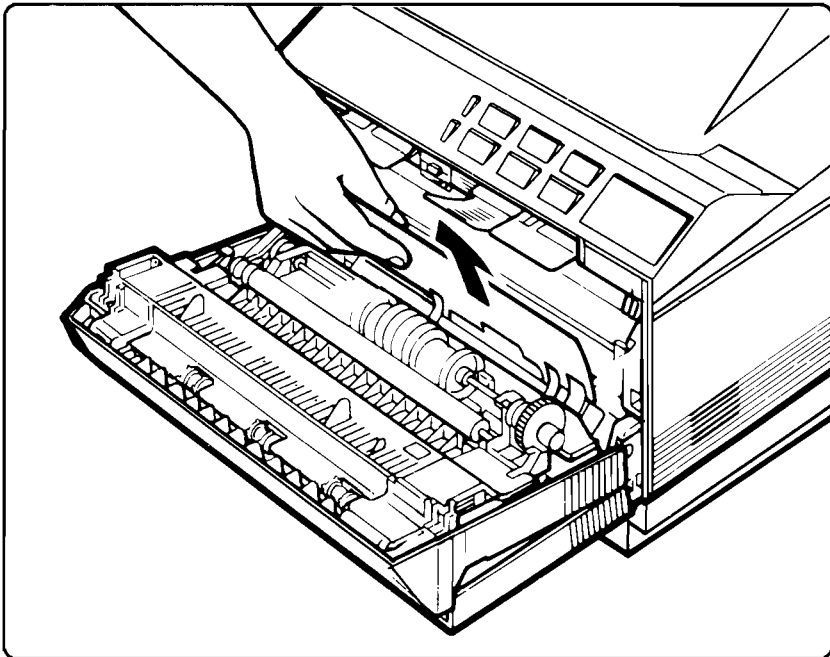   are left inside, printer jams will continue to occur.

Figure 4-9. Clearing a Paper Jam from the Paper Pick-Up Area

2. If paper is jammed in the Optional Lower Cassette tray, remove the tray to clear (see Figure 4-10 and Figure 4-11).
3. Open and close the Paper Path Door to clear the Paper Jam message.
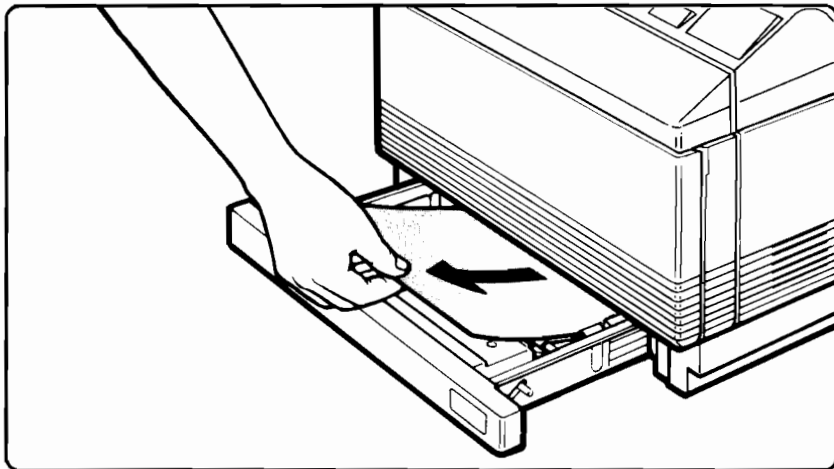
Figure 4-10. Clearing the Optional Lower Cassette Tray
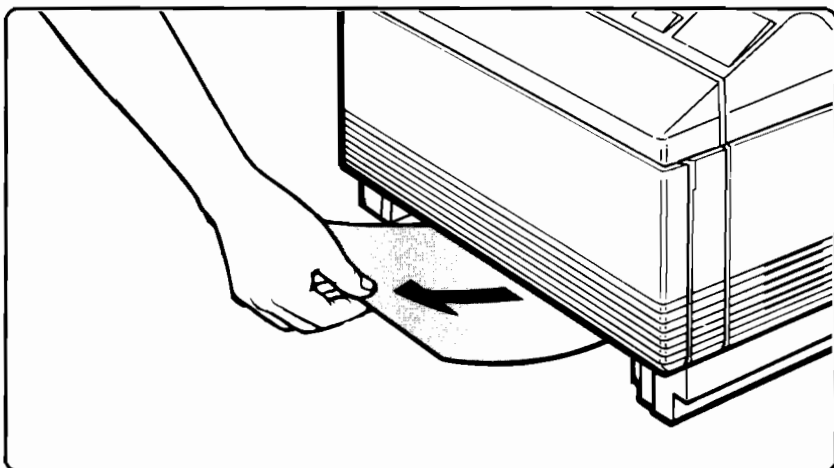
Figure 4-11. Clearing the Optional Lower Cassette Base

Jams in the Fusing Area

Warning

The fusing area is HOT! When clearing paper jams in the fusing area, **DO NOT TOUCH** the Fusing Rollers or injury may result.

1. If paper jams between the pick-up area and the fusing area, use two hands when removing the paper to avoid tearing (see Figure 4-12).

   Check for and remove any paper fragments. If paper fragments are left inside, paper jams will continue to occur.
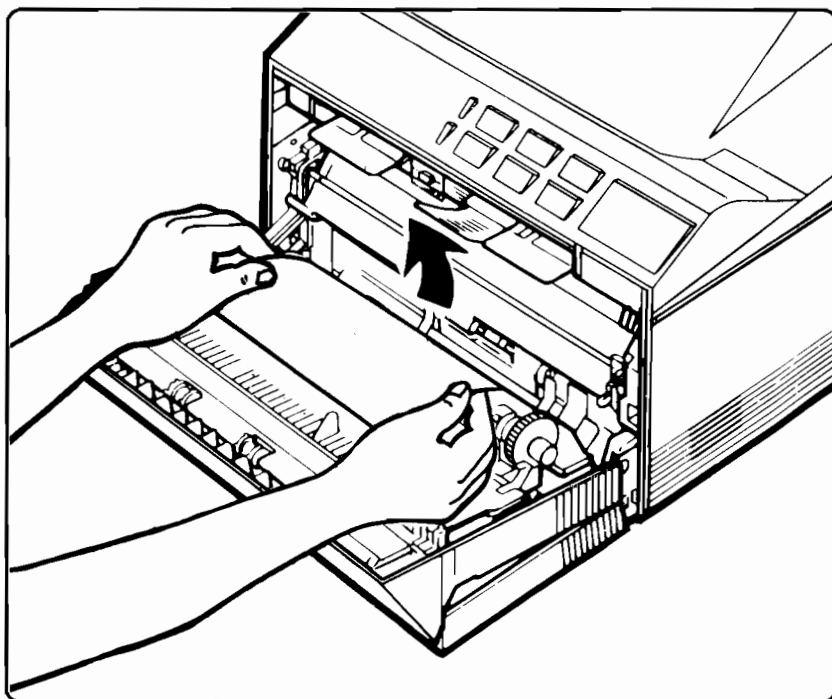
Figure 4-12. Clearing the Paper Pick-Up and Fusing Area

2. If paper jams in the fusing area only, open the printer and remove the jammed paper by pulling it firmly through the fuser (see Figure 4-13). **WARNING: FUSING ROLLERS ARE HOT!**
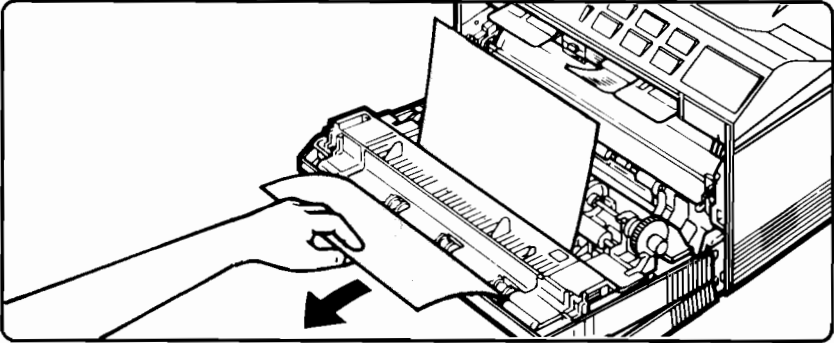

Figure 4-13. Clearing the Fusing Assembly Area

3. Open the Internal Fuser Access Door and check for jammed paper (see Figure 4-14).

   Check for and remove any paper fragments. If paper fragments are left inside, printer jams will continue to occur.
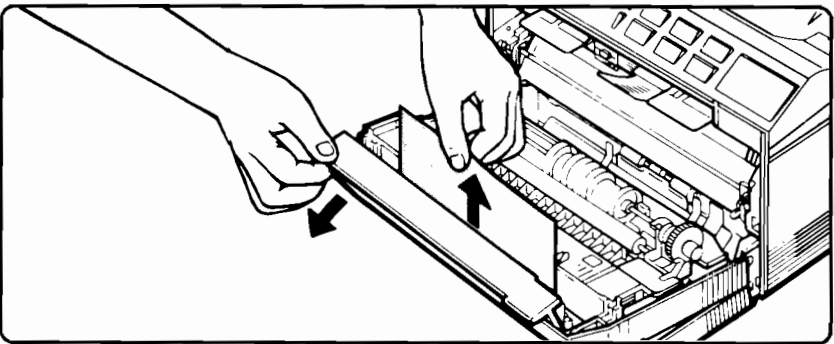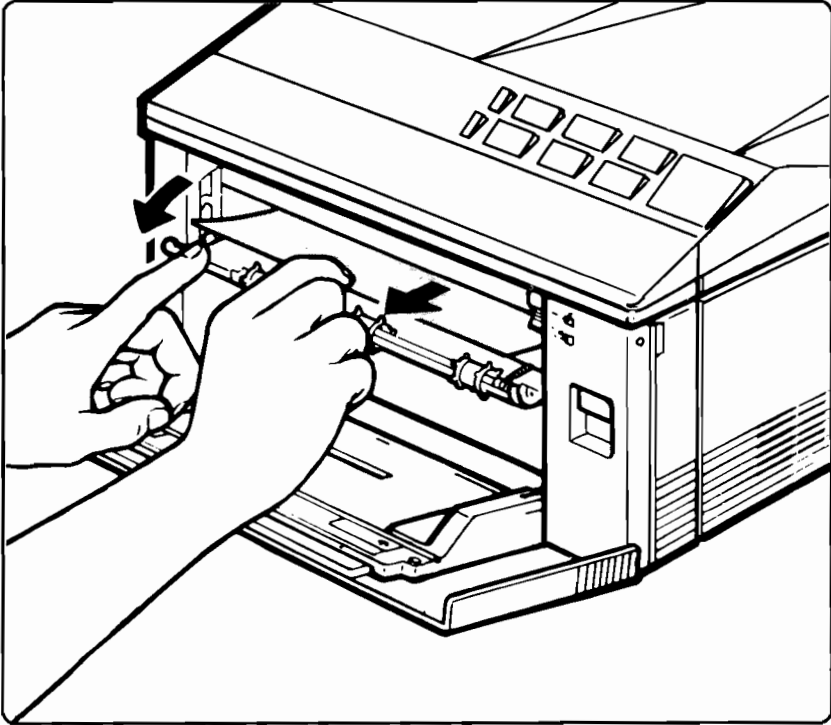

Figure 4-14. Clearing the Internal Fuser Access Door

4. After checking inside the printer for jammed paper, close the Paper Path Door. Open the External Fuser Access Door and check for jammed paper (see Figure 4-15).

Check for and remove any paper fragments. If paper fragments are left inside, printer jams will continue to occur.

Figure 4-15. Clearing the External Fuser Access Door

EP-L Cartridge Life

The electrophotographic (EP-L) cartridge in the Hewlett-Packard 33471/33481 printer has been designed to simplify the replacement of the printer's major "consumable" parts. The EP-L Cartridge contains an electrophotographic print drum, charging roller, toner reservoir, and a paddle that evenly distributes toner inside the cartridge.

An EP-L Cartridge will print approximately 3500 pages when using a typical word processing application, in which text covers about 5% of the page. When regularly printing pages with less coverage, such as short memos, an EP-L Cartridge should print over 3500 pages. However, if routinely printing both text and graphics, the cartridge will not print a full 3500 pages (see Figure 4-16).

Do NOT use refilled EP-L Cartridges in the printer (see "Refilled EP-L Cartridges" in Chapter 2).
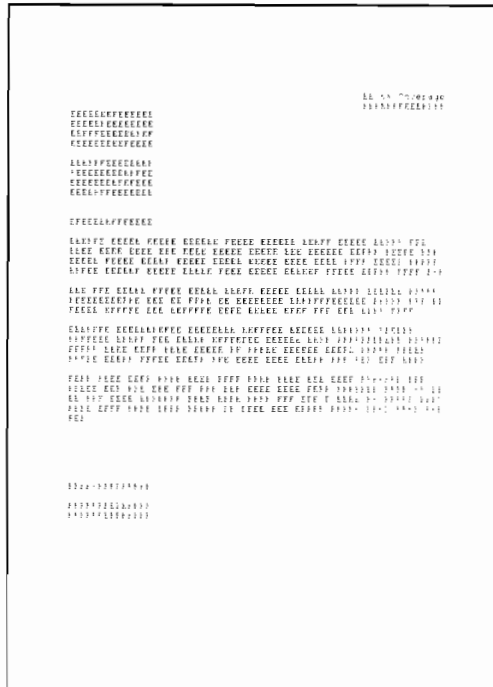

Figure 4-16. Sample 5% Page Coverage

Print Density Adjustment

Print density defines the darkness (or lightness) of the print on a page. Dense print appears darker and heavier while less dense print appears lighter, and may possibly have voids.

To adjust the print density:

1. Open the Paper Path Door.
2. Move the Density Slide to the right (to darken print) or to the left (to lighten print). The recommended initial setting is centered in the detented (middle) position (see Figure 4-17).

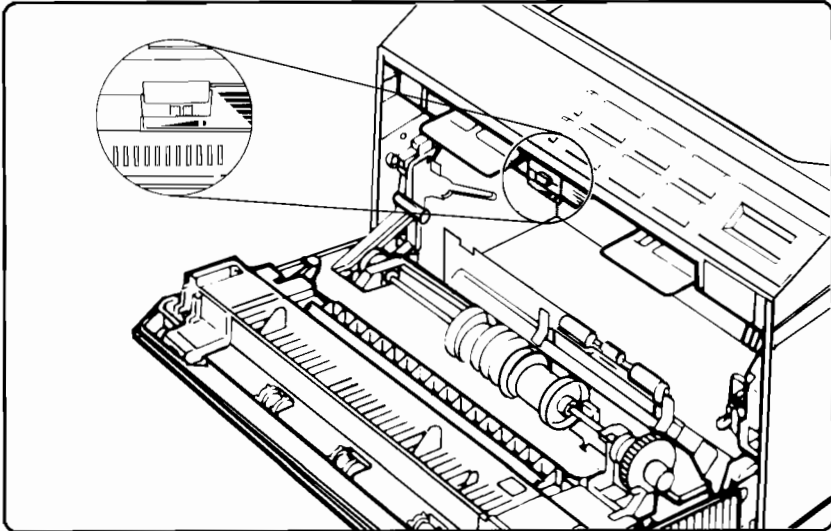| Note	On the LaserJet IIIP printer, the print density adjustment setting interacts with the *Resolution Enhancement* setting. The best print density setting may vary slightly when using Resolution Enhancement (see next section).

Figure 4-17. Adjusting Print Density

Resolution Enhancement Adjustment (LaserJet IIIP)

The LaserJet IIIP incorporates HP's *Resolution Enhancement* technology. Resolution Enhancement refines the print quality of characters and graphics by "smoothing" the fine gradations along the edge of a printed image. Figure 4-18 illustrates two magnified images, one with Resolution Enhancement set to OFF and the other set to MEDIUM.
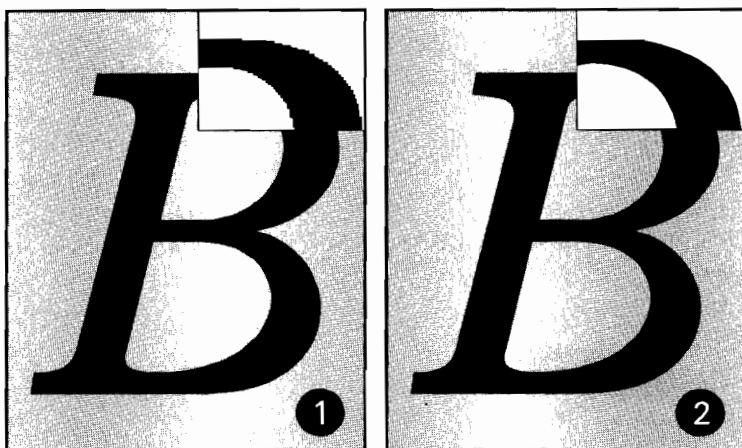

Figure 4-18. Resolution Enhancement Examples

1. RET=OFF   **2. RET=MED**

Resolution Enhancement has four settings: *light, medium, dark* and *off.* The factory default setting is *medium.* Other settings may work better for a particular printer or print density setting. Experiment with various combinations of print density and Resolution Enhancement settings to obtain the optimum setting, as follows:

1. Run a printer Self Test as described in Chapter 3, and examine the pie chart in the self test printout. Look at the 33% slice.

2. If you see *light vertical stripes* (Figure 4-19, sample 3), adjust Resolution Enhancement to the next darker setting.
3. If you see *dark vertical stripes* (Figure 4-19, sample 2), adjust Resolution Enhancement to the next lighter setting.
4. Run another self test. If the 33% pie slice still has light or dark stripes, move the **Print Density Slide** to the right (to eliminate light stripes) or to the left (to eliminate dark stripes).
5. Repeat this process until the 33% pie slice shows a minimum of light or dark lines (Figure 4-19, sample 1).
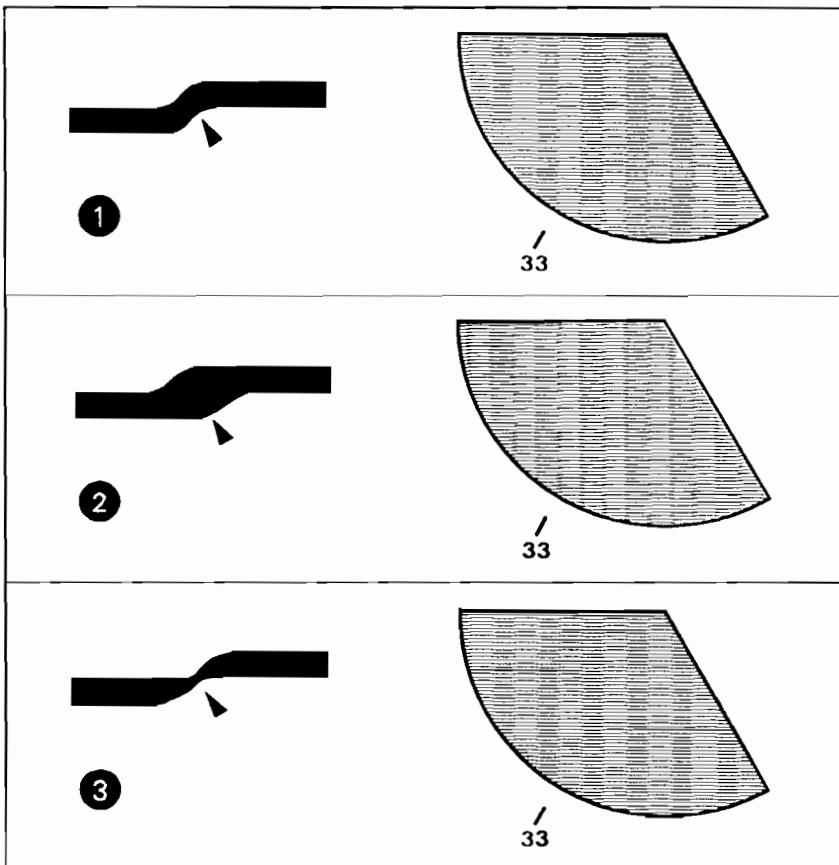

Figure 4-19. Vertical Stripes in the 33% Pie Slice

Registration Adjustment

The leading edge registration gap is adjusted at the factory. The registration should not require adjustment unless the DC Controller PCA or Scanner Motor Assembly is replaced. Use the following procedure to perform the registration adjustment.

1. Remove the Top Cover screws (see "Top Cover" in Chapter 6), and offset the cover to access VR201 on the DC Controller (see Figure 4-22).
2. Adjust VR201 on the DC Controller to an initial setting of zero (0) - see Figure 4-21 and Figure 4-22.
3. Close the Paper Path Door and switch the Paper Output Deflector to the face-up tray.
4. Load paper into the MP tray and initiate a **SELF TEST** printout (see "Self Test Printout" in Chapter 3).
5. Measure the distance from the leading edge of the page to the first dot row of the print image (see Figure 4-20).
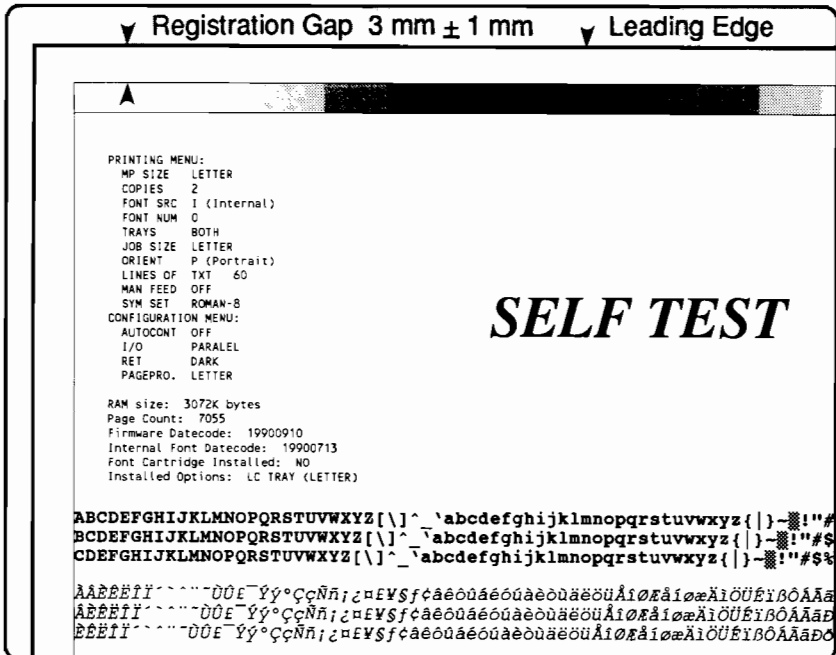

Figure 4-20. Measuring the Registration Gap

6. Determine the adjustment required to create a registration gap of 3mm.

Example: If the measured registration gap distance is 1 mm, subtract 1 mm from 3 mm to arrive at the +2 mm adjustment required. Set VR201 at approximately +8 by turning it clockwise (see Table 4-2, and Figure 4-21).

Table 4-2. VR201 Conversion Chart

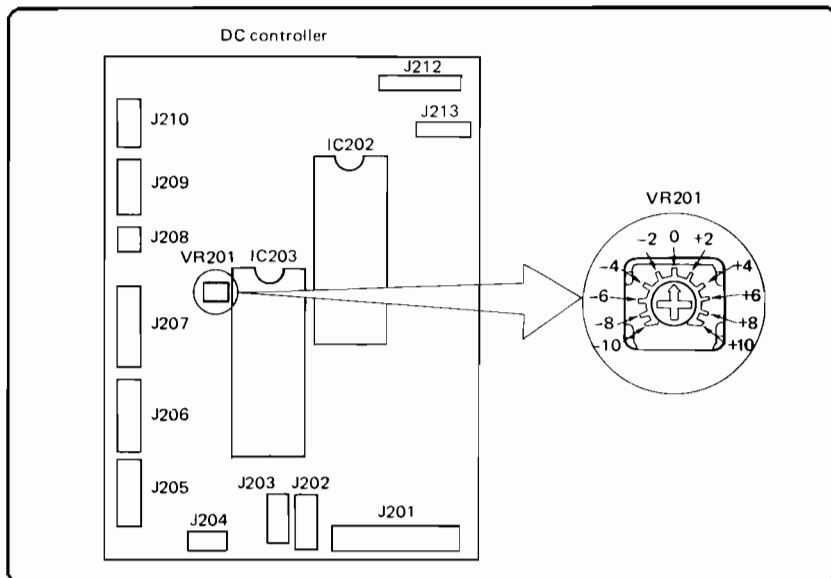| VR201 SETTING	DISTANCE IN MMs	VR201 SETTING	DISTANCE IN MMs
+10	+2.40	-2	-0.48
+8	+1.92	-4	-0.96
+6	+1.44	-6	-1.44
+4	+0.96	-8	-1.92
+2	+0.48	-10	-2.40
0	0		

Figure 4-21. VR201 Settings

7. Adjust VR201 for a registration gap to equal 3mm (see Figure 4-20 and Figure 4-22).
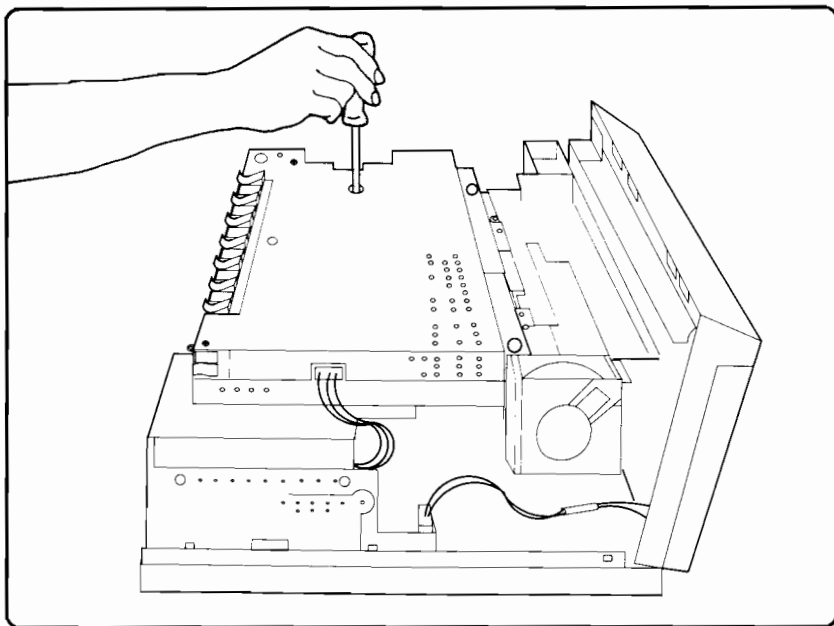

Figure 4-22. Adjusting the Registration Gap

8. Perform another **SELF TEST** printout and measure the registration gap. If the gap is not correct, readjust VR201 as necessary.
9. Re-install the Top Cover.

CHAPTER 5

Contents

Figures

Tables

Functional Overview

Introduction

This section of the manual presents a generalized functional overview of the Hewlett-Packard LaserJet IIP and IIIP printers. It is designed to provide the Service Representative with an understanding of the processes that occur during printing. A generalized block diagram of the printer is shown in Figure 5-1. The following generalized printer blocks will be discussed in this chapter:

- **DC Controller System**
- **Formatter System**
- **Image Formation System**
- **Paper Feed System**
- **Power System**

Formatter System

Dual I/O Interface PCA

Formatter PCA

Control panel

Power System

DC Controller System

DC Controller PCA

Image Formation System

Laser diode

Scanner motor

Beam position detector

Scanning mirror

LC Tray

LC Pick-up

Developing Station

Cleaning Station

Primary charging roller

Photo-sensitive drum

Transfer charging roller

Face-down tray

Fusing Station

Face-up tray

Input Feed Roller

MP Pick-up

MP Tray

Paper Feed System

Figure 5-1. Functional Block Diagram

Figure 5-2. Printer Block Diagram

DC Controller System

The DC Controller PCA is responsible for coordinating all activities involved in the printing process. The DC Controller drives the laser beam, coordinating print data from the Formatter PCA with paper size, laser beam motion, the high voltage system, fuser temperature, and motors. The DC Controller also shares machine status information with the Formatter PCA so that proper diagnostic messages are displayed on the control panel (see Figure 5-2).

In summary, the following systems and functions are controlled by the DC Controller:

- **Paper Motion**
- **Laser and Scanner Drive**
- **Timing**
- **Machine Status**
- **Paper Size and Availability**
- **High Voltage System**
- **Fusing Temperature**
- **Main Motor Drive**
- **DC Power Supply**

DC Controller Loads
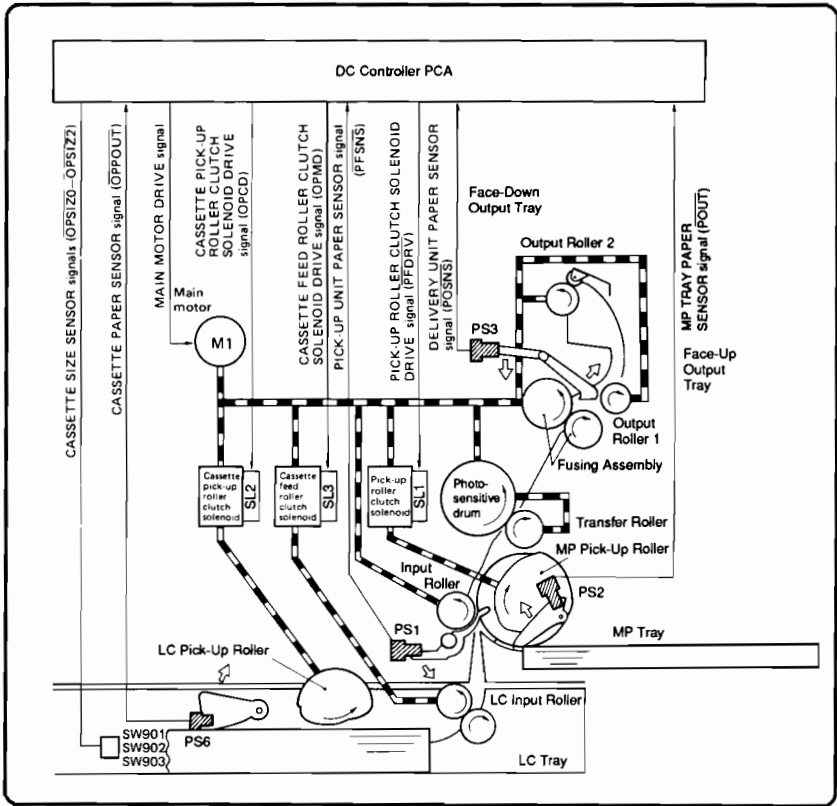
Figure 5-3. DC Controller Loads

Solenoids

Solenoids are controlled by the DC Controller, and each solenoid drives a specific roller (see Table 5-1).

Table 5-1. Solenoid Signals

SOLENOID	DESCRIPTION	SIGNAL
SL1	Multi-Purpose Tray Pick-Up Roller Clutch Solenoid	$\overline{\text{PFDRV}}$
SL2	Lower Cassette Pick-Up Roller Clutch Solenoid	OPCD
SL3	Lower Cassette Feed Roller Clutch Solenoid	OPMD

Photosensors

Photosensors, which are monitored by the DC Controller, are responsible for monitoring paper motion, timing, and open front doors (see Table 5-2).

Table 5-2. Photosensor Signals

SENSOR	DESCRIPTION	SIGNAL
PS1	Input Paper Sensor - detects paper in pick-up area	$\overline{\text{PFSNS}}$
PS2	Multi-Purpose Tray Paper-out Sensor	$\overline{\text{POUT}}$
PS3	Paper Exit Sensor - detects paper in fuser	$\overline{\text{POSNS}}$
PS4	External Fuser Access Door Open Sensor	$\overline{\text{DOSNSE}}$[1]
PS5	EP-L Cartridge/Front Door Open Sensor	$\overline{\text{DOSNSE}}$[1]
PS6	Lower Cassette Tray Paper-out Sensor	$\overline{\text{OPPOUT}}$
Notes:		
1. Connected on DC Controller PCA.		

Microswitches

Microswitches are individually activated by protrusions on each Lower Cassette (LC) tray, and the tray size is determined by the microswitch combinations activated (see Table 5-3 and Table 5-5).

Table 5-3. Microswitch Signals

SWITCH	DESCRIPTION	SIGNAL
SW901	Lower Cassette Tray Size Sensing	$\overline{\text{OPSIZ 0}}$
SW902	Lower Cassette Tray Size Sensing	$\overline{\text{OPSIZ 1}}$
SW903	Lower Cassette Tray Size Sensing	$\overline{\text{OPSIZ 2}}$

Motors

The Main Motor (M1) is controlled by the DC Controller PCA. The Main Motor rotates after any printer door is opened and closed, during the Warm-up period, the Initial Rotation period, the Print period, or the Last Rotation Period.

The Scanner Motor is controlled and monitored by the DC Controller PCA. The Scanner Motor operates during the Initial Rotation period, the Print period, and the Last Rotation period.

The Exhaust Fan Motor is controlled and monitored by the DC Controller PCA. The Exhaust Fan Motor operates at low-speed during the Warm-up period and the Standby period. It operates at high-speed during the Initial Rotation period, the Print period, and the Last Rotation period.

Table 5-4. Motors

MOTORS	DESCRIPTION	SIGNALS
M1	Main Motor	COA, OA, $\overline{\text{OA}}$ COB, OB, $\overline{\text{OB}}$
M2	Scanner Motor Scanner Motor Tachometer Feedback	$\overline{\text{SCNON}}$, SCNCLK SCNTAC
FM1	Exhaust Fan Motor Exhaust Fan Motor Tachometer Feedback	$\overline{\text{FMDRV}}$ FMTRTAC

Paper Jam Detection

The Input Paper Sensor (PS1) and the Paper Exit Sensor (PS3) detect when paper is moving. If a paper jam is detected, the DC Controller PCA immediately stops the printing process and 13 PAPER JAM is displayed. A paper jam can be detected under any of the following conditions:

- **Input Paper Delay Jam:** When paper does not **reach** the Input Paper Sensor (PS1) within the required time.
- **Input Paper Stationary Jam:** When paper does not **clear** the Input Paper Sensor (PS1) within a specified time.
- **Paper Exit Delay Jam:** When paper does not **reach** the Paper Exit Sensor (PS3) within the required time.
- **Paper Exit Stationary Jam:** When paper does not **clear** the Paper Exit Sensor (PS3) within a specified time.

If paper is sensed by either PS1 or PS3 at power-on, it is moved to the selected output tray after the fuser temperature reaches 100° C.

Lower Cassette (LC) Tray Size Sensing System

Trays inserted into the LC Base trigger specific microswitches, which define the tray size (see Table 5-5).

Table 5-5. Switch Settings for Lower Cassette Trays

TRAY SIZE *DC Controller Pin*	SW901 *J205-5*	SW902 *J205-4*	SW903 *J205-3*
Letter	ON	OFF	OFF
Legal	OFF	OFF	ON
A4	ON	ON	OFF
Executive	ON	ON	ON
Envelope	OFF	ON	ON
Tray Not Installed	OFF	OFF	OFF
Base Not Installed	OFF	ON	OFF

Formatter System

The Formatter PCA is responsible for the following:

- Receiving and processing ASCII data from the Dual I/O PCA.

- Monitoring Control Panel input and displaying printer status information.

- Developing and coordinating dot placement and timing with the print engine.
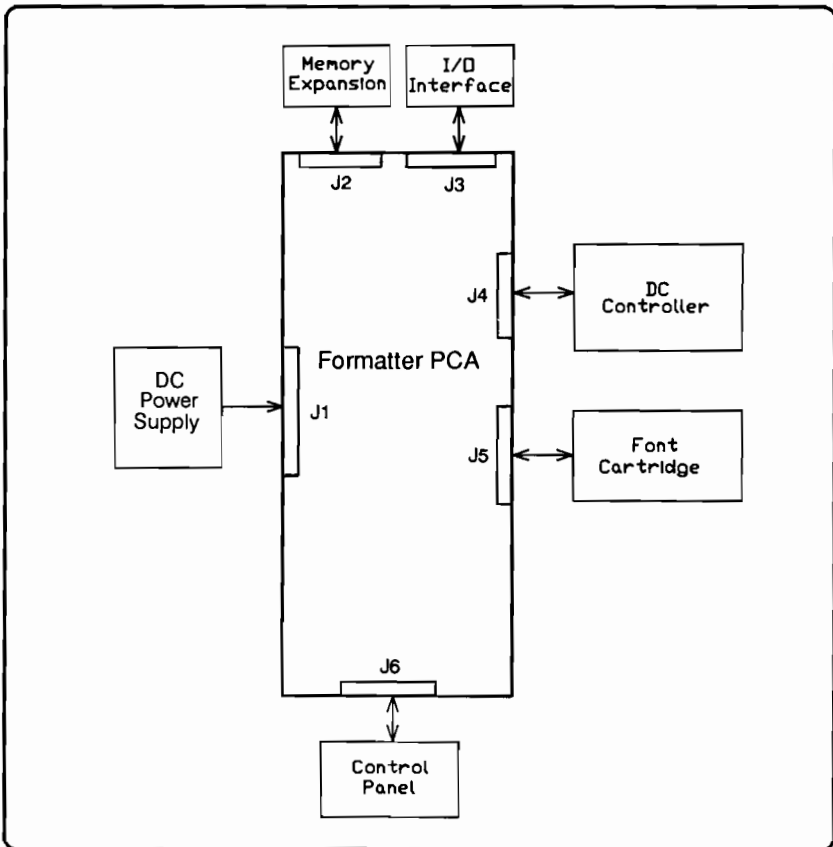
- Storage of font information.

Figure 5-4. Formatter PCA Block Diagram

Formatter Blocks

The Formatter PCA receives ASCII data from the Dual I/O Interface and stores it until a Form Feed command is received, or until the page overflow limit is exceeded. The Formatter converts the ASCII data into a dot image, 300 x 300 dots-per-inch (DPI). The image orientation (portrait or landscape) and the font type are both selected. When the scan buffer is full, the Formatter sends a PRINT signal ($\overline{\text{PRNT}}$) to the DC Controller. The DC Controller synchronizes the Image Formation System with the Paper Feed System, and signals the Formatter to send the print image data. The Formatter sends the print image data (dots) in the form of a VIDEO signal ($\overline{\text{VDO}}$), and the printing process begins.

Central Processing Unit (CPU)

The Formatter uses a 16-bit microprocessor (MC 68000) to control its operation. The LaserJet IIP processor operates at 10 MHz, and the LaserJet IIIP operates at 16 MHz clock speed.

Read Only Memory (ROM)

Besides storing microprocessor control programs, the ROM stores the dot patterns of internal character sets (fonts). The maximum Formatter ROM capacity is 1 Mbyte on the LaserJet IIP and 2 Mbytes on the LaserJet IIIP.

Non-Volatile Memory (NVRAM)

The non-volatile memory has a 1024 byte capacity. Since its contents are not lost when power is switched off, it is used to store the page count as well as printing and I/O configuration information entered using the control panel.

Random Access Memory (RAM)

The RAM consists of 512 Kbytes of standard system memory for the LaserJet IIP, and 1 Mbyte for the LaserJet IIIP. The memory can be expanded (up to 4.5 Mbytes for LaserJet IIP, 5 Mbytes for LaserJet IIIP) by adding memory expansion PCAs to the memory connector (J2). The expansion memory comes in 1 or 2 Mbyte sizes and stores printing and font information received from the host system. On the LaserJet IIIP, the RAM can also serve to temporarily store a full page of print image data before the data is sent to the print engine (see "Page Protection" on page 5-10). Note that adding memory PCAs will **not** increase I/O buffer space or print speed.

I/O Interface

The Formatter PCA receives incoming ASCII data through its interface connector (J3). After the ASCII data is received, it is stored in the Formatter's temporary I/O buffer. The ASCII data is sent from the Dual I/O Interface PCA which supports two interface ports: serial and parallel.

Resolution Enhancement (RET - LaserJet IIIP only)

The LaserJet IIIP Formatter PCA contains circuitry for Resolution Enhancement (RET), which modifies the standard video dot data on its way to the DC Controller ($\overline{\text{VDO}}$) to produce "smoothed" black-to-white boundaries. RET is user-adjustable from the control panel to LIGHT, MEDIUM, DARK, or OFF (see "Resolution Enhancement Adjustment" in Chapter 4).

Page Protection (LaserJet IIIP only)

A page's complexity (rules, complex graphics or dense text) may exceed the printer's ability to create the page image fast enough to keep pace with the engine's printing process. If a page is too complex, it may print in parts (for example, the top half of data on one page and the bottom half on the next page). Some print data loss is likely in these instances, and a 21 PRINT OVERRUN error message will be displayed.

Page protection allows the Formatter to create the entire page image before physically moving the paper through the printer. This process ensures that the entire page will be printed. Page protection requires at least 1 Mbyte of optional printer memory and only appears as a Configuration Menu item when that amount of memory is installed. The printer's memory is reconfigured when Page Protection is enabled as shown in Table 5-6.

Table 5-6. Page Protection Memory Allocation

PAGEPRO Setting	Adds:	Max Strip Memory
OFF	0	196 Kbytes
LETTER or A4	869 Kbytes	1065 Kbytes
LEGAL	1068 Kbytes	1264 Kbytes

Note

There may be a slight degradation of print speed when page protection is enabled. Page protection should be set to OFF unless typically printing complex page data.

Image Formation System

Printing on a laser printer requires the interaction of several different technologies (electronics, optics, electrophotographics, etc.) to provide a page of printed output. Each process functions independently and must be coordinated with all other printer processes. The image formation process centers around the photosensitive drum and consists of six stages:

1. **Cleaning**
2. **Conditioning**
3. **Writing**

4. **Developing**
5. **Transferring**
6. **Fusing**

The EP-L cartridge houses the cleaning, conditioning, and developing stages of the EP process. Components of the image formation system that wear, degrade, or are consumed are built into the replaceable cartridge. The EP-L cartridge contains the photosensitive drum, primary charging roller, developing station, toner cavity, and cleaning station. This eliminates the need for a service call when the replacement of these parts is required.
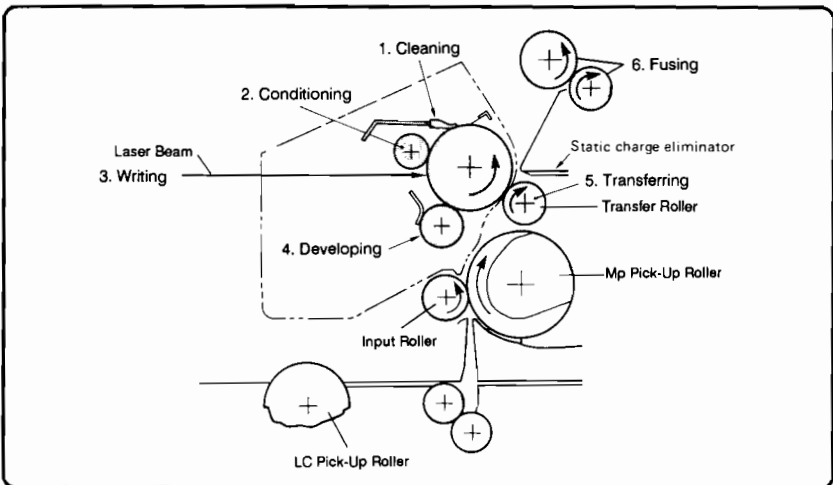

Figure 5-5. Image Formation System (cross-section)

Photosensitive Drum

The photosensitive drum is the "heart" of the Image Formation
System. The special properties of this drum allow an image to
be formed on the drum's surface and then transferred to paper.
The drum is an extruded aluminum cylinder. The outside of
the cylinder is coated with a layer of organic-photoconductive
material (OPC) which is non-toxic. The aluminum base of the
photosensitive drum is electrically connected to ground potential
(see Figure 5-6).
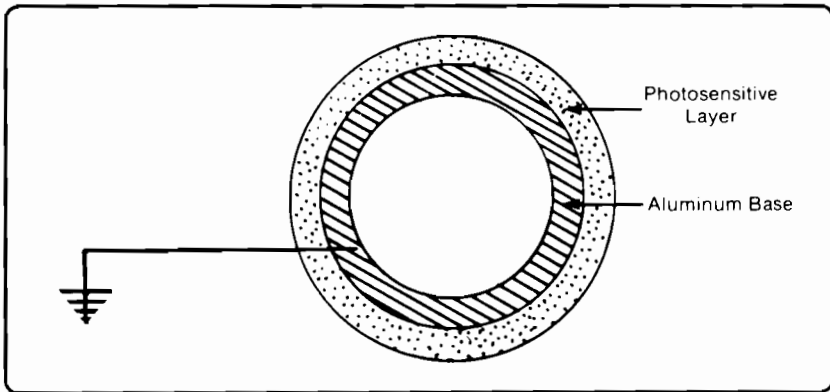
Figure 5-6. Photosensitive Drum

Drum Sensitivity

The OPC material has properties similar to a photo-resistor. It
becomes electrically conductive when exposed to light. When
the photosensitive drum is exposed to light, the negative charges
deposited on it are conducted to the ground potential of the drum's
base. Areas of the drum surface not exposed to light remain
nonconductive and maintain their negative charge.

Caution	Do not expose the EP-L Cartridge to direct sunlight or any other bright light source; permanent damage to the drum can occur.

Cleaning Stage

During the cleaning stage of the image formation process, the drum's surface is prepared to hold an image by physically cleaning the drum. During printing, the drum is constantly rotating making several complete rotations per printed page. Before forming the image for a given section of print, remaining toner from the previous rotation of the drum must be cleaned off. This is accomplished by a rubber cleaning blade that removes the toner from the drum. The excess toner is stored permanently in the cleaner container and it is prevented from leaking out of the cartridge by the sweeper strip (see Figure 5-7).
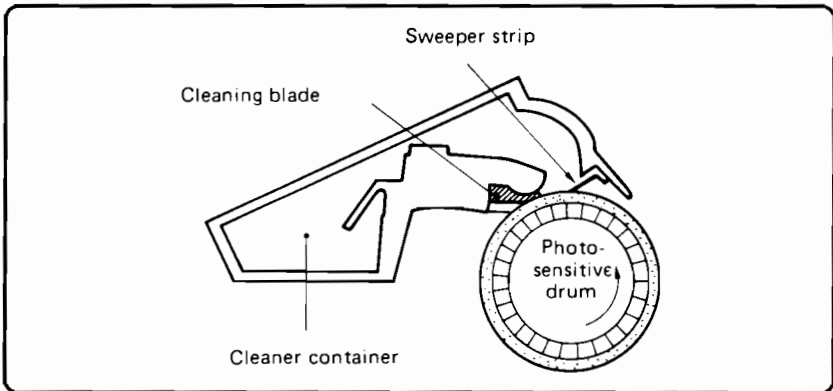

Figure 5-7. Drum Cleaning Station

Conditioning Stage

After the drum has been physically cleaned, it must be conditioned. This conditioning process consists of the application of a uniform negative charge on the surface of the drum by the primary charging roller, located in the EP-L cartridge. The primary charging roller is coated with conductive rubber that has an AC bias applied to it to erase any residual charges and maintain a constant drum surface potential. In addition, a negative DC bias is applied by the charging roller to create a uniform negative potential on the drum's surface. The amount of DC voltage is also modified by the print density adjustment slide.

Compared to the conventional corona charging system, the charging roller requires a lower charging voltage and substantially decreases the amount of ozone generated by the printer (see Figure 5-8).
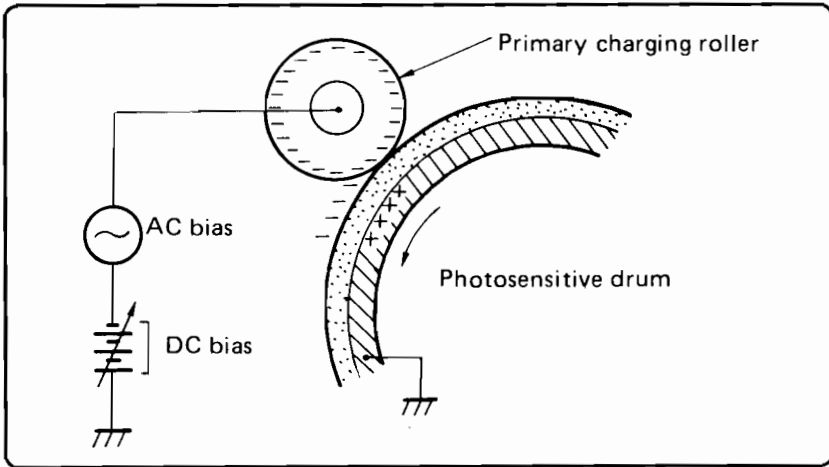

Figure 5-8. Primary Charging Roller

Writing Stage

At the writing station, a laser beam is used to discharge the drum's negative potential (applied at conditioning station) to ground by focusing laser light onto preselected areas of the photosensitive drum. This creates a latent electrostatic image, which is later developed into a visible image.

Laser light is produced by a small laser diode which is modulated by supplying or denying power. The direction of the laser beam is fixed. The beam created by the diode shines onto a rotating two-sided mirror. As the mirror rotates, the beam reflects off the mirror and sweeps (left to right) in an arcing fashion (see Figure 5-9).

A set of lenses focuses the horizontal sweeping beam through the laser beam access slot in the rear of the EP-L cartridge and onto the photosensitive drum. Because the beam is sweeping the entire length of the drum and the drum is rotating, the entire circumference of the drum can be covered. The speed of the scanner motor (which turns the scanning mirror) and the speed of the main motor (which turns the drum) are synchronized so that each successive sweep of the beam is offset 1/300th of an inch. The beam can also be turned on and off to place a dot of light every 1/300th of an inch (more with RET) in the horizontal direction. This is how the printer achieves its 300 x 300 DPI resolution.
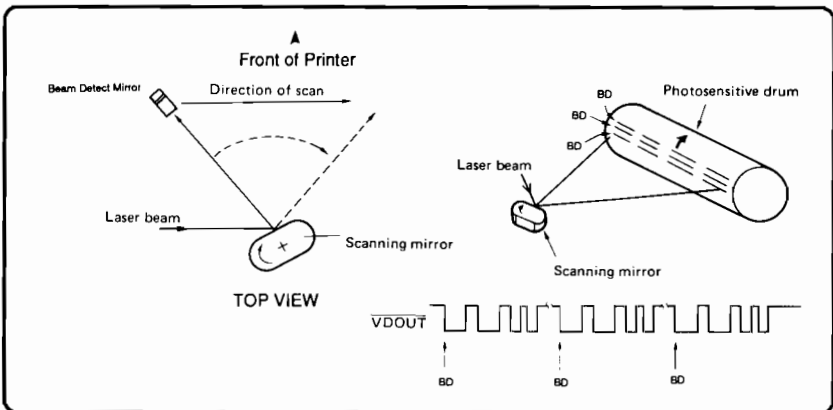

Figure 5-9. Image Writing

At the beginning of each sweep (before the beam reaches the drum), the beam is reflected off the beam detect mirror into a fiber optics cable. The momentary pulse of light is sent through the fiber optics cable to the DC Controller where it is converted to an electrical signal which is used to synchronize the output of data ($\overline{\text{VDO}}$) for one sweep (scan line). This pulse, referred to as the Beam Detect signal ($\overline{\text{BD}}$), is also used to diagnose problems with the laser diode or scanner motor.

After the writing station, the drum surface has an invisible (latent) electrostatic image. Portions of the drum that were not exposed to the laser are still at the uniform negative potential (placed there by the primary charging roller), but those portions exposed to light have been discharged to ground, to form the latent electrostatic image.

External device

Format Controller PCA

$\overline{\text{BD}}$ $\overline{\text{VDO}}$

DC Controller PCA

BD APCIN

$\overline{\text{SCNON}}$ $\overline{\text{VDOUT}}$ LSRPWR

Scanning mirror Scanner motor

Focusing lenses

Optical fiber

Collimator lens

Laser

Beam detect mirror

Photosensitive drum
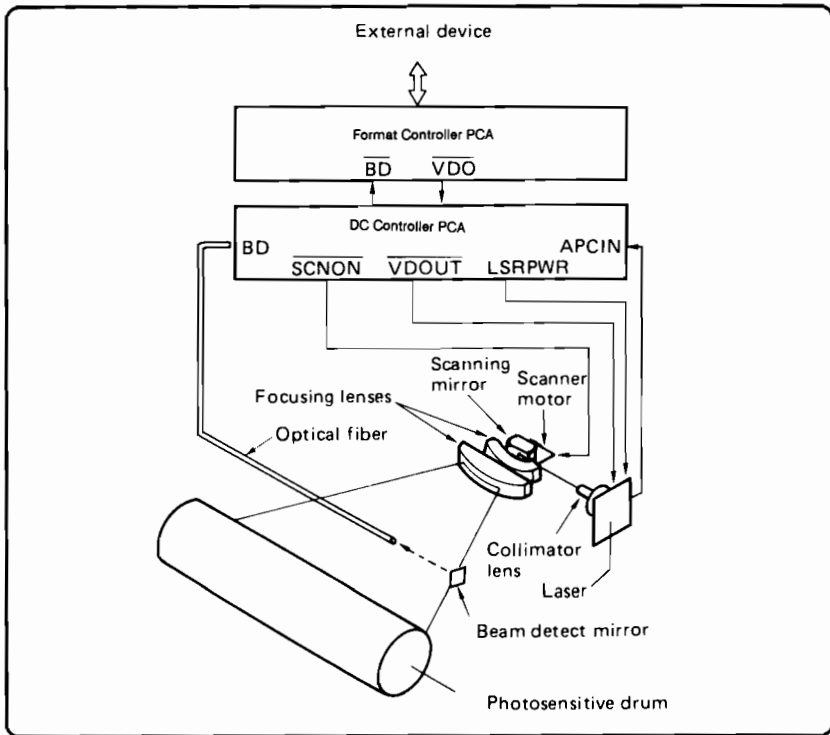
Figure 5-10. Drum Signals

Developing Stage

The developing station develops the latent electrostatic image into a visible image on the drum. The developing unit consists of a metallic cylinder that rotates around a fixed magnetic core inside the toner cavity. Toner is a powdery substance made of black plastic resin bound to iron particles, which is attracted to the magnetic core of the cylinder. A rubber blade "brushes" the toner on the developing cylinder to a uniform thickness.

The toner particles obtain a negative surface charge by rubbing against the developing cylinder that is connected to a negative DC supply. The negatively charged toner is attracted to the discharged (grounded) areas of the drum that have been exposed to laser light, and repelled from the negatively charged (non-exposed) areas. An AC potential is also applied to the developing cylinder to decrease the attraction between the toner and the magnetic core of the cylinder, and to increase the repelling action of toner against the areas of the drum that were not exposed to laser light. This AC potential improves density and contrast (see Figure 5-11).
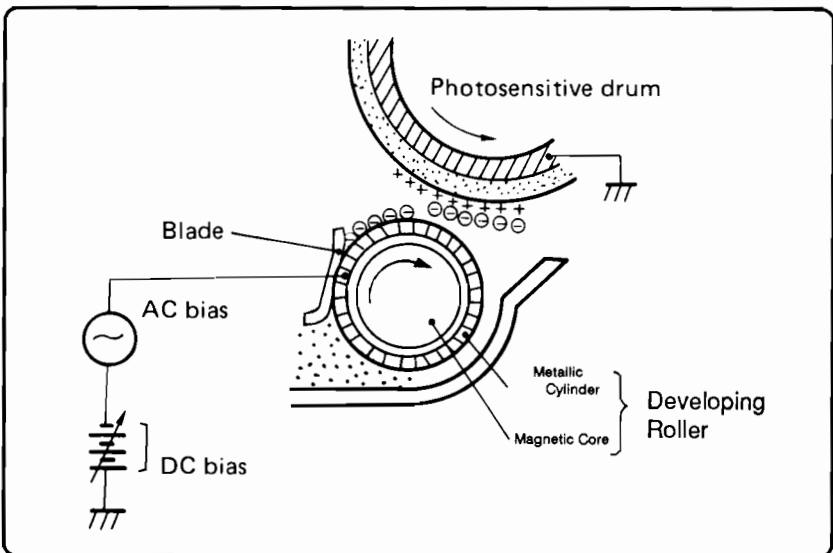
Figure 5-11. Image Development

The DC bias of the developing cylinder is adjusted to change the force of attraction between the toner and drum by moving the print density adjustment slide. A change in DC bias causes either more or less toner to be attracted to the drum which in turn, either increases or decreases the print density. The print density variation is approximately ± 10% (see Figure 5-12).
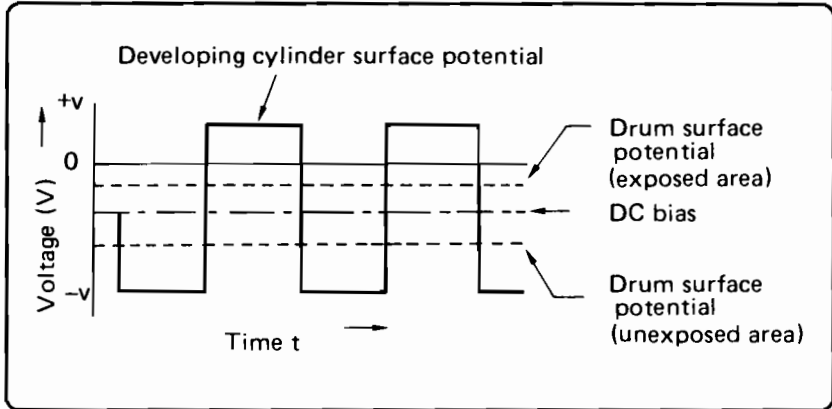
Figure 5-12. Developing Potentials

Transferring Stage

At the transferring station, the toner image on the drum's surface is transferred to the paper. A positive charge applied to the back of the paper by the transfer roller causes the negatively charged toner on the drum's surface to be attracted to the page. The Transfer Roller requires a lower transfer voltage and thus produces less ozone than the more conventional design, which uses a corona wire to develop the transfer charge.

The small radius of the rotating drum and the stiffness of the paper cause the paper to naturally peel away from the drum. Separation is also aided when the paper contacts the Static Charge Eliminator on the Fusing Assembly (a row of sharp metal teeth which are at ground potential). The Static Charge Eliminator weakens the attractive forces between the negatively charged drum surface and the positively charged paper. Without this assistance, thin paper could conceivably wrap around the drum. After separation, the paper moves to the fusing station and the drum rotates back to the cleaning and conditioning stations.
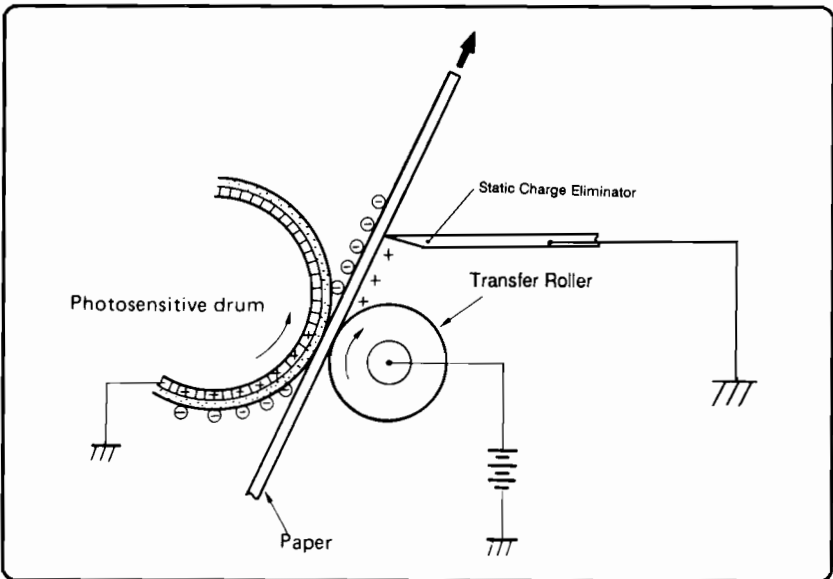

Figure 5-13. Transfer of the Toner Image and Paper Separation

Fusing Stage

At the fusing station, the toner is fused into the paper by heat and pressure to produce a permanent image. The paper passes between a non-stick roller that is heated from the inside by a high intensity lamp, and a soft pressure roller. This melts the toner and presses it into the paper fibers. To keep the toner or paper from sticking, the upper fusing roller is covered with a non-stick, "Teflon type" sleeve.

The fusing roller temperature is monitored by the DC Controller PCA using a thermistor (TH1). The DC Controller maintains a temperature of 120° C during standby mode and 150° C during print mode. Two thermoswitches are also located inside the Fusing Assembly, adjacent to the thermistor. If the fusing system does not heat from 120° C to the proper operating temperature (150° C) within 30 seconds, a 50 ERROR will occur. If the fusing system overheats (exceeds 175° C), a thermoswitch will open the power circuit to the fusing heat lamp, and a 50 ERROR will occur. The activated (open) thermoswitch must then be replaced. See Chapter 7 for error troubleshooting.
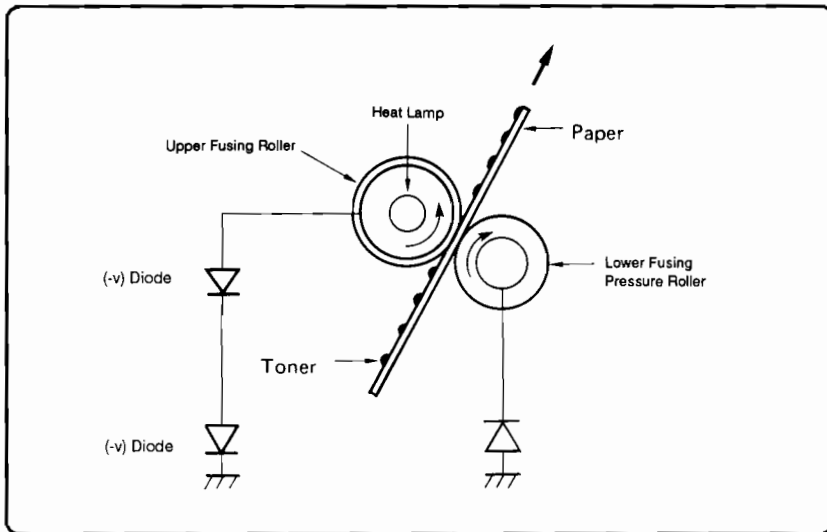
Figure 5-14. Fusing Process

Paper Feed System

The following paper paths are discussed in this section of the manual:

- **MP Tray to Face-Up and Face-Down Output Trays**
- **LC Tray to Face-Up and Face-Down Output Trays**

The paper feed system is responsible for picking up paper from either the MP (Multi-Purpose) or LC (Lower Cassette) input paper tray and delivering it to the image formation system at precisely the right time, feeding it into the fusing station, and delivering the paper to the output tray (see Figure 5-15).

Figure 5-15. Paper Feed System Diagram

Photosensors

Photosensor PS2 senses when paper is in the MP tray, and photosensor PS6 senses when paper is in the LC tray. The message MP LOAD or LC LOAD 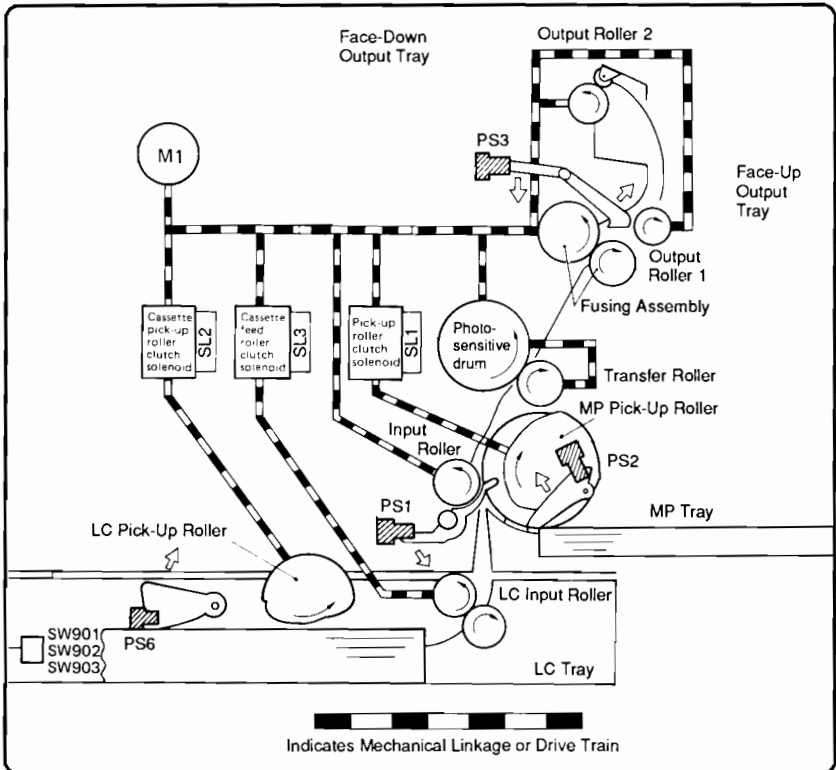will be displayed when either the MP tray or the LC tray is selected as the primary tray and is out of paper. Paper must be loaded into the primary paper tray before printing can resume. The message MP EMPTY or LC EMPTY will be displayed when either the MP tray or the LC tray is out of paper and is not selected as the primary paper tray. The EMPTY message is only a reminder that the paper tray is out of paper; it is not necessary to load paper to continue printing.

Photosensors PS4 and PS5 both sense when a printer door has been opened. The message 12 OPEN OR NO EP will be displayed when either the Paper Path Door or the External Fuser Access Door is open. Both doors must be closed before printing resumes. PS5 also detects the presence of an EP-L Cartridge.

Photosensor PS3 detects the presence of paper in the Fusing Assembly, and is used in jam detection. PS1 detects paper at the Input Feed Roller and is used in jam detection and registration.
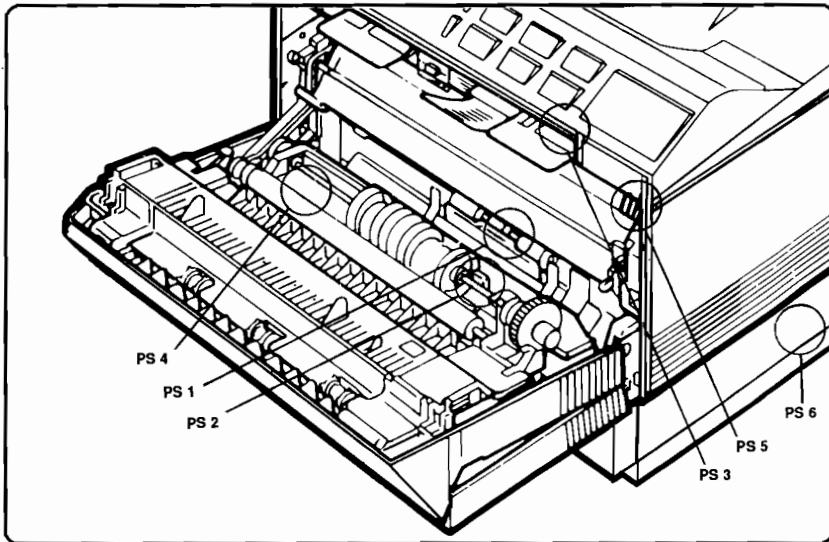

Figure 5-16. Photosensor Locations

Printing from the MP Tray

MP tray selection is provided by the Formatter PCA as configured by the operator's control panel or by a software application. The MP tray feed system's paper motion begins when the DC Controller PCA, after receiving a $\overline{\text{PRNT}}$ signal, starts the Scanner Motor (M2) and the Main Motor (M1). When the fusing roller reaches the minimum operating temperature (140° C), the MP pick-up roller clutch solenoid (SL1) is energized for 1 second, allowing the MP pick-up roller to make one rotation. Clutches and solenoids work together to start and stop gears and rollers used for paper movement. The MP pick-up roller then feeds a sheet of paper from the MP tray.

The Formatter PCA sends the $\overline{\text{VDO}}$ signal to the print engine within a specified time after the paper reaches the Input Paper Sensor (PS1). This causes the leading edge of the toner image on the photosensitive drum to align with the leading edge of the paper. After the paper passes the drum and the fusing rollers, it triggers the Paper Exit Sensor (PS3). The paper is then fed into the output tray selected using the output tray deflector button.

If the paper does not reach or clear each sensor within a specified time, the microprocessor on the DC Controller PCA assumes a paper jam has occurred and informs the Formatter.

Figure 5-17. MP Tray to Face-Up Output Tray

Printing from the LC Tray

LC tray selection is provided by the Formatter PCA as configured by the control panel or by software. When the DC Controller PCA receives a $\overline{\text{PRNT}}$ signal, it starts the Scanner Motor (M2) and the Main Motor (M1). When the fusing roller reaches the minimum operating temperature (140° C), the LC pick-up roller clutch solenoid (SL2) is energized for 1 second, causing the roller to make one rotation. The LC pick-up roller then feeds a sheet of paper from the LC tray into the stationary LC input feed rollers. The LC input feed roller clutch solenoid (SL3) is energized shortly after the sheet of paper reaches the rollers. SL3 remains energized and the LC input roller continues to feed the paper until the page clears the Input Paper Sensor (PS1).

The Formatter PCA sends the $\overline{\text{VDO}}$ signal to the print engine within a specified time after the paper reaches the Input Paper Sensor (PS1). This causes the leading edge of the toner image on the photosensitive drum to align with the leading edge of the paper. After the paper passes the drum and the fusing rollers, it triggers the Paper Exit Sensor (PS3). The paper is then fed into the output tray selected using the output tray deflector button.

If the paper does not reach or clear each sensor within a specified time, the microprocessor on the DC Controller PCA assumes a paper jam has occurred and informs the Formatter PCA.
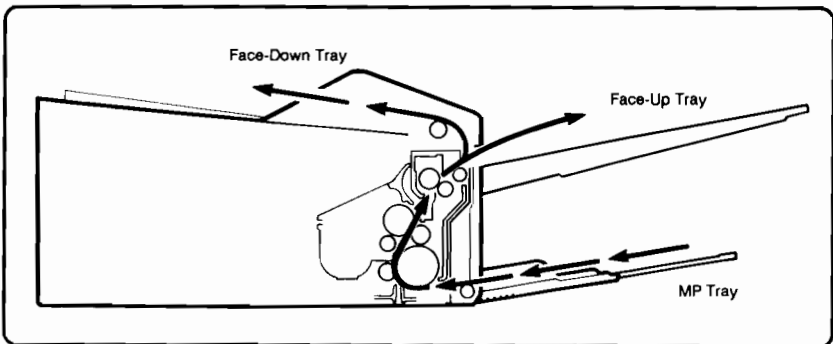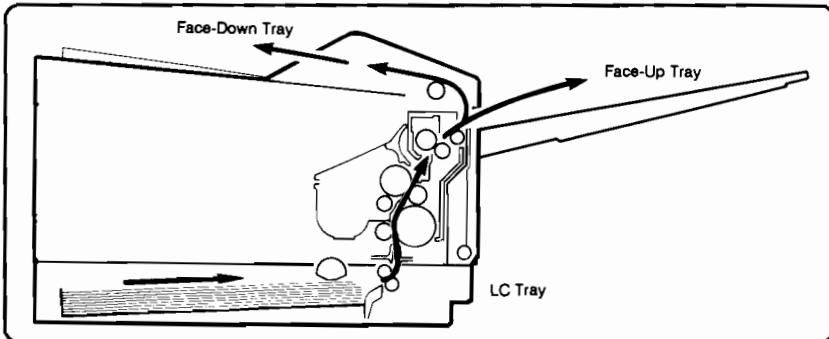

Figure 5-18. LC Tray to Face-Up Output Tray

Power System

The AC Power Supply provides AC voltage to the DC Power Supply and the Fusing Assembly Heat Lamp when the Main Power Switch is turned ON. The Paper Path Door must be closed to activate the AC Power Supply Door Switch before voltage is provided to the Heat Lamp. A circuit breaker (CB1) is included in the AC Power Supply for over-current protection.

The DC Power Supply generates +5 V DC, +12 V DC, and +24 V DC for use by the Formatter PCA and the DC Controller PCA. The DC Controller PCA distributes voltages to the remaining electrical assemblies. Over-current protection for the DC Power Supply is provided by using a current monitoring circuit (crowbar) and an in-line fuse. To reset the crowbar, the printer's power must be turned OFF for at least ten minutes. The Power System Block Diagram is illustrated in Figure 5-19.

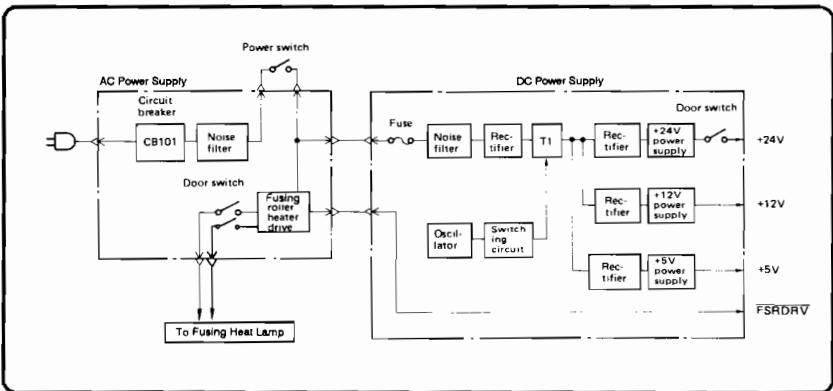Note that both AC and DC power supplies are contained within the Power Supply Assembly.

Figure 5-19. Power System Block Diagram

Basic Sequence of Operation

The Formatter PCA and the DC Controller PCA share information during printer operation. Connector J4 on the Formatter and connector J201 on the DC Controller form a link which operates as a serial data bus. This allows printer status and command information, as well as dot-image data, to be passed between both controllers.

Standard Printer Operation

The following events take place during normal printer operation:

1. After the printer's power has been turned ON, the printer enters the Warm-up period.

2. After the printer has completed the Warm-up period and is ready for operation, the DC Controller sends a READY signal ($\overline{RDY}$) to the Formatter to report that the printer is ready.

3. After the $\overline{RDY}$ signal is true and print data is ready to be transmitted, the Formatter sends a PRINT signal ($\overline{PRNT}$) to the DC Controller.

4. After the DC Controller receives the $\overline{PRNT}$ signal, the Initial Rotation period begins.

5. At the end of the Initial Rotation period, the DC Controller sends a TOP OF PRINT signal ($\overline{TOP}$) synchronized with a BEAM DETECT signal ($\overline{BD}$) to the Formatter. This initiates the Print period.

6. Each time the Formatter receives a synchronized $\overline{BD}$ signal from the DC Controller, the Formatter sends a VIDEO data stream ($\overline{VDO}$) to the DC Controller.

7. After the DC Controller receives the $\overline{VDO}$ data, the DC Controller translates it into a VIDEO OUT signal ($\overline{VDOUT}$) that switches the laser diode ON and OFF.

8. The laser beam, created by the laser diode, is then reflected off the scanner mirror onto the photosensitive drum to form a latent electrostatic image, writing a single line of print (dot) data.

9. After the last $\overline{VDO}$ line of dot data is sent from the Formatter, the DC Controller then checks for another $\overline{PRNT}$ signal from the Formatter.

10. *If* another $\overline{PRNT}$ signal is detected, the Print period continues with another page.

11. *If* the DC Controller fails to receive a $\overline{PRNT}$ signal before the end of the page passes over the Input Paper Sensor (PS1), the DC Controller initiates the Last Rotation period.

In the event that the printer fails to perform correctly, the DC Controller will send an appropriate status to the Formatter PCA and an error will be displayed on the printer's Control Panel.

Timing Diagrams

There following two timing diagrams describe the proper operation of the LaserJet IIP and IIIP printers. The "Multi-Purpose Tray Timing Diagram" (Figure 5-20), and the "Lower Cassette Tray Timing Diagram" (Figure 5-21) were developed by running two consecutive prints on A4 paper.
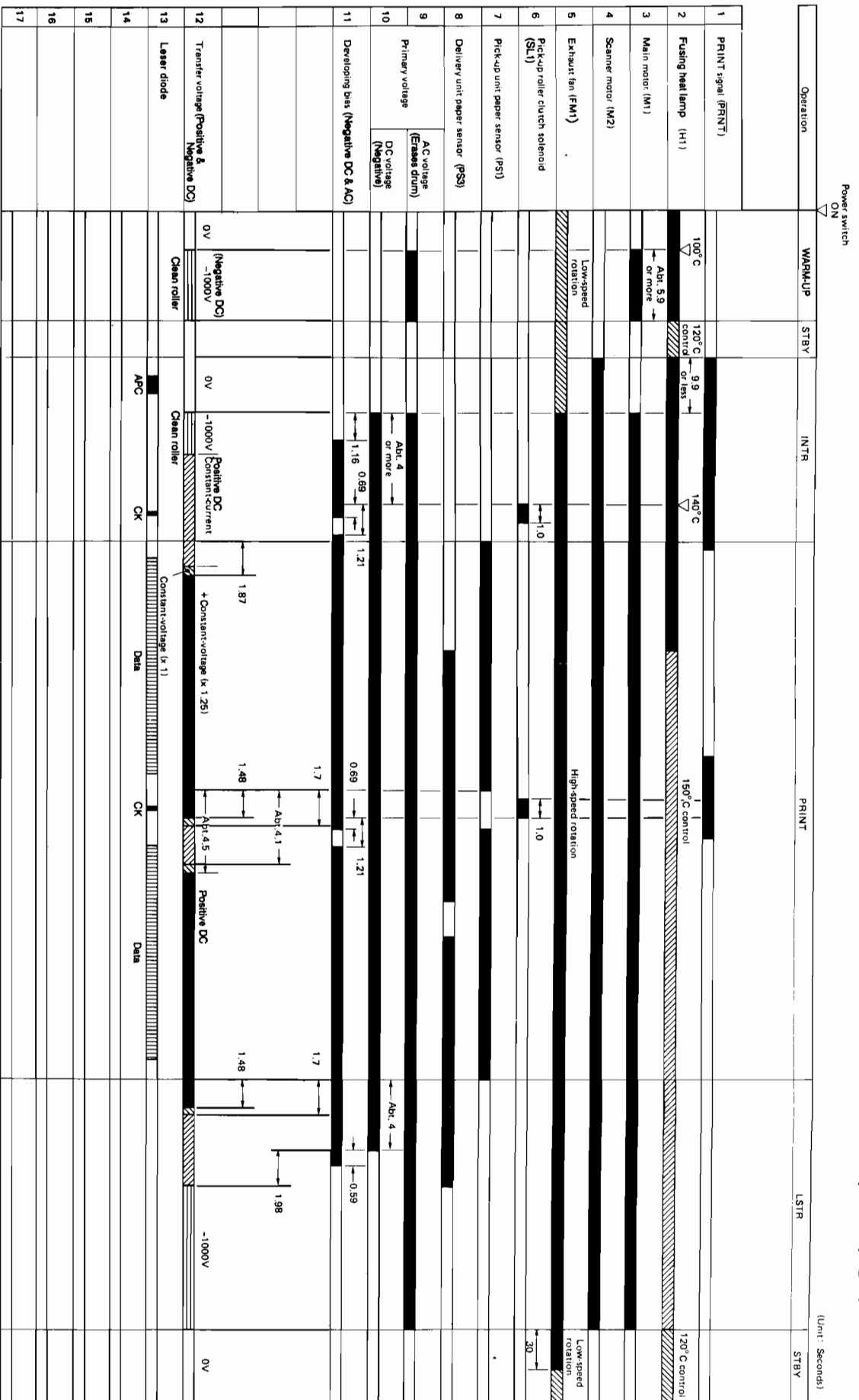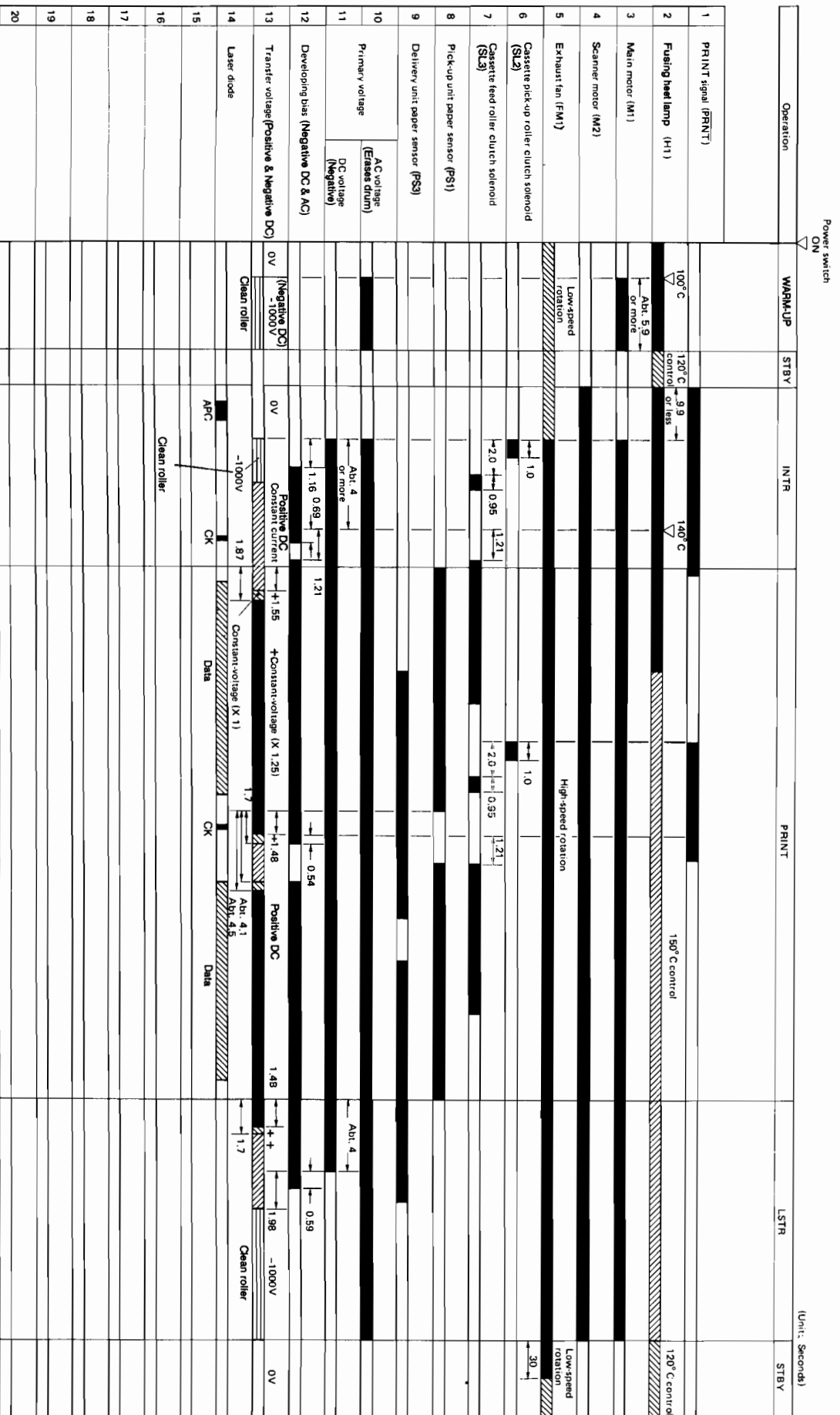
Figure 5-20. MP Tray Timing Diagram (two A4 pages)

(Unit: Seconds)

	Operation	Power switch ON	WARM-UP	STBY	INTR	PRINT	LSTR	STBY
1	PRINT signal (PRNT)							
2	Fusing heat lamp (H1)	100°C	120°C control	9.9 or less	140°C	150°C control		120°C control
3	Main motor (M1)	Abt. 5.9 or more						
4	Scanner motor (M2)	Low-speed rotation				High-speed rotation	Low-speed rotation	
5	Exhaust fan (FM1)							
6	Pick-up roller clutch solenoid (SL1)				1.0	1.0	30	
7	Pick-up unit paper sensor (PS1)							
8	Delivery unit paper sensor (PS3)							
9	Primary voltage	AC voltage (Erases drum) / DC voltage (Negative)			Abt. 4 or more	Abt. 4.1	Abt. 4	
10	Developing bias (Negative DC & AC)				1.16 0.69 / 1.21	0.69 / 1.21 / 1.7	0.59	
11		(Negative DC) −1000V	0V	0V	Positive DC −1000V / Constant-current	1.48 / Abt. 4.5 / Positive DC	1.48 / 1.98	−1000V
12	Transfer voltage (Positive & Negative DC)	0V	Clean roller	Clean roller	+ Constant-voltage (x 1.25) / Constant-voltage (x 1)			0V
13	Laser diode			APC	CK	Data CK Data		
14					1.87	1.7	1.7	
15								
16								
17								

Figure 5-21. Lower Cassette Tray Timing Diagram (two A4 pages)

(Unit: Seconds)

	Operation	Power switch ON	WARM-UP	STBY	INTR	PRINT	LSTR	STBY
1	PRINT signal (PRNT)							
2	Fusing heat lamp (H1)		100°C / Abt. 5.9	120°C control / 9.9 or less	140°C / 150°C control		120°C control	
3	Main motor (M1)		Abt. 5.9 or more					
4	Scanner motor (M2)							
5	Exhaust fan (FM1)		Low-speed rotation		High-speed rotation		Low-speed rotation	
6	Cassette pick-up roller clutch solenoid (SL2)				1.0	1.0	30	
7	Cassette feed roller clutch solenoid (SL3)				2.0 / 0.95 / 1.21	2.0 / 0.95 / 1.21		
8	Pick-up unit paper sensor (PS1)							
9	Delivery unit paper sensor (PS3)							
10	Primary voltage — AC voltage (Erases drum) / DC voltage (Negative)				1.16 / 0.69 / Abt. 4 or more	0.54 / Abt. 4		
11					1.21			
12	Developing bias (Negative DC & AC)				Positive DC Constant current / +1.55	+Constant-voltage (X 1.25) / +1.48 Positive DC / Abt. 4.1 Abt. 4.5	+ / 0.59	
13	Transfer voltage (Positive & Negative DC)	0V (Negative DC) -1000V	0V	+Constant-voltage (X 1) / 1.7	1.48	1.98 / -1000V	0V
14	Laser diode	Clean roller	-1000V / APC / 1.87 / CK / Data	-1000V / Data	1.7 / CK	Clean roller	
15			Clean roller					
16								
17								
18								
19								
20								

Warm-up Period

The Warm-up period begins when the printer's power is turned ON and ends when the Fusing Roller temperature reaches 120° C. When the printer is switched ON, the Exhaust Fan (FM1) begins low-speed rotation and the Fusing Roller warms-up to 100° C. The DC Controller then switches the Main Motor (M1) ON and applies AC high voltage to the primary charging roller to remove any residual charge from the photosensitive drum. Also, high voltage of −1000 volts is applied to the Transfer Roller to clean toner build-up from the roller. When the Fusing Roller reaches 120° C, the Main Motor, AC high voltage, and −1000 volts are turned OFF.

After the printer warms-up successfully, the message 00 READY is displayed, the printer goes "on-line," and the control panel keys become operational.

Standby Period

When the Warm-up period is completed, the message 00 READY is displayed. At this point the printer is in the Standby period. This indicates that the printer is ready for printing. The Fusing Roller remains at a constant temperature of 120° C, and the exhaust fan continues operating at low-speed rotation.

Initial Rotation Period

When the DC Controller receives a PRINT signal ($\overline{\text{PRNT}}$) from the Formatter, the DC Controller allows the Fusing Roller to begin warming-up to 140° C and starts the Scanner Motor (M2). Next the laser diode is turned ON and generates a sweep beam used to adjust the laser power (APCIN). After the DC Controller receives a BEAM DETECT signal ($\overline{\text{BD}}$), initiated by the sweep beam, the laser power is stabilized and the sweep beam is turned OFF.

The DC Controller then turns the Main Motor ON, switches the Exhaust Fan to high-speed rotation, applies AC high voltage and negative DC high voltage to the primary charging roller, and applies high voltage of −1000 volts to the Transfer Roller to help remove excess toner from the roller.

The developing bias (a negative AC/DC voltage) is applied to the developing roller 1.16 seconds after the Main Motor is turned ON, then +170 volts is applied to the Transfer Roller 2.0 seconds after the Main Motor is turned ON.

When the Fusing Roller temperature reaches 140°, the MP pick-up roller clutch solenoid (SL1) is energized and paper is fed from the MP tray. If paper is fed from the LC tray, then roughly 10 seconds after Initial Rotation begins, the LC pick-up roller clutch solenoid (SL2) is energized and 2 seconds later the LC input feed roller clutch solenoid (SL3) is energized.

If a failure occurs during this period, the following errors may be displayed:

50 NEEDS SERVICE   This error is caused when the Fusing Roller fails to reach 140° C or exceeds 185° C during the Initial Rotation Period (see Flowchart 7-7, "50 SERVICE (Fuser Error)" in Chapter 7).

51 ERROR   This error is caused when the $\overline{BD}$ signal is not received by the DC Controller (see Flowchart 7-8, "51 (41) ERROR (Beam Detect)" in Chapter 7).

52 ERROR   This error is caused when the Scanner Motor fails (see "52 ERROR" in Table 7-1, Chapter 7).

Print Period

When the leading edge of the paper activates PS1, the DC Controller forces the laser diode ON until a $\overline{BD}$ signal is received. Next, the DC Controller receives a VIDEO data stream ($\overline{VDO}$) from the Formatter. The DC Controller translates the $\overline{VDO}$ data into a VIDEO OUT signal ($\overline{VDOUT}$), which is used to modulate the Laser Diode ON and OFF, creating intermittent bursts of laser light that are reflected off of the scanner mirror and onto the photosensitive drum to form a latent electrostatic image. $\overline{VDO}$ data is sent from the Formatter for each scan line of print data on a page, and a $\overline{BD}$ signal must precede each $\overline{VDOUT}$ line data received by the DC Controller.

When the Paper Exit Sensor (PS3) is activated by the leading edge of the first page, the DC Controller allows the Fusing Roller to warm-up to 150° C. After the last $\overline{VDO}$ data is sent for the last line of print data on the first page, the Formatter sends a $\overline{PRNT}$ signal for the second page.

About 1.87 seconds after the first $\overline{VDO}$ signal is sent from the Formatter, the DC Controller applies +1000 V DC to the Transfer Roller.

When the DC Controller identifies the last line of print data on the first page, the laser diode is forced ON and generates a sweep beam used to adjust the laser power. After the DC Controller receives a BEAM DETECT signal ($\overline{BD}$) initiated by the sweep beam, the laser power is stabilized and the sweep beam is turned OFF. The DC Controller then searches for a $\overline{PRNT}$ signal to begin the second page.

When the DC Controller receives the next $\overline{PRNT}$ signal from the Formatter, the DC Controller anticipates receiving a $\overline{BD}$ signal and energizes the pick-up roller clutch solenoid (MP tray-SL1, or LC tray-SL2 and SL3) about 1.0 second before the $\overline{BD}$ signal is received, and the second page is fed from the paper tray. Until the DC Controller receives the expected $\overline{BD}$ signal, +170 volts is applied to the Transfer Roller to prevent toner build-up while the Transfer Roller is in direct contact with the drum.

Once again, the Formatter sends $\overline{\text{VDO}}$ data to the DC Controller. The DC Controller translates the $\overline{\text{VDO}}$ signal into a VIDEO OUT signal ($\overline{\text{VDOUT}}$), which is used to modulate the Laser Diode ON and OFF, creating intermittent bursts of laser light that are reflected off of the scanner mirror and onto the photosensitive drum to form a latent electrostatic image. Upon receipt of a $\overline{\text{BD}}$ signal from the DC Controller, $\overline{\text{VDO}}$ data is sent from the Formatter for each scan line of print data on a page.

Before the next sheet of paper arrives, the voltage on the Transfer Roller is switched from +170 volts to +1000 volts to prepare to transfer the toner image from the drum to the paper. The process is repeated for each successive page as necessary.

If a failure occurs during this period, the following errors may be displayed:

41 ERROR

This error is caused when a sheet of paper is fed too soon (LaserJet IIP only) or when an unstable $\overline{\text{BD}}$ or $\overline{\text{TOP}}$ signal is received (see "Error 41 Misprint Check" in Chapter 7).

50 NEEDS SERVICE

This error is caused when the Fusing Roller fails to reach 150° C or exceeds 185° C during the Print Period (see Flowchart 7-7, "50 SERVICE (Fuser Error)" in Chapter 7).

51 ERROR

This error is caused when the $\overline{\text{BD}}$ signal is not received by the DC Controller (see Flowchart 7-8, "51 (41) ERROR (Beam Detect)" in Chapter 7).

52 ERROR

This error is caused when the Scanner Motor fails (see "52 ERROR" in Table 7-1, Chapter 7).

Last Rotation Period

After printing is complete, the Last Rotation period begins, during which residual static charges are eliminated from the photosensitive drum to prepare for the next printed page.

About 1.7 seconds after the Last Rotation period begins, +170 volts is applied to the Transfer Roller to stop the toner attraction. Then, 4.0 seconds after the Last Rotation period begins, the negative DC high voltage on the Primary Charging Roller is turned OFF leaving the AC voltage to neutralize the drum's surface. Finally 5.98 seconds after beginning the Last Rotation period, the Transfer Roller voltage returns to −1000 volts and any toner on the surface of the Transfer Roller is attracted to the photosensitive drum.

At the end of the Last Rotation period, the Fusing Roller is allowed to return to 120° C, the Main Motor turns OFF, the Scanner Motor turns OFF, the AC high voltage to the Primary Charging Roller turns OFF, the Transfer Roller voltage returns to 0 volts, and the printer returns to the Standby period. About 30 seconds after the printer returns to the Standby period, the Exhaust Fan switches to low-speed rotation.

When another $\overline{PRNT}$ signal is sent from the Formatter, printer operation resumes.

CHAPTER 6

Contents

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Removal and Replacement

Introduction

Servicing the HP 33471/33481 printers involves replacement of
printed circuit assemblies and electro-mechanical subassemblies.
No attempt should be made to identify component failures within
these assemblies.

**Unless specifically stated otherwise, replacement is the
reverse of removal.** Occasionally, notes are included to provide
direction for difficult replacement procedures.

Warning	Power-off the printer and disconnect the power cord from the power outlet and the printer before attempting to service the printer.
	Some sheet metal edges, particularly in the base of the printer, are extremely sharp. Be careful when working in these areas to avoid cuts.

Caution	The HP 33471/33481 printers contain parts that are sensitive to "Electro-Static Discharge" (ESD). Always service printers at an ESD-protected workstation.
	This symbol: ESD appears in this chapter when the parts being serviced are especially susceptible to ESD damage.

Note	Always disconnect the I/O cable and remove the EP-L Cartridge from the printer before removing or replacing other printer parts. Store the EP-L Cartridge in a dark place.

Required Tools

Table 6-1. Required Tools

QTY	TOOL
2	#2 Magnetized Phillips Screwdriver (one 1-inch and one 6-inch shaft)
1	Small Needle Nose Pliers
1	Small Flat-head Screwdriver (2-inch x $\frac{1}{8}$-inch)
1	1.5 mm Allen Wrench

Hardware Review

A Phillips head screw and a Pozidrive head screw are compared in Figure 6-1 to show the difference between the two types of screw heads. *Remember, the HP 33471/33481 printers use Phillips head screws exclusively. Always use the proper tool and do NOT overtighten screws.*
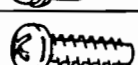

Phillips   Pozidrive
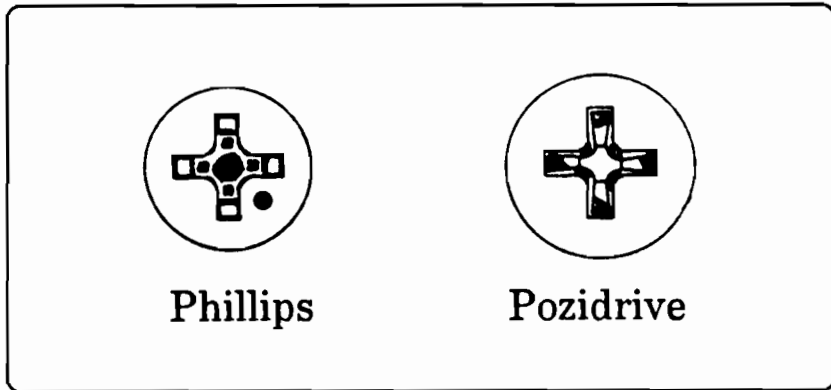
Figure 6-1. Comparing Phillips and Pozidrive Screws

Table 6-2 describes the screws used in the HP 33471/33481 printers and provides some guidelines to help determine where each type of screw is used. The screws can vary in length depending on the thickness of the material being fastened.

Typically, plated screws are used in areas visible to the customer and black screws are used in all other areas of the printer. There are exceptions, so always note where each type of screw is located and replace each one into its original location.

Table 6-2. Printer Hardware Descriptions

DRAWING	DESCRIPTION	PURPOSE
	Threaded Phillips screw	Used to fasten metal or plastic to threaded plastic or metal.
	Threaded Phillips washer head screw	Used to fasten metal or plastic to metal when high torque is required.
	Threaded Phillips w/captive star washer	Used to fasten metal to metal when good electrical contact is needed.
	Threaded Phillips shoulder-screw.	Used to aid in alignment of parts.
	Self-tapping Phillips screw[1]	Used to fasten metal or plastic to plastic mainframes.

Notes:

1. Throughout this chapter, the self-tapping screw illustration is placed in each figure requiring self-tapping screw removal.

Caution

To install a self-tapping screw, first turn it counter-clockwise to align it with the existing thread pattern, then carefully turn clockwise to tighten. **Do not over-tighten.** If a self-tapping screw-hole becomes stripped, repair of the screw-hole or **replacement of the affected assembly is required.**

In the removal and replacement procedures that follow, the number inside the parentheses, such as (4), refers to the number of screws to be removed.

User Installable Assemblies

This section lists procedures for removing the following assemblies and their serviceable subassemblies:

1. Dual I/O Interface Assembly - Pg. 6-5
2. Accessory Memory PCA - Pg. 6-6
3. Lower Cassette (LC) Base Assembly - Pg. 6-7
   A. LC Base Cover Stop - Pg. 6-8
   B. LC Base PCA - Pg. 6-9
   C. Right LC Base Cover - Pg. 6-10
   D. Left LC Base Cover - Pg. 6-11
   E. LC Pick-Up Roller Assembly - Pg. 6-12
   F. LC Feed Roller Assembly - Pg. 6-14
   G. LC Pick-Up & Feed Solenoids (SL2 & SL3) - Pg. 6-15
   H. LC Paper-Out Photosensor (PS6) - Pg. 6-16

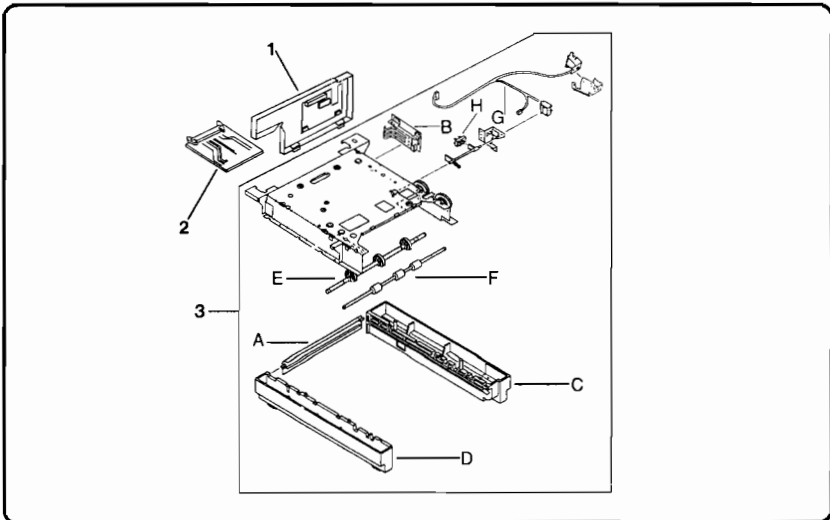| **Note**	Items 1, 2 and 3 only are user *installable*. Only Optional Interface Assemblies (replacing the original Dual I/O) and Accessory Memory PCAs are considered user *serviceable*.

Figure 6-2. User Installable Assembly Locations

Dual I/O Interface Assembly

1. Open the Rear Cover by loosening the captive screws (2) and swinging downward (see Figure 6-3, callout 1).

2. Remove the screws (3) securing the Dual I/O Interface PCA to the printer (see Figure 6-3, callout 2).

3. Grasp the Dual I/O Interface Assembly by its handle and pull it straight out the back to remove it from the printer (see Figure 6-3, callout 3).
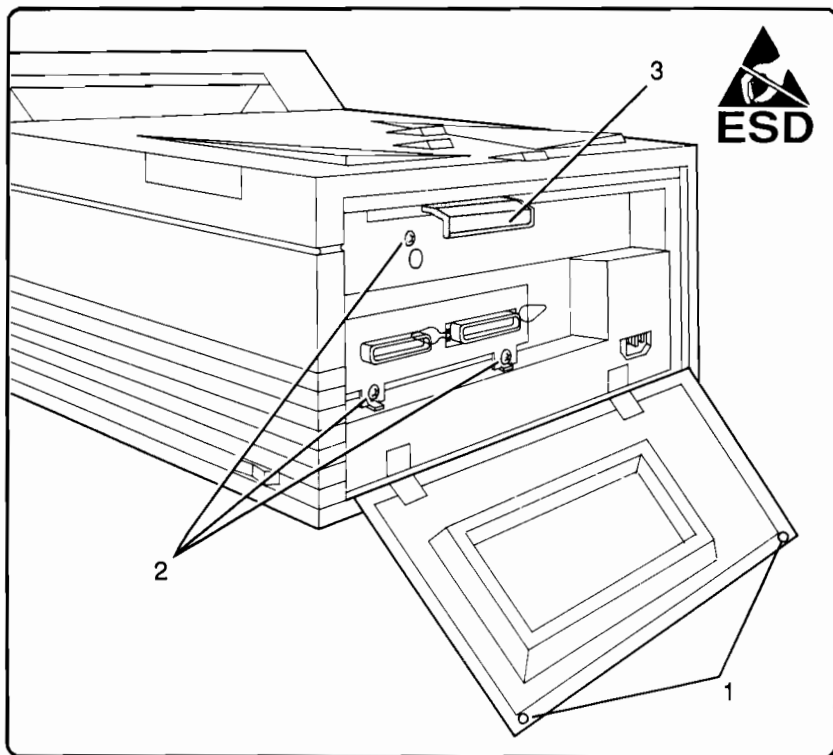
Figure 6-3. Dual I/O Interface Assembly Removal

Accessory Memory PCAs

1. Remove the Dual I/O Interface Assembly (see Figure 6-3).

2. Squeeze the Memory PCA handles together and slide each PCA out of the printer (see Figure 6-4).
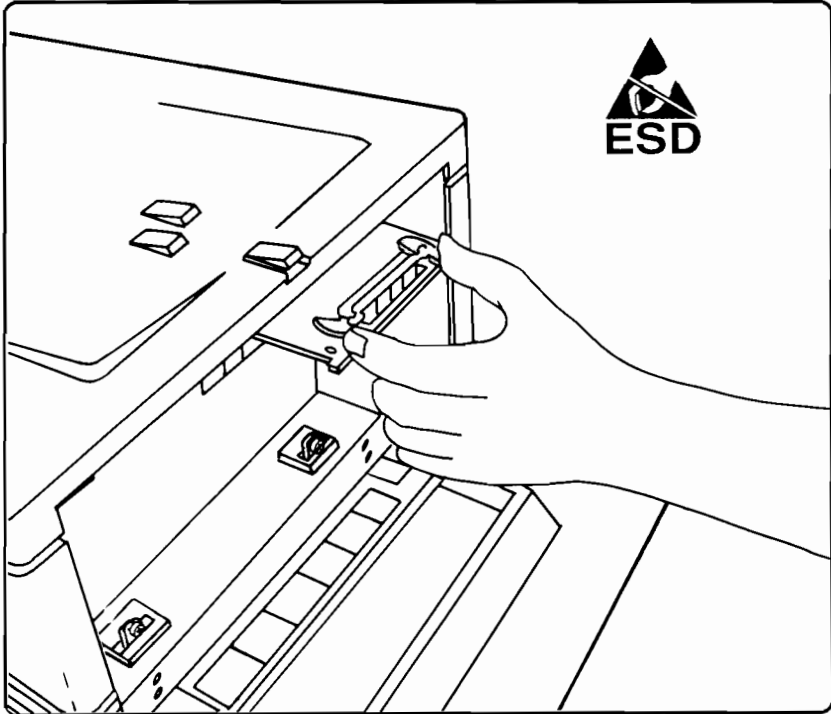

Figure 6-4. Accessory Memory PCA Removal

Lower Cassette (LC) Base Assembly

1. Remove the Lower Cassette Tray.

2. Tilt the printer up on its back end (see Figure 6-5).

3. Remove the screws (4) securing the Lower Cassette Base to the printer (see Figure 6-5, callout 1).

Caution	Always remove the Lower Cassette Base Assembly by pulling the assembly straight out from the printer, or the LC Base PCA can be damaged.

4. Pull the LC Base Assembly straight out from the printer to remove the base.
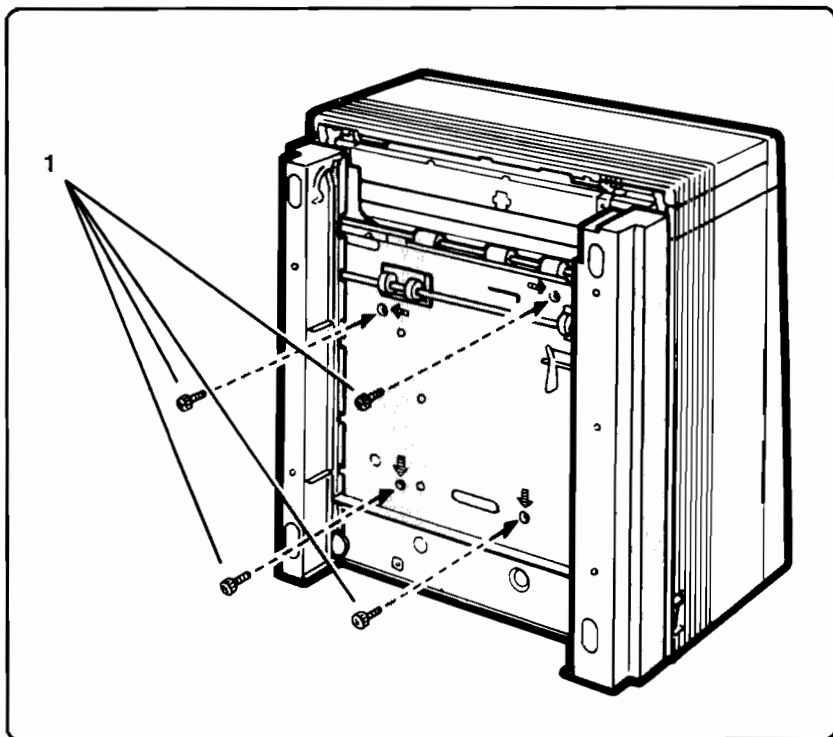

Figure 6-5. Lower Cassette Base Removal

LC Base Cover Stop

The LC Base Cover Stop must be removed before installing a legal-size LC tray. The cover stop may be removed while the LC Assembly is installed.

1. Pull out on the center of the Cover Stop, bowing it slightly to remove the stop (see Figure 6-6).
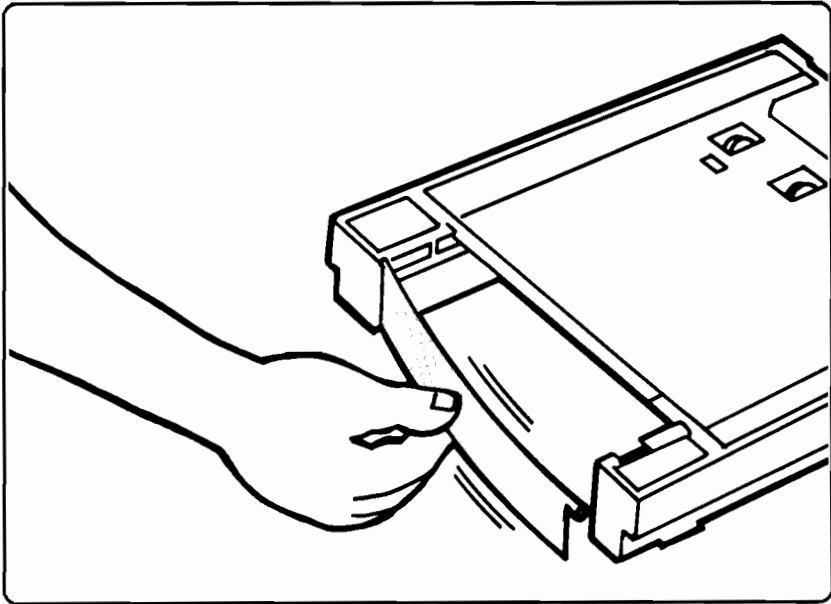

Figure 6-6. Cover Stop Removal

LC Base PCA

1. Remove the Lower Cassette Base Assembly (see Figure 6-5).

Caution ✋	Be careful not to damage the LC Switch Levers while handling the LC Base PCA and bracket.

2. Remove the screws (2) securing the LC Base PCA bracket to the LC Base frame (see Figure 6-7, callout 1). Lift the PCA and bracket out of the LC Base.

3. Unplug the cable connector from connector J902 of the LC Base PCA (see Figure 6-7, callout 2).

4. Remove the screws (4) securing the PCA to its mounting bracket (see Figure 6-7, callout 3).
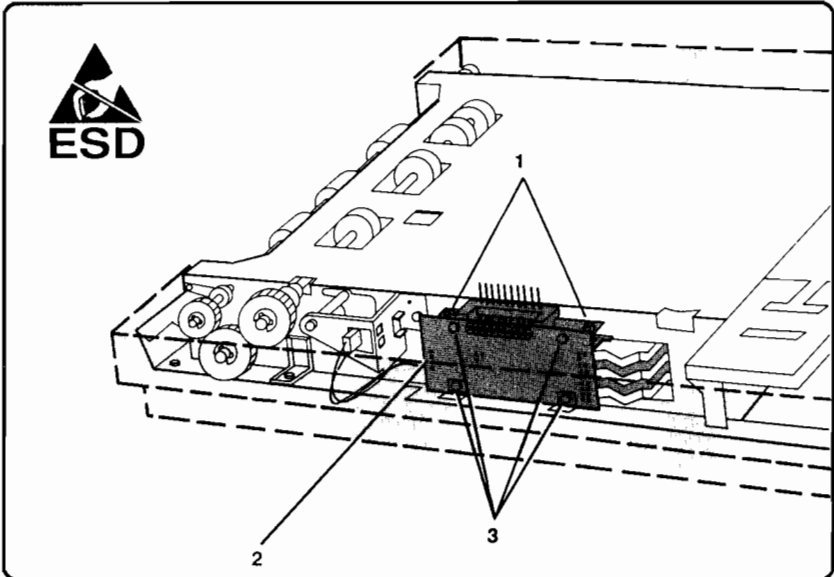

Figure 6-7. Removing the LC Base PCA (Cover Removed)

Right LC Base Cover

1. Remove the Lower Cassette Base Assembly (Figure 6-5) and the LC Base Cover Stop (Figure 6-6).

2. Remove the LC Base PCA and bracket (see Figure 6-7).

3. Turn the base over and remove the screws (3) securing the Right LC Base Cover to the base (see Figure 6-8, callout 1).
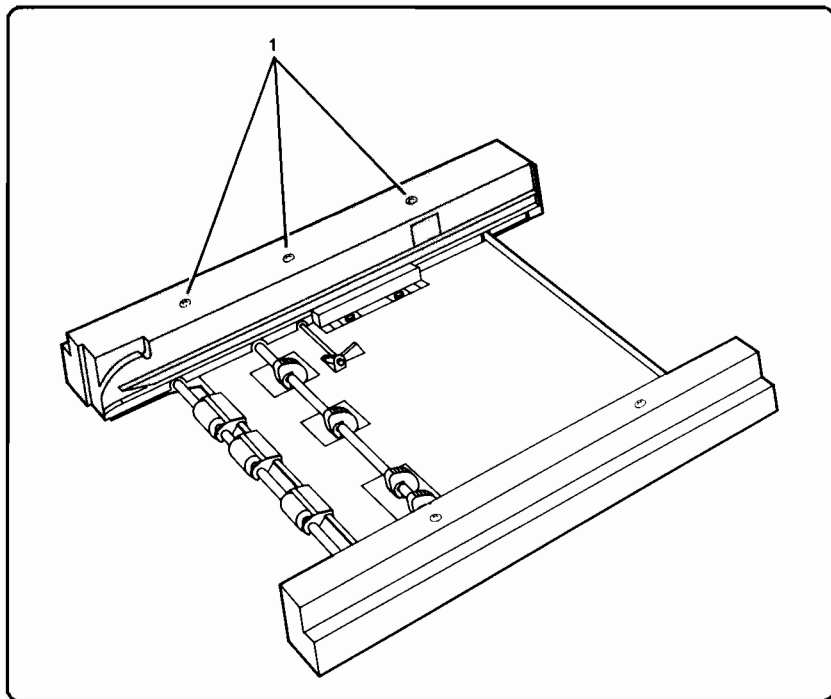
Figure 6-8. Right LC Base Cover Removal

Left LC Base Cover

1. Remove the Lower Cassette Base Assembly (Figure 6-5) and the LC Base Cover Stop (Figure 6-6).

2. Turn the base over and remove the screws (2) securing the Left LC Base Cover to the base and then lift to remove the cover (see Figure 6-9, callout 1).
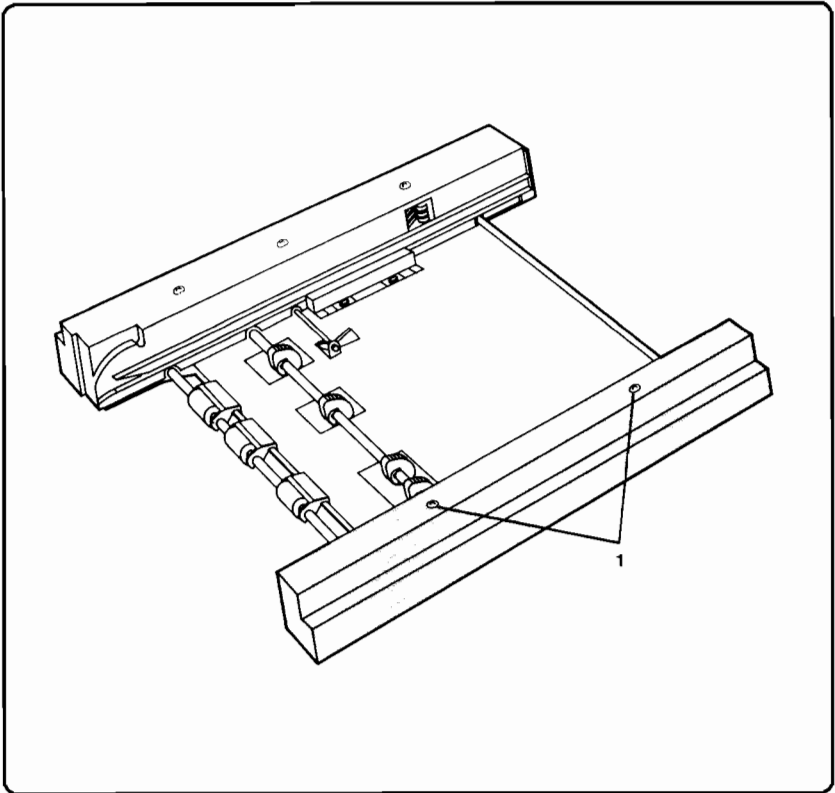
Figure 6-9. Left LC Base Cover Removal

LC Pick-Up Roller Assembly

1. Remove the Lower Cassette Base Assembly (Figure 6-5) and the LC Base Cover Stop (Figure 6-6).

2. Remove the LC Base PCA and bracket (see Figure 6-7).

3. Remove both the Right and Left Base Covers (see Figure 6-8 and Figure 6-9).

4. Remove the E-clips on each end of the LC Pick-Up Roller Assembly (see Figure 6-10, detail A).

5. Being careful not to lose the alignment pin, use a 1.5 mm Allen Wrench to loosen the set screw (3 to 4 turns) that secures the Clutch Assembly. Remove the assembly (Figure 6-10, detail B).

6. Remove the retainer pin (see Figure 6-10, detail C) and both brass bushings (see callout 1).

7. Remove the LC Pick-Up Roller Assembly from the base.

Caution	
	■ When installing the Clutch Assembly, ensure that the pick-up rollers are protruding above the base and are locked into position by the clutch solenoid SL2 as shown in Figure 6-10, callout 2. **Improper installation causes paper jams.**
	■ The Clutch Assembly contains an inner coil spring which must be retained in the **middle slot** on the gear body (see Figure 6-10, detail D).
	■ To prevent clutch binding, ensure at least 0.2 mm (0.008 inch) gap before tightening the set screw (see Figure 6-10, detail D).
	■ When replacing the clutch components, they must be properly lubricated. See the note under Table 8-10, page 8-25 for lubricant specifications.

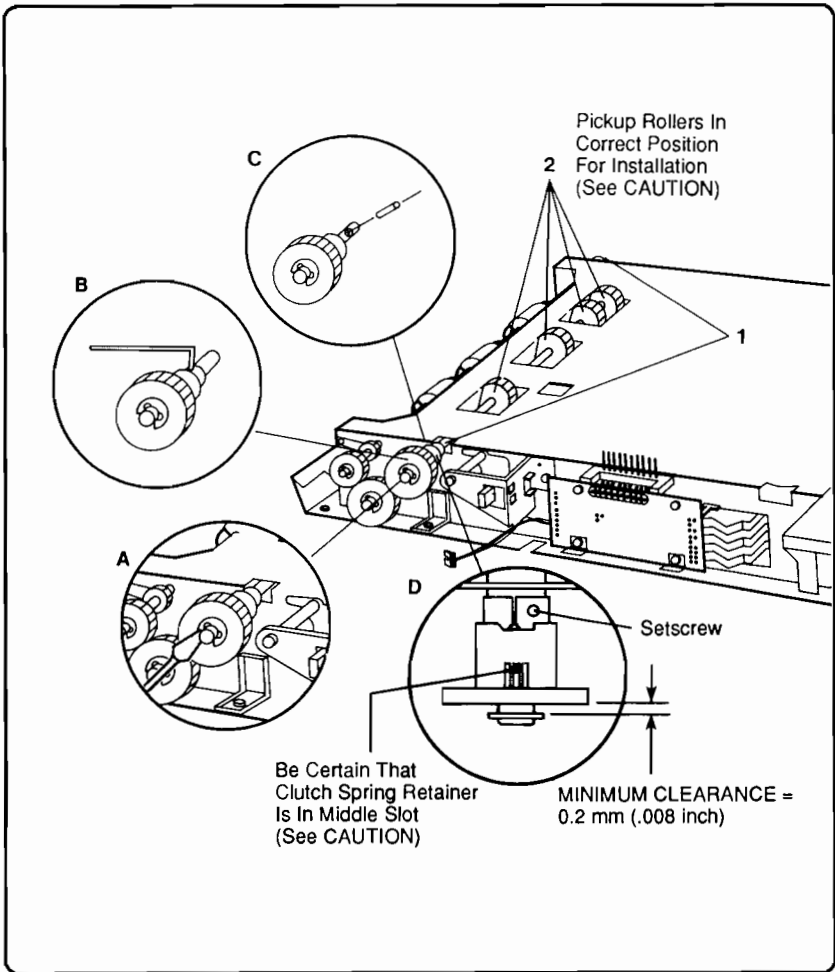# LC Pick-Up Roller Assembly (continued)

Figure 6-10. LC Pick-Up Roller Removal

LC Feed Roller Assembly

1. Remove the Lower Cassette Base Assembly (Figure 6-5) and the LC Base Cover Stop (Figure 6-6).
2. Remove the LC Base PCA and bracket (see Figure 6-7).
3. Remove the Right and Left Base Covers (see Figures 6-8 & 6-9).

Note	Before proceeding, note the way in which the black plastic Roller Guides attach to the LC Base plate (see Figure 6-11, callout 2).

4. Remove both E-clips on each end of the LC Feed Roller Assembly (see Figure 6-11, detail A).
5. Being careful not to lose the retaining pin, remove the Feed Roller Gears (2) and the retainer pin (see Figure 6-11, detail B).
6. Remove both brass bushings (see Figure 6-11, callout 1).
7. Remove the LC Feed Roller Assembly from the base.
8. Remove the plastic Roller Guides (3) from the LC Feed Roller Assembly (see Figure 6-11, callout 2).
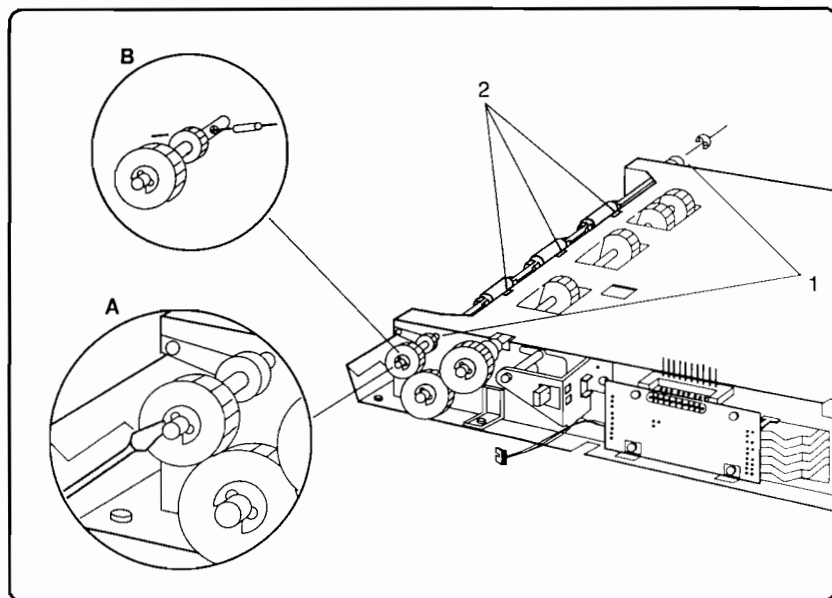

Figure 6-11. LC Feed Roller Assembly Removal

LC Pick-Up and Feed Solenoids (SL2 & SL3)

1. Remove the Lower Cassette Base Assembly (see Figure 6-5).
2. Remove the LC Base PCA and bracket (see Figure 6-7).
3. Remove the Right LC Base Cover (see Figure 6-8).
4. Remove the LC Pick-up Roller's right E-clip, Clutch Assembly, and retainer pin (see Figure 6-10, details A, B and C).
5. Remove the LC Feed Roller's E-clip, (2) Gears, and retainer pin (see Figure 6-11, details A and B).
6. Remove the Main Drive Gear retaining collar using a 1.5 mm Allen Wrench. Remove the Clutch Assembly from the base. **Note the 0.2 mm (0.008 in) gap requirement to prevent clutch binding** (see Figure 6-12, detail A).
7. Remove the E-clip (see Figure 6-12, detail B).
8. Unplug the cable connector from PS6 (Figure 6-12, callout 1).
9. Remove the screw (1) securing the Input Solenoid (SL3) Bracket to the base (see Figure 6-12, callout 2).
10. Remove the screw (1) securing each solenoid (SL2 and SL3) to its bracket (see Figure 6-12, callout 3).
11. Note the position of the Paper Out Sensor Arm and the cable to the LC Feed Solenoid, then remove the screw (1) securing the Paper-Out Photosensor (PS6) Bracket to the base (Figure 6-12, callout 4). Remove the solenoid cable assembly .
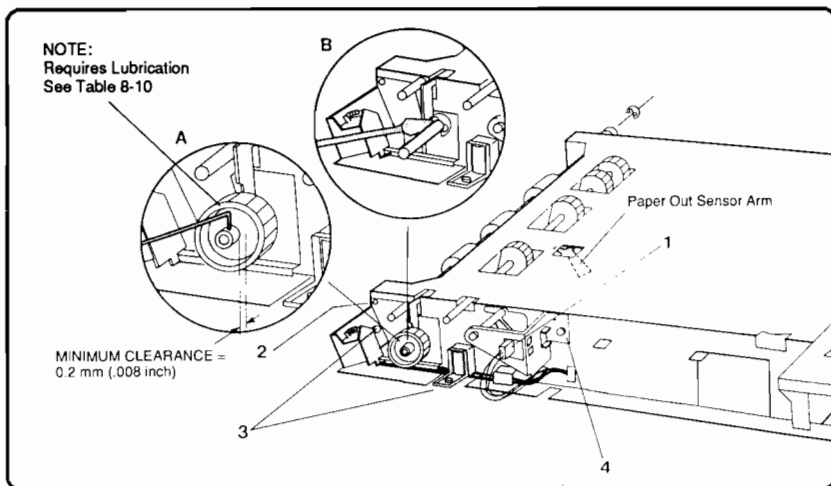

Figure 6-12. SL2 and SL3 Removal

LC Paper-Out Photosensor (PS6)

1. Remove the Lower Cassette Base Assembly (Figure 6-5) and the LC Base Cover Stop (Figure 6-6).

2. Remove the LC Base PCA and bracket (see Figure 6-7).

3. Remove the Right LC Base Cover (see Figure 6-8).

4. Unplug the cable connector from PS6 (see Figure 6-13, callout 1).

5. Remove PS6 from its bracket using a pair of needle nose pliers and/or a small flat-head screwdriver (see Figure 6-13, details A and B).
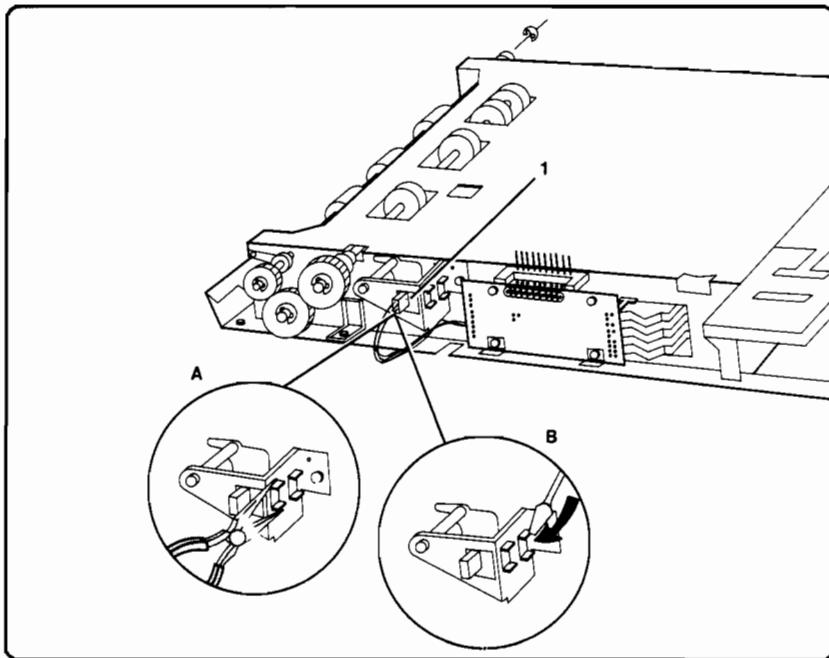

Figure 6-13. LC Paper-Out Photosensor (PS6) Removal

Covers

Throughout this section, a number enclosed in parentheses, such as (4) represents the number of screws to be removed or loosened during each step. This section lists procedures for removing the following covers and their subassemblies:

1. Rear Cover - Pg. 6-18
2. Top Cover - Pg. 6-19
   A. Paper Support Plate and Guide - Pg. 6-21
   B. Control Panel Assembly - Pg. 6-23
3. Right Side Cover - Pg. 6-24
4. Left Side Cover - Pg. 6-25
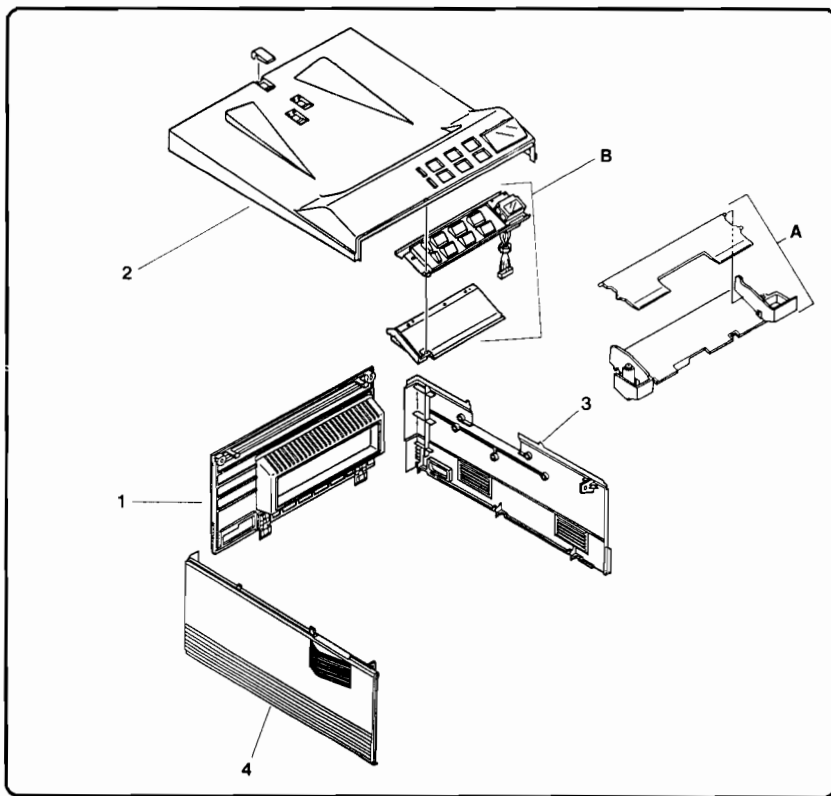
Figure 6-14. Printer Cover Locations

Rear Cover

1. Open the Rear Cover by loosening the captive screws (2) securing the cover (see Figure 6-15, callout 1).

2. Use a small flat-head screwdriver to depress each Rear Cover Hinge and pull the Rear Cover away from the printer (see Figure 6-15, detail A).

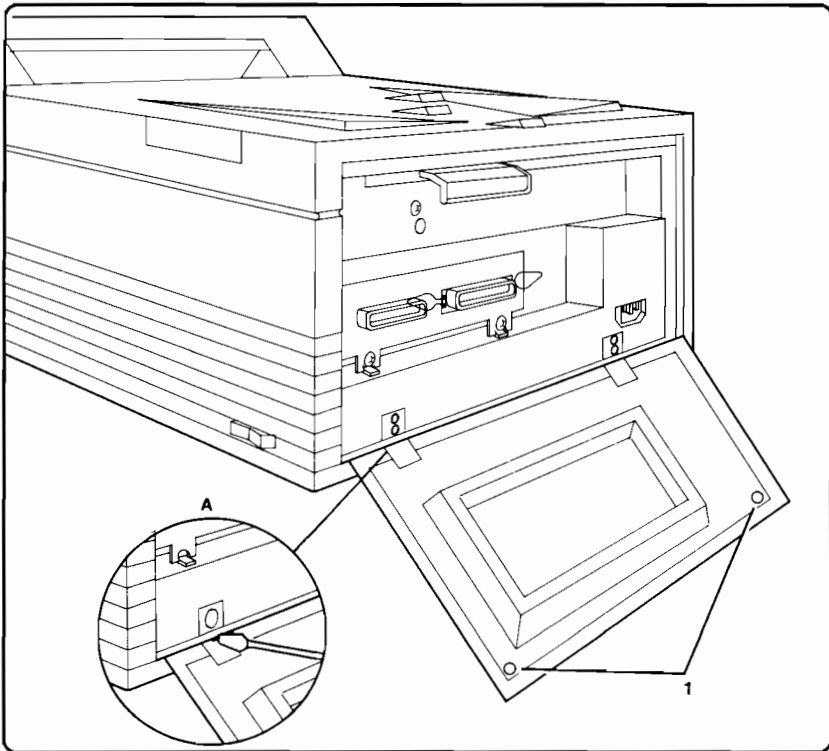| **Caution**	Do not force the hinges out of their slots or they may not stay in place upon replacement.

Figure 6-15. Rear Cover Removal

Top Cover

1. Loosen the screws (2) and open the Rear Cover (see Figure 6-15).

2. From the front of the printer, open the Paper Path Door. Remove the right screw (Figure 6-16, callout 1) and loosen the left screw (see Figure 6-16, callout 2) securing the Top Cover.

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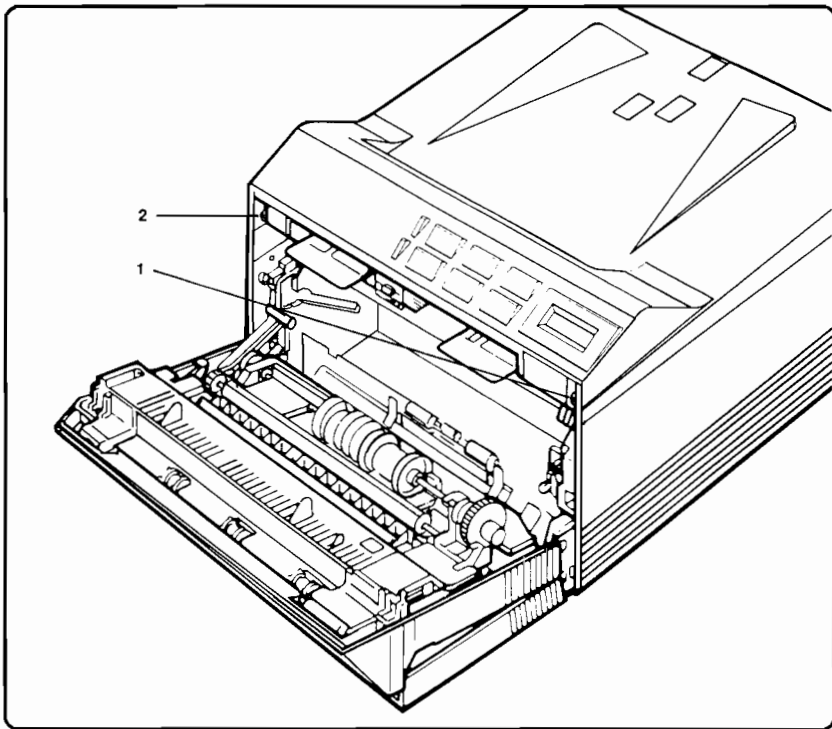
Figure 6-16. Top Cover Removal

Top Cover (continued)

3. Raise the Top Cover slightly and disconnect the Control Panel Cable from the Formatter PCA (Figure 6-17, callout 1).

4. Lift upward to remove the cover.

Note	The red stripe on the Control Panel Cable marks pin 1 and it must be facing toward the left when the Top Cover is installed.
	When replacing the Top Cover, be sure to align the font cartridge door correctly (Figure 6-17, callout 2).
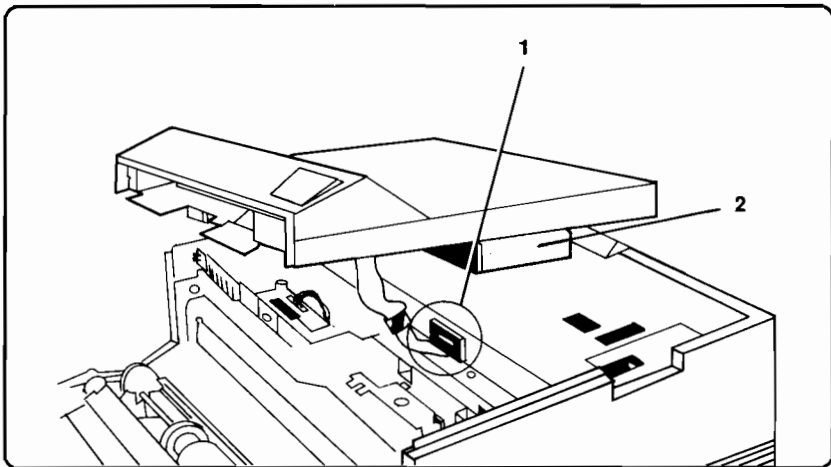
Figure 6-17. Top Cover Removal (continued)

Paper Support Plate and Guide

1. Remove the Top Cover (see Figure 6-16 and Figure 6-17). Turn the cover upside-down.

2. Remove the screws (2) (see Figure 6-18, callout 1) securing the Paper Guide (see callout 2) to the Top Cover and then remove the guide.

Note	Two different types of screws are used to secure the Paper Guide in place. A threaded Phillips screw is used on one side and a self-tapping Phillips screw is used on the other side (see Figure 6-18, callout 1).

(continued on next page)
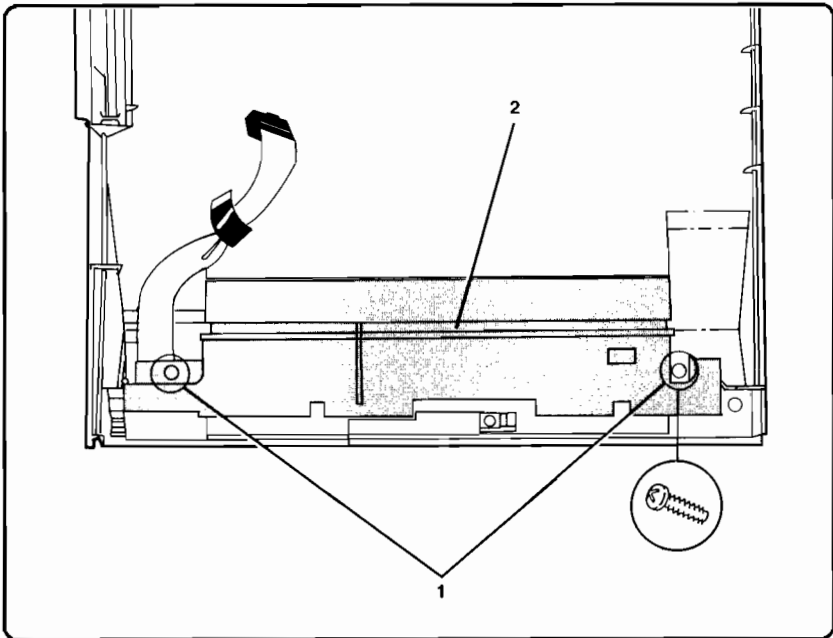
Figure 6-18. Paper Guide Removal

Paper Support Plate (continued)

3. Turn the Paper Guide upside-down.

4. While holding the Paper Guide, pull up on the center of the Paper Support Plate to remove the plate. The plate should bow slightly (see Figure 6-19, callout 1).
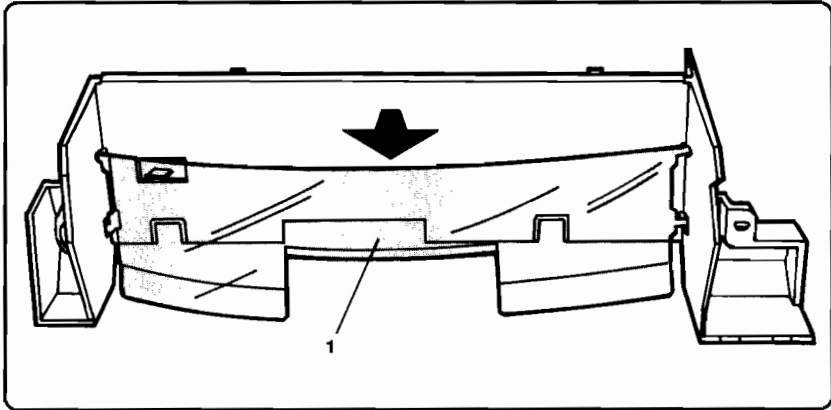
Figure 6-19. Paper Support Plate Removal

Control Panel Assembly

1. Remove the Top Cover (see Figure 6-16 and Figure 6-17). Turn the cover upside-down.

2. Remove the Paper Guide (see Figure 6-18).

3. Remove the screws (2 or 3) securing the Control Panel Cover (see Figure 6-20, callout 1), and the screw (1), securing the Control Panel (callout 4).

4. Remove the Control Panel Cover (Figure 6-20, callout 2), then the Control Panel Assembly (Figure 6-20, callout 3).

Caution	When replacing the Control Panel and Cover, ensure that the anti-static teeth and any thin plastic paper guides are not caught beneath them.
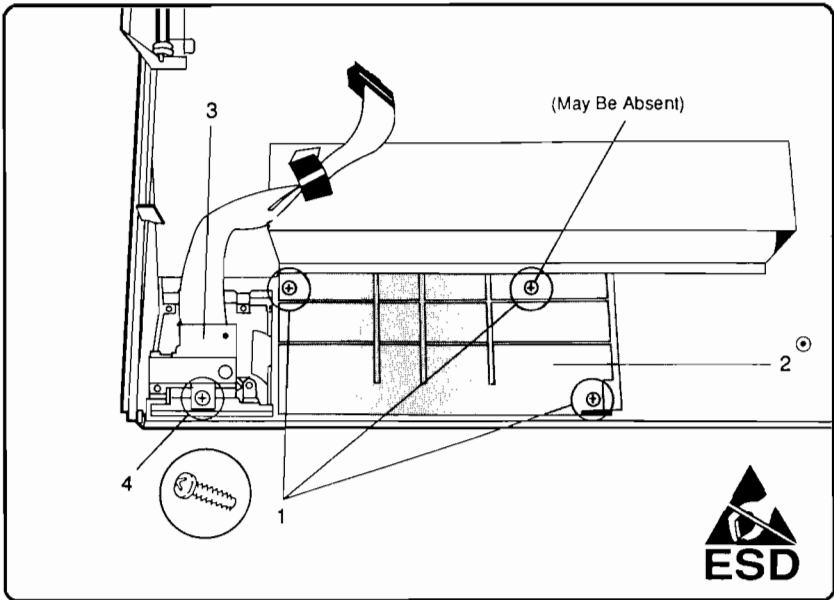
Figure 6-20. Control Panel Removal

Right Side Cover

1. Remove the Top Cover (see Figure 6-16 and Figure 6-17).

2. Use a small flat-head screwdriver to unlatch the Right Side Cover (see Figure 6-21, detail A).

3. Allow the cover to swing down until it is parallel with the work surface, then remove the cover.

Note   When replacing, be sure to open the Paper Path Door.
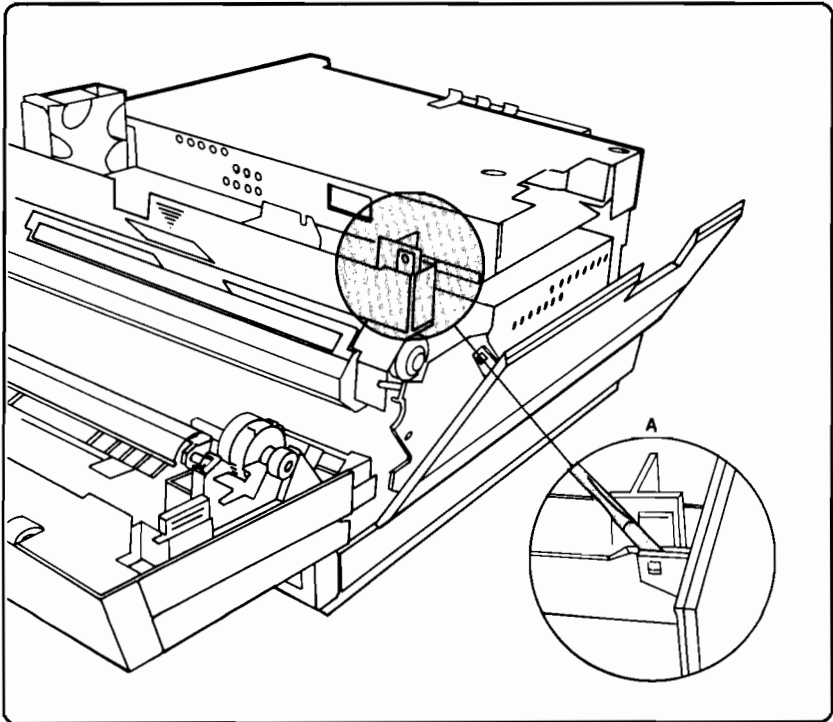
Figure 6-21. Right Side Cover Removal

Left Side Cover

1. Remove the Top Cover (see Figure 6-16 and Figure 6-17).

2. Use a small flat-head screwdriver to unlatch the Left Side Cover (see Figure 6-22, detail A).

3. Allow the cover to swing down until it is parallel with the work surface, then remove the cover.
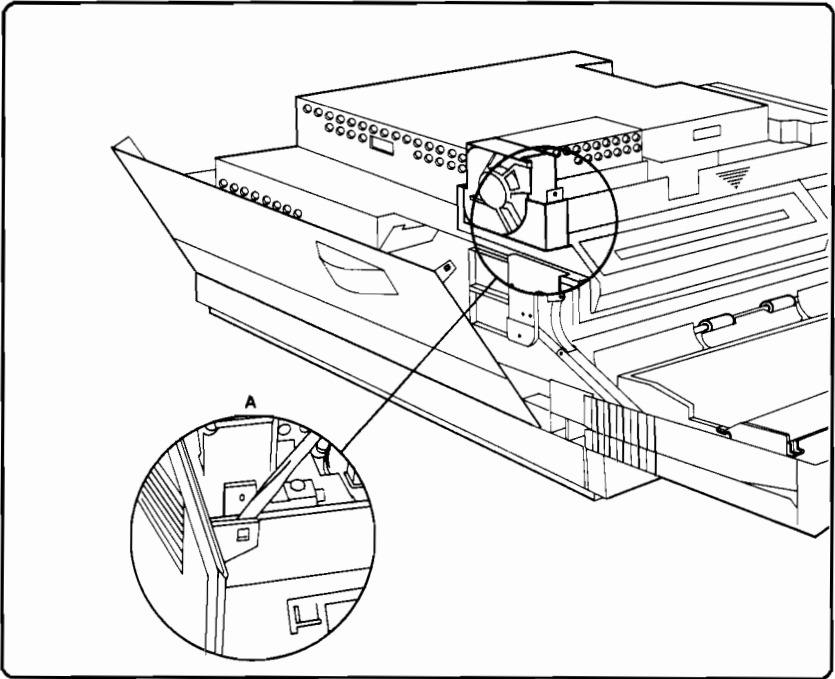
Figure 6-22. Left Side Cover Removal

Controller PCAs and Shields

This section lists procedures for removing the following PCA assemblies:

1. Formatter PCA - Pg. 6-27
2. Formatter PCA/Shield Assy - Pg. 6-29
3. DC Controller PCA - Pg. 6-30
4. Rear Support Shield - Pg. 6-32
5. Lower PCA Shield - Pg. 6-33
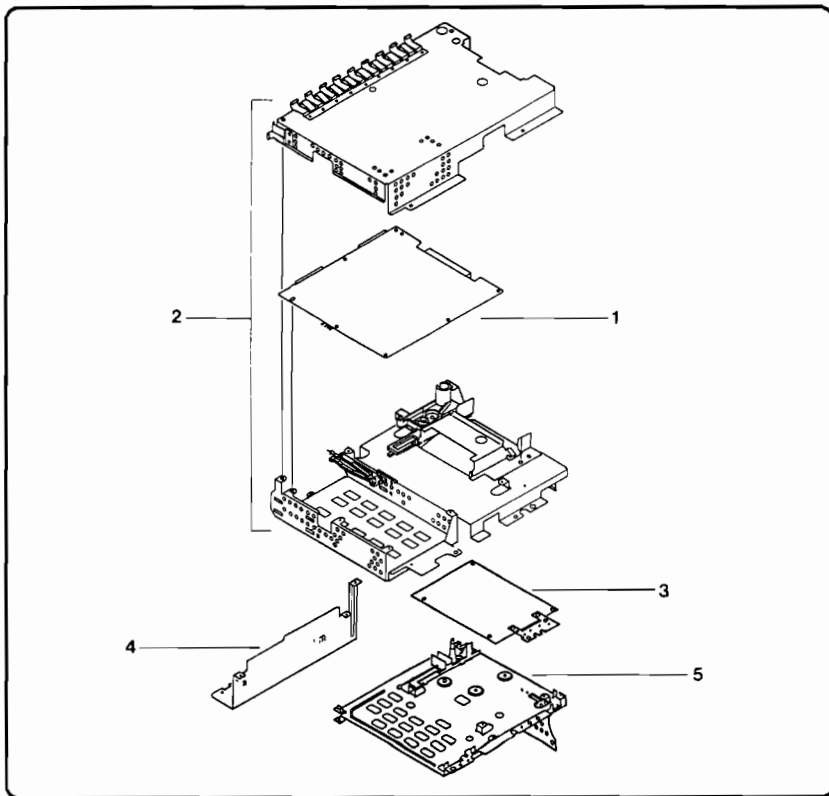
Figure 6-23. Controller PCA and Shield Locations

Formatter PCA

Caution	The Formatter PCA is susceptible to ESD (Electrostatic Discharge) damage. Take all ESD precautions. Service only at an ESD-protected workstation.

Note	**LaserJet IIIP Only:** Whenever possible, the current page count stored within the Formatter PCA should be noted and entered into the replacement PCA. See "Setting the Page Count" in Chapter 3.

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove any Accessory Memory PCAs (see Figure 6-4).
4. Remove the screws (5) securing the Upper PCA Shield and remove the shield (Figure 6-24, callout 1).
5. Disconnect the Power Cable from the Formatter PCA (see Figure 6-24, callout 2).

   (continued on next page)
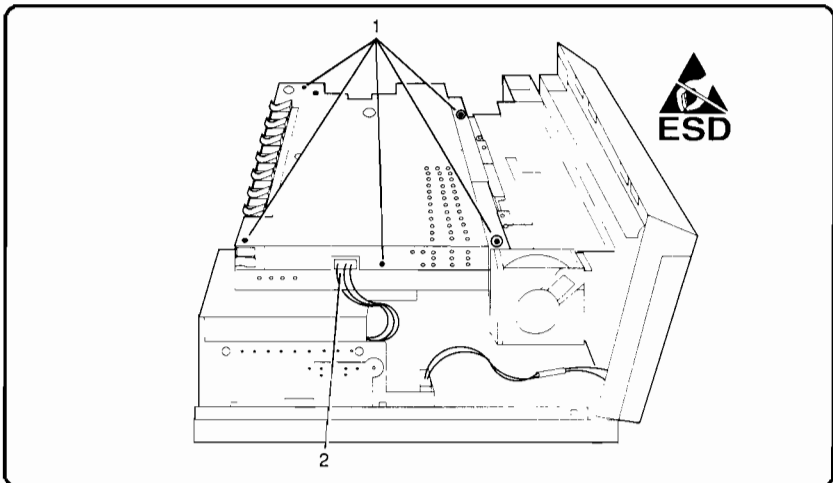
Figure 6-24. Upper PCA Shield Removal

Formatter PCA (continued)

Caution	Always remove the Formatter PCA by pulling the PCA straight up, or the connector to the DC Controller can be damaged.

6. Remove the screws (7) securing the Formatter PCA to the Intermediate PCA Shield, then lift straight up to remove the PCA (see Figure 6-25, callout 1).
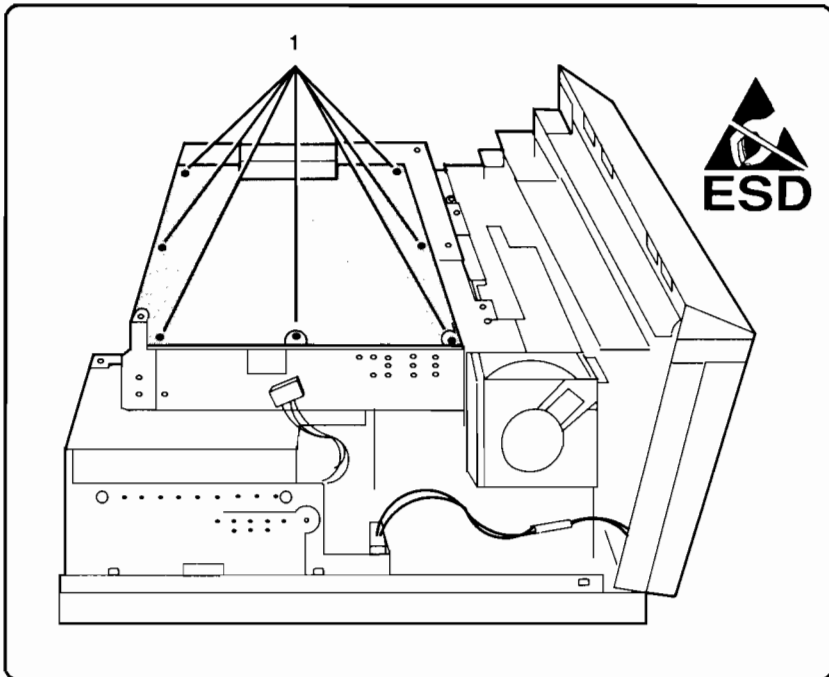
Figure 6-25. Formatter PCA Removal

Formatter PCA/Shield Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove any Accessory Memory PCAs (see Figure 6-4).
4. Remove the screws (4) with star washers securing the PCA
   Shield (see Figure 6-26, callout 1).

Caution   Always pull straight up on the Shield Assembly
when removing it to prevent damage to the DC
Controller connector.

5. Disconnect the power cable from the Formatter PCA
   (Figure 6-26, callout 2) and lift the Shield Assembly straight up
   to remove it.
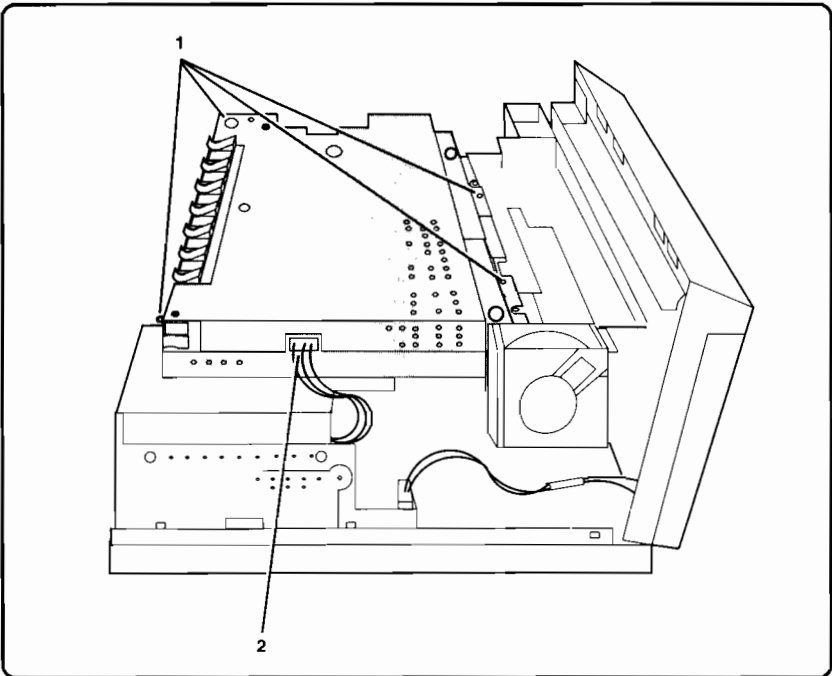
Figure 6-26. Formatter PCA/Shield Assembly Removal

DC Controller PCA

Caution	The DC Controller PCA is susceptible to ESD (Electrostatic Discharge) damage. Take all ESD precautions. Service only at an ESD-protected workstation.

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).

2. Remove the Dual I/O Interface Assembly (see Figure 6-3).

3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).

4. Unplug the cable connectors (10) to the DC Controller.

   (continued on next page)

DC Controller PCA (continued)

5. Unclamp the Cable Clamps (2) using a small flat-head screwdriver (see Figure 6-27, callout 1 and detail B).

6. Remove the washer-head screws (4) securing the DC Controller (see Figure 6-27, callout 2).

7. Remove the DC Controller PCA by lifting slightly and pivoting it out of its Positioning Bracket (see Figure 6-27, callout 3).

Caution	■ When replacing the Fiber Optics Cable, ensure that the cable has not been damaged and that it is securely connected.
	■ Whenever the DC Controller is exchanged, a registration adjustment is required (see "Registration Adjustment," in Chapter 4).
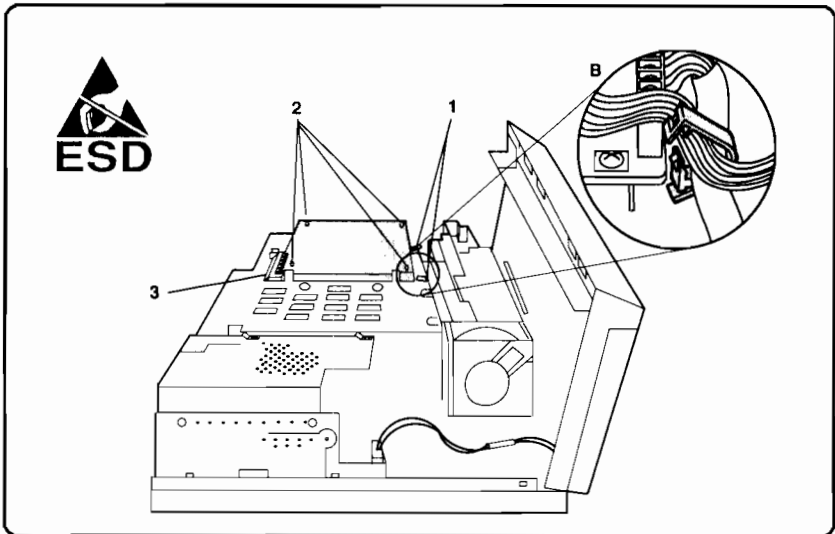
Figure 6-27. DC Controller PCA Removal

Rear Support Shield

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).

2. Remove the Dual I/O Interface Assembly (see Figure 6-3).

3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).

4. Remove the screws (4) with star washers securing the Rear
   Support Shield, and remove the shield (see Figure 6-28,
   callout 1).
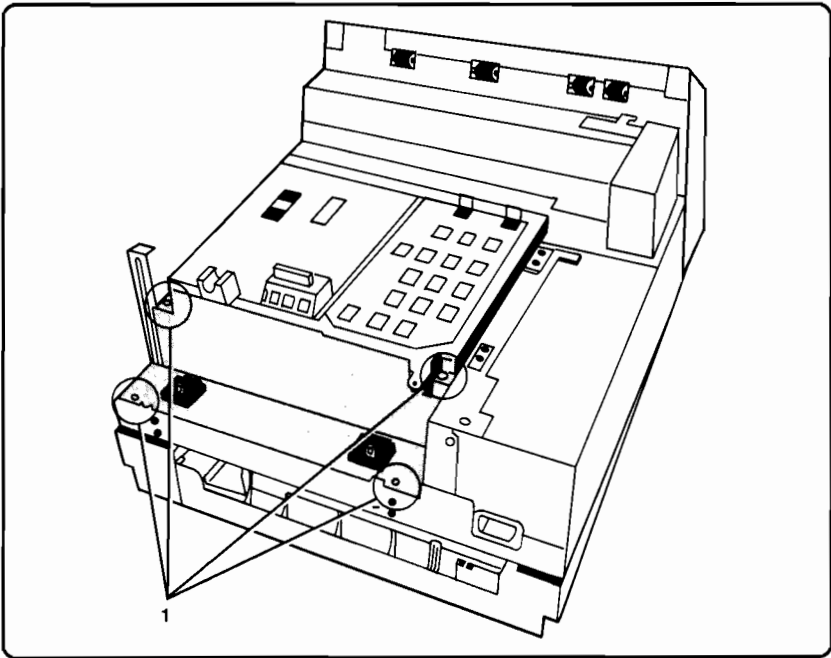
Figure 6-28. Rear Support Shield Removal

Lower PCA Shield Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove all cables from the DC Controller PCA and from their retainers (clamps) on the Lower PCA Shield Assembly (see Figure 6-27).
6. Remove the screws (4) securing the Lower PCA Shield Assembly to the printer (see Figure 6-29, callout 1).
7. Remove the Lower PCA Shield Assembly from the printer.

Note	Two different types of screws are used to secure the Lower PCA Shield Assembly in place. Two threaded Phillips screws with star washers are used on the bottom of the shield and two self-tapping Phillips screws are used on the top of the shield (see Figure 6-29).
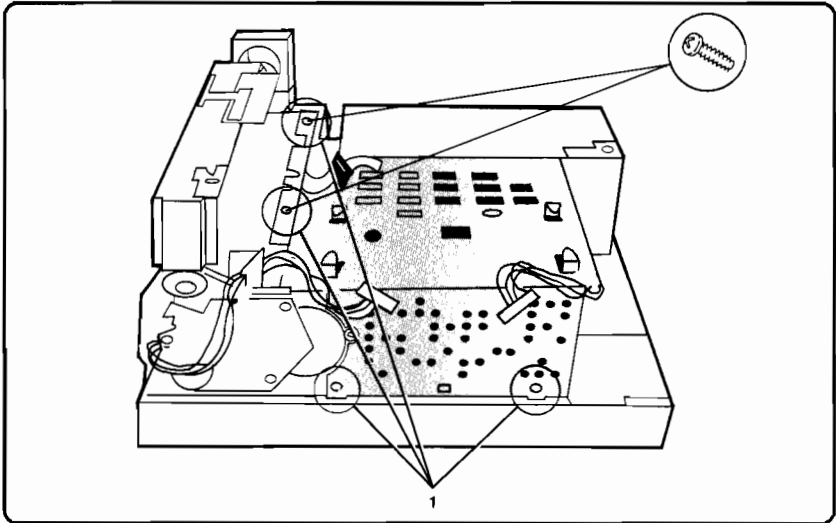
Figure 6-29. Lower PCA Shield Assembly Removal (DC Controller removed)

Upper Mainframe Assembly

This section lists procedures for removing the following assemblies:

1. Fan - Pg. 6-35
2. EP Cartridge & Paper Exit Photosensors (PS5 & PS3) - Pg. 6-36
3. Density Adjustment PCA/Cable Assembly - Pg. 6-37
4. Upper Mainframe Assembly - Pg. 6-38
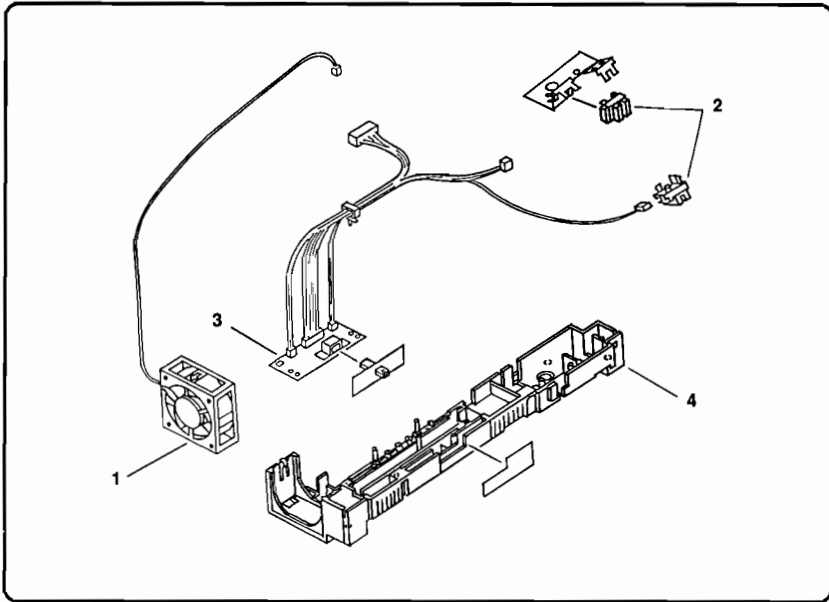
Figure 6-30. Upper Mainframe Assembly Components

Fan

1. Remove the Top Cover and Left Side Cover (Figure 6-16, Figure 6-17, and Figure 6-22).
2. Remove the screws (2) securing the Fan Clamping Bracket (see Figure 6-31, callout 1).
3. Cut the tie-wrap securing the Fan Cable (see Figure 6-31, callout 2).
4. Unplug the Fan Cable connector J701 from the Density Adjustment PCA (see Figure 6-31, callout 3).
5. Unlatch the retainer securing the Fan Clamping Bracket and remove the bracket (see Figure 6-31, detail A).
6. Remove the Fan.
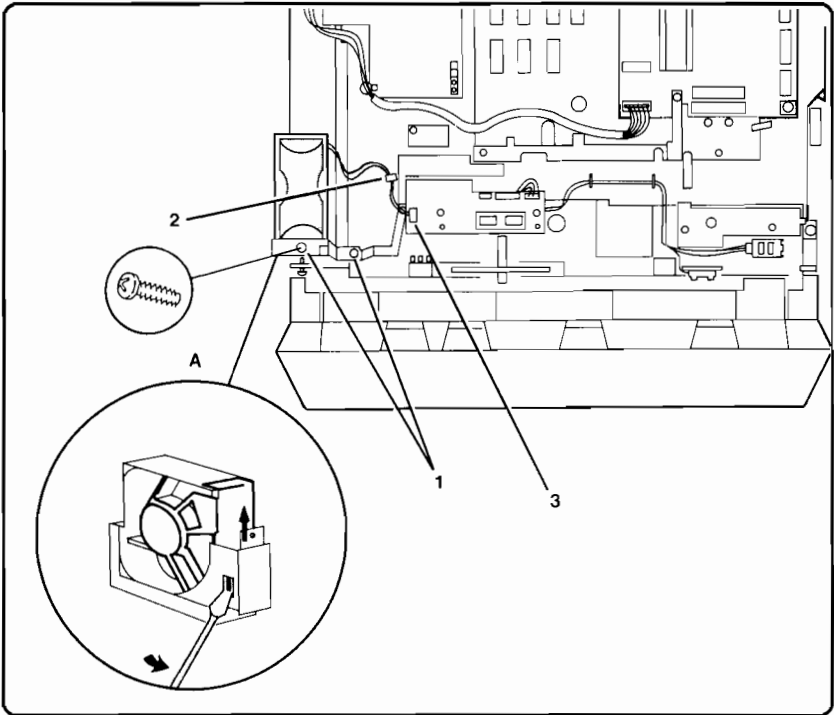
Figure 6-31. Fan Removal

EP-L Cartridge & Paper Exit Photosensors (PS5 & PS3)

1. Remove the Top Cover (see Figure 6-16 and Figure 6-17).

2. Remove the screws (2) securing the Photosensor Bracket (see Figure 6-32, callout 1).

3. Remove the Photosensor Bracket (see Figure 6-32, callout 2).

4. Unplug both photosensor connectors and then remove the faulty photosensor (see Figure 6-32, callout 3).
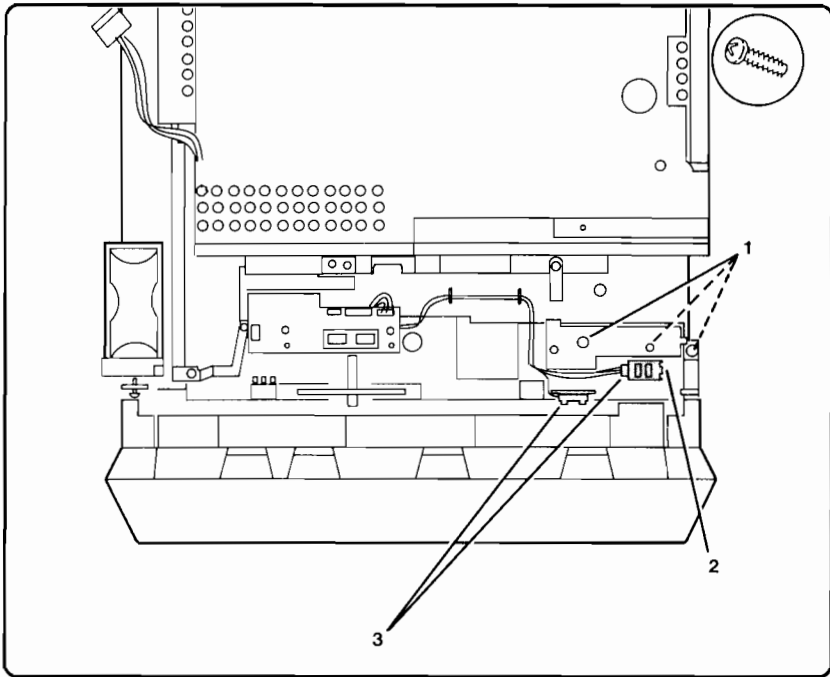
Figure 6-32. EP-L Cartridge & Paper Exit Photosensors Removal

Density Adjustment PCA/Cable Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the EP-L Cartridge/Paper Exit Photosensor Assembly (see Figure 6-32).
5. Unplug connector J213 from the DC Controller PCA (see Figure 6-33, callout 1).
6. Unplug the Fan Cable connector J701 from the Density Adjustment PCA (see Figure 6-33, callout 2).
7. Unclamp the cable clamps securing the cable assembly using a small flat-head screwdriver (see Figure 6-33, callout 3).
8. Remove the screws (2) securing the Density Adjustment PCA (see Figure 6-33, callout 4).
9. Remove the Density Adjustment PCA, Cables and Slide.
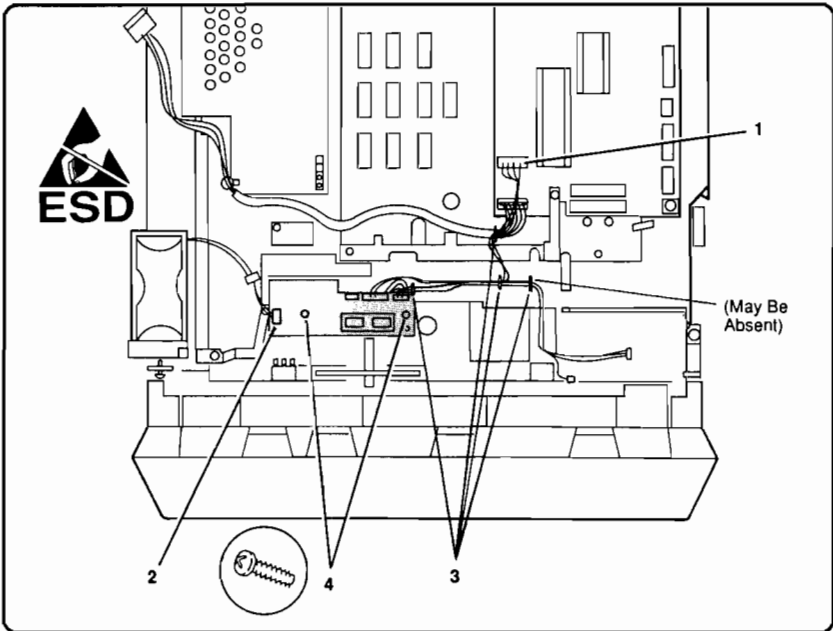
Figure 6-33. Density Adjustment PCA/Cable Assembly Removal

Upper Mainframe Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Lower PCA Shield Assembly (see Figure 6-29).
6. Unclip cables from the Upper Mainframe Assembly at specified locations (Figure 6-34, callouts 2 & 3).
7. Remove the screws (4) securing the Upper Mainframe Assembly to the Lower Mainframe Assembly (see Figure 6-34, callout 1).
8. Remove the Upper Mainframe Assembly.
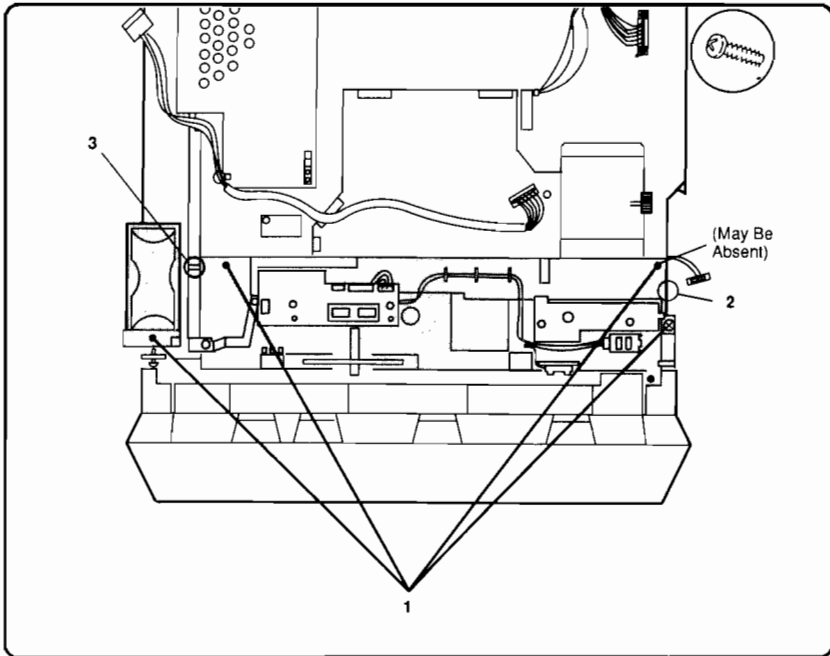
Figure 6-34. Upper Mainframe Assembly Removal

Lower Mainframe Assembly

This section describes removal of the following assemblies:

1. Input Paper Sensor (PS1)-Pg. 6-40
2. Sep Pad/Input Feed Roller-Pg. 6-41
3. Power Supply Assembly-Pg. 6-42
4. High Voltage Power Supply-Pg. 6-43
5. High Voltage Contact-Pg. 6-44
6. Main Power Switch-Pg. 6-45
7. Main Motor-Pg. 6-46
8. Main Drive Gear Assembly-Pg. 6-47
9. Drum Drive Gear/Clutch-Pg. 6-48
10. Input Feed Roller Assy-Pg. 6-49
11. Laser PCA-Pg. 6-51
12. Laser Cover/Shutter-Pg. 6-52
13. Focusing Lens-Pg. 6-53
14. Scanner Motor-Pg. 6-54

Warning　　Some sheet metal edges in the base of the printer are extremely sharp. Be careful when working in these areas to avoid cuts.
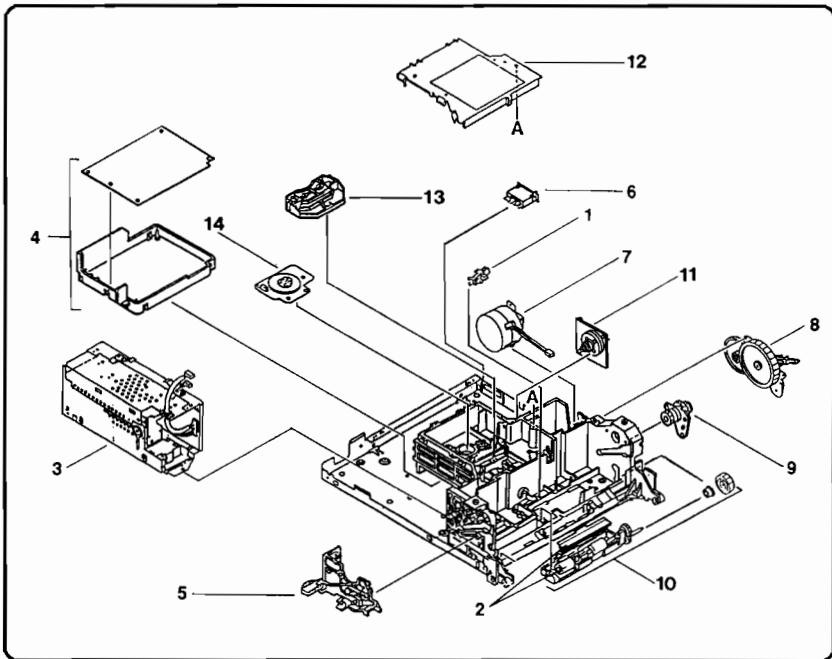
Figure 6-35. Lower Mainframe Assembly Locations

Input Paper Sensor (PS1)

1. Open the Paper Path Door and remove the EP-L Cartridge.

2. Unclamp and open the Input Paper Sensor Shield using a small flat-head screwdriver (see Figure 6-36, detail A).

3. Unplug the Input Paper Sensor Cable Connector (see Figure 6-36, detail B, callout 1).

4. Unclamp and remove PS1 using a pair of small needle nose pliers (see Figure 6-36, detail B).
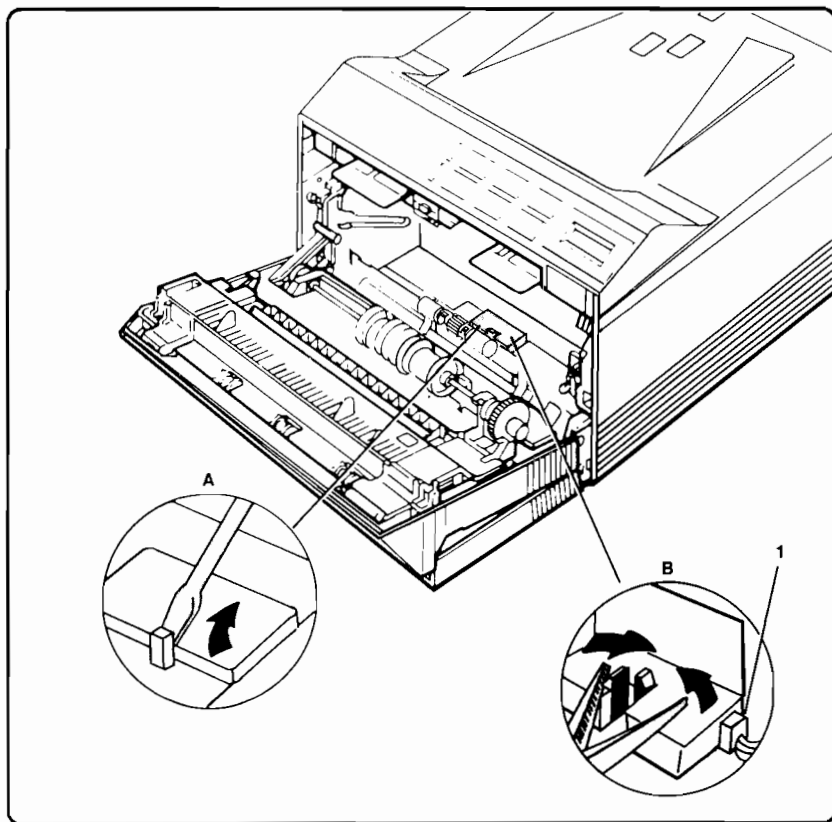
Figure 6-36. Input Paper Sensor (PS1) Removal

Separation Pad & Input Feed Roller

1. Open the Paper Path Door and remove the EP-L Cartridge.
2. Remove the cork Separation Pad with its spring attached by grasping the clear mylar strip and firmly pulling straight up (Figure 6-37, callout 1).
3. Press down on the rear of the Input Feed Roller Lever (Figure 6-37, callout 2 and detail A).
4. Pull forward on the Input Feed Roller to remove it from the lever assembly (Figure 6-37, details A and B).

Caution	The Input Paper Sensor (PS1) Lever must be below the Input Feed Roller Shaft when installing the roller (Figure 6-37, detail A, callout 3).
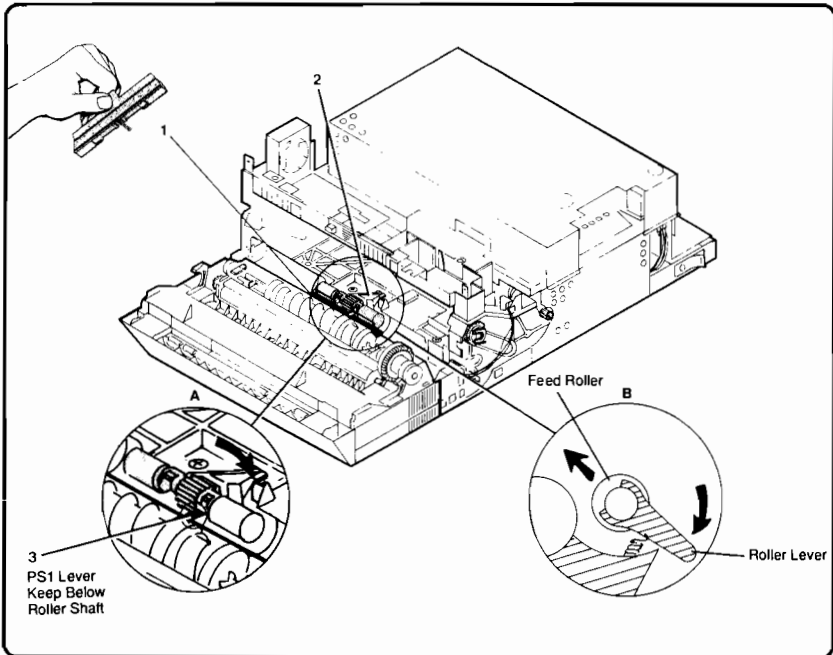
Figure 6-37. Separation Pad & Input Feed Roller Removal

Power Supply Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Unplug connector J212 from the DC Controller and release it from its cable retainers (see Figure 6-38, callout 1).
6. Squeeze connector J101 to unplug from the Power Supply (see Figure 6-38, callout 2).
7. Avoid the **sharp edge** at the rear of the printer and unplug the Power Supply connector from the Main Power Switch (see Figure 6-38, callout 3).
8. Using needlenose pliers, squeeze the switch/connector cable tie from underneath the printer base and pull up to remove the tie from the base (see Figure 6-38, callout 4).
9. Remove the (3) short screws with star washers securing the Power Supply to the Bottom Cover (see Figure 6-38, callout 5).
10. Lift the Power Supply Assembly out of the printer.
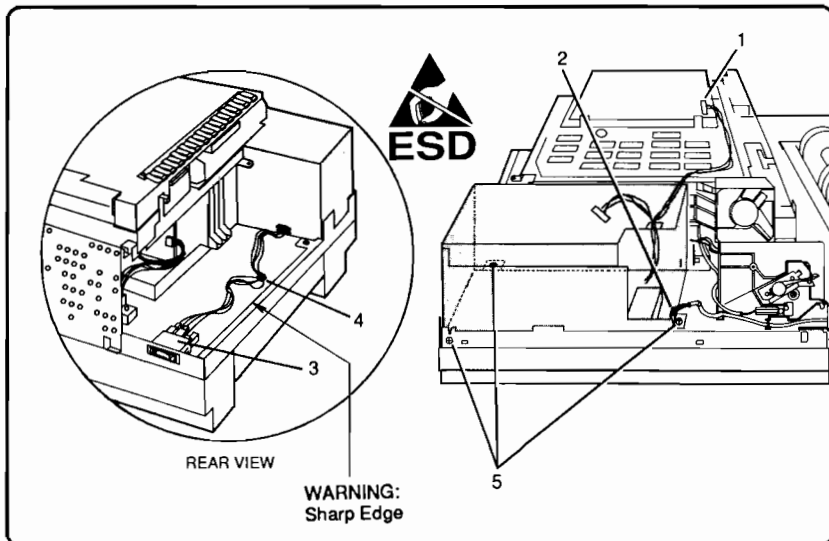
Figure 6-38. Power Supply Removal

High Voltage Power Supply Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Power Supply Assembly (see Figure 6-38).
6. Using a flat-blade screwdriver, unplug the High Voltage Cable Connector (see Figure 6-39, callout 1). **Do NOT pull on the cable.**
7. Lift the High Voltage Power Supply Assembly and pull it out slightly.
8. Unplug connectors J601 (see Figure 6-39, callout 2) and J602 (see callout 3) on the High Voltage PCA.
9. Slide the High Voltage Power Supply Assembly out of the printer.
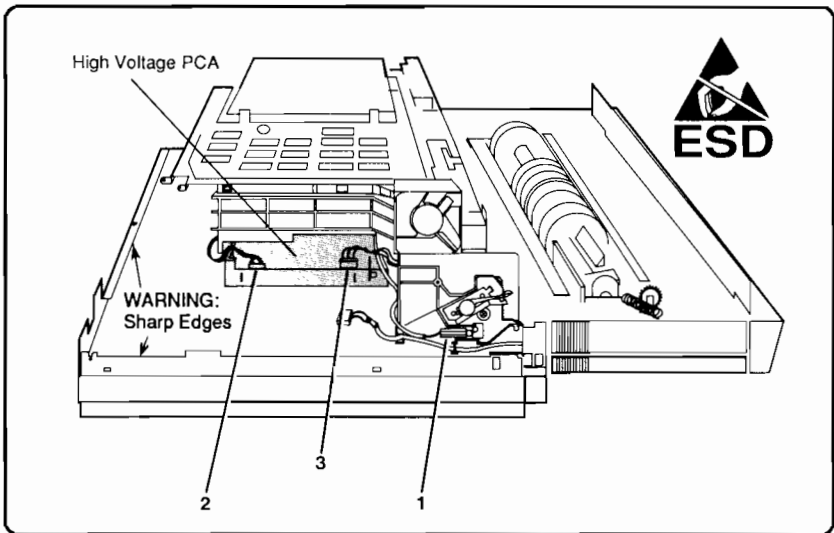
Figure 6-39. High Voltage PCA Removal

High Voltage Contact Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (Figure 6-28).
5. Remove the Power Supply Assembly (Figure 6-38).
6. Open the Paper Path Door.
7. Using a flat screwdriver, unplug the High Voltage Cable Connector (Figure 6-40, callout 1). **Do NOT pull on the cable.**
8. Unplug connector J602 on the HV PCA (Figure 6-40, callout 4).
9. Remove the screws (2) securing the Power Switching Lever Assembly to the side of the printer (Figure 6-75, callout 2).
10. Unclip the cable retainer shown (Figure 6-40, callout 2).
11. Remove the screw (1) securing the High Voltage Contact Assembly (Figure 6-40, callout 3) and carefully pry the assembly off the side of the printer.

Caution	When replacing, ensure the positioning pins are properly aligned prior to tightening the screw.
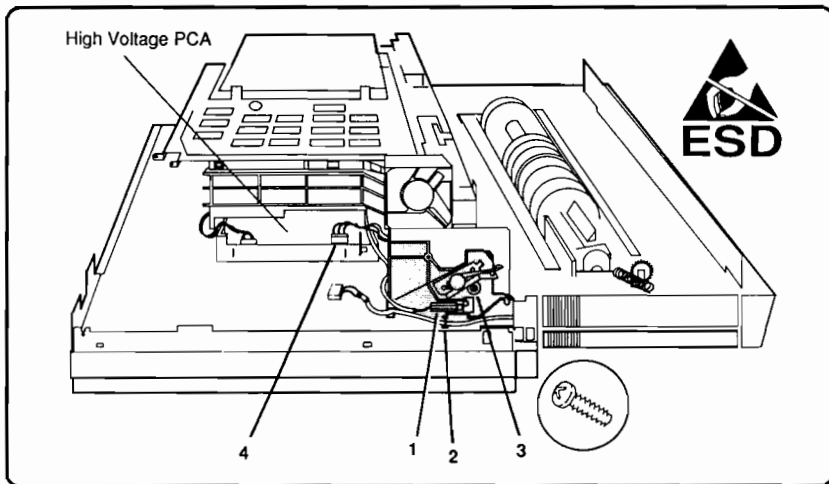
Figure 6-40. High Voltage Contact Assembly Removal

Main Power Switch

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Avoid the **sharp edge** at the rear of the printer and unplug the Power Supply connector from the Main Power Switch (see Figure 6-41, callout 1).
6. Unclamp the Main Power Switch and remove the assembly (see Figure 6-41, detail A).

Note	When reinstalling, ensure that the "0" (OFF position) on the power switch is toward the **front** of the printer.
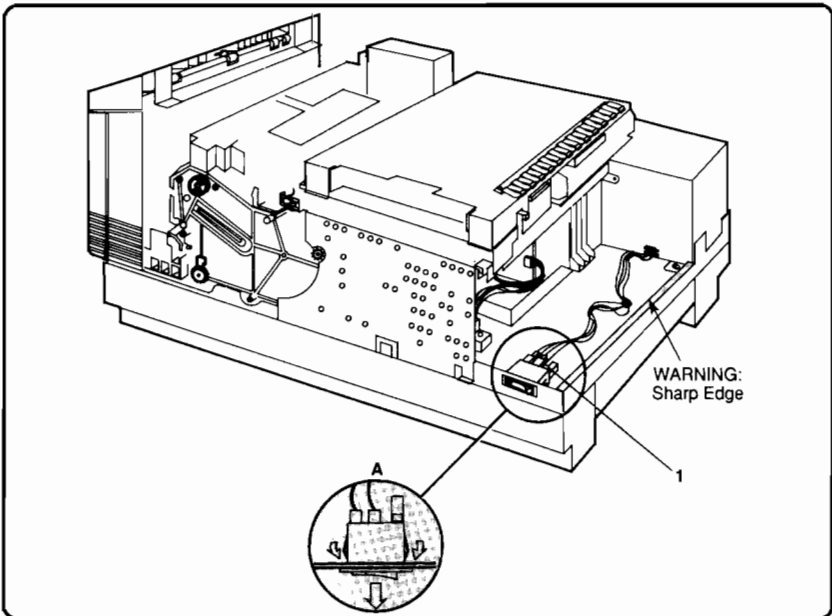
Figure 6-41. Main Power Switch Removal

Main Motor

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Lower PCA Shield Assembly (see Figure 6-29).
6. Free the cable from its retainer, then remove the screws (2) securing the Main Motor (see Figure 6-42, callout 1) and then remove the motor.

Note	When installing the Main Motor, ensure that the alignment tab is facing down. The Lower PCA Shield cannot be installed correctly if the alignment tab is facing up.
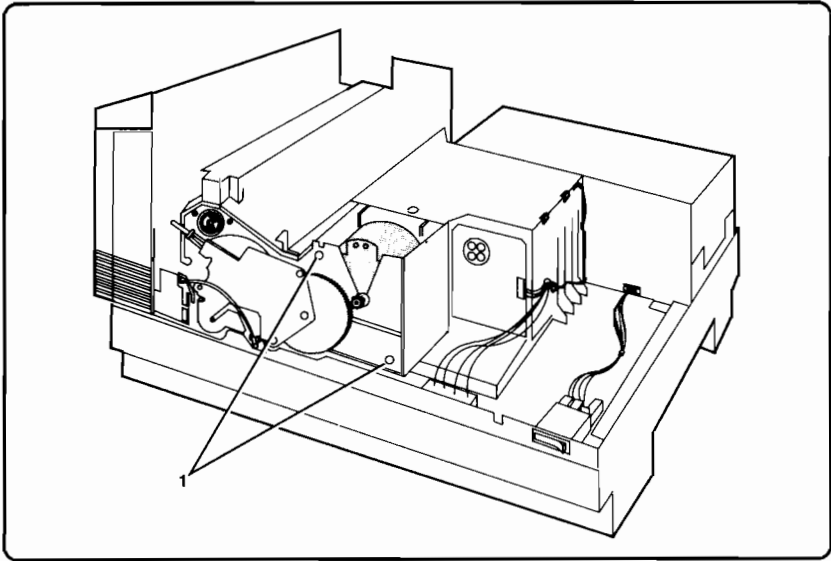
Figure 6-42. Main Motor Removal

Main Drive Gear Assembly

1. Remove the Top Cover and Right Side Cover (see Figure 6-16 and Figure 6-21).
2. Remove the cable from the Cable Clip (Figure 6-43, callout 1).
3. Unclamp the Cable Clamp securing the cable to the Main Drive Gear Assembly (see Figure 6-43, detail A).
4. Remove the screw (1) securing the grounding cable to the frame and Main Drive Gear Assembly plate (see Figure 6-43, callout 2).
5. Remove the screws (3) securing the Main Drive Gear Assembly (see Figure 6-43, callout 3).
6. Remove the Main Drive Gear Assembly.

NOTE: When installing a new assembly, apply a small amount of light grease to the large drive gear.
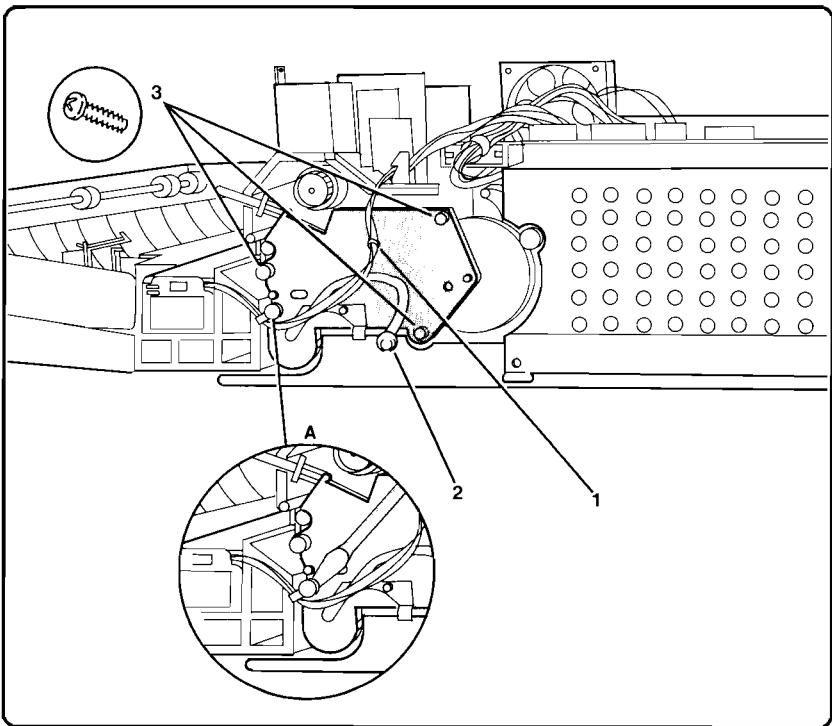
Figure 6-43. Main Drive Gear Assembly Removal

Drum Drive Gear/Clutch Assembly

1. Remove the Top Cover and Right Side Cover (see Figure 6-16 and Figure 6-21).

2. Remove the Main Drive Gear Assembly (see Figure 6-43).

3. Remove the screws (2 or 3) securing the Drum Drive Gear/Clutch Assembly (Figure 6-44, callout 1), and then remove the assembly.
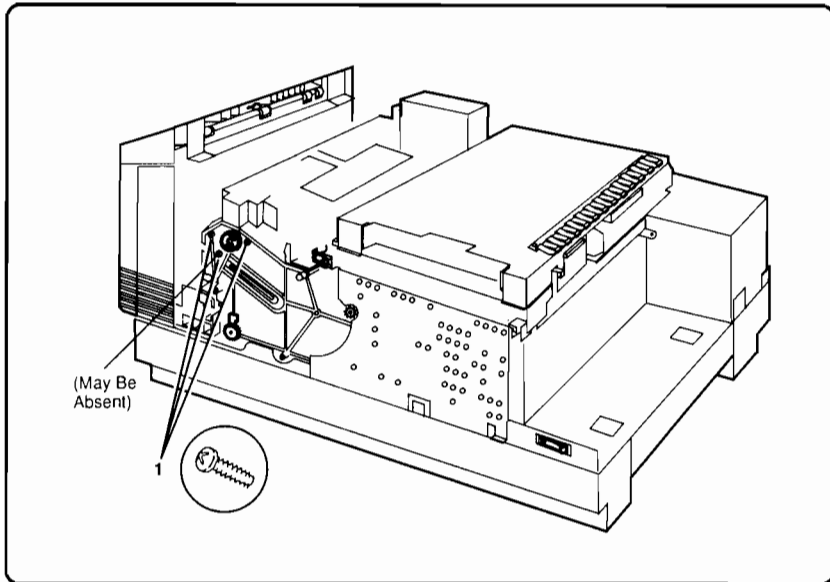
Figure 6-44. Drum Drive Gear/Clutch Assembly Removal

Input Feed Roller Assembly

This procedure is for replacing the entire Input Feed Roller Assembly. To replace the Input Feed Roller only, refer to Figure 6-37.

1. Remove the Top Cover and Right Side Cover (see Figure 6-16 and Figure 6-21).

2. Remove the Main Drive Gear Assembly (see Figure 6-43).

3. Slide the Input Feed Roller Gear (Figure 6-45, callout 1) and plastic bushing (callout 2) off its shaft.

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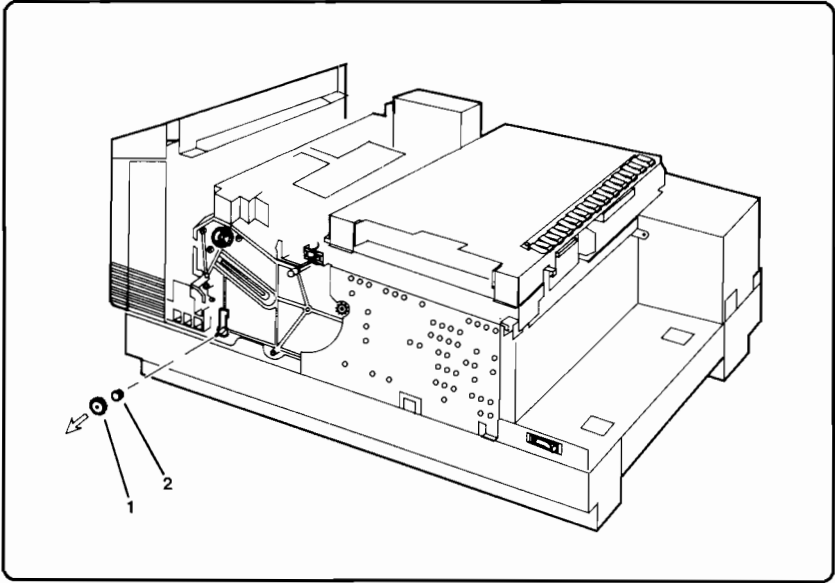
Figure 6-45. Input Feed Roller Assembly Removal

Input Feed Roller Assembly (continued)

4. Remove the EP-L Cartridge (if present).

5. Open the Input Paper Sensor Shield and unplug the Input Paper Sensor (PS1) connector (see Figure 6-36, callout 1 and Figure 6-46, callout 1).

6. Remove the Separation Pad by grasping the clear mylar strip and firmly pulling straight up (see Figure 6-46, callout 3).

7. Remove the screws (2) securing the Input Feed Roller Assembly using a Phillips screwdriver with a 1-inch shaft (see Figure 6-46, callout 2).

8. Remove the Input Feed Roller Assembly by lifting the assembly up and to the left.
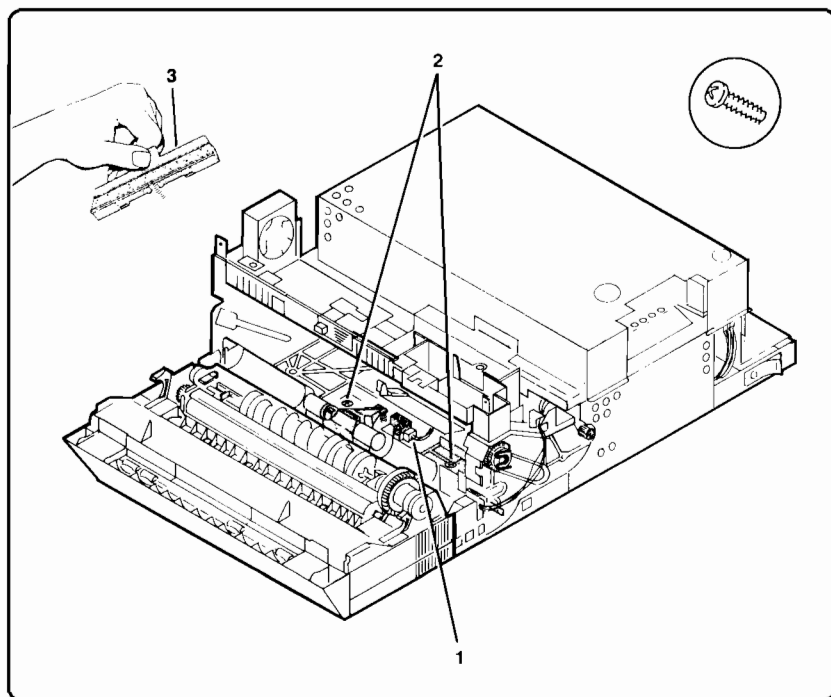
Figure 6-46. Input Feed Roller Assembly Removal (continued)

Laser PCA

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Lower PCA Shield Assembly (see Figure 6-29).
6. Unplug connector J401 from the Laser PCA (see Figure 6-47, callout 1).

Caution	**Do not** loosen the two Glyptolled screws on the Laser PCA. If these screws are loosened or removed, the Laser PCA loses alignment and must be replaced (see Figure 6-47, detail A).

7. Remove the recessed screws (2) securing the Laser PCA to the printer. Remove the PCA (Figure 6-47, callout 2).
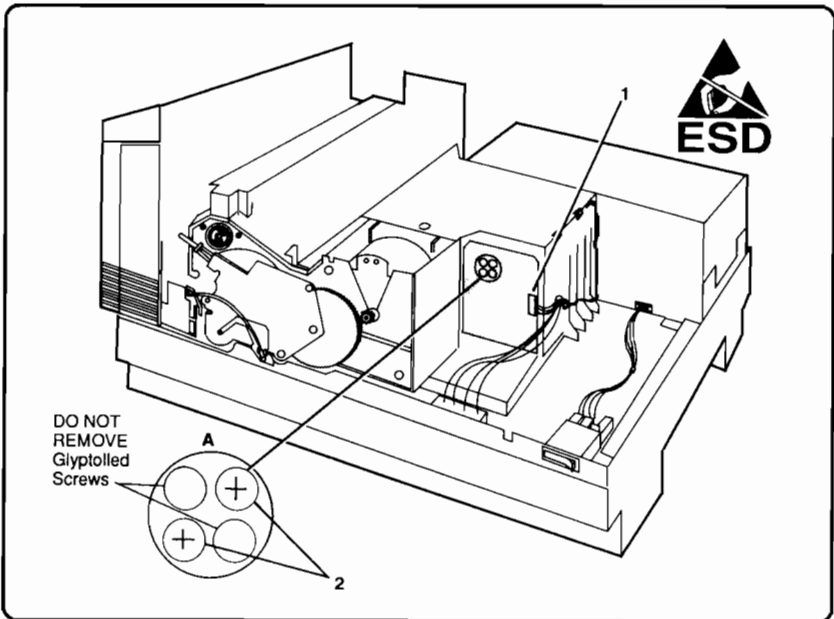
Figure 6-47. Laser PCA Removal

Laser Cover/Shutter Assembly

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Lower PCA Shield Assembly (see Figure 6-29).
6. Remove the screw (1) securing the Laser Cover (see Figure 6-48, callout 1).
7. Unclamp the (4) clamps securing the Laser Cover and then remove the cover (see Figure 6-48, callout 2).

Warning	Do not operate the printer with this cover removed.
	Install the Laser Cover/Shutter Assembly immediately after servicing. The lenses and mirrors inside cannot be cleaned and must be replaced if they become dirty.
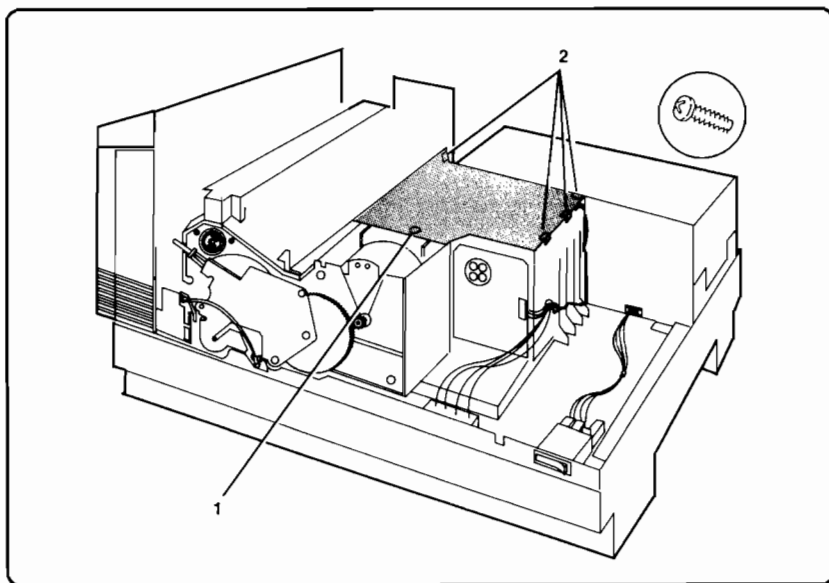
Figure 6-48. Laser Cover/Shutter Assembly Removal

Focusing Lens Assembly

Caution	■ **Do not** touch the Focusing Lens Assembly. Handle by the edges only (see Figure 6-49, callout 3). If the lens becomes dirty, it must be replaced (this part cannot be cleaned).
	■ **Do not** loosen the BD Mirror screw. The mirror requires factory alignment. If this screw is loosened the printer **must** be replaced (see Figure 6-49, callout 2).

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the Rear Support Shield (see Figure 6-28).
5. Remove the Lower PCA Shield Assembly (see Figure 6-29).
6. Remove the Laser Cover/Shutter Assembly (see Figure 6-48).
7. Remove the screws (3) securing the Focusing Lens Assembly (see Figure 6-49, callout 1) and then remove the lens.
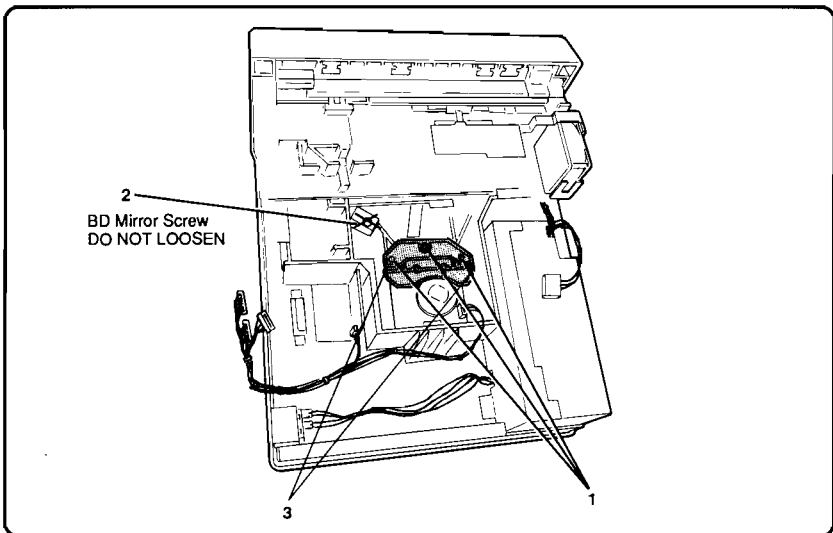
Figure 6-49. Focusing Lens Removal

Scanner Motor Assembly

Caution	■ **Do not** touch the Scanner Motor Mirror. If the mirror is touched or becomes dirty, it must be replaced. This part cannot be cleaned.
	■ **Do not** set the Scanner Motor Shaft on a hard surface, or it can be damaged (see Figure 6-50, detail A)
	■ **Do not** loosen the BD Mirror screw. The mirror requires factory alignment. If this screw is loosened the printer **must** be replaced (see Figure 6-50, callout 3).
	■ The Scanner Motor area contains parts that are sensitive to "Electro-Static Discharge" (ESD). Always service printers at an ESD-protected workstation.

1. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).

2. Remove the Dual I/O Interface Assembly (see Figure 6-3).

3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).

4. Remove the Rear Support Shield (see Figure 6-28).

5. Remove the Lower PCA Shield Assembly (see Figure 6-29).

6. Remove the Laser Cover/Shutter Assembly (see Figure 6-48).

7. Remove the Focusing Lens Assembly (see Figure 6-49).

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Scanner Motor Assembly (continued)

8. Unplug connector J301 from the Scanner Motor PCA (see Figure 6-50, callout 1).

9. Remove the long screws (3) securing the Scanner Motor PCA to the printer (Figure 6-50, callout 2), then remove the assembly.

Note	Whenever the Scanner Motor is removed or replaced, a registration adjustment is required (see "Registration Adjustment," in Chapter 4).
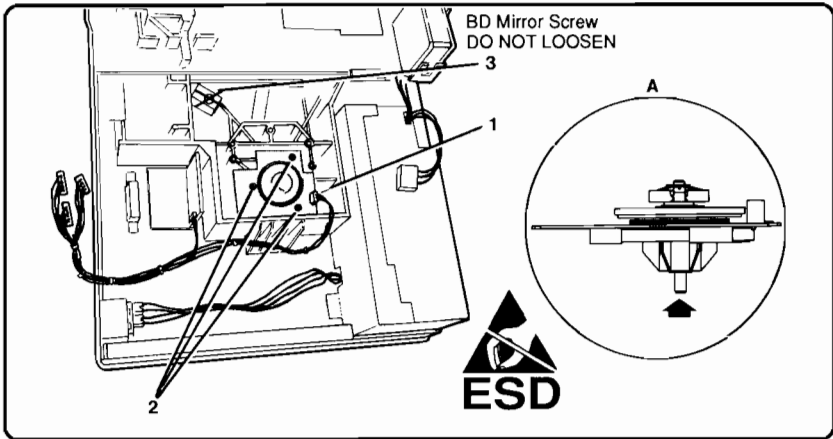
Figure 6-50. Scanner Motor Assembly Removal

Paper Path Door Assemblies

Throughout this section, a number enclosed in parentheses, such as (4) represents the number of screws to be removed or loosened during each step. This section describes procedures for removing the following Paper Path Door assemblies:

1. MP Tray-Pg. 6-57
2. MP Tray Pressure Plate-Pg. 6-58
3. Fusing Assembly-Pg. 6-60
4. External Fuser Access Door-Pg. 6-70
5. Internal Fuser Access Door-Pg. 6-71
6. Output Tray Deflector-Pg. 6-72

7. Face Down Output Rollers-Pg. 6-73
8. Transfer Roller Assembly-Pg. 6-74
9. MP Pick-Up Roller-Pg. 6-75
10. MP Paper-out/Door-open Sensors (PS2/PS4)-Pg. 6-76
11. MP Pick-Up Solenoid/Cable (SL1)-Pg. 6-77
12. Power Switching Lever-Pg. 6-79
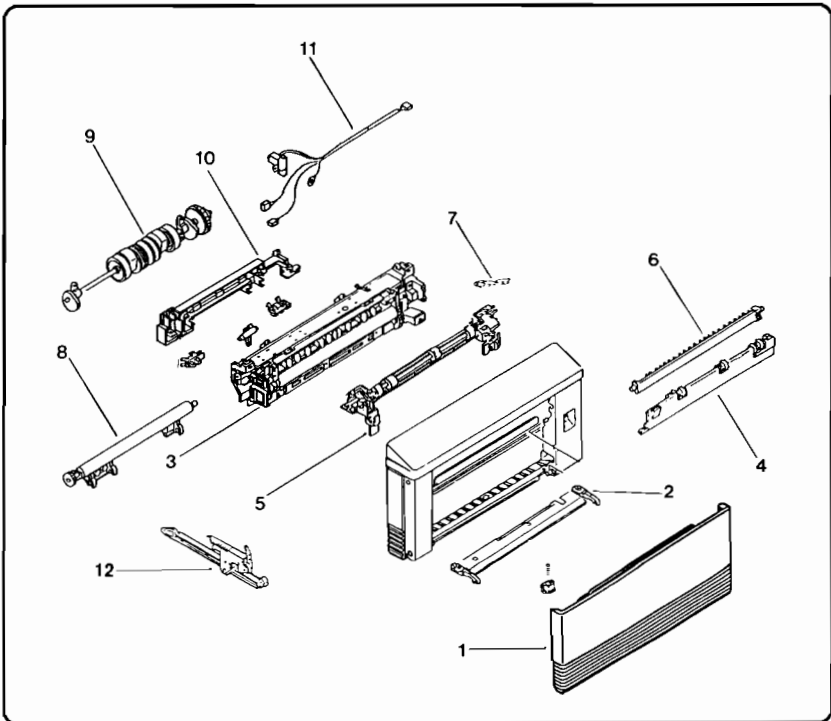
Figure 6-51. Paper Path Door Assembly Locations

MP Tray

1. If the Optional Lower Cassette is installed, then remove the LC Tray.
2. Move the printer to the edge of the work surface until the Paper Path Door is protruding over the edge.
3. Open the Multi-Purpose (MP) Tray.

Note	While removing the MP Tray, note exactly how it is installed. Installation of the MP Tray requires proper alignment.

4. Press inward on the hinge catches on both ends of the MP Tray to unlatch it. Swing the tray down to remove it from the Paper Path Door (see Figure 6-52).
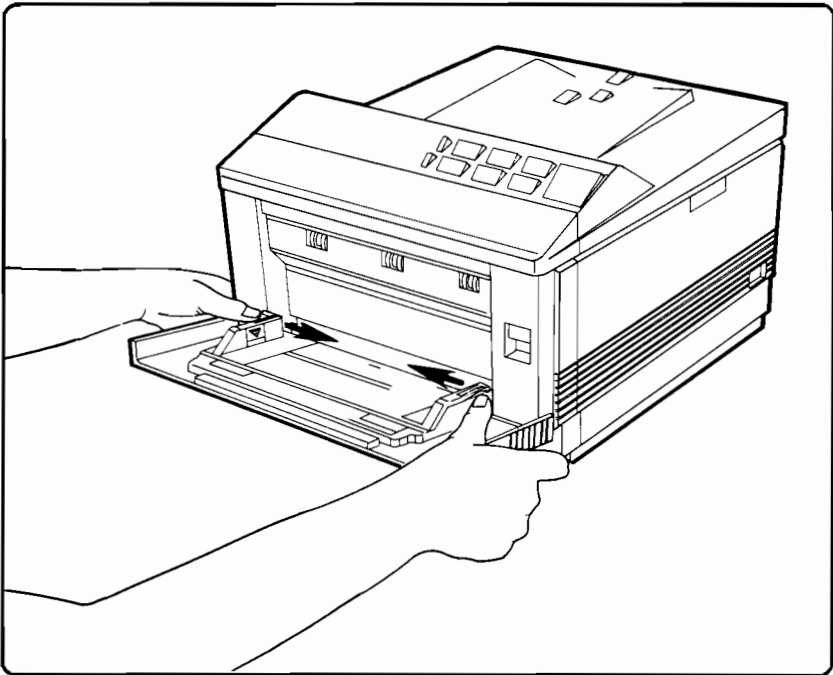
Figure 6-52. MP Tray Removal

MP Tray Pressure Plate

1. Remove the MP tray (see Figure 6-52).
2. Open the Paper Path Door.
3. If necessary, rotate the Pick-Up Roller Assembly (see Figure 6-53, callout 1) forward until the tension on the MP Tray Pressure Plate spring (see callout 2) is minimized.
4. Remove the Spring Cap and Spring from the Paper Path Door using a small flat-head screwdriver (see Figure 6-53, detail A).
5. Close the Paper Path Door.
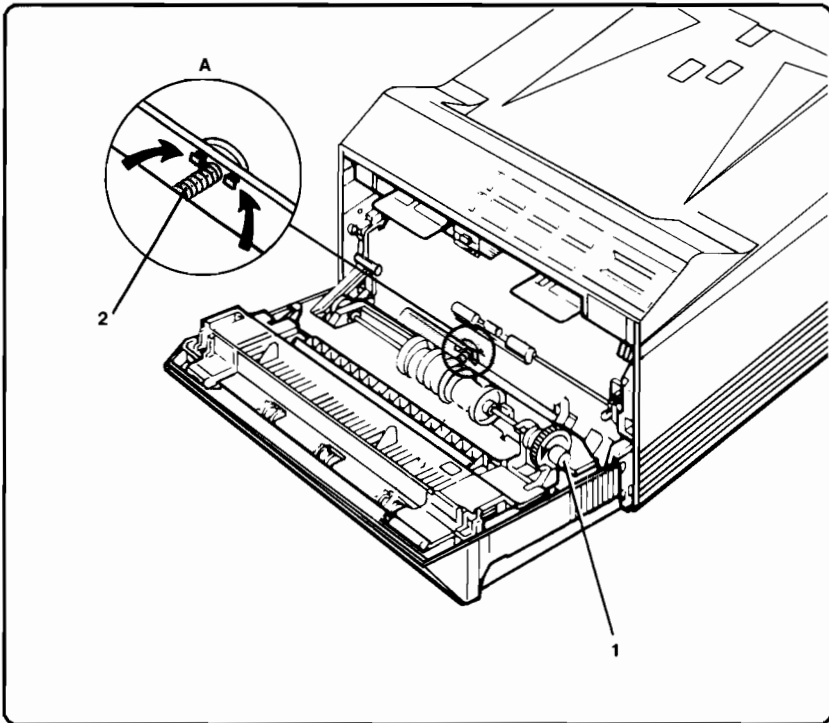
Figure 6-53. MP Tray Pressure Plate Removal

MP Tray Pressure Plate (continued)

6. Unclamp the MP Tray Pressure Plate from the Paper Path Door by pulling the Pressure Plate Arm toward you (see Figure 6-54, detail A). Continue pulling to remove the MP Tray Pressure Plate from the bottom of the Paper Path Door.

Caution	When installing the MP Tray Pressure Plate, align it carefully so that the grounding spring plate rests against the side of the MP Tray Pressure Plate. Avoid bending the grounding spring plate (see Figure 6-54, detail B).
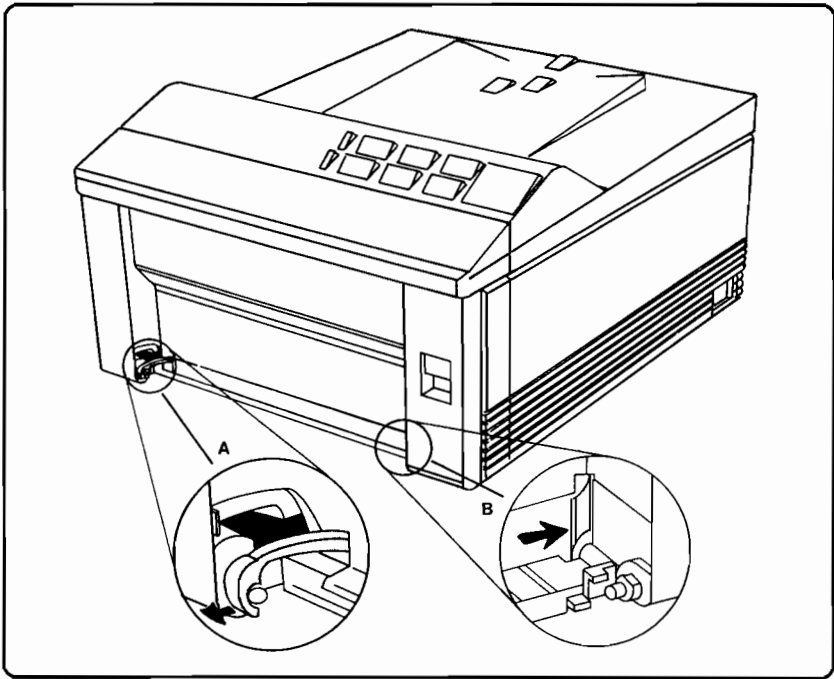
Figure 6-54. MP Tray Pressure Plate Removal (continued)

Fusing Assembly

Warning	Allow sufficient time since last power-on for the Fuser Assembly to cool. Servicing a hot fuser can cause severe burns.

1. Open the Paper Path Door, and the Internal Fuser Access Door.
2. Remove the shoulder screws (5) securing the Fusing Assembly (see Figure 6-55, callout 1).
3. Unlatch the Fusing Assembly by using a small flat-head screwdriver at both ends of the latch rod while lifting slightly (see Figure 6-55, detail A).

Caution	Twisting or Bending the assembly during removal could damage the Fusing Assembly connectors (located under the fusing roller at each end).

4. Lift straight up to unplug and remove the Fusing Assembly from the Paper Path Door.
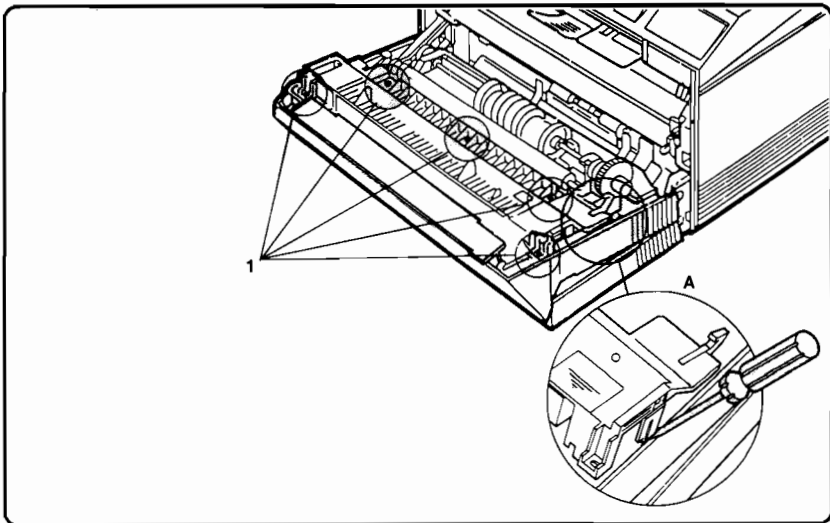
Figure 6-55. Fusing Assembly Removal

Heat Lamp

1. Remove the Fusing Assembly (see Figure 6-55).
2. Loosen (2 to 3 turns) the screw (1) securing the Heat Lamp Shaft (see Figure 6-56, callout 1).
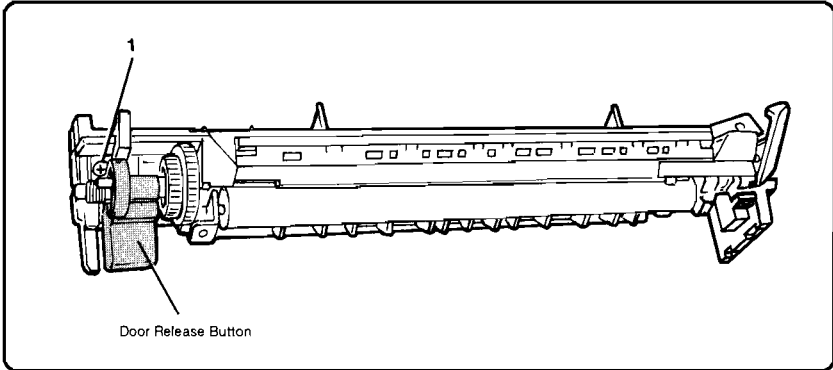
Figure 6-56. Heat Lamp Removal

3. Remove the screws (2) securing connector J501 and lift the connector up about one half-inch (see Figure 6-57, callout 1).
4. Remove the screws (2) securing the Connector Bracket (see Figure 6-57, callout 2).

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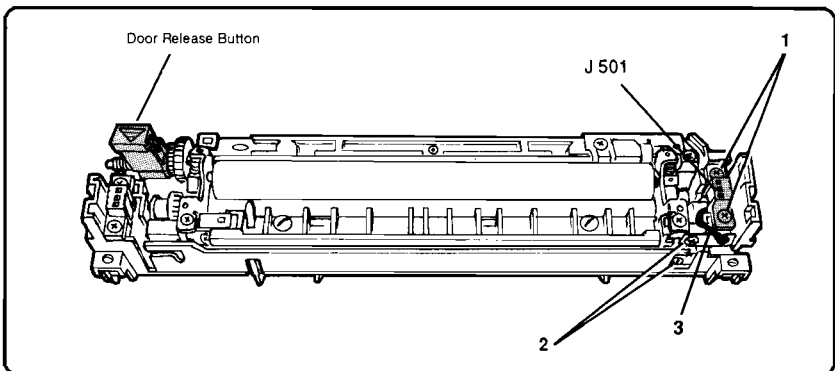
Figure 6-57. Heat Lamp Removal (continued)

Heat Lamp (continued)

5. Remove the screw (1) securing the Heat Lamp Retaining Spring Clip and remove the spring clip (see Figure 6-58, callout 1).
6. Remove the screw (1) securing the Heat Lamp Cable (see Figure 6-58, callout 2).
7. Remove the screws (2) securing the Connector Bracket (see Figure 6-58, callout 3).

Caution	**Do not** touch the surface of the Heat Lamp. Handle the lamp by its ceramic end pieces only. If the lamp is touched accidentally, clean thoroughly using isopropyl alcohol.

8. Carefully slide the Connector Bracket and the Heat Lamp out of the Fusing Assembly.
9. Carefully remove the Heat Lamp from the Connector Bracket.

Caution	When installing J501, ensure that the connector wire (see Figure 6-57 callout 3) does not interfere with J501. If the connector is not free to move, damage may result.
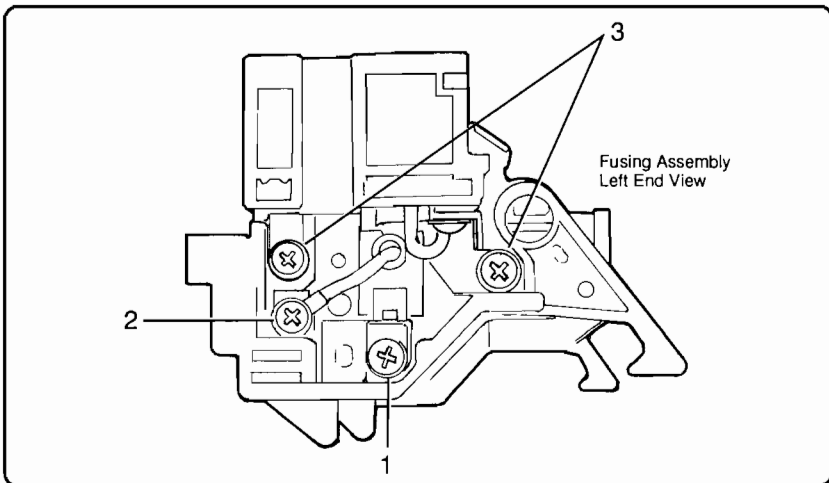
Figure 6-58. Heat Lamp Removal (continued)

Pressure (Lower Fusing) Roller

1. Remove the Fusing Assembly (see Figure 6-55).

2. Remove the screws (2) securing the Pressure Roller Lifting Plates (see Figure 6-59, callout 1).

3. Pivot each bracket forward and then remove the Lower Fusing Pressure Roller.

Caution

Avoid touching the roller material or subjecting it to other contaminants.

Do not touch the surface of the Upper Fusing Roller. The Teflon sleeve that covers its surface can be damaged very easily. If the surface of the roller is touched accidentally, clean thoroughly using isopropyl alcohol.

Door Release Button
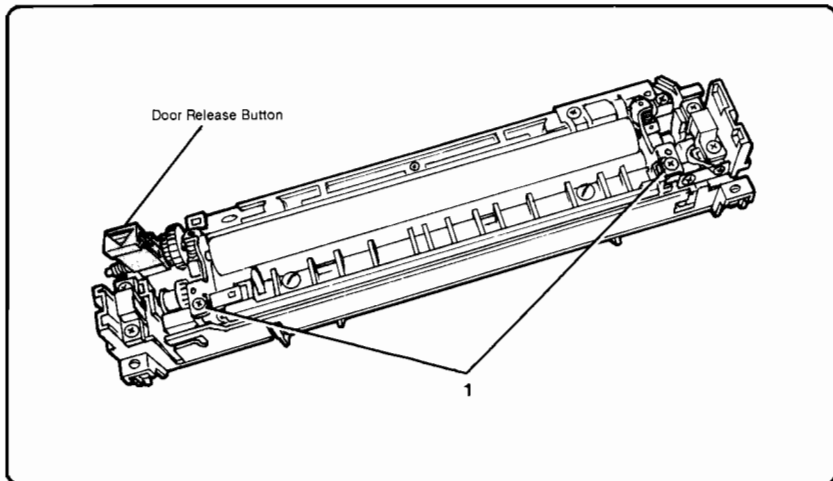
Figure 6-59. Pressure (Lower Fusing) Roller Removal

Upper Fusing Roller

Caution	Do not touch the surface of the Upper Fusing Roller. The Teflon sleeve that covers its surface can be damaged very easily. If the surface of the roller is touched accidentally, clean thoroughly using isopropyl alcohol.

1. Remove the Fusing Assembly (see Figure 6-55).
2. Remove the Heat Lamp (see Figure 6-56, Figure 6-57, and Figure 6-58).
3. Remove the Pressure Roller and brackets (see Figure 6-59).
4. Turn the Fusing Assembly over and remove the the Fuser Entrance Guide (2 screws with washers - Figure 6-60, callout 1).
5. Remove the Door Release Button retaining screw (1) (Figure 6-60, callout 2).
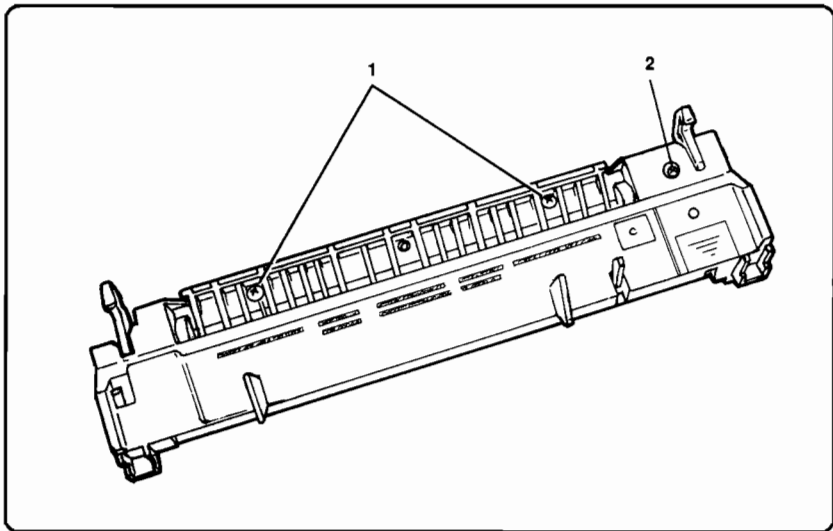
Figure 6-60. Upper Fusing Roller Removal

Upper Fusing Roller (continued)

6. Turn the Fusing Assembly back over and remove the Paper Delivery Guide (2 screws with springs - Figure 6-61, callout 1).
7. Unclip and remove the Latch Spring (see Figure 6-61, callout 2).
8. Slide the Door Release Button off of the Latch Rod and slide the Drive Gear (Figure 6-61, callout 3) sufficiently to disengage it from the Upper Fusing Roller Gear.
9. Handling by the ends only, remove the Upper Fusing Roller from the Fusing Assembly.

Caution	When replacing the Upper Fusing Roller, be careful not to bend or break the grounding button riding on the end of the Fusing Roller (Figure 6-61, callout 4).
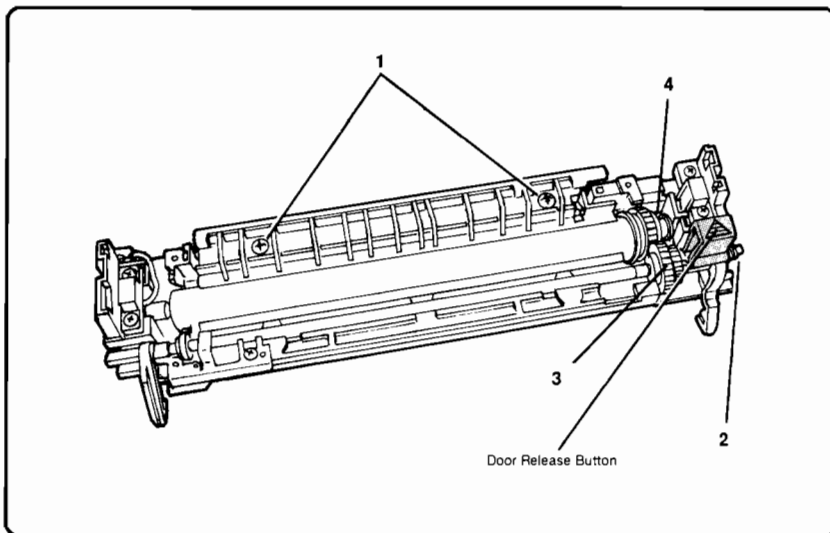
Figure 6-61. Upper Fusing Roller Removal (continued)

Thermoswitches (TS1 and TS2)

1. Remove the Fusing Assembly (see Figure 6-55).

2. Remove the shoulder screws (2) (with springs) that secure the Paper Delivery Guide (see Figure 6-62, callout 1).

Caution	**Do not** touch the surface of the Upper Fusing Roller. The Teflon sleeve that covers its surface can be damaged very easily. If the surface of the roller is touched accidentally, remove and clean it thoroughly using isopropyl alcohol.

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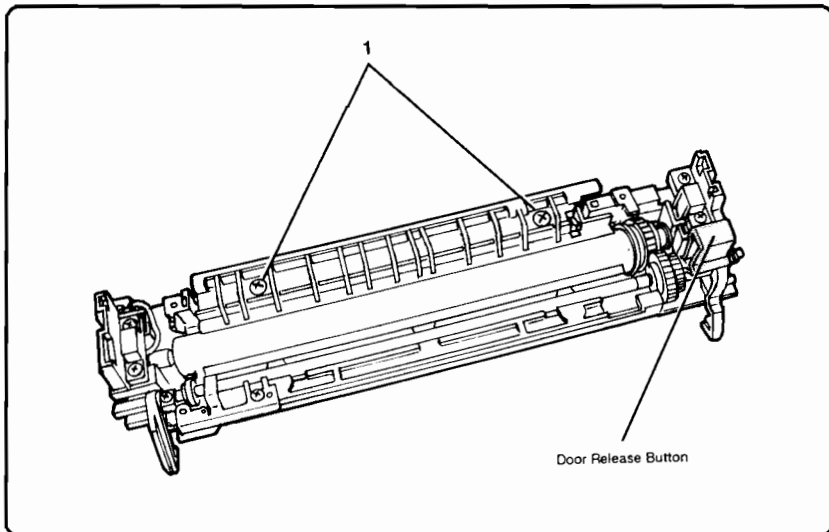
Figure 6-62. Thermoswitch (TS1 and TS2) Removal

Thermoswitches (TS1 and TS2) (continued)

3. Remove the screws (2) securing the faulty Thermoswitch (see Figure 6-63, callout 1).
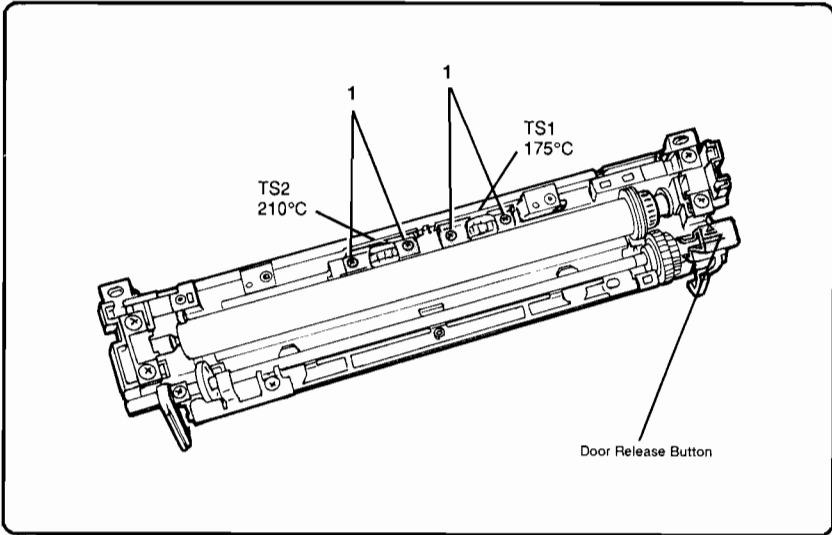
Figure 6-63. Thermoswitch (TS1 and TS2) Removal (continued)

Thermistor (TH1)

1. Remove the Fusing Assembly (see Figure 6-55).

2. Remove the shoulder screws (2) securing connector J502 (see Figure 6-64, callout 1).

3. Remove the Fusing Assembly Wire Cover by unclipping it using a small flat-head screwdriver (see Figure 6-64, callout 2).

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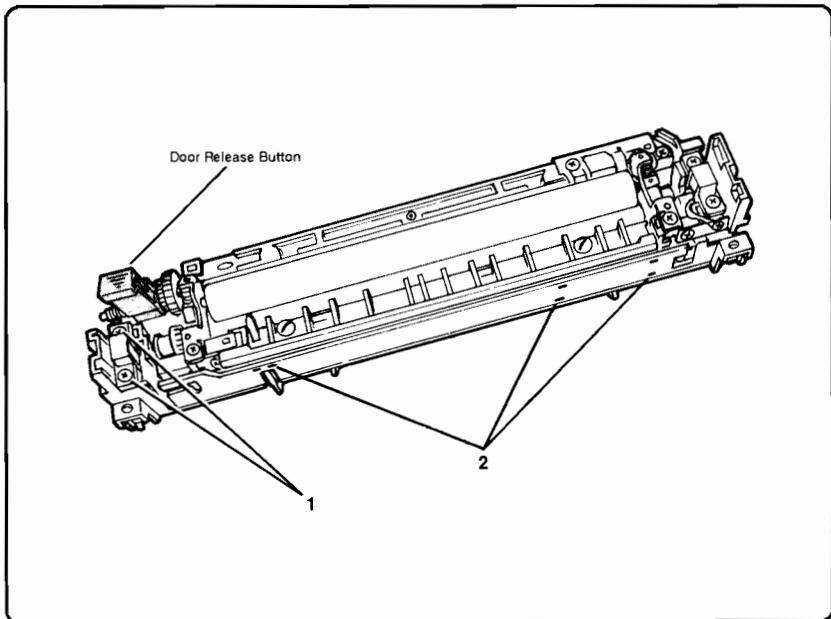
Figure 6-64. Thermistor (TH1) Removal

Thermistor (TH1) (continued)

4. Remove the screw (1) securing the grounding wire (blue) from connector J502 (see Figure 6-65, callout 1).

5. Remove the screw (1) securing the Thermistor (see Figure 6-65, callout 2).

6. Remove the Thermistor with cable and J502 from the Fusing Assembly.

Caution	**Avoid contact with the Hot Roller Grounding Spring when installing the Wire Cover; the ground button must contact the Fusing Roller for proper operation.**
	Also, ensure that the paper sensor lever is properly positioned before installing the Fusing Assembly Wire Cover.
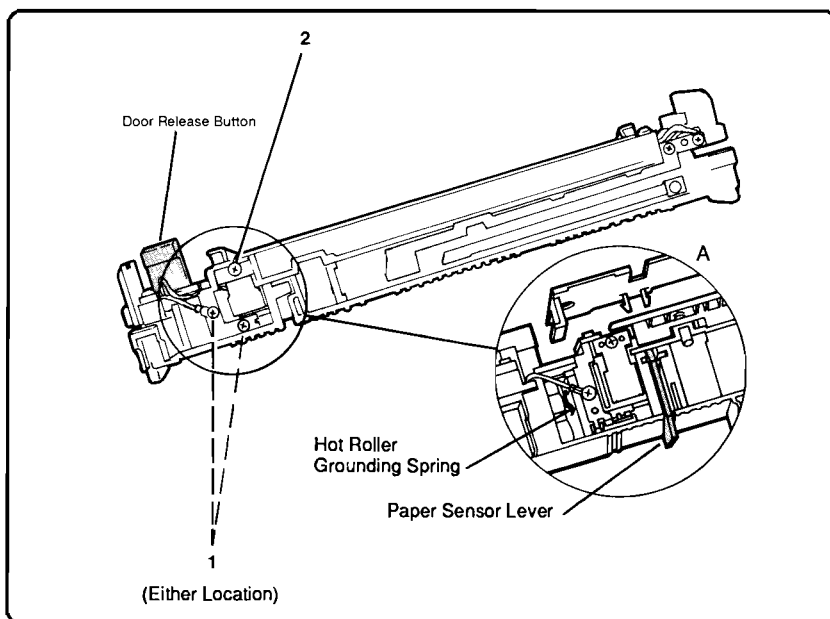
Figure 6-65. Thermistor (TH1) Removal (continued)

External Fuser Access Door

1. Open the Paper Path Door.
2. Remove the Fusing Assembly (see Figure 6-55).
3. Remove the Door Spring using small needle nose pliers (see Figure 6-66, detail A).
4. Open the MP Tray and hold the External Fuser Access Door closed.
5. Unclip the right end of the access door using a small flat-head screwdriver (see Figure 6-66, detail B).
6. Slide the access door to the right to remove it from the Paper Path Door.
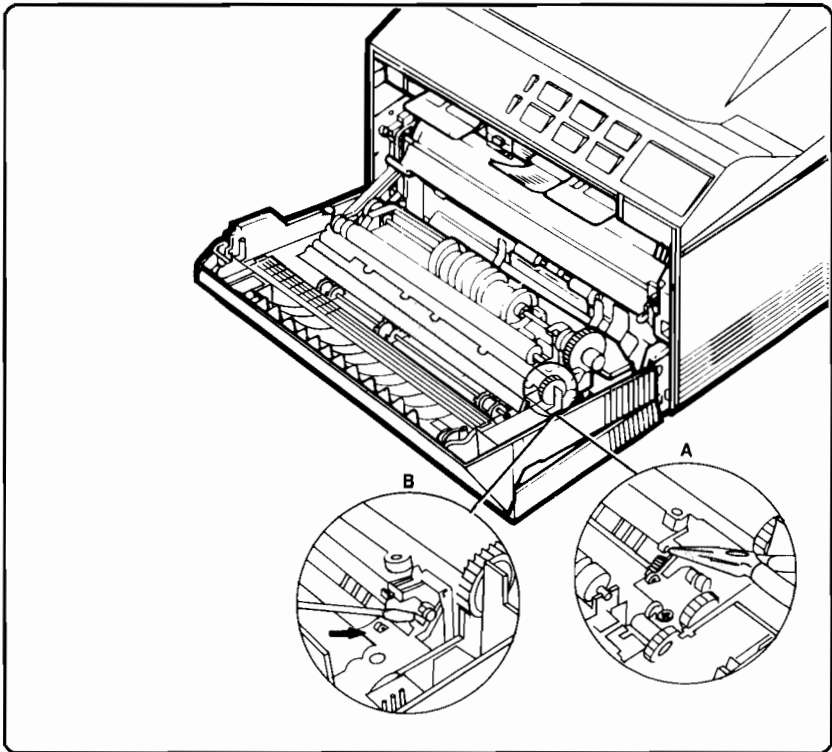
Figure 6-66. External Fuser Access Door Removal

Internal Fuser Access Door Assembly

1. Open the Paper Path Door.

2. Remove the Fusing Assembly (see Figure 6-55).

3. Open the Internal Fuser Access Door (see Figure 6-67, callout 1).

4. Remove the screws (3-5) securing the Internal Fuser Access Door (see Figure 6-67, callout 2).

5. Remove the Internal Fuser Access Door Assembly from the Paper Path Door.
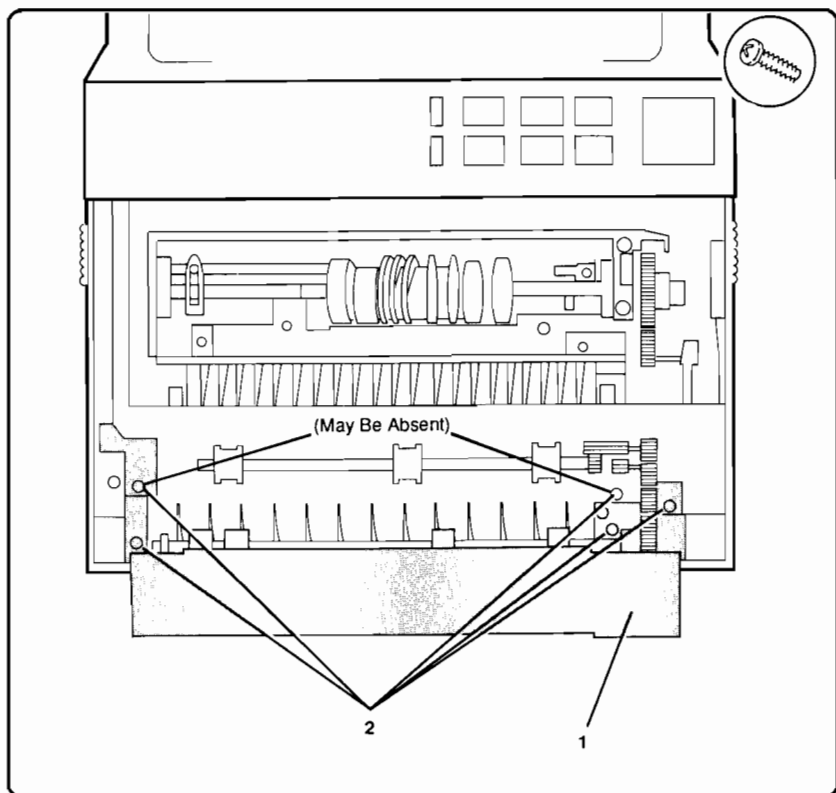
Figure 6-67. Internal Fuser Access Door Removal

Paper Output Tray Deflector

1. Open the Paper Path Door.

2. Remove the Fusing Assembly (see Figure 6-55).

3. Remove the Internal Fuser Access Door Assembly (see Figure 6-67).

4. Lift out the Paper Output Tray Deflector (see Figure 6-68, callout 1).
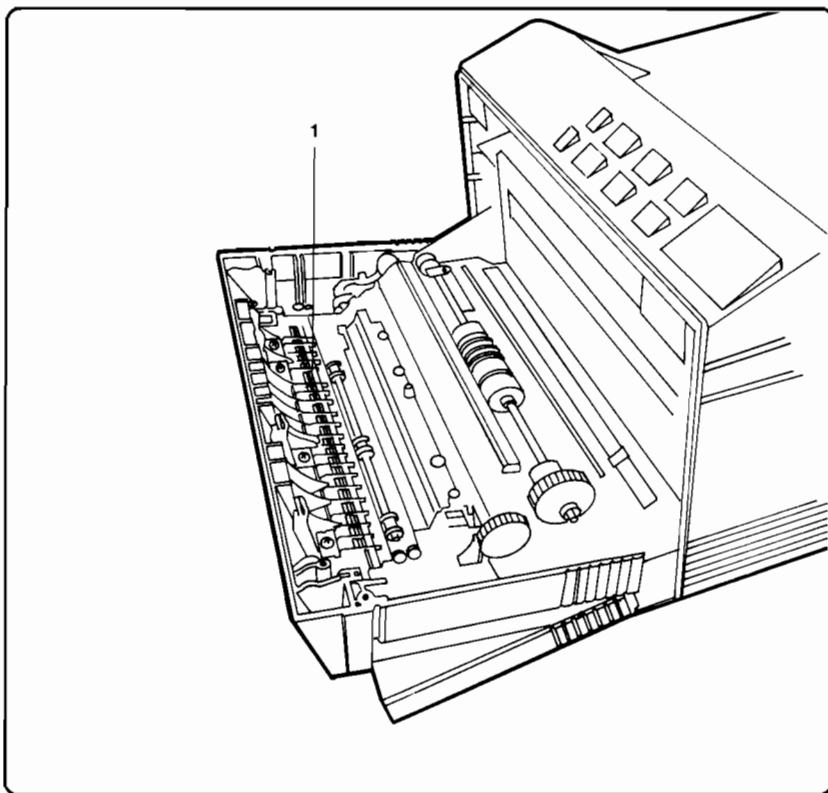
Figure 6-68. Paper Output Tray Deflector Removal

Face Down Output Rollers

1. Open the Paper Path Door.

2. Open the Internal Fuser Access Door.

3. Remove the screw (1) securing each Face Down Output Roller and remove the roller assembly (see Figure 6-69, callout 1).
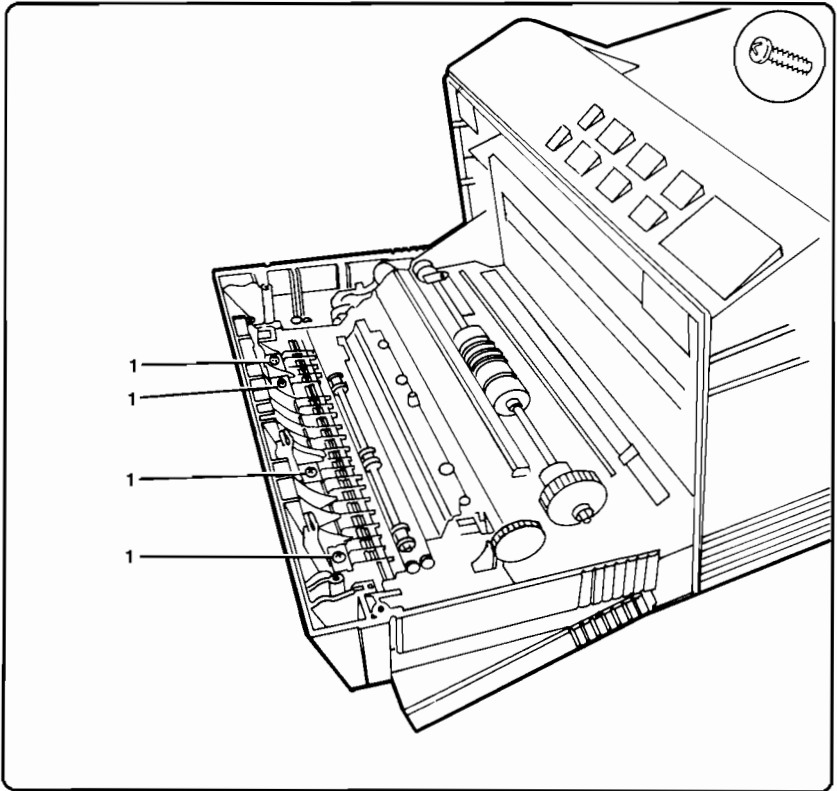
Figure 6-69. Face Down Output Roller Removal

Transfer Roller Assembly

Caution	Do not touch or otherwise contaminate the surface of the Transfer Roller. Oils and other contaminants affect its electrical characteristics, resulting in poor image transfer.

Note	The Transfer Roller Grounding Bracket must be properly aligned with the MP Pick-Up Roller Shaft during re-installation. Remove the Transfer Roller Assembly slowly and note how both parts fit together (see Figure 6-70, detail B).

1. Open the Paper Path Door.
2. Unlatch the left end of the Transfer Roller Assembly using a small flat-head screwdriver (see Figure 6-70, detail A). Slide the roller assembly to the left, and lift to remove.
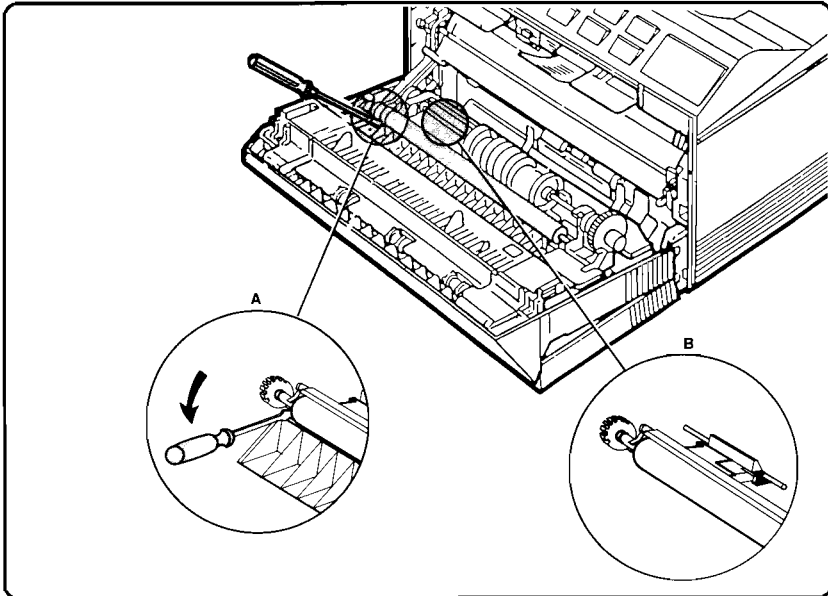
Figure 6-70. Transfer Roller Assembly Removal

MP Pick-Up Roller Assembly

1. Open the Paper Path Door.

2. Remove the Transfer Roller Assembly (see Figure 6-70).

3. Remove the screws (3) securing the MP Pick-Up Roller
   Assembly and remove the assembly (see Figure 6-71, callout 1).

Note Check the Separation Pad (Figure 6-71, callout 2).
Replace it if the pad is worn, glazed, or if replacing
an old pick-up roller.
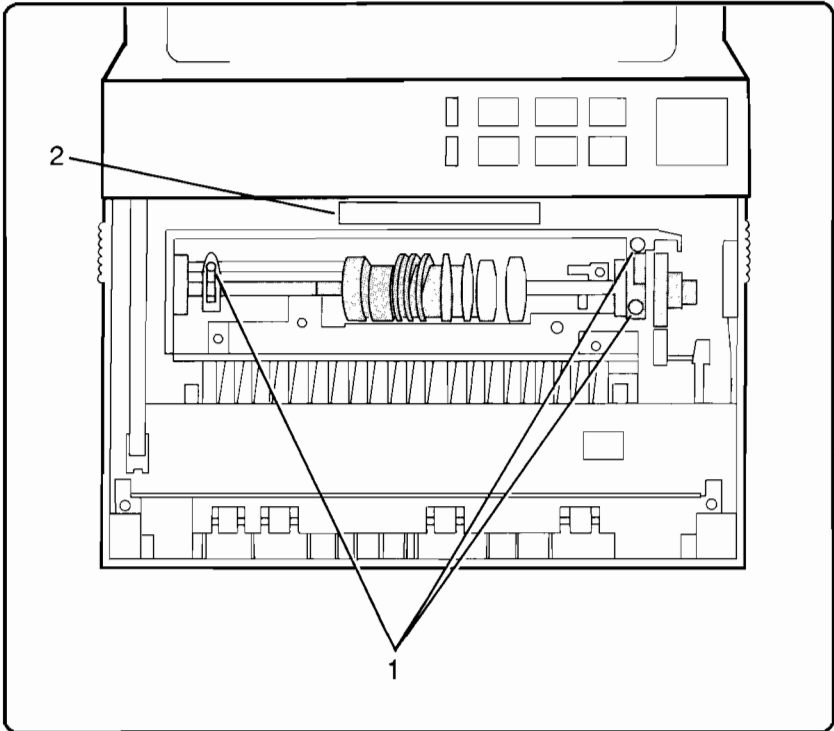
Figure 6-71. MP Pick-Up Roller Assembly Removal

MP Paper-Out & Door-Open Photosensors (PS2 & PS4)

1. Open the Paper Path Door.
2. Remove the Transfer Roller Assembly (see Figure 6-70).
3. Remove the MP Pick-Up Roller Assembly (see Figure 6-71).
4. Remove the screw (1) securing the plastic Cable Cover and then remove the Cover (see Figure 6-72, callout 1).
5. Remove the screw (1) securing the right Transfer Roller Bracket and remove the bracket (see Figure 6-72, callout 2).
6. Remove the Pick-Up Roller Drive Gear (see Figure 6-72, detail A, callout 5).
7. Remove the screw (1) securing the MP Pick-Up Feed Solenoid (see Figure 6-72, detail B, callout 3). Lift the solenoid up and out of the way.
8. Remove the screws (2) securing the Photosensor Assembly (see Figure 6-72, callout 4).
9. Lift up the Photosensor Assembly and swing it to the right to access and replace the faulty photosensor.
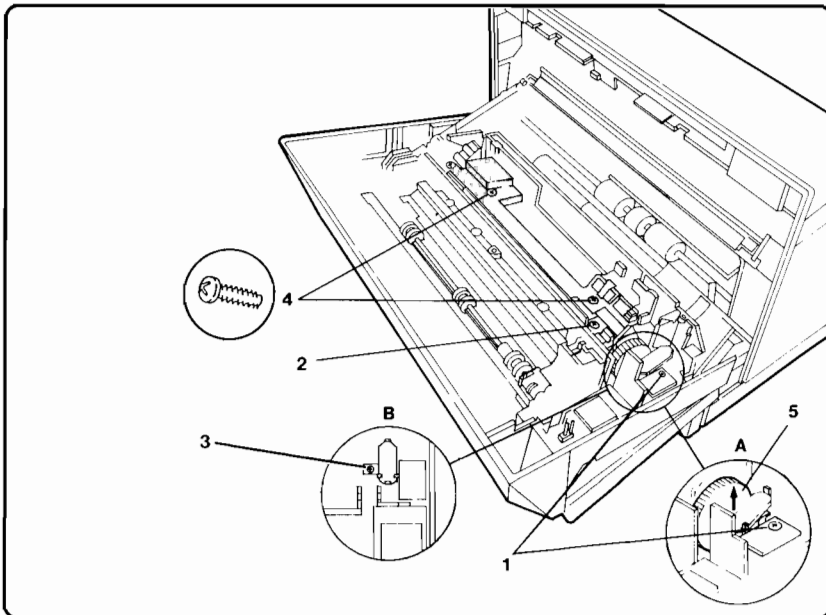
Figure 6-72. PS2 and PS4 Removal

MP Pick-Up Feed Solenoid/Cable Assembly (SL1)

1. Open the Paper Path Door.
2. Remove the Fusing Assembly (see Figure 6-55).
3. Remove the Transfer Roller Assembly (see Figure 6-70).
4. Remove the MP Pick-Up Roller Assembly (see Figure 6-71).
5. Remove the screws (2) securing MP Paper-Out/Door-Open Sensor Assembly (see Figure 6-72).
6. Remove the screw (1) with star washer, securing the ground cable (see Figure 6-73, detail A, callout 1).
7. Remove the screw (1) securing the right Fuser connector (J502) to the MP Door (see Figure 6-73, detail B, callout 2).
8. Remove all covers (see Figures 6-15, 6-16, 6-17, 6-21, 6-22).
9. Remove the Dual I/O Interface Assembly (see Figure 6-3).
10. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
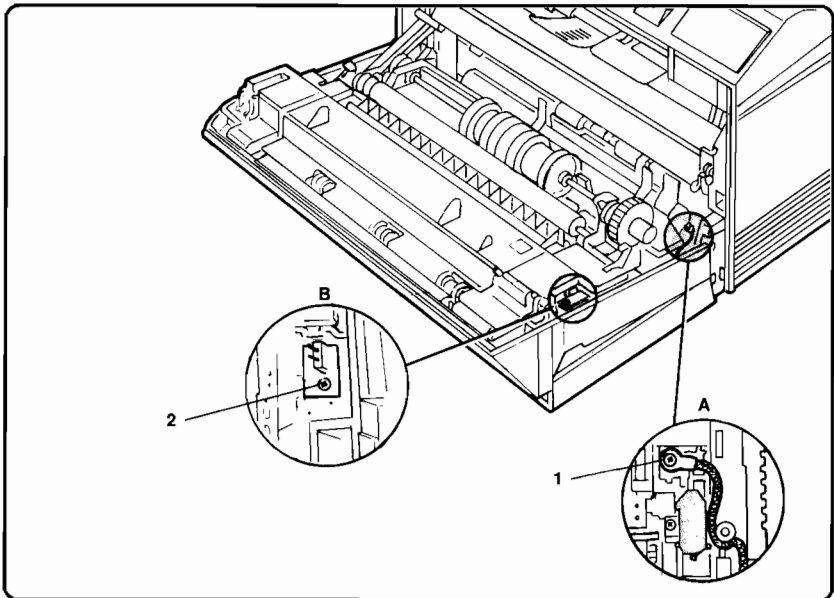
Figure 6-73. **MP Pick-Up Feed Solenoid/Cable Assembly Removal (SL1)**

MP Pick-Up Feed Solenoid/Cable Assembly (continued)

11. Unplug connector J209 from the DC Controller (see Figure 6-74, callout 1).
12. Remove the cable from its clamping brackets (see Figure 6-74, callout 2).
13. Remove the screw (1) securing the grounding cable (see Figure 6-74, callout 3).
14. Unclamp the Cable Clamp using a small flat-head screwdriver and remove the cable (see Figure 6-74, detail A).
15. Unclip and remove the Cable Retaining Bracket using a small flat-head screwdriver (see Figure 6-74, detail B).
16. Remove the MP Pick-Up Feed Solenoid/Cable Assembly from the printer.

Note	Ensure that the cable is routed correctly before reinstalling the Cable Retaining Bracket (see Figure 6-74, detail B).
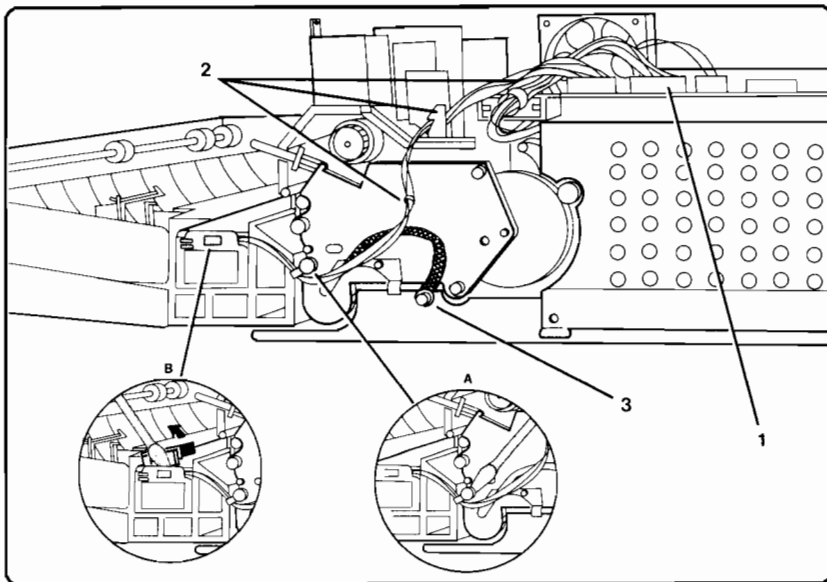
Figure 6-74. SL1 Removal (continued)

Power Switching Lever Assembly

1. Remove the Top Cover and the Left Side Cover (see Figure 6-16, Figure 6-17, and Figure 6-22).

2. Remove the Fusing Assembly (see Figure 6-55).

3. Remove the screw (1) securing the Power Switching Lever Bracket to the Paper Path Door (see Figure 6-75, callout 1). **Carefully** release the spring tension on the lever arm.

4. Remove the screws (2) securing the Power Switching Lever Assembly (see Figure 6-75, callout 2).

5. Remove the lever assembly.

Note	When replacing, it may be easier to remove the Lever Bracket from the end of the arm before securing it to the Paper Path Door.
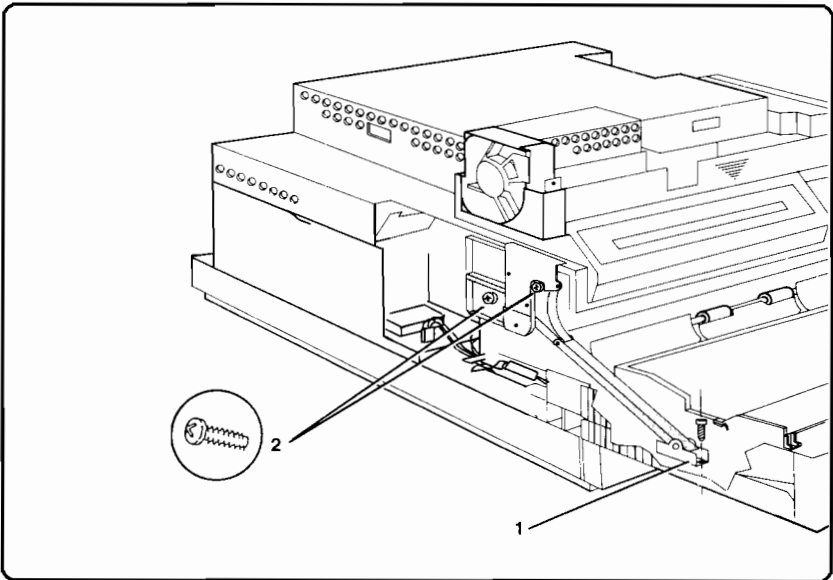
Figure 6-75. Power Switching Lever Assembly Removal

Paper Path Door Removal

1. Remove all covers (see Figures 6-15, 6-16, 6-21, 6-22).
2. Remove the Dual I/O Interface Assembly (see Figure 6-3).
3. Remove the Formatter PCA/Shield Assembly (see Figure 6-26).
4. Remove the MP Tray (see Figure 6-52).
5. Unplug connector J209 from the DC Controller (see Figure 6-76, callout 1) and remove the cable from its clamping brackets (see Figure 6-76, callout 2).
6. Remove the screw (1) securing the grounding cable (see Figure 6-76, callout 3).
7. Unclamp the Cable Clamp using a small flat-head screwdriver and remove the cable (see Figure 6-76, detail A).
8. Open the Paper Path Door and remove the cable Retaining Bracket using a small flat-head screwdriver (Figure 6-76, detail B), and remove the cable from its trough.
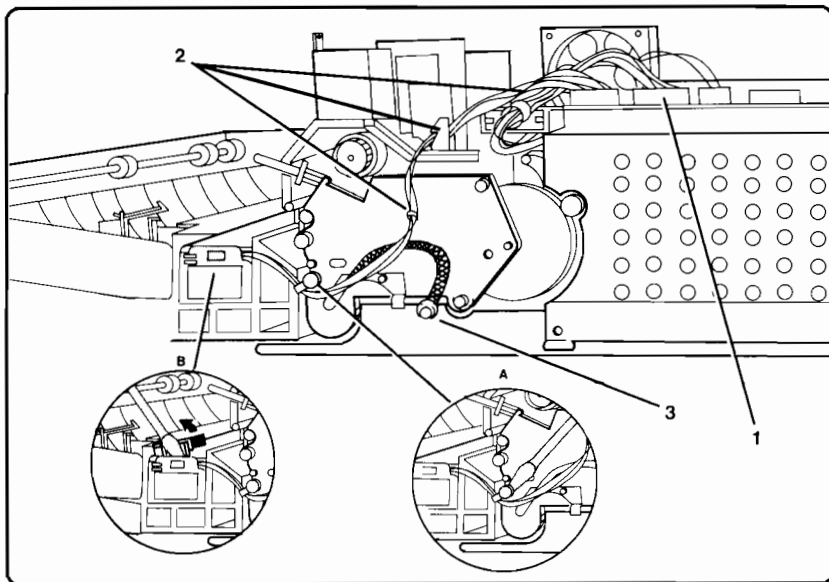
Figure 6-76. Paper Path Door Removal

Paper Path Door Removal (continued)

9. Remove the long screw (1) with star washer securing the metal Paper Path Door Stop (see Figure 6-77, detail A, callout 1).
10. Remove the Fusing Assembly (see Figure 6-55).
11. Remove the screw (1) securing the Power Switching Lever Bracket (see Figure 6-77, callout 2), and carefully release the spring tension on the bracket.

(continued on next page)
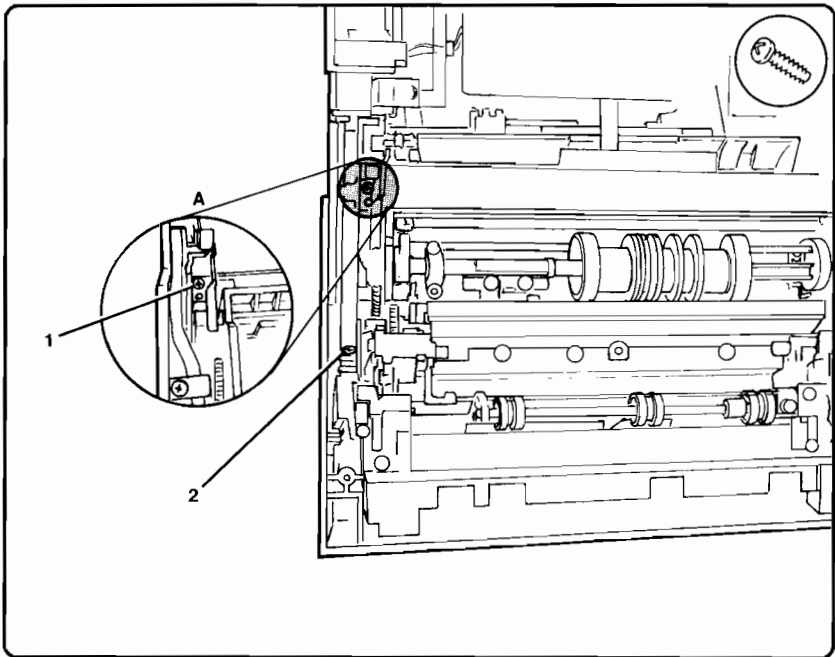
Figure 6-77. Paper Path Door Removal (continued)

Paper Path Door Removal (continued)

12. Squeeze connector J101 to unplug it from the Power Supply (see Figure 6-78, callout 1).
13. Remove the cable from its retaining points as shown (Figure 6-78, callout 2).

(continued on next page)
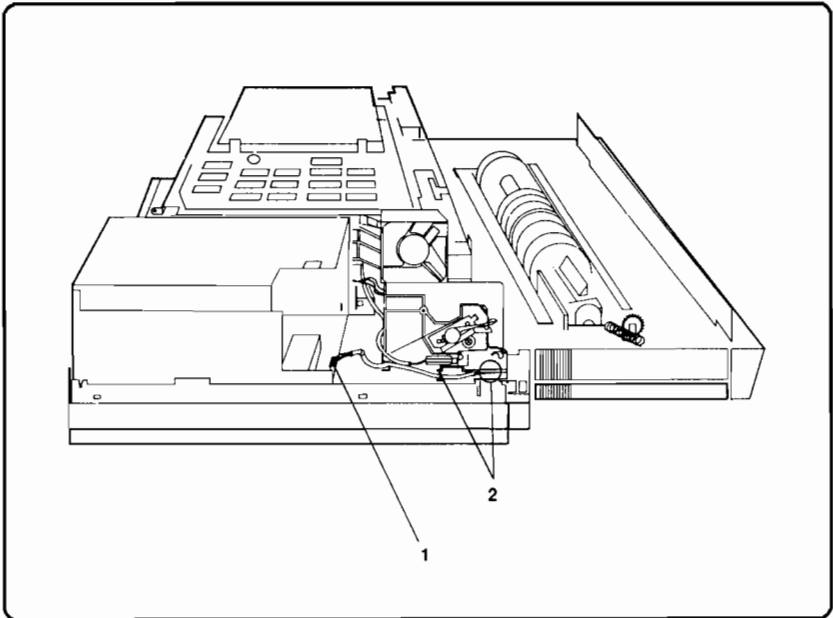
Figure 6-78. Paper Path Door Removal (continued)

Paper Path Door Removal (continued)

14. Hold the Paper Path Door with one hand. With the other hand, remove the (2) Door Hinge Pins using a small flat-head screwdriver to remove the Door (see Figure 6-79, callout 1).
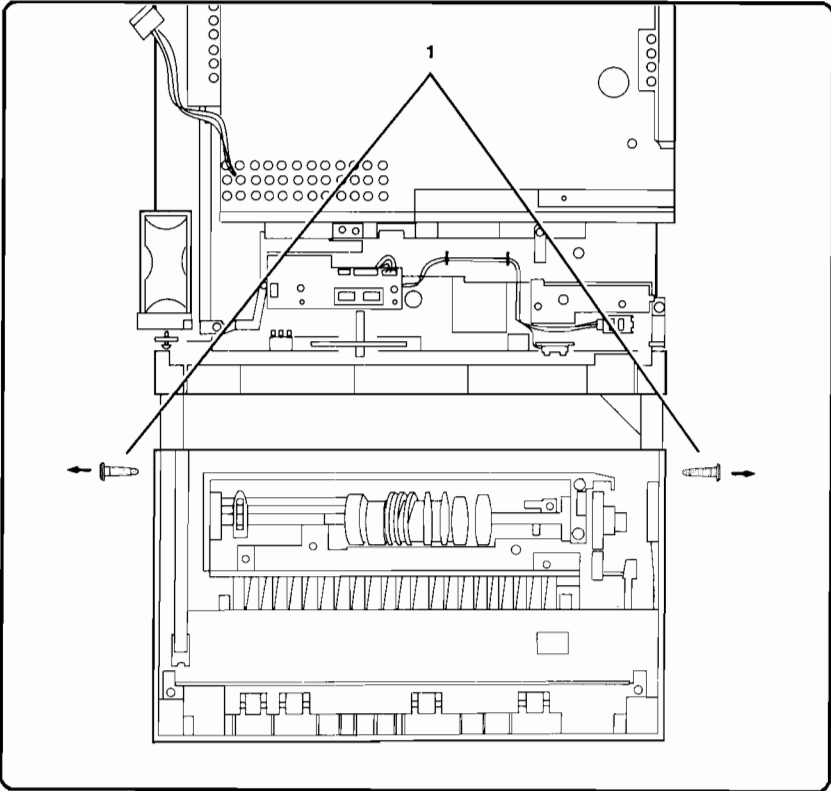
Figure 6-79. Paper Path Door Removal (continued)

CHAPTER 7

Contents

Tables

7

Troubleshooting

Introduction

This chapter uses a combination of tables, flowcharts, and step-by-step procedures to help troubleshoot printer problems. The chapter is divided into the following main sections, each designed to provide quick troubleshooting information:

Printer Verification Flowchart (page 7-3):
When servicing a printer, always begin with Flowchart 7-1, the Printer Verification Flowchart, and complete each step until all of the printer's major functions are verified. If a printer malfunction is confirmed, proceed as directed in Flowchart 7-1 for detailed troubleshooting information.

Printer Message Troubleshooting (page 7-4):
This section lists all printer messages, with detailed message descriptions and the recommended response. Message tables are followed by troubleshooting procedures for power distribution, blank or garbled display, and misprint errors. This section also contains troubleshooting flowcharts for specific symptoms.

Image Formation Troubleshooting (page 7-29):
Samples of actual print image defects are followed by information necessary to quickly identify and resolve the source of the problem. Also included are troubleshooting procedures for paper curl and print registration problems.

Data Communications Check (page 7-47):
Troubleshooting procedures for identifying and resolving host-to-printer communication problems.

Troubleshooting Aids (page 7-51):
This section contains several useful aids to the troubleshooting process, including Printer Components, CE Test Connector, Main Wiring Diagram, Connector Tables, and a Repetitive Defect Ruler.

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Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
06 FONT PRINTOUT	Font sample printout is printing.	Proceed after 00 READY is displayed.
07 RESET	The printer is clearing buffered pages, temporary soft fonts, and temporary macros. (This returns printer settings to the settings specified in the Printing Menu.)	Proceed after 00 READY is displayed.
08 COLD RESET	Invoked by powering ON the printer while holding down the (ON LINE) key. Resets Printing and Configuration Menu items to factory defaults.	Ensure Configuration Menu items are properly set and press (ON LINE) to proceed.
09 MENU RESET	The printer is clearing buffered pages, temporary soft fonts, and temporary macros. (This returns the Printing Menu settings back to factory default settings.)	Proceed after 00 READY is displayed.
10 RESET TO SAVE	This message appears when Printing Menu items have been changed and data, temporary soft fonts, or temporary macros are stored in the printer's buffer.	Perform a 07 RESET to save the changes (data stored in the printer's memory will be lost), or press the (ON LINE) key (changes made to the Printing Menu will not take effect until the printer is reset).
12 OPEN OR NO EP	This message appears if the EP-L Cartridge is missing or installed incorrectly, if the Paper Path Door or External Fuser Access Door is open, or if the exhaust fan is not working.	Proceed to Flowchart 7-3, on page 7-18.
13 PAPER JAM	This message appears when paper does not enter, feed, or exit the printer correctly. False paper jams can be caused by a defective photosensor or DC Controller.	Proceed to Flowchart 7-4 on page 7-19.
15 TEST ENGINE	The Test Print button on the DC Controller PCA has been pressed (see "Engine Test" in Chapter 3).	Proceed after 00 READY is displayed.

Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
17 MEM CONFIG	Memory is being reconfigured for Page Protection. This is followed by a full, power-on self test.	Proceed after **00 READY** is displayed.
20 ERROR or **20 MEM OVERFLOW**	More data has been received from the computer than can be stored in the printer's memory. Perform a **RESET** to clear unwanted data from the printer's memory.	Additional printer expansion memory is required. As an alternative, reduce the amount of data sent to the printer or lower the resolution (DPI) of the graphics image.
21 ERROR or **21 PRINT OVERRUN**	Too complex data (rules, raster graphics, or dense text) was sent to the printer. Perform a **RESET** to clear unwanted data from the printer's memory.	Simplify the page layout. With the LaserJet IIIP, the problem can be resolved by adding accessory memory and setting Page Protection (**PAGEPRO.**) to the desired print image size.
22 ERROR or **22 I/O CONF ERR**	The printer's receiving buffer overflowed during a busy state. The software application or system driver may be ignoring the printer's busy state.	Verify that the printer and the computer's software are set up to communicate properly. Also, ensure that the proper interface cable is being used (see Appendix A). Refer to "Data Communications Check" on page 7-47 for more information.
40 ERROR	An invalid interface configuration error has been detected. This error can occur by turning off your computer while the printer is on line or if the baud rate of the computer does not match the baud rate of the printer. Also, the handshake protocol or data settings may be incorrect.	Make sure the proper interface and cable is installed, and that printer and host system configuration settings match. Proceed to "Data Communications Check" on page 7-47 for more information.
41 ERROR	A temporary misprint error occurred while printing. The page, drum, and beam detect signal are not synchronized and the printing process is stopped.	Press the `Alt`+`Continue` keys and the page will be reprinted. If the error persists, proceed to "41 ERROR Misprint Check" on page 7-14.

Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
50 NEEDS SERVICE	Indicates a Fusing Assembly malfunction, or a missing +12 V supply.	Turn the printer OFF for 10 minutes to clear the error. If the fan (FM1) is not operational, proceed to "Power Distribution Check" on page 7-11. If the error message persists, go to Flowchart 7-7.
51 ERROR	This beam detect malfunction error can be caused by a poorly connected or defective Fiber Optics Cable, or a defective Scanner Motor, Laser PCA, DC Power Supply, or DC Controller.	Turn the printer OFF and back ON. If the error persists, proceed to Flowchart 7-8.
52 ERROR	This scanner malfunction error can be caused by a poor connection between the Scanner Motor PCA and the DC Controller, or by a defective Scanner Motor PCA, or DC Controller.	Turn the printer OFF and back ON. If the error persists: a. Check cable from J203 on the DC Controller to J301 on the Scanner Motor Assy. b. Replace the DC Controller. c. Replace the Scanner Motor.
53 ERROR	An error on one or more memory expansion units is indicated. The location of the unit cannot be determined.	Verify that all memory units are installed correctly. If the error persists, remove all memory PCAs and reinstall one at a time until the offending PCA can be determined.
53 ERROR UNIT X	An error on a specific memory expansion unit is indicated. Unit 1 is the first Memory PCA installed and unit 2 is the second PCA. This error can be caused by poorly connected or defective memory expansion units.	Verify that all memory units are installed correctly. Remove the indicated accessory memory PCA and retry operation. If the error persists, remove all memory PCAs and reinstall one at a time until the offending PCA can be determined.
55 ERROR	An internal printer command error. The Formatter PCA and the DC Controller PCA are unable to communicate correctly.	Turn the printer OFF and back ON. If the error persists, replace the Formatter or DC Controller as needed. Note that this error can also be generated by inadequate site power.

Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
57 ERROR UNIT X	The printer's memory expansion limits have been exceeded. Unit 1 is the first and unit 2 is the second Memory PCA installed. The maximum expansion memory the printer can recognize is 4 Mbytes.	Turn the printer OFF and back ON. If the error persists, remove the offending accessory memory PCA.
61-67 NEEDS SERVICE	An internal service error due to a defective Formatter PCA.	Turn the printer OFF and back ON. If the error persists, replace the Formatter PCA.
68 ERROR	Indicates a Non-Volatile Memory malfunction. All or part of the user's default settings may have reverted to the factory default settings. Verify proper menu settings before resuming.	Press the [Alt]+[Continue] keys to resume printing. If the error persists, the Formatter PCA should be replaced at the earliest opportunity.
68 NEEDS SERVICE	The Non-Volatile Memory is defective, and the Formatter PCA should be replaced. All of the user's default settings have returned to the factory default settings. Verify proper menu settings before continuing.	Press the [Alt]+[Continue] keys to resume printing. Both the Printing Menu and the Configuration Menu can be temporarily modified, but all changes will be lost when the printer is turned OFF. The message **68 READY** will be displayed until the Formatter PCA is replaced.
70 ERROR	The personality cartridge installed is not designed for this Formatter or the cartridge parameters are inappropriate for this hardware environment.	Verify that the cartridge was specifically designed to work with this printer. Turn the printer OFF, remove the cartridge, and turn back ON to clear the error.
71 ERROR	The personality cartridge installed cannot use the printer's firmware routines.	Turn the printer OFF and remove the cartridge, then turn the printer ON to clear the error. Do not use the incompatible cartridge.
72 NEEDS SERVICE	The font cartridge was removed while the Formatter PCA's firmware was attempting to read it.	Turn the printer OFF and back ON. If the message persists, the font cartridge or Formatter cartridge connector may be at fault.

Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
79 XXXX SERVICE	An unexpected error was detected; write down the error number. Include the error number with the defective Formatter PCA and return them for evaluation.	Turn the printer OFF and back ON to clear the error. If the error persists, replace the Formatter PCA. If the problem still persists, call for technical assistance.
CONFIG LANGUAGE	Invoked by powering ON the printer while holding down **ENTER**. After self test has completed, the printer prompts for a display language (**LANGUAGE ENGLISH**).	Use the ⊞ and ⊟ keys to scroll through the display language options and press the **ENTER** key to make a selection. Press **ON LINE** to continue.
FC CART NO FONT	The font cartridge could not be read by the printer after three attempts were made. Cause may be a defective cartridge or worn electrical contacts.	Remove the font cartridge and re-install it. If this message continues, discontinue use of the defective cartridge.
FC REMOVED	The font cartridge was removed while the printer contained buffered data.	To clear, re-install the original cartridge and press **ON LINE**, or turn the printer OFF and ON (loses buffered data).
FE CARTRIDG	The font cartridge was removed while the printer was "on-line," whether or not the cartridge was being accessed.	To clear the error, turn the printer OFF then back ON.
LANGUAGE ENGLISH	Will appear after invoking language configuration until a specific language is selected using the **ENTER** key (see CONFIG LANGUAGE, above).	Use the ⊞ and ⊟ keys to scroll through the display language options and press the **ENTER** key to make a selection. Press the **ON LINE** to continue.
LE TRAY [size]	Since the envelope cassette (used with the Optional Lower Cassette) is unable to determine the actual envelope size loaded, the user is prompted to enter the envelope size with this message. The printer will use the previous default size if the message is not responded to within 10 seconds.	Use the ⊞ ⊟ and **ENTER** keys to select the desired envelope size. Press **ON LINE** to continue. Note that an improper setting may yield an **LE LOAD** message along with the desired envelope size.

Table 7-1. Printer Display Messages (continued)

Message	Description	Recommended Response
ME FEED [size]	The printer has been configured for manual feed or it has received a command to manually feed an envelope from the computer. The envelope size may be: **COM10, MONARCH, DL, C5,** or **ENVELOPE.**	Load the correct envelope type into the Multi-Purpose tray and press ⌈**ON LINE**⌋.
MF FEED [size]	The printer has been configured for manual feed or it has received a command to manually feed a sheet of paper from the computer. The paper size may be: **A4, EXEC, LETTER.** or **LEGAL.**	Load the correct paper into the Multi-Purpose tray and press ⌈**ON LINE**⌋.
MF READY	Printer is configured for media to be fed manually from the MP tray.	Proceed.
MP, LC, or LE EMPTY	This message appears when the MP, LC or LE tray is empty and is not the selected tray. This message may also indicate a faulty photosensor.	This message does not require paper to be loaded. It is only a reminder that the MP, LC or LE tray is currently out of paper. If paper is loaded and the message persists, go to Flowchart 7-5 or 7-6 for troubleshooting.
MP, LC, or LE LOAD [size]	This message appears when the MP, LC or LE tray is empty and it is the selected paper tray. Note that an unexpected **MP LOAD** message often occurs as the result of failing to select the proper MP SIZE when changing media size in the MP Tray.	Load the correct paper (A4, Letter, Com10, etc.) into the indicated MP, LC or LE tray and set the corresponding MP SIZE or LE TRAY size (if applicable). Press ⌈**ON LINE**⌋ to continue. If the problem persists, go to Flowchart 7-5 (MP Tray) or Flowchart 7-6 (LC/LE Tray).
SYSTEM CONFIG	Invoked by powering ON the printer while holding down the ⌈**MENU**⌋ key.	Not generally used. Power the printer OFF then back ON to clear the message.

START

ON/OFF Switch to ON.

NOTE: Some printers may yield both an error message and a bad printout. ALWAYS troubleshoot any error message before attempting to troubleshoot using a resulting printout.

Does the Display read "READY" after 60 seconds?

YES

Open rear cover and perform ENGINE TEST (see Chapter 3).

NO

Is any message displayed?

YES

Go to Table 7-1, "Printer Display Messages."

NO

Proceed to "Power Distribution Check" on Page 7-11.

Can the printer successfully move paper?

YES

Is a clear ENGINE TEST print being printed?

NO

Is any message displayed?

NO

Go to Flowchart 7-4, "13 PAPER JAM".

YES

Is an error being displayed?

YES

NO

YES

Perform SELF TEST

NO

If ENGINE TEST is OK, yet SELF TEST PRINT is unacceptable or garbled text, trouble shoot the Formatter PCA or Memory PCAs.

Compare the SELF TEST print to the "Image Defect" examples on pages 7-30 & 7-31.

Is the SELF TEST print quality acceptable?

YES

Are any images similar to those in the table?

NO

Go to Flowchart 7-9, "Image Formation."

YES

Perform the recommended action listed in the table

Can the printer successfully communicate with the computer?

YES

Printer OK!

NO/Don't Know

Does the printer's FORM FEED indicator remain lit?

YES

This indicates that print data is in the printer's buffer. Take the printer OFF LINE and press the FORM FEED key to print the page.

NO

Go to "Data Communications Check" on Page 7-47.

ENGINE TEST PRINT

SELF TEST PRINT

SELF TEST

PCL 5   PCL 5   PCL 5

Printer Message Troubleshooting

Table 7-1 lists each printer display message, describes it, and provides troubleshooting information.

Note	Refer to Appendix C for corresponding display messages in other languages.

Table 7-1. Printer Display Messages

Message	Description	Recommended Response
(blank display)	A blank display indicates a problem with the Control Panel, Formatter PCA, Power Supply or DC Controller PCA.	Turn the printer OFF for 15 minutes. If the problem persists, check the cable from the Control Panel to the Formatter PCA. Proceed to "Power Distribution Check" on page 7-11.
00 **READY**	The printer is ready to use. The second line of the display, if present, indicates the current MP SIZE selection or tray status condition.	Proceed.
00 **SMODE**	Service Mode has been invoked. See "Service Mode" in Chapter 3 for more information.	Press $\boxed{\text{ON LINE}}$ to continue.
02 **WARM UP**	Printer engine is warming up. Message should change to 00 **READY** within 3 minutes.	If the message remains for more than 3 minutes, there may be a problem with the +24 V power supply. Check connector J209 on the DC Controller PCA. Proceed to "Power Distribution Check" on page 7-11.
04 **SELF TEST**	Continuous **SELF TEST** is invoked.	Press the $\boxed{\text{ON LINE}}$ key to exit the continuous **SELF TEST** mode. Pages will continue to print until the print buffer is empty (several pages).
05 **SELF TEST**	Printer is initiating **SELF TEST**.	Proceed after 00 **READY** is displayed.
06 **PRINT TEST**	**SELF TEST** is printing.	Proceed after 00 **READY** is displayed.

(41 ERROR)

The printer is detecting a
sheet at the input paper
sensor (PS1) before it should
have arrived.

Check the following items:

* Verify ALL paper has been
removed from the printer
AFTER a jam has occured.
A partially fed sheet can
trigger PS 1 too early.

* Inspect the media for
rough surface texture or
sheets which easily stick
together.

* Inspect for double feeding
of sheets.

In which
tray does the
error occur?

BOTH TRAYS

MP TRAY

LC TRAY

* Inspect paper for sheets
which have stuck together
or have a rough surface
texture.

* Inspect the input paper
feed sensor (PS1) for proper
operation.

* Proceed to Flowchart 7-4,
"13 PAPER JAM" for additional
diagnostics.

* Inspect MP tray separation
pad, clean or replace.

* Check MP pick-up roller
for multiple rotations per
sheet. If it turns more than
1 rotation, replace roller or
the MP Tray pick-up solenoid.

* Proceed to Flowchart 7-4,
"13 PAPER JAM" for additional
diagnostics.

The LC tray feed rollers
should stop momentarily to
allow the sheet to align from
the pickup rollers.

* Inspect the LC tray feed
roller clutch for proper
operation.

* Inspect the feed roller
solenoid (SL3) for proper
operation (sticky armature).

EXIT

12 OPEN OR NO EP-L CARTRIDGE

"12 OPEN" message can be caused by one of four things:
- Paper Path open.
- Fuser exit door open.
- EP cartridge not in position.
- Fan fault.

NOTE: Before proceeding, ensure that J701 on the Density Adjustment PCA and J213 on the DC Controller are firmly seated.

Is the Paper Path Door securely latched?
NO → Close the Paper Path Door and ensure that the door arm opens the EP-L cartridge protective drum flap (door).
YES ↓

Is the EP-L cartridge installed and seated completely in the printer?
NO → Install the EP-L Cartridge and press the green EP-L drum drive clutch release button to allow the gears to mesh fully.
YES ↓

Is the external fuser access door closed completely?
NO → Close the fuser door. Check for binding in the door sensing lever.
YES ↓

Is the fan operating?
NO → Inspect the fan motor cable connection, J701 on the Density Adjust. PCA. Measure J701-1 for +12V. Measure J701-3 for /FMDRV signal when the power is turned on. +4 volts for low speed (stand-by) and +2 volts for high speed (print). Replace the FAN. Replace the Density or DC Controller PCAs.
YES →

Measure the sensor signal levels at the DC Controller PCA, while the sensor lever or flag is operated by hand.
The signals should toggle from ~+5V to ~0V.

Did all of the sensor signals toggle when activated?
NO → Check cable connections. Replace the sensor(s). Replace the fan (if necessary). Replace the Density PCA.
YES ↓

Replace the DC Controller

EXIT

SENSOR	ACTIVE SIGNAL	SIGNAL PATH
PS5 EP/Paper Path Door	/DOSNSE	TB702-1 on Density PCA to TB701-4 to J213-4 on the DC Controller.
PS4 Fuser Door	/DOSNSE	J504-1 to J209-8 on the DC Controller.
Fan Motor Tach	FMTRAC anded with /DOSNSE on the Density PCA.	J701-2 on the Density PCA to TB701-4 to J213-4 on the DC Controller.

J213
TB701/
TB702
Density Adjustment PCA
J701 Door Open Sensor PS5
EP Cartridge Door/flag

EP-L Drum Drive Clutch Release Button (green)
External Fuser Door Sensor PS4

J209
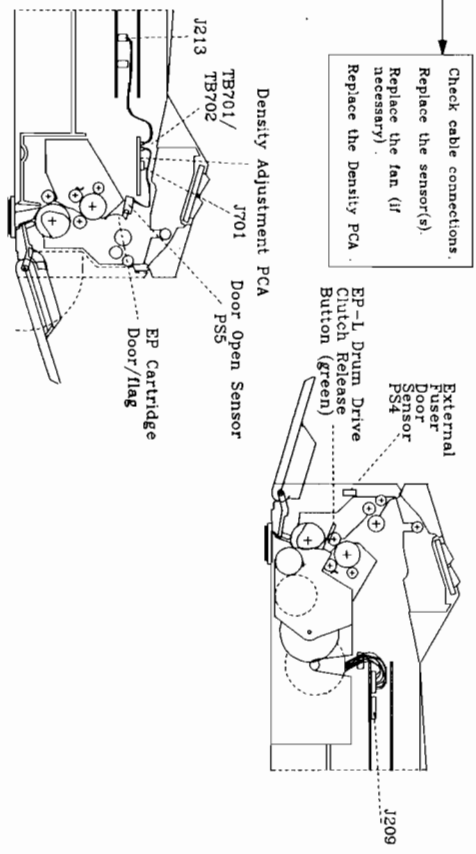
Power Distribution Check

The Power Supply receives 100/115 V or 220/240 V input and distributes +5 V, +12 V and +24 V DC power to the rest of the printer. If one or more of the DC supplies fail, the following symptoms will result:

Table 7-2. DC Power Supply Failures

MISSING SUPPLY	SYMPTOM
+5VDC	Blank Control Panel display AND exhaust fan not operational.
+12VDC	50 **NEEDS SERVICE** message displayed AND exhaust fan not operational.
+24VDC	Continuous 02 **WARM UP** message displayed with operational exhaust fan.

If the current symptom is a blank display, yet the exhaust fan IS operational, skip to the section "Blank or Garbled Display," on page 7-13.

If a DC supply problem is suspected, proceed as follows:

1. Ensure that the printer is plugged into site power that matches (±10%) the Power Rating Label next to the printer's AC receptacle. Note that inadequate site power (*e.g.* brownout conditions) may also prevent one or more DC supplies from reaching adequate voltage levels. The printer may need to be powered OFF for up to 15 minutes following a site power disturbance to allow the power supply to reset.

2. Using a DC voltmeter, verify the missing or marginal voltage(s) at connector J1 on the Formatter PCA and J212 on the DC Controller PCA as shown in Figure 7-1.

   a. If +5V is missing, ensure AC power is reaching the Power Supply and that CB101 (at the rear of the Power Supply) is properly set.

   b. If +5V and/or +12V is missing or inadequate, replace the Power Supply.

   c. If +24V is missing, ensure the interlock switch (SW101) inside the Power Supply is closed when the Paper Path Door is closed. If the switch is being closed, replace the Power Supply.

3. If the problem persists after replacing the Power Supply, the supply is being overloaded. Remove connectors from the Formatter and DC Controller PCAs one at a time until the supply provides the correct voltage. Then, using the printer wiring diagram (page 7-55), identify and replace the problem component(s).

J1 on Formatter PCA

PIN	1	n/c	2	3	4
SIGNAL	+5	n/c	+5	Gd	Gd
COLOR	Brn		Brn	Blu	Blu

J212 on DC Controller PCA

PIN	COLOR	SIGNAL
1	Blue	Ground
2	Blue	Ground
3	Red	+24V *
4	Red	+24V *
5	Blue	Ground
6	Orange	+12V
7	Blue	Ground
8	Brown	+5V
9	Yellow	/FSRDRV

* Must have Paper Path Door closed or the Power Supply interlock defeated.
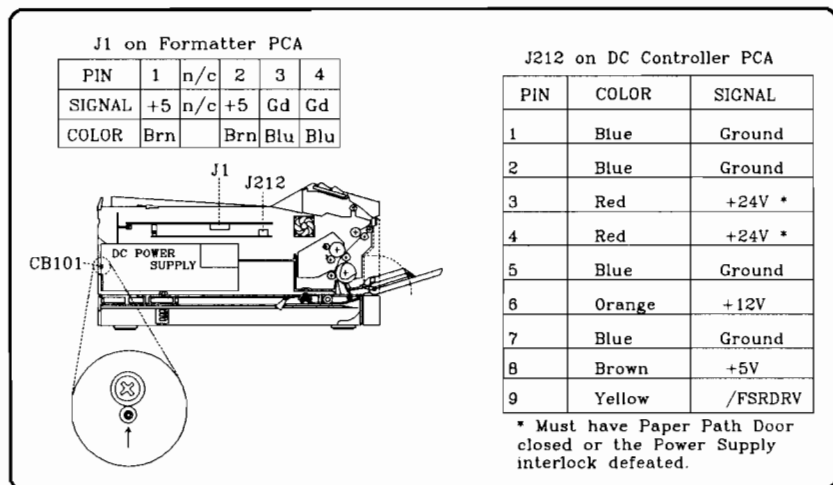
Figure 7-1. Power Distribution Check

Blank or Garbled Display

Note	A blank display is normal if the printer is powered ON with the (ON LINE) (MENU) and (ENTER) keys pressed. (See "Service Mode" in Chapter 3 for more information.)

If a blank display is accompanied by a non-operational exhaust fan, complete the preceding steps under "Power Distribution Check."

If the Control Panel message is "garbled," first ensure that the printer is configured for a display language you understand (see Chapter 3 and Appendix C). If the display still indicates a problem, proceed as follows:

1. Reseat the Control Panel cable into the Formatter PCA.
2. Replace the Control Panel Assembly.
3. Replace the Formatter PCA.
4. Replace the DC Controller PCA.

41 ERROR - Misprint Check

A 41 ERROR (misprint) is used to indicate that a **temporary** malfunction has occurred with the print engine (i.e., NOT a Formatter error). Occasional occurrences of this message can be expected. However, persistent 41 ERROR messages can indicate a problem requiring attention.

Error 41 is usually accompanied by a blank or partially printed page. Pressing (Continue) will re-print the page and continue with the print job.

An 41 ERROR will occur due to the following conditions:

1. **An unstable or temporary loss of the Beam Detect pulse.** This problem is normally accompanied by a partially printed page, often with thin horizontal black lines, deformed characters, or solid black areas on this or previous pages. If these symptoms are present, **proceed to Flowchart 7-8.** Note that loss of the Beam Detect pulse for more than 2 seconds will result in a 51 ERROR condition.

2. **Paper reaching the Input Paper Sensor (PS1) before it is expected.** This is **always** accompanied by a **blank** piece of paper fed through the printer, and there is **no** accompanying 41 ERROR reported with the LaserJet IIIP. This is normally due to paper feed problems. Refer to Flowchart 7-2 if the problem occurs frequently.

3. **Excessive electrical noise is present on some of the signal lines shared by the Formatter and DC Controller PCAs.** This problem normally results in a blank or partially printed page. The source of this electrical noise must be eliminated to resolve the problem. Look for any sources of disturbance such as electrostatic discharge (ESD) that may be causing the problem.

If the misprint problem persists, ensure that the Fusing Assembly's electrostatic biasing diodes (2) are present as follows:

1. Remove the Fusing Assembly (see "Fusing Assembly" in Chapter 6).

2. Check for a diode at either location A or B in Figure 7-2. If there is **no** diode at either location, replace the Fusing Assembly with a newer assembly (see Chapter 8 for part numbers).
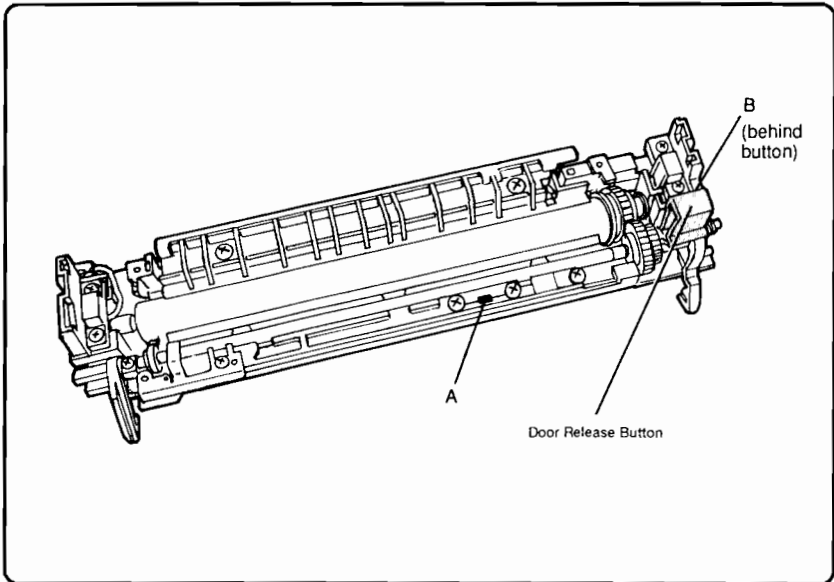
Figure 7-2. Diode Locations

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13 PAPER JAM
Paper Movement Problems

Does the Error occur at printer Power-up? — YES / NO

Does the Main Motor rotate for 10 sec. after warm-up cycle? — YES / NO

Check for Paper Sensors. (PS1 and PS3) — YES

Does the Error persist? — YES / NO

Check paper sensor operation and possible binding. Correct or replace.

Does the Error persist? — YES / NO

Replace DC Controller PCA.

EXIT

* Verify Main Motor operation.
* Inspect gear train for binding.
* Inspect EP-L cartridge for binding.
* Ensure the Paper Path Door is fully latched.
* Reseat motor cable at DC Controller J210.
* Replace main motor or DC Controller PCA.

Exit to Main Chart 7-1.

Does the Main Motor rotate for 5 sec after warm-up cycle? — YES / NO

Will Paper feed from the MP tray to the Face-Up tray? — YES / NO — Go to Chart 7-4A.

Will Paper feed to the Face-Down Tray? — YES / NO — Go to Chart 7-4B

Will Paper feed from the LC Tray to the Face-Down Tray? — YES / NO — Go to Chart 7-4C.

SENSOR	DC CONTROLLER ACTIVE SIGNAL	CONNECTOR
PS1 Input Paper	/PFSNS	J208-1
PS3 Paper Exit	/POSNS	J213-5 via Density PCA TB703, pin 1.

J208 J213 TB703

INPUT PAPER SENSOR PS1
PAPER EXIT SENSOR PS3

J210 MAIN MOTOR

FACE-DOWN TRAY
DEFLECTOR
FACE-UP TRAY
MP TRAY
LC CASSETTE

Computer Museum

Flowchart (reading from start)

(7-4A)

Does the MP Pickup Roller rotate?
- NO → **Is the Paper Path Door gear train turning?**
  - YES → Verify solenoid... (see below)
  - NO → Verify Main Motor operation. Inspect gear train for binding.
    - Ensure that the Paper Path Door is fully latched.
    - Inspect the fuser for binding.
- YES → **Does the MP Tray Pressure Plate hold paper against the pick-up rollers?**

Is the Paper Path Door gear train turning?
- YES → **Is the MP Pick-up Solenoid (SL1) being energized?**
  - YES → Inspect pick-up roller for binding. Replace the pick-up roller assembly.
  - NO → Verify solenoid operation by connecting a jumper between J209-2 and GND. If SL1 is not being energized, inspect for a loose or broken door cable from SL1 to J209 on the DC Controller PCA. Replace SL1 and cable assembly. If SL1 is being energized, replace the DC Controller PCA.

Does the MP Tray Pressure Plate hold paper against the pick-up rollers?
- NO → Check plate, pressure Spring, holding clip, and pressure plate arms.
- YES → **Is the Separation Pad properly installed and not damaged?**

Is the Separation Pad properly installed and not damaged?
- NO → Replace Separation Pad. Check for damage or missing pressure spring.
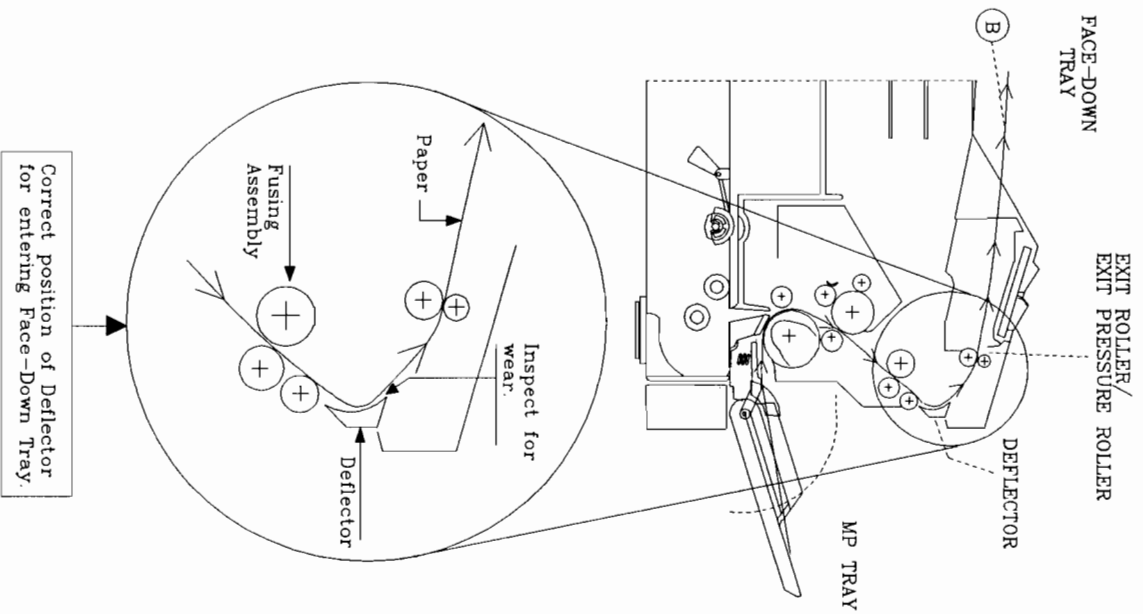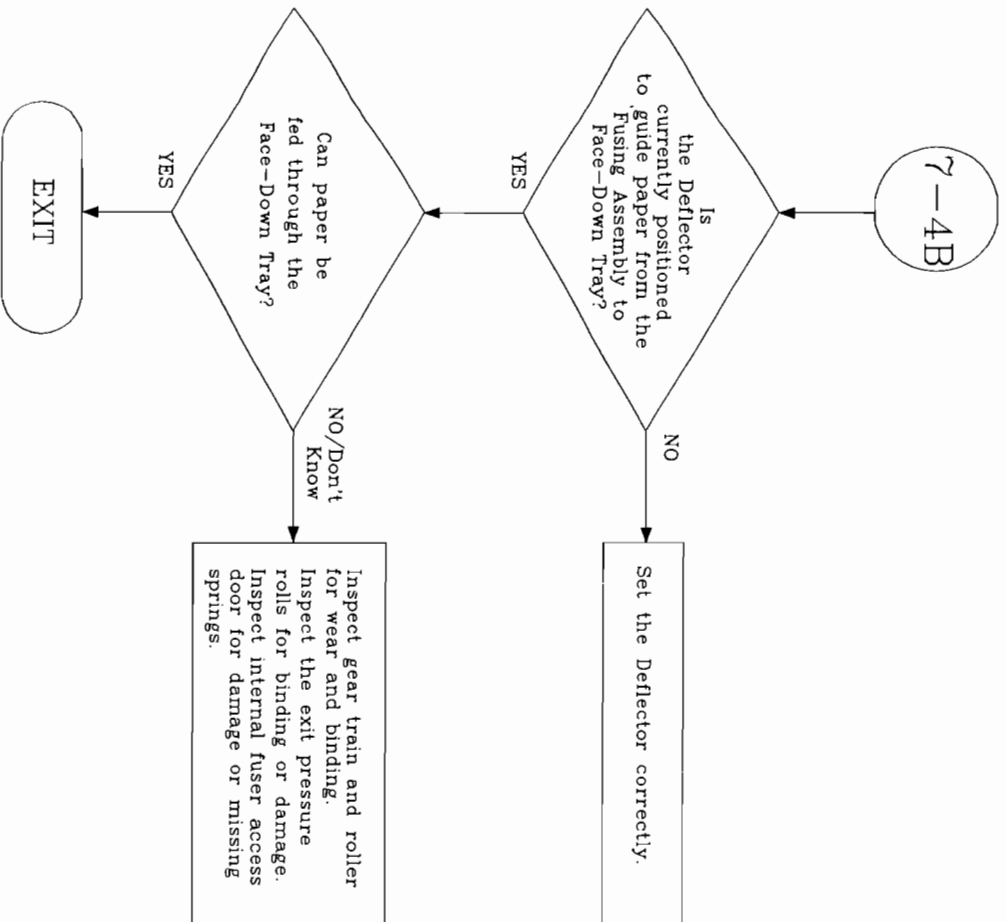- YES → **Is Paper entering the Fusing Assembly?**

Is Paper entering the Fusing Assembly?
- NO/Don't Know → Check Paper Path, EP Cart., PS1, Transfer roller, Feed roller and gears, for proper operation. Correct all hinderances to paper movement. Replace the EP-L Cartridge.
- YES → **Does Paper move freely through the Fusing Assembly?**

Does Paper move freely through the Fusing Assembly?
- NO/Don't Know → Ensure Fusing Assembly drive gear engages with the main drive and pick-up roller drive gears. Observe paper passing through the Fusing Assembly. Remove or repair obstacles.
- YES → **Does Paper move from the Fusing Assembly to the Face-up Tray?**

Does Paper move from the Fusing Assembly to the Face-up Tray?
- NO → Visually inspect Deflector to determine if it is in the correct position to move paper from the Fusing Assembly to the Face-up Tray. Inspect deflector for wear.
- YES → **EXIT**

Diagram labels

Separation Pad
MP Tray Pressure Plate and Pressing Spring
MP TRAY
(A)
FACE-UP TRAY
DEFLECTOR

PICK-UP ROLLER AND CLUTCH
SL1
PAPER PATH DOOR DRIVE GEARS
MAIN DRIVE GEAR TRAIN
J210   J209   MAIN MOTOR

⑦—4B

Is
the Deflector
currently positioned
to guide paper from the
Fusing Assembly to
Face-Down Tray?

YES

NO → Set the Deflector correctly.

Can paper be
fed through the
Face-Down Tray?

YES → EXIT

NO/Don't
Know

Inspect gear train and roller
for wear and binding.
Inspect the exit pressure
rolls for binding or damage.
Inspect internal fuser access
door for damage or missing
springs.

FACE-DOWN
TRAY

Ⓑ

EXIT ROLLER/
EXIT PRESSURE ROLLER

DEFLECTOR

MP TRAY

Paper

Fusing
Assembly

Inspect for
wear.

Deflector

Correct position of Deflector
for entering Face-Down Tray.

(7-4C)

First, ensure that the printer is resting on a hard, flat, and continuous surface with all four printer feet level. Then perform the following:
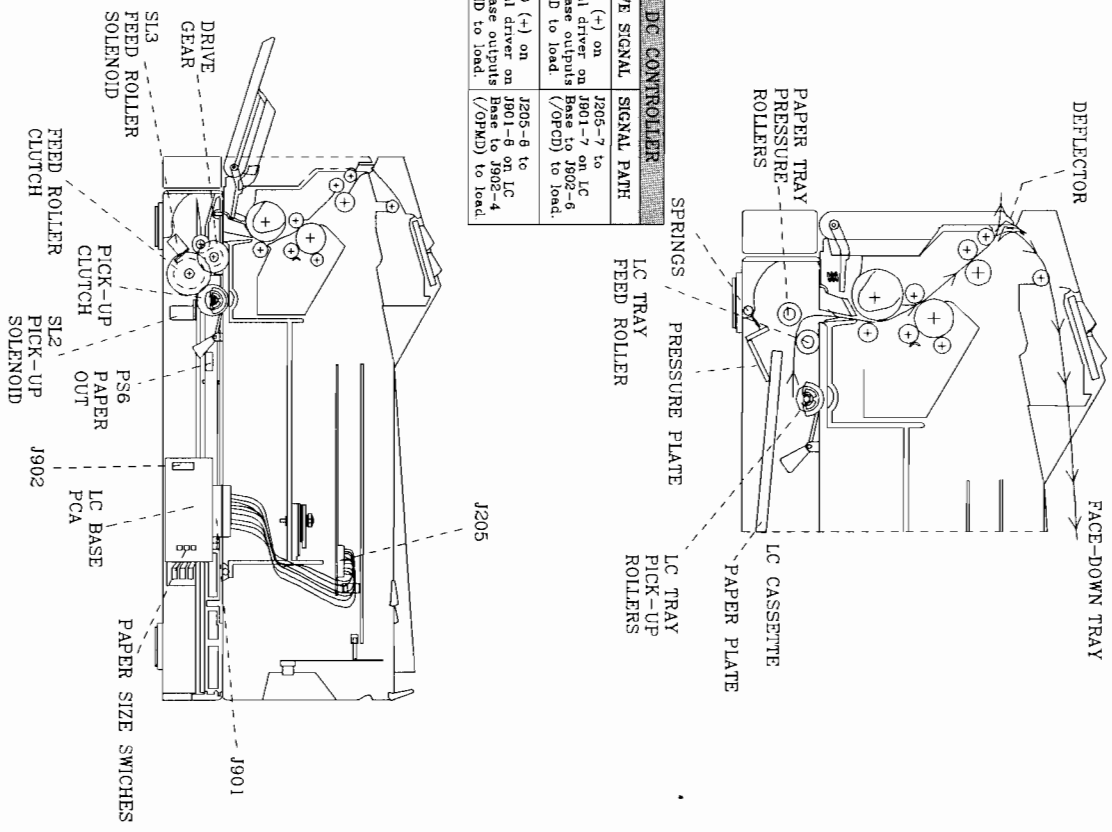
1. Select the LC Tray from the printer's Control Panel.
2. Load paper.
3. Perform a Control Panel SELF-TEST.

Is the LC Tray and base installed properly? — YES / NO

Separate the LC base from the printer. Ensure that the connector and drive gears make good connection. Reinstall the base and ensure good pin alignment and that screws are tight.

Does the LC pick-up "D" roller rotate? — YES / NO

Visually observe and listen for two clicks: first for the pick-up solenoid (SL2), then for the feed solenoid (SL3). Inspect the cables for good connection. Observe pick-up & feed roller clutches' operation. Check for overfilled LC Tray.

Do the LC feed rollers rotate? — YES / NO

Clean the rollers. Repair or replace as needed.

Does paper move from the LC Tray to the printer input feed roller? — YES / NO

Check cassette tray for damage or missing pressure plate springs. Check for obstruction in the printer inlet to feed roller area. Check LC Tray base for alignment.
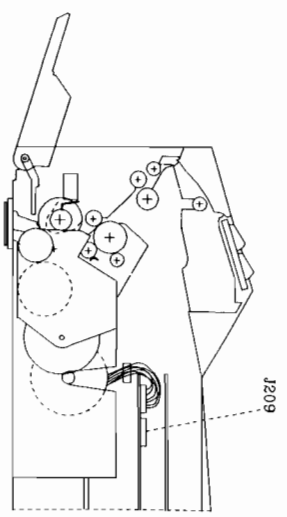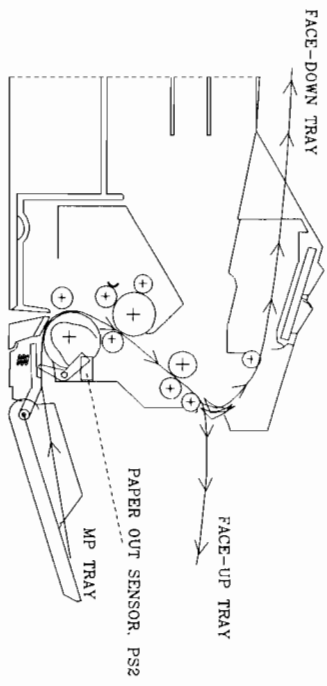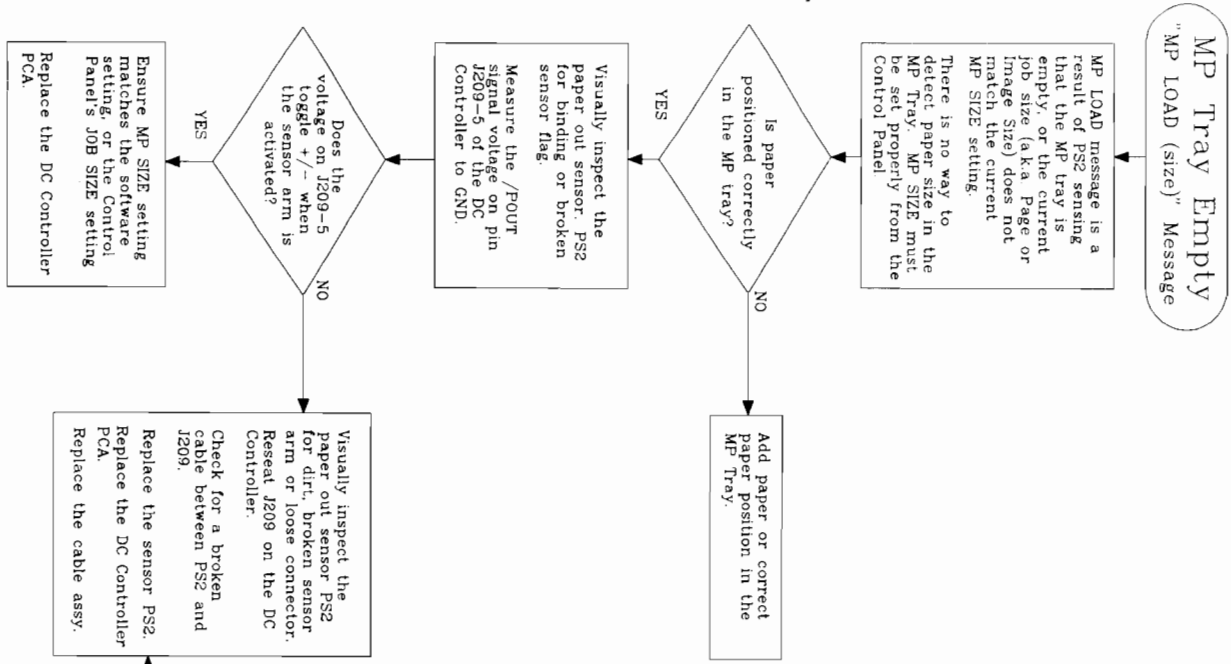
EXIT

NOTE: To observe LC Tray operation, the LC Base test tool (P/N RY9-0064-000CN) should be installed.

Errors can occur if the printer is operated without the right side LC base cover.

DC CONTROLLER		
SOLENOID	ACTIVE SIGNAL	SIGNAL PATH
SL2 Pick-up	OPCD (+) on Signal driver on LC Base outputs /OPCD to load.	J205-7 to J901-7 on LC Base to J902-6 (/OPCD) to load.
SL3 Feed Rollers	OPMD (+) on Signal driver on LC Base outputs /OPMD to load.	J205-6 to J901-6 on LC Base to J902-4 (/OPMD) to load.

PAPER TRAY PRESSURE ROLLERS
DEFLECTOR
SPRINGS
PRESSURE PLATE
LC TRAY FEED ROLLER
FACE-DOWN TRAY
LC TRAY PICK-UP ROLLERS
LC CASSETTE
PAPER PLATE
DRIVE GEAR
SL3 FEED ROLLER SOLENOID
FEED ROLLER CLUTCH
PICK-UP CLUTCH
SL2 PICK-UP SOLENOID
PS6 PAPER OUT
J902
LC BASE PCA
J205
J901
PAPER SIZE SWICHES

MP Tray Empty
"MP LOAD (size)" Message

MP LOAD message is a result of PS2 sensing that the MP tray is empty, or the current job size (a.k.a. Page or Image Size) does not match the current MP SIZE setting.

There is no way to detect paper size in the MP Tray. MP SIZE must be set properly from the Control Panel.

Is paper positioned correctly in the MP tray?

NO → Add paper or correct paper position in the MP Tray.

YES ↓

Visually inspect the paper out sensor, PS2 for binding or broken sensor flag.

Measure the /POUT signal voltage on pin J209-5 of the DC Controller to GND.

Does the voltage on J209-5 toggle +/- when the sensor arm is activated?

NO → Visually inspect the paper out sensor PS2 for dirt, broken sensor arm or loose connector. Reseat J209 on the DC Controller.

Check for a broken cable between PS2 and J209.

Replace the sensor PS2. Replace the DC Controller PCA. Replace the cable assy.

YES ↓

Ensure MP SIZE setting matches the software setting, or the Control Panel's JOB SIZE setting

Replace the DC Controller PCA.

SENSOR	ACTIVE SIGNAL	DC CONTROLLER SIGNAL PATH
PS2 MP Paper Empty	/POUT	J209-5 via Front door cable to sensor

FACE-DOWN TRAY

PAPER OUT SENSOR, PS2

FACE-UP TRAY

MP TRAY

J209

LC Tray Empty
"LC LOAD (size)" Message

NOTE The LC LOAD message is caused by either an empty paper tray, an incorrect size (other than requested tray), or a missing paper tray.

Errors can occur if the printer is operated without the right side LC base cover.

NOTE It may be necessary to install the LC Base test tool P/N R19-0064-000CN to observe or measure some of these components (see Appendix B).

Is paper correctly loaded in the LC Tray?

— NO → Load paper and install the tray in the LC Base.

— YES ↓

Visually inspect the paper out sensor flag (arm) for binding or damage. (PS6)

↓

Measure the /OPPOUT signal voltage on pin J205-6 of the DC Controller to GND.

↓

Does the voltage on J205-6 toggle +/- when the sensor arm is activated?

— NO → Visually inspect the paper out sensor PS6 for dirt, broken sensor arm, or loose connector. Check for cable continuity between pins J205-6 and the sensor arm, pin 1. Locate the bad cable. Replace the sensor PS6. Replace the LC Base PCA.

— YES ↓

Measure the LC Tray paper size switches signals /0PSIZ0, /OPPSIZO, /OPSIZ1, and /OPSIZ2 at pins 5, 4 and 3 on the DC Controller. Manually operate the switches and the signals should toggle between +5V and GND.

↓

Do ALL paper size switch signals toggle +/- when the switch arms are activated?

— NO → Visually inspect the paper size switches on J205 and the LC Base PCA. Replace the LC Base PCA. Ensure a proper tray is being used in the LC Base.

— YES ↓

Replace the DC Controller PCA.

Ensure that the tray pressure plate raises when the tray is loaded into the base. Inspect for missing, tray springs or bad tray. Replace the sensor PS6. Replace the LC Base PCA.

Check for cable continuity between pins on J205 and the LC Base PCA. Replace the LC Base PCA.

Switch Settings for Lower Cassette Trays

TRAY SIZE	SW901	SW902	SW903
DC Controller Pin	J205-5	J205-4	J205-3
Letter	ON	OFF	OFF
Legal	OFF	OFF	ON
A4	ON	ON	ON
Executive	ON	ON	OFF
Envelope	OFF	OFF	ON
Tray Not Installed	OFF	ON	ON
Base Not Installed	OFF	OFF	OFF

SENSOR	ACTIVE SIGNAL	DC CONTROLLER SIGNAL PATH
PS6 LC Paper Empty	/OPPOUT	J205-6 via LC Base PCA; J901-6 to J902-1 to PS6

FUNCTIONAL CHECK:
Remove the lower cassette tray and push (back) on the Paper-out sensor flag.

PRESS	DISPLAY INDICATION
SW903	00 READY
SW901	00 READY
SW903+SW902	LE TRAY [size]

SWITCH	ACTIVE SIGNAL	DC CONTROLLER SIGNAL PATH
SW901	/OPSIZ0	J205-5 to J901-5
SW902	/OPSIZ1	J205-4 to J901-4
SW903	/OPSIZ2	J205-3 to J901-3

SPRINGS
PRESSURE PLATE
PAPER PLATE
LC CASSETTE
LC TRAY PICK-UP ROLLERS
PS6 PAPER OUT
J902
J901
LC BASE PCA
PAPER SIZE SWITCHES
J205
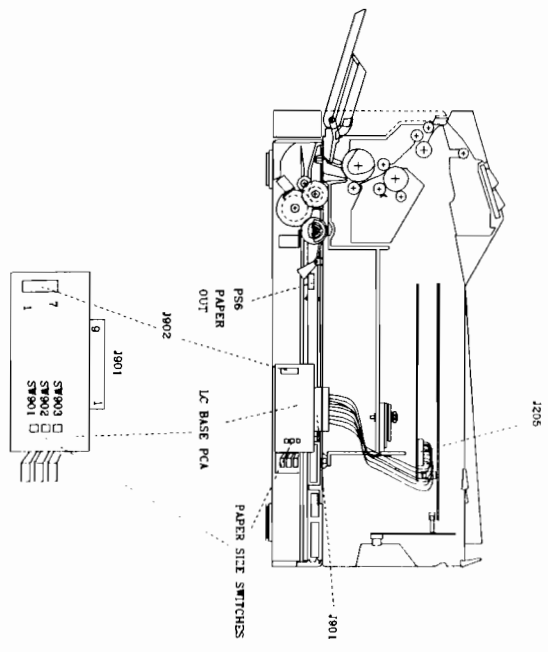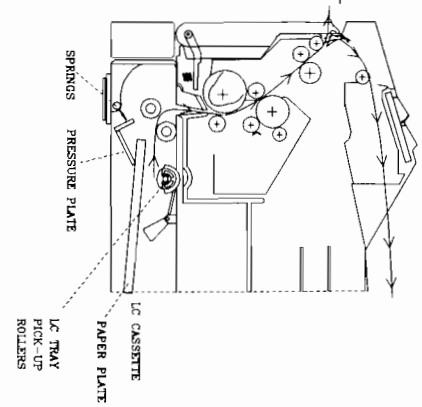
50 SERVICE

50 NEEDS SERVICE error is a hardware fault with the fuser assembly or it's controlling circuits. The error may also indicate a marginal or missing +12 V supply voltage, or faulty site power.

NOTE Power OFF the printer for at least 10 minutes to reset the printer. An alternate method to reset the error is to short C212 (+ lead) to GND on the DC Controller PCA.

Power OFF the printer for 10 minutes to reset the error and allow the fuser to cool.

Open the MP Tray and watch the upper left corner of the face-up/down deflector while turning the power ON.

The fuser lamp can normally be seen brightly illuminated after 5 or 10 seconds.

Ensure that the Paper Path Door is securely latched on the left side.

Does the fuser lamp illuminate?
YES → Go to Chart 7-7A
NO →

Ensure that the DC Controller has been reset for 10 minutes. If unsure, short C212 to GND on the DC Controller.

It may be necessary to reset the error each time power is cycled.

Remove the Fuser Assembly. Measure J501 on the fuser for <10 ohms resistance between pins 1 and 3. (2 n/c)

Is the resistance less than 10 ohms?
YES → Go to Chart 7-7A1
NO →
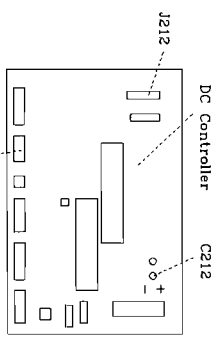
The fuser lamp has an open circuit. The lamp is in series with two thermoswitches (TS1 & TS2).

Use an ohmmeter to isolate the defective component.

Keep the printer powered OFF for 10 minutes to allow the fuser error to reset.

Replace the faulty component or the complete Fusing Assembly. Note that an open thermoswitch may indicate a Fusing Assembly requiring replacement due to overheating.
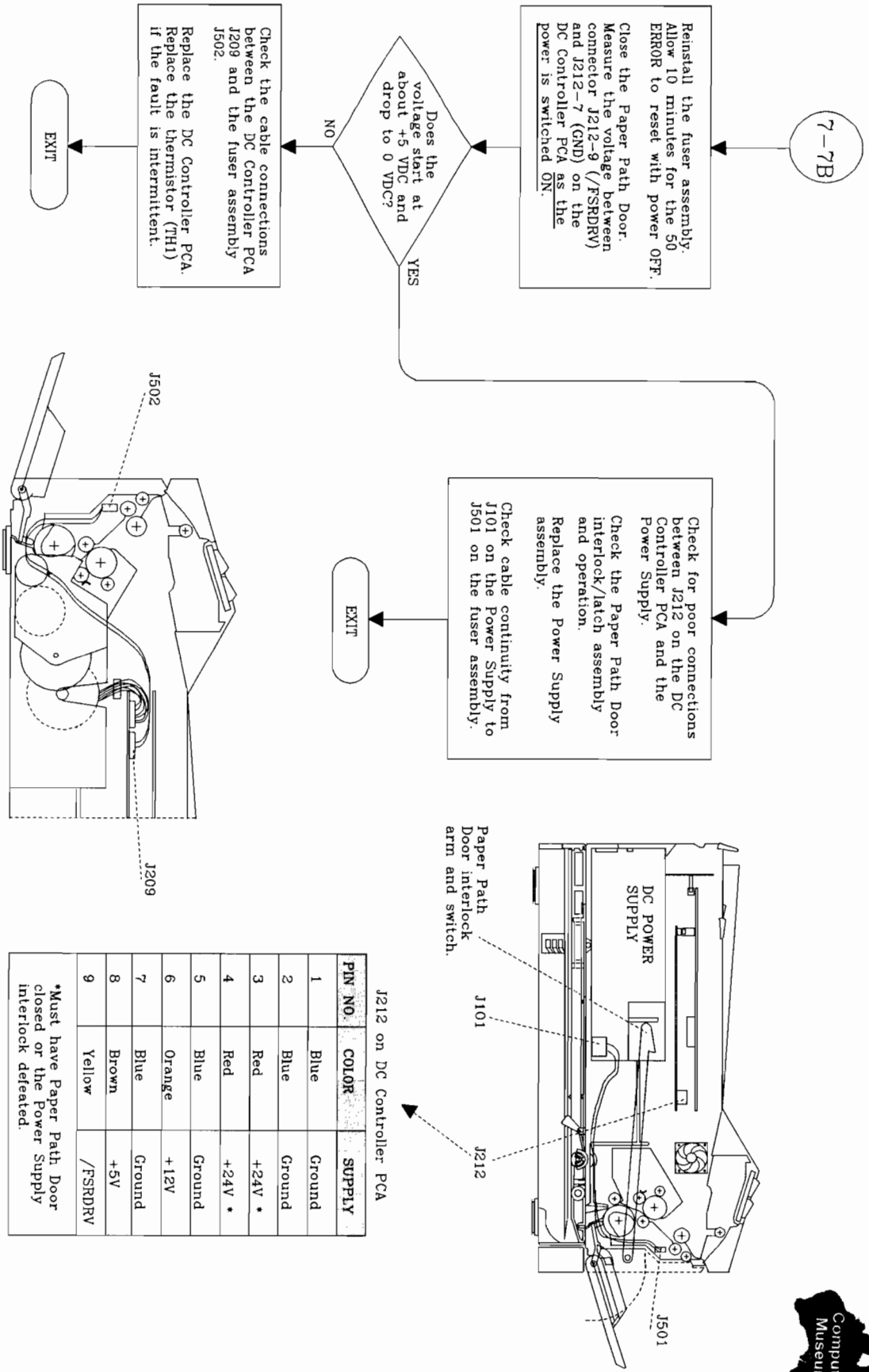
EXIT

CAUTION If the fuser lamp remains illuminated up to the time a 50 NEEDS SERVICE error is indicated, check connectors J212 and J209 on the DC Controller and replace the DC Controller if necessary. This scenario can cause permanent damage to the Fusing Assembly if repeated.

DC Controller — J212 — J209 — C212

J501-1, 3

Fuser Assembly — TS2 — TS1 — Front Door Release Button — J502-3, 1

DC Controller — J209 — J212 /FSRDRV — AC Line — Power Supply — Door Switch — J501 — TS2 — TS1 — Fuser Assembly — FSRTH — J502 — TH1 — Lamp (heater)

Flowchart 7-7A.
Fuser Error (continued)

(7-7A)

NOTE: The fuser lamp illuminates after the 50 ERROR has been reset.

After resetting the 50 error the fuser lamp illuminates when the printer is powered ON.

NOTE: If the error is intermittent, you should follow both legs of the decision diamond prior to this box.

NOTE: Intermittent faults can be caused by loose cables, and connectors, or power line transients.

Power OFF the printer for 10 minutes to allow the fuser to cool and reset the error. Power ON the printer and perform a Self Test.

Does the error persist after having been reset?

YES

NO

Check for poor connections between the Fuser Assembly (J502) and the DC Controller PCA (J209) and the Power Supply (J209), and the Power Supply (J212). Inspect the Paper Path Door latch/fuser interlock assembly for proper operation.

EXIT

(7-7A1)

NOTE: The fuser lamp does NOT illuminate after the 50 ERROR has been reset.

Remove the fuser assembly from the printer. Allow the fuser to cool and measure the resistance between J502-1 and J502-3 on the fuser assembly.

Is the resistance between 180K and 290K ohms at room temperature?

YES

Go to chart 7-7B.

NO

Replace the thermistor (TH1). Ensure good cable connections between the thermistor/fuser assembly (J502) and the DC Controller PCA (J209).

EXIT

DC Controller
J212 /FSRDRV
AC Line
Power Supply
Door Switch
FSRTH
J501
TS2
TS1
Fuser Assembly
TH1
Lamp (heater)
J502
J209

Fuser Assembly
TS2
TS1
Thermistor TH1
J501- 1 3
J502 -3 -2 -1
Front Door Release Button

DC Controller   C212
J212
J209

(7-7B)

Reinstall the fuser assembly. Allow 10 minutes for the 50 ERROR to reset with power OFF.

Close the Paper Path Door. Measure the voltage between connector J212-9 (/FSRDRV) and J212-7 (GND) on the DC Controller PCA as the power is switched ON.

Does the voltage start at about +5 VDC and drop to 0 VDC?

NO →

Check the cable connections between the DC Controller PCA J209 and the fuser assembly J502.

Replace the DC Controller PCA. Replace the thermistor (TH1) if the fault is intermittent.

→ EXIT

YES →

Check for poor connections between J212 on the DC Controller PCA and the Power Supply.

Check the Paper Path Door interlock/latch assembly and operation.

Replace the Power Supply assembly.

Check cable continuity from J101 on the Power Supply to J501 on the fuser assembly.

→ EXIT

J502

J209

Paper Path Door interlock arm and switch.

DC POWER SUPPLY

J101

J212

J501

J212 on DC Controller PCA

PIN NO.	COLOR	SUPPLY
1	Blue	Ground
2	Blue	Ground
3	Red	+24V *
4	Red	+24V *
5	Blue	Ground
6	Orange	+12V
7	Blue	Ground
8	Brown	+5V
9	Yellow	/FSRDRV

*Must have Paper Path Door closed or the Power Supply interlock defeated.

Flowchart 7-8.
51 (41) ERROR (Beam Detect Error)

41/51 ERROR

ERRORs 51 and 41 are Beam Detect errors. 41 is a soft (recoverable) error. 51 is a hard fault lasting more than 2 seconds. ERROR 41 is reset by pressing the CONTINUE key. ERROR 51 must be power cycled before restarting the printer.

Beam Detect is the synchronizing signal used by the DC Controller to begin a laser scan (dot row).

The laser beam is transmitted by a fiber optic cable to the sensor on the DC Controller PCA. If the scanner motor is not rotating a false 51 error can occur.

Check the fiber optic cable at J204 on the DC Controller PCA to the Laser/Scanner Unit.

Is the cable connected securely?

NO → Reconnect the cable.

YES

NOTE: A faulty Scanner Motor can cause a 51 ERROR if its speed in incorrect.
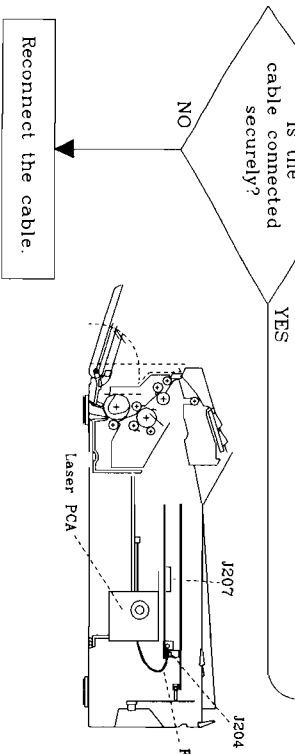
a. Power OFF the printer.
b. Check the EP-L Cartridge for an intact Laser interlock tab (see Figure 9-11).
c. Check the Laser Cover's Shutter for proper operation (see Figure 6-48).
d. Power ON the printer.
e. Close the Paper Path Door.
f. While measuring the voltage between J202-4 (LSRPWR) and J202-2 (GND) on the DC Controller, connect a jumper between J207-6 (/LPC) and GND (also on DC Controller PCA).
g. Listen for the Scanner Motor sound as it starts to turn.

Does the voltage measure 1.65VDC to 2.0VDC after 1 second?

NO → Replace the DC Controller PCA.

YES
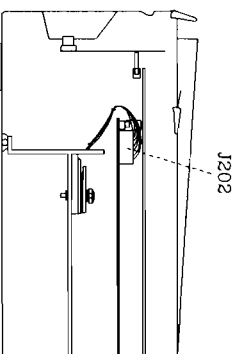
With J207-6 jumpered to GND, and the paper path door closed, measure the voltage between J202-3 (ACPIN) and J202-2 (GND). The voltage should change from 4.0VDC to 1.50VDC.

Is the voltage 1.5VDC (±.075) after 1 second?

NO → Replace the Laser PCA.

YES

a. Check cable from J203 on DC Controller to J301 on Scanner Motor Assy.
b. Replace DC Controller.
c. Replace Scanner Motor Assy.

EXIT

7-28 Troubleshooting: Printer Messages

Image Formation Troubleshooting

The quality of the printer's output is difficult to measure. This section of the manual is intended to assist the Service Representative in defining acceptable print quality and in understanding what factors may affect print quality.

Print Density Check

Density (blackness) is very difficult to judge. To evaluate the customer's print quality with respect to density, both the service person and the customer must use the same method of evaluation. The following variables must be clarified or defined before a true evaluation can occur.

Table 7-3. What Affects Print Density

Variables	Description
Paper	All types of paper react differently to the laser imaging process. The surface texture, paper color (degree of whiteness), paper type, and moisture content all contribute to density perception.
	Because paper varies widely, it is important that all density evaluations are made using the same type of paper if not the same paper lot. It is recommended that all evaluations be made using Xerox 4024 or Canon NP copier bond paper.
Density Adjustment	The printer's Density Adjustment Slide changes the developer DC bias which directly affects the amount of toner used for the print image. For evaluation purposes, ensure that all print samples are taken with the Print Density set in the detented (middle) position.
Environmental Conditions	Although it is difficult to duplicate the printer's location with respect to sunlight, humidity, and temperature, these factors should not be ruled out when judging Print Density.
Incorrect Density Perceptions	This phenomenon occurs when someone is asked to judge the Print Density of two or more font styles - for example, **bold print** versus *italic print*. In most cases, a person will judge bold print to be blacker just because the stroke weight is thicker. Print Density is an evaluation of how "dark" or "black" print is, and it is not determined by the "width" or "thickness" of a line.
	To eliminate the perceived density phenomenon, all density comparisons should be made using the same print patterns. It is recommended that all density evaluations be based on the Self Test Printout.

Image Defects

This section illustrates some image defects and their possible causes. Since there are many variables in the printing process, it is possible to encounter image defects that are not illustrated below. If you find a defect that is not illustrated, record the probable cause along with the printing environmental conditions and save a copy of the defect for future reference.
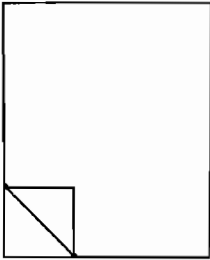
Blank (White) Page
Table 7-4

Black Page
Table 7-5
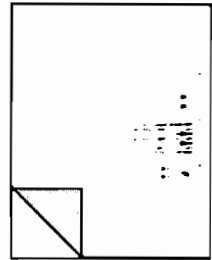
Faint Print
Table 7-6

Vertical White Lines
Table 7-7
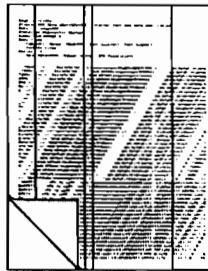
Vertical Black Lines
Table 7-8
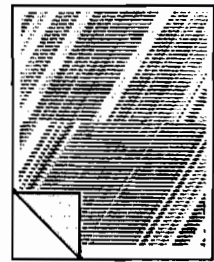
Faulty Registration
Table 7-9

Horizontal Black Lines
Table 7-10
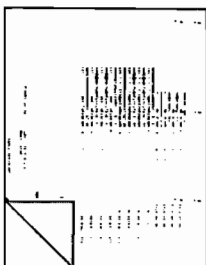
Repetitive Defects
Table 7-11
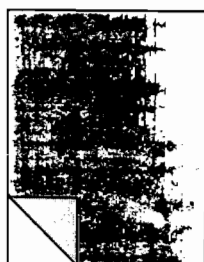
Smeared Print
Table 7-12
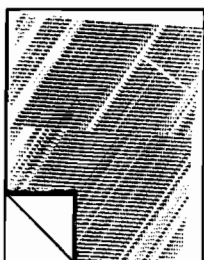
Image Skew
Table 7-13
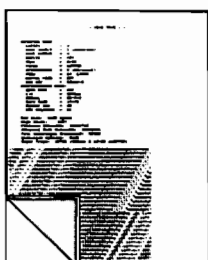
Improperly Sized Image
Table 7-14
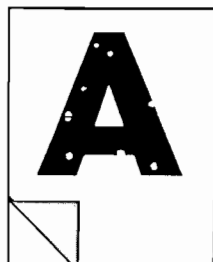
Character Voids
Table 7-15

Background
Table 7-16
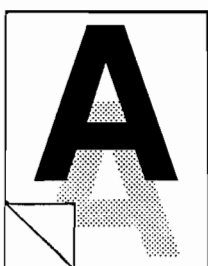
Ghosting
Table 7-17
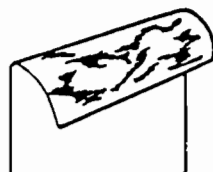
Back of Page Dirty
Table 7-18

Table 7-4. Blank (White) Page

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Sealing tape left in EP-L Cartridge.	Sealing tape is not removed at all, or not completely removed from the cartridge. Toner is not available.	Remove the sealing tape.
2. Empty EP-L Cartridge.	Toner is not available.	Replace the EP-L Cartridge.
3. Temporary misprint error.	A 41 ERROR caused by an unstable beam detect pulse, or a sheet arriving too early at the Input Paper Sensor.	Go to "41 ERROR Misprint Check", on page 7-14.
4. Laser beam blocked.	Laser beam shutter is closed, preventing the beam from writing on the drum. This can cause a 51 ERROR.	Check the EP-L Cartridge's Laser Interlock Tab for damage (near the point of the large green arrow - see Figure 9-11). If the tab is missing or damaged, replace the cartridge. Verify operation of the laser beam shutter.
5. No Transfer Roller voltage.	Without the Transfer Roller voltage, toner cannot be pulled from the photosensitive drum to the paper.	Check roller contacts and mounts for proper connections (see Flowchart 7-9). Replace the Transfer Roller Assembly.
6. High Voltage PCA or Contact Assembly is defective.	The Developing Bias applies a charge to the developing cylinder, which in turn passes a charge onto the toner. The charged toner is attracted to the neutralized areas of the drum previously discharged by the laser. If the toner is not charged, it will not be attracted to the drum.	Check the cable from J206 on the DC Controller to J601 on the High Voltage PCA. Replace the High Voltage PCA if necessary. Proceed to Flowchart 7-9.
7. DC Controller PCA is defective.	The DC Controller is not supplying the proper voltage to the High Voltage PCA.	Replace the DC Controller PCA.

Table 7-5. Black Page

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Defective EP-L Cartridge.	If the photosensitive drum ground inside the EP-L cartridge is defective, or the primary charging roller cannot charge the drum's surface to the proper voltage, the result is a black page (see "Conditioning Stage" in Chapter 5).	Replace the EP-L Cartridge.
2. Poor EP-L Cartridge grounding or high voltage contacts.	If the grounding contact on the High Voltage Contact Assembly is bent and not touching the EP-L Cartridge grounding button, or the primary charging roller contact is bent and cannot charge the drum's surface to the proper voltage, the result is a black page (see "Conditioning Stage" in Chapter 5).	Check the contacts on the High Voltage Contact Assembly. If any are bent, replace the assembly. (Refer to Flowchart 7-9 for contact locations.)
3. Fiber Optics Cable is defective or incorrectly installed.	If the Fiber Optics Cable is damaged, causing the beam detect signal not to reach the DC Controller, the laser beam will remain ON continuously. This will also cause a 51 Error.	Replace the Fiber Optics Cable. Go to Flowchart 7-8 for further troubleshooting.
4. High Voltage PCA is defective.	The Primary Charging Roller applies a uniform negative charge to the drum. If the High Voltage PCA is not supplying the correct negative voltage to the Primary Charging Roller, the drum may become neutrally charged and attract toner, creating a completely black page.	Replace the High Voltage PCA. Go to Flowchart 7-9 for further troubleshooting.
5. DC Controller PCA is defective.	If the DC Controller turns ON the laser beam continuously, the entire surface of the EP-L drum is neutralized causing a completely black page. This may also cause a 41 Error.	Replace the DC Controller. Go to Flowchart 7-9 for further troubleshooting.

Table 7-6. Faint Print

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Print Density is set incorrectly.	If the Print Density slide is set to the far left position, the print may be faint.	Move the density slide to the detented (middle) position.
2. EP-L Cartridge is nearly empty.	The toner supply is low.	Replace the EP-L Cartridge.
3. Bad paper lot.	The paper moisture content, conductivity, or surface finish may not work correctly with the printer's electrophotographic process.	Try a different paper lot (see "Media Specifications" in Chapter 2).
4. Transfer Roller is defective or incorrectly installed.	If the transfer roller looses its conductivity, it cannot effectively pull toner from the photosensitive drum to the paper.	Inspect the Transfer Roller for proper installation. If the roller is installed correctly, replace the Transfer Roller Assembly. Check the Transfer Roller contact per Flowchart 7-9.
5. High Voltage PCA or Contact Assembly is defective.	The Developing Bias indirectly applies a charge to the toner. The charged toner is attracted to the neutralized surfaces of the photosensitive drum previously discharged by the laser beam. If the toner is not charged correctly, it will not be attracted to the drum correctly and the print may be faint or missing.	Inspect the Developer Roller and Transfer Roller Contacts for damage and replace if necessary. (Refer to Flowchart 7-9 for contact locations.) If the problem persists, replace the High Voltage PCA.
6. DC Controller PCA is defective.	The DC Controller PCA is not supplying the proper voltage to the High Voltage PCA.	Replace the DC Controller PCA.

Table 7-7. Vertical White Lines

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. EP-L Cartridge is nearly empty.	The toner is unevenly distributed.	Remove the EP-L Cartridge and rock it slowly. The cartridge will soon require replacement.
2. EP-L Cartridge is damaged.	Vertical scratches or streaks may have developed on the drum.	Inspect the EP Drum for scratches or streaks and replace the EP-L Cartridge as necessary.
3. Foreign objects in beam path.	Any foreign objects will block the light from developing an image on the EP Drum.	Remove the EP-L Cartridge and check the laser beam printer slot for foreign objects. Replace the EP-L Cartridge if it is damaged.

Table 7-8. Vertical Black Lines

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. EP-L Cartridge is damaged.	A scratched EP Drum or toner leaking through EP-Cartridge seals may cause this problem.	Inspect and replace the EP-L Cartridge as necessary.
2. Fusing Assembly is damaged.	Toner build-up or scratches on the fuser's pressure or fusing rollers may cause this problem.	Try cleaning the Fusing Assembly with the Cleaning Paper (refer to "Cleaning Paper Usage" in Chapter 4) or replace the Fusing Assembly if damaged.

Table 7-9. Faulty Registration

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE[1]
1. Overloaded paper tray.	If either the MP tray or LC tray is overloaded, the Pick-up Rollers may not pick the paper up correctly.	Review paper loading with the customer.
2. Paper guides on the MP Tray or Envelope tray adjusted too tight.	If the guides are pushed too tightly against the paper, it may be delayed in being pulled into the printer.	Adjust the paper guides for a slightly looser setting. Note that too loose a setting may cause image skewing.
3. Bad paper lot	The surface of the paper may be too smooth for the Pick-up and Feed Rollers to correctly feed paper into the printer.	Try a different paper lot (see "Media Specifications" in Chapter 2).
4. Registration adjustment is required.	If the top of the page is not 3 mm (±1 mm) from the leading edge of the paper, then a registration adjustment is required. The adjustment can move the top of page up or down 2.5 mm.	Adjust the Leading Edge Registration (refer to the section "Registration Adjustment" in Chapter 4).
5. Worn or broken drive gears	If any gear within the drive train of the paper path becomes excessively worn or is excessively dirty, erratic paper movement can result.	Replace the defective gear or assembly.
6. PS1 is defective.	If the voltage on J208-1 and J208-2 of the DC Controller drops from +5VDC to 0V when the sensor arm is moved, then PS1 is good. If the voltage does not drop, then PS1 is defective.	Replace PS1. Refer to Flowchart 7-4 as necessary.
7. DC Controller PCA is defective.	If PS1 is operating correctly and the faulty registration problem persists, then the DC Controller may be defective. The DC Controller controls the paper movement in the printer.	Replace the DC Controller.
Notes:		
1. Also review the section "Registration Check" on page 7-46 in this chapter.		

Table 7-10. Horizontal Black Lines

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Defective or improperly seated Fiber Optics Cable.	Horizontal black lines and a **41 ERROR** can occur consecutively. In this error condition, the DC Controller turns the laser on continuously waiting for a beam detect signal, which it never receives. If the beam detect signal is not received within two seconds, a **51 ERROR** is displayed.	A defective or improperly installed Fiber Optics Cable can cause this problem. Reseat or replace the Fiber Optics Cable.
2. DC Controller PCA is defective.	Same as step 1.	Refer to Flowchart 7-8.

Table 7-11. Repetitive Defects

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE[1]
1. EP-L Cartridge is damaged.	The circumference of the photoconductive drum inside the EP-L Cartridge is $3\frac{11}{16}$ inches (94 mm). If the defect repeats at this interval, the defect is associated with the photoconductive drum.	Replace the EP-L Cartridge.
2. Dirty Rollers	Any dirty roller in the paper path may result in a repetitive print defect.	Examine and clean rollers in the paper path (refer to "Keeping the Printer Clean" in Chapter 4).
3. Fusing Assembly is dirty or defective.	The circumference of the Upper Fusing Roller is $2\frac{7}{8}$ inches (74 mm). If the defect repeats at this interval, the defect is associated with the Upper Fusing Roller.	Use the self test Cleaning Paper to clean the Fusing Assembly (see "Cleaning Paper Usage" in Chapter 4). If the problem persists, replace the Fusing Assembly.
Notes:		
1. Also see "Repetitive Image Defect Ruler," on page 7-57.		

Table 7-12. Smeared Print

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Bad media.	The moisture content, conductivity, or surface finish of the media being printed may not work correctly with the electrophotographic process.	Try a different paper lot or other media (see "Media Specifications" in Chapter 2).
2. Dirty Fusing Rollers.	Open the External Fuser Access Door and inspect the rollers for excessive toner build-up. Toner build-up can cause the print on a page to smear.	Clean the Fusing Assembly using the self test Cleaning Paper (refer to "Cleaning Paper Usage" in Chapter 4).
3. The Fusing Assembly's Static Charge Eliminator is defective.	If the Static Charge Eliminator is dirty or is not grounded, then a static charge will remain on the page. This can cause the toner on the page to be pulled off to the fusing rollers or to be smeared. The toner can then be put back onto the page during the next rotation.	Clean or replace the Static Charge Eliminator (see Chapter 8, Figure 8-8, item number 19).
4. Fusing Assembly is defective.	The print will smear if the Fusing Assembly is not heated sufficiently to bond the toner image to the paper.	Refer to Flowchart 7-7.
5. DC Controller is defective.	The DC Controller uses the thermistor to determine fusing roller temperature and controls the fusing lamp to maintain what it believes to be the proper fusing temperature.	Replace the Fusing Assembly. If a new Fusing Assembly does not resolve the problem, replace the DC Controller PCA.

Table 7-13. Image Skew

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Paper is loaded incorrectly.	If the paper is not installed flush into the MP or LC Tray, a skewing problem will result.	Remove paper from the tray and install the paper correctly. Position paper guides against the edge of the paper in the MP or accessory Envelope Tray.
2. Bad Paper Lot.	Paper that is manufactured poorly or inconsistently, or that has too smooth or too rough a surface texture can cause an image skew problem.	Try a different paper lot (see "Media Specifications" in Chapter 2).
3. Worn LC or MP Pick-Up Rollers or Separation Pad.	Paper is not being picked-up consistently.	Replace the problem Pick-Up Roller or the Separation Pad.
4. Worn LC or Input Feed Roller	Paper is not being fed properly into the balance of the printer.	Replace the problem Feed Roller assembly.

Table 7-14. Improperly Sized Image

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Job Size set incorrectly. (This is usually the Page or Paper size setting in the host software.)	The job size and actual paper size, or the paper tray size do not match.	Install the correct size paper or paper tray into the printer, or change the job size to match the paper size and paper tray size (refer to "Control Panel Usage" in Chapter 3).
2. Defective LC Base PCA Microswitch.	If the LC Base PCA has a defective microswitch, an improperly sized image can result.	Refer to Flowchart 7-6.

Table 7-15. Character Voids

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Bad transparencies.	Transparencies can have this problem because they are not designed for proper toner adhesion.	Use Hewlett-Packard approved transparencies (refer to "Overhead Transparency Specifications" in Chapter 2).
2. Bad paper lot.	The surface of the paper may be too smooth or rough for proper toner adhesion.	Try a different paper lot (see "Media Specifications" in Chapter 2).
3. Bad Transfer Roller.	If the Transfer Roller has finger oils on its surface, is dirty or is worn-out, this problem can result.	Clean the Transfer Roller (see "Transfer Roller Cleaning" in Chapter 4). If problem persists, replace the Transfer Roller Assembly.

Table 7-16. Background

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Defective EP-L Cartridge.	The EP-L Cartridge may be internally damaged.	Replace the EP-L Cartridge.
2. Bad Media.	The moisture content, conductivity or surface finish may not work correctly with the electrophotographic process.	Try a different media (see "Paper Specifications" in Chapter 2).
3. Dirty or worn Transfer Roller.	A worn Transfer Roller can cause background due to improper bias voltages.	Clean the Transfer Roller (see "Transfer Roller Cleaning" in Chapter 4). If problem persists, replace the Transfer Roller Assembly.
4. Print Density set incorrectly.	If the Print Density is set incorrectly, then background scatter can result, particularly with envelopes and heavier papers.	Adjust the Print Density (see "Print Density Adjustment" in Chapter 4).
5. Inside of printer is dirty.	If toner dust has leaked out of the EP Cartridge this problem can occur.	Clean inside the printer (see "Keeping the Printer Clean" in Chapter 4).

Table 7-17. Ghosting

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE[1]
1. Dirty Fusing Rollers.	This is a repetitive defect that can occur specifically on overhead transparency films every $2\frac{7}{8}$ inches (74 mm) and is usually only visible toward the bottom of the page. Any toner build-up on the Fusing Rollers is easily transferred to transparency film.	Use Cleaning Paper to clean the Fusing Rollers (see "Cleaning Paper Usage" in Chapter 4). Replacement of the Fusing Assembly or Fusing Rollers may be required on high usage printers.
2. Insufficient fusing temperature.	A "cool" fuser will not fuse the toner image properly into the paper and may transfer the remaining toner further down the page.	Replace the Fusing Assembly's thermistor or the DC Controller PCA as necessary.
3. Worn or contaminated Transfer Roller.	A bad Transfer Roller will result in improper charges in the surface of the Fusing Roller. This will cause secondary images at $2\frac{7}{8}$ inch (74 mm) intervals.	Replace the Transfer Roller Assembly.
4. Fuser biasing diodes.	If the biasing diodes are not able to maintain proper electrostatic charges, ghosting may result.	Replace the Fusing Assembly.
Notes:		
1. Also see "Repetitive Image Defect Ruler," on page 7-57.		

Table 7-18. Back of Page Dirty

POSSIBLE CAUSE	DETAILED DESCRIPTION	RECOMMENDED RESPONSE
1. Dirty Transfer Roller.	This problem will not occur unless the Transfer Roller is extremely dirty.	Remove the Transfer Roller Assembly and clean it using a dry, lint-free cloth. **Do not** use water or any other cleaning solutions on this roller.
2. Dirty Input Feed Roller.	The Input Feed Roller will leave wide streaks on the back of the page if it is dirty.	Clean the Input Feed Roller. Replace the assembly if the problem persists.
3. Toner build-up in the Fusing Assembly.	If Cleaning Paper has not been used as specified, toner build-up can occur in the Fusing Assembly. Toner build-up can physically damage the Fusing Assembly.	Clean the Fusing Assembly using the self test Cleaning Paper (see "Cleaning Paper Usage" in Chapter 4). High volume units may produce toner spots on the back of the page caused by toner build-up on the Fusing Assembly Thermoswitches (TS1 and TS2). See "Thermoswitches" in Chapter 6.

Image Formation Problems

Conditions:
A print quality (image defect) problem exists.

No hardware error messages are present and host communications are good.

The image problem sheets have been compared to the Image Defect Examples found on pages 7-30 & 7-31 and no similar problems are identified.

↓

Replace the EP-L Cartridge.

↓

Is the problem corrected?

YES → EXIT

NO ↓

Perform the image development (half self-test) check
* Run self-test, and as the sheet exits the fuser roller switch the power OFF.
* Check the drum on the EP-L cartridge for correctly formed images which have been developed with toner.

Is the correct image being written to the drum?

YES →

NO → Go to Chart 7-9A

The printer has an image transfer or paper path problem. Check the following items:
* Transfer roller, replace
* Transfer roller mounts and high voltage cables and contact spring
* High Voltage PCA cable from J206 to J601.
* High Voltage PCA, replace
* DC Controller PCA, replace.

↓

Is the problem corrected?

YES → EXIT

NO → Consult technical assistance.

EP-L Cartridge

abcdefghijk

Heavy toner developed but untransferred characters

Light toner from characters having been transferred to the paper.

Paper smudge line (paper in contact with the drum)

Drum and image

Power Supply Assembly

J206

J601

J602

High Voltage PCA (Behind Power Supply)

Developer Roller Contact

Developer Roller

Primary Roller Contact

Primary Roller

EP-L Drum GND Contact

Transfer Roller Contact

Transfer Roller

(7–9A)

Primary or development problem is indicated.

*Inspect the EP-L cartridge contacts for drum GND, primary roller, and developer bias.
*Inspect cable connection from J601 to J206, between the HV PCA and the DC Controller.
*Replace the HV PCA, HV contact/cable.
*Replace the DC Controller.

Is the problem corrected?

YES → EXIT

NO →
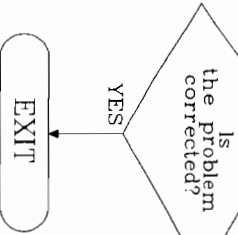
Ground J207–6 on the DC Controller PCA. (grounding this point continuously enables the laser diode)

Measure laser power at J207–10 on the DC Controller PCA to GND. When the laser is ON, +1.5 VDC (+/–.075) should be measured.

If +1.5 VDC $\underline{is}$ present:
*Check the laser shutter interlock arm and the EP–L cartridge interlock tab.
*Check the laser beam path opening for a blockage in the beam to drum path.
*Check DC voltages on the DC Controller PCA.

If +1.5 VDC $\underline{is\ not}$ present:
*Replace the Laser PCA.
*Replace the DC Controller PCA.

Is the problem corrected?

YES → EXIT

NO → Consult technical assistance.

Laser Shutter Interlock Tab

J206

J601

J602

High Voltage PCA

Developer Roller Contact

Primary Roller Contact

Primary Roller

EP–L Drum GND Contact

Developer Roller

Transfer Roller

Transfer Roller Contact
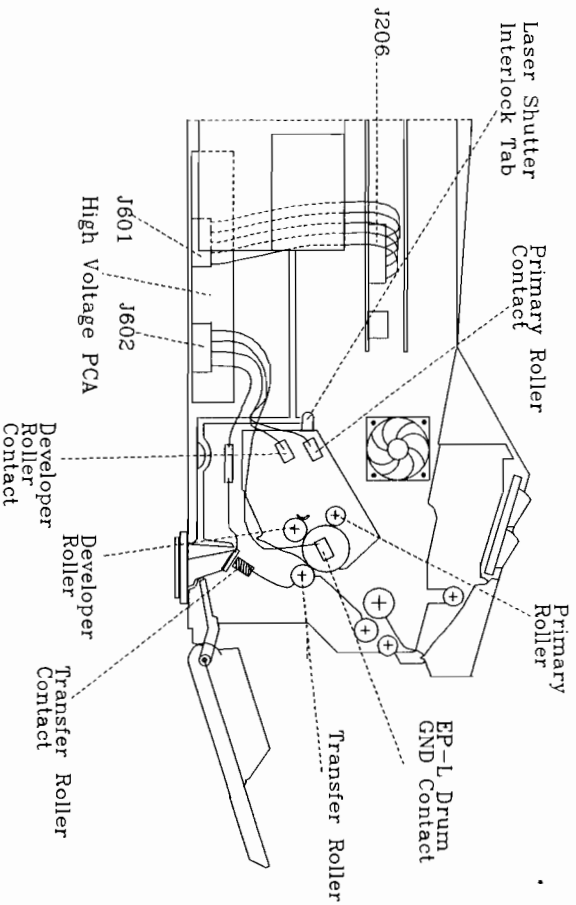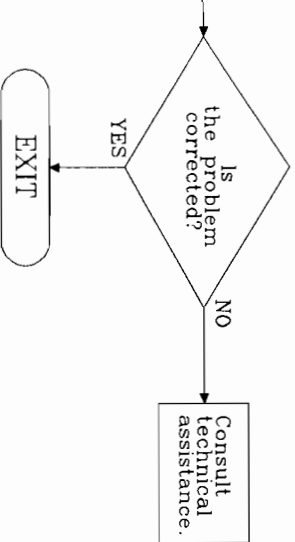
Paper Curl

Paper curl is inherent to the laser printing processes, and occurs when paper is subjected to heat. Paper curl tends to relax as the paper cools while resting on a flat surface.

Although paper curl cannot be totally eliminated, some steps can be taken to lessen its impact, as suggested in Table 7-19.

Table 7-19. Causes of Paper Curl

POSSIBLE CAUSE	RECOMMENDED RESPONSE
Paper Output Trays	Try using the Face-up Paper Output Tray to shorten and simplify the paper path.
Paper Surface	The recommended printing surface of the page is usually marked on the end of a ream of paper, indicated by a small arrow and the phrase "print this side first." Load paper with the recommended printing surface facing up when using the Lower Cassette Tray, and the printing surface facing down when using the Multi-Purpose Tray.
Paper Storing and Handling	Over time, paper assumes the characteristics of its storage environment (*i.e.*, if it is stored in a humid environment, the paper absorbs the moisture, etc.). Paper with higher moisture content will tend to curl more. Evaluate the storage conditions of the paper.
Paper Type	All paper is manufactured differently (*i.e.*, different textures, moisture content, drying processes, composition, etc.). Change the type of paper being using and re-evaluate the paper curl results.

Note

When the top face-down tray is selected, convex rollers are used to reduce excessive paper curl. Use the face-up output tray to eliminate the effect of the anti-curl rollers. DO NOT attempt to modify the face-down rollers as other problems may result.

Registration Check

Registration is defined as the printer's ability to accurately position a printed image on paper. The border printed on the Self Test printout defines the printed image area of a page. This border also provides a convenient reference point to measure the print image registration gap. The registration gap tolerances are as follows:

Table 7-20. Registration Specifications

BORDER	DESCRIPTION	TOLERANCE
TOP	Letter & A4 Paper: Leading Edge to First Dot Row (Top Horizontal Border)	3 mm ±1 mm
LEFT	Letter Paper: Left Edge to First Dot Row (Left Vertical Border)	6 mm ±2 mm
LEFT	A4 Paper: Left Edge to First Dot Row (Left Vertical Border)	5 mm ±2 mm

See "Registration Adjustment" in Chapter 4, if the top registration gap is out of tolerance.

Image Skew

Image skew can be caused when paper is improperly installed into the MP Tray or by a bad paper lot (see "Media Specifications" in Chapter 2). To check image skew, first verify that the paper is cut square, then measure the left border of the Self Test printout. The maximum image skew tolerance is 1.5 mm over a distance of 259 mm (10.2 inches). See Table 7-13 on page 7-39 for troubleshooting procedures.

Data Communications Check

If the printer is **not** connected to an MS-DOS-based host, skip directly to Table 7-21, on page 7-49.

Note	Except for a potentially bad Dual I/O or Formatter PCA, establishing host-to-printer communication is normally the customer's responsibility. Time spent attempting to resolve these problems may not be covered by the Hewlett-Packard warranty.
	The Peripheral Products Assist Line (PPAL) is available to the customer at no charge to help them through these problems. The PPAL telephone number is: **(208) 323-2551**.

Test Message

After the printer is installed, verify communications between the printer and the computer using MS-DOS by entering the following at the computer:

Type:	COPY CON: LJTEST (ENTER)
Type:	LASERJET COMMUNICATIONS OK! (ENTER)
Press:	CTRL Z *(hold down the* (CONTROL) *key while pressing the letter* Z*)*
Press:	(ENTER)
Displayed:	1 file(s) copied
Type:	PRINT LJTEST (ENTER)
Displayed:	Name of list device [PRN]
Press:	(ENTER) *(see NOTE below)*

Note	MS-DOS normally associates PRN with LPT1. If the printer is attached to a different parallel port (*e.g.*, LPT2, etc.) or if it is attached to a serial port (*e.g.*, COM1, etc.), substitute the appropriate port designator at the Name of list device prompt.

The printer should print a page with the following text: "LASERJET COMMUNICATIONS OK!" If the Communications Check fails, proceed as follows:

AUTOEXEC.BAT Serial Configuration Test

If the previous check did not produce the desired result, ensure
that the AUTOEXEC.BAT file contains the following two
statements for **serial** interface communications:

Note	If COM2 is not available on your computer,
	substitute COM1 for COM2 in the following
	statements.

```
MODE COM2 9600,N,8,1,P

MODE LPT1:=COM2:
```

In sequence, the parameters of the first statement mean:

COM2	*PC Serial Communications Port 2.*
9600	*Baud Rate.*
N	*Parity (none).*
8	*Word length (data bits).*
1	*Number of stop bits.*
P	*Continuous retries on time-out errors.*

The second statement (MODE LPT1:=COM2:) redirects LPT1 output to
the COM2 port.

Configure the printer for RS-232 at 9600 baud. Install it to the
COM2 (or COM1) port on the PC using the appropriate cable and
repeat the test message procedure above. See Appendix A or the
Getting Started Guide, for the appropriate cable.

If the problem persists, proceed with the following checks in
Table 7-21.

Table 7-21. Communications Checks

CHECKS	ACTION
1. If using a serial interface, is the computer configured as follows:? Start bits = 1 Stop bits = 1 Data bits = 8 Parity = NONE	These parameters are required to communicate with the printer. Verify the computer's communications port configuration matches these parameters. **Note:** If these parameters are not set properly, it may also yield a 40, 20, or 22 ERROR on the printer's Control Panel.
2. Do the printer's settings match that of the computer's communications port?	Run the printer's Self Test to verify the printer's configuration settings. At the computer, verify the correct settings in any system and application configuration files. **Note:** A baud rate problem may also yield a printer 40 ERROR.
3. Is the interface cable known to be functional and wired correctly?	See the cable wiring diagrams in Appendix A.
4. Are you using the correct RS-232-C protocol?	During the communications "handshake," the printer transmits both the XON/XOFF signal and the DTR signal. The DTR (Data Terminal Ready) signal may be set for either a negative going or positive going (normal) transition. DTR polarity is set at the printer's Control Panel. XON may be set to transmit only when data is needed (ROBUST XON set OFF) or once every second (ROBUST XON set ON). DTR is available at pin 20 and XOFF is transmitted from pin 2 of the printer.
5. If using a serial interface, is the cable longer than 50 feet (15 meters)?	The maximum recommended cable length for RS-232 serial communications is 50 feet. Use RS-422 or move the printer closer to the host.
6. If using a Centronics parallel cable, is it over 10 feet (3 meters) long?	Consider using a serial interface connection or move the printer closer to the host.
7. Does the printer have a bad interface port?	Replace the Dual I/O Interface Assembly. If the problem persists, replace the Formatter PCA and re-configure the printer.
8. Does the host have a bad interface port?	If possible, try a different host system port than the one having a problem and reconfigure both the host and printer appropriately.

If steps 1 through 8 in Table 7-21 have been completed, and the host system and printer are still not communicating, a protocol analyzer may be required to determine the source of the problem.

Caution	HP LaserJet printers are not designed to work with mechanical switch-box products that don't have proper surge protection. These devices can generate high transient voltages that will cause permanent damage to printer circuitry. This circumstance is not covered by Hewlett-Packard warranty.

Troubleshooting Aids

Printer Components

Use Chapter 9, "Reference Data" to locate the printer components listed in this section.

Clutch Assemblies

Clutch Assemblies are used to start and stop paper movement gears and rollers. They rely heavily on lubrication for proper movement. Since the Clutch Assembly is lubricated at the factory before it is put together, the whole assembly should be replaced if it sticks or causes the printer to operate incorrectly.

The field-replaceable Clutch Assemblies used in the printer are:

- Multi-Purpose Tray Pick-up Roller/Clutch Assembly
- Drum Drive Gear/Clutch Assembly

Photosensors

Photosensors monitor paper and the presence of an EP-L Cartridge, as well as determining when the printer's doors are open or closed. When the sensor's viewing field is blocked, the sensor activates. If a sensor is not functional, it will not activate when blocked.

Table 7-22 lists each sensor, its function, and where to proceed for additional troubleshooting information.

Table 7-22. Photosensors

SENSOR	FUNCTION	GO TO:
PS1	Input Paper Sensor	Flowchart 7-4
PS2	Multi-Purpose Tray Paper-out Sensor	Flowchart 7-5
PS3	Paper Exit Sensor	Flowchart 7-4
PS4	External Fuser Access Door Open Sensor	Flowchart 7-3
PS5	NO EP-L Cartridge/Front Door Open Sensor	Flowchart 7-3
PS6	Lower Cassette Tray Paper-out Sensor	Flowchart 7-6

Rollers

The printer uses several different types of rollers. Every time
the printer is serviced, each roller should be examined for wear.
Table 7-23 describes how to check each roller for signs of wear.

Table 7-23. Rollers

ROLLER	SIGNS OF WEAR
MP Pick-up Roller	Thin rubber on the pick-up surface of the roller.
LC Pick-up Roller	Smooth rubber on the pick-up surface of the roller.
LC Feed Roller	Hard or glazed roller surface.
Transfer Roller	Dirty or caontaminated roller. Brittle roller caused by improper cleaning, extreme heat, or age.
Input Feed Roller	Hard or glazed roller surface.
Exit Rollers	Irregularly shaped roller.
Fuser Rollers	Scarred Teflon surface, missing rubber, or extreme toner build-up that cannot be removed using Cleaning Paper.

Solenoids

Solenoids control the movement of the Clutch Assemblies, which in
turn control the movement of the pick-up and feed rollers used in
the printer. Table 7-24 lists each solenoid, its function, and where
to proceed for additional troubleshooting information.

Table 7-24. Solenoids

SOLENOID	FUNCTION	GO TO:
SL1	MP paper pick-up solenoid	Flowchart 7-4A
SL2	LC paper pick-up solenoid	Flowchart 7-4C
SL3	LC input feed solenoid	Flowchart 7-4C

Switches

Trays inserted into the LC Base trigger three microswitches, which define the tray size (see Table 7-25). See Flowchart 7-6 for troubleshooting information.

Table 7-25. Switch Settings for Lower Cassette Trays

TRAY SIZE *DC Controller Pin*	SW901 *J205-5*	SW902 *J205-4*	SW903 *J205-3*
Letter	ON	OFF	OFF
Legal	OFF	OFF	ON
A4	ON	ON	OFF
Executive	ON	ON	ON
Envelope	OFF	ON	ON
Tray Not Installed	OFF	OFF	OFF
Base Not Installed	OFF	ON	OFF

CE Test Connector

This connector is used by the factory for production and quality assurance inspections. A detailed description of each pin on the CE Test Connector is listed in Table 7-26.

Table 7-26. DC Controller J207

PIN	SIGNAL	FUNCTION
J207-1	+5 V	Monitoring +5 VDC
J207-2	+12 V	Monitoring +12 VDC
J207-3	+24 V	Monitoring +24 VDC
J207-4	GND	Signal ground
J207-5	/RDYINH	Ready Inhibit; permits operation by preventing open door, paper out, error and service messages. This does not prevent a Fusing Assembly 50 **ERROR**.
J207-6	/LPC	**Low** Forces the Laser and Scanner Motor ON, and checks/adjusts Laser power.
J207-7	/TSS	Factory test point.
J207-8	/TSC	Factory test point.
J207-9	+8 V	Monitoring +8 VDC.
J207-10	APCIN	Analog Power Control Input Signal should be 1.5 VDC (±.075 volts) during Laser Operation.
J207-11	/TSTPE	**Low** selects white test pattern; **High** selects line test pattern.
J207-12	/TSTPNT	Test Print runs continuously, as long as the signal remains low.
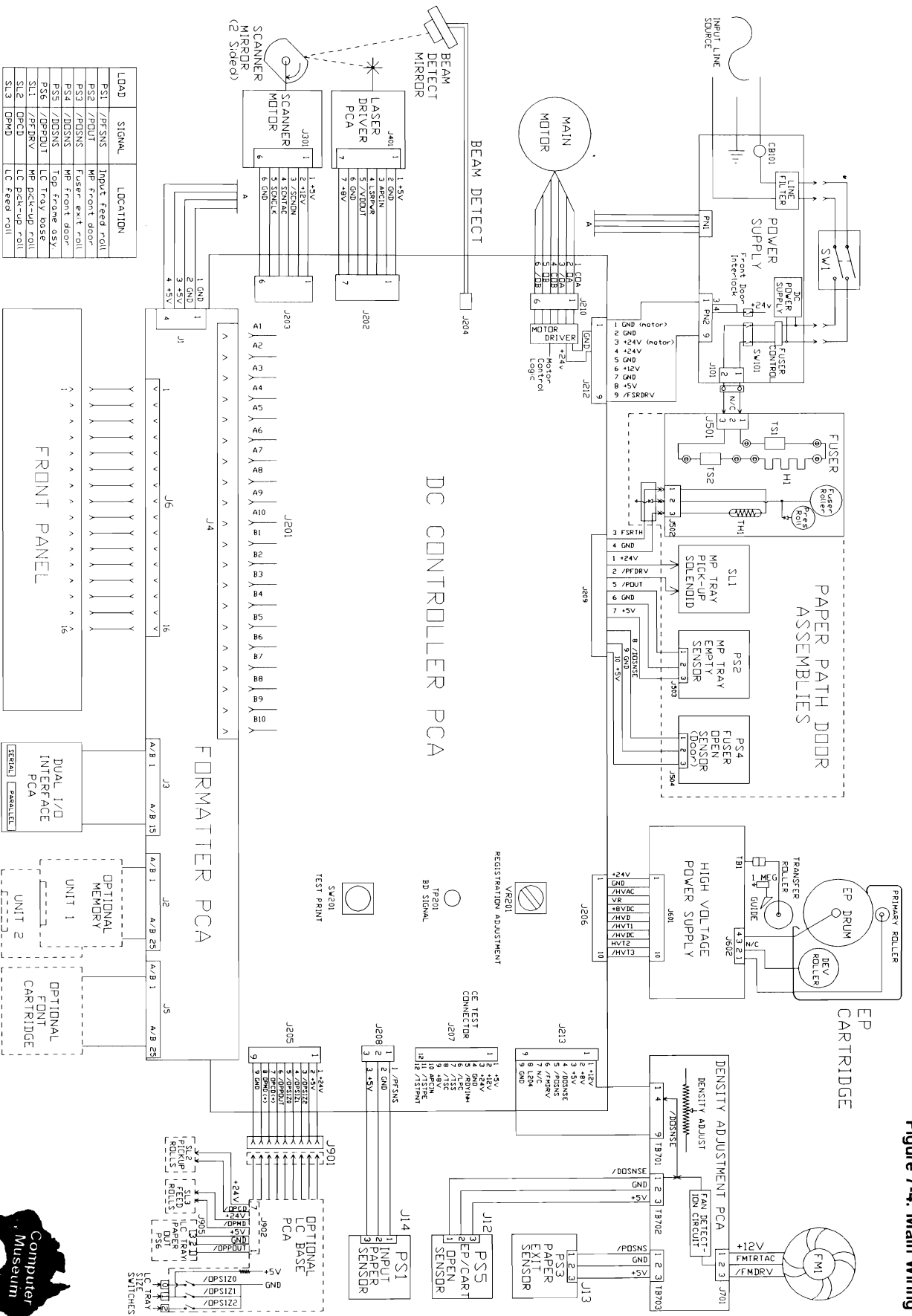
Figure 7-4. Main Wiring Diagram

Formatter Connectors

CONNECTOR	FUNCTION
J1	Power connection
J2	Expansion memory interface
J3	I/O interface
J4	DC Controller PCA interface (J201)
J5	Cartridge interface
J6	Control Panel interface

DC Controller J202

PIN	COLOR	NAME	LOC.	FUNCTION
J202-1	Gray	+5V	Laser	
J202-2	Gray	GND	Laser	
J202-3	Gray	APCIN	Laser	Analog Power Control Input (from laser sensor)
J202-4	Gray	LSRPWR	Laser	
J202-5	Gray	VDOUT	Laser	Video Output (from DC controller)
J202-6	Gray	GND	Laser	
J202-7	Gray	+8V	Laser	

DC Controller J203

PIN	COLOR	NAME	LOC.	FUNCTION
J203-1	Violet	+5V	Scanner	
J203-2	Violet	+12V	Scanner	
J203-3	Violet	SCNON	Scanner	Scanner Control Signal.
J203-4	Violet	SCNTAC	Scanner	Scanner Feedback Signal.
J203-5	Violet	SCNCLK	Scanner	Scanner Driver Clock Speed Reference
J203-6	Violet	GND	Scanner	

DC Controller J204

PIN	COLOR	NAME	LOC.	FUNCTION
J204-1	Black	BEAM DETECT	Optics Housing	Filter optics cable. Beam detect synchronization pulse.

DC Controller J205

PIN	COLOR	NAME	LOC.	FUNCTION
J205-1	Violet	+24V	LC PCA	
J205-2	Violet	+5V	LC PCA	
J205-3	Violet	0PSIZ23	SW903	LC Tray Paper Size Sensing (see Table 7-25)
J205-4	Violet	0PSIZ22	SW902	LC Tray Paper Size Sensing (see Table 7-25)
J205-5	Violet	0PSIZ21	SW901	LC Tray Paper Size Sensing (see Table 7-25)
J205-6	Violet	0PPOUT	PS6	LC Tray Paper Out Sensor (see Table 7-22)
J205-7	Violet	0PCD	SL2	LC Tray Pickup Roller Solenoid (see Table 7-24)
J205-8	Violet	0PMP	SL3	LC Tray Feed Roller Solenoid (see Table 7-24)
J205-9	Violet	GND	LC PCA	

DC Controller J206

PIN	COLOR	NAME	LOC.	FUNCTION
J206-1	Gray	+24V	HV PCA	
J206-2	Gray	GND	HV PCA	
J206-3	Gray	HVAC	HV PCA	Turns on AC High Voltage (HV) supply
J206-4	Gray	VR	HV PCA	Variable resistor for density control.
J206-5	Gray	+8VDC	HV PCA	Developed by DC Controller PCA.
J206-6	Gray	HVD	HV PCA	Turns on Developer DC Bias
J206-7	Gray	HVT1	HV PCA	Enables Constant Current (CC) and Constant Voltage (CV) Controls
J206-8	Gray	HVT2	HV PCA	Turns on DC High Voltage (HV) supply
J206-9	Gray	HVT3	HV PCA	Changes polarity of Transfer Voltage (±)
J206-10	Gray	HVT3	HV PCA	Increases Transfer Voltage (1.25 x CC Level)

DC Controller J207

PIN	COLOR	NAME	LOC.	FUNCTION
J207-1	N/A	+5V	CE TEST	Monitoring +5VDC
J207-2	N/A	+12V	CE TEST	Monitoring +12VDC
J207-3	N/A	+24V	CE TEST	Monitoring +24VDC
J207-4	N/A	GND	CE TEST	Signal ground
J207-5	N/A	RDVINH	CE TEST	Ready Inhibit; permits operation by disabling errors.
J207-6	N/A	LPC	CE TEST	Low Forces laser on.
J207-7	N/A	TSS	CE TEST	Factory test point.
J207-8	N/A	TSC	CE TEST	Factory test point.
J207-9	N/A	+8V	CE TEST	Monitoring +8VDC - developed on DC Controller.
J207-10	N/A	APCIN	CE TEST	Analog Power Control Input Signal from Laser.
J207-11	N/A	TSTPE	CE TEST	Low detects white test pattern. High selects line test pattern
J207-12	N/A	TSTPNT	CE TEST	Test Print

DC Controller J208

PIN	COLOR	NAME	LOC.	FUNCTION
J208-1	Black	PFSNS	PS1	Paper input feed roller sensor (see Table 7-22)
J208-2	Black	GND	PS1	
J208-3	Black	+5V	PS1	

DC Controller J209

PIN	COLOR	NAME	LOC.	FUNCTION
J209-1	Blue	+24V	SL1	
J209-2	Blue	PFDRV	SL1	MP tray pickup solenoid (see Table 7-24)
J209-3	Gray	FSRTH	TH1	Thermistor fuser temperature sensor.
J209-4	Blue	GND	TH1	
J209-5	Gray	FOUT	PS2	MP tray paper out sensor (see Table 7-22)
J209-6	Violet	GND	PS2	
J209-7	Violet	+5V	PS2	
J209-8	Gray	DOSNSE	PS4	External fuser door open sensor (see Table 7-22)
J209-9	Blue	GND	PS4	
J209-10	Blue	+5V	PS4	

DC Controller J210

PIN	COLOR	NAME	LOC.	FUNCTION
J210-1	Green	COA	M1	Main drive motor stepper phases.
J210-2	Gray	OA	M1	Main drive motor stepper phases.
J210-3	Brown	OA	M1	Main drive motor stepper phases.
J210-4	Black	COB	M1	Main drive motor stepper phases.
J210-5	L. Violet	OB	M1	Main drive motor stepper phases.
J210-6	D. Blue	OB	M1	Main drive motor stepper phases.

DC Controller J212

PIN	COLOR	NAME	LOC.	FUNCTION
J212-1	Blue	GND	Power S.	
J212-2	Blue	GND	Power S.	
J212-3	Red	+24V	Power S.	
J212-4	Red	+24V	Power S.	+24V Controlled by door switch.
J212-5	Blue	GND	Power S.	Input DC power to DC Controller.
J212-6	Orange	+12V	Power S.	Input DC power to DC Controller.
J212-7	Blue	GND	Power S.	
J212-8	Brown	+5V	Power S.	
J212-9	Yellow	FSRDRV	Power S.	Fuser Drive Signal; turns on AC Lamp Voltage

DC Controller J213

PIN	COLOR	NAME	LOC.	FUNCTION
J213-1	Violet	+12V	Den PCA	
J213-2	Violet	+8V	Den PCA	Developed on DC Controller PCA.
J213-3	Violet	+5V	Den PCA	
J213-4	Violet	DOSNSE	PS5	Door Open/EP-L Cartridge Sensor
J213-5	Violet	POSNS	PS3	Paper Feed Exit Sensor
J213-6	Violet	FMDRV	FM1	Fan Motor Drive
J213-7	Violet	N/C		
J213-8	Violet	L204	VR101	Density Control Variable Resistor
J213-9	Violet	GND	Den PCA	

Repetitive Image Defect Ruler

Use the ruler shown below to measure the approximate distances
between repetitive image defects.

First occurrence of print defect

Primary Charging Roller (1 1/2 inches, 38 mm)

Input Feed Roller (1 15/16 inches, 49 mm)

Developing Roller (2 inches, 51 mm)

Transfer Roller (2 1/16 inches, 52 mm)

Lower Fusing Roller (2 1/8 inches, 54 mm)

Upper Fusing Roller (2 1/2 inches, 63 mm)

EP-L Cartridge Photosensitive Drum
(3 11/16 inches, 94 mm)

CHAPTER 8

Contents

Figures

Tables

8

Parts and Diagrams

How to use the Part Lists and Diagrams

The figures in this chapter illustrate the major subassemblies in the printer and their component parts. A table (material list) follows each exploded assembly diagram. Each table lists the reference designator (item number) for each part, the associated part number for the item, the quantity, and a description of the part.

While looking for a part number, pay careful attention to the voltage listed in the description column to ensure that the part number selected is for your model of printer. When the LaserJet IIP (HP 33471) uses a different part than the LaserJet IIIP (HP 33481), it is noted in the **NOTES** column either as "IIP" or "IIIP." The **NOTES** column is also used when parts can be ordered either new ("NEW") or as rebuilt ("RBLT") exchange parts.

All **standard part numbers** listed are stocked and can be ordered through Hewlett-Packard's Support Material Organization (SMO). The phone number for SMO is **800-227-8164.** Part numbers that are noted "S" in the **NOTES** column are special order parts which may need to be "hotlined" through SMO, and may have up to a 13 week lead time.
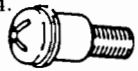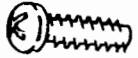
Product numbers, such as those listed in "Supplies and Accessories" on page 8-3, must be ordered through DMK. The phone number for DMK is **800-538-8787.**

Note	Parts that have no reference designator or part number are not field replaceable parts and cannot be ordered through SMO.

The following table identifies common hardware used in the HP
LaserJet IIP (33471) and LaserJet IIIP (33481) Printers. Refer to
the figures for other special fasteners.

DRAWING	DESCRIPTION	PURPOSE	PART NO.
1.	Threaded Phillips screw	Used to fasten metal or plastic to threaded plastic or metal.	XB1-2300-406 (3 X 4 mm, silver) XB1-2300-606 (3 X 6 mm, silver) 0515-1895 (3 X 8 mm, silver)
2.	Threaded Phillips washer head screw	Used to fasten metal or plastic to metal when high torque is required.	XA9-0267-000CN (3 X 6 mm, silver)
3.	Threaded Phillips screw with captive star washer	Used to fasten metal to metal when good electrical contact is needed.	XA9-0389-000CN (3 X 8 mm, silver)
4.	Threaded Phillips shoulder screw.	Used to aid in alignment of parts.	XA9-0342-000CN (3 X 8 mm, silver)
5.	Self-tapping Phillips screw	Used to fasten metal or plastic to unthreaded plastic mainframes.	XB4-7300-807 (s) (3 X 8 mm, silver) XB4-7401-007 (s) (4 X 10 mm, silver) XB4-7401-009 (4 X 10 mm, black)

Supplies and Accessories

DESCRIPTION	PRODUCT NO.
EP-L Toner Cartridge	92275A
1 MByte Accessory Memory	NEW=33474B
	RBLT=33471-69004
2 MByte Accessory Memory	NEW=33475B
	RBLT=33475-69011
Optional Lower Cassette	
Base w/Letter Tray	33472A
Base w/A4 Tray	33472AB
Cassette Tray, Letter	92275B
Cassette Tray, Legal	92275C
Cassette Tray, A4	92275D
Cassette Tray, Executive	92275E
Cassette Tray, Envelope	92275F
Interface Cables	
Parallel (2.0 m)	92284A
Serial, 25 pin female to 25 pin male, 1.2 m	17255D
Serial, 25 pin female to 25 pin male, 5.0 m	92219J
Serial, 9 pin female to 25 pin male, 3.0 m	24542G
Serial, 25 pin male to 25 pin male, 1.2 m	17255M
Serial, 25 pin male to 25 pin male, 5.0 m	13242-60010
Control Panel Overlays	
Dutch	33481-40002
Italian	33481-40003
Norwegian	33481-40004
German	33481-40005
Danish	33481-40006
French	33481-40007
Finnish	33481-40008
Spanish	33481-40009
Swedish	33481-40010
Documentation	
LaserJet IIP User's Manual	33471-90901
LaserJet IIIP User's Manual	33481-90901
LaserJet IIP Technical Reference Manual	33471-90905
LaserJet IIIP Technical Reference Manual	33481-90969
LaserJet IIP/IIIP CBT Training Kit	33481A+49A-00
LaserJet IIP/IIIP Video Training (for experienced techs)	33481A+49A-00
Student Lab Guide (for additional students)	33481+49A-90002

DC Controller PCA
Fig. 8-6

Internal Fuser
Access Door
Fig. 8-3

High Voltage
Power Supply PCA
Fig. 8-6

Main Drive
Gear Assembly
Fig. 8-5

Input Feed
Roller Assembly
Fig. 8-7

Power Supply
Assembly
Fig. 8-6

High Voltage
Contact Assembly
Fig. 8-5

Power Switching
Lever Assembly
Fig. 8-5

Formatter
PCA Assembly
Fig. 8-9

Density PCA
Assembly
Fig. 8-4

Fan
Fig. 8-4

MP Tray
Pick-Up Roller
Assembly
Fig. 8-3

Fusing Assembly
Fig. 8-8

Figure 8-0. Main Assemblies
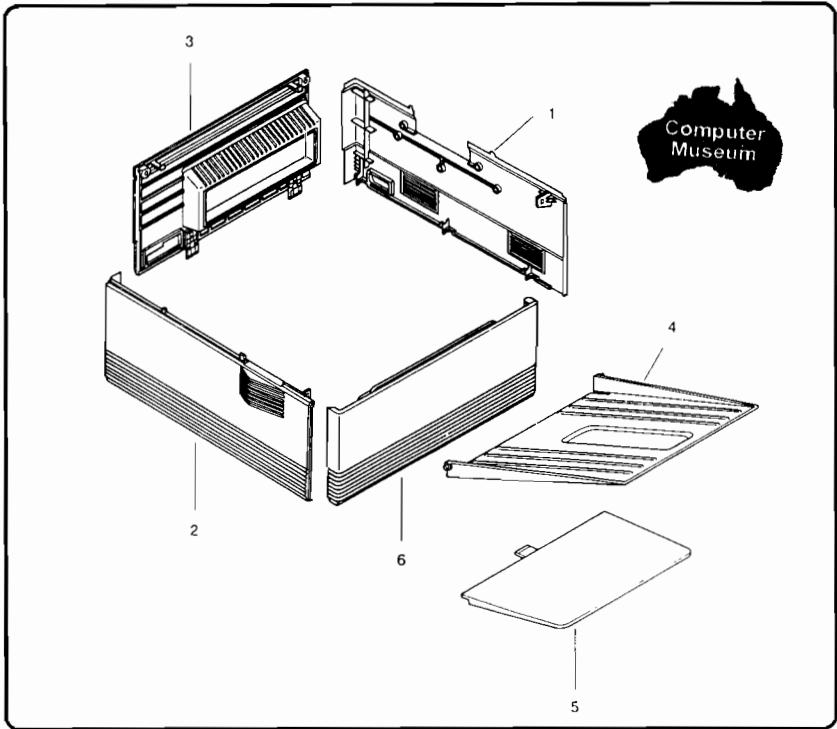
Figure 8-1. External Covers and Trays

Table 8-1. External Covers and Trays

REF	PART NO.	QTY	NOTES	DESCRIPTION
1	RA1-7520-000CN	1		COVER PANEL, RIGHT
2	RF1-2401-000CN	1		COVER PANEL, LEFT
3	RF1-2431-000CN	1		COVER PANEL, REAR
4	RA1-7630-000CN	1		TRAY, FACE-UP
5	RA1-7631-000CN	1		LGL EXTENSION TRAY
6	RG1-1806-000CN RG1-1806-070CN	1	IIP IIIP	MP TRAY ASSEMBLY (compatible w/IIP)
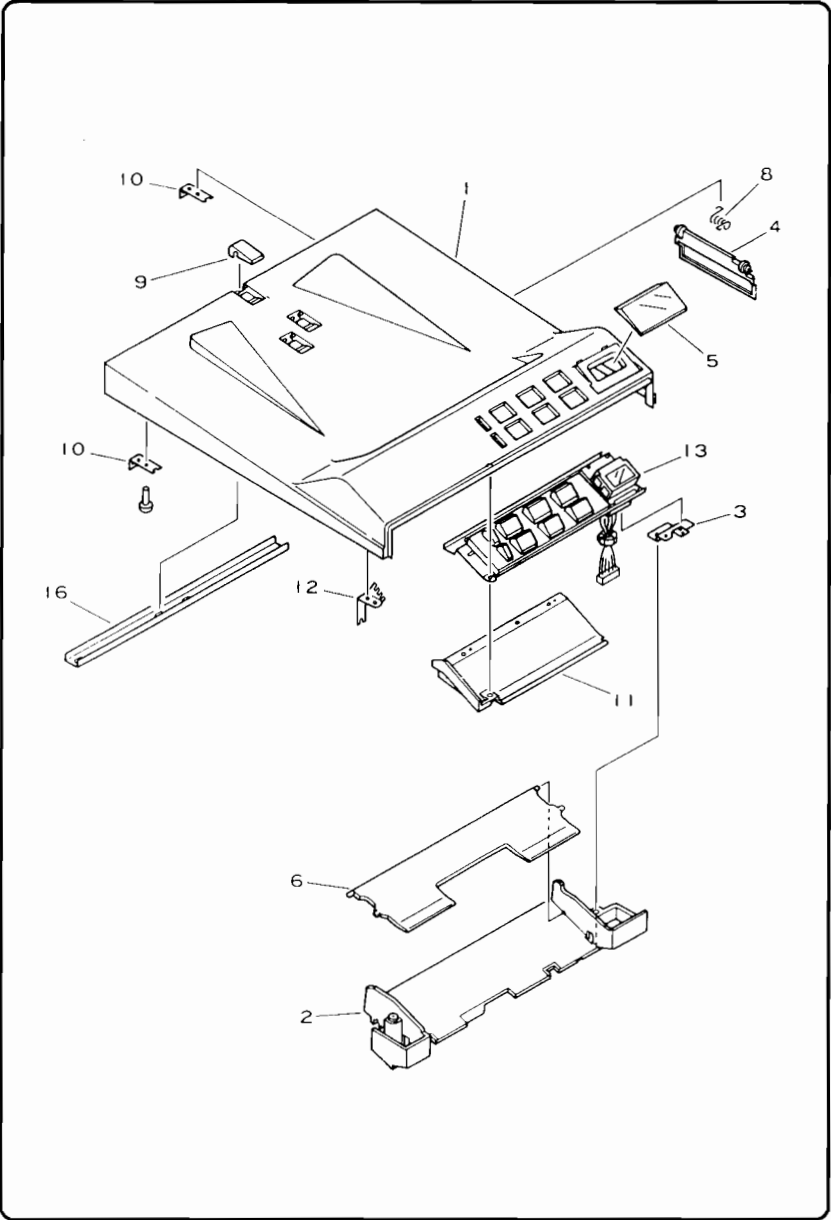
Figure 8-2. Top Cover Assembly

Table 8-2. Top Cover Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
ALL PARTS	RG1-1809-000CN RG1-2662-000CN	1	IIP IIIP	TOP COVER ASSEMBLY
1	RF1-2490-000CN RF1-3202-000CN	1	IIP IIIP	COVER, TOP
2	RA1-7512-000CN	1	S	GUIDE, PAPER
3	RA1-7513-000CN	1	S	PLATE, MOUNTING
4	RA1-7514-000CN	1	S	DOOR, FONT CTG ACCESS
5	RA1-7515-000CN	1	S	COVER, DISPLAY
6	RA1-7516-000CN	1		PLATE, PAPER SUPPORT
8	RA1-7518-000CN	1	S	SPRING, TORSION
9	RA1-7519-000CN	3		STOP, PAPER
10	RA1-7551-000CN	2	S	BRACKET, REAR MOUNTING
11	RA1-7558-000CN	1		COVER, CONTROL PANEL
12	RA1-7814-000CN	1	S	SPRING, GROUND
13	RH6-0010-000CN	1		CONTROL PANEL ASSEMBLY
16	RA1-8220-000CN	1	S	BRACKET, REINFORCEMENT
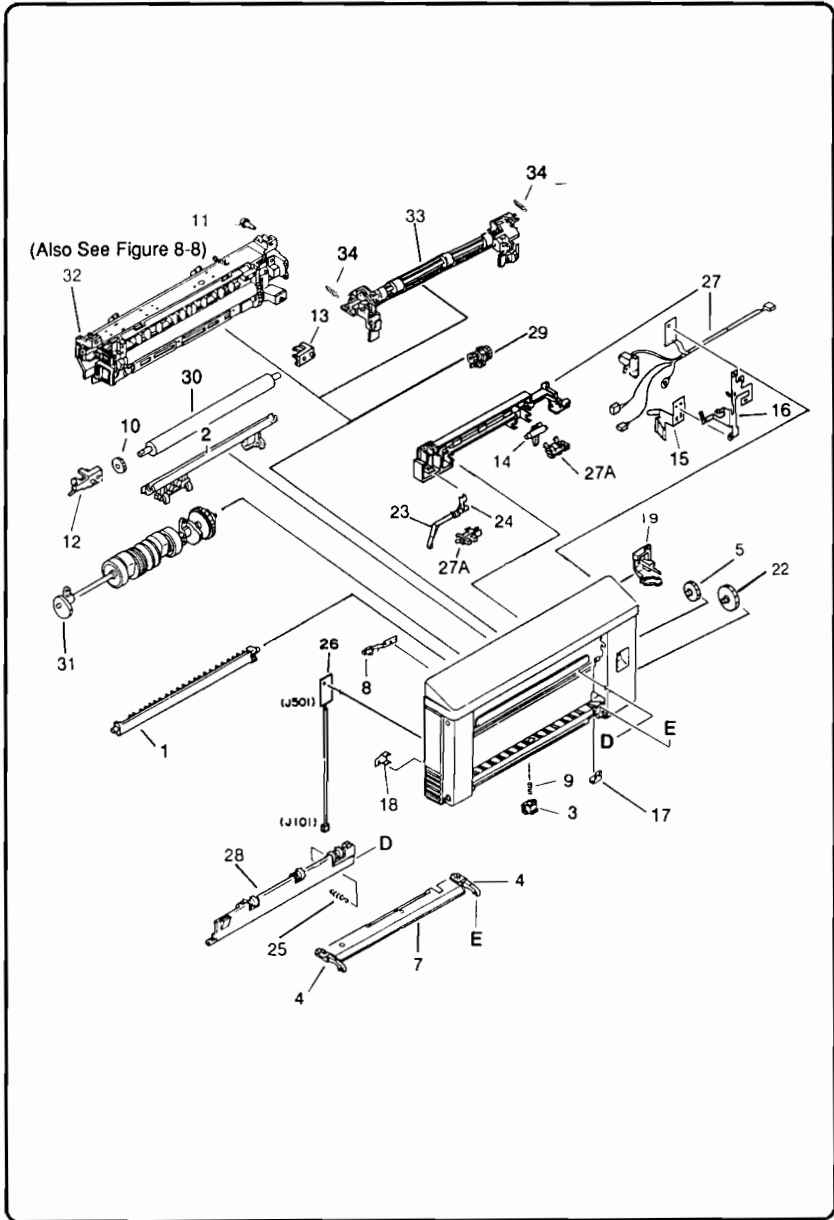
Figure 8-3. Paper Path Door Assembly

Table 8-3. Paper Path Door Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
ALL PARTS	RG1-1804-020CN RG1-2692-000CN	1	IIP IIIP	ASSEMBLY, PAPER PATH DOOR 100/115V
ALL PARTS	RG1-1805-000CN RG1-2693-000CN	1	IIP IIIP	ASSEMBLY, PAPER PATH DOOR 220/240V
1	RA1-8244-000CN	1		DEFLECTOR, PAPER OUTPUT
2	RG9-0681-000CN	1		ROLLER GUIDE ASSEMBLY
3	RA1-7628-000CN	1		CAP, SPRING
4	RA1-7629-000CN	2		ARM, PAPER GUIDE
5	RS1-0290-000CN	1		GEAR, 30T
7	RF1-2400-000CN	1		PLATE, PAPER GUIDE
8	RF1-2491-000CN	4		ROLLER, FACE DOWN OUTPUT
9	RS1-2244-000CN	1		SPRING, COMPRESSION
10	RS1-0292-000CN	1		GEAR, TR ROLLER DRIVE
11	RA9-0621-000CN	5		SCREW, STEPPED, M3
12	RG1-1793-000CN	1		LEFT TRANS. ROLLER BRKT
13	RG1-1794-000CN	1		RIGHT TRANS. ROLLER BRKT
14	RA1-7562-000CN	1		LEVER, PAPER SENSOR
15	RA1-7565-000CN	1	S	PLATE, GROUNDING, A
16	RA1-7566-000CN	1	S	PLATE, GROUNDING, B
17	RA1-7567-000CN	1	S	PLATE, POSITIONING
18	RA1-7637-000CN	1	S	CLAMP, CABLE
19	RA1-7632-000CN	1		COVER, FRONT CABLE

Table 8-3. Paper Path Door Assembly (continued)

REF	PART NO.	QTY	NOTES	DESCRIPTION
22	RS1-0291-000CN	1		GEAR, 20T
23	RA1-7717-000CN	1		LEVER, PAPER SENSOR
24	RA1-7718-000CN	1		SPRING, TORSION
25	RS1-2253-000CN	1		SPRING, EXTERNAL DOOR
26	RG1-1602-000CN	1		CABLE, FUSING, ASSEMBLY
27	RG1-1608-000CN	1		CABLE ASSEMBLY, PAPER PATH DOOR (SL1)
27A	WG8-0323-000CN	2		PHOTOSENSOR (PS2 and PS4) (also included w/item 27)
28	RG1-1834-000CN	1		DOOR, EXTERNAL ACCESS
29	RG1-1833-000CN	1		FACE-UP GEAR ASSEMBLY
30	RA1-7627-000CN	1		ROLLER, TRANSFER
31	RG1-1792-000CN	1		ROLLER ASSY, MP PICK-UP
32	RG1-1788-150CN 33471-69018	1	NEW RBLT	FUSING ASSEMBLY, 110/115V
32	RG1-1789-150CN 33471-69019	1	NEW RBLT	FUSING ASSEMBLY, 220/240V
33	RG1-1791-000CN	1		DOOR, INTERNAL ACCESS
34	RS1-2248-000CN	2		SPRING, INTERNAL DOOR
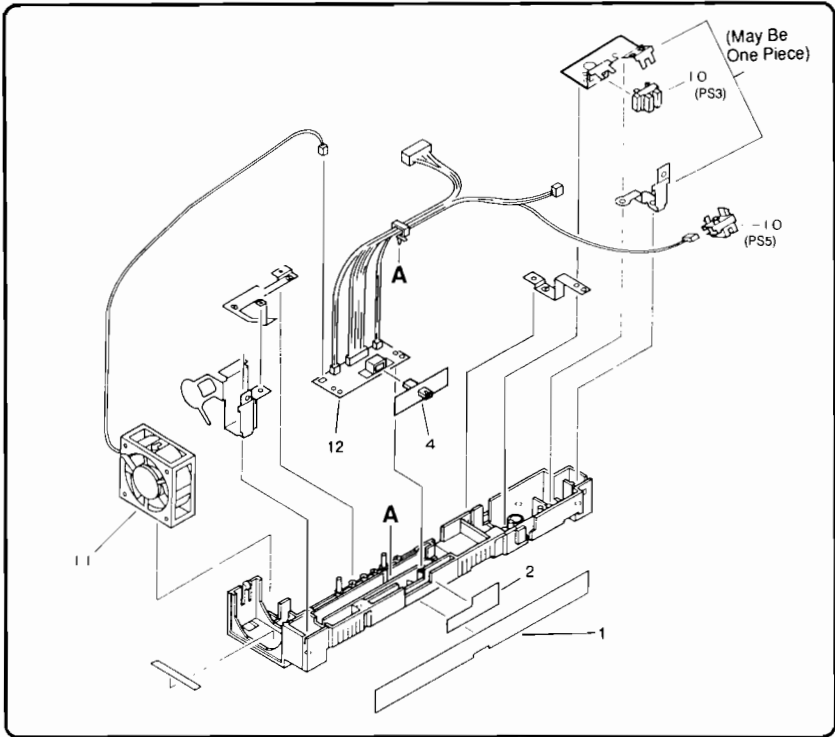
Figure 8-4. Upper Mainframe Assembly

Table 8-4. Upper Mainframe Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
ALL PARTS	RG1-1775-000CN	1		UPPER MAINFRAME ASSEMBLY
1	RA1-7818-000CN	1	S	SHEET, MYLAR
2	RS1-8790-000CN	1	S	LABEL, DENSITY SLIDE
4	RA1-7457-000CN	1		SLIDE, DENSITY
10	WG8-0291-000CN	2		PHOTOSENSOR (PS3 and PS5)
11	RH7-1093-000CN	1		FAN
12	RG1-1604-000CN	1		DENSITY PCA ASSEMBLY
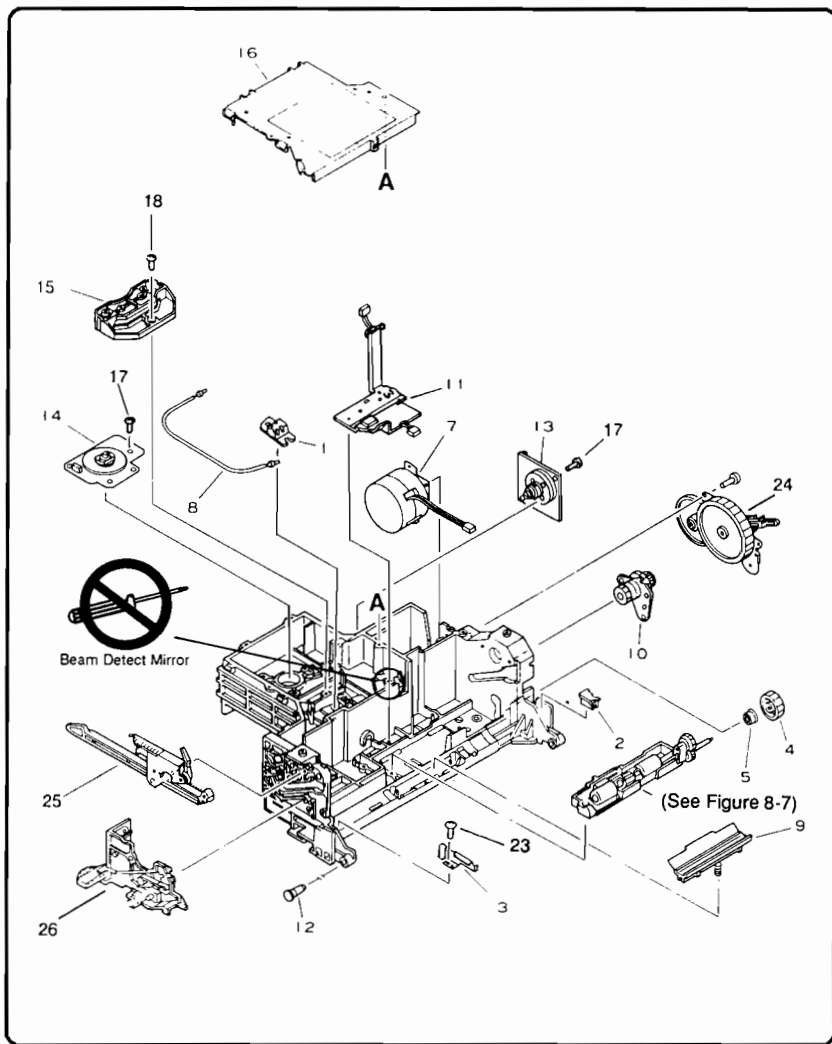
Figure 8-5. Main Body Block Assemblies

Warning	If the Beam Detect Mirror is removed or damaged the entire printer must be replaced. This mirror is aligned at the factory and is not available as a replaceable part.

Table 8-5. Main Body Block Assemblies

REF	PART NO.	QTY	NOTES	DESCRIPTION
1	RA1-7446-000CN	1	S	LENS ASSY, FIBER OPTICS
2	RA1-7506-000CN	1	S	COVER, CABLE CLAMP
3	RA1-7507-000CN	1	S	BRACKET, TRAY STOP
4	RS1-0284-000CN	1		GEAR, 30T
5	RS1-1048-000CN	1		BUSHING, PLASTIC
7	RH7-1094-000CN	1		MOTOR, MAIN DRIVE
8	RH2-5104-000CN	1		CABLE, FIBER OPTICS
9	RG1-1912-080CN	1		SEPARATION PAD ASSEMBLY
10	RG1-1777-000CN	1		GEAR ASSY, DRUM DRIVE
11	RG1-1612-000CN	1		CABLE ASSY, PICK-UP SENSOR
12	RA1-7499-000CN	2		HINGE PIN
13	RG1-1769-000CN RG1-1769-020CN	1	IIP IIIP	LASER PCA (compatible w/ IIP)
14	RG1-1771-000CN	1		SCANNER MOTOR ASSEMBLY
15	RG1-1772-000CN	1		LENS ASSEMBLY, FOCUSING
16	RG1-1773-000CN	1		LASER CVR SHUTTER ASSY
17	XA9-0459-000CN	6		SCREW, MACHINE, M3X16
18	XA9-0462-000CN	3		SCREW, MACHINE, M3X10
23	XA9-0488-000CN	1	S	SCREW, M3X18
24	RG1-1776-000CN	1		GEAR ASSY, MAIN DRIVE
25	RG1-1781-000CN	1		LEVER ASSEMBLY, POWER SWITCHING
26	RG1-1780-000CN	1		HIGH VOLTAGE CONTACT/CABLE ASSEMBLY

NOTE: Main Body Block is **not** available.
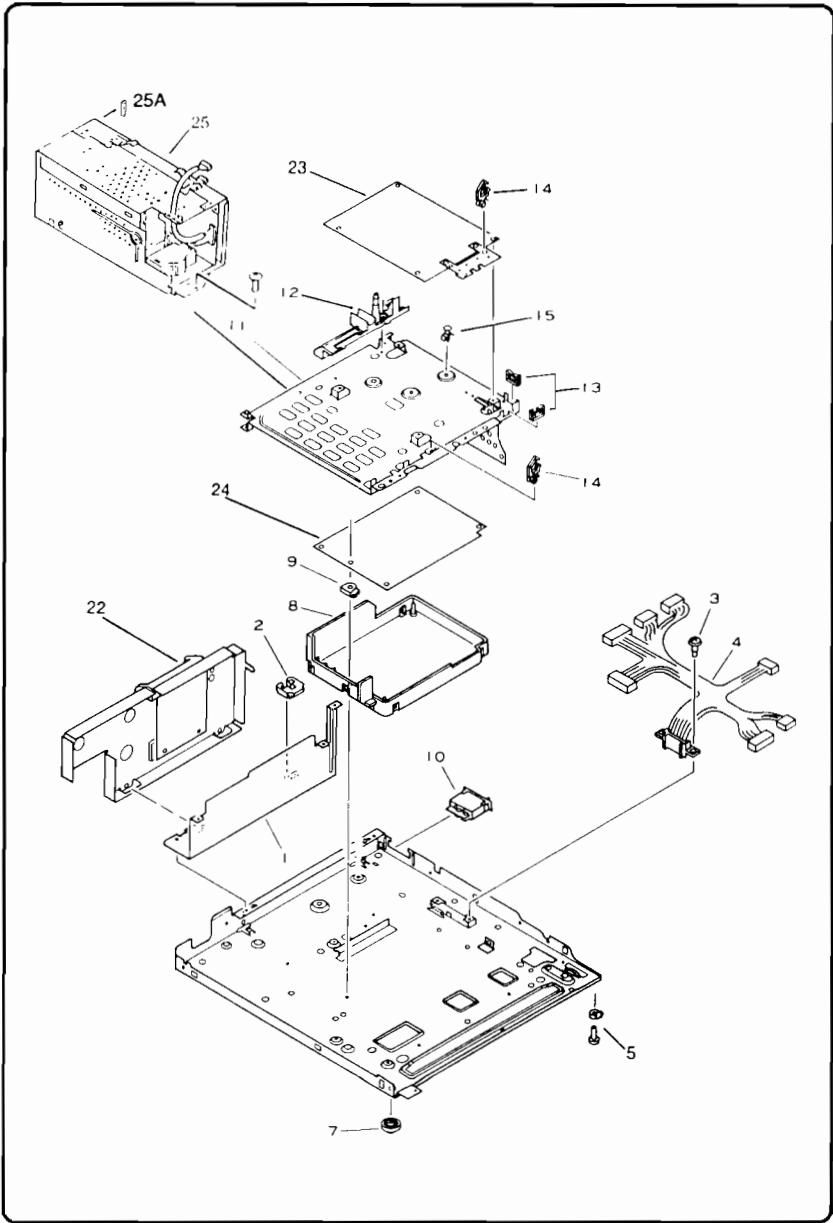
Figure 8-6. Internal Components and Assemblies

Table 8-6. Internal Components and Assemblies

REF	PART NO.	QTY	NOTES	DESCRIPTION
1	RA1-7535-000CN	1	S	SHIELD, REAR SUPPORT
2	RA1-7536-000CN	2	S	GUIDE, I/O
3	RA9-0621-000CN	2		SCREW, MACHINE M3
4	RG1-1609-000CN	1		CABLE ASSEMBLY, MAIN
5	RA1-7453-000CN	1	S	FOOT, BOTTOM
7	XH9-0059-000CN	3		FOOT, BOTTOM RUBBER
8	RA1-7475-000CN	1	S	SHIELD, HV POWER SUPPLY
9	RA1-7816-000CN	1	S	TAB, GROUNDING
10	RH7-6017-000CN	1		SWITCH, MAIN
11	RA1-7533-000CN	1	S	SHIELD, LOWER PCA
12	RA1-7552-000CN	1	S	BRACKET, DC CONTROLLER
13	WT2-5011-000CN	2	S	CLAMP, CABLE
14	WT2-0317-000CN	2		CLAMP, CABLE
15	VT2-0016-004CN	3	S	SUPPORT TAB, PCA
22	33471-60007 33481-60004	1	IIP IIIP	INTERFACE ASSY., DUAL I/O
23	RG1-1591-000CN 33471-69002	1	NEW RBLT	PCA, DC CONTROLLER
24	RG1-1597-000CN	1		PCA, HV POWER SUPPLY
25	RG1-1782-020CN	1		POWER SUPPLY ASSEMBLY, 100/115V
25	RG1-1783-000CN	1		POWER SUPPLY ASSEMBLY, 220/240V
25A	VD5-0185-000CN	1		FUSE, 125V, 5A
25A	WD1-0222-000CN	1		FUSE, 250V, 3.15A
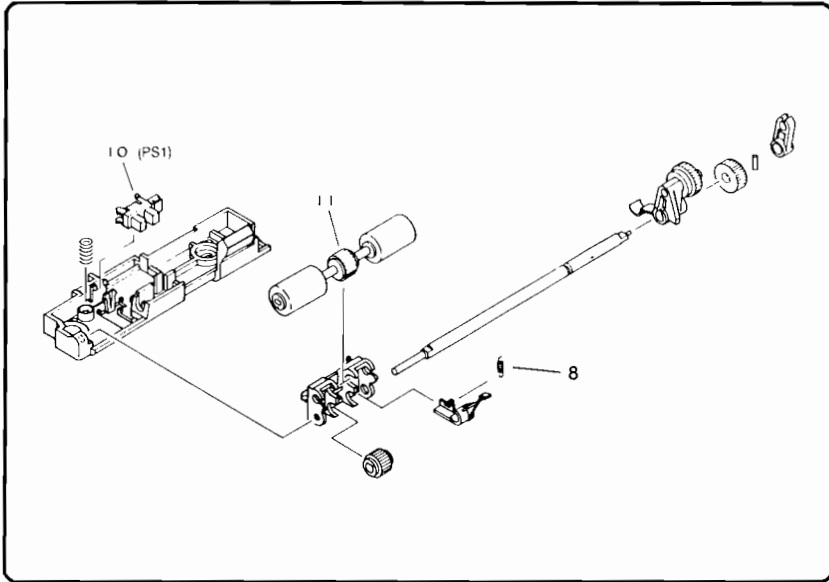
Figure 8-7. Input Feed Roller Assembly

Table 8-7. Input Feed Roller Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
ALL PARTS	RG1-1778-000CN	1		ROLLER ASSEMBLY, INPUT FEED
8	RS1-2236-000CN	1	S	SPRING, TENSION
10	WG8-0291-000CN	1		PHOTOSENSOR (PS1)
11	RF1-2394-000CN	1		ROLLER, INPUT FEED
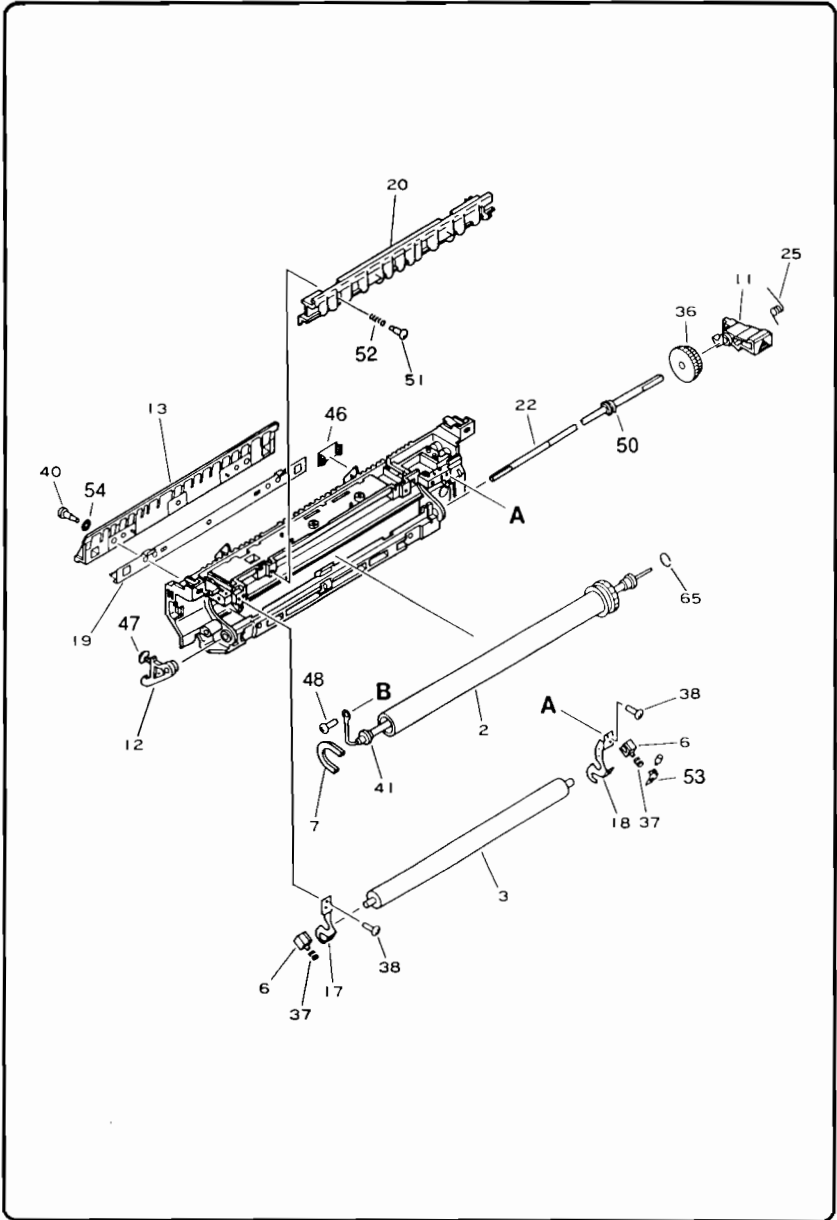
Figure 8-8. Fusing Assembly
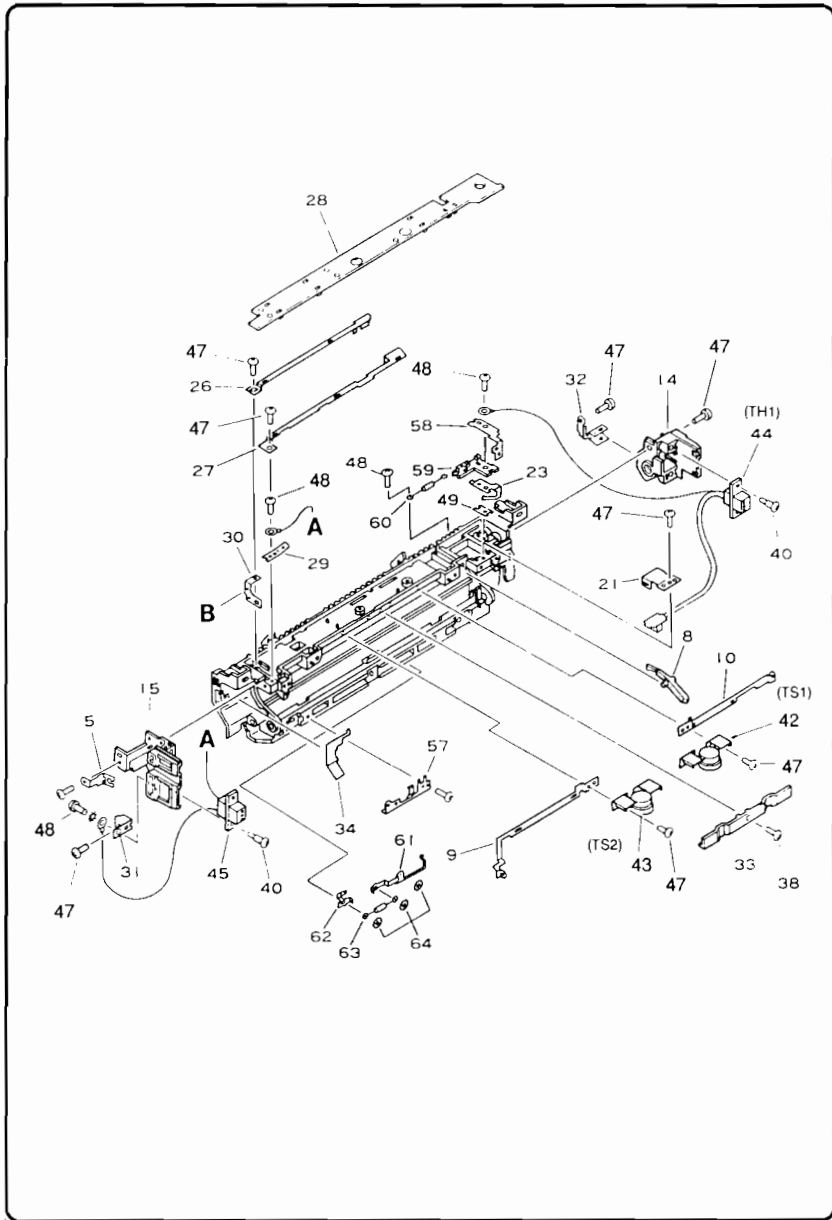
Figure 8-8. Fusing Assembly (continued)

Table 8-8. Fusing Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
ALL PARTS	RG1-1788-150CN 33471-69018	1	NEW RBLT	FUSING ASSEMBLY, 100/115V
ALL PARTS	RG1-1789-150CN 33471-69019	1	NEW RBLT	FUSING ASSEMBLY, 220/240V
2	RF1-2505-000CN	1		ROLLER, FUSING, UPPER
3	RA1-7583-000CN	1		ROLLER, PRESSURE, LOWER
5	RA1-7585-000CN	1	S	SPRING, LEAF
6	RA1-7586-000CN	2	S	BUSHING
7	RA1-7587-000CN	1	S	BUSHING
8	RA1-7588-000CN	1	S	LEVER, PAPER SENSOR
9	RA1-7589-000CN	1	S	PLATE, CABLE, LEFT
10	RA1-7591-000CN	1	S	PLATE, CABLE, RIGHT
11	RA1-7592-000CN	1	S	BUTTON, DOOR RELEASE
12	RA1-7593-000CN	1	S	PLATE, HOOK, LEFT
13	RA1-7594-000CN	1		GUIDE, ENTRANCE
14	RA1-7595-000CN	1	S	HOLDER, CONNECTOR, RGT
15	RA1-7596-000CN	1	S	HOLDER, CONNECTOR, LEFT
17	RA1-7598-000CN	1	S	PLATE, LIFTING, LEFT
18	RA1-7599-000CN	1	S	PLATE, LIFTING, RIGHT
19	RA1-7600-000CN	1	S	ELIMINATOR, STATIC CHARGE

Table 8-8. Fusing Assembly (continued)

REF	PART NO.	QTY	NOTES	DESCRIPTION
20	RF1-2495-000CN	1		GUIDE, PAPER DELIVERY
21	RA1-7602-000CN	1	S	SPRING, LEAF, THERMISTOR
22	RA1-7603-000CN	1	S	ROD, LATCH
23	RA1-7604-000CN	1	S	SPRING, LEAF, GROUNDING
25	RA1-7607-000CN	1	S	SPRING, TORSION
26	RA1-7608-000CN	1	S	PLATE, CABLE, 1
27	RA1-7609-000CN	1	S	PLATE, CABLE, 2
28	RA1-7610-000CN	1	S	COVER, WIRE
29	RA1-7617-000CN	1	S	PLATE, CONTINUITY, 1
30	RA1-7618-000CN	1	S	PLATE, CONTINUITY, 2
31	RA1-7619-000CN	1	S	PLATE, CONTINUITY, 3
32	RA1-7620-000CN	1	S	PLATE, CONTINUITY, 4
33	RA1-7720-000CN	1	S	COVER, THERMOSWITCH
34	RA1-7722-000CN	1	S	COVER
36	RS1-0287-000CN	1	S	GEAR, 27T/21T
37	RS1-2241-000CN	2	S	SPRING, COMPRESSION
38	XA9-0267-000CN	3		SCREW, TP, M3X6
40	RA1-7636-000CN	9		SCREW, STEPPED, M3

Table 8-8. Fusing Assembly (continued)

REF	PART NO.	QTY	NOTES	DESCRIPTION
41	RH7-4032-000CN	1		HEAT LAMP, 100/115V
41	RH7-4033-000CN	1		HEAT LAMP, 220/240V
42	RF1-2483-000CN	1		THERMOSWITCH (TS1) 175°C
43	RF1-2484-000CN	1		THERMOSWITCH (TS2) 210°C
44	RF1-2405-000CN	1		THERMISTOR (TH1) ASSY
45	RF1-2427-000CN	1		CABLE, AC CONNECTOR
46	RA1-7510-000CN	1	S	PLATE, BLANKING
47	XA9-0233-000CN	14	S	SCREW, M3X6
48	XB2-7300-607CN	5	S	SCREW, M3X6
49	RA1-8260-000CN	1	S	SHEET, INSULATION
50	RA1-7730-000CN	1	S	PLATE, INSULATING
51	RA1-7803-000CN	2	S	SCREW, MACHINE, M3
52	RS1-2255-000CN	2	S	SPRING, COMPRESSION
53	RF1-3095-000CN	1	S	SPRING, LEAF
54	XD9-0079-000CN	2	S	WASHER, WAVE
57	RA1-7828-000CN	1	S	SPRING, LEAF
58	RA1-8245-000CN	1	S	PLATE, CONTINUITY
59	RA1-8246-000CN	1	S	HOLDER, DIODE
60	RF1-2494-000CN	1	S	DIODE, UPPER
61	RA1-8263-000CN	1	S	PLATE, CABLE
62	RA1-8264-000CN	1	S	PLATE, CABLE
63	RH6-3097-000CN	1	S	DIODE, LOWER
64	XA9-0134-000CN	3	S	NUT, PUSH
65	RA1-8620-000CN	1	S	RING, RETAINING
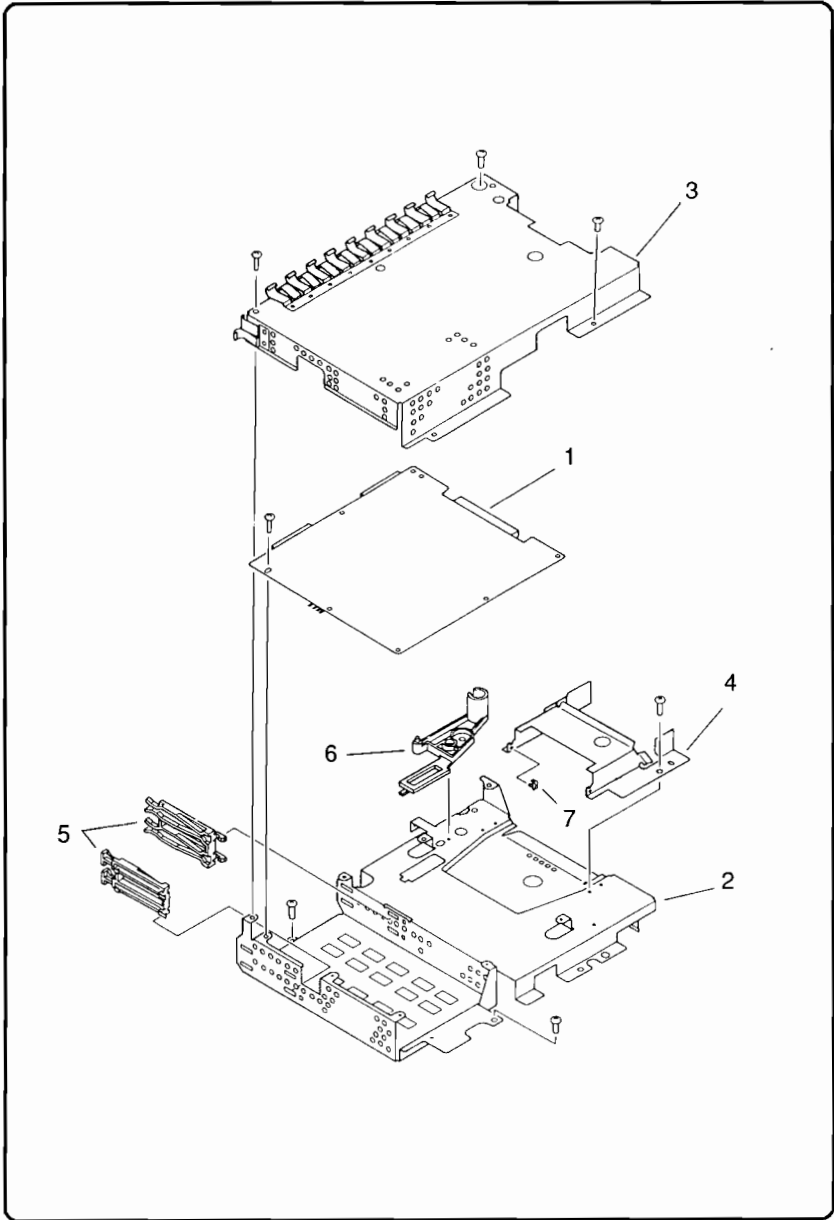
Figure 8-9. Formatter PCA and Shield Assembly

Table 8-9. Formatter PCA and Shield Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
1	33471-60004 33471-69001 33481-60001 33481-69001	1	NEW, IIP RBLT, IIP NEW, IIIP RBLT, IIIP	FORMATTER PCA
2	RA1-7537-020CN	1		SHIELD, UPPER
3	RA1-7539-000CN	1		SHIELD, LOWER
4	RA1-7541-030CN	1		GUIDE, FONT
5	RA1-7543-020CN	4	S	GUIDE, MEMORY PCA
6	RA1-7555-030CN	1	S	MOUNT, PCA
7	RA1-8250-020CN	2	S	BUMPER, FONT GUIDE
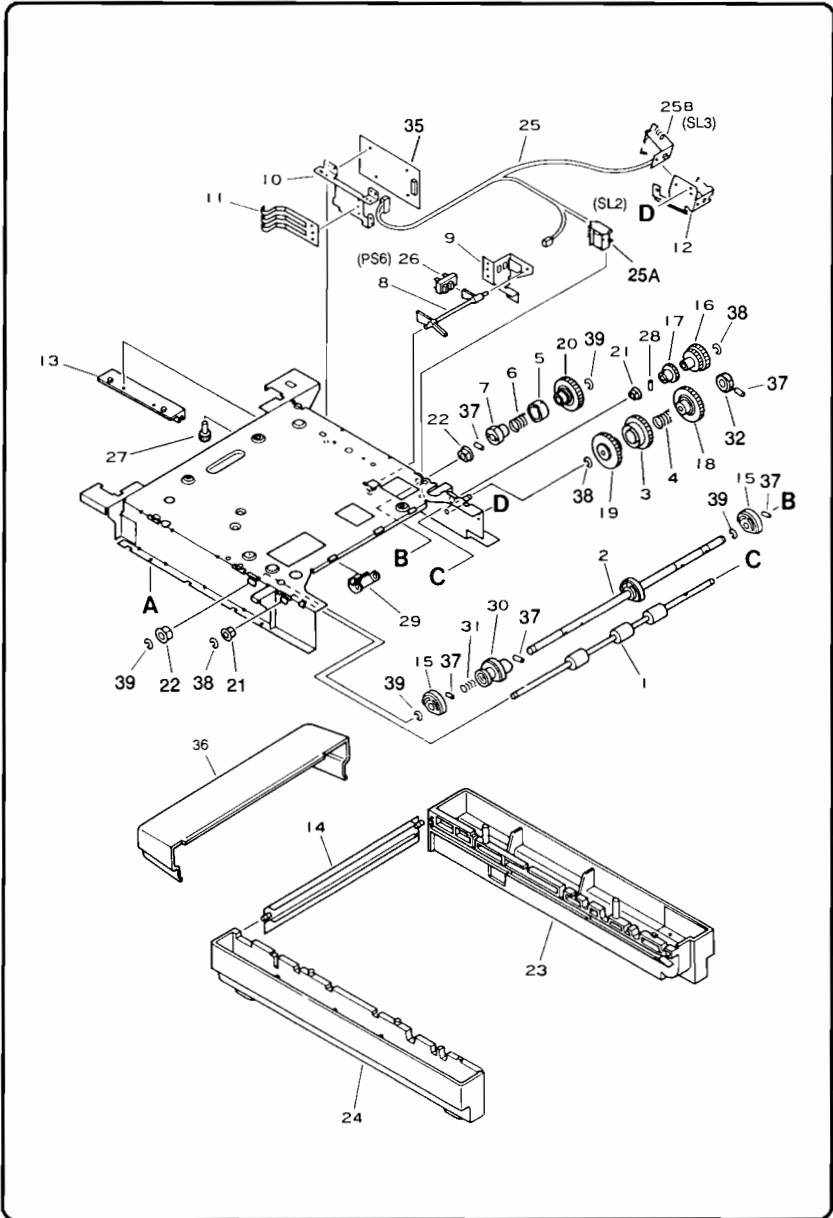
Figure 8-10. Lower Cassette Base Assembly

Table 8-10. Lower Cassette Base Assembly

REF	PART NO.	QTY	NOTES	DESCRIPTION
1	RA1-7654-000CN	1		SHAFT, FEED ROLLER
2	RA1-7655-000CN	1	S	SHAFT, PICK-UP ROLLER
3	RA1-7656-000CN	1	S	RING, RATCHET, A[1]
4	RA1-7657-000CN	1	S	SPRING, CLUTCH, A[1]
5	RA1-7658-000CN	1	S	RING, RATCHET, B
6	RA1-7659-000CN	1	S	SPRING, CLUTCH, B[1]
7	RA1-7660-000CN	1	S	RING[1]
8	RA1-7661-000CN	1	S	LEVER, PAPER SENSOR
9	RA1-7662-000CN	1	S	BRACKET, SENSOR MOUNT
10	RA1-7663-000CN	1	S	BRACKET, PCA MOUNT
11	RA1-7664-000CN	1	S	SPRING, LEAF
12	RA1-7665-000CN	1	S	BRACKET, SOLENOID MOUNT
13	RA1-7666-000CN	1	S	GUIDE, CASSETTE
14	RA1-7672-000CN	1	S	COVER, STOP
15	RA1-7674-000CN	3		ROLLER, PICK-UP
16	RS1-0295-000CN	1	S	GEAR, 33T/19T
17	RS1-0296-000CN	1	S	GEAR, 17T
18	RS1-0297-000CN	1	S	GEAR, 37T[1]
19	RS1-0298-000CN	1	S	GEAR, 39T[1]
20	RS1-0299-000CN	1	S	GEAR, 34T[1]
21	RS1-1053-000CN	1	S	BUSHING
22	RS1-1054-000CN	2	S	BUSHING
23	RF1-2420-000CN	1	S	COVER, BASE, RIGHT
24	RF1-2421-000CN	1	S	COVER, BASE, LEFT

1. When replacing these components, lubricate using MOLYKOTE® U PASTE, HP P/N CK-0549-000CN.

Table 8-10. Lower Cassette Base Assembly (continued)

REF	PART NO.	QTY	NOTES	DESCRIPTION
25	RF1-2406-000CN	1		CABLE/SOLENOID ASSEMBLY (SL2 and SL3)
25A	RH7-5025-000CN	1		SOLENOID, DC24V
25B	RH7-5026-000CN	1		SOLENOID, DC24V
26	WG8-0291-000CN	1		PHOTOSENSOR (PS6)
27	XA9-0494-000CN	4		SCREW, M3X8
28	XD3-2160-082CN	1		PIN, DOWEL (1.6 X 8 mm)
29	RA1-7821-000CN	3	S	GUIDE, INPUT ROLLER
30	RA1-7824-000CN	1		ROLLER, PICK-UP
31	RS1-2254-000CN	1	S	SPRING, COMPRESSION
32	RS1-6047-000CN	1	S	COLLAR, RETAINING
35	RG1-1596-000CN	1		PCA, LOWER CASSETTE BASE
36	RA1-7673-000CN	1		COVER, LEGAL TRAY
37	XD3-2200-142CN	4		PIN, DOWEL (2 X 14 mm)
38	XD2-1100-502CN	2		E-CLIP (5.0 mm I.D.)
39	XD2-1100-642CN	4		E-CLIP (6.4 mm I.D.)

Note

CHAPTER 9

Contents

Figures

9

Reference Data

This chapter is provided as reference tool for identifying the names and locations of the printer's major assemblies and components. Each illustration shows the location and/or details of assemblies, sensors, solenoids, and PCAs.

External Assembly Locations
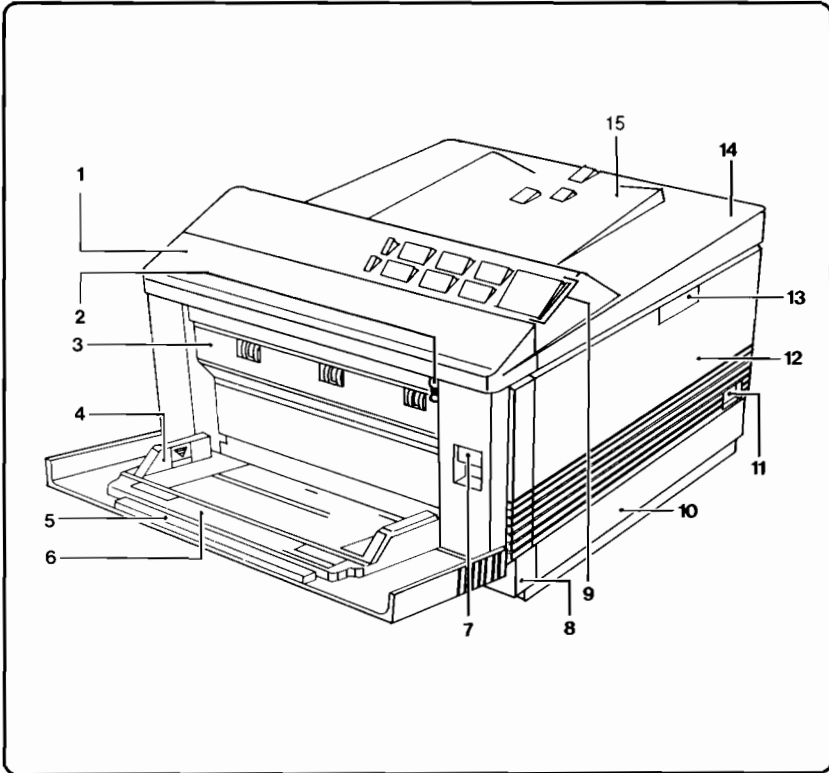
Figure 9-1. External Assembly Locations

1. Paper Path Door
2. Output Tray Deflector
3. External Fuser Access Door
4. Media Width Adjuster
5. MP Tray Extender
6. Multi-Purpose (MP) Tray
7. Paper Path Door Release Button

8. Optional Lower Cassette Tray
9. Control Panel
10. Optional Lower Cassette Base
11. ON/OFF Power Switch
12. Right Side Cover
13. Font Cartridge Door
14. Top Cover
15. Face-Down Output Tray
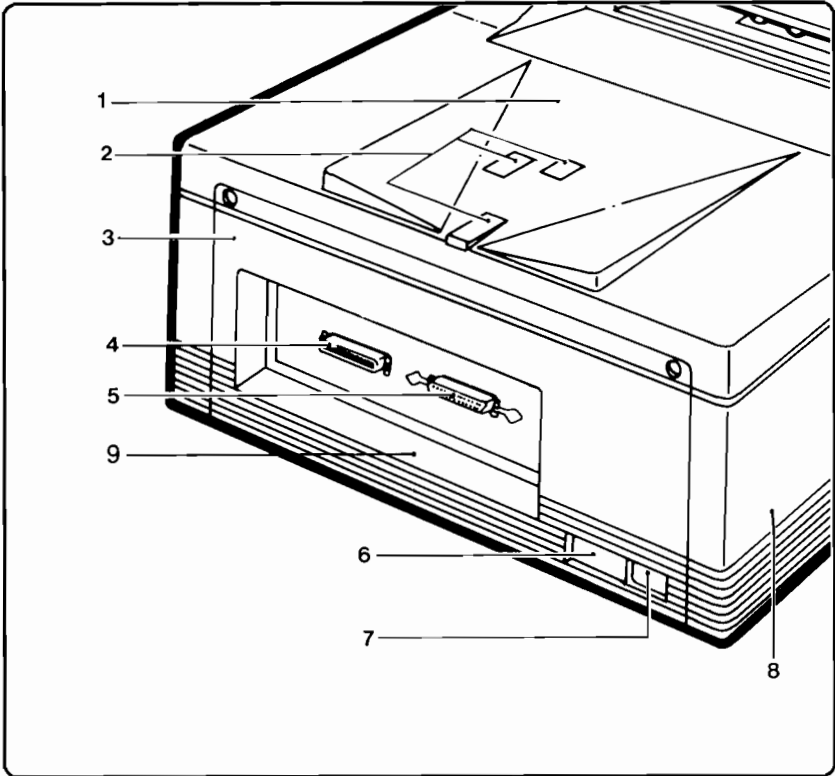
Figure 9-2. External Assembly Locations (continued)

1. Face-Down Output Tray
2. Paper Stops
3. Rear Cover
4. Serial Interface Port
5. Parallel Interface Port
6. Serial Number/Power Rating Label
7. Power Receptacle
8. Left Side Cover
9. Model Number/Certification Label

Internal Assembly Locations
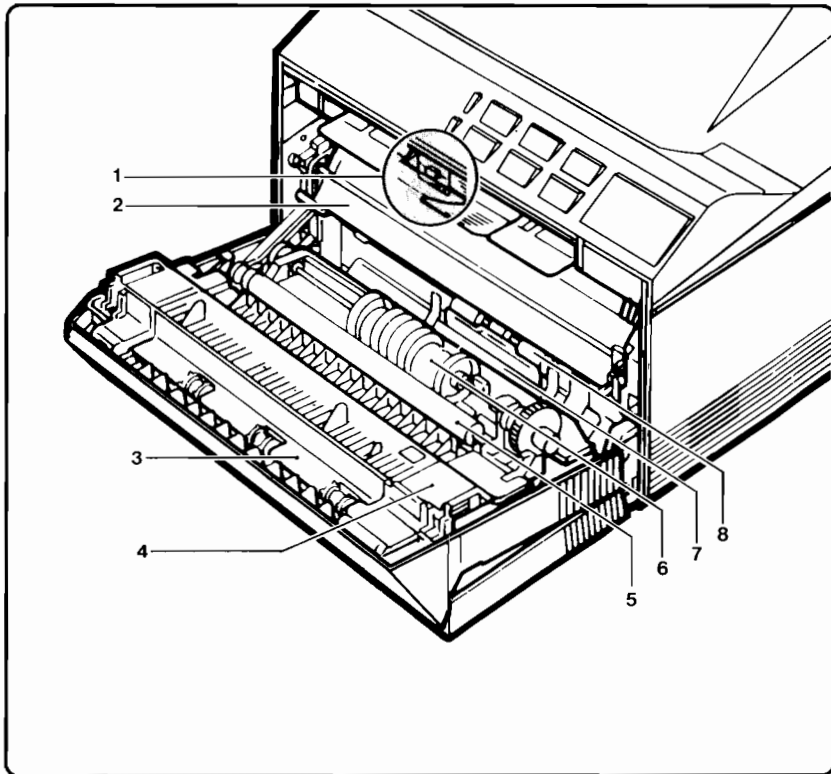
Figure 9-3. Internal Assembly Locations

1. Print Density Slide
2. EP-L Cartridge (installed)
3. Internal Fuser Access Door
4. Fusing Assembly
5. Transfer Roller
6. MP Pick-Up Roller
7. Separation Pad
8. Input Feed Roller
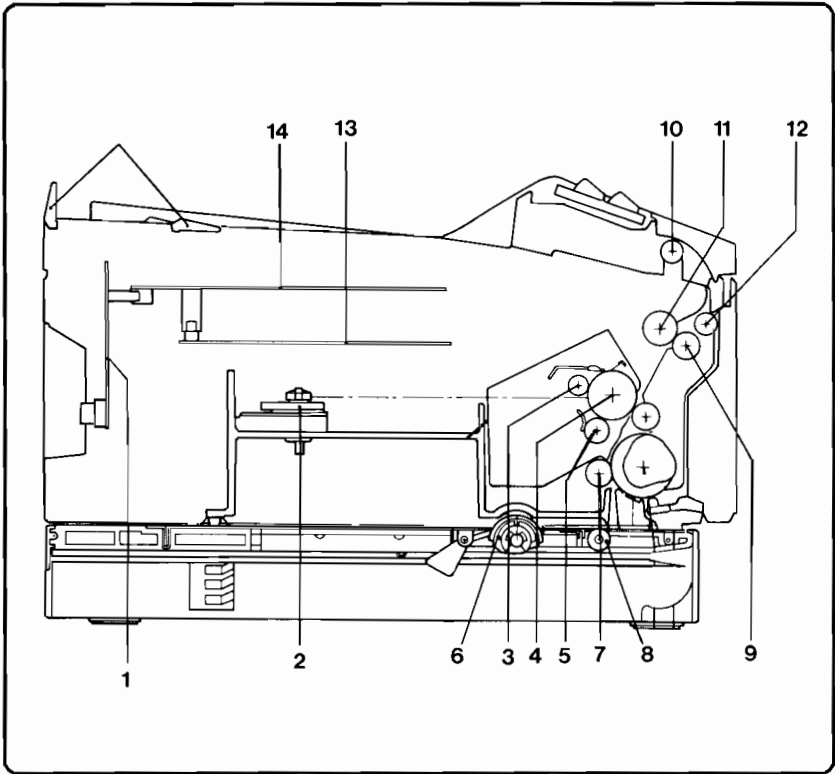
Figure 9-4. Internal Assembly Locations (continued)

1. Dual I/O Interface Assembly
2. Scanner Motor Assembly

EP-L Internal Components:
3. Primary Charging Roller
4. Photosensitive Drum
5. Developing Cylinder
6. LC Pick-Up Roller

7. Input Feed Roller
8. Lower Cassette Feed Roller
9. Pressure (Lower Fusing) Roller
10. Face-Down Output Rollers
11. Upper Fusing Roller
12. Face-Up Output Roller
13. DC Controller PCA
14. Formatter PCA

Photosensor and Solenoid Locations
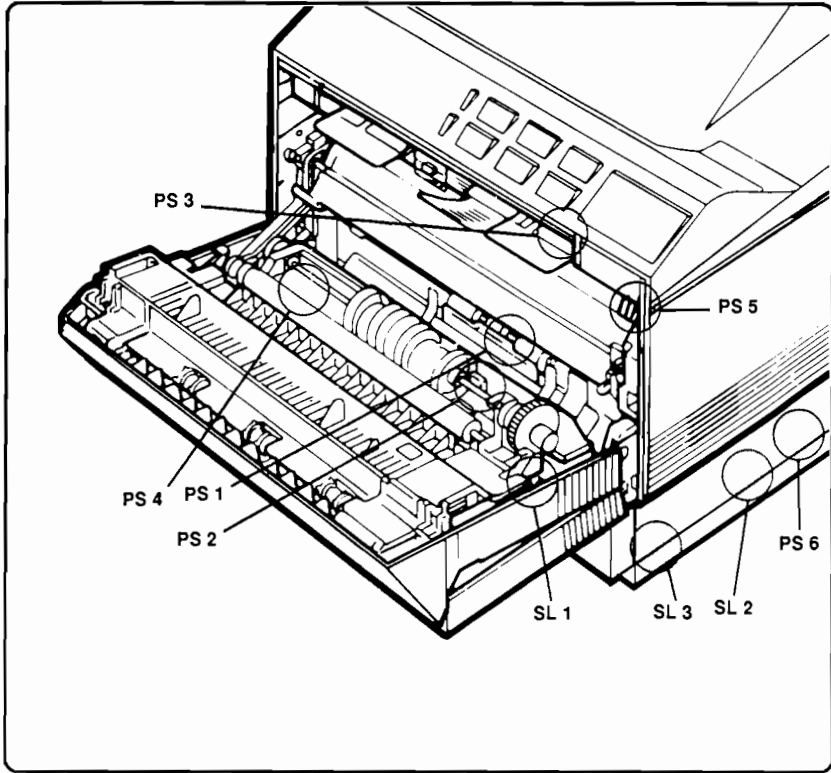
Figure 9-5. Photosensor and Solenoid Locations

Photosensor PS1 (Main Body Block)
Photosensor PS2 (Paper Path Door)
Photosensor PS3 (Upper Mainframe)
Photosensor PS4 (Paper Path Door)
Photosensor PS5 (Upper Mainframe)
Photosensor PS6 (LC Base)
Solenoid SL1 (Paper Path Door)
Solenoid SL2 (LC Base)
Solenoid SL3 (LC Base)

DC Controller PCA
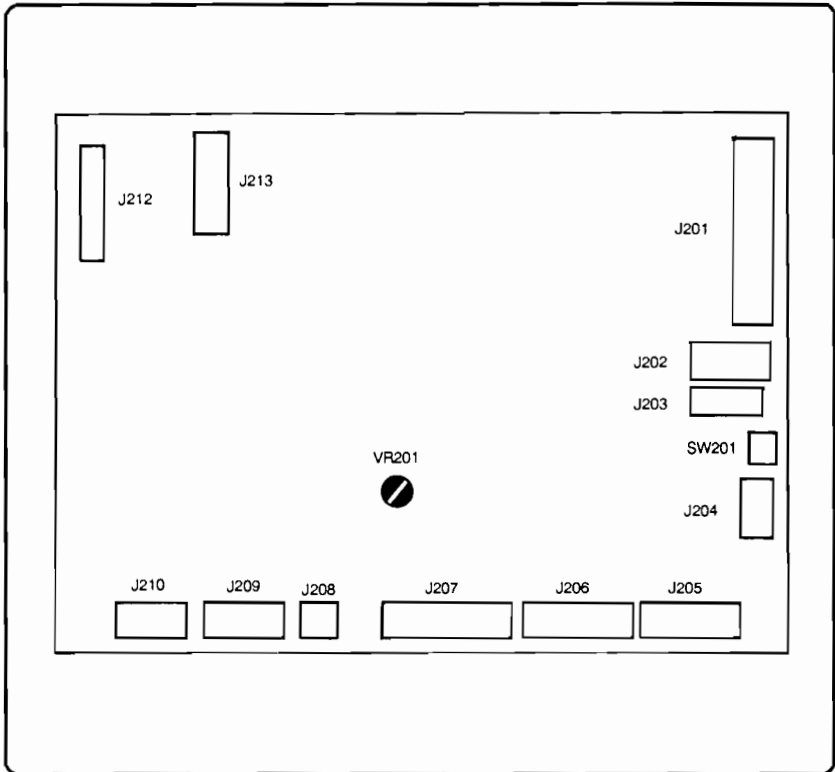
Figure 9-6. DC Controller PCA

J201 (Formatter Interface) J207 (CE Test Con.)
J202 (Laser PCA) J208 (PS1)
J203 (Scanner Motor) J209 (PS2, PS4, and SL1)
J204 (Beam Detect) J210 (Main Motor)
J205 (LC Base) J212 (DC Power Supply)
J206 (High Voltage PCA) J213 (Density Adjustment PCA)

VR201 (Registration) SW201 (Test Print)

Formatter PCA
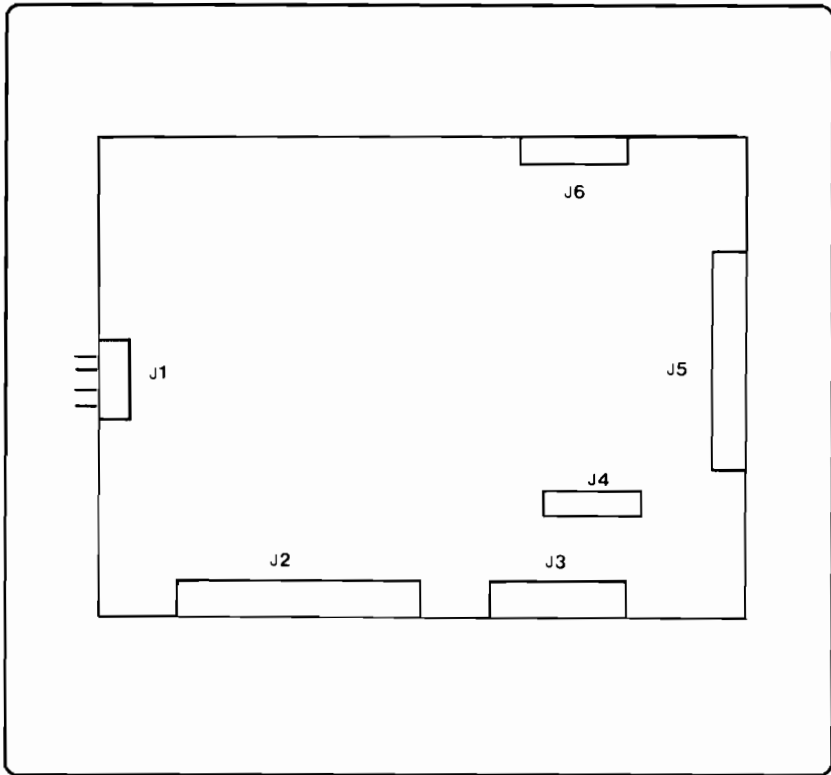
Figure 9-7. Formatter PCA

J1 (DC Power Supply) J4 (DC Controller Interface)
J2 (Memory PCA)   J5 (Font Cartridge)
J3 (Dual I/O PCA)   J6 (Control Panel)

High Voltage PCA
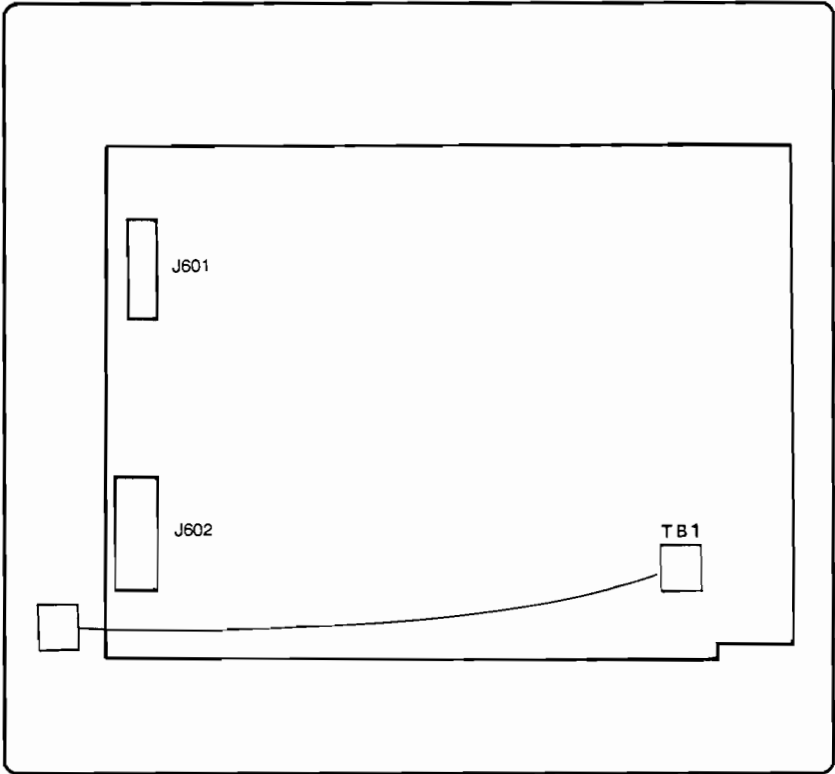
Figure 9-8. High Voltage Power Supply PCA

J601 (DC Controller)   TB1 (Transfer Roller)
J602 (High Voltage Contact Assembly)

Lower Cassette Base PCA
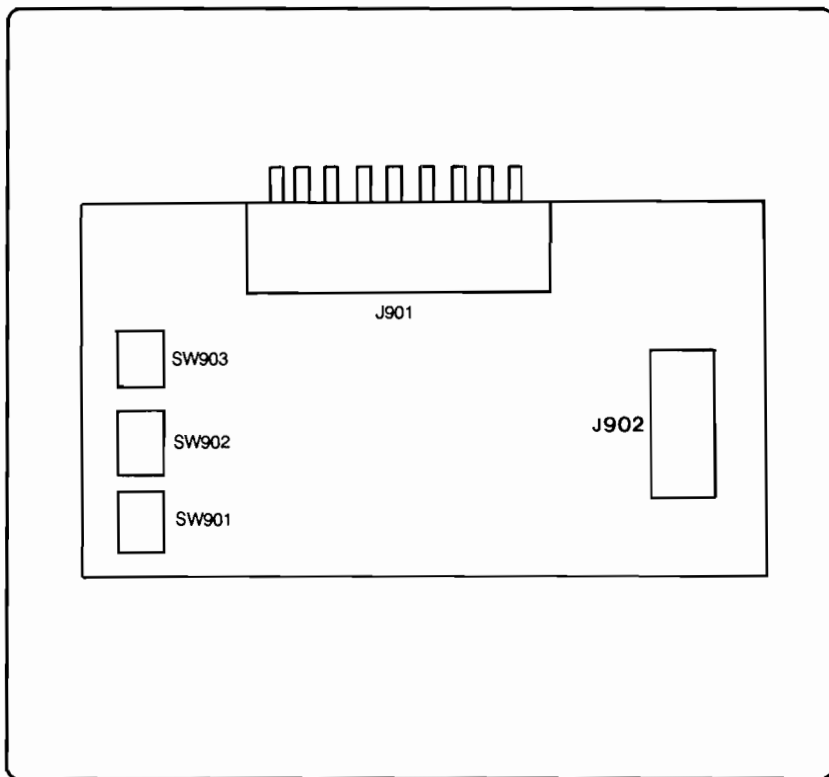
Figure 9-9. Lower Cassette Base PCA

J901 (DC Controller)
J902 (PS6, SL2, and SL3)
SW901/SW903 (Tray Size Sensors)

Density Adjustment PCA
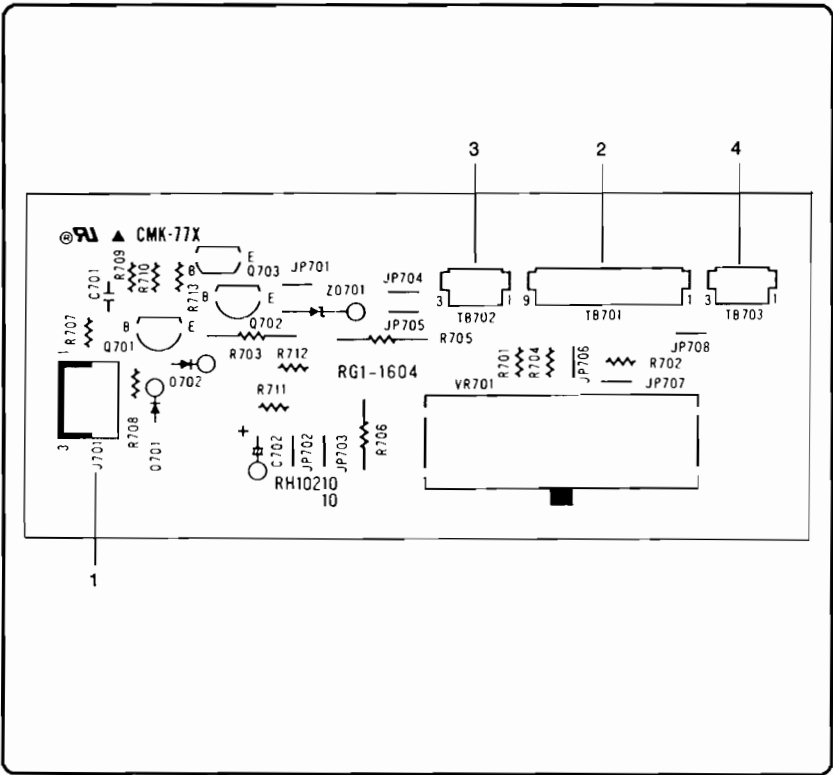
Figure 9-10. Density Adjustment PCA

1. J701 (Fan)   3. TB702 (PS5)
2. TB701 (DC Controller) 4. TB703 (PS3)

EP-L Cartridge
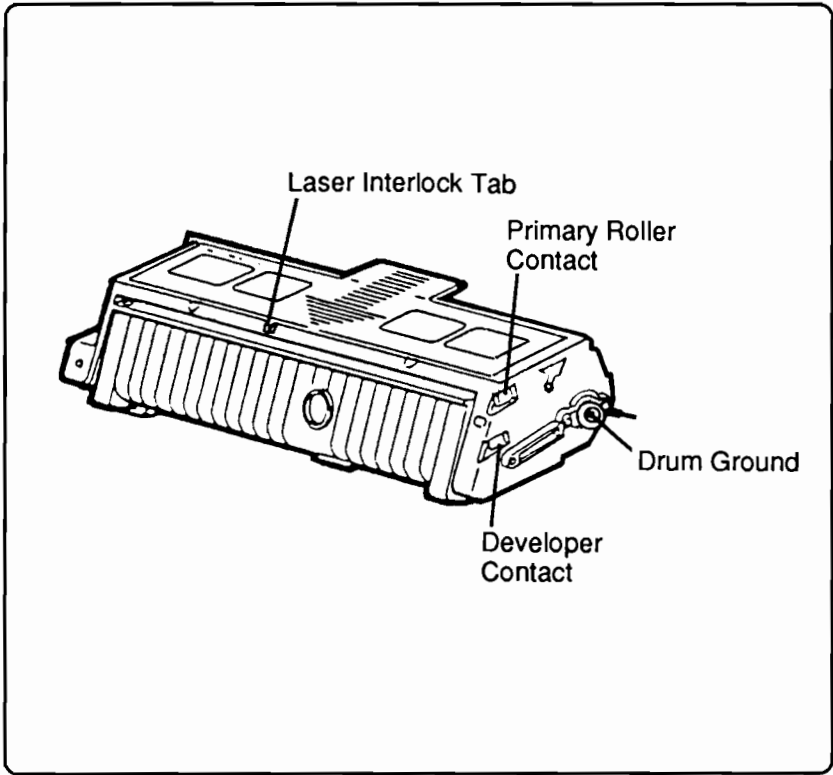
Figure 9-11. EP-L Cartridge (External Components)

A

I/O Cabling Information

Parallel Interface Pin Assignments

Table A-1. Parallel Cable Pin Assignments

Signal	Pin #	Pin #	Signal
STROBE (Input)	1	19	GND
DATA 1 (Input)	2	20	GND
DATA 2 (Input)	3	21	GND
DATA 3 (Input)	4	22	GND
DATA 4 (Input)	5	23	GND
DATA 5 (Input)	6	24	GND
DATA 6 (Input)	7	25	GND
DATA 7 (Input)	8	26	GND
DATA 8 (Input)	9	27	GND
$\overline{\text{ACK}}$ (Output)	10	28	GND
BUSY (Output)	11	29	GND
Paper error (Output)	12	30	GND
Select	13	31	NC
NC	14	32	$\overline{\text{fault}}$ (Output)
NC	15	33	Auxout1 (Output)
O VDC	16	34	NC
Chassis GND	17	35	Auxout2 (Output)
+5 VDC (Output)	18	36	NC

The bar above (—) some signals indicates that the signal is negative true (active LOW). GND means the connection is grounded. NC indicates that the pin has no connection.

Serial Interface Pin Assignments

Table A-2 lists RS-232C and RS-422A pin assignments and signal descriptions. Those pins not appearing in the table are not used.

Table A-2. Serial Cable Pin Assignments

Pin Number	Description	RS-232	RS-422	I/O
1	Protective ground.	✓	✓	
2	Transmitted data (data from printer).	✓		Output
3	Received data (received by printer).	✓		Input
3 (RS-422)	Received data inverted (RDA) (received by printer).		✓	Input
4	Request to send. This signal is HIGH when unit is powered on.	✓		Output
7	Signal ground.	✓	✓	
9 (RS-422)	Send data inverted (SDA).		✓	Output
10 (RS-422)	Send data noninverted (SDB).		✓	Output
18 (RS-422)	Receive data noninverted (RDB).		✓	Input
20	Data terminal ready.	✓	*	Output

The check marks (✓) identify signals used.
* = RS232 signal available, but not used in RS422 communication.

The following serial cabling schematics are typical of IBM (AT/XT) and compatible personal computers using the standard (9/25) pin serial RS-232C interface.
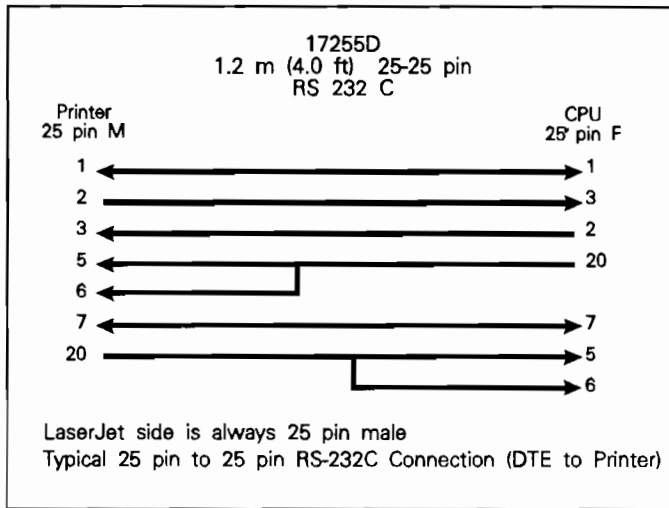
Figure A-1. Typical **PC/XT** and **PS/2** Pin Assignments
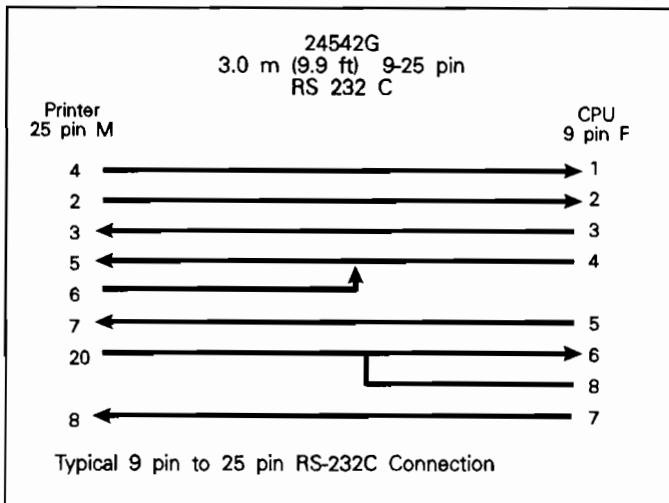
Figure A-2. Typical AT Pin Assignments

The following cabling schematic is based on an HP Vectra PC with an HP24541B RS-422A interface card installed. Specific configurations may vary.

RS 422A

Printer
25 pin M

HOST
25 pin M

```
1 ━━ NC
2 ━━ NC
3 ━━ RDA ━━━━━━━━━━━━━━━━━━━━━━━━━━━ SDA ━━ 9
4 ━━ NC
7 ━━ SG  ━━━━━━━━━━━━━━━━━━━━━━━━━━━ SG  ━━ 7
10 ━━ SDB ━━━━━━━━━━━━━━━━━━━━━━━━━━ RDB ━━ 18
18 ━━ RDB ━━━━━━━━━━━━━━━━━━━━━━━━━━ SDB ━━ 10
20 ━━ NC
9 ━━ SDA ━━━━━━━━━━━━━━━━━━━━━━━━━━━ RDA ━━ 3
```

Typical 25 to 25 pin RS-422 Connection (DTE to Printer)
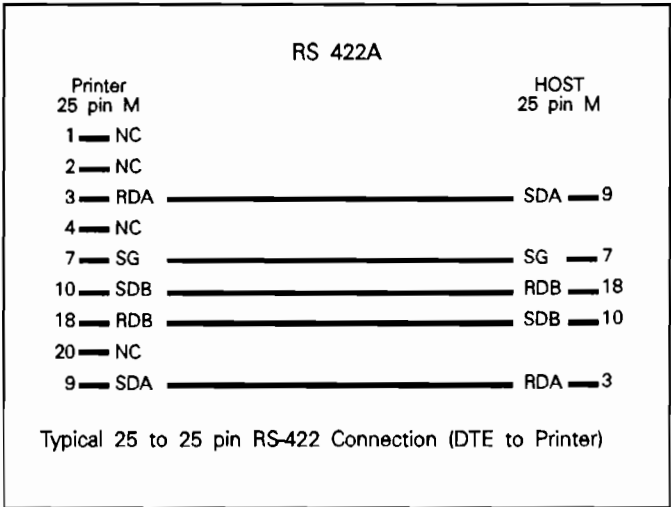
Figure A-3. Typical RS-422A 25-25 Pin Assignments

B

Sample Test Print Program

The following program is designed to allow the Service Representative to verify communication between the host computer and the printer. This program can run with or without the Lower Cassette Base installed.

```
10 LPRINT CHR$(27)+"E"    (Reset)
20 LPRINT CHR$(27)+"&l1x1H"  (Select MP Tray)
30 LPRINT "THIS IS A TEST PRINT FROM THE MP TRAY"
40 LPRINT CHR$(13);  (Carriage Return)
50 LPRINT CHR$(12);  (Form Feed)
60 LPRINT CHR$(27)+"&l4H"  (Select MP Tray)
70 LPRINT "THIS IS A TEST PRINT FROM THE LC TRAY"
80 LPRINT CHR$(27)+"E";  (Reset)
```

C

Display Message Translations

This appendix contains translations of many of the messages that may appear on the printer's control panel. The LaserJet IIIP can be configured for any of the 10 languages shown. The LaserJet IIP can be configured for the first five languages only.

Supported Languages (Both Printers)

ENGLISH	FRENCH	GERMAN	ITALIAN	SPANISH
LANGUAGE ENGLISH	LANGUE FR	SPRACHE DEUTSCH	LINGUA ITALIAN	LENGUAJE ESPAÑOL

Supported Languages (LaserJet IIIP only)

SWEDISH	DANISH	NORWEG	DUTCH	FINNISH
SPRÅK SVENSKA	SPROG DANSK	SPRÅK NORSK	TAAL NEDERL	KIELI SUOMI

Message Translations - LaserJet IIP & IIIP

ENGLISH	FRENCH	GERMAN	ITALIAN	SPANISH
00 READY	00 PRET	00BEREIT	00PRONTA	00 LISTO
00 SMODE	00 SMODE	00 SMODE	00 SMODE	00 SMODE
02 WARM UP	02 PRE-CHAUFFE	02 BITTE WARTEN	02 ATTENDI	02 ESPERAR
04 SELF TEST	04 AUTO TEST	04SELBST TEST	04 AUTO TEST	04 AUTO TEST
05 SELF TEST	05 AUTO TEST	05SELBST TEST	05 AUTO TEST	05 AUTO TEST
06 FONT PRINTOUT	06 IMPR POLICES	06 SCHR. LISTE	06STAMPA CARATT.	06 LISTA DE FONTS
06 PRINT TEST	06 IMPR TEST	06 DRUCK TEST	06STAMPA TEST	06 TEST IMPRES.
07 RESET	07REINIT	07 ZUR.-SETZEN	07 RESET	07 RESET
08 COLD RESET	08REINIT USINE	08 AUSG. WERTE	08 RESET TOTALE	08 RESET TOTAL
09 MENU RESET	09REINIT MENU	09 AUSG. WERTE	09 RESET MENU	09 MENU INICIAL
10 RESET TO SAVE	10REINIT CONFIG ?	10 ZUR Z SICHERN	10 RESET =SALVA	10 RESET Y GUARDA
12 OPEN OR NO EP	12 CAPOT OU ENCRE	12OFFEN/ KEINE TK	12APERTA O NO EP	12 NO EP O ABIERT
13 PAPER JAM	13PAPIER BOURRAGE	13PAPIER STAU	13 CARTA INCEPP.	13 PAPEL ATASCADO
15 TEST ENGINE	15 TEST MOTEUR	15 MOTOR TEST	15 TEST MACCHINA	15 TEST MAQUINA
17 MEM CONFIG	17 CONF. MEM	17KONFIG SPEICHER	17 CONF. MEMORIA	17 CONF. MEMORIA
20 MEM OVERFLOW	20 MEM SATUREE	20 VOLLER SPEICHER	20 MEM. SATURA	20 DESB. MEMORIA
21 PRINT OVERRUN	21 PAGE TP DENSE	21ZUVIEL DATEN	21TROPPI DATI	21 DESB. PAGINA
22 I/O CONF ERR	22 CONF INTF ERR	22 E/A-KONFG-F.	22 ERR CONF I/O	22 ERROR CONF E/S
## ERROR	## ERREUR	## FEHLER	## ERRORE	## ERROR
## NEEDS SERVICE	## MATERIEL	## WARTUNG	## ASSIST.	## SERVICIO

C-2   Display Message Translations

Message Translations - LaserJet IIP & IIIP (continued)

ENGLISH	FRENCH	GERMAN	ITALIAN	SPANISH
A4	A4	A4	A4	A4
C5	C5	C5	C5	C5
COM10	COM10	COM10	COM10	COM10
DL	DL	DL	DL	DL
ENVELOPE	ENVELOP	ENVELOPE	BUSTA	SOBRE
EXEC	EXEC	EXEC	EXEC	EXEC
FC CART NO FONT	PC CART LECT IM	SK NICHT LESBAR	CC NO FONT	CF CART NO FONT
FC REMOVED	PC RETIREE	SK ENTFERNT	CC RIMOSSA	CF RETIRADO
FE CARTRIDG	PE CART ATTN!	SK ENTFERNT	CC ERRORE	EF CARTUCHO
LC EMPTY	CP VIDE	UK LEER	CI VUOTO	IP VACIA
LC LOAD	CP CHRG	UK LADEN	CI CARIC	IP CARGA
LE EMPTY	EA VIDE	UB LEER	VB VUOTO	IS VACIA
LE LOAD	EA CHRG	UB LADEN	VB CARIC	IS CARGA
LE TRAY	EA BAC	UB KASS	VB CASS	IS BANDJ
LEGAL	LEGAL	LEGAL	LEGALE	LEGAL
LETTER	LETTER	LETTER	LETTERA	LETTER
ME FEED	EM ALIM	MZ ZUF.	AB MAN.	MS MANU
MF FEED	PM ALIM	MZ ZUF.	AC MAN.	AM MANU
MF READY	PM PRET	MZBEREIT	AMPRONTA	AM LISTO
MONARCH	MONARCH	MONARCH	MONARCH	MONARCH
MP EMPTY	BM VIDE	MZ LEER	MF VUOTO	MP VACIA
MP LOAD	BM CHRG	MZ LADEN	MF CARIC	MP CARGA

Message Translations - LaserJet IIIP Only

ENGLISH	SWEDISH	DANISH	NORWEG	DUTCH	FINNISH
00 READY	00 REDO	00 KLAR	00 KLAR	00 KLAAR	00VALMIS
00 SMODE	00 SMODE	00 SMODE	00 SMODE	00 SMODE	00 SMODE
02 WARM UP	02 VÄNTA	VARM OP	02 KLAR-GJØRING	02 OPWARMEN	02 ODOTA
04 SELF TEST	04 FUNK. TEST	04 SELV TEST	04 SELV-TEST	04 ZELF TEST	04 TESTAUS
05 SELF TEST	05 FUNK. TEST	05 SELV TEST	05 SELV-TEST	O5 ZELF TEST	05 TESTAUS
06 FONT PRINTOUT	06 FONT-UTSKRIFT	06 FONT UDSKRIFT	06 FONT UTSKRIFT	06 PRINT FONTS	06K-LAJI TULOSTUS
06 PRINT TEST	06 UTSKR TEST	06 PRINT TEST	06 TEST-UTSKRIFT	06 PRINT ZELFTEST	06 TULOS-TUSTESTI
07 RESET	07 ÅTER-STÄLLD	07 RESET	07 NULLSTIL	07 HERSTEL	07 ALKU-ASETUS
08 COLD RESET	08 GRUND INSTÄLLN	08 FULD RESET	08 FULL NULLSTIL	08 UITG. WAARDEN	08PERUS-ASETUS
09 MENU RESET	09 MENY ÅTERSTLD	09 MENU RESET	09 MENY NULLSTIL	09 MENU HERSTEL	09 MENU-ASETUS
10 RESET TO SAVE	10 ÅTERS + SPARA	10 RESET OG GEM	10 RESET = LAGRE	10 RESET = BEWAAR	10ALKUAS =TALLENN
12 OPEN OR NO EP	12 ÖPPN/ INGEN TK	12 ÅBEN/ INGEN EP	12 ÅPEN/ INGEN EP	12 OPEN/ GEEN EP	12 AUKI/ EI KASET
13 PAPER JAM	13PAPPER FASTNAT	13 PAPIR STOP	13 PAPIR STOPP	13PAPIER STORING	13PAPERI TUKOS
15 TEST ENGINE	15 MOTOR TEST	15 TEST MOTOR	15 TEST MOTOR	15 MOTOR TEST	15 KIRJ. TESTAUS
17 MEM CONFIG	17KONFIG MINNE	17 HUK KONFIG	17 RAM-KONFIG	17 CONF. GEHEUGEN	17MUIST. ASETUS
20 MEM OVERFLOW	20 MINNE FULLT	20 HUK FULD	20 RAM-OVERFLYT	20 VOL GEHEUGEN	20 MUIST YLIVUOTO
21 PRINT OVERRUN	21 SIDA KOMPLEX	21 DATA OVERLØB	21 SKRIV OVERFLYT	21 DATA LIMIET	21 KIRJ. YLIVUOTO
22 I/O CONF ERR	22 I/O KONF FEL	22 I/O KONFIG	22 FEIL I/U KONF	22 FOUT I/O CONF	22 I/O-AS:VIRHE
## ERROR	## FEL	## FEJL	## FEIL	## FOUT	## VIRHE
## NEEDS SERVICE	## BEHÖV SERVICE	## BEHOV SERVICE	## MÅ HA SERVICE	## SERVICE	## HUOLTO

C-4 Display Message Translations

Message Translations - LaserJet IIIP Only (continued)

ENGLISH	SWEDISH	DANISH	NORWEG	DUTCH	FINNISH
A4	A4	A4	A4	A4	A4
C5	C5	C5	C5	C5	C5
COM10	COM10	COM10	COM10	COM10	COM10
DL	DL	DL	DL	DL	DL
ENVELOPE	KUVERT	KONVOLUT	KONVOLUT	ENVELOP'	KIRJEKUO
EXEC	EXEC	EXEC	EXEC	EXEC	EXEC
FC CART NO FONT	FK EJ LÄSBAR	FK INGEN FT	FK IKKE LESELIG	FC CASS. GEEN FNT	KK KASET EI K-LAJ
FC REMOVED	FK UTTAGEN	FK FJERNET	FK INGEN KASSETT	FC AFWEZIG	KK POISSA
FE CARTRIDG	FF OBS! KASSETT	FF FEJL KASSETTE	FE INGEN KASSETT	FF CASSETTE	KV KASETTI
LC EMPTY	NM TOMT	NK TOM	NE TOM	OI LEEG	AL TYHJÄ
LC LOAD	NM LADDA	NK ILÆG	NE LAST	OI LADEN	AL TÄYTÄ
LE EMPTY	NK TOMT	NKo TOM	NK TOM	OE LEEG	AK TYHJÄ
LE LOAD	NK LADDA	NKo ILÆG	NK LAST	OE LADEN	AK TÄYTÄ
LE TRAY	NK MAGA	NKoKASS	NK SKUFF	OE LADE	AK KAUK.
LEGAL	LEGAL	LEGAL	LEGAL	FOLIO	LEGAL
LETTER	LETTER	LETTER	LETTER	KWARTO	LETTER
ME FEED	MK MATN	MI ISÆT	MA ARKM	E. INVOER	KK SYÖTÄ
MF FEED	MM MATN	MI ISÆT	MA ARKM	H.INVOER	KS SYÖTÄ
MF READY	REDO MM	MI KLAR	MAN KLAR	H. KLAAR	KSVALMIS
MONARCH	MONARCH	MONARCH	MONARCH	MONARCH	MONARCH
MP EMPTY	HM TOMT	MF TOM	FL TOM	MP LEEG	MK TYHJÄ
MP LOAD	HM LADDA	MF ILÆG	FL LAST	MP LADEN	MK TÄYTÄ

Glossary

A4

The international standard paper size (210 mm by 297 mm).

Assembly

A term used to define assembled printer components.

Baud Rate

Baud rate is the data transfer rate between the computer and the printer. The computer and the printer must be configured at the same baud rate. The rate can be set between 300 and 19,200 baud depending upon the type of computer used.

Beam Detect Mirror

This mirror is used to reflect the beginning of each Laser Beam print line into the Fiber Optics Cable. The DC Controller PCA receives the reflected Laser Beam and translates it into a $\overline{BD}$ signal.

C5

An international envelope size, also known as "ISO-C5" (162 mm by 229 mm).

Cold Reset

A Cold Reset is used to return the User Default Settings for both the Printing and the Configuration Menu back to the Factory Default Settings.

Commercial #10 (COM-10)

A standard business envelope used primarily in the United States and Canada ($4\frac{1}{8}$ by $9\frac{1}{2}$ inches).

Component
A single part of the printer that does not have any attached parts.

Configuration
Configuration is the process of specifying certain settings to allow your computer and printer to communicate properly. For example, interface selection (serial or parallel) is part of printer configuration. The printer is configured through the control panel. A computer may be configured through MODE commands in an AUTOEXEC.BAT file.

Configuration Menu
The Configuration Menu is one of two control panel menus accessed using the [MENU] key. The menu provides selection and configuration of the Auto Continue mode, the interface type (parallel or serial) and, on the LaserJet IIIP, Resolution Enhancement and Page Protection settings.

Control Panel
The main printer access panel used to modify the printer's printing and configuration settings. Usually, the computer's software application can send signals to modify these settings (lines-per-page, font type used, page orientation, etc.). Refer to Chapter 3 for more information.

Cotton Bond
Cotton bond is a type of paper which includes a certain percentage of cotton fibers. It is usually used when a high-quality paper is desired.

DC Controller PCA
The DC Controller PCA synchronizes all printer operations by monitoring and supplying voltages to all electro-mechanical assemblies inside the printer.

DL
An international envelope size, also known as "ISO-DL" (110 mm by 220 mm).

Dots-per-inch (DPI)

The number of horizontal and vertical dots produced by a printer inside the area of a square-inch. For example: the HP LaserJet IIP printer is capable of producing a dot every 1/300th of an inch in both the vertical and horizontal directions. This is how the printer achieves its 300 x 300 DPI resolution.

Downloading

Downloading refers to the process of transferring fonts stored on disk to the printer's memory.

Dual I/O Interface

The HP LaserJet IIP/IIIP printer comes with two interface ports, serial and parallel, located on the back panel. The serial port can be configured for either RS 232 or RS 422 operation.

Electro-static Discharge (ESD)

Electrical charges generated by friction that are attracted to another object. Electronic components can be permanently damaged by Electro-static Discharge.

EP-L Cartridge

The EP-L Cartridge contains the cleaning blade, the charging roller, the photosensitive drum, the developing roller, and a supply of toner. Because the drum is photosensitive, it must be protected from exposure to light. The replaceable cartridge prints an average of 3,500 pages.

Executive (EXEC)

A smaller-sized paper, primarily used in the United States and Canada for corporate communications ($7\frac{1}{4}$ by $10\frac{1}{2}$ inches).

External Fuser Access Door

The external door allows access to areas where paper may jam.

Face-Up Tray

A tray that can be attached to the front of the printer. It supports printed pages stacked in face-up, reverse order when the output tray deflector is set in the face-up position.

Factory Default Settings

Factory Default Settings refer to the control panel menu settings that are programmed into the printer at the factory.

These settings are used as defaults unless they are overridden by user control panel selections or by print commands sent through a software application. Holding down the [Alt] key and the [Reset] key simultaneously until 09 MENU RESET appears returns printing menu items to factory defaults.

Flowchart

A diagram used to provide direction through a detailed process. In Chapter 7, troubleshooting flowcharts are used to direct the Service Representative through a series of detailed problem solving processes.

Font

Fonts are collections of characters and symbols. A font is described by its symbol set, spacing, pitch, point size, style, stroke weight, and typeface. Fonts can refer to the printer's internal fonts or to fonts stored in optional font cartridges or on disks.

Font Cartridge

Font cartridges contain fonts which can supplement the printer's internal resident fonts to increase the variety of available typefaces.

Font Printout

A Font Printout is used to verify all fonts available in the printer.

Fusing Assembly

The fusing assembly contains one heated fusing roller and one pressure roller. The paper passes between the two rollers after toner has been applied. The pressure roller and fusing roller work together to bond the toner into the page.

HP-GL/2

An industry standard language for pen plotters that is integrated into the PCL 5 printer language used in the LaserJet IIIP. Allows drawing of vector (line) drawings, such as circles and rectangles.

Internal Fuser Access Door
   The internal door allows access to areas where paper may jam.

Initial Rotation Period
   The Initial Rotation period begins when the DC Controller
   PCA receives a $\overline{\text{PRNT}}$ signal from the Format Controller PCA,
   and ends when the Print period begins (see "Initial Rotation
   Period" in Chapter 5).

Job Size
   The printer formats data into an image before it physically
   picks up a sheet of paper. This image size is determined by the
   JOB SIZE. The software application usually sends a command
   (called paper size or page size) to tell the printer what size
   image to use. If no command is sent, the printer will default to
   the image size specified by the control panel JOB SIZE item. Job
   size allows selection of one of four image sizes corresponding to
   four paper sizes as well as four image sizes corresponding to
   four envelope sizes.

Laser Beam
   Amplified light waves that are concentrated by the Laser PCA
   to produce an intense, infrared (invisible) beam of light.

Laser Printing Process
   There are six stages used in the Laser Printing Process. Each
   stage must function independently and must be coordinated
   with all other printer processes (see "Image Formation System"
   in Chapter 5).

Last Rotation Period
   The Last Rotation period begins after the last line of print data
   is transmitted, and ends when the printed page is output from
   the printer (see "Last Rotation Period" in Chapter 5).

Legal
   $8\frac{1}{2}$ by 14 inch size paper, primarily used in the United States
   and Canada for printing legal documents.

Letter
   $8\frac{1}{2}$ by 11 inch size paper, commonly used in the United States
   and Canada for general purpose printing.

Menu

Menus list items that can be selected from the printer's control panel. The printer has two menus: the Printing Menu and the Configuration Menu. The Printing Menu lets you select printing defaults such as the number of copies to print and the default font. The Configuration Menu lets you select configuration items, such as parallel or serial I/O configuration.

Monarch

A standard envelope size used primarily in the United States and Canada for personal correspondence ($3\frac{7}{8}$ by $7\frac{1}{2}$ inches).

MP Size

A control panel selection item used to tell the printer the physical size of the paper you put into the Multi-Purpose (MP) tray, since the MP tray does not have paper-size sensors.

Off-Line

When the printer is *off-line*, it will not accept data from the computer. The printer is taken *off-line* by pressing the ON LINE key. When the ON LINE indicator is off, the printer is *off-line*.

On-Line

When the printer is *on-line*, it will accept data from the computer. The printer is *on-line* when the ON LINE key is clicked and the ON LINE indicator is on.

Optional Lower Cassette Base

An optional paper input device which can be attached to the printer. It comes with either a letter-size or an A4 size paper tray. Additional paper trays and an envelope tray can be purchased.

Orientation

The direction of print across a page. Printing across the width of a page is called portrait orientation printing. Printing across the longer dimension or length of a page is called landscape orientation printing. Only one orientation is allowed per page.

Output Tray Deflector

This lever, located on the upper right front side of the paper path door, is used to adjust the paper path. It selects either the *face down* (correct order) or *face-up output tray*.

Page Count

The HP LaserJet IIP/IIIP printer keeps a record of the number of pages it prints. This record is called Page Count. The LaserJet IIP and IIIP track and report the page count differently. See Chapter 3 for more information.

Page Protection

Reserving a block of printer memory to prevent 21 PRINT OVERRUN errors when composing very dense or complex graphics and/or text.

Paper Jam

Occurs when print media is stuck somewhere inside the paper path. Paper jams can be caused by: toner build-up in the fusing assembly, faulty photosensors, or worn printer parts (see "Clearing Paper Jams" in Chapter 4).

Paper Path

The path through which the paper is fed during the printing process; it begins at the paper pick-up tray and ends when the paper exits the printer at the paper output tray.

PCL

HP's page description language for printers. Used for defining a page, selecting fonts, etc. PLC 5, used in the LaserJet IIIP also includes the HP-GL/2 graphics language.

Permanent Soft Fonts

Permanent soft fonts are soft fonts downloaded into the printer's memory that remain resident there, even if the printer is reset, until the printer is powered off or the fonts are deleted by software printer commands.

Photosensitive Drum

A drum in the *EP-L cartridge* which is sensitive to both light and electrical voltages. It is used in the creation and transfer of images to the printed page.

Photosensor
A sensor that is activated when its field of vision is blocked. These sensors are used to detect doors opened or closed, the presence of paper, and the EP-L cartridge.

Primary Charging Roller
This roller is located inside the EP-L Cartridge and is used to neutralize the drum's surface and place a uniform charge on the surface of the drum. Refer to "Conditioning Stage" in Chapter 5.

Print Density
Print density refers to the relative darkness of print on the page. Very dense print appears totally black. Less dense print looks lighter and may have solid fill areas that are not totally covered. The print density can be adjusted in the HP LaserJet IIP/IIIP printer (see "Print Density Adjustment" in Chapter 4).

Print Period
The Print period begins when the DC Controller PCA receives a $\overline{\text{VDO}}$ signal from the Format Controller PCA, and ends when the last line of print data is transmitted (see "Print Period" in Chapter 5).

Print Quality
Print quality refers to the sharpness and clarity of the type or graphic on the printed page.

Printing Menu
One of two menus accessed from the printer control panel by pressing the [MENU] key. Several printing items like the number of copies to print and the number of lines per-page are selected from this menu.

Resolution Enhancement
An HP technology that improves the 300 dpi print quality standard used in the LaserJet printers.

Robust-Xon
Robust-Xon is a transmission protocol used in serial communications. When Robust-Xon is ON, the printer sends continuous ready messages to the computer, one per second.

When Robust-Xon is OFF, the printer sends only one ready message. Robust-Xon ON is the recommended setting.

Rotating Scanner Mirror
This mirror is fastened to the Scanner Motor Assembly and is used to reflect the Laser Beam onto the photosensitive drum.

Self Test
The Self Test is used to verify proper printer operation (see Chapter 3).

Service Mode
A mode of printer operation used to generate special diagnostic self test print-outs and, in the LaserJet III, to reset the page count (see "Service Mode"in Chapter 3).

Soft Font
Bitmapped or scalable fonts that can be transferred from disk to the printer's memory. Also known as downloadable fonts.

Solenoid
An electrically controlled mechanism used to control the movement of gears inside the printer.

Standby Period
When the Warm-up period is completed, the message 00 READY is displayed (see "Standby Period" in Chapter 5).

Test Print
A Test Print is used to verify proper operation of the print engine controlled by the DC Controller PCA (see Chapter 3).

Toner
Toner is a dry, powdered iron and resin substance capable of being electrically charged and attracted to areas on the revolving photosensitive drum. The HP LaserJet IIP/IIIP printer's EP-L cartridge holds the toner. The negatively charged toner is first attracted to the neutral area of the drum, then attracted to the page by the positively charged transfer roller. The toner is melted (or fused) in place by the *Fusing Assembly*.

Transfer Roller

The Transfer Roller replaces the Transfer Corona used in previous HP LaserJet printers. The Transfer Roller is electrically charged to attract the toner image from the surface of the Photosensitive Drum to the page. Improved paper handling and decreased ozone production are both benefits of the Transfer Roller system.

User Default Settings

User Default Settings are Printing Menu choices the user has selected through the control panel. They are set using the *Printing Menu* and override the factory defaults (see Chapter 3).

Warm-up Period

The Warm-up period is the time from switching the printer's power ON until the Fusing Roller temperature reaches 120° C (see "Warm-up Period" in Chapter 5).

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