LaserJet IID Printer (HP 33447)
and
LaserJet IIID Printer (HP 33459)
Combined Service Manual

HP Part No. 33459 - 90906
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Conventions

This manual uses the following conventions:

Color indicates text or graphics that is specific to the LaserJet III (HP 33449) printer. Color may also be used for emphasis, titles, and other non-HP 33449-specific material.

The names of major printer parts and assemblies are capitalized.

Bold is used for emphasis, particularly in situations where *italic* type would be confusing.

Italic type is used to indicate related documents or for emphasis.

COMPUTER type indicates text visible on the printer's display or commands as seen on a PC terminal.

(KEYFACE) indicates keys, such as (MENU), on the printer's Control Panel or on a computer keyboard.

Note

Notes contain important information set off from the text.

Caution

Caution messages appear before or after procedures which, if not observed, could result in loss of data or in damage to equipment.

Warning

Warning messages signal a specific procedure or practice which, if not followed correctly, could cause personal injury.

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1

PRODUCT INFORMATION

1-1. INTRODUCTION

This manual addresses the maintenance, repair and troubleshooting requirements of the HP 33447 (LaserJet IID) and 33459 (LaserJet IIID) Laser Printers. The focus of this manual is the hardware and mechanical aspects of the printer. This manual includes software commands as they affect testing and troubleshooting the printer. No attempt is made to include a comprehensive list of the software interfaces between the printer and the computer.

To facilate the fastest repair time, this manual is developed on the basis of a modular repair approach to troubleshooting. For both printers, the diagnostics and this manual will indentify the problem area. After identifying the problem, replace the failed assembly. Do not try to repair the failed assembly.

Repair Parts

For both printers, an exchange program for Formatter PCAs, optional memory PCAs, and the Fusing Assembly will be available. All other failed PCAs will normally be discarded when discovered to be defective. Service parts may be ordered from Hewlett-Packard's Support Materials Organization (SMO) or Parts Center Europe (PCE). Part numbers can be found in Chapter 8 of this document.

Support Materials Organization
8050 Foothills Blvd.
Roseville, California 95678
(800) 227-8164

Parts Center Europe
Wolf-Hirth Strasse 33
D-7030 Boeblingen, W. Germany

Consumables and Accessories

Consumables may be ordered from Hewlett-Packard's Direct Marketing Division (DMK) and are often available through an authorized Hewlett-Packard dealer. The telephone number for DMK is 800-538-8787 (In California: 408-738-4133).

Although they should not be used as a part of normal repair operations, more common consumable and accessory part numbers can be found in Chapter 8 of this manual. Current font cartridges, cables, and miscellaneous accessories and part numbers can be obtained by calling the DMK number above and requesting a current catalog.

RELATED DOCUMENTATION

The following documents provide additional information about the HP 33447 and HP 33459 printers:

HP 33447

Shipped with printer:

- *Your Road Map to Getting Started With Your LaserJet IID Printer* (P/N 33447-90908).
- *LaserJet IID Printer User's Manual* (P/N 33447-90901). (English language version.)
- *LaserJet IID Printer Technical Reference Manual* (P/N 33447-90905).

Additional information:

- *Self-Paced Training Guide and Final Review* (P/N 33459+59A-90107).

HP 33459

Shipped with printer:

- *Your Guide to Setting up Your LaserJet IIID* (P/N 33459-90905); included here as Appendix B.
- *LaserJet IIID Printer User's Manual* (P/N 33459-90901). (English language version.)

- *LaserJet IIID Software Application Notes* (P/N 33459-90917). (U.S. only.)
- *LaserJet IIID User's Quick Reference Guide* (P/N 33459-90902).

Additional information:

- *Self-Paced Training Guide and Final Review* (P/N 33459+59A-90107).
- *PCL5 Printer Language Technical Reference Manual* (P/N 33459-90903).

1-2. IDENTIFICATION

The regulatory labels, located behind the Face-Up (Rear) Output Tray, are different for the HP 33447 and HP 33459. For the HP 33447, the regulatory label contains both the model and serial number. On the HP 33459, the model and serial number are located on a separate label just below the power connector on the right side panel of the Main Body Covers (see Figure 1-1). Note that this portion of the right side panel is removable on the HP 33459. *Ensure that the printer's cover, with its serial number, stays with the printer.* The model number is an alphanumeric such as HP 33447A or 33459AB.

For both printers, the serial number consists of the following sequence: a four digit prefix, a letter, and a five digit suffix (for example: 0000J00000). The prefix is used to indicate year and week of manufacture. The letter designates the country in which the printer was manufactured ("J" indicates Japan, for example). The suffix is a sequential number incremented for each printer produced.

For both printers, the power rating is located on a plate next to the Power Switch (see Figure 1-1). The HP 33447A and HP 33459A (50/60 Hz) have a transformer that automatically adjusts for 100 or 115 volts; the HP 33447AB/AU and HP 33459AB (50 Hz) automatically adjust for 220 or 240 volts.

Note

Printers configured for 115 volt, 50/60 Hz operation cannot be modified for 220/240 volt, 50 Hz operation. The opposite is also true. Printer model numbers HP 33447AB/AU or HP 33459AB cannot be modified to operate as HP 33447A or HP 33459A printers.

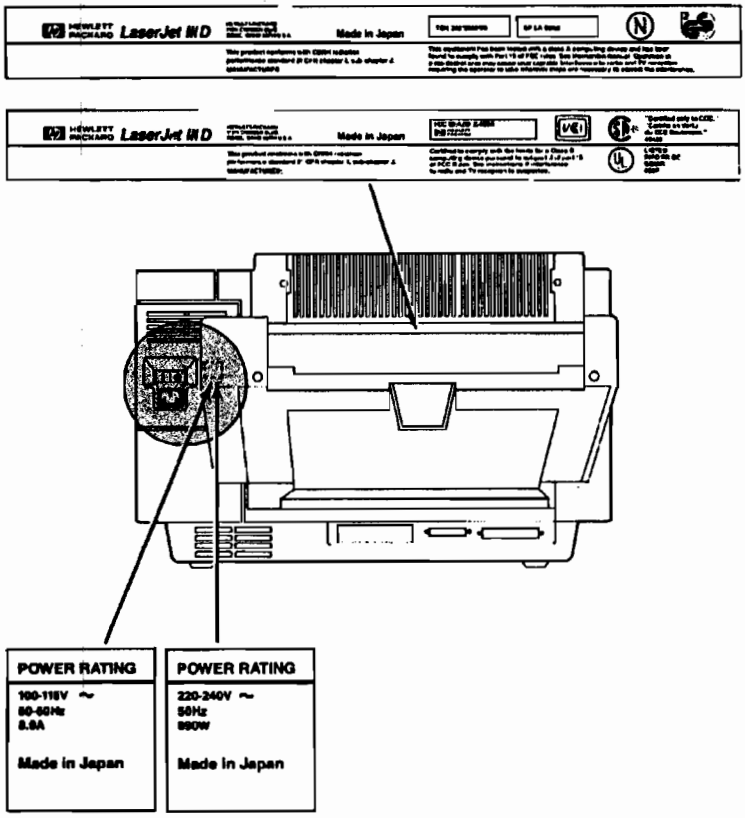


Figure 1-1. Printer Identification and Power Rating

1-3. SPECIFICATIONS

Physical Dimensions

Table 1-1. Physical Dimensions

Specification	HP 33447	HP 33459
Width	45.4 cm (17.9 in.)	46.0 cm (18.1 in.)
Depth (body only)	62.5 cm (25.0 in.)	67.5 cm (26.4 in.)
Depth (with letter tray)	88.8 cm (35.0 in.)	85 cm (33.2 in.)
Height	31.3 cm (12.3 in.)	34.5 cm (13.5 in.)
Weight*	32.5 kg (72 lbs)	34.5 kg (75.9 lbs)
*Includes power cord, 2 empty letter-size paper trays, EP-S Cartridge, and printer.		

Electrical Specifications

Table 1-2. Electrical Specifications*

Specification	HP 33447A HP 33459A	HP 33447AB/AU HP 33459AB
Voltage	100 V or 115 V ± 10%	220 V or 240 V ± 10%
Frequencies	50 or 60 Hz ± 2 Hz	50 Hz ± 2 Hz
Current, Steady State	9.4 A at 100 V 8.2 A at 115 V	3.4 A at 220 V 3.1 A at 240 V
Power, Maximum	940 Watts at 115 V 3200 BTU/hr	850 Watts at 220 V 2900 BTU/hr
Power, Standby	170 Watts at 115 V 580 BTU/hr	170 Watts at 220 V 580 BTU/hr
* With no accessories installed.		

Environmental Specifications

Table 1-3. Environmental Specifications

Environmental Factor	Condition	* HP 33447 and HP 33459
Temperature	Operating: *Storage:	10 to 32.5°C (50 to 91° F) 0 to 35° C (32 to 95° F)
Humidity	Operating: *Non-Operating:	20 to 80% RH 10 to 80% RH
Altitude	Operating: *Non-Operating:	0 to 4600m (0 to 15000 ft) 0 to 15,000m (0 to 49200 ft)
Audible Noise	Printing: Standby:	5.8 B L_{WAd} (1 B = 10 dB) 42.9 dB L_{PAm} (at 4 positions) 5.0 B L_{WAd} (1 B = 10 dB) 33.3 dB L_{PAm} (at 4 positions)
* Printer only, not EP-S Cartridge. See Chapter 2, Section 2-3 for EP-S Cartridge.		

1-4. SAFETY AND RELATED INFORMATION

General

The HP 33447 and HP 33459 printers are UL 478 listed, CSA 22.2 154 certified, and manufactured in accordance with DIN IEC 380/IEC 435. Where necessary, warning labels are affixed to the printer wherever special service attention is needed.

Warning

Because the printers contain potentially hazardous voltages, power should be removed before working on the printers.

Laser Safety

Both printers are certified as Class 1 laser products 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 they do not produce hazardous laser radiation. Both printers also comply with the Center for Devices and Radiological Health (CDRH) regulations. Since laser light emitted inside the printer is completely confined within protective housings and external covers and further contained by an interlock system, 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 since August 1, 1976. Compliance is mandatory for products marketed in the United States. The label below (see Figure 1-2) indicates compliance with CDRH regulations and must be attached to laser products marketed in the United States. European models all comply with or meet IEC 825 for laser safety.

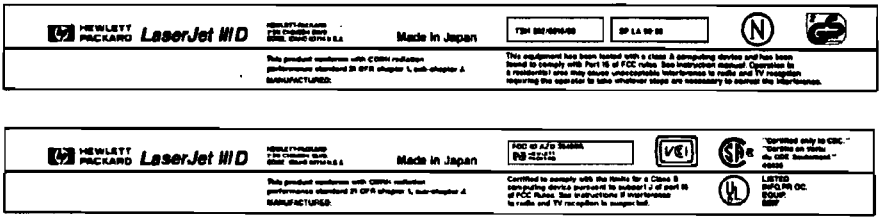


Figure 1-2. Printer Regulatory Labels

Warning

When servicing or adjusting the printer's optical system, do not place screwdrivers or other shiny objects in the path of the laser beam. Although invisible, the reflected beam can cause permanent eye damage.

Where there is danger of exposure to laser radiation, the following label is attached inside printer covers:

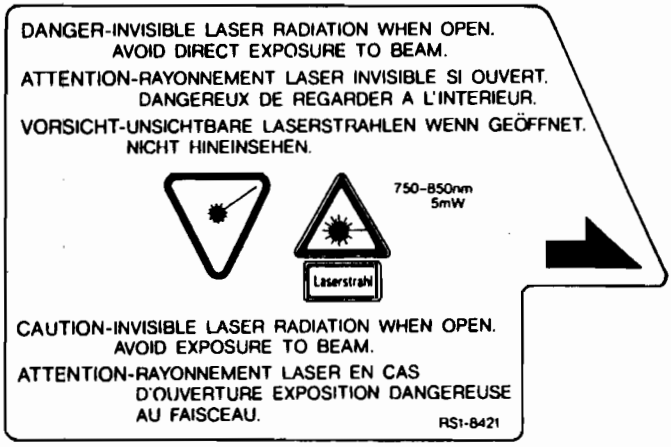


Figure 1-3. Laser Safety Label Example

Finnish Laser Statement

The following notice is required to be printed in Finnish.

T U R V A L L I S U U S Y H T E E N V E T O

LASERTURVALLISUUS

VARO! Avattaessa ja suojalukitus ohitettaessa olet alttiina näaymäattömäalle lasersäateilylle. lä katso säteeseen.

VARNING! Osynlig laserstrlning när denna del är öppnad och spärren är urkopplad. Betrakta ej strlen.

Figure 1-4. Finnish Laser Statement

German ZZF Declaration

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

Funkentstörung Deutschland
Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät HP 33447 oder HP 33459 in Übereinstimmung mit den Bestimmungen von *Postverfügung 1046/84* funkentstört ist.

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

Wird das 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.

Figure 1-5. German ZZF Declaration

FCC Regulations

Federal Communications Commission (FCC) Radio Frequency Interference (RFI) Statement

This equipment generates and uses radio frequency energy. If not installed, serviced, and used properly (that is, in strict accordance with the manufacturer's instructions), it may cause interference to radio and television reception. The equipment has been type tested and found to comply within the limits set for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation.

Note

Use of a shielded interface cable is required for compliance to fall within the Class B limits in Subpart J of Part 15 of FCC rules.

No guarantee can be given that interference with radio or television reception will not occur in a particular installation. If this equipment does cause interference – which can be determined by turning the equipment off and on – try to correct it by using the following measures:

- Reorient the radio or television antenna.
- Reorient the device with respect to the radio or television receiver.
- Move the device away from the receiver.
- Plug the device into a different outlet so it is on a different branch circuit than the receiver.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions. The Federal Communications Commission has prepared a booklet entitled *Interference Handbook* (1986) (stock number 004-000-004505-7) which may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Ozone Emission

General

The corona assemblies 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 actually printing (i.e., while the corona assembly is energized). Underwriters Laboratory (UL) has established a standard for ozone emissions. All LaserJet 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 employer should provide a work environment that meets the following standards:*

- A person may not be exposed to an average concentration of greater than 0.1 part per million (PPM) of ozone for a period of eight hours.
- At this time, the American Conference of Governmental Industrial Hygienists (ACGIH) has proposed a ceiling limit of 0.1 PPM for ozone.

Recommendations for Minimizing Ozone Exposure

Almost all ozone concerns arise from abnormal site or operating conditions. The following conditions may generate an ozone complaint:

- Multiple laser printers in a confined area.
- Extremely low relative humidity.
- Poor room ventilation.
- Printer exhaust port directed toward the faces of personnel.
- Existing Ozone Filter in need of replacement (see Chapter 4, section 4-6).
- Long, continuous printing combined with any of the above conditions.

Inspect your work environment for the operating conditions listed above if you believe ozone emissions are a problem in your area. Some people may be extremely sensitive to ozone odor. If this situation is encountered, it is advisable to position the printer away from the sensitive user.

Toner Safety and Care

Toner is a nontoxic substance composed of plastic, iron, and a small amount of pigment. Care should be taken to avoid breathing toner particles. To clean toner from skin and clothing, remove as much toner as possible with a vacuum or dry tissue wipes, then wash the toner from skin or clothing with *cold* water. Hot water makes toner very difficult to remove. Because toner tends to be degraded by vinyl materials, contact with vinyl, such as in a typical 3-ring binder, should be avoided.

1-5. WARRANTY STATEMENT

Warranty

This warranty gives you specific legal rights. You may also have other rights which vary from state to state or province to province.

One-Year Limited Warranty

Hewlett-Packard warrants its computer hardware products against defects in materials and workmanship for a period of one year from receipt by the end user. During the warranty period, HP will, at its option, either repair or replace products which prove to be defective.

Should HP be unable to repair or replace the product within a reasonable amount of time, a refund of the purchase price may be given upon return of the product.

Exclusions

The warranty on your LaserJet IIID printer shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer.
- Customer-supplied software or interfacing.
- Unauthorized modification or misuse.
- Operation outside of the environmental specifications for the product.
- Operation of non-supported printing media.
- Duty cycle abuse (see note below).
- Operating the printer from a mechanical switchbox without a designated surge protector.
- Improper site preparation and maintenance.
- Damage from use of non-Hewlett-Packard EP-S Cartridges, memory boards, or interface boards.

Note

Operation of the printer beyond the limit of its duty cycle (printing greater than the equivalent of 16,000 (HP 33447) or 20,000 (HP 33459) single-sided pages per month) shall be deemed printer abuse and all repairs thereafter will be billed on a time and materials basis.

The warranty period begins either on the date of delivery or, where the purchase price includes installation by Hewlett-Packard, on the date of installation.

Your LaserJet II-D printer must be serviced by one of the authorized repair depots within the country of original purchase. Customer shall prepay shipping charges and shall pay all duty and taxes for products returned for service. Except for products returned to the customer from another country, Hewlett-Packard shall pay for return of products to the customer. If the unit is repaired by an authorized dealer, you will need to negotiate the method and cost of returning the unit with the dealer.

You may convert the one-year warranty on your HP LaserJet IID to a 90-day on-site service agreement any time within 90 days of purchase. *Your HP LaserJet IIID has a one year on-site service warranty.* Contact your dealer or HP Sales Representative for details regarding this option.

Warranty Limitations

The warranty set forth above is exclusive and no other warranty, whether written or oral, is expressed or implied. Hewlett-Packard specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. However, any implied warranty of merchantability or fitness is limited to the one-year duration of this written warranty.

Service During the Warranty Period

If your LaserJet IID should fail during the warranty period, bring the equipment to an authorized HP Dealer Repair Center or send the equipment to one of the HP Field Repair Centers.

If your LaserJet IIID should fail during the warranty period, call your Authorized HP Service provider.

When sending equipment to an HP Field Repair Center or Dealer Repair Center, follow the instructions in the repacking guidelines. Also, complete and enclose the Service Information Form beginning on page 8-9 (HP 33459 only) of the *User's Manual.* Insuring the equipment for shipment is recommended.

Warning

Shipping damage as a result of inadequate packaging is the customer's responsibility. Use the original packing materials whenever possible.

Service After the Warranty Period

If your hardware fails after the warranty period, contact an Authorized HP Dealer Repair Center. If you have an HP Maintenance Agreement, request service under your agreement.

When sending equipment to an HP Field Repair Center, follow the repacking guidelines (listed in the *User's Manual*). Also, complete and enclose the Service Information Form (in the *User's Manual*) and enclose a copy of proof of purchase. Insuring the equipment for shipment is recommended.

Repacking Guidelines for Returning Your Printer

- Remove any font cartridges installed in the printer.
- Remove the EP-S Cartridge and the Fuser Cleaning Pad.
- Remove any non-HP accessories and memory boards (if installed).
- Remove paper trays, but include them in the box with the printer.
- Use the original shipping container and packing materials, if possible.
- Include the completed Service Information Form. Include print samples which illustrate the problems you are having, if applicable.
- Include 50-100 sheets of any problem paper or forms, if possible.
- Remove and retain the power cord.

Note

If you have already disposed of your printer's packaging material and are unable to locate another package, the packaging can be ordered from HP's Support Materials Organization at the following phone numbers:

United States:	800-227-8164
Canada:	416-678-9430

Ask for part number 33447-00908 for the HP 33447 or 33459-00908 for the HP 33459. The proper packaging material (box and inserts) will be sent to you for a nominal charge.

2

SITE PLANNING AND REQUIREMENTS

2-1. INTRODUCTION

HP 33447 and HP 33459 printers are carefully adjusted and inspected before they are shipped. To maintain the performance level set at the factory, correct selection of a location is important. The service representative should fully understand the functions of the printers to ensure selection of a suitable location.

2-2. SITE REQUIREMENTS

The HP 33447 and HP 33459 printers are designed to operate in a clean environment, preferably in an area not subject to excessive mechanical shock, vibration, or a wide range of temperatures. Although air conditioning and power conditioning are not required to ensure reliable operation, the environmental specifications listed in Chapter 1, Section 1-3, should not be exceeded.

The following suggestions should be taken into consideration prior to installation:

- The printer should not be installed near water faucets, humidifiers, refrigerators, or similar devices that affect the environment. A location where the temperature changes abruptly, such as near an air conditioner, should also be avoided.
- The printer should not be exposed to open flames, dust, ammonia fumes, and direct sunlight or other excessively bright light source at anytime.
- The room should be well ventilated.
- The printer should be installed on a sturdy, level surface.
- Sufficient space should be provided to permit unimpeded printer operation and adequate ventilation (see Figure 2-1).

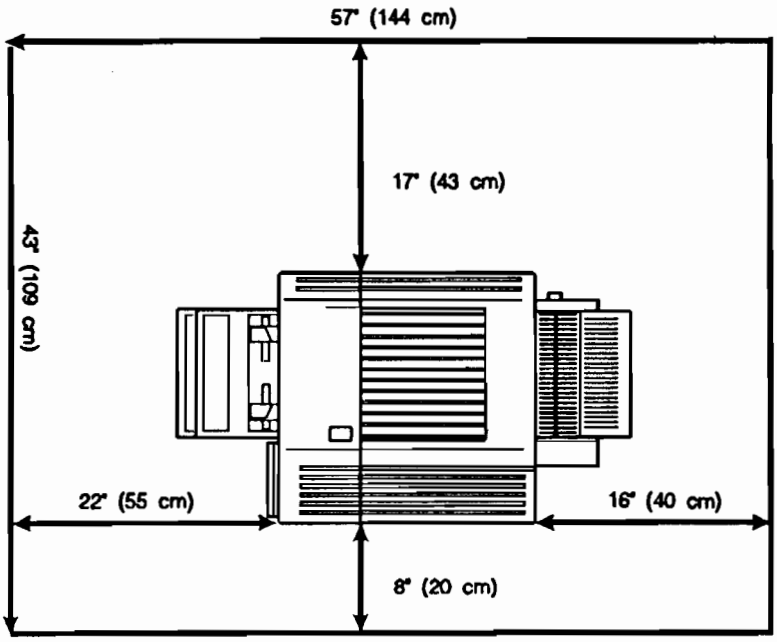


Figure 2-1. Printer Space Requirements

2-3. STORING EP-S CARTRIDGES

The EP-S Cartridge can be adversely affected by the environment and time. Careful attention should be given to the following information about storing and handling cartridges.

Note

The expiration date specified on the cartridge box is 2.5 years (storage time plus use time) after the date of manufacture, assuming an intact storage bag. If the bag is broken, the maximum storage-plus-usage time is six months.

Storage with Packaging Intact

Under warehouse conditions, be sure the storage area meets the conditions in Table 2-1.

Table 2-1.
EP-S Cartridge Storage Conditions With Packaging Intact

Category	Temperature	Humidity
Normal Conditions (2 Years)	0° to 35°C	35 to 85% RH
Severe Conditions (18 Days)	High: 35° to 40°C Low: −20° to 0°C	High: 85 to 95% RH Low: 10 to 35% RH
Maximum Temperature Change (3-Minute Period)	High: 40° to 15°C Low: −20° to 25°C	n/a

Storage After Opening Packaging

The drum in the EP-S Cartridge uses a photosensitive organic coating that deteriorates when exposed to strong light. The toner in the EP-S Cartridge can also be affected by the environment. For these reasons, the customer must be fully informed about the correct method for storing and handling the cartridge. *The EP-S Cartridge must be fully used within six months after it has been removed from its packaging* or the toner becomes unstable and print quality will degrade.

Storage Conditions

1. Do not place cartridges in direct sunlight or near a window. Also, do not leave them inside an automobile for a long period of time in warm weather. (These conditions apply even if the cartridge is still in its package.)
2. Avoid locations subject to abrupt changes in either temperature or humidity, such as near an air conditioner.
3. Do not store cartridges in dusty locations and avoid exposure to ammonia gas or other organic solvent vapors.
4. **Never expose the cartridge to temperatures above 40° C (104° F).**

3

INSTALLATION AND CONFIGURATION

3-1. INTRODUCTION

Proper installation is important to maintain printer performance at the level set at the factory. The service representative should fully understand the operating environment parameters of the printer to ensure that it is properly installed in a suitable location (see Chapters 1 and 2).

A thorough knowledge of the Control Panel is necessary to understand default settings, restart routines, and the font and other printouts—as well as to use the Printing and Configuration Menus, run self tests, and use the service mode.

Since their physical appearance is quite similar, the HP 33459 has generally been used to represent both printers. If there is a significant difference, appropriate instructions for both printers have been added.

3-2. INSTALLATION

Hardware Installation

Ensure that the printer's site environment meets all the specifications in Chapter 1 and Chapter 2.

Interface Cabling

Typical cabling diagrams for both serial and parallel (Centronics) configurations can be found in the chapter seven. HP part numbers for cables used in MS-DOS environments can be found in chapter eight.

Configure the Control Panel For a Serial Interface

Step	Press:	Printer Displays: (If not, press + or - until it does, then press the Enter key)
1	On Line	00 READY (The On Line indicator goes out.)
2	Menu (Press for approximately 5 seconds.)	AUTO CONT = OFF*†
3	Menu	I/O = PARALLEL*†
4	+ (Plus) or - (Minus)	I/O = SERIAL
5	Enter	I/O = SERIAL*
6	Menu	SERIAL = RS-232*†
7	Menu	BAUD RATE = 9600*†
8	Menu	ROBUST XON = ON *†
9	Menu	DTR POLARITY = HI*†
10	On Line	00 READY (The On Line indicator comes on.)

* Indicates item has been selected and saved
† Indicates the factory default

Figure 3-1. Printer Interface Setup

Step	Press:	Printer Displays: (If not, press + or - until it does, then press the Enter key)
1	On Line	00 Ready (Tha On Line indicator goes out.)
2	Menu (Press for approximately 5 seconds.)	AUTO CONT = OFF*†
3	Menu	I/O = PARALLEL*†
4	On Line	00 READY (The On Line indicator comes on.)

* Indicates item has been selected and saved
† Indicates the factory default

3-3. USING THE CONTROL PANEL

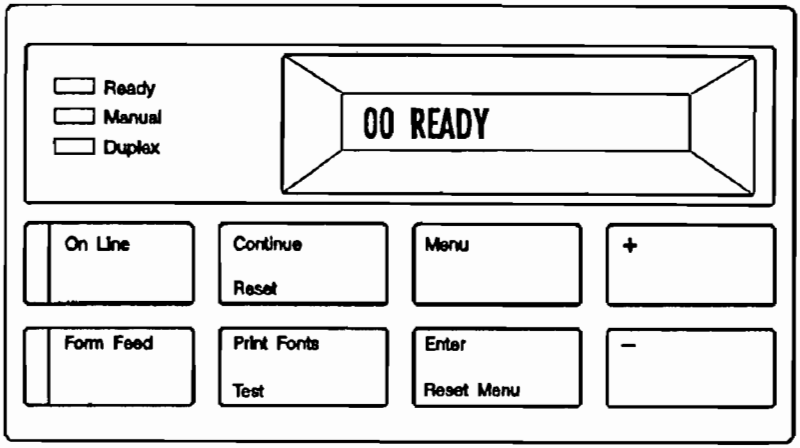
Overview

Control Panel operation for the HP 33447 and HP 33459 printers is quite similar. Although the HP 33447 uses a membrane-type keypad and the HP 33459 uses a set of raised keys with a slightly different arrangement (see Figure 3-2), the keys and indicators as well as most of the functions displayed are the same.

The HP 33459 adds the following features:

- **Localization**: Five languages (English, French, German, Italian, and Spanish) can be chosen for display, self test, and font printout messages.
- **Expanded Symbol Sets**: An expanded list of symbol sets is offered. Symbol set selection appears in the Printing Menu.
- **Scalable Typefaces**: Pitch or point size can be selected from the printing menu.
- **Resolution Enhancement**:TM This HP proprietary technology improves the visual quality of printed images beyond the 300 dpi standard.
- **Page Protection:** This feature, with the addition of at least 1 Mbyte of expansion memory, reserves additional memory to ensure that an entire page will be printed, regardless of its complexity.

Note that, for both printers, some keys have a lower function label which indicates a second or, for some keys, a third functional level. Pressing keys briefly accesses the top level of Control Panel functions. Holding down keys for a number of seconds accesses a second or third level of Control Panel functions. Remember that, with the exception of the [ON LINE] key, *the printer must be off-line to use the Control Panel.*



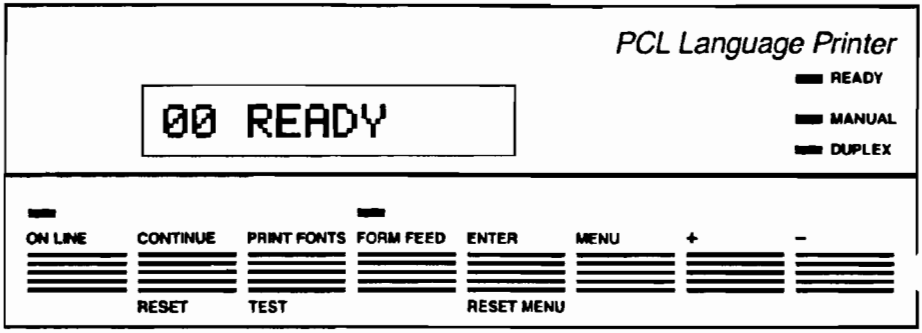


Figure 3-2. control Panels

Control Panel Functional Description

The HP 33447 and HP 33459 operator control panels consist of eight keys, one green LED indicator (READY), four amber LED indicators (ON LINE, FORM FEED, MANUAL, DUPLEX), and a one-line by 16-character LCD display.

The following control panel map provides a guide for setting up the front panel to print a standard document. Refer to the appropriate user's manual for a detailed description of the function of each key.

Press MENU key ⇒	1 times	2 times	3 times	4 times	5 times	6 times	7 times	8 times	9 times	10 times
Display reads ⇒	COPIES=1*	FONT SOURCE=I*	FONT NUMBER=1*	DUPLEX=OFF*	TRAY=BOTH*	PAPER=LETTER*	ORIENTATION=P*	FORM=60 LINES*	MANUAL FEED=OFF*	SYM SET=ROMAN-8*
Press ⇒	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)
Choices ⇒ *(press ENTER to save)*	COPIES=2 to COPIES=99	FONT SOURCE=L† FONT SOURCE=R† FONT SOURCE=S†	FONT NUMBER=2 to FONT NUMBER=24	DUPLEX=ON *(if ON press MENU again for next selections)* BIND=LONG EDGE* BIND=SHORT EDGE	TRAY=UPPER TRAY=LOWER	PAPER=LEGAL PAPER=A4 PAPER=EXEC ENVELOPE=COM10 ENVELOPE=MONARC ENVELOPE=C5 ENVELOPE=DL	ORIENTATION=L	FORM=5 LINES to FORM=128 LINES	MANUAL FEED=ON	ECMA-94 (Latin 1) PC-8 PC-8 DN (Denmark/Norway) PC-850 LEGAL ISO-2 (Intl. Reference Ver.) ISO-4 (United Kingdom) ISO-6 (ASCII) ISO-10 (Swedish/Finnish) ISO-11 (Swedish) 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 v1) ISO-61 (Norwegian v2) ISO-69 (French) ISO-84 (Portuguese - PC) ISO-85 (Spanish - PC) GERMAN (HP) SPANISH (HP)

* Indicates the factory default.

† Depends on the presence of a cartridge or soft font.

– Printer must be off line

Press and hold the MENU key approximately 7 seconds	1 time	press again momentarily
Display reads ⇒	AUTO CONT=OFF*	I/O=SERIAL*
Press ⇒	+ (plus) or - (minus)	+ (plus) or - (minus)
Choices ⇒ *(press ENTER to save)*	AUTO CONT=ON	I/O=PARALLEL I/O=OPTIONAL

IF SERIAL IS SELECTED

Press MENU key again ⇒	1 time	2 times	3 times	4 times (SERIAL=232 only)
Display reads ⇒	SERIAL=RS-232*	BAUD RATE=9600*	ROBUST XON=ON*	DTR POLARITY=HI*
Press ⇒	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)	+ (plus) or - (minus)
Choices ⇒ *(press ENTER to save)*	SERIAL=422	BAUD RATE=300 BAUD RATE=600 BAUD RATE=1200 BAUD RATE=4800 BAUD RATE=19200	ROBUST XON=OFF	DTR POLARITY=LO

Figure 3-3. Control Panel Display Map

Default Settings and Restart Routines

Default Settings

The printers originally ship with factory default settings as specified in table 3-1. The factory default menu settings remain in effect until altered by using the Control Panel menu selection.

Note that all default Printing Menu settings can be overridden using software commands and remain in effect until a subsequent printer reset or Control Panel Reset (07 RESET) is performed. These software commands do not alter the menu settings. Note also that software commands cannot override Configuration Menu settings.

Factory defaults are permanently stored in the printer's ROM memory and can be used to set Printing and Configuration Menu settings in NVRAM. The printer will use these default settings until they are changed using the Control Panel or overridden by sending printer commands through software. Both Printing and Configuration Menu settings can be returned to factory default settings using the COLD RESET routine. For both printers, performing the RESET MENU routine will reset all Printing Menu settings to the factory defaults shown in Table 3-1.

Table 3-1. Factory Default Settings

Item (Display)	HP 3[illegible]	HP 3[illegible]
Number of Copies (COPIES=)	01	1
Font Source (FONT SOURCE=)	I (Internal)	I (Internal)
Font Number (FONT NUMBER=)	0	0
Pitch (PITCH=) or Point Size (PT. SIZE=)	PITCH 10.00 or POINT SIZE 12.00	PITCH 10.00 or POINT SIZE 12.00
Paper Size (PAPER=)	LETTER/A4	LETTER/A4
Orientation (ORIENTATION=)	PORTRAIT	PORTRAIT
Form (lines/page) (FORM=)	60	60
Manual Feed (MANUAL FEED=)	OFF	OFF
Symbol Set (SYM SET=)	ROMAN-8	ROMAN-8
Auto Continue (AUTO CONT=)	OFF	OFF
I/O (I/O=)	SERIAL	PARALLEL
Serial (SERIAL=)	RS-232	RS-232
Baud Rate (BAUD RATE=)	9600	9600
Robust XON (ROBUST XON=)	ON	ON
DTR Polarity (DTR POLARITY=)	HI	HI
RET (RET=)	n/a	DARK
Page Protect (PAGEPROTECT=)	n/a	OFF
Display Language (LANGUAGE=)	n/a	ENG (English)

Envelope Cassette Size Setting

Whenever an envelope tray is inserted in the printer, the Control Panel will display ENVELOPE= (HP 33447) or PE TRAY= (HP 33459). The envelope tray was designed for a variety of envelope sizes and the Control Panel setting establishes the printable area for four common sizes. These are MONARCH, C5, DL, or COM10. The first time an envelope tray is inserted in the printer, this message will read ENVELOPE=COM10* or PE TRAY=COM10* (the asterisk indicates the current default choice). If an envelope size different from COM10 is being used, the (+) and (-) keys should be used to display the available choices. When the (ENTER) key is used to make the desired selection, this choice becomes the new default value. This means that, when an envelope tray is inserted in the printer, the display will read from that time forward: ENVELOPE/PE TRAY=[selected choice]*.

For the *HP 33459 only*, note that if an alternate selection is not made within 10 seconds after inserting the envelope tray, the printer will return to an on-line condition using COM10 (or other previously selected envelope size setting) as its expected envelope size. To alter this setting, the envelope tray should be removed and reinstalled, and the selection procedure repeated within 10 seconds of reinstallation. In contrast, the **HP 33447** printer will remain in an off-line condition until explicitly placed on line by the user after insertion of an envelope tray.

Keep in mind that this setting is completely independent of any Printing Menu item selection. This means that, for example, although the paper/envelope size in the Printing Menu of the HP 33459 may have been changed to ENVELOPE=C5, insertion of an envelope tray will yield the same PE TRAY=[envelope size] message, where the displayed envelope size may not necessarily be C5. If C5 envelopes are indeed loaded in the envelope tray, the user must notify the printer of this fact at the time the tray is installed. Once selected, however, each subsequent time the envelope tray is installed, PE TRAY=C5* (in our example) will be displayed as the new default value.

For both printers, once set, the envelope tray size setting will not be altered by any other procedure than the one just discussed. Not even a COLD RESET routine will modify this setting.

Resetting the Printer

The printer can be reset in three different ways:

- Pressing the (CONTINUE/RESET) key until 07 RESET is displayed resets the printer to the values the user has selected through the Printing Menu.
- Pressing the (ENTER/RESET MENU) key until 09 MENU RESET is displayed resets the printer and all Printing Menu items to the factory default settings.
- Performing a COLD RESET (or "Cold Start") operation resets the printer and menu items to factory default Printing and Configuration Menu settings. (See "Cold Reset Routine".)

Most software automatically sends a RESET command before and after each job. With some software packages, this command may need to be sent by the user from the computer or a Control Panel RESET routine may need to be performed before sending a new job to the printer. Resetting the printer ensures that the Printing Menu settings from the Control Panel are used. If these settings are changed often or if printer commands that affect page format are sent, the printer may need to be reset to make sure that the desired settings are in use. (Note: any temporary fonts and temporary macros are also cleared when resetting the printer.)

Ordinarily, software will perform any necessary printer reset for the user. *Note that a Control Panel reset will clear (rather than print) any buffered data in the printer's memory.*

Reset Menu Routine

Holding down the (RESET MENU) key at least two seconds until 09 MENU RESET is displayed returns Printing Menu settings to factory default settings and puts these settings in effect. It also clears temporary soft fonts, temporary macros, and any stored page data.

Cold Reset Routine

A "COLD RESET" returns all Printing Menu and I/O Configuration Menu items to their factory default settings. "COLD RESET" does not reset the page count or envelope cassette size (or, for the HP 33459, display language) settings which are also stored in non-volatile

RAM. A "COLD RESET" is performed by holding down the (ON LINE) key while powering on the printer. 08 COLD RESET (not localized for HP 33459) is displayed for one second, followed by the power-on SELF TEST message. The actual "COLD RESET" is performed immediately after the display shows 00 READY, and, afterward, the printer must be put on line by the user. Since I/O configuration values have been reset to factory defaults, proper settings should be verified before placing the printer on line.

3-4. FONT PRINTOUTS

Understanding the Font Printout

Font printouts for the HP 33447 and HP 33459 are different although the printout procedure is basically the same:

1. Take the printer off line, then briefly press the (PRINT FONTS/TEST) key.
2. The message, 06 FONT PRINTOUT, will appear and several pages will be printed. (HP 33459 only: *thirty seconds may elapse between pages to allow time for the generation of any scalable characters.*)

HP 33447: The numbered items below refer to Figure 3-4.

1. **Font ID** is the number the printer uses to select internal fonts, cartridge fonts, or downloadable soft fronts from the Control Panel. (Note: this is *not* a soft font ID number used by software.) The letter preceding the font number indicates the location of the font.

   S = Permanent soft font, residing in printer memory.
   R = Fonts in the right font cartridge.
   L = Fonts in the left font cartridge.
   I = Internal printer fonts.

2. **Name** is the name of the typeface (e.g., COURIER).
3. **Pitch** shows the characters-per-inch of a fixed pitch font or "PS" for proportionally spaced fonts.
4. **Point Size** refers to the character's height (72 points per inch, 28.3 per centimeter).

5. **Symbol Set** refers to the specific collection of characters and symbols associated with a font.

6. **Print Sample** shows what the font characters look like.

HP 33459: The numbered items below refer to Figure 3-5.

The HP 33459 printout displays 11 columns of information in the localized language.

1. **Font #** is the number the printer uses to select internal fonts, cartridge fonts, or downloadable soft fronts from the Control Panel. (Note: this is *not* a soft font ID number used by software.) The letter preceding the font number indicates the location of the font.

   S = Permanent soft font, residing in printer memory.
   R = Fonts in the right font cartridge.
   L = Fonts in the left font cartridge.
   I = Internal printer fonts.

Note

For the HP 33447, **Font ID** is the equivalent of **Font #** for the HP 33459.

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2. **Font ID** is an ID number assigned only to permanent soft fonts downloaded from the host system and selected by software.

3. **Symbol Set** refers to the specific collection of characters and symbols associated with a font. Internal and cartridge scalable fonts will only be shown in the symbol set selected on the Control Panel.

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

5. **Pitch (cpi)** shows the characters-per-inch of a fixed pitch font. (If the font is a scalable, fixed-spaced font, "Scale" will appear in this column.)

6. **Point Size** refers to the character's height (72 points per inch, 28.3 per centimeter). (If the font is a scalable, proportional-spaced font, "Scale" will appear in this column.)

7. **Style** indicates whether the font is upright or italic.

8. **Stroke Weight** is a font treatment such as medium, bold, light, or black.

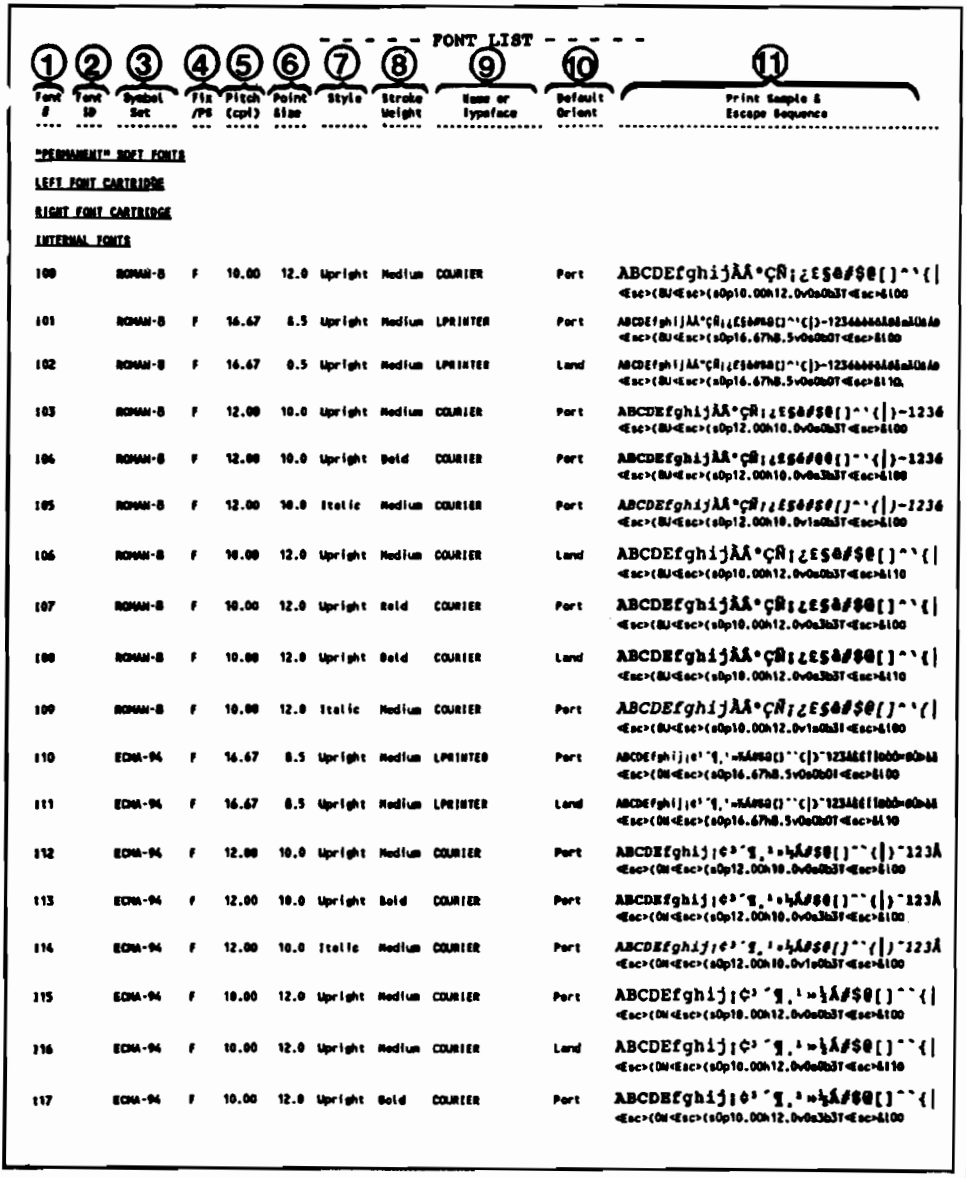
9. **Name or Typeface** is the name of the typeface.

10. **Default Orient** indicates whether the font defaults to either portrait or landscape orientation. (Note that the HP 33459 printer, unlike the HP 33447, can rotate fonts to the orientation selected by the software, even if the font is not resident in the printer in that orientation.) Fonts produced from scalable typefaces are only listed in the portrait orientation.

11. **Print Sample and Escape Sequence.** *Print sample* shows what the characters look like. *Escape sequence* is an actual printer command sequence used to select the designated font.

Symbol Sets

A symbol set is usually selected during initial printer configuration. If a new default symbol set is selected from the appropriate menu, it will cause the font selection menu item to revert to FONT NUMBER=0. This is done because the printer places all fonts in the selected symbol set at the top of its font list and reassigns font numbers. If, after specifying a new default symbol set, font 0 is not the desired default font, a new Print Fonts routine should be performed and a new default font selected from the resulting printout See the User's manual or the Technical Reference Manual for more information on symbol sets and font selection.



- - - - - FONT LIST - - - - -

① Font #	② Font ID	③ Symbol Set	④ Fix /PS	⑤ Pitch (cpi)	⑥ Point Size	⑦ Style	⑧ Stroke Weight	⑨ Name or Typeface	⑩ Default Orient	⑪ Print Sample & Escape Sequence
"PERMANENT" SOFT FONTS										
LEFT FONT CARTRIDGE										
RIGHT FONT CARTRIDGE										
INTERNAL FONTS										
100	ROMAN-8	F	10.00	12.0	Upright	Medium	COURIER	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{| <Esc>(8U<Esc>(s0p10.00h12.0v0s0b3T<Esc>&l00
101	ROMAN-8	F	16.67	8.5	Upright	Medium	LPRINTER	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{}-1234àáâäçèéêëìíîïñòóôöùúûüßÀÁ <Esc>(8U<Esc>(s0p16.67h8.5v0s0b0T<Esc>&l00
102	ROMAN-8	F	16.67	8.5	Upright	Medium	LPRINTER	Land	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{}-1234àáâäçèéêëìíîïñòóôöùúûüßÀÁ <Esc>(8U<Esc>(s0p16.67h8.5v0s0b0T<Esc>&l10
103	ROMAN-8	F	12.00	10.0	Upright	Medium	COURIER	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{|}~1236 <Esc>(8U<Esc>(s0p12.00h10.0v0s0b3T<Esc>&l00
104	ROMAN-8	F	12.00	10.0	Upright	Bold	COURIER	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{|}~1236 <Esc>(8U<Esc>(s0p12.00h10.0v0s3b3T<Esc>&l00
105	ROMAN-8	F	12.00	10.0	Italic	Medium	COURIER	Port	*ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{|}~1236* <Esc>(8U<Esc>(s0p12.00h10.0v1s0b3T<Esc>&l00
106	ROMAN-8	F	10.00	12.0	Upright	Medium	COURIER	Land	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{| <Esc>(8U<Esc>(s0p10.00h12.0v0s0b3T<Esc>&l10
107	ROMAN-8	F	10.00	12.0	Upright	Bold	COURIER	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{| <Esc>(8U<Esc>(s0p10.00h12.0v0s3b3T<Esc>&l00
108	ROMAN-8	F	10.00	12.0	Upright	Bold	COURIER	Land	ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{| <Esc>(8U<Esc>(s0p10.00h12.0v0s3b3T<Esc>&l10
109	ROMAN-8	F	10.00	12.0	Italic	Medium	COURIER	Port	*ABCDEfghijÀÂ°ÇÑ¡¿£§¤#$@[]^`{|* <Esc>(8U<Esc>(s0p10.00h12.0v1s0b3T<Esc>&l00
110	ECMA-94	F	16.67	8.5	Upright	Medium	LPRINTER	Port	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{}~123ÀÁÂÄÇÈÉÊËÌÍÎÏÑÒÓÔÖÙÚÛÜßÀÁ <Esc>(0N<Esc>(s0p16.67h8.5v0s0b0T<Esc>&l00
111	ECMA-94	F	16.67	8.5	Upright	Medium	LPRINTER	Land	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{}~123ÀÁÂÄÇÈÉÊËÌÍÎÏÑÒÓÔÖÙÚÛÜßÀÁ <Esc>(0N<Esc>(s0p16.67h8.5v0s0b0T<Esc>&l10
112	ECMA-94	F	12.00	10.0	Upright	Medium	COURIER	Port	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{|}~123Á <Esc>(0N<Esc>(s0p12.00h10.0v0s0b3T<Esc>&l00
113	ECMA-94	F	12.00	10.0	Upright	Bold	COURIER	Port	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{|}~123Á <Esc>(0N<Esc>(s0p12.00h10.0v0s3b3T<Esc>&l00
114	ECMA-94	F	12.00	10.0	Italic	Medium	COURIER	Port	*ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{|}~123Á* <Esc>(0N<Esc>(s0p12.00h10.0v1s0b3T<Esc>&l00
115	ECMA-94	F	10.00	12.0	Upright	Medium	COURIER	Port	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{| <Esc>(0N<Esc>(s0p10.00h12.0v0s0b3T<Esc>&l00
116	ECMA-94	F	10.00	12.0	Upright	Medium	COURIER	Land	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{| <Esc>(0N<Esc>(s0p10.00h12.0v0s0b3T<Esc>&l10
117	ECMA-94	F	10.00	12.0	Upright	Bold	COURIER	Port	ABCDEfghij¡¢³´¶¸¹º»¼Á#$@[]^`{| <Esc>(0N<Esc>(s0p10.00h12.0v0s3b3T<Esc>&l00

Figure 3-4. HP 33447 Font Printout

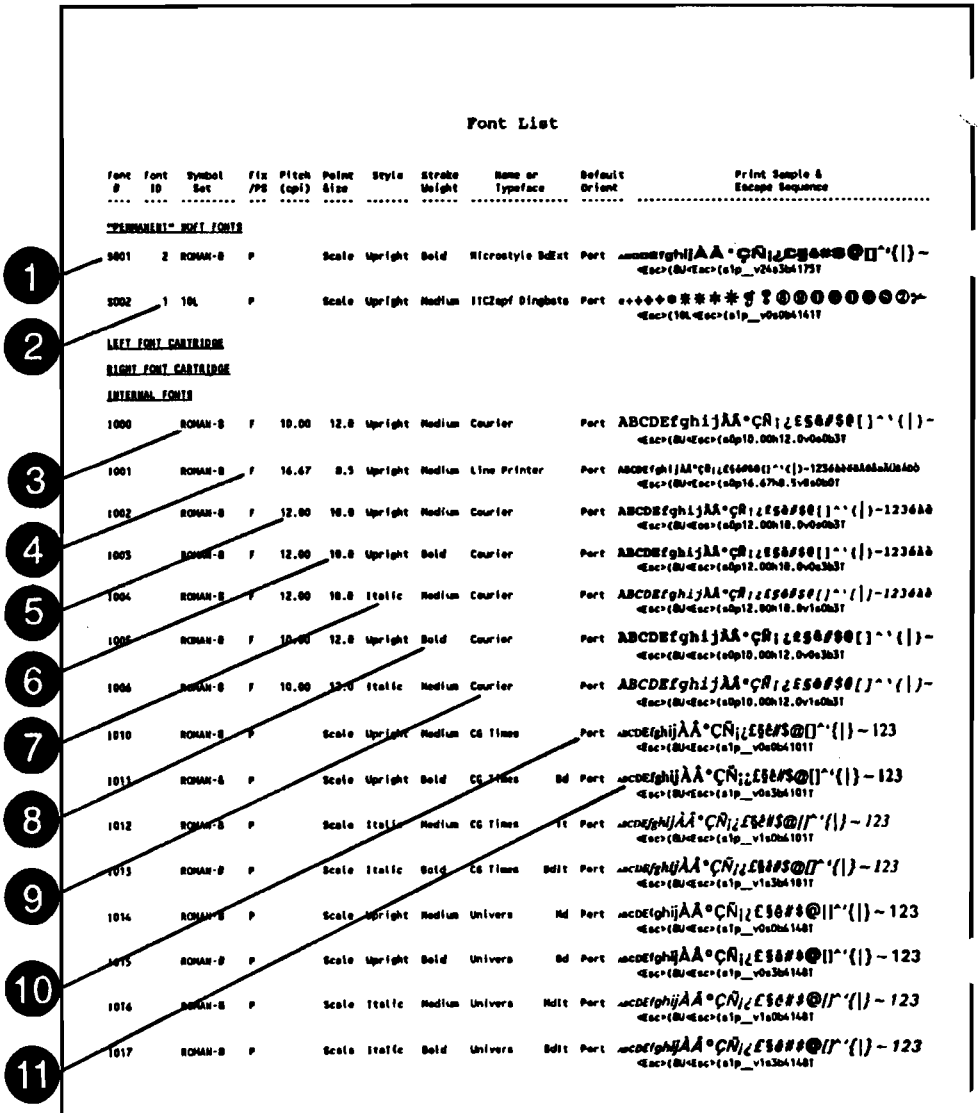


Figure 3-5. HP 33459 Font Printout

3-5. SELF TESTS

General

Three types of self-test routines, other than Service Mode tests covered in the next section, can be performed on the HP 33447 and HP 33459 printers. These self-test routines are:

- 05 SELF TEST.
- 04 SELF TEST.
- 15 ENGINE TEST (Test Print).

05 SELF TEST

Each time the printer is powered on or the Control Panel (PRINT FONTS/TEST) key is held down for 2-to-5 seconds, 05 SELF TEST is displayed. (If the key is held down longer, 04 SELF TEST will be displayed.) The printer will then execute a self test that verifies operation in the following areas:

- Program ROM.
- Internal Font ROM.
- RAM on the Formatter PCA and any optional (accessory) RAM PCAs.
- DRAM Controller.
- Formatter logic.
- All LEDs.

If the self test was explicitly invoked, valuable information about page count, date codes, and configuration selections can be obtained from the first portion of the resulting printout. The information is summarized in Figure 3-6 for the HP 33447 and in Figure 3-7 for the HP 33459. When the printer is first switched on, only the non-printing portion of the self test is performed. A self test must be requested from the Control Panel to get a self-test printout. When the printing portion of the self test begins, the message 06 PRINTING TEST is displayed. The self test may be aborted by pressing the (ON LINE), (CONTINUE/RESET), or (PRINT FONTS/TEST) keys. The numeric portion of the message will flash while the self test is being aborted.

Note

The self test is printed in the default media size in the default orientation. The HP 33447 self-test printout is an example of 12% print coverage (see Figure 3-6). The HP 33459 self-test printout is an example of 10% print coverage (see Figure 3-7). This may be useful as a reference in determining toner use. A typical EP-S Cartridge should have adequate toner to print 4000 sheets of paper at an average 5% coverage.

Self-Test Printout Information

The Self-Test Printout contains valuable information such as page count, firmware date codes, Control Panel settings, and any installed options.

HP 33447 Self Test Printout

The numbered items below refer to Figure 3-6.

1. **Page Count:** Shows approximately how many pages have been printed over the life of the printer. Page count can be used to determine when to change the ozone filter and to track printer usage. The page count is current as long as the printer is powered on. When the printer is powered off, the page count is rounded down to the nearest ten-page increment and recorded in non-volatile memory.
2. **Date Codes:** Shows Program ROM and Internal Font ROM date codes (YYYYMMDD).
3. **Auto Continue:** Shows Auto Continue setting.
4. **Installed Memory:** Shows total amount of available memory.
5. **Symbol Set:** Shows selected symbol set.
6. **Printing Menu:** Shows selected Printing Menu items.
7. **Configuration Menu:** Shows selected Configuration Menu items.
8. **Sample Print:** Shows ripple print pattern. This area is useful for checking print density and quality.

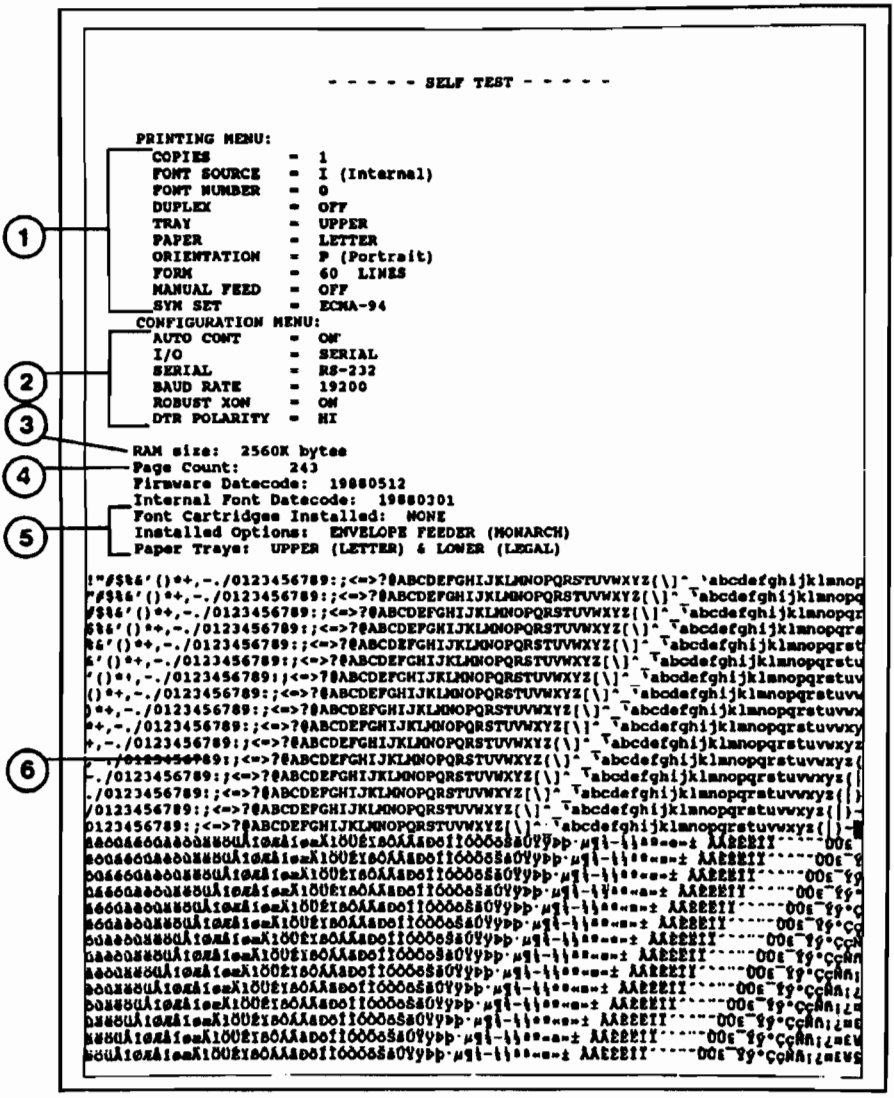


Figure 3-6. Portion of HP 33447 05 SELF TEST Printout

HP 33459 Self Test Printout

The numbered items below refer to Figure 3-7.

1. **Printing Menu**: Shows the current Printing Menu selections in the order that they appear in the Control Panel display. Use this information to verify that the selections are active in the Printing Menu.

2. **Configuration Menu**: Shows the current Configuration Menu selections in the order that they appear in the Control Panel display. Use this information to verify how the printer is set up to communicate with the computer.

3. **RAM Size**: Shows how much memory is installed in the printer. 1024 Kbytes of installed memory is standard with the printer. If optional memory boards have been installed, a self test can be used to verify that the boards are installed properly.

4. **Page Count**: Shows approximately how many pages have been printed over the life of the printer. Page count can be used to determine when to change the ozone filter and to track printer usage. The page count is current as long as the printer is powered on. When the printer is powered off, the page count is rounded down to the nearest ten-page increment and recorded in non-volatile memory.

5. **Date Codes and Installed Devices**: Shows firmware and internal font date codes (YYYYMMDD) as well as installation of cartridges and media tray size.

6. **Sample Print**: Shows ripple print pattern. The ripple print pattern (always in Courier for the HP 33459) and the areas at the top and bottom of the page are useful for checking print density and quality.

7. **Scalable Typefaces**: Demonstrates the printer's ability to print with scalable typefaces.

8. **Graph/Pie Chart**: The bar graph and pie chart test the printer's HP-GL/2 vector graphics capability. (The 33% portion of the pie chart also serves as a check on the Resolution Enhancement quality and proper adjustment.

9. **Patterns**: Use the shading and crosshatch patterns in the blocks at the top and bottom of the page as well as in the charts to check print density and quality.

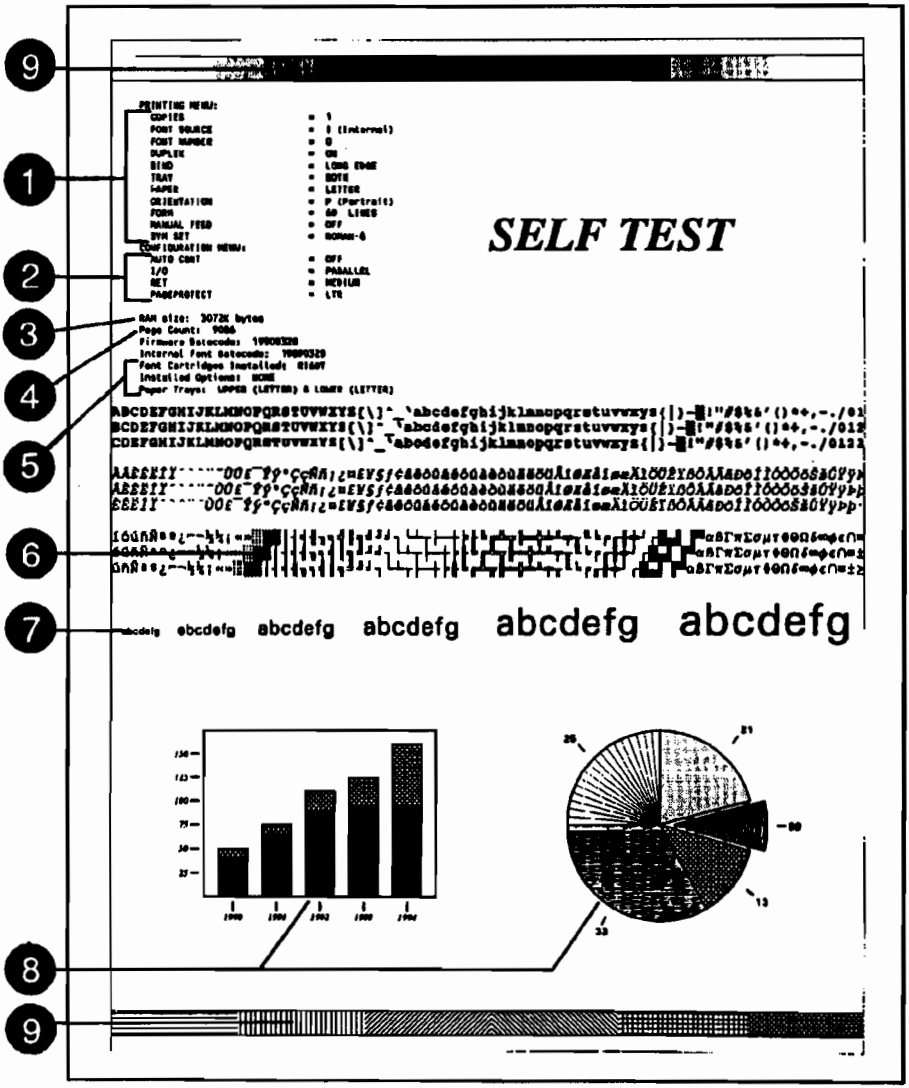


Figure 3-7. HP 33459 05 SELF TEST Printout

04 SELF TEST

Holding down the (PRINT FONTS/TEST) key until 04 SELF TEST is displayed (about 5 seconds) will cause a continuous self test to be run using the 05 SELF TEST printout page. The continuous self-test mode is a good way to test the paper path since it only tests the electronics once while continuing to print out the self-test page. Pressing the (PRINT FONTS/TEST), (ON LINE), or (CONTINUE/RESET) key terminates the continuous test mode. The numeric portion of the message will flash while the self test is being aborted.

Note

Because of the complex graphics on the Self-Test page, printing speed for the HP 33459 will be less than the full eight-page-per-minute rated level.

Test Print (15 ENGINE TEST)

Activating the TEST PRINT switch—accessed by inserting a pen or pencil into the hole on the lower right side of the printer (Figure 3-8) (behind a cover panel on the HP 33459)—causes a page of vertical lines (shown in Figure 3-9) to be printed. While printing, the display will read 15 ENGINE TEST. This is an engine test only since the Formatter PCA is completely bypassed to produce this print. It is useful to verify proper operation of the DC Controller circuitry and all other print engine components (i.e., everything but the Formatter PCA). Holding down this button will produce continuous pages until the button is released.

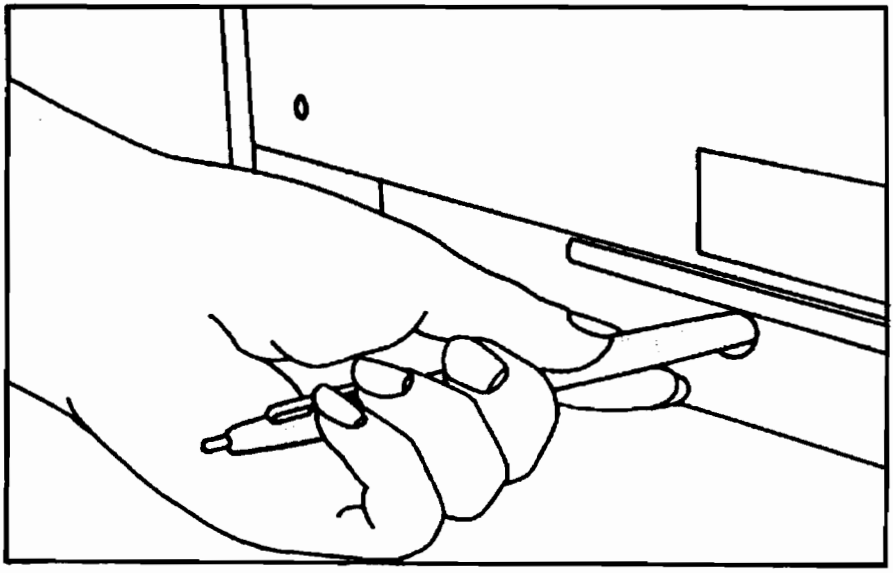


Figure 3-8. Selecting the Test Print Switch (HP 33447 shown here)

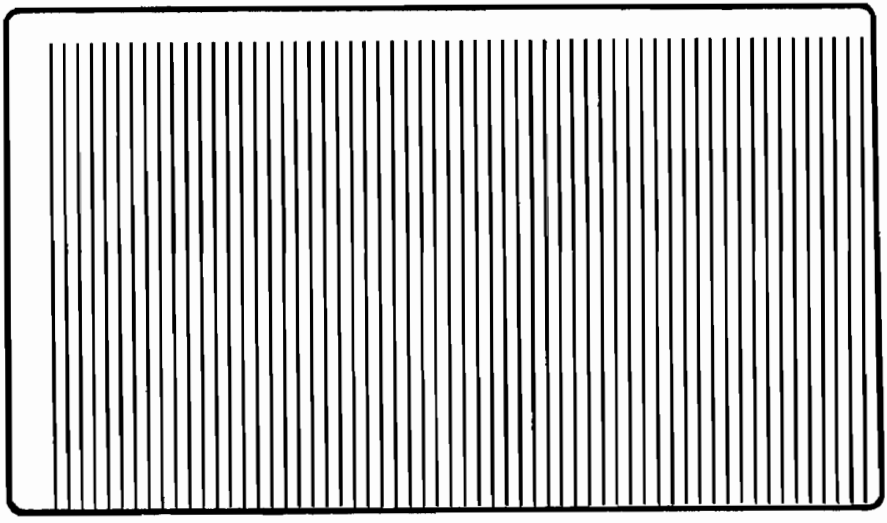


Figure 3-9. Portion of Test Print Pattern

3-6. SERVICE MODE

General

Service Mode should only be used by service representatives. It exists to allow the page count (which measures the life of the print engine) to be changed in the event the Formatter PCA is replaced and to print a test pattern which is useful for print quality analysis.

Using Service Mode

To access Service Mode:

1. Hold down the (ON LINE), the (CONTINUE/RESET), and the (ENTER/RESET MENU) keys simultaneously for at least one second while powering on the printer. This interrupts the normal initial non-printing self test. If Service Mode has been properly selected, the display will be blank and all four LEDs will be illuminated.
2. Press the (CONTINUE/RESET) key *once only*. Then press the (ENTER/RESET MENU) key.
3. The display will read SERVICE MODE (not localized) and all four LEDs on the Control Panel will still be illuminated.

Note

Any attendance message, such as 16 TONER LOW, will override the SERVICE MODE display. However, the printer is in service mode at this time if the preceeding steps were performed.

4. Although the procedures are essentially the same, timing for the HP 33447 and HP 33459 differ at this point:

   HP 33447: After 5 to 30 seconds, depending upon installed memory, 05 SELF TEST will be displayed and all four lights on the Control Panel will turn off. After about five seconds, 02 WARMING UP will be briefly displayed, after which the printer will again display SERVICE MODE and the ready indicator (only) will illuminate.

   HP 33459: After less than one second, 05 SELF TEST (not localized) will be displayed and all four lights on

the Control Panel will remain lit for up to 60 seconds, depending upon installed memory, then turn off for about 10 seconds, after which the printer will again display SERVICE MODE and the ready indicator (only) will illuminate.

If the self test fails, the printer will display the same error message that it normally would.

5. To exit Service Mode for either printer, press either the (ON LINE) or the (CONTINUE) key. To return the HP 33447 on line, the (ON LINE) key must be pressed again.

Self Tests

Several self tests can be performed in Service Mode:

1. **HP 33459 only:** Press the (PRINT FONTS/TEST) key to perform the printing portion of the self test. 05 SELF TEST is displayed (localized for HP 33459) and a self-test printout is produced.
2. For both printers, holding down the (PRINT FONTS/TEST) key until 05 SELF TEST is displayed (about two seconds) causes the formatter to first perform a self test. During the printing portion, 06 PRINTING TEST (localized for HP 33459) is displayed and a Service Mode self-test printout is produced. The printer will then again display SERVICE MODE. Figure 3-10 shows a sample of the Service Mode self-test print.
3. The (PRINT FONTS/TEST) key can also be used to run continuous Service Mode self tests by holding down the key until 04 SELF TEST (localized for HP 33459) is displayed. After several seconds, the printer will begin continuously printing the Service Mode printout.
4. To abort the self test, press the (ON LINE) key once; this will return the printer to Service Mode. Several additional pages may be printed to clear the buffer, during which time the 04-portion of the message will flash.

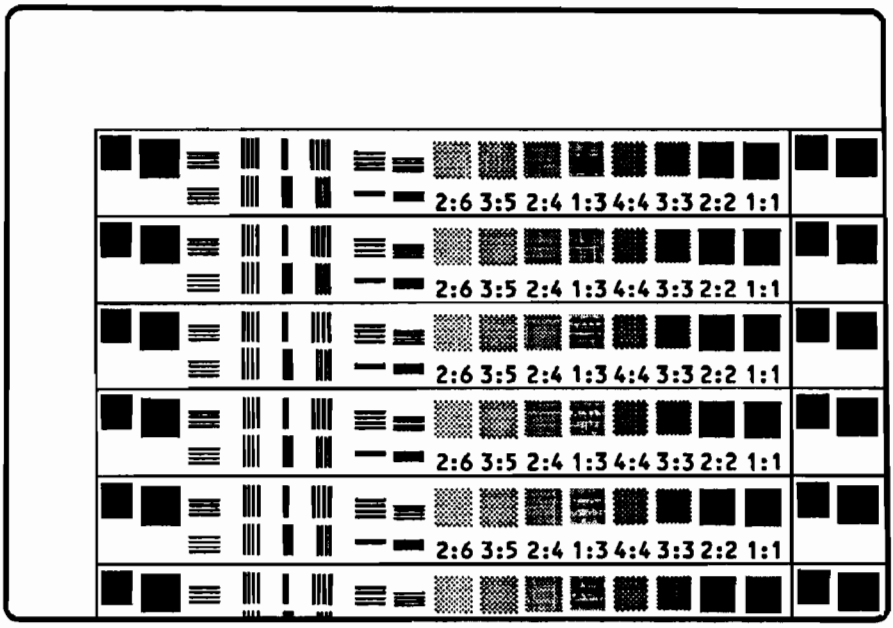


Figure 3-10. Portion of Service Mode Self Test

Note

The Service Mode Self Test is printed in either the portrait or landscape orientation, depending on the orientation setting established prior to entering Service Mode. It is also formatted to the default page size.

Setting the Page Count

The page count, which is stored in non-volatile RAM and displayed on the self-test printout, represents the number of pages which have been formatted by the printer. If it becomes necessary to install a new Formatter PCA, the page count should be set to reflect the page count (age) of the print engine. To set the page count, enter Service Mode and perform the following procedure:

1. Before removing the old Formatter PCA, verify the current page count of the printer. This can be done by executing a 05 SELF TEST (before entering Service Mode) or, for the HP 33459, by pressing the (PRINT FONTS/TEST) key while in Service Mode. The page count can be found on the first line of the printout for the HP

33447 and following the Configuration Menu settings for the HP 33459.

Note

If a 05 SELF TEST will not execute, the page count can be verified by entering Service Mode as described above. After entering Service Mode, perform the following steps:

- Press the (MENU) key.
- PAGES=XXXXXX is displayed. XXXXXX is the page count currently stored in NVRAM. The underlined character denotes the cursor position.
- Record this number for future reference in setting the page count after installing the new PCA.

2. After verifying the page count of the old Formatter PCA, install the new PCA as described in Chapter 6.
3. To store the page count in the Non-Volatile RAM (NVRAM) on the new Formatter PCA, perform the following steps:
   - After entering Service Mode, press the (MENU) key.
   - PAGES=XXXXXX is displayed. XXXXXX represents the digits for the page count currently stored in NVRAM. The underlined character denotes the cursor position.
   - Using the (+) or (-) keys, select the desired value for the underlined digit and press (ENTER). The cursor will automatically move one digit to the right.
   - Set each digit in the same manner. When the final value has been entered, the printer will automatically return to Service Mode.

Note

When the printer is switched off, the page count is rounded down to the nearest 10 increment and retained in NVRAM. The page count may be off by up to nine pages each time the printer is switched off.

3-7. Changing the Display Language

The HP 33447 and HP 33459 Printers can be configured to display front panel messages in five languages. The default language set at the factory is English. To change the default language do the following:

1. Turn the printer off.
2. Press and hold the (ENTER) key while turning the printer back on.
3. Wait until CONFIG LANGUAGE appears. Release the (ENTER) key. 05 SELF TEST will appear.
4. Wait for LANGUAGE=ENG to appear. Press the (+) key to scroll through the available choices.
5. Press the (ENTER) key to save your choice. An asterisk will appear beside your language selection to indicate that it is in the default status.
6. Press the (ON LINE) key. The On-Line indicator light will come on.
7. Your display messages will now be in the language you selected.

4

Routine operator maintenance is required for HP 33447 and HP 33459 printers. Most maintenance and adjustment procedures are carried out only when the EP-S Cartridge is changed or there is a print quality or paper feed problem. Since the maintainable parts of both printers are similar, the HP 33447 has generally been used for illustration. All routine maintenance and adjustments are the customer's responsibility.

4-2. LIFE EXPECTANCY OF CONSUMABLES AND RELATED PARTS

The expected service life of consumables and related parts is given in table 4-1. Always inspect these components for wear when servicing the printer. The expected-service-life estimates are based on A4 or letter size prints with an average of 5 percent toner coverage at a density dial setting of "7". The control panel self test printout produces approximately a 12 percent coverage for the HP 33447, 10 percent for the HP 33459.

Table 4-1. Service Life of Consumables

Description	Service Life (# of prints)	Remarks
EP-S Cartridge*	Approximately 4000 pages (application dependent). Open: 6-mo. shelf life. Unopened: 2-yr. shelf life.	Rocking the cartridge when TONER LOW appears may prolong cartridge life.
Cleaner Pad*	Life of EP-S Cartridge.	Included with EP-S Cartridge.
Fusing Assembly	100,000**	
Feed Roller Assembly (Upper and Lower)	100,000** or anytime the Separation Pad is replaced.	
Separation Pad	100,000** or anytime Feed Roller Assembly is replaced.	
Ozone Filter	50,000*	
Transfer Corona	100,000**	
Alignment Roller	100,000**	

*Customer responsibility. **Estimated, see note below.
Part numbers for consumable items are listed in chapter 8.

Note

The 100,000-page component service life is ONLY AN ESTIMATE. The service life of consumables is directly related to the type of media used and the type of printing being done. The Fusing Assembly, Feed Roller Assembly, Separation Pad, and Transfer Corona Assembly should be inspected for excessive wear and replaced if necessary whenever a printer is being serviced.

4-3. MAINTENANCE CHECKPOINTS

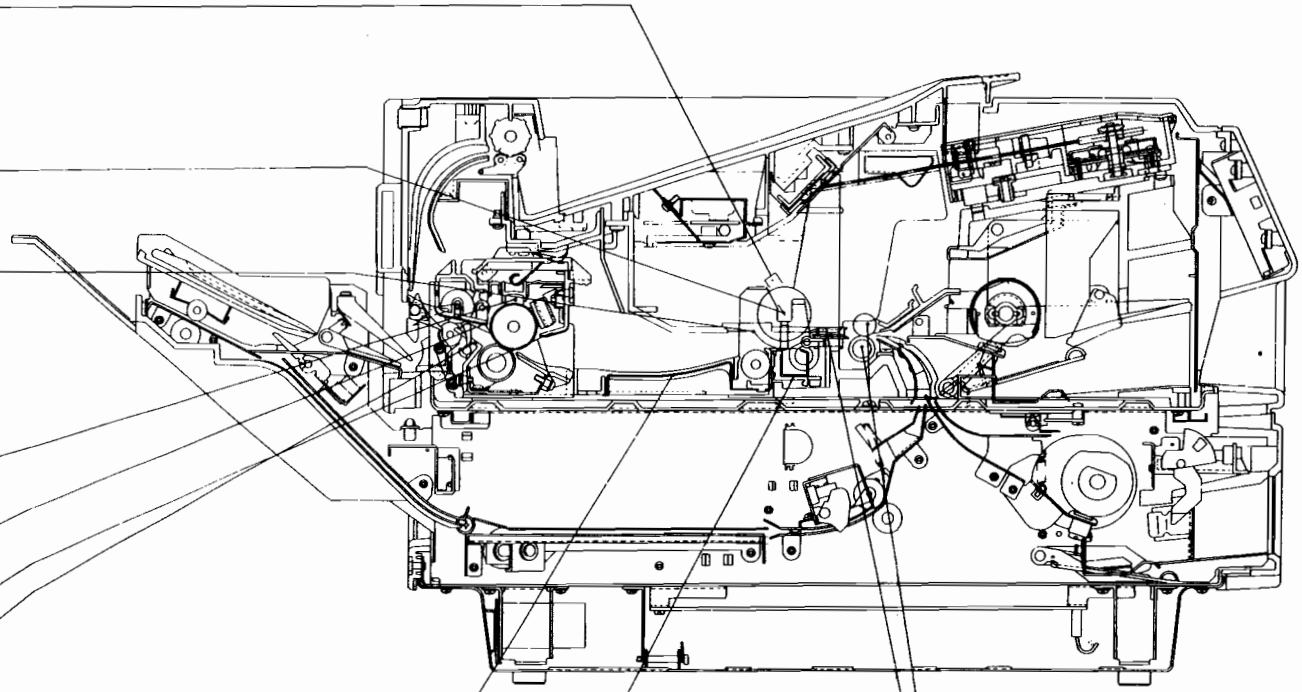
Principal maintenance checkpoints for the HP 33447 and HP 33459 printers are illustrated in table 4-1 below. Since the printers are quite similar, the HP 33447 has been used for illustration here.

Cartridge

Point	Tool/solvent	Remarks
Primary corona wire	Cleaning Brush	Clean with wire cleaner supplied with printer
Photo-sensitive drum		Never clean drum with solvents. Unless absolutely required, drum should not be touched or cleaned. Do not expose it light.
Protective shield for drum	Damp cloth	Image may be marked by falling tonner, so always clean this part.

Fuser Assembly

Point	Tool/solvent	Remarks
Fuser roller cleaner felt	–	If dirty, prints will be dirty and there will be jams.
Separation claws	MEK	Clean carefully. The tip of the claw is easily damaged.
Entrance guides	MEK	Clean guide.
Lower delivery guide	MEK	Clean guide.



Feed guide unit

Point	Tool/solvent	Remarks
Feed guide	Damp cloth	Clean guide.

Transfer corona unit

Point	Tool/solvent	Remarks
Transfer corona wire	Alcohol/ Swab	Wipe with dry, cloth, then clean with lint-free swab dampened with alcohol.

Transfer guide unit

Point	Tool/solvent	Remarks
Registration rollers	Damp cloth	Clean rollers.
Transfer guides	Damp cloth	Clean guides.

Figure 4-1. Maintenance Checkpoints

4-4. CLEANING THE PRINTER

General

If reduced print quality occurs, clean the inside of the printer by wiping any visible toner away with a damp cloth. Items that are colored green are user-accessible for cleaning.

Caution

Do not clean with—or expose rubber parts to—isopropyl alcohol. Ammonia-based cleaning products will permanently damage the EP-S Cartridge.

Note

Do not breathe toner particles. To clean toner from skin and clothing, remove as much toner as possible with a vacuum or dry tissue wipes, then wash the toner from skin or clothing with *cold* water. Hot water may make toner difficult to remove. Toner tends to be degraded by vinyl materials, contact with vinyl should be avoided.

Listed below are seven primary areas of the printer that the operator is responsible for cleaning. Failure to keep these parts clean will result in unnecessary service costs and printer downtime. Ensure that these areas are properly maintained before troubleshooting further.

1. Transfer Guide.
2. Transfer Corona Assembly.
3. Registration Assembly.
4. Feed Guide Assembly.
5. Fusing Assembly.
6. Beam-to-Drum Mirror.
7. Primary Corona.
8. Static Eliminator Teeth

Transfer Guide

Wipe the Transfer Guide silver strip, see Figure 4-2 clean with a damp cloth (use water only).

Transfer Corona Assembly and Static Eliminator Teeth

To clean the Transfer Corona Assembly:

1. Switch the printer OFF and open the Top Cover Assembly.
2. Dip a cotton swab in isopropyl alcohol. Water can be used if isopropyl alcohol is not available. Make sure the swab is not dripping.
3. Carefully clean the Transfer Corona housing, removing as much toner buildup as possible. (See Figure 4-3).
4. With a clean swab and isopropyl alcohol (or water), gently wipe the Transfer Corona wire (see Figure 4-3) with the cotton swab until no residue remains.
5. With the brush-end of the green cleaning brush, remove any debris accumulations around the sharp row of static teeth on the output side of the Transfer Corona (see Figure 4-3).

Caution

Be careful not to break the monofilament lines that cross diagonally above the Transfer Corona wire. Also, be careful not to get alcohol on any rollers or plastic parts.

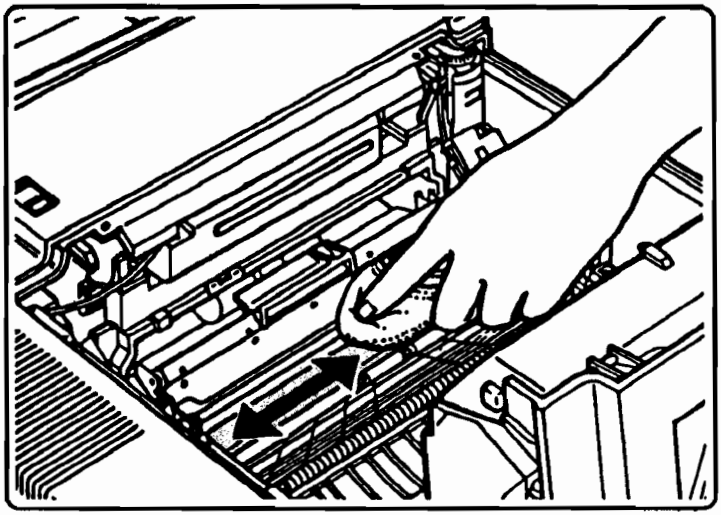


Figure 4-2. Cleaning the Transfer Guide

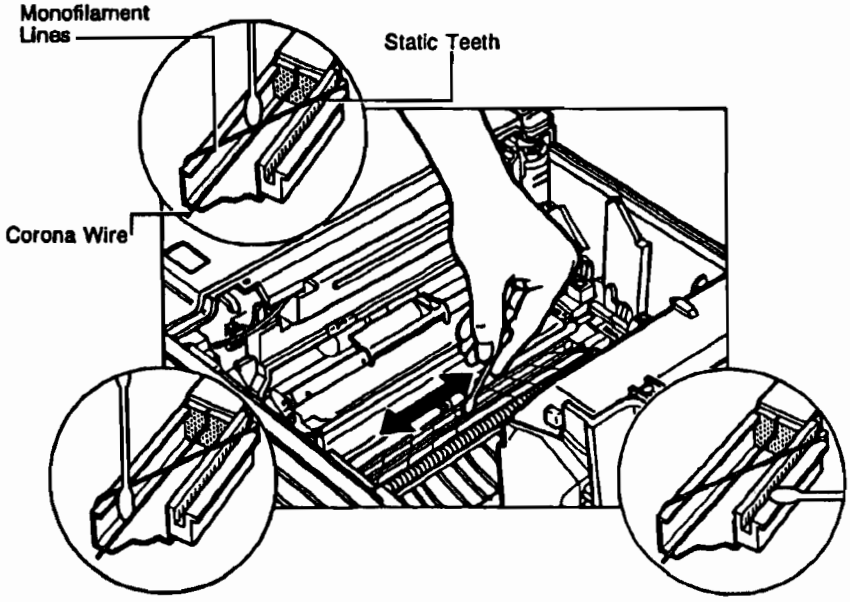


Figure 4-3. Cleaning the Transfer Corona Wire

Registration Assembly

Remove any debris from the Registration Assembly's cover. Lift the cover of the Registration Assembly (see Figure 4-4) and wipe off any paper dust underneath the assembly cover with a damp cloth (use water only).

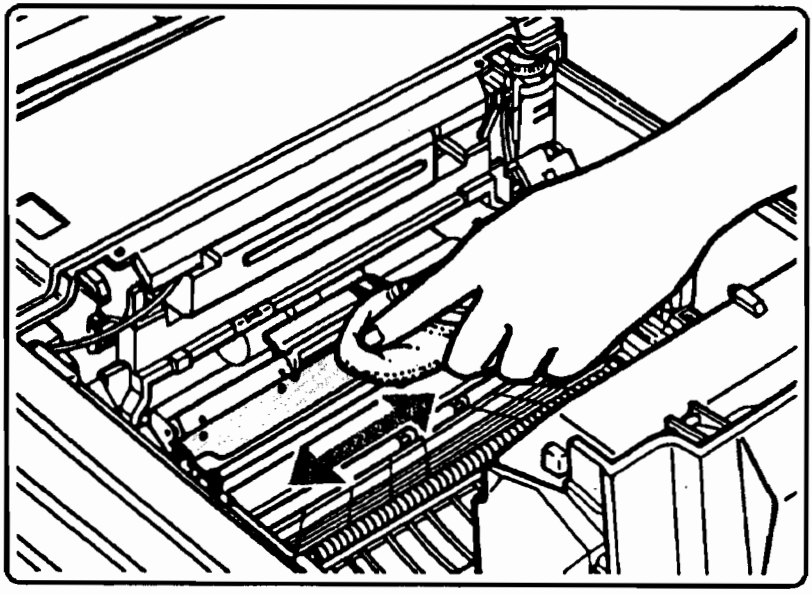


Figure 4-4. Cleaning the Registration Assembly

Feed Guide Assembly

Wipe the Feed Guide Assembly (see Figure 4-5) with a dampened cloth (use water only).

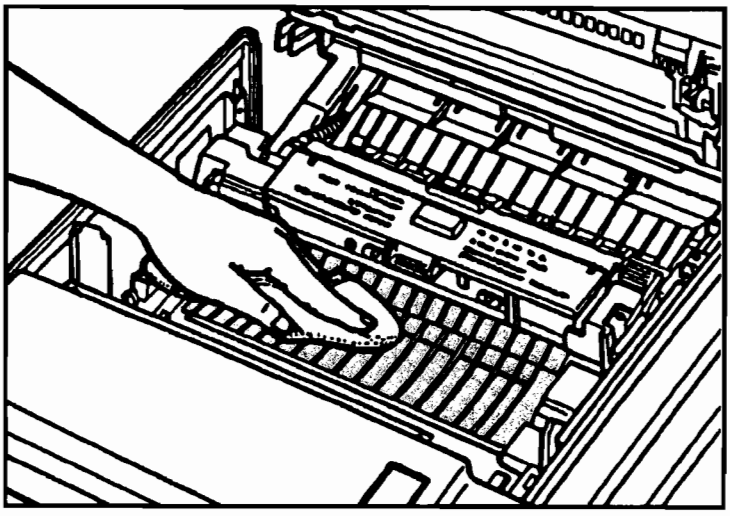


Figure 4-5. Cleaning the Feed Guide Assembly

Fusing Assembly

Warning

The fusing area gets HOT. Allow the fusing assembly to cool before initiating repair. Also, be careful not to get toner on clothing; it may stain.

Periodically cleaning the Fuser Separation Pawls (claws) (see Figure 4-6) will help prolong the life of the printer's Fusing Assembly.

Fuser Separation Pawls

To clean the pawls:

1. Turn the printer OFF.
2. Fully open the Top Cover Assembly.
3. Push the rear section of the Fusing Assembly (the section toward the rear of the printer) fully open. You will be able to see the four black plastic Fuser Separation Pawls (claws) along the lower edge of the section just pushed back (see Figure 4-6).
4. Clean the tip of each pawl with a cloth dampened with water. Avoid contact with the main portion of the Fusing Assembly.

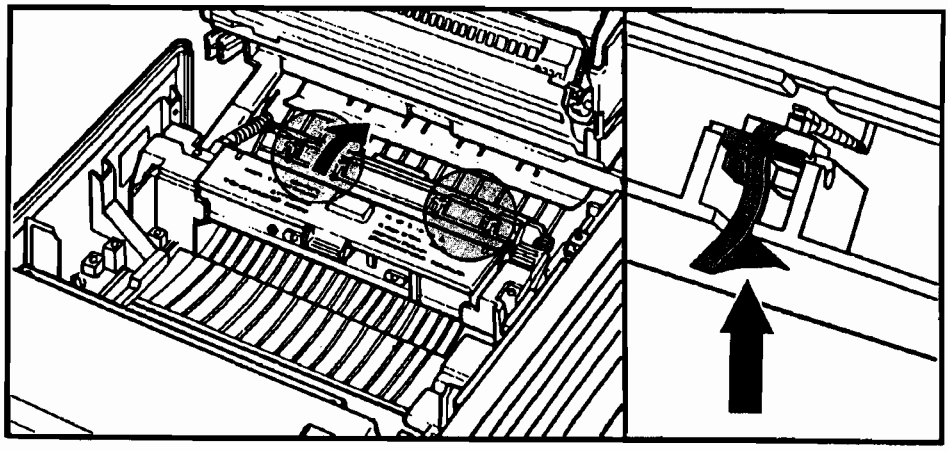


Figure 4-6. Cleaning the Fusing Assembly

Fusing Assembly Maintenance

The left side of the Fusing Assembly contains a felt pad that lubricates the a contact plate on the fusing roller. This pad is normally coated with a conductive lubricant. If the pad becomes dry, the fusing assembly will squeak. To eliminate this squeaking, apply conductive lubricant (HP part no.CK-0544-000CN) to the pad.

To access the pad, remove the Fusing Assembly from the printer and place the assembly upside down on a clean surface. The pad is located next to the paper exit sensor flag. Apply a small amount of lubricant between the pad and the roller cap as shown in Figure 4-7.

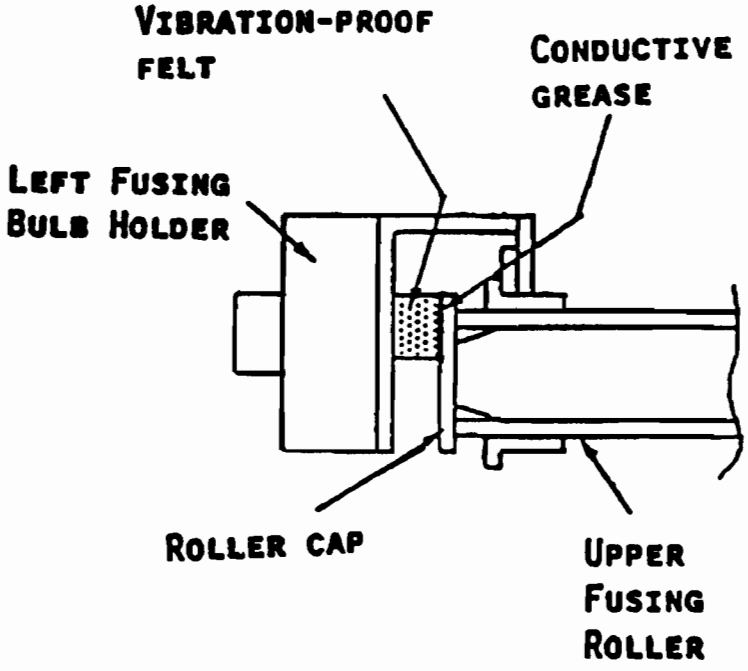


Figure 4-7. Left End of Fusing Assembly

Beam-To-Drum Mirror

The Beam-to-Drum Mirror is delicate. Use optical-quality canned gas to clean any debris off its surface.

The Beam-to-Drum mirror is a first-surface mirror (i.e., a mirror with its reflective coating on the top, or *first*, surface) which can be easily damaged. *Do not clean the mirror unless absolutely necessary* (e.g., fingerprints, water condensation, etc.).

If additional cleaning is required, proceed as follows:

1. Access the Beam-to-Drum Mirror, located under the Top Cover Assembly, by moving the Mirror Shutter Assembly to the right (freeing the lever) and swinging it up and out of the way (see Figure 4-8, also "Mirror Shutter Assembly" in Chapter 6).
2. Carefully clean the mirror with a clean, lint-free wipe, *dampened only with a cleaning fluid approved for a camera lens.*

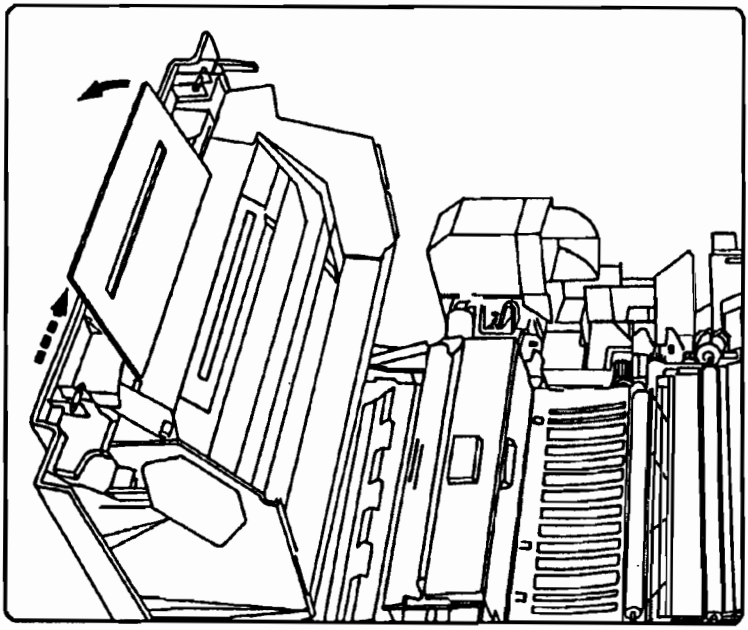


Figure 4-8. Cleaning the Beam-to-Drum Mirror

Primary Corona Wire

The Primary Corona wire is delicate, clean the corona wire when dark vertical streaks appear on the page).

Caution

Clean the Primary Corona wire using only the pad-end of the cleaning brush provided. Using a cotton swab or other cleaning tool may break the wire, requiring replacement of the EP-S Cartridge.

1. Turn the printer OFF and open the top cover.
2. Remove the EP-S Cartridge from the printer.
3. Insert the felt-tipped end of the brush in one end of the EP-S cartridge slot, as shown in Figure 4-9. (The brush will fit only one way. Look carefully at Figure 4-9 for the correct way to position the cleaning brush.)
4. Slide the brush back and forth to clean the Primary Corona wire.
5. Return the brush and the EP-S Cartridge to the printer.

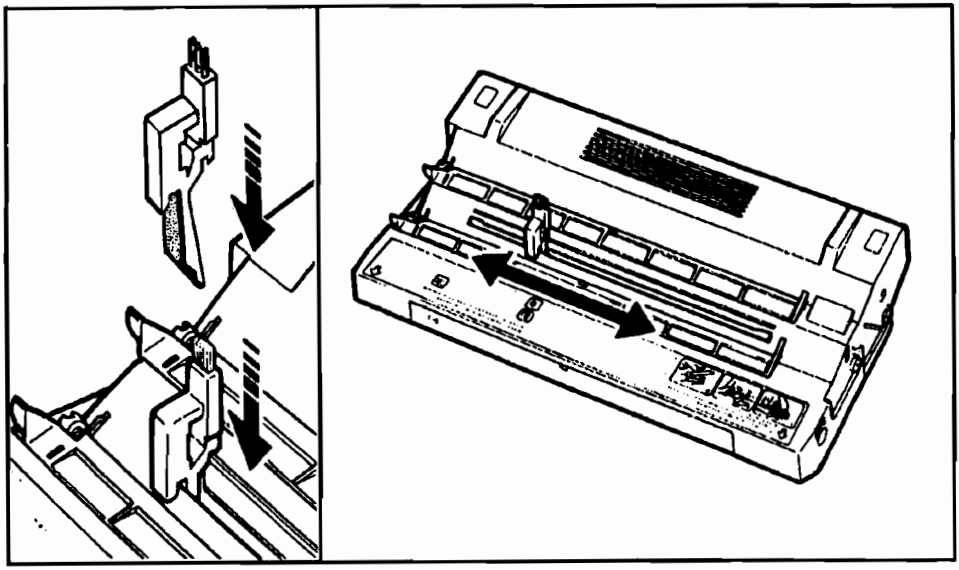


Figure 4-9. Cleaning the Primary Corona Wire in the EP-S Cartridge

4-6. OZONE FILTER REPLACEMENT

The filter should be replaced every 50,000 pages. If the printer is being operated in a confined environment, it may need to be replaced more often. Visual inspection will not show that a filter is dirty; page count is the only reliable indicator on which to base a decision to change a filter.

If a filter change is necessary, turn to Chapter six for complete instructions.

Conditions that may generate ozone complaints are:

- Multiple laser printers and/or copiers in a confined area.
- Extremely low relative humidity.
- Poor room ventilation.
- Printer exhaust port directed toward the face of personnel.
- Ozone Filter in poor condition (i.e., over 50,000 page count).
- Long, continuous printing combined with any of the above.

Note

Examine the printer's environment to determine if any of the preceding conditions exist. It may be necessary for the customer to take corrective action to ensure the printer's environment is free of conditions that may generate an ozone complaint.

4-7. FUSER CLEANING PAD REPLACEMENT

To replace the Fuser Cleaning Pad:

1. Open the Top Cover Assembly.
2. Open the Fusing Assembly top cover (green felt cover).
3. Remove existing cleaning pad (see WARNING below).
4. Use the felt end of the new cleaning pad to wipe the Fusing Assembly roller.
5. Discard the felt end of the cleaning pad and insert the new cleaning pad.
6. Lower the Fusing Assembly cover (it does not close tightly).
7. Close the printer's top cover and turn the printer ON.

Warning

The Fusing Roller gets HOT. Be sure to hold the Cleaning Pad by the tabs as shown in Figure 4-10.

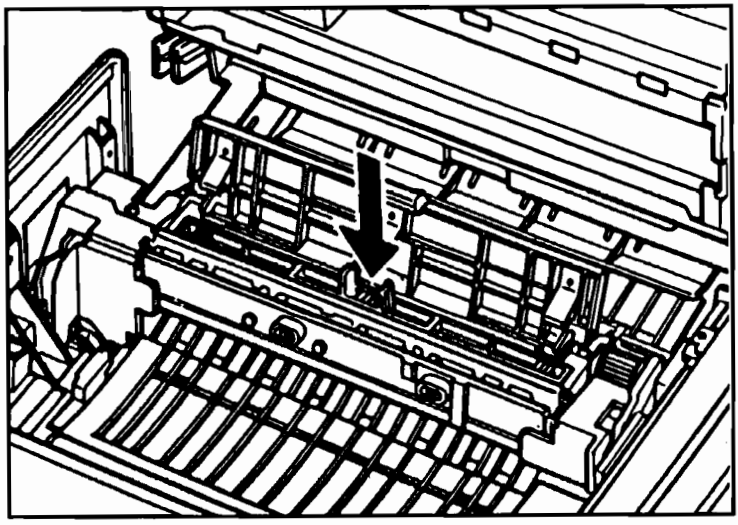


Figure 4-10. Replacing the Cleaning Pad

4-8. EP-S CARTRIDGE LIFE AND USE

Cartridge Life

The electrophotographic (EP-S) cartridge is a clean and convenient means of supplying the consumable items needed in the printing process. When using either the HP 33447 or HP 33459 printer for typical word processing applications, an EP-S Cartridge will print approximately 4000 pages. If average page coverage is light (a typical page of text has a great deal of "white space"), the EP-S Cartridge should last longer. If the application requires a denser page coverage (graphics and forms, for example), then the EP-S Cartridge will not last as long.

The life of an EP-S Cartridge can be extended by operating the printer with the print density adjustment dial set on a higher number (for lighter prints).

Caution

Do NOT attempt to refill a used cartridge. Damage to the printer can result.

5

FUNCTIONAL OVERVIEW

5-1. INTRODUCTION

This functional overview of the HP 33447 and HP 33459 printers is designed to provide the service representative with a general understanding of the processes which occur during printing. The diagram below (Figure 5-1) groups the five basic functional blocks discussed in this chapter:

- Section 5-2: Image Formation System.
- Section 5-3: Paper Pickup/Feed System.
- Section 5-4: Machine Control System (DC Controller PCA).
- Section 5-5: Interface System.
- Section 5-6: Power Distribution.

For additional details about how the printers function in various operational situations, refer also to Chapter 7, "Troubleshooting."

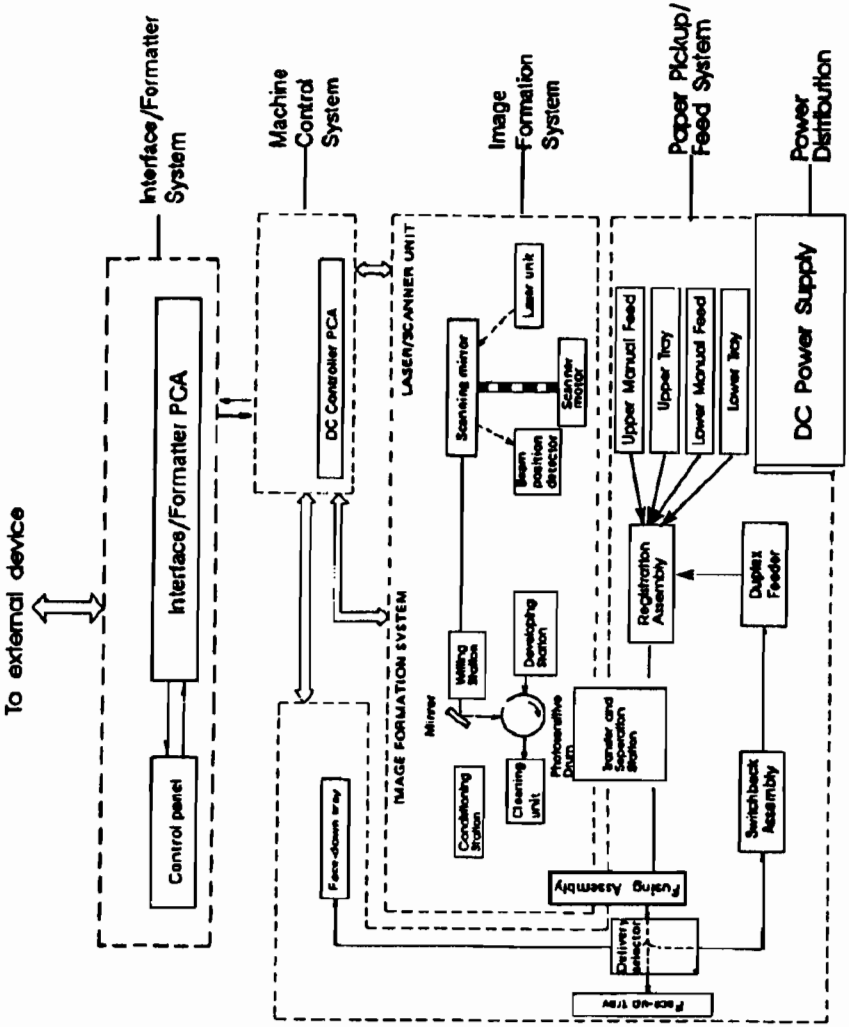


Figure 5-1.
Diagram of Functional Blocks for HP 33447 and HP 33459 Printers

5-2. IMAGE FORMATION SYSTEM

Overview

Laser printing requires the interaction of several technologies (mechanical, electronics, optics, electrophotographics, etc.) which are coordinated to produce a printed page. The first in the sequence of processes, image formation, centers around the photosensitive drum contained in the Electrophotographic (EP-S) Cartridge and consists of four progressive stages:

- Cleaning.
- Conditioning.
- Writing.
- Developing.

Two additional stages, performed outside the EP-S Cartridge, are:

- Transferring.
- Fusing.

Most image formation system components which undergo wear or degradation (consumable components) are conveniently assembled in the replaceable EP-S Cartridge. Because this makes maintenance essentially an operator's task, it eliminates the need for a service call when these parts must be replaced. The EP-S Cartridge contains the photosensitive drum, Primary Corona, developing station, toner cavity, and cleaning station. A cross-section of the EP-S Cartridge detailing the image formation system and its relationship to other printer components is illustrated in Figure 5-2.

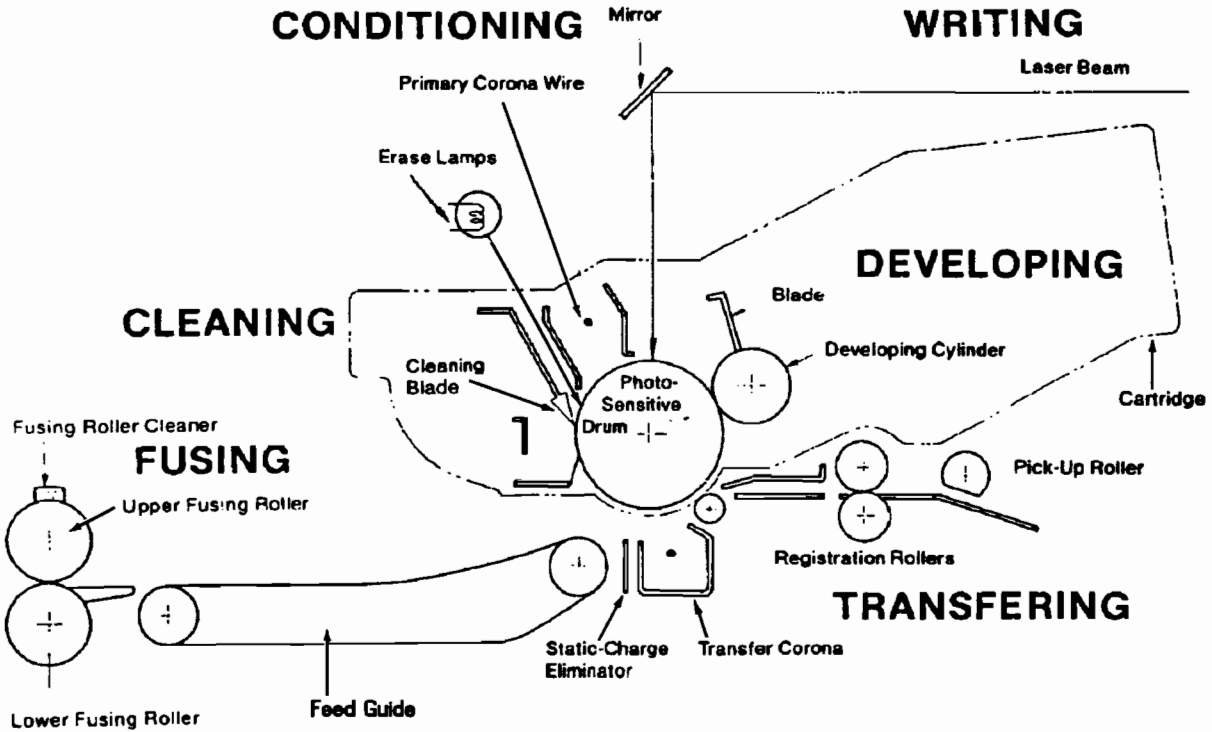


Figure 5-2. Diagram of EP-S Cartridge Illustrating Image Formation System

Photosensitive Drum

The photosensitive drum—the core of the image formation system—has special properties which allow an image to be formed on its surface and then be transferred to paper. The drum is an extruded aluminum cylinder which is coated with a non-toxic layer of organic-photoconductive material (OPC). The aluminum base of the drum is electrically connected to ground.

The OPC material has properties similar to a photodiode. It becomes electrically conductive (in one direction only) when exposed to light. Negative charges deposited on the surface of the drum conduct to the aluminum (zero potential) base of the drum when exposed to light. Areas of the drum not exposed to light remain nonconductive and retain the initial charge.

Caution

Do not expose the drum to direct sunlight or any other bright light source; permanent damage to the drum could occur.

Drum Sensitivity

Because all drums cannot be manufactured to the exact same sensitivity levels, they are tested at the factory and given a rating of high, medium, or low sensitivity (see Table 5-1). Depending on this rating, tabs are placed on the cartridge which enable printer microswitches which, in turn, control laser power output to adjust for the drum's sensitivity level. These microswitches also indicate whether or not the EP-S Cartridge is installed.

Table 5-1. Drum Sensitivity Tab Settings

Drum Sensitivity	CSENS 1	CSENS 2
High	L	L
Medium	L	H
Low	H	L
Cartridge not Installed	H	H
L = Switch Activated		

CLEANING: Stage One

During the first stage of the image formation process, the drum's surface is prepared to hold an image through a physical and electrical cleaning process. During printing, the drum is constantly rotating, making several complete rotations per printed page. Before forming the image for a given section of print, leftover toner from the previous rotation of the drum must be removed. This is accomplished by a rubber cleaning blade which scrapes toner off the drum and into a debris cavity. A sweeper blade in the debris cavity rotates, sweeping toner away from the area near the drum (see Figure 5-3).

The drum is electrostatically cleaned by the Erase Lamps. These five small lamps, located in the hinged Top Cover Assembly, illuminate the drum's photosensitive material to neutralize any electrical charges which may have previously been on the drum. The illumination of these lamps is controlled by the Machine Control System (DC Controller PCA).

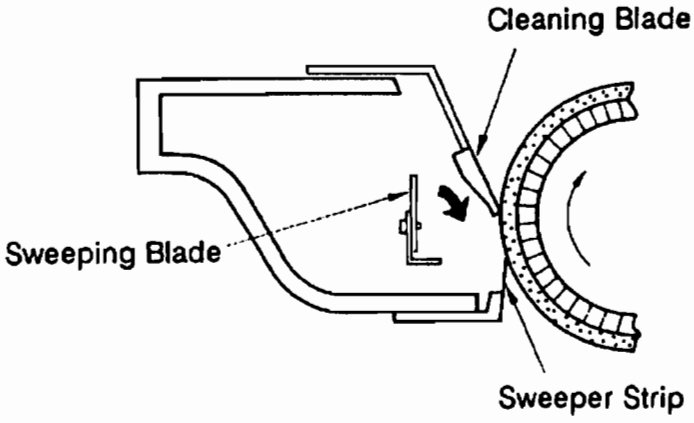


Figure 5-3. Drum Cleaning Station

CONDITIONING: Stage Two

After the drum has been physically and electrically cleaned, it must be conditioned. The conditioning process consists of the application of a uniform negative charge on the surface of the drum by the Primary Corona Assembly (see Figure 5-4) located inside the EP-S Cartridge. This −6 KV charge, applied to the corona wire by the High Voltage Power Supply Assembly, creates a *corona effect*. This means that the air surrounding the wire is ionized and no longer acts as an insulator. Negative charges from the wire migrate to the surface of the drum.

The Primary Corona grid (see Figure 5-4), positioned between the corona wire and the drum, regulates the voltage applied to the drum's surface, so that a uniform −600 V charge is deposited. The corona grid is connected to a varistor in the High Voltage Power Supply Assembly which bleeds off any extra current which would raise the surface voltage above the desired level.

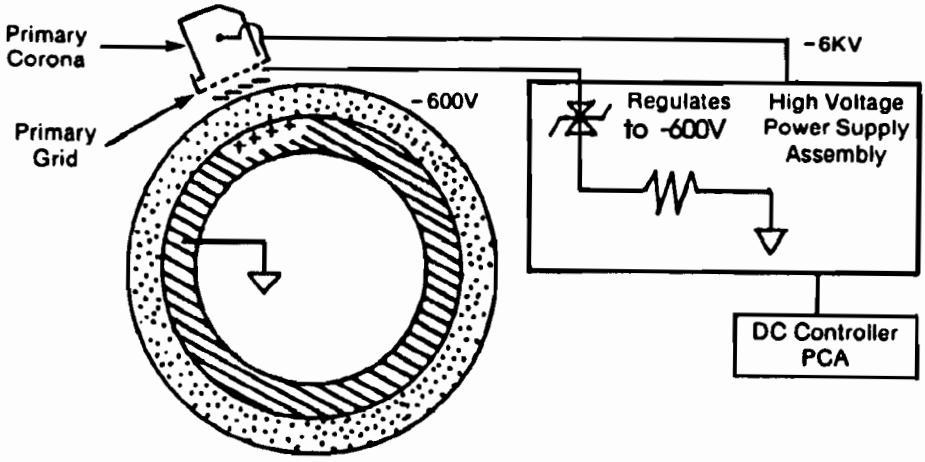


Figure 5-4. Primary Corona Assembly

WRITING: Stage Three

After rotating past the conditioning station, the drum has a uniform −600 V potential on its surface. At the writing station, a laser beam is used to discharge this potential in selected areas by focusing laser light on selected portions of the photoconductive drum. This creates what is known as an electrostatic image. This image is later developed into a visible image.

The following is an explanation of how laser light is controlled to achieve the electrostatic image described above. Laser light is produced by a small laser diode which is turned on and off by supplying or denying power. The fixed focus beam of the laser diode is directed onto a six-faced rotating polygon mirror (see Figure 5-5). As the mirror rotates, the beam reflected off the mirror sweeps in an arcing fashion. Through a set of mirrors and lenses, the swept beam is brought into focus to describe a horizontal line on the photosensitive drum. The beam reaches the drum through an opening in the top of the EP-S Cartridge.

Because the beam is sweeping, the entire length of the drum can be covered by the beam; similarly, because the drum is rotating, the entire circumference can be covered. This sweeping of the drum and modulation of the beam allows exposure of all desired surfaces on the drum (see Figure 5-6). This is similar to how the electron beam in a television set scans to form a video image on the screen.

The speed of the Scanner Motor (which rotates the polygonal mirror) and the speed of the main motor (which rotates the drum) are synchronized so that each successive sweep of the beam is offset on the surface of the drum by 1/300 of an inch. The beam can also be turned on and off at such a rate as to place an intermittent series of dots of light every 1/300 of an inch in the horizontal direction. This is how the printer achieves its 300 x 300-dots-per-square-inch resolution. (Note that one aspect of the HP 33459's Resolution Enhancement™ feature allows for more defined dot placement in the horizontal direction.) The Scanner Motor is controlled by the SCNCONT line from the DC Controller. This voltage level varies depending on the Scanner Motor speed feedback signals FG+ and FG− (see Figure 5-12 also).

Before the beam reaches the drum at the beginning of each sweep, it is reflected off a small mirror into an optical fiber cable. This

momentary pulse of light is sent down the optical fiber to the DC Controller PCA where it is converted to an electrical signal which, in turn, is used to synchronize the output of data for one sweep (scan line). This pulse—called the Beam Detect pulse—is also used to diagnose problems with the laser or scanner motor. (See Figure 5-6.)

After passing the writing station, the drum's surface has an invisible electrostatic latent image. The portions of the drum not exposed to the laser are still at the −600 V potential (placed there by the Primary Corona) while those portions exposed to light have been discharged to approximately −100 V.

Warning

The invisible laser beam can cause eye damage. Heed all CAUTIONS and WARNINGS when working on the printer.

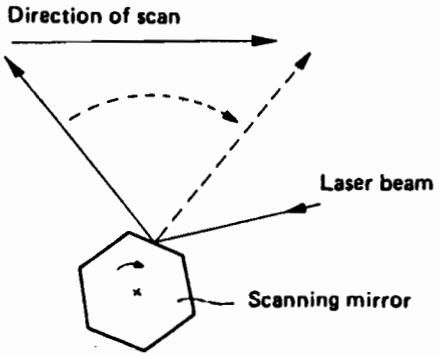


Figure 5-5. Rotating Scanner Mirror (Top view)

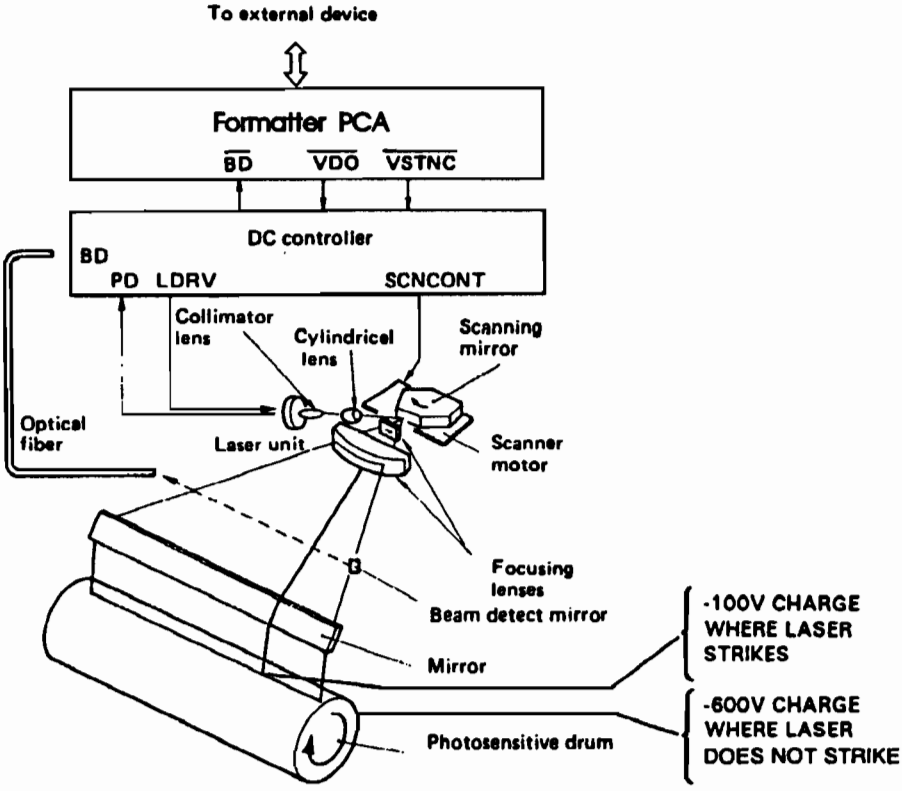


Figure 5-6. Drum Signals

DEVELOPING: Stage Four

At the developing station, the invisible electrostatic image is developed into a visible image on the drum when toner from a developer cylinder is transferred to discharged areas on the drum. The developer consists of a rotating metallic cylinder, a fixed magnet that runs the length of the cylinder, a toner cavity, and a toner-brush-height-control blade. The toner in the toner cavity is a powdery substance made of black plastic resin bound to iron particles. The iron in the toner causes it to be attracted to the magnet inside the cylinder. As the cylinder rotates, the brush-height-control blade limits the amount of toner on the cylinder.

The plastic toner particles acquire a negative surface charge by rubbing against the cylinder which is connected to a negative DC supply (see Figure 5-7). This electrostatic charge causes the toner particles to be attracted to the areas of the drum which have been exposed to laser light and repelled from the areas not exposed (see Figure 5-7). An AC potential is also applied to the developer cylinder to further assist toner particles to overcome the attraction of the magnet and to pull toner back to the cylinder from unexposed areas, thus improving density and contrast.

The DC bias of the developer cylinder can be user-adjusted with the Print Density control. This changes the attractive force between toner and drum, pulling more or less toner to the drum.

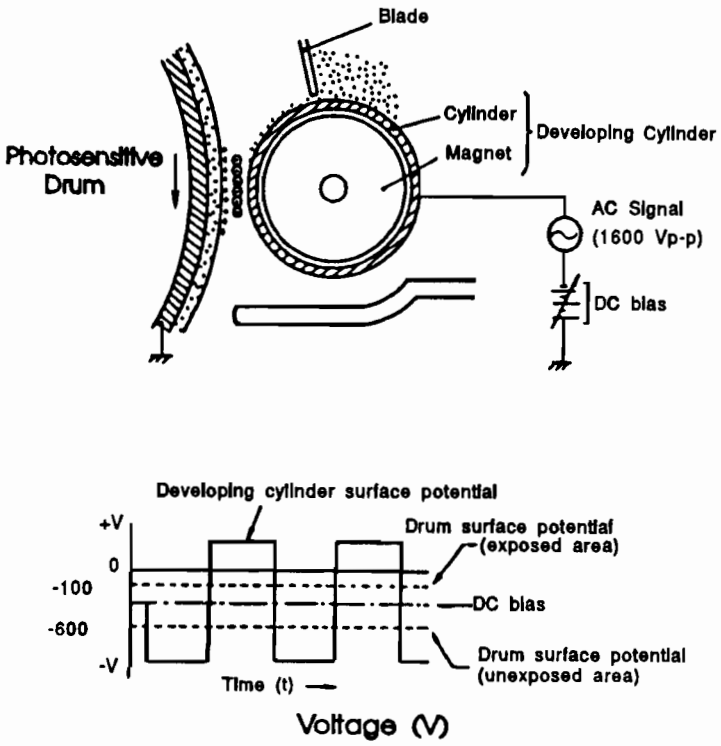


Figure 5-7. Developing an Image

Note

The charges making up the latent image shown in Figure 5-7 are negative but they are shown as positive in the illustration because they are less negative than the charges on the toner.

TRANSFER: Stage Five

At the transfer station, the toner image on the drum is transferred to the paper. A corona assembly is positioned behind the paper so that the paper, which is traveling at the same speed the drum's surface is rotating, contacts the drum. This corona produces positive charges which collect on the back of the paper. Because the positive charges on the paper are stronger, they pull the negatively charged toner particles off the drum (see Figure 5-8).

As the paper and drum continue to advance, the small radius of the drum and the stiffness of the paper cause the paper to naturally peel away from the drum. Separation is also assisted by a high negative voltage being applied to a row of sharp metal teeth—the Static Charge Eliminator. This Static Charge Eliminator weakens the attractive forces between the negatively charged drum surface and positively charged paper. Without this assistance, thin papers could conceivably wrap around the drum. From the transfer station, the paper moves to the fusing station and the drum rotates back to the cleaning station to prepare it to receive the next section of print.

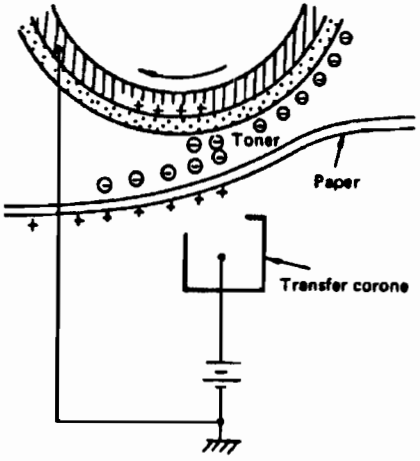


Figure 5-8. Transfer of Toner Image

FUSING: Stage Six

Until the paper reaches the fusing station, the toner is held on the paper only by gravity and weak electrostatic forces. At the fusing station, toner is melted and forced into the paper by heat and pressure to produce a permanent image. To keep the toner or paper from sticking to the Fusing Roller, the roller is covered with a non-stick, Teflon-type resin. A cleaning pad, which is in contact with the Fusing Roller, applies a thin coat of silicone oil to the surface of the roller to also help prevent sticking and wipes off any toner or debris that is transferred to the roller.

The Fusing Roller temperature is monitored by the Machine Control System via a thermistor. The Machine Control System maintains a temperature of 165° C (330° F) during standby mode and 180° C (355° F) during printing.

A thermoprotector switch is also located in the Fusing Assembly, adjacent to the thermistor. The thermoprotector shuts down (opens the power circuit to the fuser bulb) when the temperature is in excess of 210° C (410° F). If the fusing system is shut down by overheating, an ERROR 50 is displayed. If this occurs, the printer must be powered off and the thermoprotector replaced. The printer must remain powered off for at least seven to ten minutes or the ERROR 50 condition will remain.

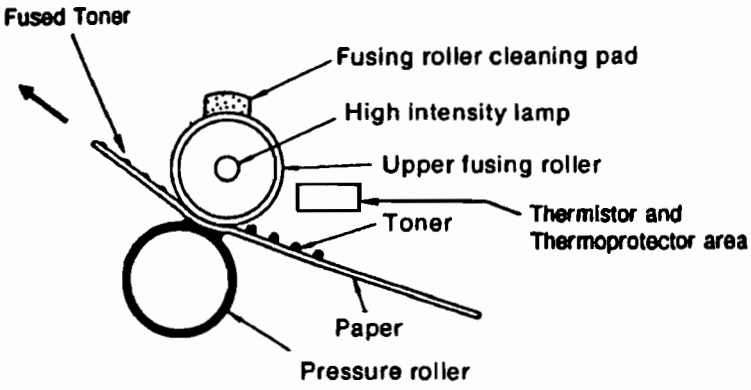


Figure 5-9. Fusing Process

5-3. PAPER PICKUP/FEED SYSTEM

Paper Path Overview

The printer can select paper from one of four sources. These are; upper and lower manual feed input, the upper paper tray, or the lower paper tray. The paper may be printed on one or both sides, and the paper may exit the printer from either the face-down output tray (top of printer) or the face-up output tray (rear of printer). The paper that exits the printer in the rear face-up output tray cannot be duplexed.

Paper Path Single-Sided Print Operation

The paper pickup and feed system is responsible for picking paper from the input paper tray, delivering it to the image formation system at precisely the right time. From the Image Formation system (transfer station) the paper is delivered to the fusing station, and on to the output tray. Figure 5-10 illustrates the HP 33447/HP 33459 paper path. The cassette-feed paper path begins when the Machine Control System (DC Controller PCA), after receiving a print command, starts the Main Drive Motor. Approximately two seconds later, the Upper Paper Pickup Solenoid is enabled and the Upper Paper Pickup Roller makes one rotation and feeds paper to the Registration Rollers. Since the Registration Rollers are not turning at this time, the front edge of the paper bows (see Figure 5-11).

The registration rollers align the leading edge of the paper with the leading edge of the image on the photosensitive drum. When the alignment is correct, the Registration Clutch Solenoid is activated and the paper advances to the photosensitive drum (transfer station). After the print image has been transferred to the paper at the transfer station, the paper is fed into the fusing assembly where the image is permanently bonded to the paper. From the fusing station, the paper exits the printer to either the face-up or face-down output tray depending on the position of the output deflector pawls. A single-sided tray feed operation from the lower paper tray would be similar except the lower paper pick-up roller makes TWO complete rotations to advance the paper from the lower paper tray to the registration rollers. The remainder of the paper path is similar to that of the upper paper tray.

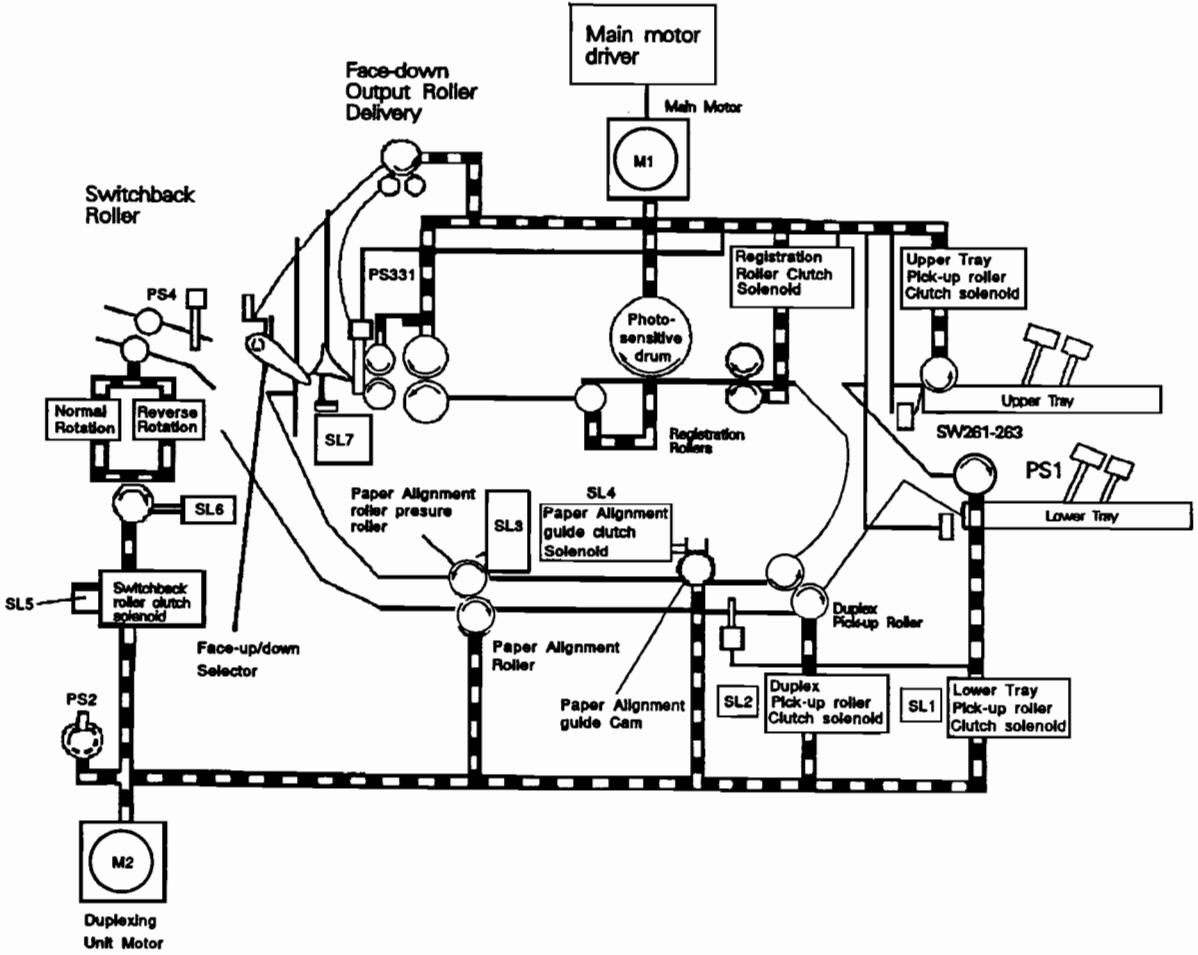


Figure 5-10. Paper Pickup/Feed System

Table 5-2.
Solenoids, Photosensors, Motors and Microswitches

Solenoids	Description	Commands
SL301	Upper Tray Pickup Roller Clutch Solenoid	CPUDU
SL302	Registration Roller Clutch Solenoid	REGD
SL1	Lower Tray Pickup Roller Clutch Solenoid	/CPUDD
SL2	Duplex Pickup Roller Clutch Solenoid	/DUPFED
SL3	Upper Guide Roller Solenoid	/SFTSLD
SL4	Vert/Registration Clutch Solenoid	/GUIDSLD
SL5	Duplex Mode Solenoid	/SBROLD
SL6	Directional Solenoid	/SBOLD
SL7	Switchback Deflector Solenoid	/EXDEF

Photosensors	Description	Commands
PS1	Paper-Out Sensor, Lower Tray	PEMPD
PS2	Timing Disk Photosensor	DMTG
PS3	Duplex Area Paper Sensor	DUPFEDS
PS4	Switchback Paper Sensor	/PRS
PS5	Vert/Registration "Home" Sensor	HMPS
PS6	Lower Paper Tray Manual Feed Sensor	MPFLS
PS301	Paper-Out Sensor, Upper Paper Tray	/PEMPU
PS302	Upper Paper Tray Manual Feed Sensor	/MPFUS
PS331	Fusing Assembly Exit Sensor	PDP

Motors	Description	Commands
M1	Upper Main Motor	/A,A,/B,B
M2	Lower Main Motor	DMDVO

Switches	Description	Commands
MS1	Positioning Knob Microswitch	FUPSENS
SW201	Lower Paper Tray Size (on DC Controller)	
SW202	Lower Paper Tray Size (on DC Controller)	
SW203	Lower Paper Tray Size (on DC Controller)	
SW261	Upper Paper Tray Size	/PSIZEU1
SW262	Upper Paper Tray Size	/PSIZEU2
SW263	Upper Paper Tray Size	/PSIZEU3

DUPLEX PRINTING PAPER PATH

Paper from either the upper or lower paper tray passes through the printer in its normal manner to the fuser. After the image is fused, the paper, through the action of the deflection solenoid, is directed into the switchback assembly. (The paper must change direction in order to be printed on both sides. The switchback mechanism does this). A photosensor in the switchback assembly (ps4) monitors the paper movement. When this photosensor detects that the trailing edge of the paper is clear of the fuser, paper movement stops and a directional solenoid is energized to direct the paper back into the lower part of the printer. Now the paper is pulled back into the printer and fed into the duplex paper path. The duplex path directs the paper to the registration rollers where it is aligned to receive an image on the second side. The Vertical Registration Assembly in the duplex area of the printer ensures that the paper enters the upper registration roller with the correct alignment. After the second side is printed, the paper exits the top output tray (face down).

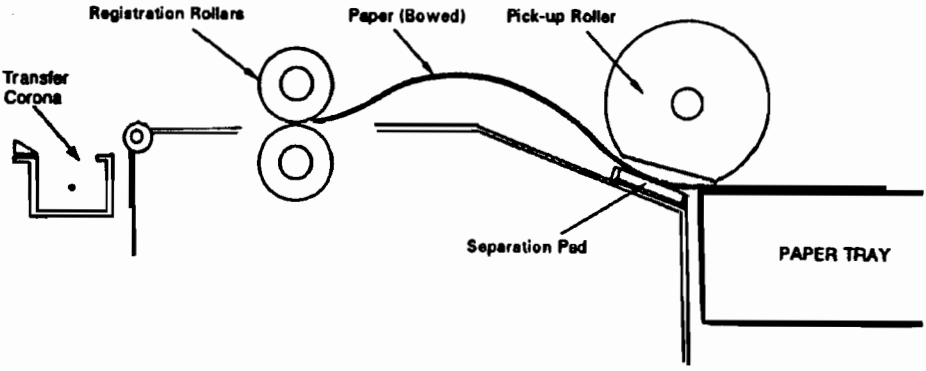


Figure 5-11. Paper Reaching the Registration Rollers

Manual Feed

The timing of manual paper feed is identical to the timing for cassette paper feed, except for the following points:

1. A different input paper sensor is used.
   - Cassette paper out sensor: PS301.
   - Manual feed paper sensor: PS302.
2. The initial warmup time for manual feed is longer. It is assumed that manual feed will be used for heavier media such as envelopes and heavier paper. Because these heavier papers will absorb more heat, the extra warmup time allows all components of the fusing system to reach the 180° C (355° F) temperature before paper movement begins, which is required for proper fusing of toner to these papers.

Main Drive

The upper motor (M1) and lower motor (M2) operate all the mechanical drives for the paper path. The scanner is operated in response to the Scanner Motor Drive command (SCN-CONT) from the DC Controller PCA.

The upper and lower motors are controlled via a driver by commands output from the DC Controller. The upper and lower motors, via gear trains, drive the following:

- Pickup Rollers.
- Registration Assembly.
- Drum (within EP-S Cartridge).
- Feed Rollers.
- Fusing Assembly.
- Delivery Rollers.
- Switchback Assembly
- Lower Alignment Roller
- Vertical Registration Assembly

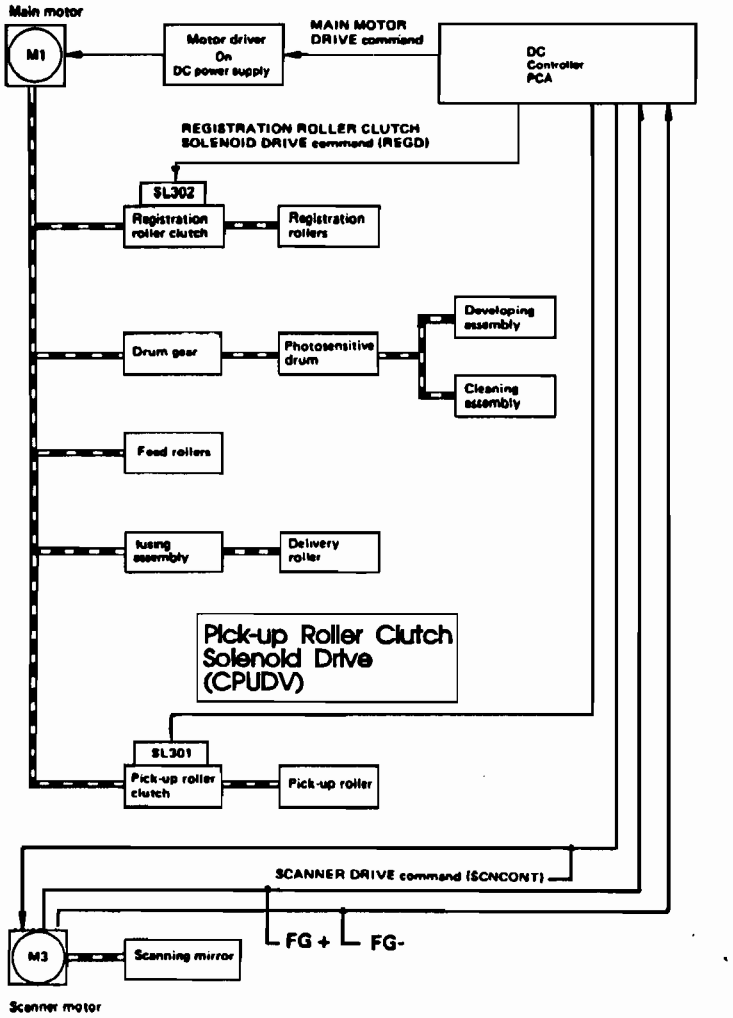


Figure 5-12. Upper Main Drive System

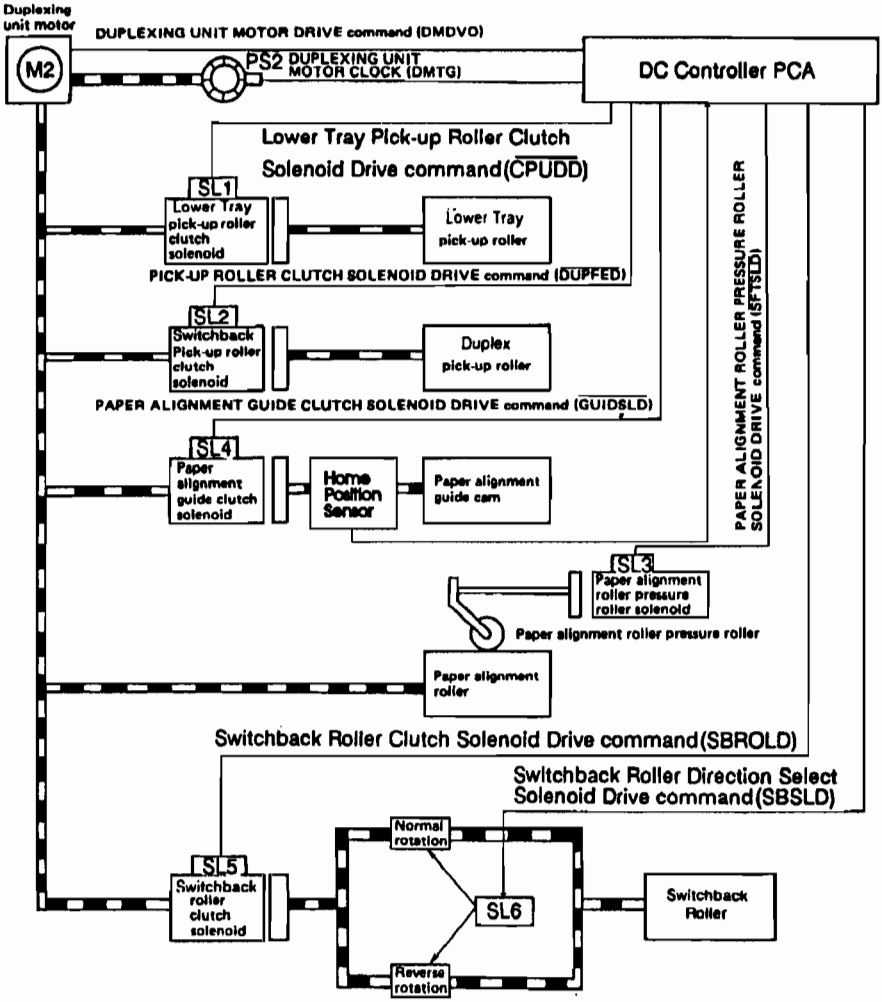


Figure 5-13. Lower Main Drive System

5-4. MACHINE CONTROL SYSTEM

The DC Controller PCA—the machine control system—is responsible for coordinating all activities involved in the printing process. It drives the laser beam, coordinates dot pattern (video) data from the Formatter PCA with paper size, drum sensitivity, and laser beam motion information. The machine control system also controls and monitors paper motion, the high-voltage system, fuser temperature, erase lamps, and all motors. It also shares machine status information with the Formatter PCA so that proper diagnostic messages are displayed on the Control Panel (see Figure 5-14). A list of the signals monitored or controlled by the DC Controller PCA is in Chapter 7, Section 7-7.

In summary, the following items are controlled by the machine control system:

- Paper motion.
- Laser drive.
- Erase Lamps.
- Timing.
- Machine status.
- Paper size and availability.
- High-voltage system.
- Fuser temperature.
- Scanner and Main Motor drivers.
- +24 V operation. Switchback Status

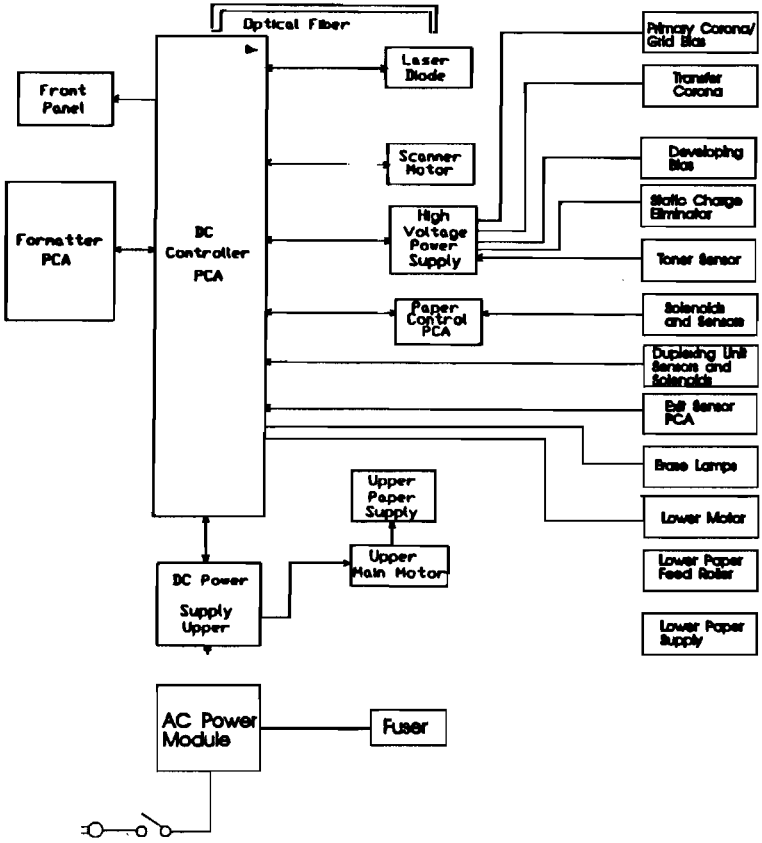


Figure 5-14. DC Controller Block Diagram

5-5. INTERFACE SYSTEM

General

For both the HP 33447 and HP 33459, the Formatter PCA is responsible for the following:

- Communicating with the host system, either through the standard serial or parallel ports or through the optional I/O interface, if installed.
- Monitoring operator interface via the printer's Control Panel and displaying printer status information to the operator.
- Communicating with the print engine (DC Controller PCA).
- Storing font information.
- Storing configuration information.
- Manipulating incoming data, such as conversion of ASCII character data into a binary page image that the print engine may use for creating a laser image on the photoconductive drum.

In addition, for the HP 33459 only, the Formatter PCA contains circuitry for Resolution Enhancement™ capable of modulating the DC Controller PCA's laser drive circuitry to produce "smoothed" black-to-white boundaries.

Optional cartridges may also be installed in connectors on the Formatter PCA to provide additional fonts for text printing or to overlay portions of machine code (ROM) for printer emulation. Proper communication between the Formatter PCA and the host system is established by configuration settings selected at the Control Panel. ASCII code and graphics data from the external device is then processed according to the Control Panel settings or printer commands and is converted to dot data. The dot data is used for modulating the laser.

Descriptions of Blocks in the HP 33447/33459 Formatter PCA Diagram

The HP 33447 Formatter PCA Block Diagram is shown in Figure 5-15.

The Block Diagram of the HP 33459 Formatter PCA is shown in Figure 5-16.

ASIC (Application Specific Integrated Chip)

The Application Specific Integrated Chip (ASIC) is a custom-built integrated chip designed to assist the main microprocessor in formatting print image information. The ASIC has two subsystems: the dynamic memory controller and hardware assist logic, and the video direct memory access control. As the dynamic memory controller, the ASIC controls most DRAM access. The video direct memory portion of the ASIC prepares and provides serialized video data that is to be used for the print engine's laser subsystem.

CPU (Central Processing Unit)

The CPU block contains a 16-bit microprocessor that executes programs stored in ROM to control the operation of the Interface PCA. The Microprocessor has a clock rate of 9.83 Mhz.

EPROM/ROM (Erasable-Programable Read-Only Memory)

Besides storing microprocessor control programs, the ROM stores the internal character set patterns for each printer.

NVRAM (Non-Volatile Random Access Memory)

The NVRAM is a non-volatile random-access memory. Since its contents are not lost when power is switched off, it is used to store printing setup configuration information entered via the Control Panel and page count information.

SRAM (Static Random Access Memory)

The 4 Kbyte SRAM is used as a stack area in the 16 Mbyte address space accessed by the microprocessor (CPU).

Address Controller

The address controller is a single gate array circuit (GA1). Jumpers attached to the gate array enable the ROM address region to be changed. The address controller also outputs address information enabling access to data in the Interface PCA's DRAM.

DRAM (Dynamic Random Access Memory)

The DRAM is a dynamic random access memory with a maximum capacity of 512 Kbytes for the HP 33447 Printer and 1Mbyte for the HP 33459 Printer. It stores printing and font information input from the host system. It also stores page formatting information and other parameters required by the microprocessor. Expansion memory can be added to increase the DRAM by one or two Mbytes increments, depending upon the board purchased.

Bit Shifter

The bit shifter is used to offset or overlay printed characters, and to shift data by 1 to 15 bits.

Timing Controller

The timing controller generates timing signals needed when data is written to or read from DRAM. It also generates DRAM refresh signals.

I/O Controller

The I/O controller controls the timing of data input from an optional I/O PCA to the microprocessor via the parallel interface connector. It also controls the timing of communication with the DC Controller.

Video Interface

The video interface has two 4-Kbyte scan buffer memories (SRAMs) through which printing information converted to dot data is output continuously to the DC Controller.

Font Cartridge Interface

"Font cartridges" are ROM cartridges which hold additional dot pattern data for different fonts. The font cartridge interface buffers the main bus from the font cartridge connectors.

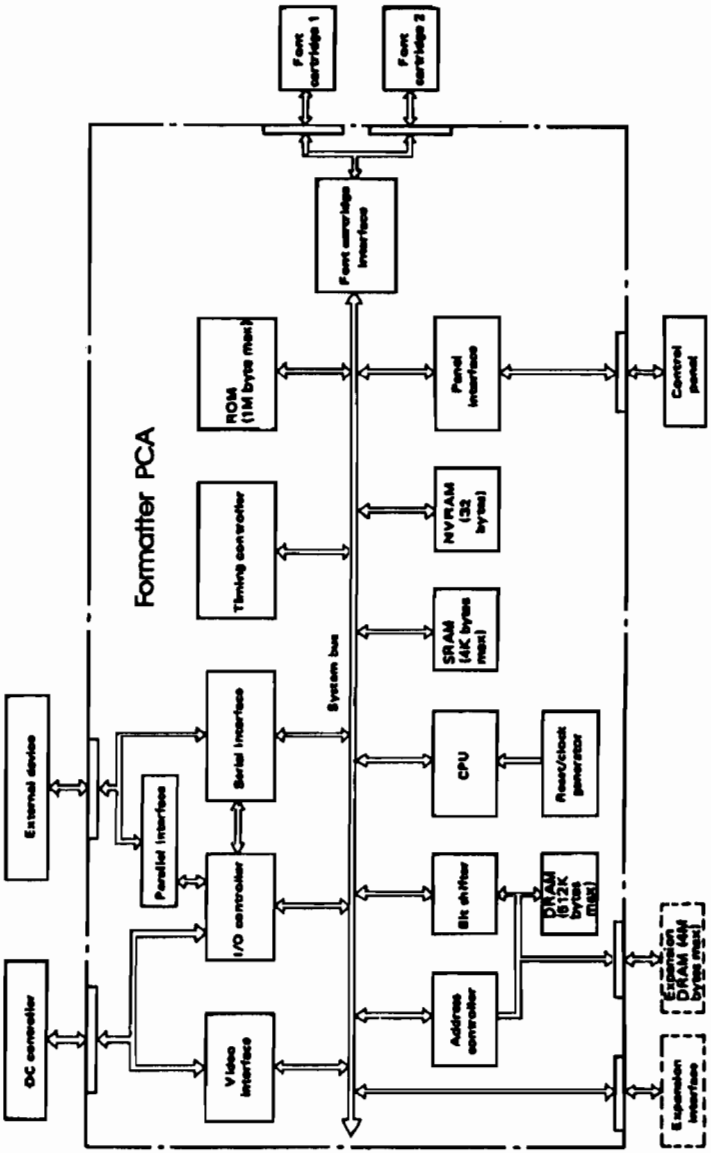


Figure 5-15. HP 33447 Formatter PCA Block Diagram

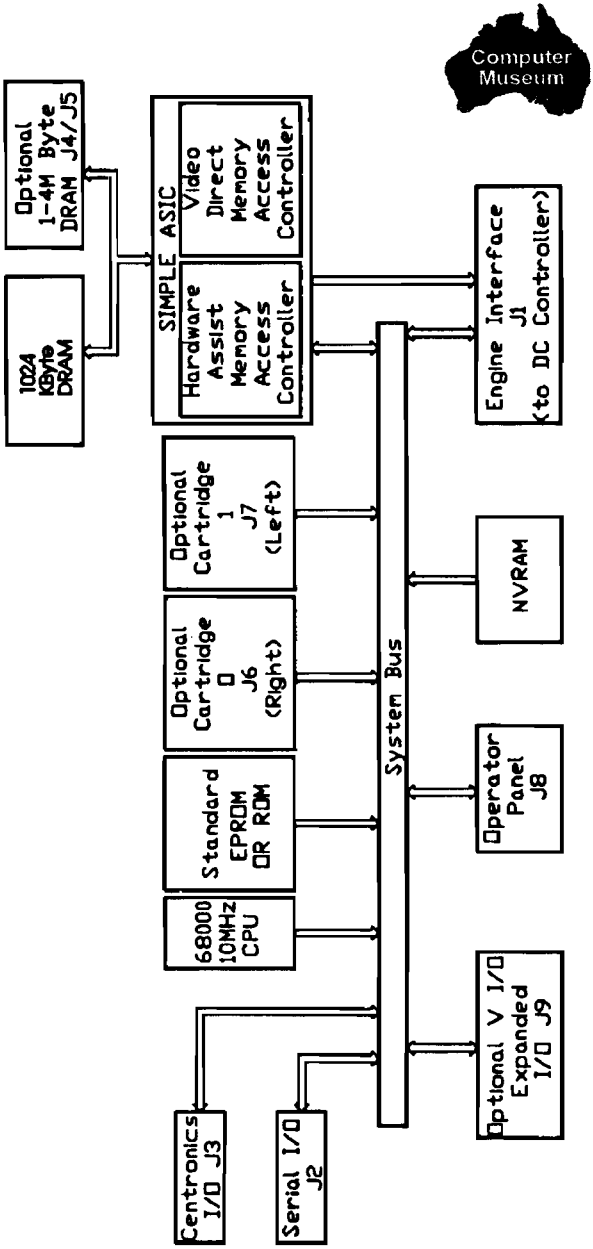


Figure 5-16. HP 33459 Formatter Block Diagram

5-6. POWER DISTRIBUTION

When the ON/OFF switch is set to ON, AC voltage is supplied to the DC Power Supply Assembly via the AC Power Module. Fuse F1 protects the DC Power Supply Assembly from current surges. The DC Power Supply provides the following voltages:

+5 Vdc and -5 Vdc

+24A Vdc and +24B Vdc

The RESET signal generated by the DC Power Supply Assembly results from any of the following conditions:

- When the power is initially switched ON.
- When the +5 Vdc power falls below the required level.
- When AC power is momentarily interrupted.

The +5 Vdc power supply is the first supply enabled and is the only voltage level required to "wake up" the main microprocessor on the DC Controller PCA. After the processor initializes itself, the processor generates the REMOTE signal which enables the +24 Vdc regulators.

The High-Voltage Power Supply is a modular assembly that is enabled by the +24VB voltage through J601. The High-Voltage Power Supply receives a feedback voltage from the toner cartridge which is proprotional to the level of toner available in the cartridge. This voltage level will eventually generate a "Toner Low" message as the level of available toner decreases.

The High-Voltage Power Supply generates voltages for:

- The Primary Corona Bias.
- The Transfer Corona.
- Developing Bias Voltage.
- Static Charge Eliminator Voltage.

6

REMOVAL AND REPLACEMENT

6-1. INTRODUCTION

General

The service philosophy for the HP 33447 and HP 33459 printers centers on the modular-level replacement of electro-mechanical assemblies and some associated components as well as the assembly-level replacement of printed circuit assemblies (PCAs). No attempt should be made to identify component failures within these assemblies. The components and the procedures for their removal and replacement are essentially the same for both printers. *Unless specifically noted, replacement is the reverse of removal.*

The procedures in this chapter attempt to be as thorough as possible regarding the removal and replacement of specific assemblies with minimal removal of other components. Figures in Chapter 8, although not generally referenced, will also be found useful. The service representative should use these procedures as a guide to build familiarity with the replaceable components of both printers. In referring to the orientation of the various assemblies, the *front* of the printer is the Control Panel/Paper Tray end. Right and left sides of the printer are with reference to the user facing the control panel.

Warning

Before disassembling the printer, disconnect the power cord, remove the EP-S Cartridge, and allow Fusing Assembly components to cool.

Tools Required

- Magnetic Phillips No. 2 screwdriver with minimum 4-inch shaft.
- Needle-nose pliers.
- Small flat-blade screwdriver.
- Antistatic safeguards.
- Stubby or offset magnetic screwdriver.
- Springhook

Caution

PCA's are easily damaged by Electro-Static Discharge (ESD). Use personal grounding techniques and equipment when handling PCA's. The *Electrically Conductive Field Service Grounding Kit* (HP 9300-0933) is available for this purpose.

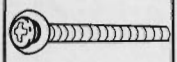
Hardware Review

In the removal procedures which follow in this chapter, numbers inside parentheses — (2) for example — refer to the quantity of screws to be removed. Pay careful attention to the type of screw removed; always replace it in the same location. The following table presents usage guidelines for the principal screw types used in the HP 33447 and HP 33459 printers.

Caution

Use of a pozidrive screwdriver may strip the screw head. The HP 33447 and HP 33459 printers *use only No. 2 Phillips screws*. Use the proper screwdriver when working with these screws.

Table 6-1. Types of Fasteners

Example	Type	Use
	Black Pan-head Machine Screw.	Fastening Metal Or Plastic To Metal
	Plated Pan-head Phillips Machine Screw.	Fastening Metal To Metal.
	Black Washer-head Phillips Machine Screw.	Fastening Plastic Or Metal To Metal When A Washer Is Required.
	Plated Washer-head Machine Screw.	Fastening Metal To Metal When A Washer Is Required.
	Self-tapping Phillips Screw.	Attaching Plastic Parts To Plastic W/o Metal Inserts
	Plated Phillips Shoulder Screw.	Attaching Fusing Assembly Cover, H/V Controller, Env. Feeder Connector.
	Phillips Screw With Captive Star Washer.	Fastening Metal To Metal Where Ideal Ground Is Required.
	Long, Brass-colored Screw	Laser Scanning Assembly.

Component Location and Identification

Since the location of major external components is similar for both printers, only the HP 33447 is shown here. For HP 33459 component identification, see Chapter 1, Section 1-6.

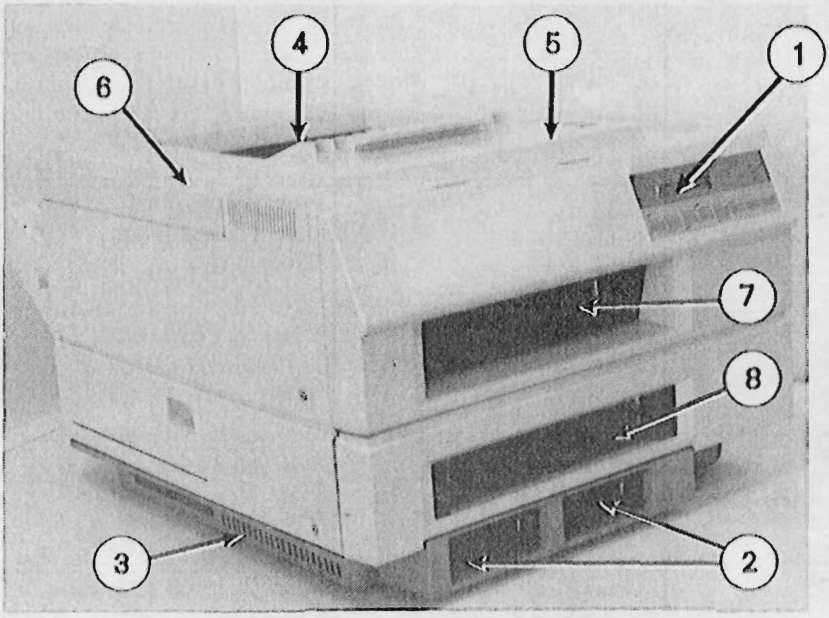


Figure 6-1. Front View

1. Control Panel
2. Font Cartridge Slots
3. Expansion Memory Slot(s)
4. Face-Down Output Tray
5. Top Cover Release Button
6. Top Cover Assembly (Hinged)
7. Upper Paper Tray Slot
8. Lower Paper Tray Slot

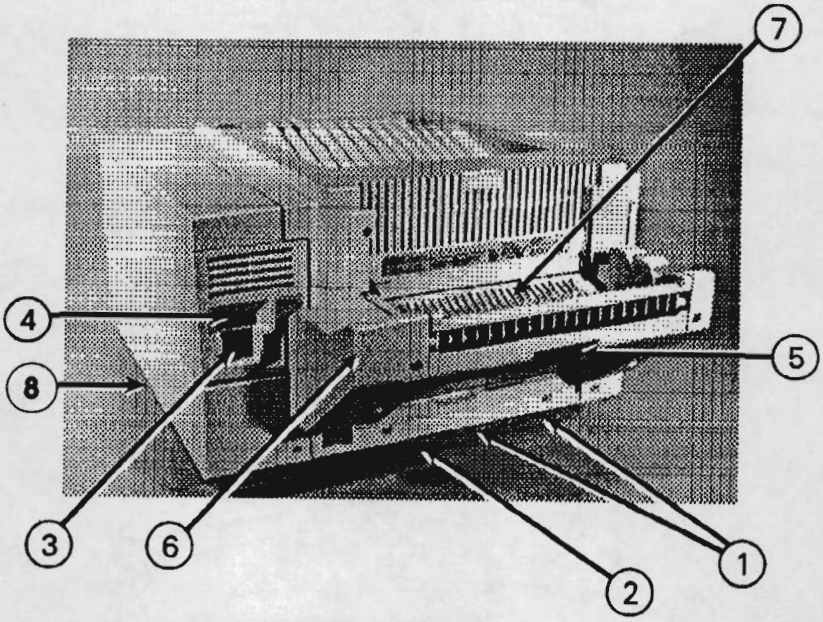


Figure 6-2. Rear View

1. Serial and Parallel I/O Ports
2. Optional I/O Slot
3. Power Connector
4. Power Switch
5. Switchback Paper Guide
6. Switchback Assembly
7. Face-Up (Rear) Output Tray (Closed)
8. Test Print Button

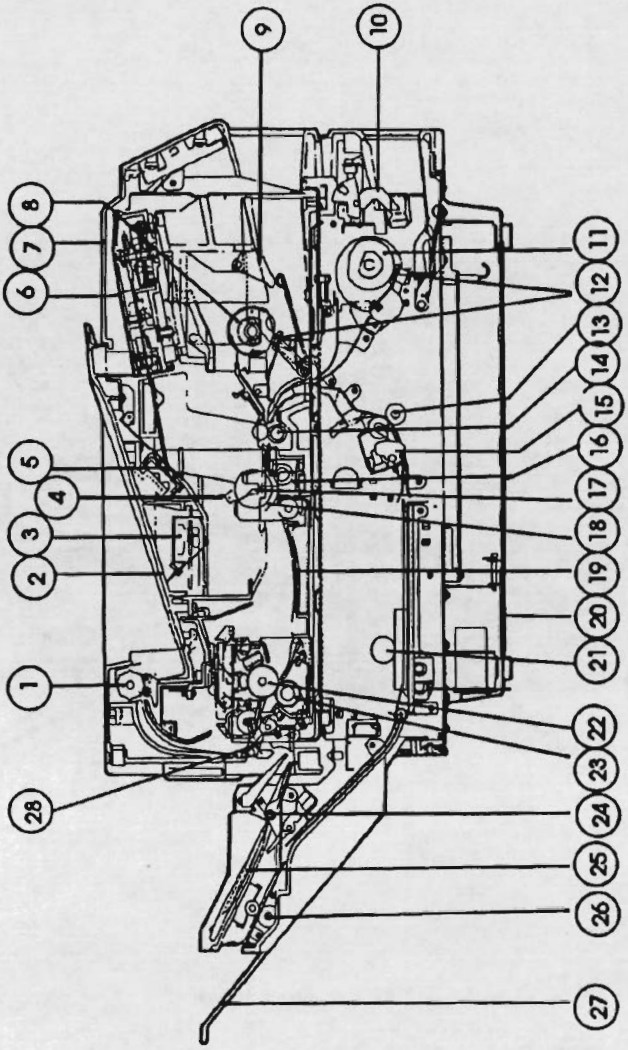


Figure 6-3.
Internal Printer Components
(HP 33447 shown, but all internal parts are essentially identical)

1. Delivery Assembly
2. Face-Down Tray
3. Erase Lamp Assembly
4. Primary Corona Wire
5. Beam-to-Drum Mirror
6. Laser/Scanning Assembly
7. Main Body Covers
8. Upper Tray Feed Roller
9. Upper Paper Sensor
10. Lower Paper Sensor
11. Lower Tray Pickup Roller
12. Separation Pads
13. Duplex Pickup Roller
14. Registration Rollers
15. Duplex Paper Sensor
16. Transfer Corona Ass'y
17. Photosensitive Drum
18. Drum Shield
19. Feed Guide
20. Bottom Pan
21. Pressure Roller
22. Upper Fusing Roller
23. Lower Fusing Roller
24. Switchback Paper Sensor
25. Face-Up Delivery Tray
26. Switchback Drive Roller
27. Switchback Paper Guide
28. Fuser Paper Sensor

6-2. COVERS, PANELS, AND ASSOCIATED PARTS

General

This section describes removal of the Main Body Covers and related parts which allow access to the Main Body components described in Section 6-4. Access to components within the hinged Top Cover Assembly or encased within the bottom cover(s) are described later in this section. This section contains two sets of procedures. One for removing LaserJet IID covers and brackets, another for removing LaserJet IIID covers and brackets. All other removal and replacement procedures are the same for both printers.

Main Body Covers

Warning

Remove the EP-S Cartridge and Paper Trays and unplug the printer from its power source before proceeding with any removal procedures.

HP 33447 Printer

Upper Main Body Removal

This procedure involves rotating the top cover with the control panel cable attached. Be careful to support the cover properly while disconnecting the control panel cable.

1. Remove the power cord from the printer's receptacle, the paper tray, and any font cartridges.
2. Remove (8) screws securing the Main Body Cover Assembly (see Figure 6-4).
3. Remove the cover by lifting the entire assembly slightly and rotating the rear of the cover up and toward the Control Panel. Be careful to avoid damage to the Control Panel and cables.
4. Disconnect the Control Panel connector by pushing the plastic latches outward, then unseating the connector.
5. The Main Body Cover Assembly may be further disassembled if required.

Lower Main Body Cover Removal HP 33447

The lower main body covers house the duplexing mechanism, the lower registration and pick solenoids and the lower main motor drive assembly. For the HP 33447, the covers are removed from:

1. The lower right side first (3 screws).
2. The lower left side (2 screws).
3. Finally the lower front cover is removed (4 screws).

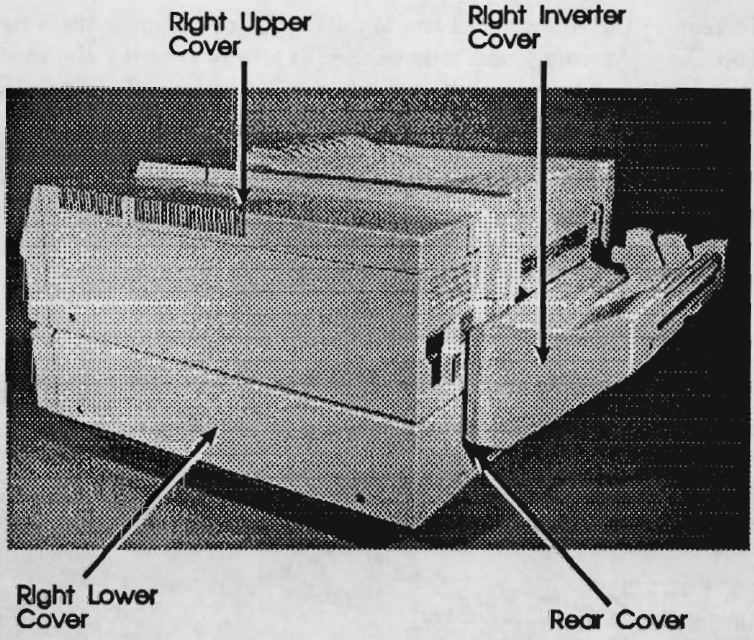


Figure 6-4. HP33447 Main Body Covers

HP 33459 Printer Covers Removal

The HP 33459 main body covers interlock tightly. *The four covers that form the HP 33459 Main Body Covers may be damaged if not removed as described below* (see Figure 6-5).

The printer's model and serial number are permanently attached to the Fan Guide portion of the right side cover. Be sure to put the cover back on the printer from which it was removed. *If the right side cover must be replaced, the Fan Guide panel containing the model and serial number must be transferred to the new right side panel.*

Top Cover Removal

1. To remove the top cover of the Main Body Covers, open the hinged Top Cover Assembly and remove the (3) screws securing the top cover and the (1) screw in the side cover at the rear of the printer. Lift the right rear corner about 3 inches then push in on the *right side cover* at the points shown in Figure 6-6. Rotate the rear of the top cover to vertical before lifting it off.
2. The three tabs on the front edge of the top cover must fit into the slots on the front cover before rotating the top cover into place (see Figure 6-5).

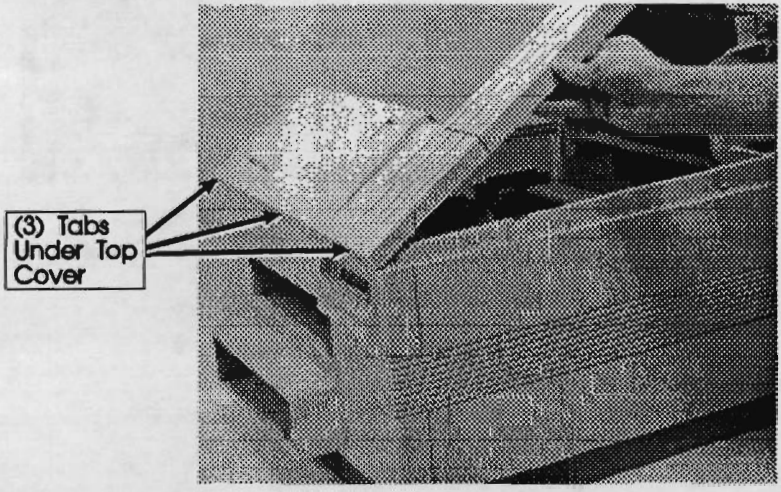


Figure 6-5. HP 33459 Top Cover Removal

Caution

The side covers are locked to the front cover with tabs. To avoid breaking the tabs, lift the covers straight up from the printer body.

Right Side Cover Removal

1. Remove the right side cover by removing the (2) screws — one at the rear next to the Power Switch and one attaching it to the front cover — and *lifting it vertically* out of the printer.
2. Note that the Fan Guide panel (Power Switch area) which contains the model and serial number plate can be detached from the right side cover (see the caution at the top of the page).

Left Side Cover Removal

1. Remove the left side cover by removing the (3) screws — two attaching it to the base plate and one attaching it to the front cover — and lifting it *vertically* out of the printer. Be careful to keep the front cover from falling. (**Hint:** Leave the paper tray installed to hold the front cover in place.)

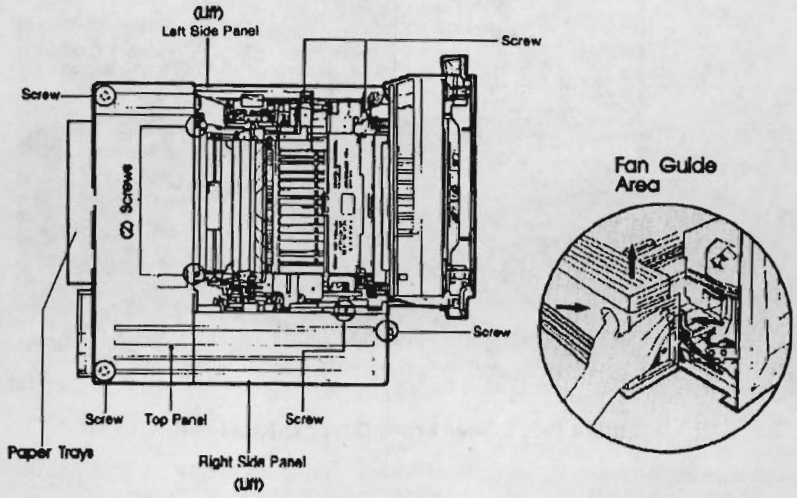


Figure 6-6. HP 33459 Side Cover Removal

Front Cover Removal HP33459

1. The Front cover locks to the lower front cover by a lip on its lower edge. Carefully pull the front cover straight forward to separate the two sections.
2. Detach the Control Panel Cable connector by pushing the plastic latches outward, then unseating the connector.
3. The three tabs on the front edge of the top cover must fit into the slots on the front cover before rotating the top cover into place (see Figure 6-5).

Caution

If the front cover is not installed correctly, intermittent static-induced hardware failures will periodically disable the printer.

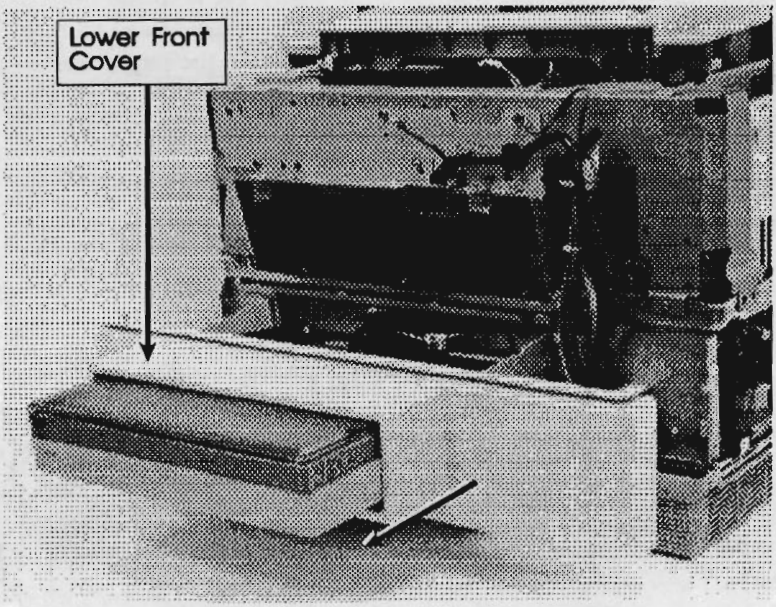


Figure 6-7. Lower Front Cover Disassembly

HP 33459 Lower Covers Removal

The lower covers must be removed to access components in the lower printer region. To remove the Lower Right Side Cover, first remove the (2 screws) Rear Switchback Cover, then remove the (1) screw that holds the Lower Right Cover (see Figure 6-8). The forward end of the cover slips underneath the lower front covers and is not held by screws.

The lower left side cover is removed by first removing the Rear Switchback Cover, the Top Cover and the Upper Left Side Cover. Finally, remove the (1) screw at the lower rear of the cover that holds the Lower Left Cover in place (see Figure 6-8). The forward end of the side cover slips underneath the lower front covers and is not held in place with screws (see Figure 6-7.)

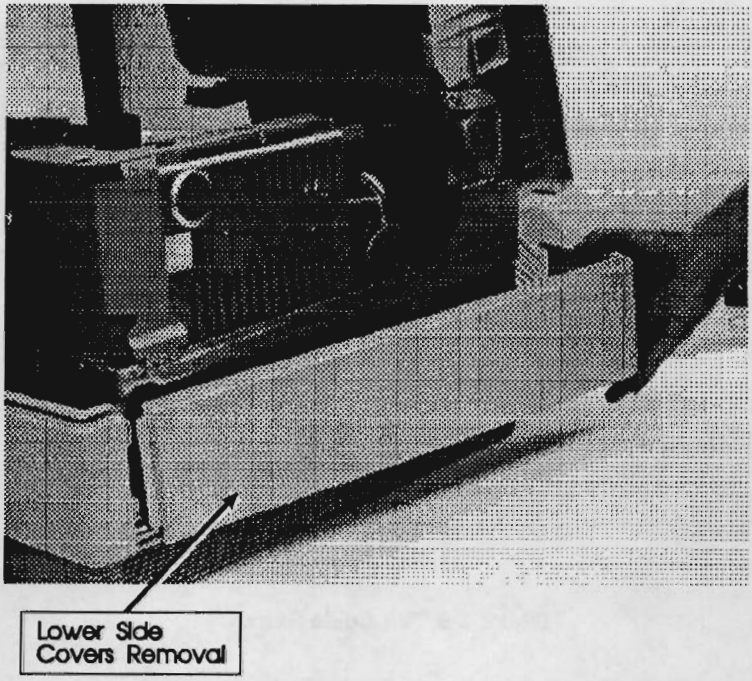


Figure 6-8. HP 33459 Lower Side Covers Removal

HP 33459 Fan Guide (Serial Number Plate)

The HP 33459's model and serial number label is affixed to the upper right cover assembly. If the original cover is replaced, refer to Figure 6-9 for instruction on moving the serial number label.

1. Remove the (3) top cover screws, then the (2) right cover screws of the Main Body Covers.
2. Remove the black self-tapping screws (2) securing the Fan Guide to the right cover.
3. Lift the Fan Guide slightly and slide it out of it positioning pin retainers on the right cover.

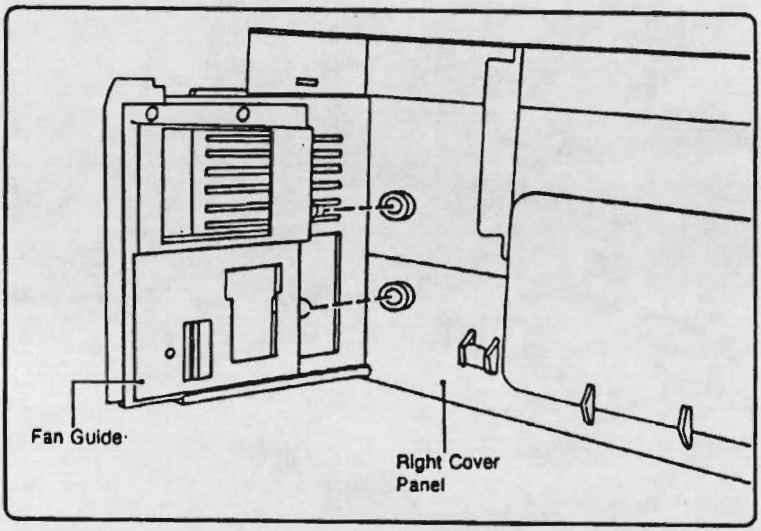


Figure 6-9. Fan Guide Removal

Control Panel Removal (Both Printers)

1. Remove the Main Body Covers.
2. Remove the (4) screws securing the Control Panel to the front cover (see Figure 6-10).

HP 33459 only: When replacing the Control Panel, be sure the keys do not bind on the front cover surfaces.

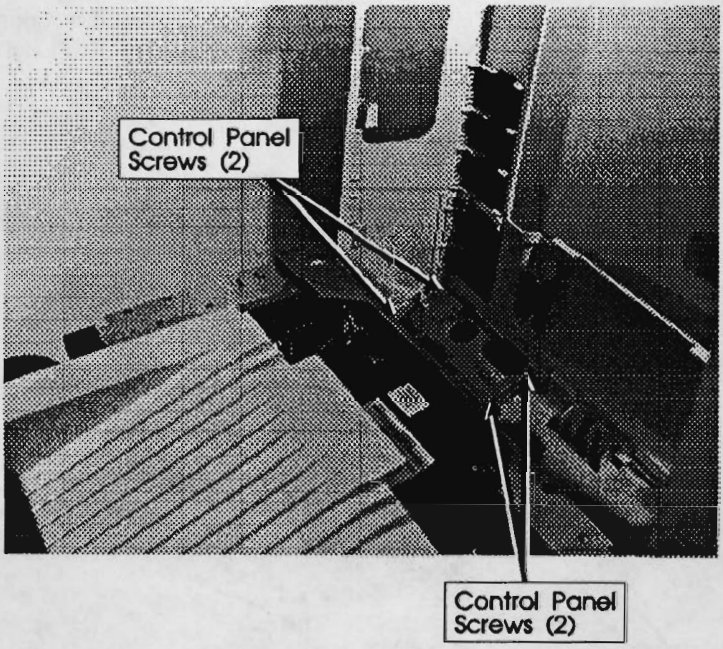


Figure 6-10. Control Panel Removal HP 33447 and 33459

HP 33447 Front Support Plate

Removing the HP33447 Front Support Plate

The Front Support Plate (shown in Figure 6-11) must be removed before most of the components in the front of the printer can be accessed.

1. Remove the Main Body Covers.
2. Disconnect the ground wire (1) screw and cable restraint connected to the plate. Note the cable routing.
3. Remove the (6) screws that secure the plate to the printer.
4. Carefully lift the plate slightly and to the right to avoid snagging the Laser/Scanning Assembly cables. Be particularly careful of the fiber-optic cable.

Replace the cable restraint.

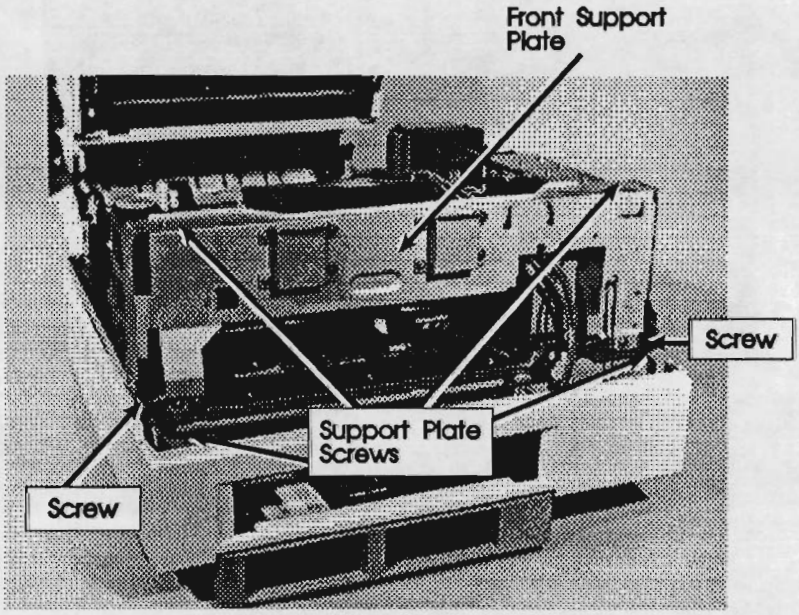


Figure 6-11. HP 33447 Front Support Plate

Removing the HP33459 Front Support Plate

The LaserJet IIID Front Support Plate contains the Envelope Feeder support bracket, which must be removed before the Front Support Plate can be detached from the printer. *Mark the location of the front support plate before loosening the screws that hold it in place.* To remove the Feeder Support Bracket:

1. Remove the body covers.
2. Free the envelope feeder cable from its restraint (see Figure 6-12).
3. Remove the (2) screws that attach the envelope feeder connector bracket.
4. Remove the (2) shoulder screws that attach the envelope feeder connector, and (2) screw from the grounding lugs.
5. Remove the (5) screws that attach the envelope feeder support bracket.
6. Remove the Control Front Panel cable from its restraint.
7. Remove the (6 screws) Front Cover Support Plate.

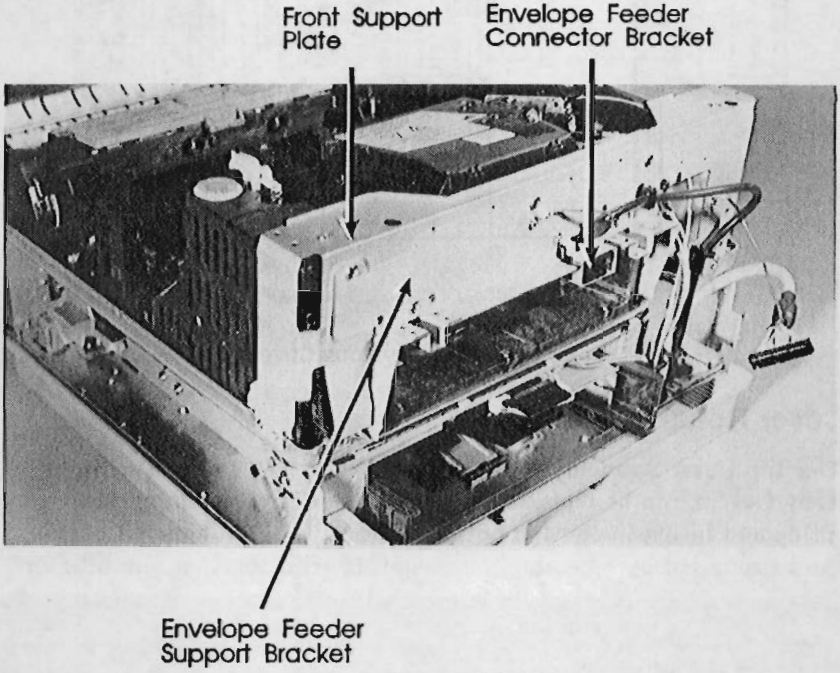


Figure 6-12. HP 33459 Front Support Plate and Brackets

Miscellaneous Covers

Two protective covers, the Exit Sensor PCA Cover (1) and the Main Motor Drive Gears Cover (1), located inside the printers (see Figure 6-13) can be removed to facilitate access to other components. Note the position of each of these covers and replace them when servicing is complete.

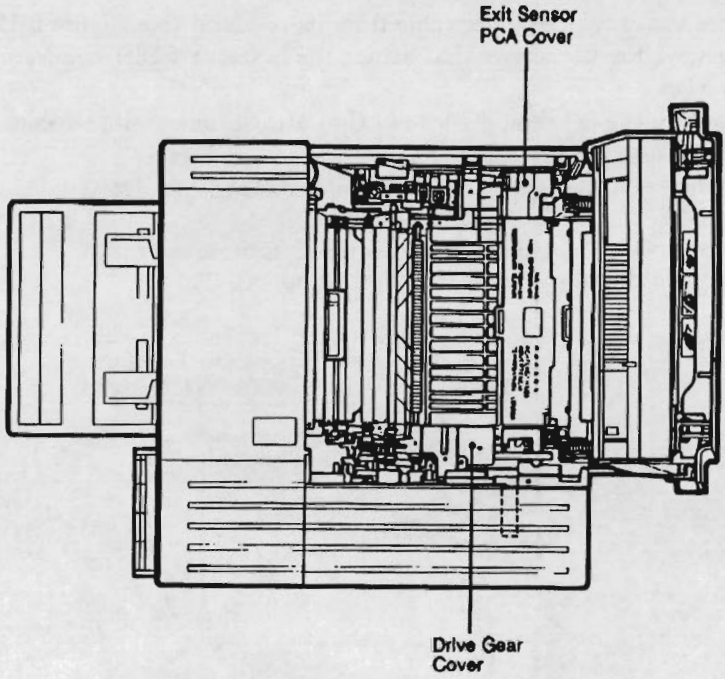


Figure 6-13. Miscellaneous Covers

Cover Release Button

The Top Cover Assembly Release Button, attached to the Top Main Body Covers, can be replaced on the HP 33447 by detaching the spring and lifting the button out. For the HP 33459, the latch button can be removed by squeezing the mounting arms together and lifting it out.

6-3. SWITCHBACK ASSEMBLY

Switchback Assembly Covers Removal

General

The HP33447 and the HP33459 Switchback Assemblies have different methods of removing the switchback covers. The switchback mechanisms of the two printers are identical.

Switchback Side Cover Removal (HP 33447)

1. Remove the screws that secure the side covers as shown in (Figure 6-14).
2. Remove each switchback cover by rotating it in the direction indicated by the arrows.

Remove and replace the left side cover and Output Selector Knob as a unit. When installing the left cover be careful to align the knob with the output selector lever.

Switchback Rear Covers Removal (HP33447)

1. Remove the (4) screws holding the upper rear cover.
2. Remove the (2) screws holding the lower rear cover.

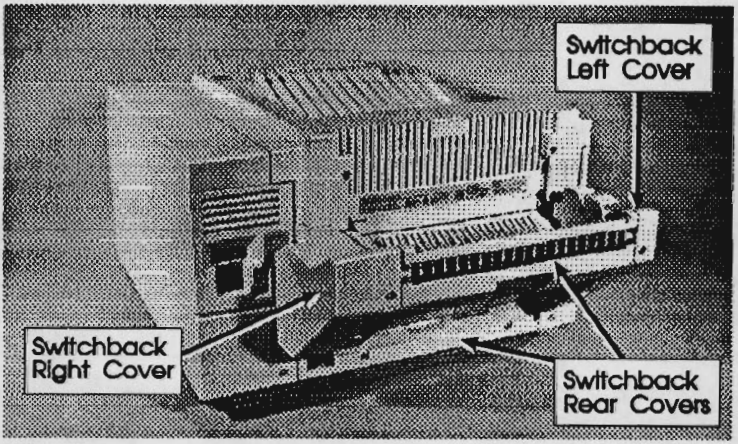


Figure 6-14. Switchback Assembly Covers (HP 33447)

Switchback Covers Removal (HP 33459)

As with the other LaserJet IIID body covers, the Switchback Assembly covers interlock with one another. The removal order is:

1. Remove the (2) screws that secure the rear switchback cover.
2. Slide the rear cover straight out from the body of the printer toward the rear. Note that the rear cover engages slots in both side covers.
3. Remove the black self-tapping screw from each side cover.
4. The left side cover must be removed with the output selector knob attached. See Figure 6-15

For both printers, when installing the left side cover be careful to align the knob with the output selector lever.

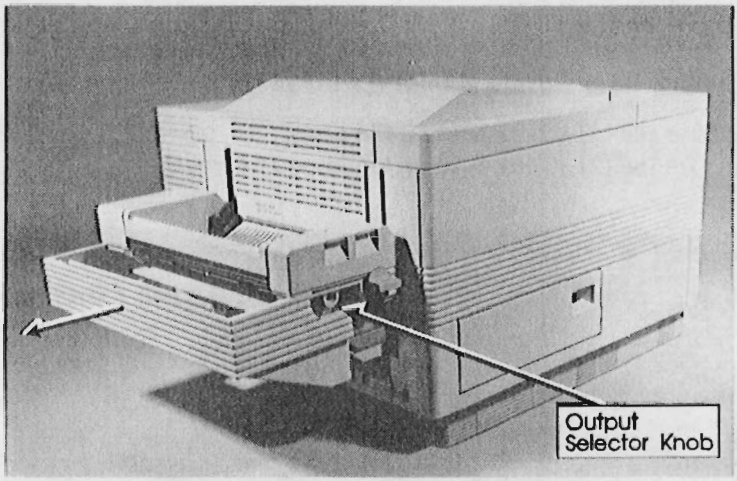


Figure 6-15. HP 33459 Rear Cover Removal

Switchback Drive Control Assembly Removal

The Switchback Drive Control Assembly is located on the printer's lower right side. To remove the Switchback Drive Control Assembly:

1. Remove the lower right side cover.
2. Disconnect the connector J706.
3. Remove the (2) screws that hold the Switchback Drive Control Assembly.
4. Remove the Switchback Drive Control Assembly.

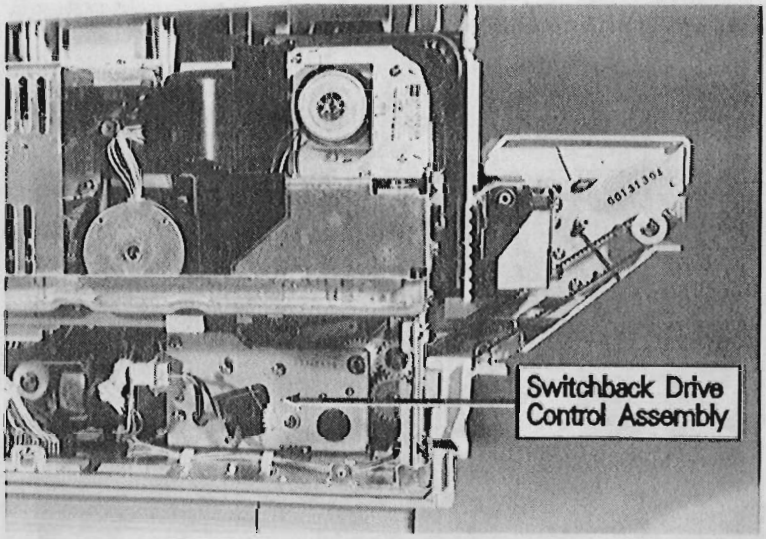


Figure 6-16. HP33447/33459 Drive Control Assembly

Switchback Assembly Removal

The Switchback Assembly removal procedures apply to both the HP33447 and HP33459 Printers. Use this procedure ONLY if it is necessary to replace the complete switchback assembly. It is *not necessary* to remove the assembly in order to replace components within it. Refer to other switchback removal procedures for component replacement instructions.

1. Remove the rear and side covers.
2. Loosen both black guide brackets that support the switchback assembly (3 screws) and free them from the vertical tracks. Lower the switchback assembly.
3. Remove the large support spring (1 screw) located on the right side of the switchback assembly.

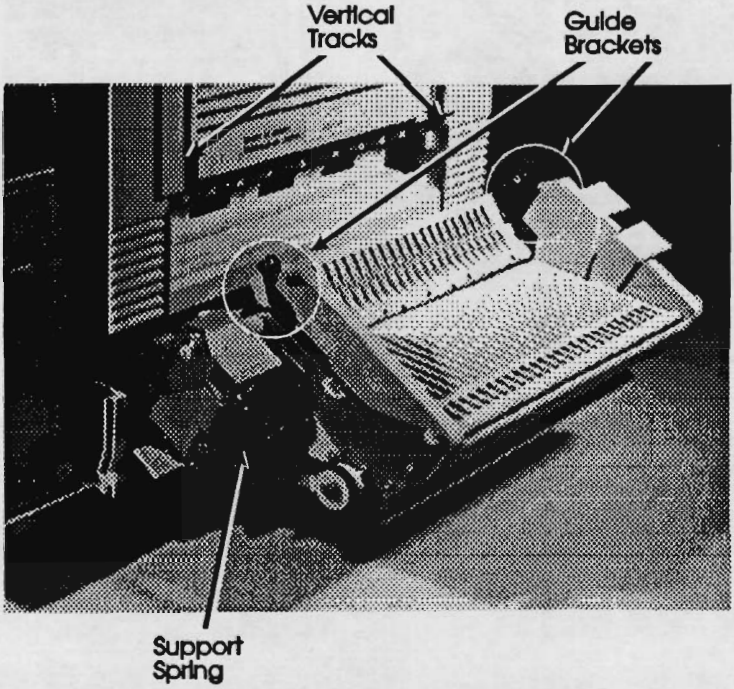


Figure 6-17. HP 33459 Switchback Assembly Removal

Duplex Drive Gear Removal

1. Remove the right angle bracket that connects the drive gear with the rear printer frame. This horizontally mounted bracket passes through the rear printer frame and is held in place with (2) screws. One screw attaches to the printer frame, the other holds a drive gear to the bracket.
2. Remove the bracket, gear assembly, bushings, and drive belt.
3. Unplug the (2) connectors from the rear of the printer.
4. Remove (3) "E" rings, (two on the right, one on the left) then remove the switchback assembly.

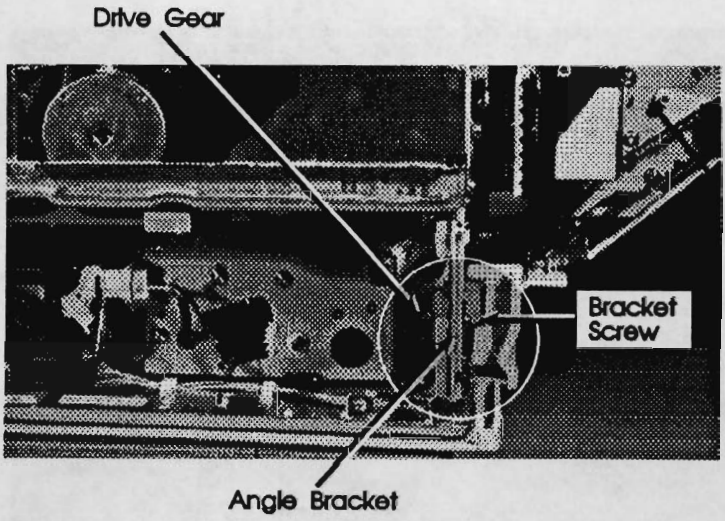


Figure 6-18. Angle Bracket and Drive Gear (HP 33447 and 33459)

Switchback Assembly Adjustment

This procedure should be performed when the switchback assembly is installed or if paper jams occur when paper passes to the switchback assembly.

1. Remove the right and left side covers of the switchback assembly.
2. Loosen both of the switchback assembly support brackets. These have (2) screws on the left and (1) screw on the right. (See Figure 6-17).
3. Align the Switchback Assembly as closely as possible to the top rear cover while tightening the bracket screws (see Figure 6-19).
4. Replace the side covers.

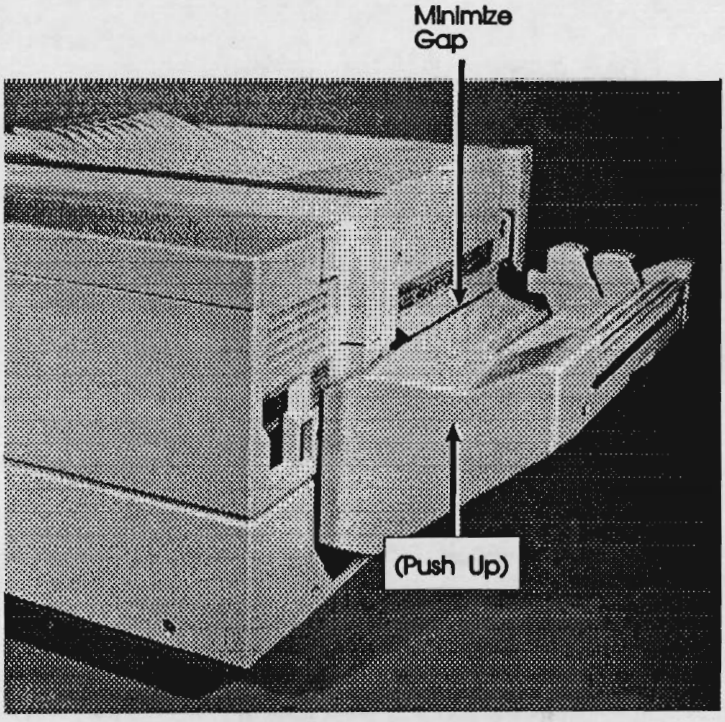


Figure 6-19. Switchback Assembly Clearance Adjustment

Switchback Rear Exit Door Removal

1. Perform steps one and two of the Switchback Assembly Removal procedure.
2. Open the switchback rear exit door and disconnect the two door support springs.
3. Remove (1) screw from the left side hinge.
4. Remove the (1) screw on the right side that retains the door.
5. Remove the door.

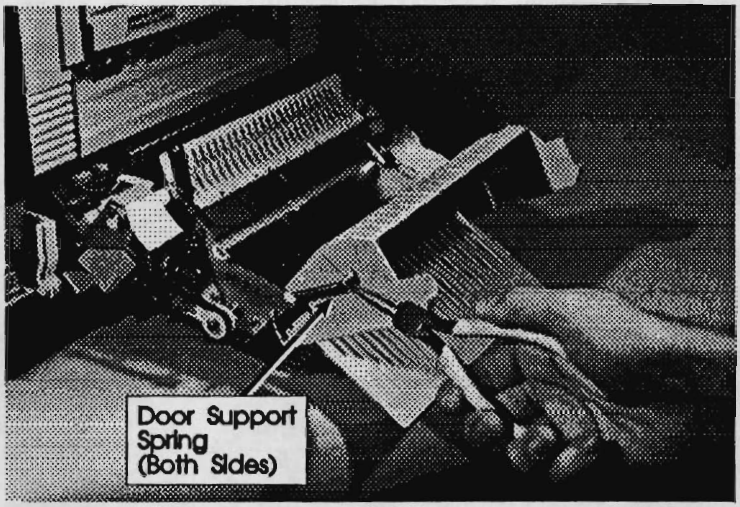


Figure 6-20. Switchback Rear Exit Door

Switchback Roller Removal

1. Remove the rear and side covers of the switchback assembly.
2. Remove the (4) screws that retain the back cover of the switchback assembly.
3. From the right side of the switchback assembly, remove the E-ring, pulley flange, timing belt, and pulley.
4. Remove the right and left side E-rings, the bushing and the switchback roller shaft. See Figure 6-18.

Switchback Deflector Solenoid Removal (SL7)

The switchback deflector solenoid is located under the right side cover of the the switchback assembly

1. Remove the switchback assembly side covers.
2. Remove the large support spring located on the right side of the switchback assembly.
3. Loosen the (3) screws that retain the support guide brackets and free them from their tracks.
4. Disconnect the connector, cut the tie wrap, and pull the wiring harness free.
5. Remove the (2) screws that hold the solenoid to its bracket.

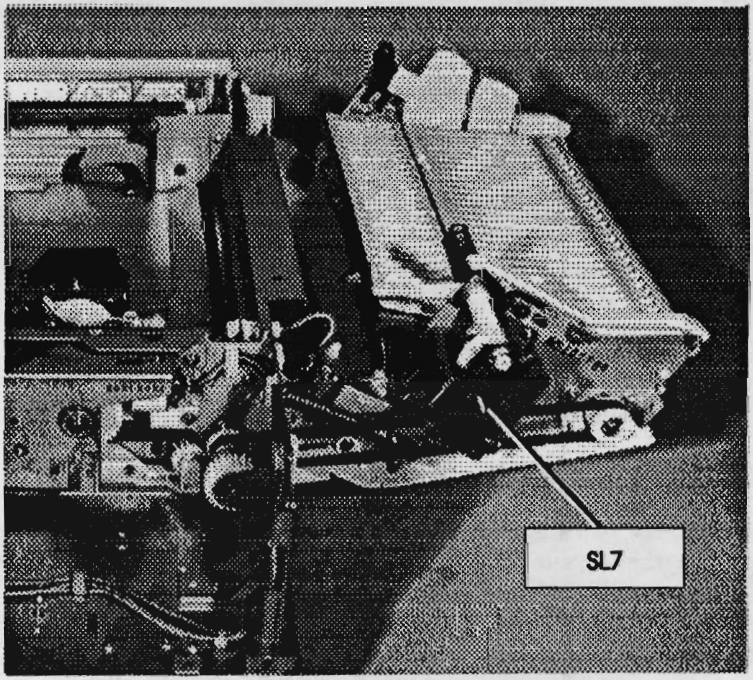


Figure 6-21. Switchback Deflector Solenoid

Switchback Paper Sensor Removal (PS4)

1. Remove both side covers of the switchback assembly.
2. Remove the back cover of the switchback assembly (4 screws, 2 on each side).
3. Remove the (1) screw holding the sensor.
4. Loosen and free the support guide brackets from their tracks and lower the switchback assembly.
5. Lift the face-up paper tray to expose the paper sensor switch actuator.
6. Free the paper sensor from its mounting bracket.
7. Disconnect the sensor from the wiring harness and remove the (1) screw. Remove the sensor.
8. When installing the replacement switchback paper sensor use the actuator to position the sensor. Be careful not to damage the actuator when installing the sensor. The actuator is fragile.

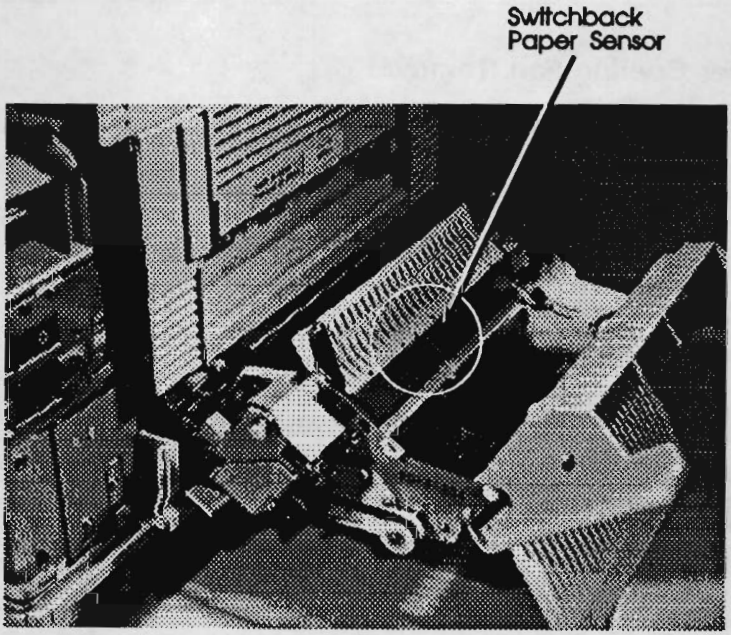


Figure 6-22. Switchback Paper Sensor HP 33447 and 33459

6-4. MAIN BODY COMPONENTS

Ozone Filter Mount

The Ozone Filter is contained in the Ozone Filter Mount shown in Figure 6-23. The entire AC Power Module does not need to be removed to remove the Ozone Filter. To remove the Ozone Filter Mount in both printers:

1. Remove the Main Body Covers.
2. Remove the (2) screws securing the filter mount and lift straight out.
3. Slide the filter out of its mount.

Warning

When replacing the Ozone Filter Mount, position the circuit breaker reset button in the center of the access hole. Failure to position the Ozone Filter Mount properly may disable the circuit breaker.

Upper Cooling Fan Removal

1. Remove the Ozone Filter Mount.
2. Remove the (3) screws that secure the Upper Cooling Fan to the AC Power Module (see Figure 6-23). Remove the fan connector.

Route the Upper Cooling Fan wires properly before securing the Ozone Filter Mount.

AC Power Module

Warning

Disconnect the Power Cord from the printer and allow the fusing assembly to cool before servicing the AC Power Module.

The AC Power Module, located below the Upper Cooling Fan, is shown in Figure 6-23. The Circuit Breaker is located at the frontmost end of the AC Power Module beneath the Ozone Filter Mount.

1. Remove the Main Body Covers as shown in section 6-2.
2. Remove the (4) Fusing Assembly screws and the (2) Ozone Filter Mount screws, and (3) Upper Cooling Fan screws.
3. Remove the (4) silver-colored screws that secure the AC Power Module to the printer base plate. Remove the module from the printer, being careful not to damage the large pin connectors attaching the module to the base connectors.
4. *The screw with the captive star washer goes on the rear of the printer.*

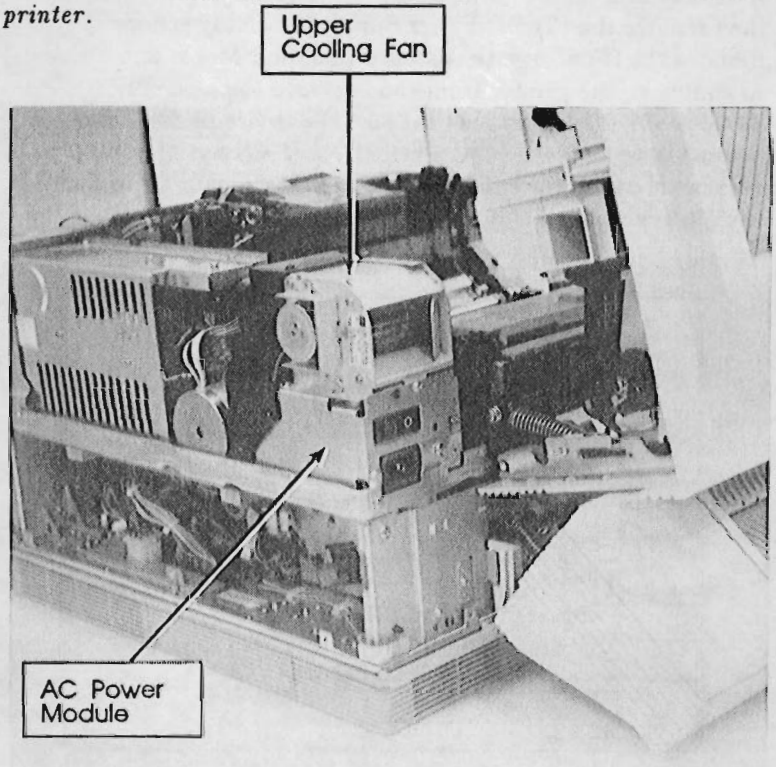


Figure 6-23. AC Power Module and Upper Cooling Fan

MAIN MOTOR AND DRIVE ASSEMBLIES

The location of the Main Motor and Drive Assemblies are shown in Figure 6-24. The disassembly procedures described below (Main Motor, 57- and 19-Tooth Gears, and Feed Drive Assembly) need to be performed in sequential order.

Main Motor and Drive Assembly Removal

1. Remove the Main Body Covers and Front Support Plate.
2. Remove the plastic Gear Cover, the Ozone Filter Mount, Fusing Assembly, and AC Power Module.
3. Disconnect the Main Motor connector from the DC Power Supply Assembly and unfasten the fiber-optic cable from its retaining clip, then remove the (3) DC Power Supply Assembly screws.
4. Remove the (5) screws that secure the Main Motor and Drive Assembly to the printer frame and remove the assembly.
5. Remove the (4) screws that connect the motor to the Drive Assembly and separate the units. *Do not attempt to replace individual gears*; the entire Drive Assembly should be replaced if any part becomes damaged.

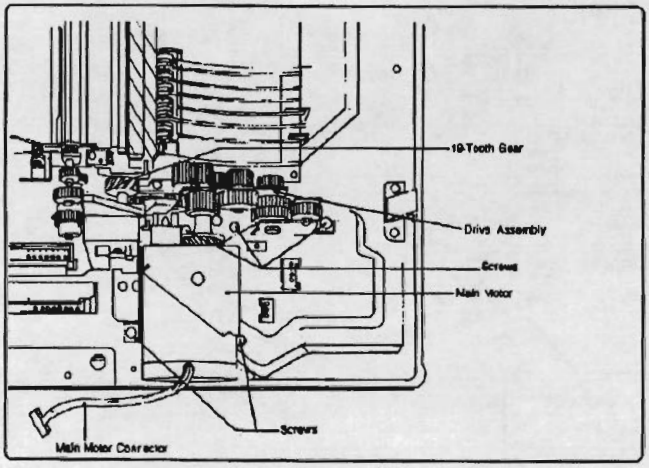


Figure 6-24. Main Motor and Drive Assembly

57- and 19-Tooth Gears and Drum Drive Shaft Removal

Before the 57- and 19-Tooth Gears (located at the ends of the Drum Drive Shaft) can be removed (see Figure 6-25), several adjacent assemblies must be removed.

1. After removing the Main Body Covers and Main Motor Assembly, remove the High-Voltage Power Supply Assembly, Registration Assembly, and Transfer Corona Assembly.
2. Use needle-nose pliers or a small flat-blade screwdriver to remove the E-clip from the left (inside) end of the (drum drive) gear shaft.
3. Pull the bushing off the left end of the shaft.
4. Pull the shaft out the right side opening, letting the gears drop off the shaft. Since the gears and shaft are keyed, they may have to be rotated to remove the shaft.

When replacing the gears, note that the 19-Tooth Gear can only be installed in one direction. The 57-Tooth Gear can be installed on the shaft either way.

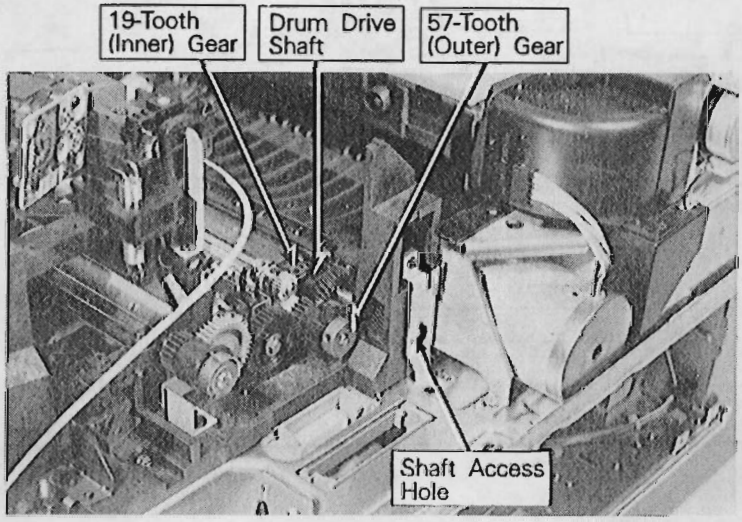


Figure 6-25. 57- and 19-Tooth Gears and Drum Drive Shaft

Feed Drive Assembly

The Feed Drive Assembly is shown in Figure 6-26.

1. Remove the Main Motor and Drive Assembly and the 57- and 19-Tooth Gears and Drive Shaft.
2. Remove the (1) right side Feed Roller Assembly mounting screw and carefully push the right end of the assembly out of the way to access the front-most Feed Drive Assembly mounting screw.
3. Remove the (3) screws securing the Feed Drive Assembly and lift out.

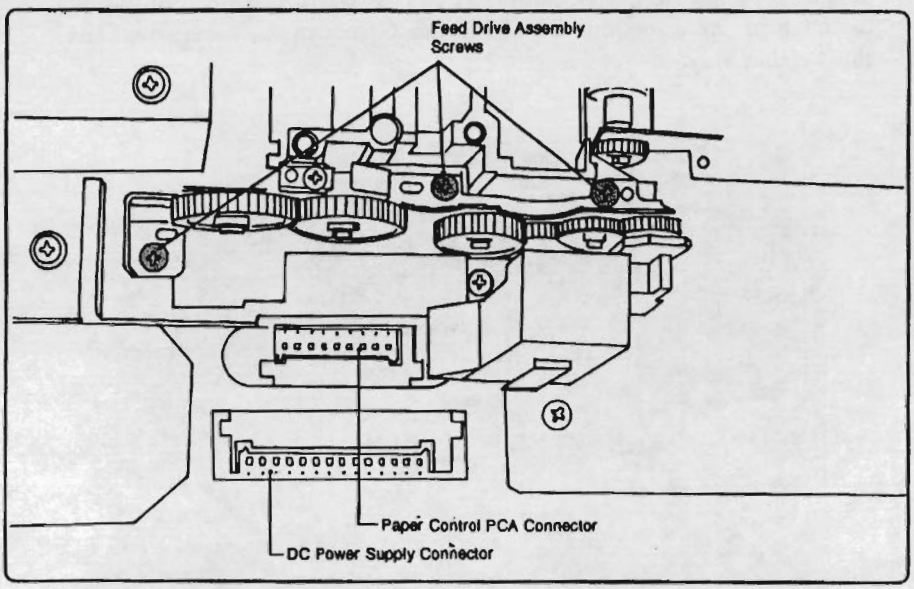


Figure 6-26. Feed Drive Assembly

Laser/Scanning Assembly Removal

Caution Some printers have metal shims (plates) located under one or both ends (left or right) of the laser unit. These shims *must not be removed or altered.*

The Laser/Scanning Assembly (Figure 6-27) is extremely fragile and should be handled carefully. Be particularly careful when handling the fiber-optic cable.

1. Remove the Main Body Covers. (Only the top cover of the Main Body Covers needs to be removed on the HP 33459).
2. Remove the (1) screw on the Fiber-optic Cable connection cover, open the cover, and remove the cable. (Be sure to observe the routing of this cable for exact replacement.)
3. Open the cover flap and disconnect cables J401 and J451 on the Laser/Scanning PCA and Laser Driver PCA.
4. Remove the (4) screws that secure the Laser/Scanning Assembly to the printer.
5. Carefully lift the assembly off the frame.

Fiber-Optic Cable Removal

To *replace* the Fiber-Optic Cable, disconnect it from both the Laser/Scanning Assembly and the DC Controller PCA.

1. Remove the Main Body Covers. (Only the top cover of the Main Body Covers needs to be removed on the HP 33459).
2. *Disconnect* the Fiber-optic Cable from the Laser/Scanning Assembly, by removing (1) screw securing the small door (see Figure 6-27), open the door, and slip the cable out of the retainer.
3. To disconnect the cable from the DC Controller PCA, follow the directions in section 6-7.

To prevent damage when reinstalling the cable, be sure it is routed properly with no sharp bends. See Figure 6-27.

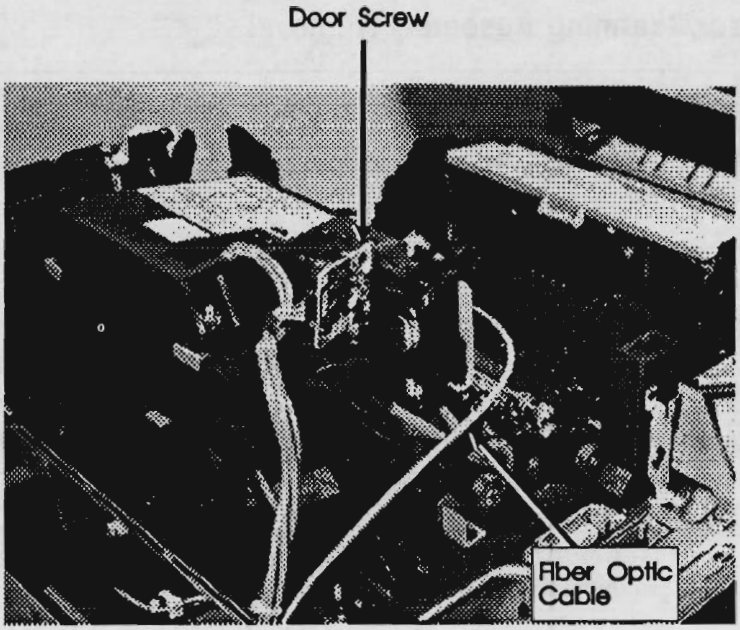


Figure 6-27. Laser/Scanning Assembly

Cover Latch Assembly

General

The DC Power Supply Assembly and High-Voltage Power Supply Assembly must be removed to access the Hooks and Guides (see Figure 6-28). Note that the Right and Left Cover Latch Hook assemblies are not interchangeable. The Cover Release Button is discussed in Section 6-2.

Right and Left Cover Latch Hook Removal

1. Remove the Main Body Covers, Front Support Plate, DC Power Supply Assembly, and High-Voltage Power Supply Assembly.
2. Remove the (1) screw and plate that secures the Right Latch Hook and the (1) screw that secures the Left Latch Hook.
3. Pull the hooks and springs off the shaft, being careful not to lose the springs (see Figure 6-28).

To replace the hooks and springs, slide the spring onto the shaft, slide the hook onto the shaft, secure one end of the spring in its retaining position, and push the hook securely into position. Then move the other end of the spring into its retaining position, as if closing a safety pin. Note that the right and left hook springs are different.

Right and Left Hook Guide Removal

1. Remove the Main Body Covers.
2. Remove the Right and Left Cover Latch Hooks according to the above procedure as needed.
3. Remove the (1) screw that secures each Hook Guide.
4. Lift and slide the Hook Guides off the shaft.

Note that the smaller diameter coil spring is installed on the Left Hook Guide.

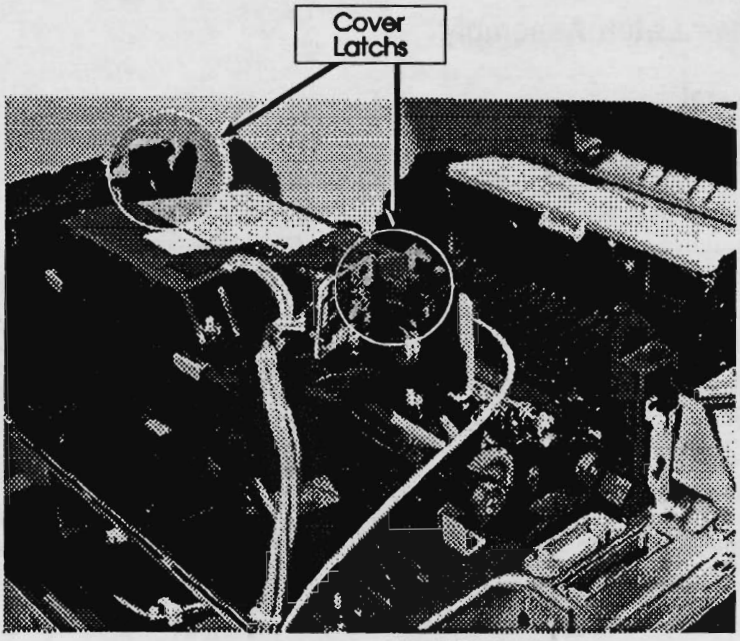


Figure 6-28. Cover Latch Assembly

6-5. DC POWER SUPPLY ASSEMBLY

The DC Power Supply Assembly contains the Main Motor Driver circuitry as well as the DC Power Supply assembly and fuse. The Paper Control PCA attaches to the Power Supply Assembly.

DC Power Supply Fuse

1. Remove the Main Body Covers and Front Support Plate.
2. Remove the DC Power Supply Fuse (located in the lower left front corner of the DC Power Supply Assembly (see Figure 6-29). Be sure to replace this fuse with one of the proper value. The 250V/3.15A fuse part no. is WD1-0222-000. The 125V/6.3A fuse part no. is WD1-0224-000.

DC Power Supply Assembly Removal

Caution

When removing the DC Power Supply, be careful not to damage the Paper Sensing Arm.

1. Remove the Main Body Covers and Front Support Plate.
2. Remove the (3) screws securing the DC Power Supply Assembly, disconnect the Main Motor connector, and remove the Fiber-optic Cable from its retaining clip.
3. Lift the assembly straight up and out, taking care not to damage the Paper Sensing Arm. This may require a firm lifting action combined with a front-to-back rocking action because of the three large pin connectors which secure the assembly to the base plate.
4. Remove (6) screws to separate the DC Power Supply Assembly from the Paper Control PCA.

Use caution when replacing the assembly to ensure the connectors are properly aligned before securing it to the base plate. Be sure to install the mounting screw with star washer at its proper location at the rear of the assembly (see Figure 6-29).

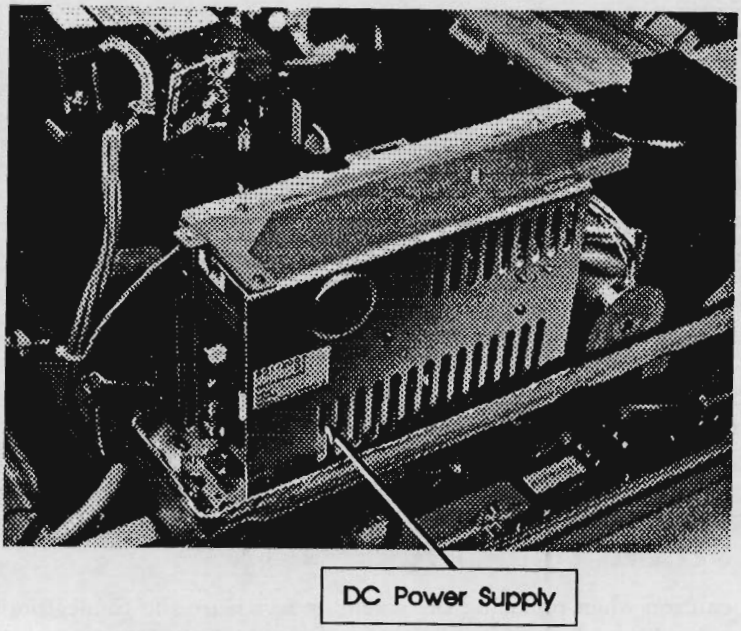


Figure 6-29. DC Power Supply Assembly

Paper Control PCA Removal

The Paper Control PCA is attached to the DC Power Supply as shown in Figure 6-30.

1. Remove the Main Body Covers, Front Support Plate, and DC Power Supply Assembly.
2. Remove the (1) screw in the Paper Control PCA Cover.
3. Remove the (6) screws that secure the Paper Control PCA to the DC Power Supply Assembly (see Figure 6-30).

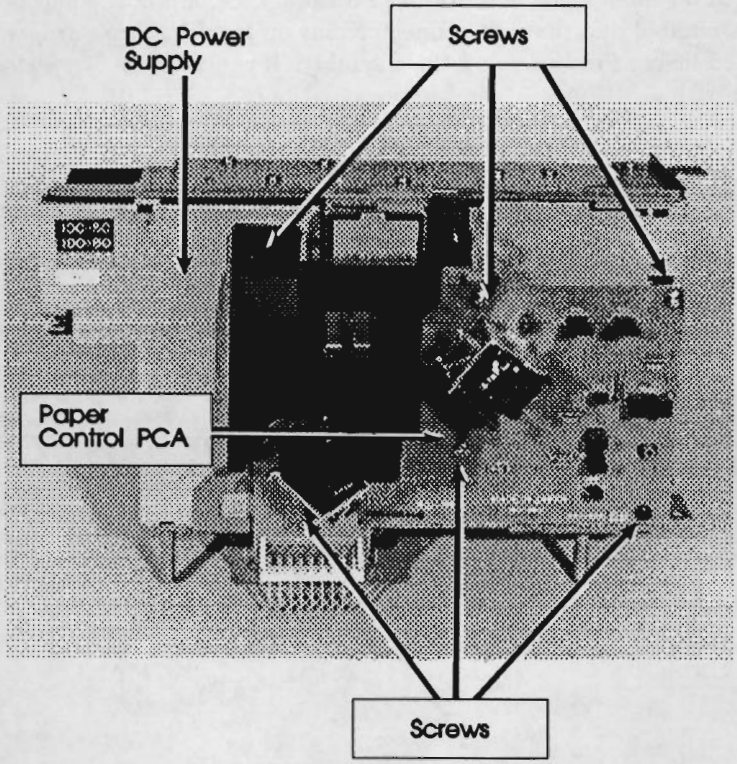


Figure 6-30. Paper Control PCA Removal

High-Voltage Power Supply Assembly Removal

The High-Voltage Power Supply (HVPS) and the HVPS Connector must be removed and replaced as a unit.

1. Remove the Main Body Covers and the Front Support Plate.
2. Remove the (2) screws that secure the High-Voltage Power Supply and the (2) screws that secure the High-Voltage Power Supply Connector, and remove the assembly from the printer (see Figure 6-31).

When reinstalling, ensure that the High-Voltage Contact coil springs, located on the underside of the HVPS Connector, are not damaged or contaminated and that the connector pins on the HVPS are properly aligned before firmly seating the assembly. If contacts are dirty, clean them with a cotton swab and isopropyl alcohol.

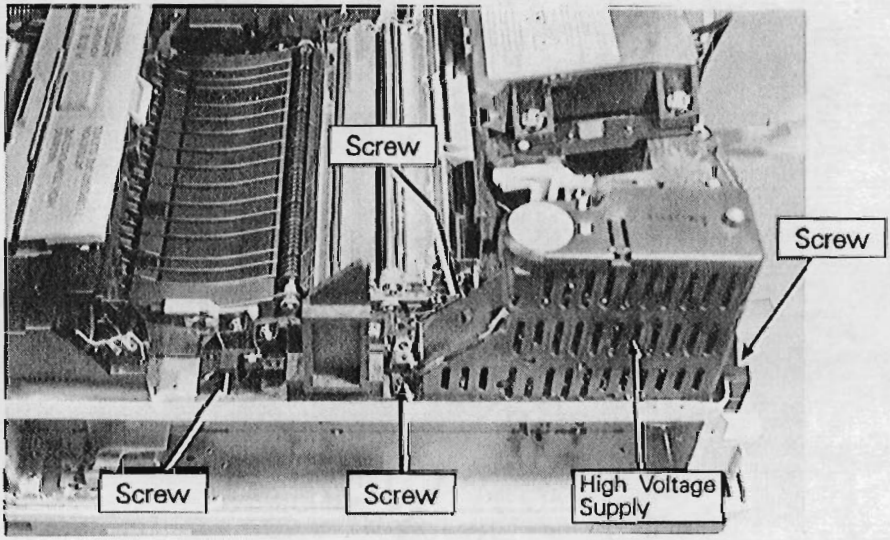


Figure 6-31. High-Voltage Power Supply Assembly

6-6. UPPER PAPER TRANSPORT AREAS

General

To access assemblies in the Paper Pickup/Input Tray areas, the Main and Lower Body Covers, Front Support Plate, and DC Power Supply Assembly must first be removed. Be careful not to damage the Paper Sensing Arm or Fiber-Optic Cable when removing the DC Power Supply Assembly.

Paper Sensing Arm Removal

1. Remove the Main Body Covers, Front Support Plate, and DC Power Supply Assembly.
2. Remove the (1) screw securing the Paper Sensing Arm bracket to the Main Body Assembly (see Figure 6-33 for location).
3. Slide the Paper Sensing Arm out the right side of the printer.

Laser Shutter Arm Removal

1. Remove the Main Body Covers, Front Support Plate, and DC Power Supply.
2. Remove the High-Voltage Power Supply Assembly and the Laser/Scanning Assembly.
3. Remove the Right and Left Cover Latch Hooks.
4. Remove either the Right or Left Hook Guide.
5. Remove the metal plate from under the Laser Shutter Arm (1).
6. Slide the shaft with the Laser Shutter Arm out the side of the printer.

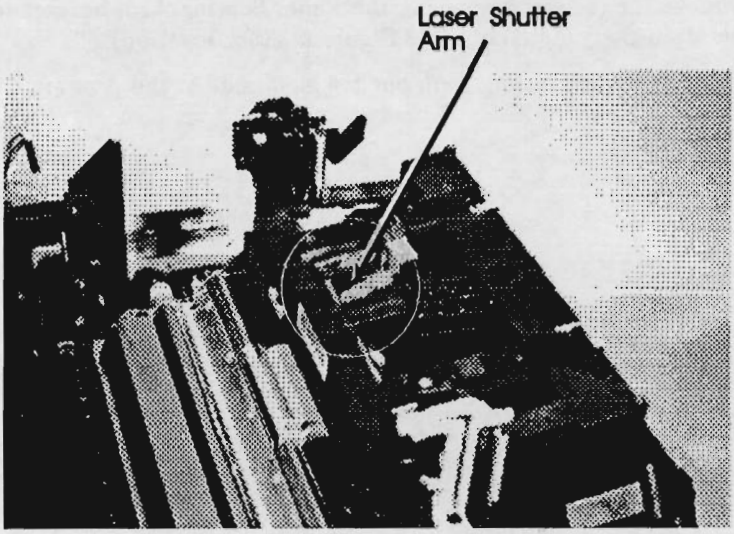


Figure 6-32. Laser Shutter Arm

Upper Feed Roller Assembly Removal

1. Remove the Main Body Covers, Front Support Plate, and DC Power Supply.
2. Remove the High-Voltage Power Supply Assembly.
3. Remove the (2) screws that secure each end of the Feed Roller Assembly (see Figure 6-33).
4. Lift slightly and slide the assembly through the right side opening, being careful not to damage the Paper Sensing Arm.

When reinstalling the assembly, be careful not to deform the left side grounding spring.

Note

Due to wear characteristics, the Separation Pad (see Registration Assembly section below) and the Feed Roller Assembly should be replaced at the same time.

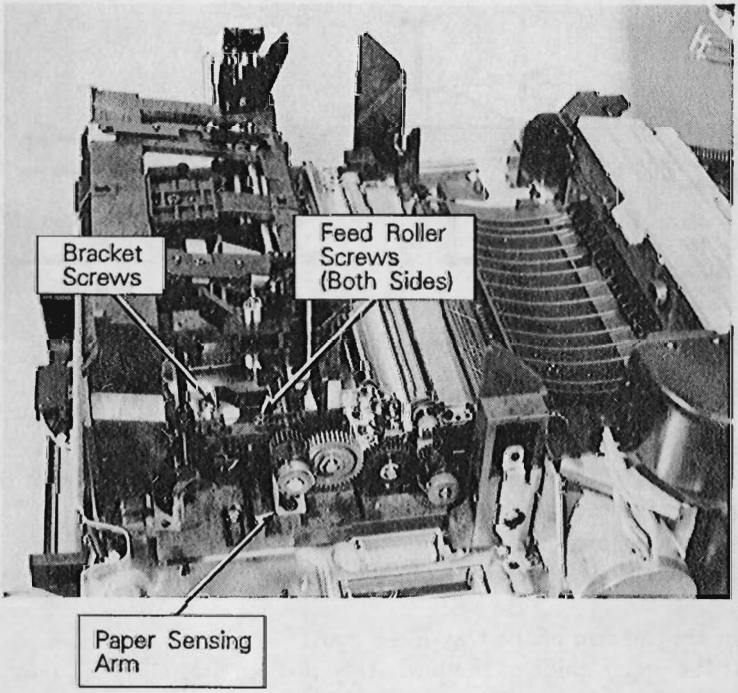


Figure 6-33. Feed Roller Assembly

Separation Pad Removal

Note

The Separation Pad should be replaced with the Feed Roller Assembly. The pad is located at the Paper Tray end of the Registration Assembly (see Figure 6-34).

Upper Separation Pad Removal

1. Open the Top Cover Assembly and remove paper tray.
2. Remove the (4) Registration Assembly screws. Note the position of the bronze gounding block (see Figure 6-36).
3. Remove the (2) screws on the underside of the Registration Assembly securing the Separation Pad.

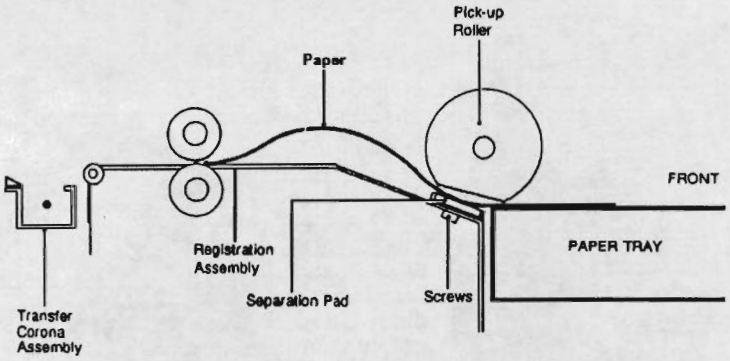


Figure 6-34. Separation Pad (Upper Tray)

Lower Separation Pad Removal

1. Remove all the lower covers.
2. On the HP 33459, remove the lower paper tray support bracket and the envelope support bracket.
3. Remove the lower tray pickup roller assembly.
4. Remove the lower sensing assembly and the front plate it's mounted on.
5. Remove the arm of the tray-lifter shaft.
6. Lift the paper guide of the lower tray pick-up assembly and remove the (2) screws under the separation pad.

Manual Feed Guides

1. Remove the Main Body Covers, Front Support Plate, DC Power Supply, the Paper Sensing Arm Assembly and Laser/Scanning Assembly.
2. Remove the Feed Roller Assembly.
3. Remove the (1) screw securing the Manual Feed Guide (see Figure 6-35) and slip the guide out of the printer.

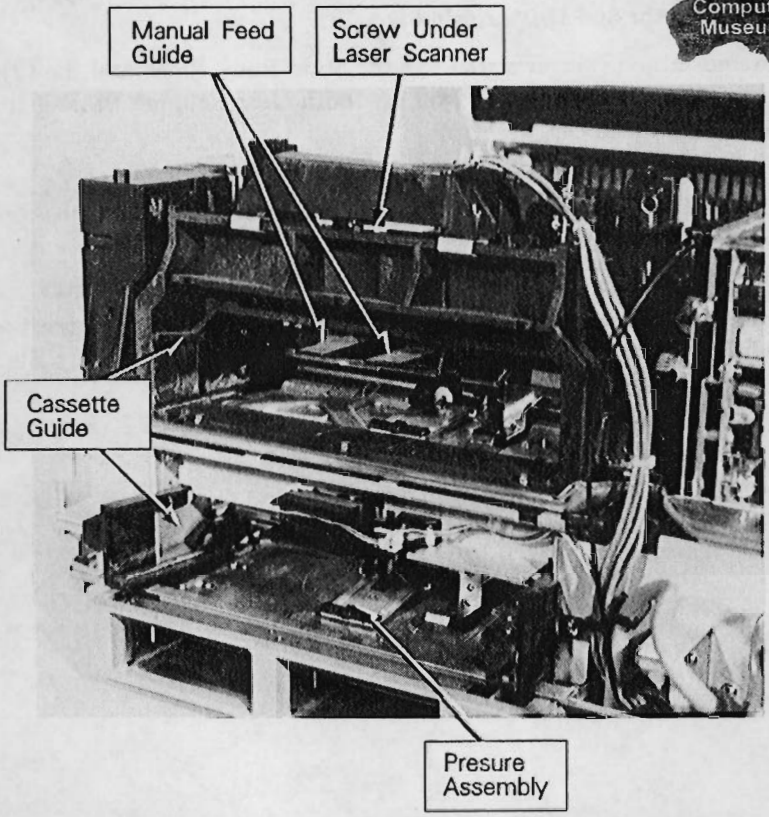


Figure 6-35. Manual Feed Guide and Pressure Assembly

Upper Pressure Assembly

The Pressure Assembly (see Figure 6-35) is attached to the bottom of the Main Body Assembly. To access it, everything in the top printer cavity *except* the hinges, Top Cover assembly, Feed Guide Assembly, and any components connected to the Main Body Block (plastic casting) must first be removed.

1. Remove the Main Body Covers, Front Support Plate, Fusing Assembly, DC Power Supply Assembly, the High-Voltage Power Supply Assembly, AC Power Module, Registration Assembly, and Main Motor and Drive Assembly.
2. Remove the (8) screws securing the Main Body Block and the (2) screws that attach the 57- and 19-Tooth Gear Support Bracket to the Base Plate.
3. The Pressure Assembly Shaft is attached to the bottom of the Main Body Block. Remove the (2) screws that secure the Pressure Assembly shaft and cassette guides, and remove the assembly.

When reinstalling the Main Body Assembly, ensure that the Feed Guide grounding spring plate fits *under* the grounding tab on the Feed Guide Assembly (see Figure 6-39). Also, be sure the Main Body Block fits in its guide pins before the screws are tightened.

REGISTRATION ASSEMBLY

General

The Registration Assembly can be removed without removing the DC Power Supply. However, it is easier to install with the power supply removed.

Registration Assembly

Note

Prior to removing the Registration Assembly, note the position of the bronze grounding block at the left rear of the assembly.

1. Open the Top Cover Assembly and remove the paper tray.
2. Remove the (2) screws securing the front of the assembly and the (2) screws securing the Transfer Guide Plate at the rear of the assembly.
3. Lift the Registration Assembly up and out (see Figure 6-36).

When replacing the Registration Assembly, be sure to rotate the bronze grounding block on the end of the Transfer Corona Roller to its full counterclockwise position (the "3:00 O'Clock" position as viewed from the assembly's left end) and position it properly on top of the grounding spring as shown in Figure 6-36. Failure to position this block properly may result in intermittent hardware indications. Be certain to replace the ground lug on top of the registration assembly at the left front. Finally, install the transfer guide plate.

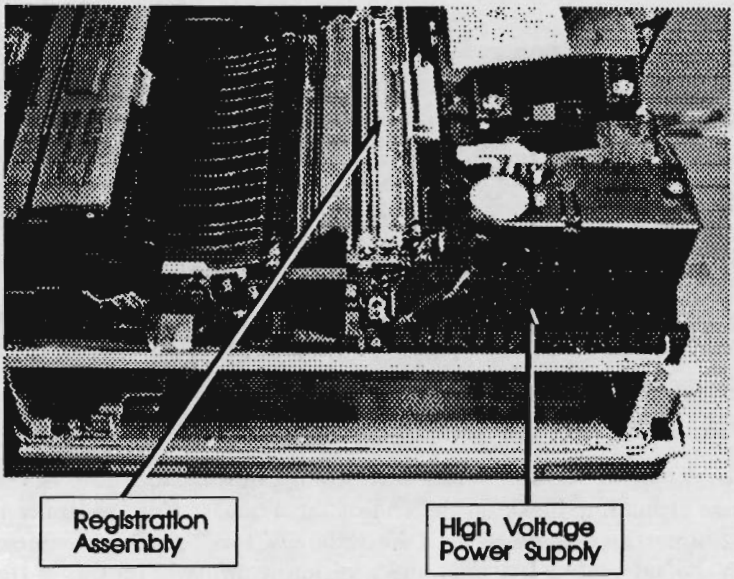


Figure 6-36. Registration Assembly

Transfer Corona Assembly

The Registration Assembly and High-Voltage Power Supply Assembly must be removed before the Transfer Corona Assembly can be removed.

1. Remove the Main Body Covers, Front Support Plate, Registration Assembly, and High-Voltage Power Supply Assembly.
2. Remove the (2) screws at the ends of the Transfer Corona Assembly (see Figure 6-37), and remove it from the printer.

Caution

Do not remove the screws securing the nylon filament. Coronas cannot be restrung, and the entire corona will have to be replaced if the wires are disturbed.

Transfer Area Resistor Replacement

The two 15-Mohm and one 1-Kohm resistors (see Figure 6-37), located toward the front of the printer just beyond the Transfer Corona Assembly, can be accessed by removing the Registration Assembly, High-Voltage Power Supply Assembly, and Transfer Corona Assembly.

1. Remove the Main Body Covers, Front Support Plate, Registration Assembly, High-Voltage Power Supply Assembly, and Transfer Corona Assembly.
2. Remove the (2) screws securing the resistors to be replaced, and remove them from the printer.

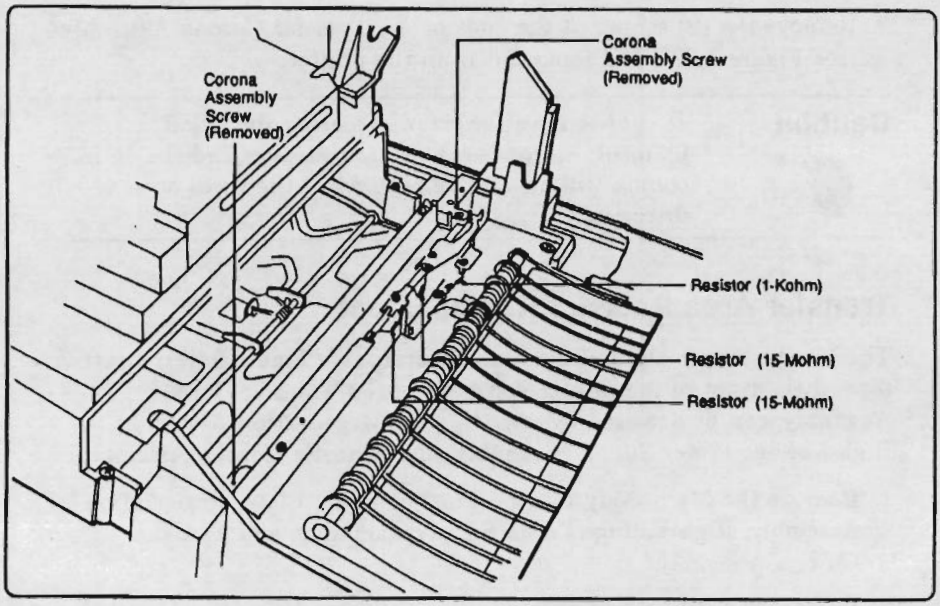


Figure 6-37. Transfer Corona Assembly and Resistor Locations

Feed Guide Assembly Removal

1. Open the Top Cover and remove the Fusing Assembly.
2. Remove the Main Motor Drive Assembly gear cover.
3. Remove the (4) screws securing the Feed Guide Assembly and lift it out of the printer.

For replacement, the Registration Assembly and Transfer Corona must be removed in order to position the Feed Guide Assembly ground tab on top of the ground spring plate as shown in Figure 6-39. The Feed Guide Assembly must also fit over the two guide pins adjacent to the two screws nearest the front of the printer.

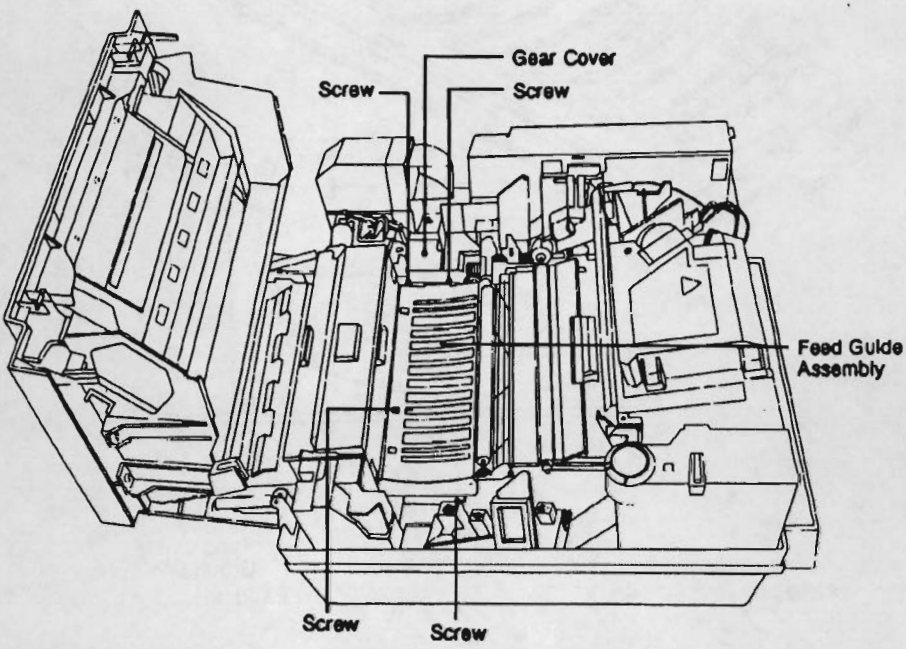


Figure 6-38. Feed Guide Assembly

Feed Guide Grounding Spring Plate

The Feed Guide Assembly has a grounding tab that must sit on a grounding spring plate located beneath the Transfer Corona Assembly (see Figure 6-39). Make sure that the grounding spring plate fits under the grounding tab on the Feed Guide Assembly whenever it is reinstalled.

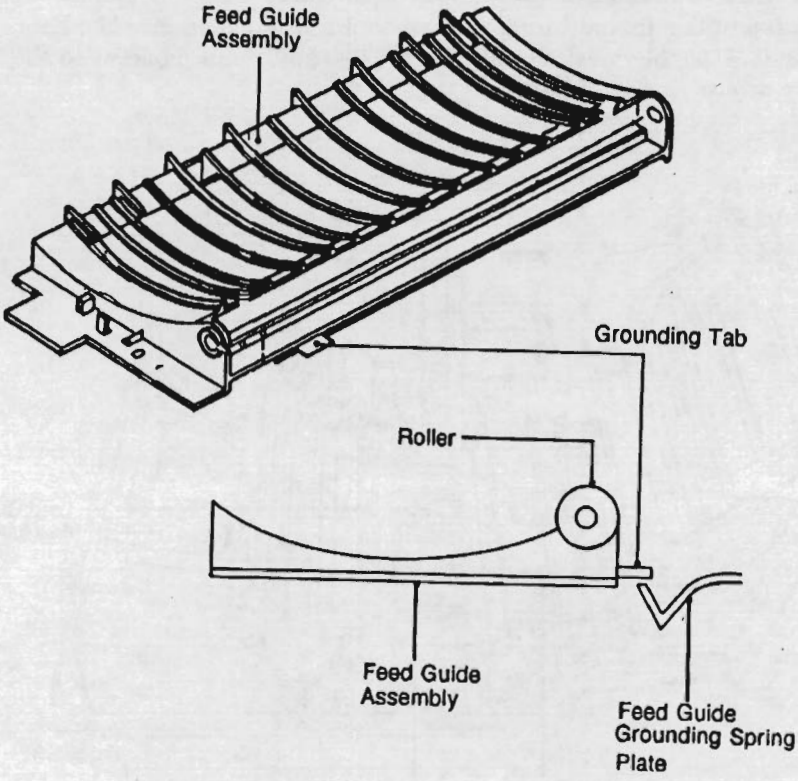


Figure 6-39. Grounding Spring Plate

Fusing Assembly

Fusing Assembly Removal

1. Open the Top Cover Assembly and remove the (4) silver-colored screws that secure the Fusing Assembly. Note the location of the screw with the star washer.
2. Lift the assembly straight up and out, using care to unseat the connectors on both ends simultaneously.

Exit Sensor PCA and Thermistor Removal

The Thermistor is attached to the Exit Sensor PCA. Follow the instructions below to remove these assemblies.

1. Remove the Fusing Assembly.
2. Remove the Exit Sensor PCA cover (1) (see Figure 6-38).
3. Remove the (1) screw securing the right side Fusing Assembly cover (see Figure 6-38), and slide the cover up and out (the plastic cover will flex around the lever arm on the assembly).
4. Remove the electrical lug connector screws at the left and right ends of the assembly.
5. Remove the (2) screws securing the Fusing Assembly front cover to the assembly and, to avoid damage to the Thermistor spring mount, carefully move the cover *slightly* away from the Fusing Assembly. Be careful not to lose the wavy washers.
6. Remove the (1) screw securing the Thermistor and lift it off its mount (see Figure 6-40).
7. Remove the (2) screws securing the Exit Sensor PCA, carefully remove it from its two positioning tabs (see Figure 6-40), and remove it and the Thermistor from the Fusing Assembly.

Upon reinstallation, refer to Figure 6-40 for proper routing of the Thermistor cable.

Thermoprotector Removal

1. Complete steps 1 - 6 of the removal procedure for the Thermistor and Exit Sensor PCA.
2. Remove the (2) screws that secure the Thermoprotector (see Figure 6-40) and lift it out.

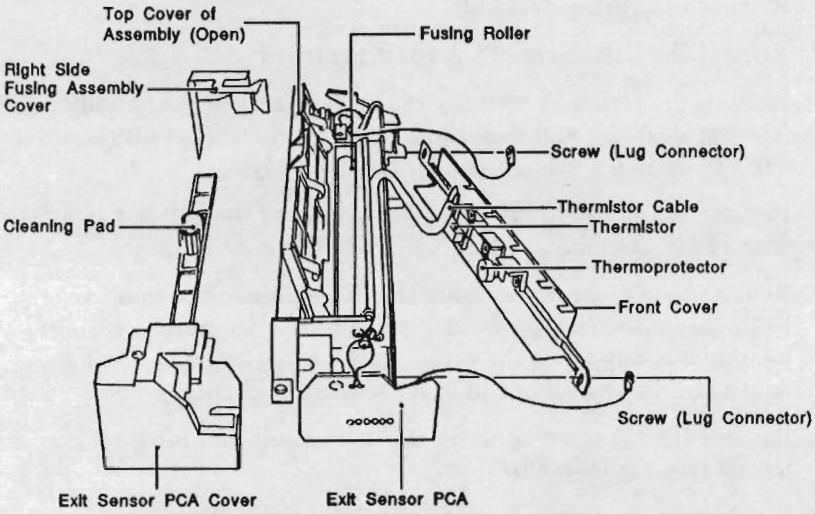


Figure 6-40. Fusing Assembly Components

Exit Sensor Flag Removal

1. Remove the (4) screws that hold the Fusing Assembly.
2. Remove the (1) Exit Sensor PCA cover and the (2) screws securing the Exit Sensor PCA to the Fusing Assembly.
3. Remove the (2) brass-colored screws securing the Exit Shutter Arm Assembly (located on the lower back side of the Fusing Assembly), remove the assembly from the retaining pins, and carefully pop the Exit Shutter Arm off the assembly.
4. Pull the Exit Sensor Arm (Flag) out the side of the unit.

Caution

Tighten the brass-colored screws carefully. They should just be snug.

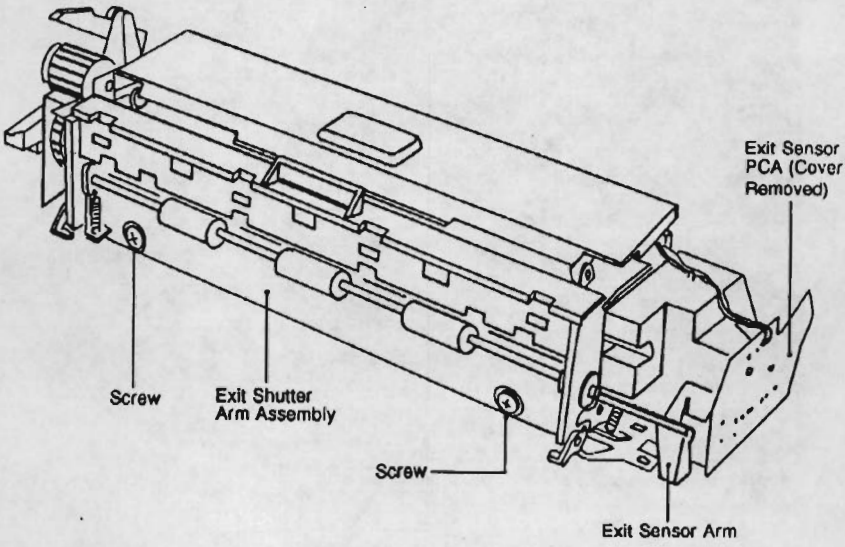


Figure 6-41. Exit Sensor Flag

6-7. LOWER PRINTER ASSEMBLY

The lower printer assembly houses:

- The lower paper tray input.
- Duplexing mechanism.
- Vertical Registration Assembly.
- Lower Main Motor.
- Switchback Drive Control Assembly

Lower Paper Sensor Removal (PS1)

1. Remove all the body covers.
2. Remove the (2) screws that hold the sensor assembly.
3. Disconnect the two cables.
4. Remove the paper assembly.

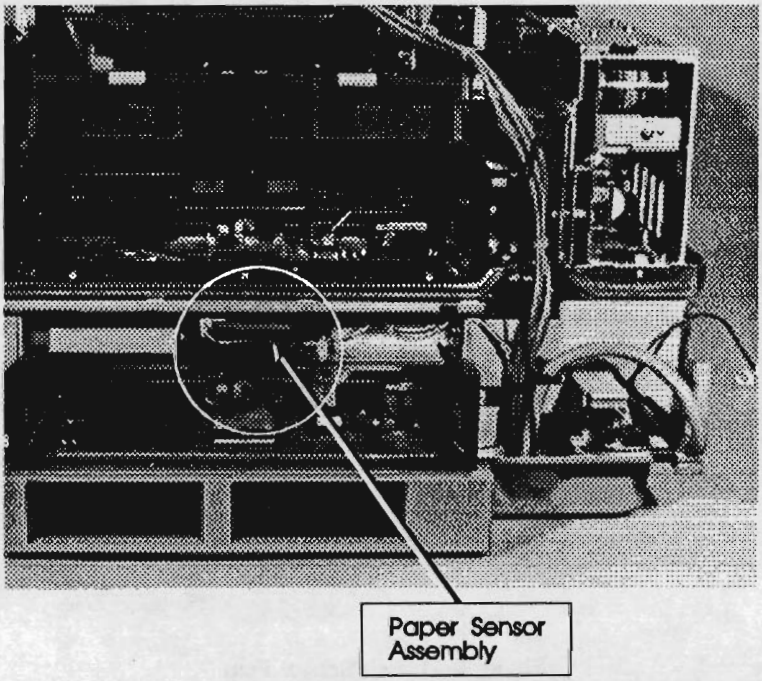


Figure 6-42. Lower Paper Sensor Assembly

To separate the upper and lower printer assemblies:

1. Remove the switchback assembly side covers, loosen and free the switchback support brackets and lower the switchback assembly.
2. Remove the top cover, lower front cover and the upper and lower side covers (for the HP 33459, remove the front cover also).
3. Remove the Fusing Assembly, Front Support Bracket and the Registration Assembly. The (5) screws that retain the lower printer assembly are now exposed as shown in Figure 6-43.
4. Remove connectors J401, J451 and the fiber-optic cable from the laser/scanning assembly.
5. Disconnect J214 and J215 from the DC controller PCA.
6. Remove the (5) screws that hold the upper and lower sections together and lift the top section straight up off the lower section.
7. Close the printer and lift the top section off.

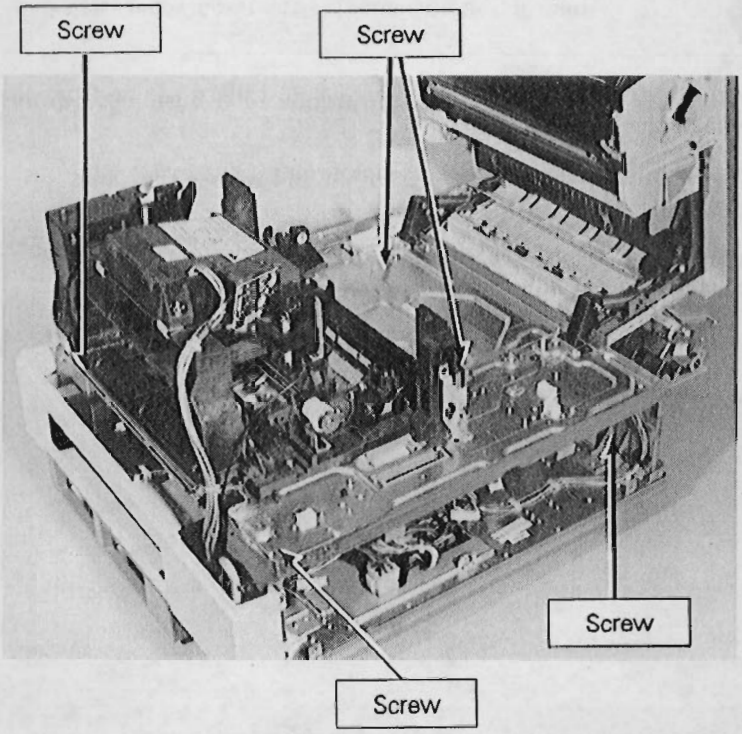


Figure 6-43. Lower Printer Assembly Retaining Screws

Lower Printer Disassembly Procedures

The lower printer components are modular assemblies. To remove the following three assemblies the top portion of the printer must already be disassembled and these components must be removed in the sequence described.

1. Lower Pickup Roller Assembly Removal
2. Lower Main Motor Removal
3. Lower Duplex Drive Roller Removal

Lower Pickup Roller Removal

Note

The lower pickup roller and the lower separation pad should be replaced together. See Section 6-6 for instruction on removing the lower separation pad.

1. Remove the E-ring and the lower pickup roller bushing from the left side of the printer.
2. Disconnect the lower pickup solenoid and release the cable restraint.
3. Remove the (3) screws that secure the solenoid. Remove the solenoid mount and pickup shaft together (see Figure 6-45).

Lower Main Motor Removal

1. Separate the upper and lower printer assemblies.
2. Remove the lower pickup roller assembly and duplex clutch solenoid.
3. Disconnect the (2) solenoid connectors.
4. Remove the (3) screws that hold the lower motor assembly mounting plate.
5. Shift the motor assembly forward and free the timing belt from the Vertical Registration Assembly.
6. Remove the lower main motor assembly and mounting plate (see Figure 6-44).

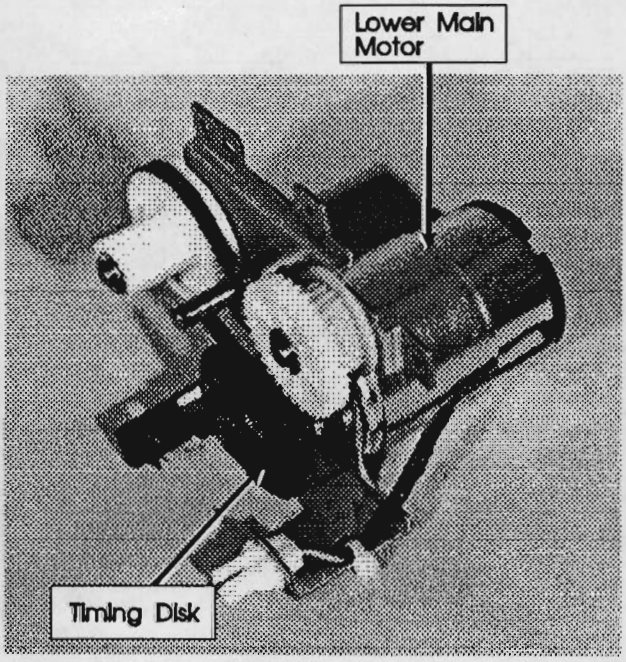


Figure 6-44. Lower Main Motor

Lower Duplex Drive Roller Removal

1. Perform the Lower Main Motor removal procedure.
2. Remove the E-ring, then remove the nylon bushing from the from the lower duplex drive shaft on the left side of the printer frame.
3. Remove the shoulder screw from the upper duplex roller plate.
4. Remove the (1) screw that retains the lower duplex clutch solenoid. Unplug the solenoid leads.
5. Lift the upper duplex roller plate and free the brass bushing on the right side of the roller shaft.
6. Free the shaft from its slot and slide the drive rollers out the right side of the printer.

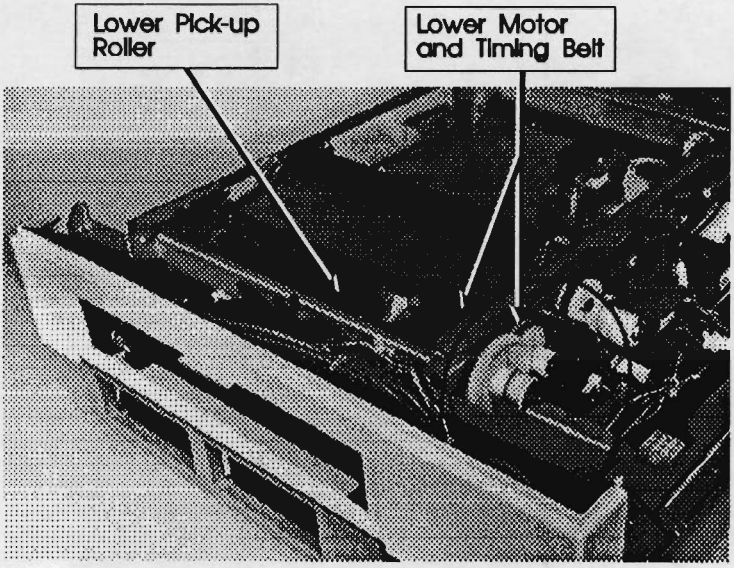


Figure 6-45. Lower Pickup Roller

Vertical Registration Assembly Removal

The Vertical Registration Control Assembly is located on the lower right side of the printer. To access this assembly:

1. Remove the lower right side cover.
2. Remove the Switchback Drive Control Assembly.
3. Remove the (3) mounting screws, free the paper alignment guide drive assembly and remove the timing belt (see Figure 6-46.
4. Disconnect the connector and free the cable.
5. Remove the Vertical Registration Assembly.

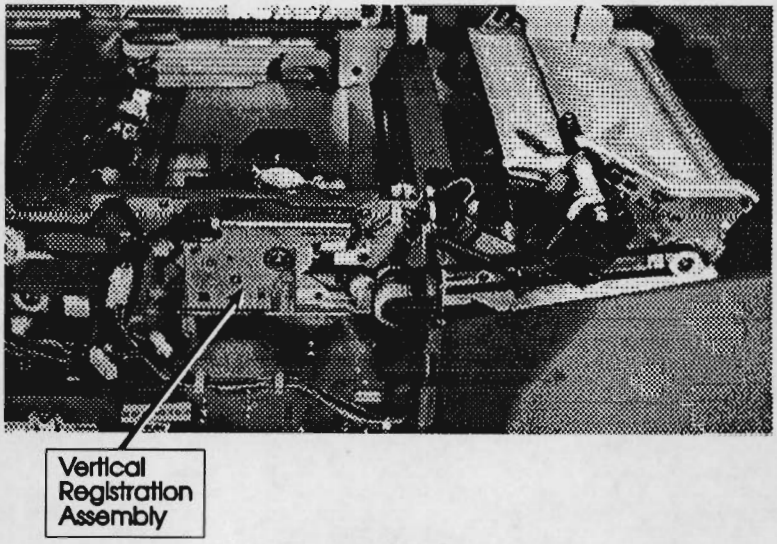


Figure 6-46. Vertical Registration Assembly

Paper Alignment Roller Removal

1. Separate the upper and lower printer sections.
2. Remove the right bottom cover.
3. Remove the Switchback Drive Control Assembly.
4. Remove the Paper Alignment Drive Assembly.
5. Remove the Paper Alignment Roller Shaft Stop Plate.
6. Open the door on the left side of the printer (see Figure 6-47.
7. Rotate the green lever to lift the Upper Duplex Paper Guide.
8. Push the Paper Alignment Guide into the machine, go back to the right side. Pull and drop the roller assembly under the alignment guide, then lift the paper alignment roller assembly out through the slot.

Paper Alignment Pressure Roller Removal

1. Separate the printer's upper and lower sections.
2. Remove the Switchback Drive Control Assembly.
3. Disconnect the Switchback Drive gear solenoid.
4. Remove the (1) screw from the rear pivot pin and remove the pin.
5. Remove the (1) screw from the Upper Duplex Paper Inlet Guide.
6. Remove the Paper Alignment Pressure Roller.

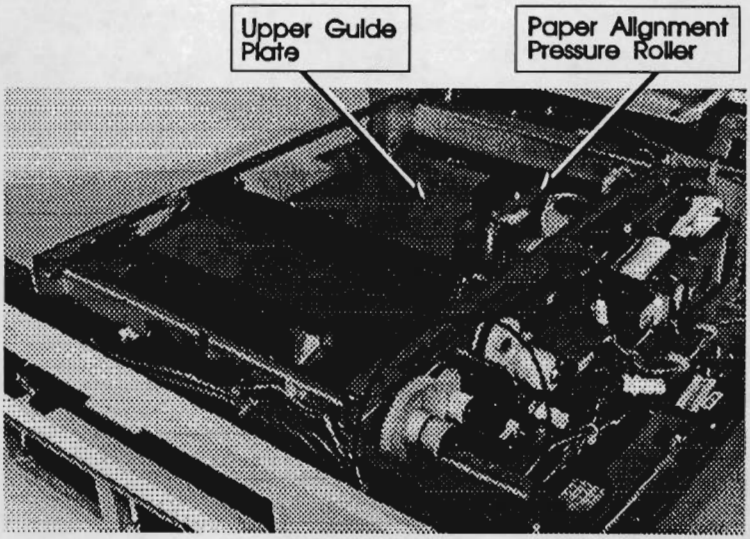


Figure 6-47. Paper Alignment Pressure Roller

Duplex Paper Sensor Removal (PS3)

1. Open the left side access door of the duplexing assembly.
2. Remove the (1) screw, and remove the connector cover.
3. Disconnect the connector and its retaining screw and remove the sensor (See Figure 6-48).

Switchback Deflector Microswitch (MS1) Removal

1. Remove the left side cover of the switchback assembly.
2. Disconnect the wiring harness from the switch and remove the (1) screw that retains the microswitch assembly (see Figure 6-21).

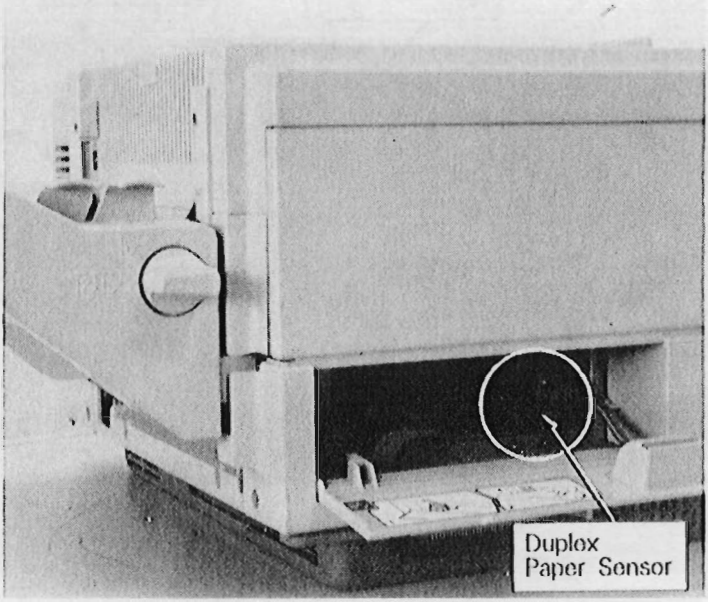


Figure 6-48. Duplex Paper Sensor

6-8. TOP COVER ASSEMBLY COMPONENTS

General

The Top Cover Assembly (see Figure 6-49), which is essentially the same for both printers, is the hinged lid that opens when the Top Cover Release Button is pressed. It houses the EP-S Cartridge and contains the Mirror, Shutter, Erase Lamp, and Delivery Assemblies.

All assemblies attached to the Top Cover can be replaced without separating the Top Cover Assembly from the rest of the printer, except for the Delivery Assembly, Static Eliminator, the Hinge Bracket Plates, and the Hinge Assemblies.

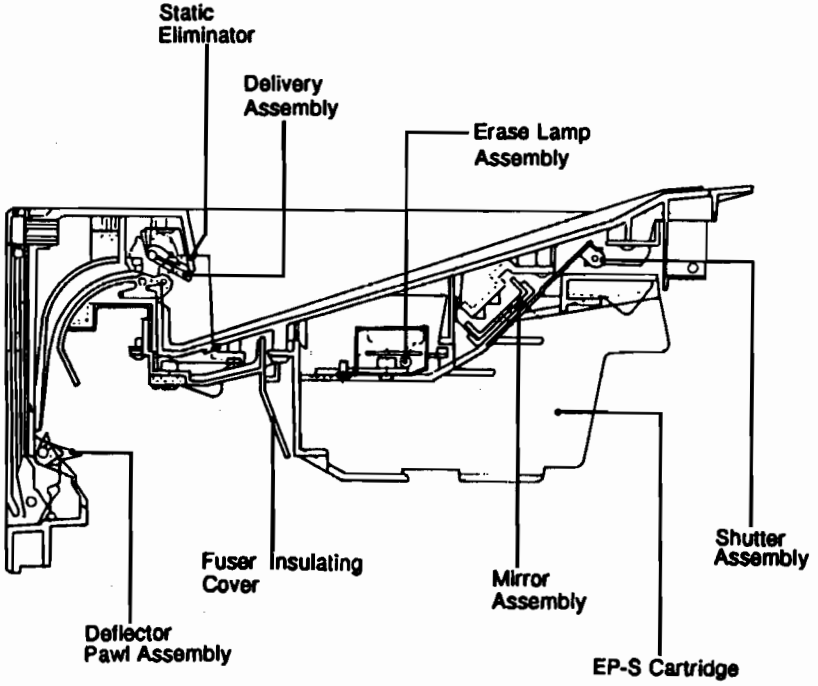


Figure 6-49. Top Cover Section (HP 33447 shown)

Top Cover Assembly Removal

1. Perform steps 1 and 2 of the Switchback Removal procedure.
2. Open the Top Cover Assembly and remove the EP-S Cartridge.
3. Remove the Hinge Security Plates (one screw on each hinge plate) and dissconnect the two coil springs on the left side (see Figure 6-50). Swing the Hinge Springs out of the way.
4. Remove the (4) Hinge Bracket Plate screws (two through each Hinge Bracket Plate) where they attach to the Top Cover Assembly, supporting the Top Cover Assembly.
5. Separate the Top Cover Assembly from the Hinge Bracket Plates.

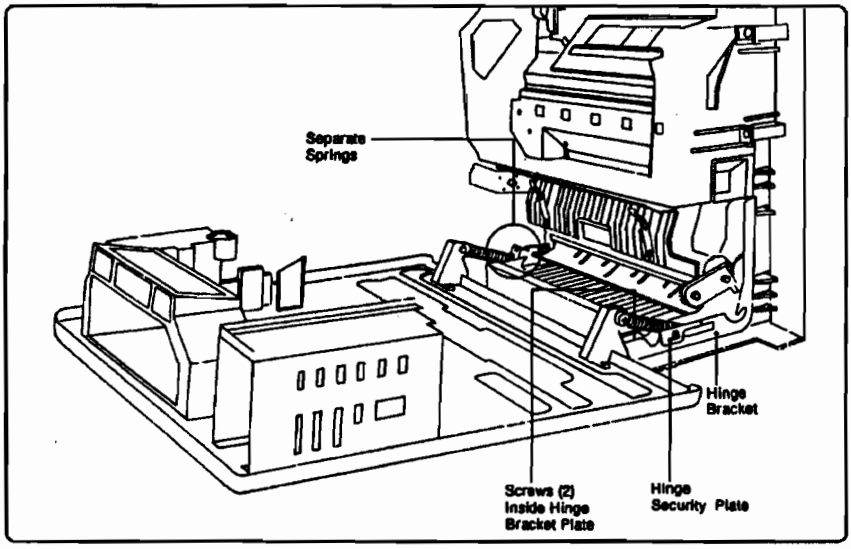


Figure 6-50. Top Cover Assembly Removal

Mirror Shutter Assembly Removal

The Mirror Shutter Assembly (Figure 6-51) is located above the Erase Lamp Assembly near the top of the opened Top Cover Assembly.

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. Remove the (3) Mirror Shutter Assembly mounting screws shown in Figure 6-51.
3. Take care not to touch or otherwise damage the mirror when removing the Mirror Shutter Assembly.

Caution

When handling the Mirror Assembly, *do not* touch the mirror's surface. if the mirror must be cleaned, use a soft, clean, damp, lint-free wipe with a cleaning fluid approved for camera lenses. See Chapter 4, Section 4-4, "Cleaning the Printer."

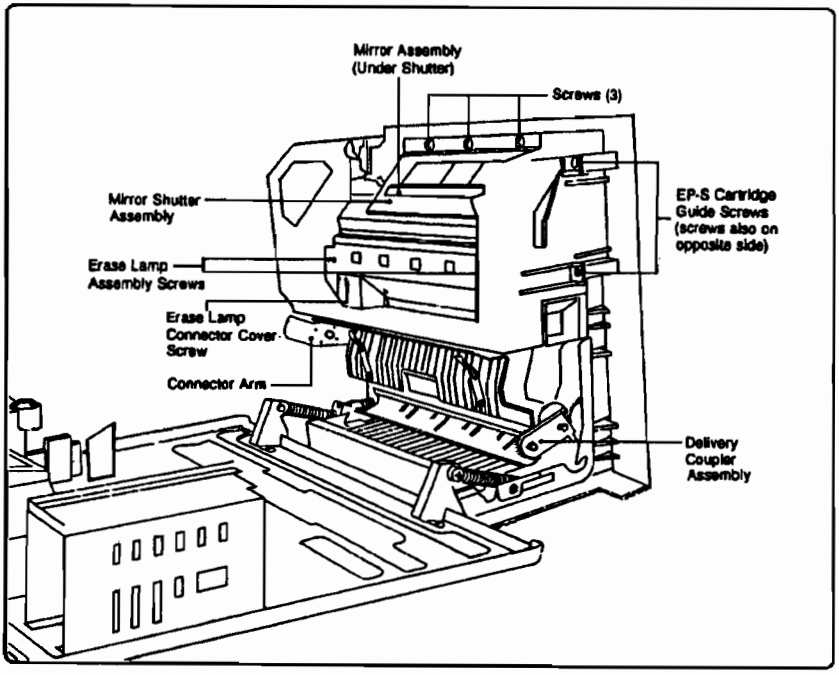


Figure 6-51. Shutter, Mirror, and Erase Lamp Assemblies

Mirror Assembly Removal

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. Remove the Mirror Shutter Assembly (3) or slide the shutter to the right past the lever and swing it up and out of the way.
3. *Note the orientation of the Mirror Assembly* so that it may be returned to the same position (possibly mark the top of the mirror frame or note the location of the formed part number).
4. Loosen the plastic frame (the EP-S Cartridge Guide) holding the Mirror and Erase Lamp assemblies by removing the large upper screws (4 of 5) that secure the EP-S Cartridge Guide Frame (see Figure 6-51) to the Top Cover Assembly.
5. Slide the Mirror Assembly slightly to the right and lift it out the left side of the frame.
6. Ensure that the Mirror Assembly is returned to the printer in the correct orientation. The assembly has a 6 mm slot on the left and an 8 mm slot on the right as shown in Figure 4-8.

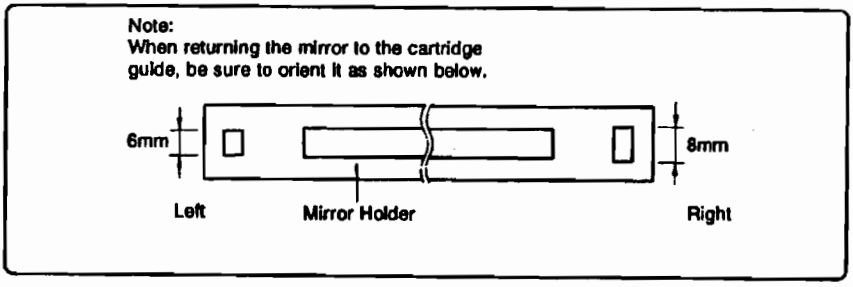


Figure 6-52. Mirror Holder

Erase Lamp Assembly Removal

The Erase Lamp Assembly (see Figure 6-51) contains the Erase Lamp PCA and surrounding sheet metal.

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. Remove the connector cover (1) on the Erase Lamp Assembly (see Figure 6-51).
3. Remove the (2) screws securing the PCA to the Erase Lamp Connector Arm (see Figure 6-53).
4. Remove the (2) screws on the top face of the Erase Lamp Assembly.
5. Lift out the Erase Lamp Assembly.

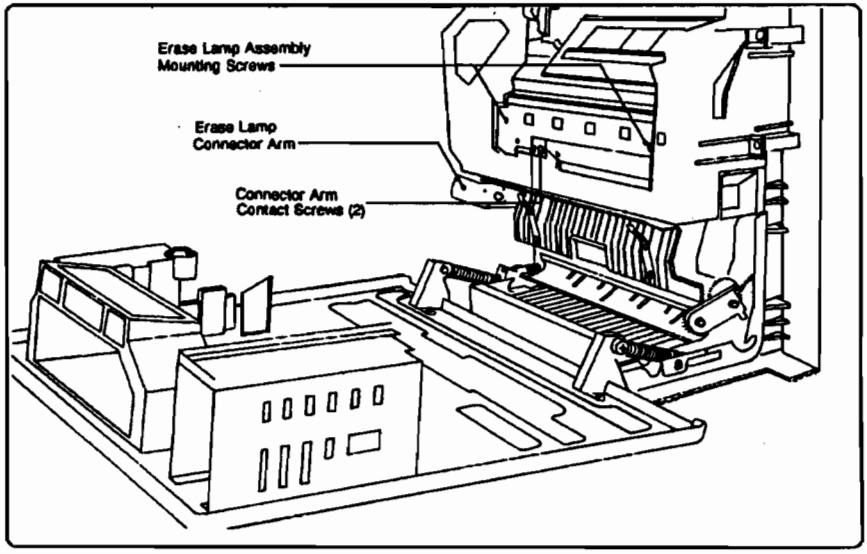


Figure 6-53. Erase Lamp Assembly

Erase Lamp Connector Arm Removal

The Erase Lamp Connector Arm (see Figure 6-51) enables power to the lamps from the Exit Sensor PCA located on the Fusing Assembly.

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. **HP 33447 only:** Remove the Fusing Assembly and the black plastic Fuser Insulating Cover in the Top Cover Assembly (see "Fuser Insulating Cover" below).
3. Remove the connector cover (1) on the Erase Lamp Assembly (see Figure 6-51).
4. Remove the (2) screws securing the Erase Lamp Connector Arm to the Erase Lamp Assembly (see Figure 6-53).
5. Remove the (2 for HP 33447, 1 for HP 33459) screws securing the Connector Arm to the Top Cover Assembly, remove the Connector Arm.

Delivery Area

The Delivery Assembly (Figure 6-55) guides printed paper to the Face-Down (Top) Output Tray. Note that removal of the Delivery Assembly itself or the Output Static Eliminator will require separating the Top Cover Assembly from the printer.

Fuser Insulating Cover Removal

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. Remove the Fusing Assembly.
3. Remove the black-plastic Fuser Insulating Cover screws (the 2 smaller brass-colored pan-head screws with washers) (see Figure 6-54).
4. Insert a small flat-blade screwdriver between the cover and the EP-S Cartridge Guide frame as shown in Figure 6-54. Pry the plastic clips away from the cover to release it.

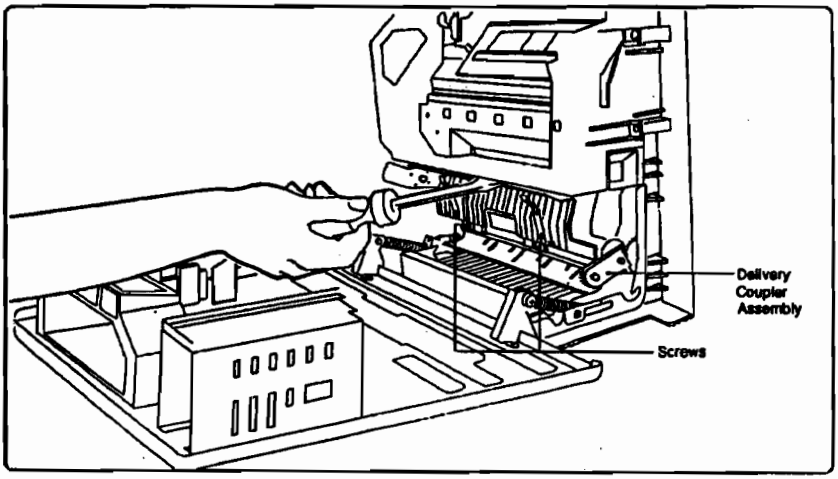


Figure 6-54. Fuser Insulating Cover Removal

Delivery Assembly Removal

1. Remove the hinged Top Cover Assembly from the printer.
2. Remove the black plastic Fuser Insulating Cover covering the Delivery Assembly (see above).
3. Remove the Erase Lamp Assembly cover (1) screw, and (2) connector screws.
4. Remove the Erase Lamp Connector Arm (see Figure 6-53).
5. With the Top Cover Assembly resting upside down on the work area, remove the (5) screws securing the EP-S Cartridge Guide and remove the Guide from the Top Cover Assembly. (Minimize disturbance to the Top Cover Assembly to prevent damage to the Mirror Assembly.)
6. Remove the (2) black Lower Delivery Cover screws and the (4) Delivery Assembly mounting screws (see Figure 6-55).
7. Lift the Delivery Assembly, with the Lower Delivery Cover, free of the Top Cover Assembly.
8. Detach the Lower Delivery Cover from the Delivery Assembly by removing the (2) brass-colored screws.

9. Separate the Delivery Coupler Assembly from the Delivery Assembly.

When reinstalling the Delivery Assembly, position the Delivery Coupler Assembly as shown in the inset in Figure 6-55. When reinstalling the Cartridge Guide, be sure to position the Mirror Assembly mounting slots properly (see Figure 6-52).

Delivery Coupler Assembly Removal

1. Open the Top Cover Assembly and remove the EP-S Cartridge.
2. Remove the Fusing Assembly and Fuser Insulating Cover as described above.
3. Remove the (1) Delivery Coupler Assembly mounting screw and lift it out (see Figure 6-55).

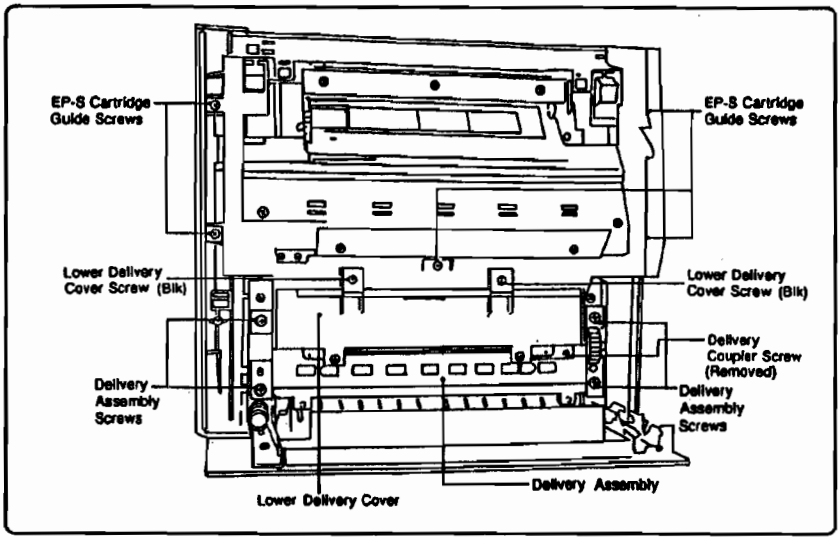


Figure 6-55. Delivery Assembly Removal

Static Eliminator Removal

The Static Eliminator is the fine fiber brush located on the outside top of the printer where the paper exits to the Top (Face-Down) Output Tray.

1. Remove the Top Cover Assembly and the Delivery Assembly (see above).
2. Remove the (2) screws securing the Static Eliminator.

Deflector Pawls (Claws) Removal

1. With the Top Cover Assembly fully open, pry the right end of the Deflector Pawls (Claws) shaft out of its retaining clip (see Figure 6-56).
2. Slide the assembly to the right out of its retainer.

When reinstalling the Deflector Pawls, ensure that the spring is positioned properly and that it is not damaged (see Figure 6-56).

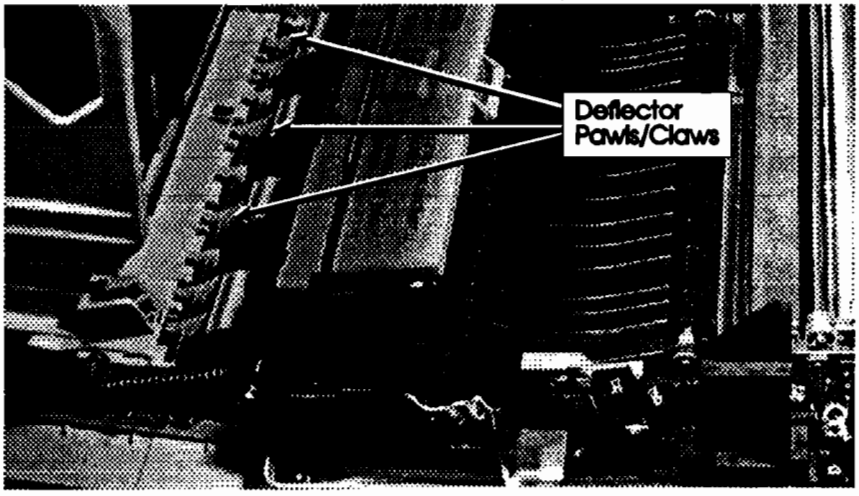


Figure 6-56. Deflector Pawls (Claws)

Top Cover Hinge Bracket Plates Removal

1. Remove the Top Cover Assembly from the printer.
2. If the Hinge Assemblies are still attached to the Top Cover Assembly (see Figure 6-50), remove them (4 screws, 2 on each Hinge Assembly).
3. Remove the Delivery Assembly.
4. Remove the remaining screws (2 each) securing the Hinge Bracket Plates to the Top Cover Assembly and lift them out of the printer.

When reinstalling, note that the Hinge Plate with the coil spring must mount on the left side of the Top Cover Assembly as viewed from the front of the printer.

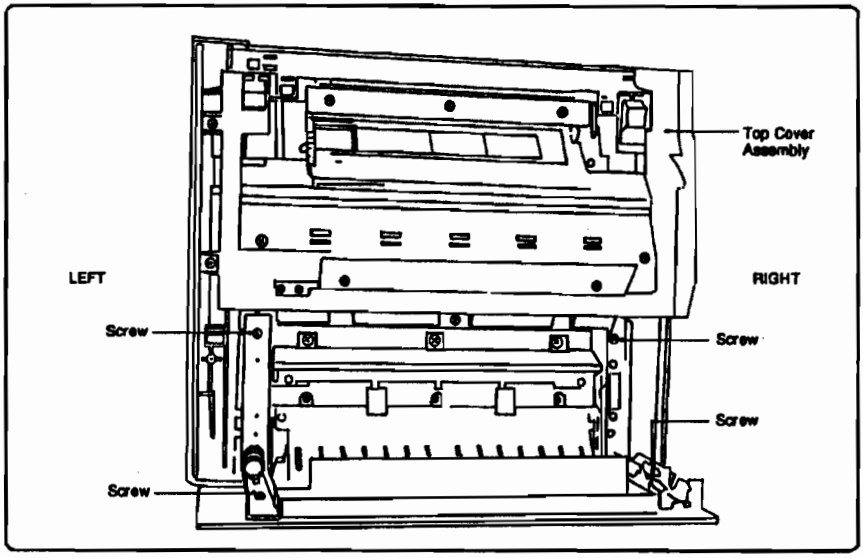


Figure 6-57. Hinge Plate Removal

6-9. BOTTOM COVER COMPONENTS

Bottom Cover Removal

The Bottom Pan (see Figure 6-58) encases the components located on the underside of the printer. The Bottom Pan must be removed to replace the Lower Cooling Fan, Formatter PCA, DC Controller PCA, and some cable assemblies.

Caution

Before turning the printer over, the EP-S Cartridge must be removed as well as any other brackets or fasteners that are not secured. When turning the printer over, use extreme care not to bend or otherwise damage the upper body frame and components. Also remove any accessory memory I/O PCAs and font cartridges at this time, using proper ESD procedures.

For HP 33459 only: With the printer turned over, remove the (4) screws securing the outer Bottom Cover and remove the RAM expansion cover. Lift the rear of the cover until the cover is vertical and remove it from the printer.

For both printers: Remove the (9) screws securing the Bottom Pan and lift it off. Note that on the HP 33447, one screw is accessed through a slot in the Font Cartridge Cover.

Lower Cooling Fan

1. Remove the Bottom Cover(s).
2. Detach the connector from the DC Controller PCA, remove the (4) screws securing the fan, and lift the fan out of the printer.

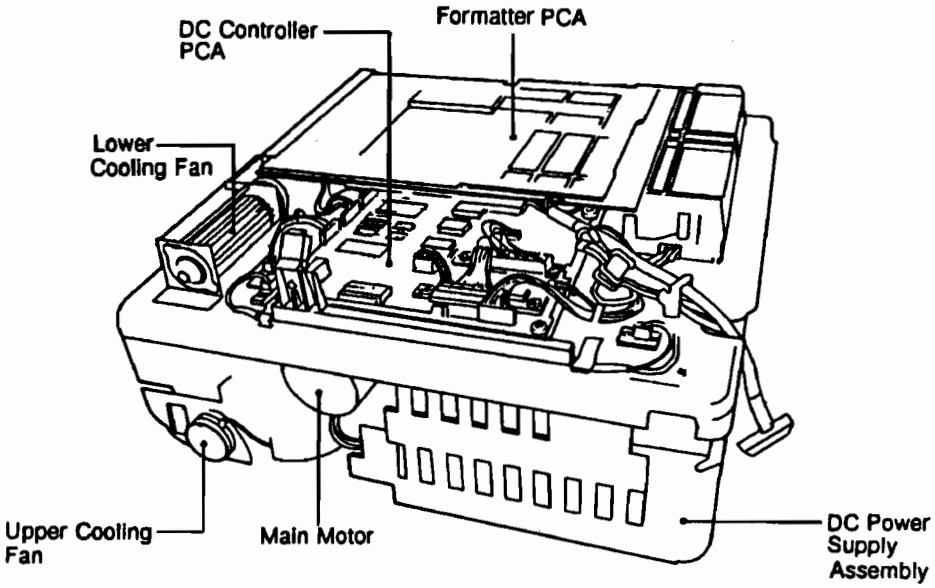


Figure 6-58. Bottom Cover Components

Formatter PCA Removal

The Formatter PCA is located on the underside of the printer, as shown in Figure 6-58.

Caution

PCAs contain components that are sensitive to damage by electrostatic discharge. Be sure to use protective measures such as the *Electrically Conductive Field Service Grounding Kit* (HP 9300-0933), when removing, installing, or handling any of these assemblies.

---

1. Remove any accessory PCAs (expansion memory boards and optional I/O), font cartridges, and the Bottom Cover(s).
2. Disconnect connector J8 (connects to the Control Panel. See Figure 6-59).
3. Remove the (2) screws with star washers at the Voltage Connector (see Figure 6-59) and the (4) screws securing the PCA (2 at the front, 1 at the long edge, and 1 in the center of the board).
4. Remove the (2) screws connecting the I/O Connector Plate to the printer's base plate.
5. Remove the PCA and the attached metal plate by lifting the rear of the board (by the I/O Connector plate) 4 to 6 inches (10 to 15 centimeters) and then pulling it out of the printer. This will allow the two cartridge connectors to slide out of its plastic frame, and will disconnect the DC Controller connector.

When reinstalling the Formatter PCA, ensure that the PCA is aligned with the plastic positioning pins and that the I/O Connector plate does not pinch the cable assembly running between the DC Controller and the Fusing Assembly. *Only when the board assembly is positioned properly should the DC Controller connector be seated and the (8) screws be replaced.*

Note

If the Formatter PCA is replaced, the page count should be set to its previous value. Refer to "Setting the Page Count" in Chapter 3, Section 3-7, for instructions.

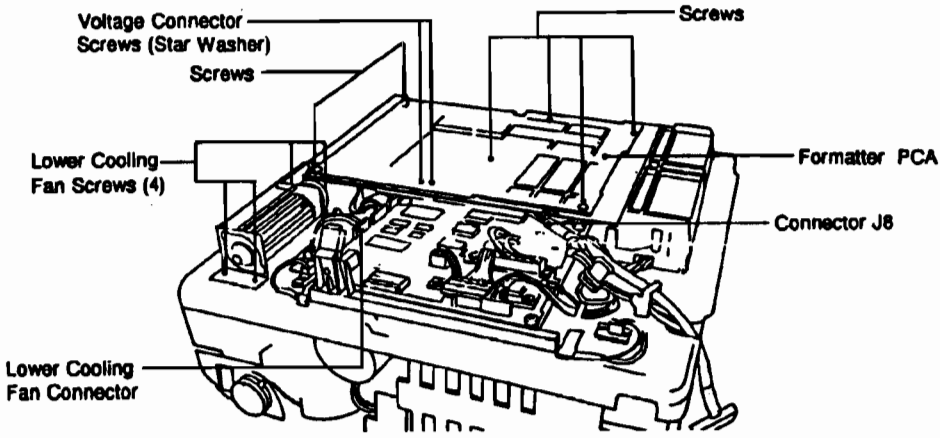


Figure 6-59. Formatter PCA

DC Controller PCA Removal

The DC Controller PCA is located on the underside of the printer as shown in Figure 6-60. See notes and cautions for this section.

Caution

PCAs contain components that are sensitive to damage by electrostatic discharge. Be sure to use protective measures such as the *Electrically Conductive Field Service Grounding Kit* (HP 9300-0933), when removing, installing, or handling any of these assemblies.

---

1. Remove any accessory PCAs (expansion memory boards and optional I/O), font cartridges, and the Bottom Cover(s).
2. Remove the Formatter PCA.
3. Disconnect connectors J202, J203, J206, J207, J208, J211, J214, J215, J216 and the fiber-optic cable from the DC Controller PCA. (See Figure 6-60.)
4. Loosen the (1) screw and remove the Thermistor Bypass Switch Actuator Plate from its plastic stanchion (located next to the Lower Cooling Fan).
5. Remove the (4) screws that secure the four corners of the DC Controller PCA.

The HP 33447 and the HP 33459 use different DC Controllers. The HP 33459 DC Controller runs at a higher clock speed to accomodate the Resolution Enhancement™ feature of the LaserJet IIID. The Resolution Enhancement feature is dependent upon having the correct DC Controller and Formatter installed.

When reinstalling the DC Controller PCA, be sure the connector pins are properly aligned and that no cables (particularly the Beam Detect Fiber-Optic Cable) will be pinched before pressing the board into place. (Hint: Pushing down on the top of the connectors is the best way to reseat the board.) *Ensure jumper J209 is in place or intermittent hardware failure indications may result.*

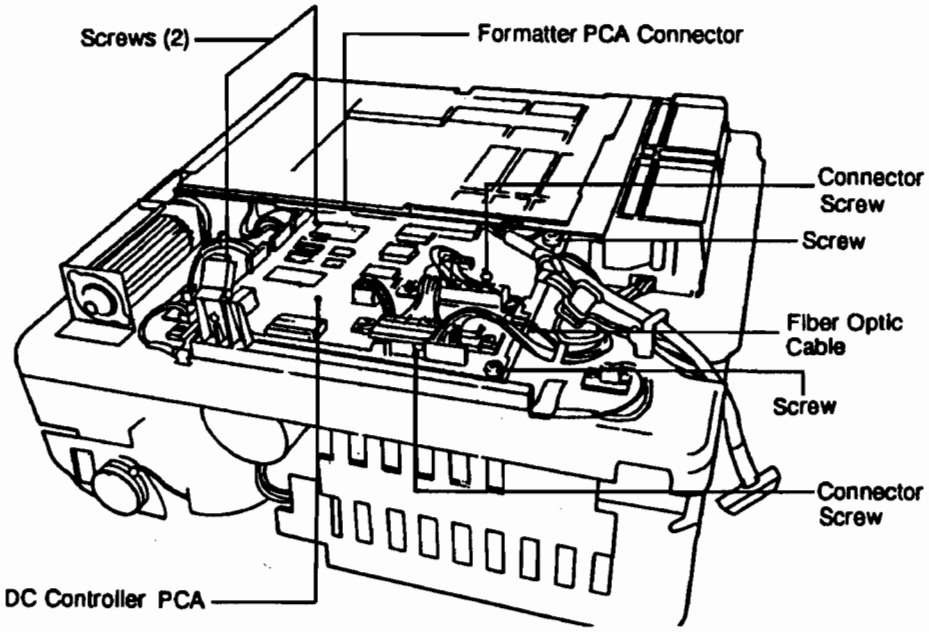


Figure 6-60. DC Controller PCA

TROUBLESHOOTING

7-1. INTRODUCTION

This chapter was designed to provide the information necessary to quickly identify the cause of an HP 33447 or HP 33459 printer failure. Chapter organization is based upon three predominant sources of symptoms:

- Control Panel display messages.
- Print quality problems.
- Host/printer communication problems.

A series of flowcharts are included to provide support personnel with a logical sequence of steps to verify proper printer operation. If a failure is discovered through the verification procedure, the engineer can quickly find the appropriate section of Chapter 7 to identify the faulty component or assembly.

Once a defective printer component is identified as the cause of the failure, service personnel should reference Chapter 6 ("Removal and Replacement") to effect the repair. If the cause is not an internal printer component, this chapter should provide the information necessary to resolve the problem or, at a minimum, reference another appropriate section of the manual.

Section 7-2, "Pre-troubleshooting Procedures," provides a preliminary checklist designed to assist the service representative in determining ——over the telephone if possible—— if a service call is necessary.

Section 7-3, "Main Flowchart," provides several flowcharts which give a step-by-step sequence of actions to take to verify proper printer operation.

Section 7-4, "Printer Message Troubleshooting," lists Control Panel messages, their causes, and the appropriate actions to take to respond to them.

Section 7-5, "Image Formation Troubleshooting," describes typical image formation and print quality problems and the steps to take to correct them.

Section 7-6, "Interface Troubleshooting," describes interface problems between the printer and its host system and the actions to take to correct these problems.

Section 7-7, "Troubleshooting Aids," provides additional troubleshooting material, including a print image repetitive defect ruler, connection diagrams, the main wiring diagram, followed by a listing and brief description of the signals illustrated in the diagram, and a signal timing chart.

7-2. PRE-TROUBLESHOOTING PROCEDURES

Preliminary Operating Checks

Prior to troubleshooting a specific printer problem, the service representative should ensure that:

1. The printer is installed on a solid, level surface.
2. The line voltage providing power to the printer does not vary more than 10% from the nominal rated value as specified on the Power Rating label.
3. The operating environment for the printer is within the temperature and humidity specifications listed in Chapter 1, Section 1-3, of this manual.
4. The printer is operated in a well-ventilated area.
5. The printer is not located in a hot or humid area (near water taps, boilers, or humidifiers), a cold area, near open flames, or in a dusty situation.
6. The printer is never exposed to ammonia gas such as that produced by diazo copiers or office cleaning materials.
7. The printer is not exposed to direct sunlight at any time during the day.
8. The customer is using media as specified in the User's Manual.
9. Non-HP components are removed from the printer such as refilled toner cartridges, font cartridges, are memory boards.

Pre-Troubleshooting Check List

The "Pre-Troubleshooting Check List" on the following page is designed to help resolve user-responsible problems before they become service calls.

PRE-TROUBLESHOOTING CHECK LIST

Blank Display

- Verify that power cord is firmly connected to both the printer and its power source. Remove any Optional I/O or memory PCAs.

Slow Printer

- The optimal eight-page-per-minute specification does not take into account data transfer time between the host and printer or the time required by the printer to format more complex data such as HP-GL/2 commands and scalable fonts. A complex page may take up to several minutes to format before printing. The READY indicator should flash while formatting.
- A Print Fonts routine involving scalable fonts (HP 33459 only) will typically cause delays of up to 30 seconds between pages.
- Because the HP 33459 self test involves font scaling and HP-GL/2 graphics, it will not run continuously at eight ppm.

Short EP-S Cartridge Life

- A new Hewlett-Packard EP-S Cartridge is rated for 4,000 letter-sized pages with average coverage (i.e., a double-spaced page) of five percent toner per page. Forms, graphics, and/or a density dial setting less than "5" will yield fewer pages.
- Paper with high surface abrasion (typical of a good writing or general purpose bond paper) can prematurely wear the surface of the EP drum. Recommend a good quality xerographic bond paper.

Font Cartridge Not Recognized

- Reinstall cartridge - push until it "clicks."

Print Quality Problems

- Thoroughly clean the printer (see User's Manual).
- Avoid poor quality or non xerographic paper and improper paper storage practices. Recommend use of high quality xerographic bond paper and proper storage per the User's Manual.

Black Pages (Undefined Border)

- Broken Primary Corona wire - replace the EP-S Cartridge.

Dark Streaks (or Lines) Down the Page

- Clean the Primary Corona wire with felt end of cleaning tool.
- Clean Transfer Coronoa and antistatic teeth.
- Check the Fuser Cleaning Pad. If marks correspond to streaks, it may need replacement. Check any pre-printed forms for corresponding images.

Light Areas of Print (Blotches or Streaks Down the Page)

- Toner running low. Gently rock the EP-S Cartridge around its long axis to resolve temporarily. May require a new EP-S Cartridge immediately.
- Clean the Transfer Corona housing and wire.
- Improper paper storage and some types of paper will exhibit this problem. Recommend usage of high quality xerographic bond paper and proper storage techniques.

Smeared Print

- Paper with a surface texture that is too smooth will exhibit this problem.

Gray Background

- With envelopes and thick media, set the Print Density dial to a lower (darker) setting.
- Clean the Primary Corona wire with felt end of cleaning tool.

Figure 7-1. Pre-Troubleshooting Check List

Partial Pages
- Set AUTO CONT = OFF in Configuration Menu and troubleshoot error message. If no message, probable cause is an application and/or printer setup problem.

Communication Problems
- If tied to an MS-DOS system, ensure the AUTOEXEC.BAT file properly reflects I/O configuration, via the MODE and COM commands, and reboot.
- Verify that a cable known to be good is securely installed between the host and printer –10' max. for parallel, 50' max. for RS-232.
- Verify that both the host system and printer Control Panel configurations match.
- Check that the application's printer configuration file has not been improperly modified or inadvertently purged.

02 WARMUP (Continuous)
- Can be caused by host interface or cabling problems, or improper use of the printer's interface ports. Remove I/O cables and power cycle the printer.

13 PAPER JAM Indications
- If media visibly jams, it may be unsuitable for the LaserJet printer. Try a reputable xerographic bond paper or other suitable media per Chapter 2 herein or Appendix D of the User's Manual.
- If using envelopes, ensure they meet the specifications in User's Manual. Do not shuffle envelopes prior to loading in the input tray.
- Printer may require operator cleaning. (See User's Manual.)
- If all looks well but jam indication occurs just prior to delivery, host application and/or printer setup is probably at fault. Can occur if unexpected media size is placed in Manual Feed tray.

ERROR 20 (Memory Overflow)
- Insufficient printer user memory is available to format the current page. Additional user memory may be freed up by removing any soft fonts or macros. User may need to purchase additional memory.

ERROR 21 (Print Overrun)
- The current page is too complex to be printed in its entirety. On the HP 33447, the only solution is to simplify the page. With the HP 33459, accessory memory can be purchased and PAGE PROTECT (in the Configuration Menu) enabled.

ERROR 22 (I/O Configuration Error)
- Because printer and host are not handshaking properly, the printer's I/O buffer has overrun. Verify cabling per Appendix D, and the host's interface/configuration and the printer's Control Panel configuration.

ERROR 40 (Data Transfer Error)
- Printer is receiving data in an unrecognizable format, a common result of having powered down the host with the printer online. Also caused by non-matching baud rates or host configuration other than an 8-bit –1 start/stop bit – no parity ASCII character.

Unexpected Results - No Failure Indication
- Most unexpected problems can be attributed to the host application or its use. The Personal Peripherals Assist Line is available free of charge to help the user through these problems at (208) 323-2551. Note that this is a toll call.

Figure 7-2. Pre-Troubleshooting Check List

7-3. TROUBLESHOOTING FLOWCHARTS

All troubleshooting should begin with Flowchart 7-1 which can be used to verify the major printer functions described in the table below:

Table 7-1. Major Printer Functions

FUNCTION	DESCRIPTION
Power Up.	The powering up of the printer to the ready state following Self Test, and the distribution of DC voltages.
Paper Movement.	The printer's ability to successfully move media from the input tray to either the Face-Up or Face-Down (Top) Output Tray.
Image Formation.	The printer's ability to successfully generate a print image and transfer this image to various print media.
Communications	The printer's ability to successfully communicate with its host system.

The service representative should work through the main flowchart sequentially, function by function, until all of the printer's major functions have been verified. Flowchart 7-2 (Power-Up Sequence) and Flowchart 7-3 (Paper Movement Sequence) should be used in conjunction with Flowchart 7-1. If a malfunction is encountered, the service person should branch to the specified section.

START

ON/OFF Switch to ON !

Does the Display Read "00"Ready After 60 Seconds?

No

Yes

Is An Error Being Displayed?

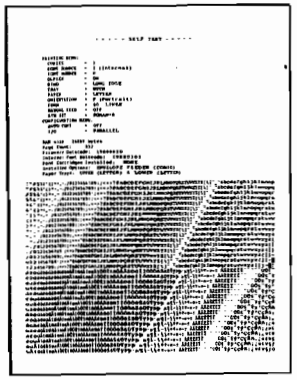
No

Yes

Go To Flowchart 7-2. Power up/ Ready Troubleshooting

Perform TEST PRINT.

SELF TEST



Can The Printer Successfully move Paper?

No

Yes

Is a Clear TEST PRINT Image Being Transferred to Paper?

No

Yes

Is an Error Being Displayed?

No

Yes

Are Any of The Images Similar To Those in Figure 7-32

No

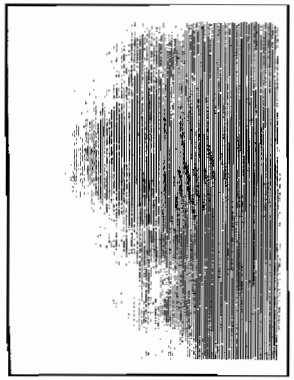
Yes

Go to Flowchart 7-8. Image Formatting Page 7-14

Perform the recommended action listed in table 7-99, 7-115

Perform SELF TEST

TEST PRINT



Is The SELF TEST Print Quality Acceptable?

No

If test print is ok, yet SELF TEST PRINT is unacceptable. Troubleshoot the Formatter PCA

Yes

Successful SELF TEST

Can The Printer Sucessfully Communicate with the Computer?

No/Don't Know

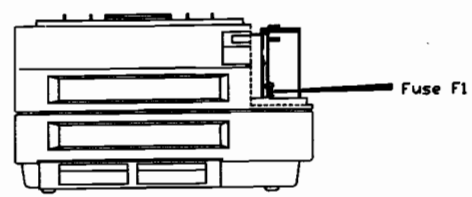
Go to Flowchart 7-9. Data Communication Check Page 7-15

Yes

EXIT

ERROR	MESSAGE	ACTION
LC TRAY EMPTY	Lower paper tray is empty.	Pg.7-31
UC TRAY EMPTY	Upper paper tray is empty.	Pg.7-31
02 WARMING UP (continuous)		Pg.7-31
12 PRINTER OPEN	Printer top cover is open.	Pg.7-39
13 PAPER JAM	Paper in paper path.	Pg.7-43
14 NO EP CART	No EP Cartridge is installed.	Pg.7-75
16 TONER LOW	Cartridge is low on toner.	Pg.7-78
20 ERROR	Indicates memory overflow.	Pg.7-19
21 ERROR	Too complex data.	Pg.7-19
22 ERROR	No host communications.	Pg.7-20
40 ERROR	Communications error.	Pg.7-20
41 ERROR	Tempory beam detect error.	Pg.7-80/85
42 ERROR	Expanded I/O error.	Pg.7-20
43 ERROR	Expanded I/O error.	Pg.7-20
50 SERVICE	Fusing system malfunction.	Pg.7-80
51 ERROR	Beam detect error.	Pg.7-85
52 ERROR	Scanner malfunction	Pg.7-90
53 ERROR	Optional RAM malfuntion.	Pg.7-92
54 ERROR	Duplex guide plate malfuntion.	Pg.7-92
55 ERROR	DC Controller/Interface error.	Pg.7-95
56 ERROR	Duplex error (output selector)	Pg.7-95
61 SERVICE	ROM checksum error.	Pg.7-22
62 SERVICE	Font ROM checksum error.	Pg.7-22
63 SERVICE	Dynamic RAM error.	Pg.7-22
67 SERVICE	Miscellaneous hardware error.	Pg.7-22
68 SERVICE	NVRAM error.	Pg.7-22
69 SERVICE	Expanded I/O time-out.	Pg.7-23
70 SERVICE	Incorrect firmware cartridge.	Pg.7-23
71 SERVICE	Incorrect firmware cartridge.	Pg.7-23
72 SERVICE	Font cartridge insertion problem.	Pg.7-23
79 SERVICE	Miscellaneous firmware problem.	Pg.7-24

Chart 7-2
Power-Up/Ready



Power Malfunction

On/Off Switch to ON

Is the Lower Cooling Fan Operational ?

NO → Verify Input Power

YES

Is Fuse F1 Good ?

NO → Replace Fuse F1

YES

Is AC Power Present at J502 Pins 1 and 3 of the DC Power Supply ?

NO → Reset and/or Replace the AC Power Module. Electrical Check Page 7-29

YES

Are the DC Supply Voltages being Generated ?

NO → See DC Power Electrical Check Page 7-28

YES

Is DC Power Present at J210 ?

NO → (back to Are the DC Supply Voltages being Generated ?)

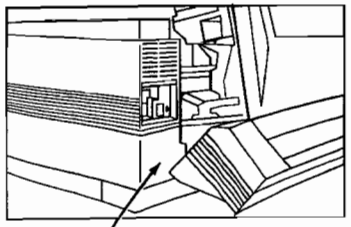
YES

Is the display blank or garbled ?

NO → Return to the Main Troubleshooting Flowchart 7-1

YES → The Printer's Display must be functional for further troubleshooting ; perform the following :

A. Reseat or Replace the Display Panel Cable.
B. Replace the Formatter PCA.
C. Replace the Display Panel.
D. Replace the DC Controller PCA.

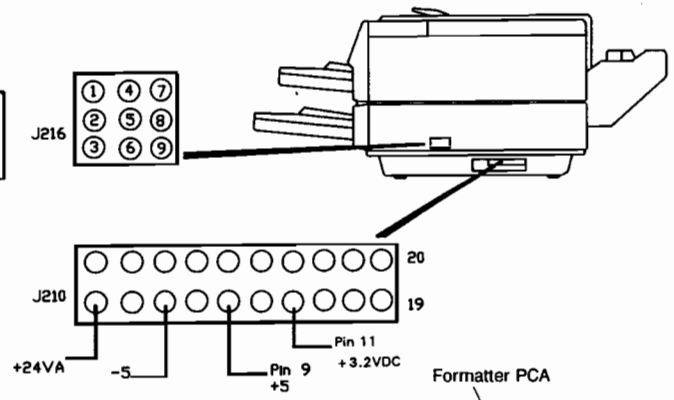


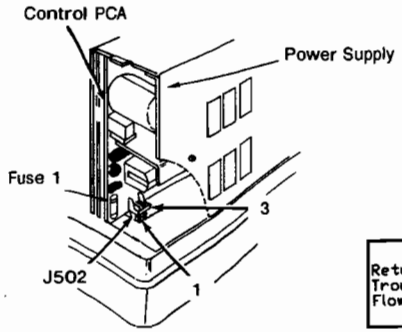
Lower Cooling Fan

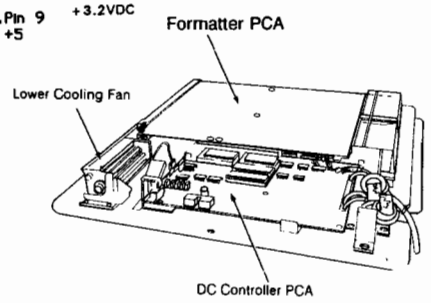
J216

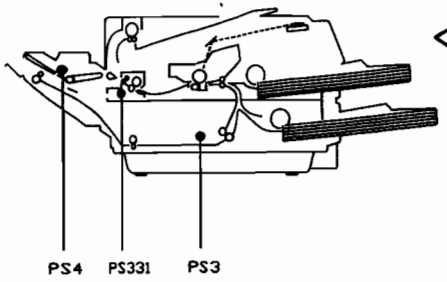
Pin #	Color	Supply
1	Gray	+5
2	Brown	+5
5	Brown	+5
8	Red	+24VB*
9	Red	+24VA

* Must have Top Cover closed or MS1 and 2 Defeated









'13 Paper Jam'

Check and Clean Paper path.

Does the Error occur at printer Power-up ?

NO

Yes

Envelope Feeder Connected

Yes

No

Disconnect Envelope Feeder

Is the Upper Main Motor connected?

NO

Connect Main Motor

YES

Check for Paper In the Sensors.

YES

Does the Error persist ?

NO

EXIT

YES

Verify Paper Sensors are Functional.
(See Functional Check)

Does the Error Persist ?

NO

EXIT

Yes

Replace DC Controller PCA.

Error at Power-Up?

Yes

No

Replace Paper Control PCA

Does error Presist ?

No

Exit

Yes

Contact Technical Resource

Will Paper Feed from the Upper Tray to the Face-up Tray?

NO

A

Go to Flowchart 7-4

YES

Will Paper Feed from the Lower Tray to the Face-up Tray?

NO

B

Go to Flowchart 7-5

YES

Will Paper Feed to the Face-down Tray?

NO

C

Go to Flowchart 7-6

YES

Will Paper Feed through the Duplex Paper Path ?

NO

D

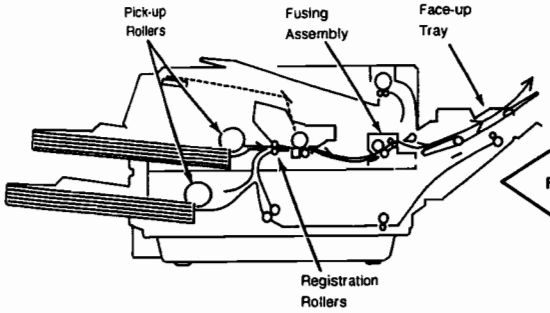
Go to Flowchart 7-7

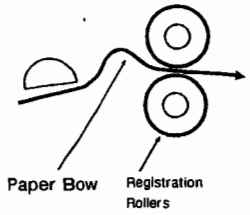
YES

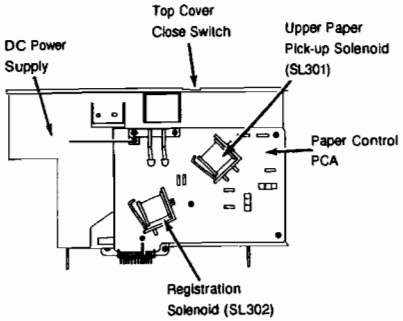
EXIT

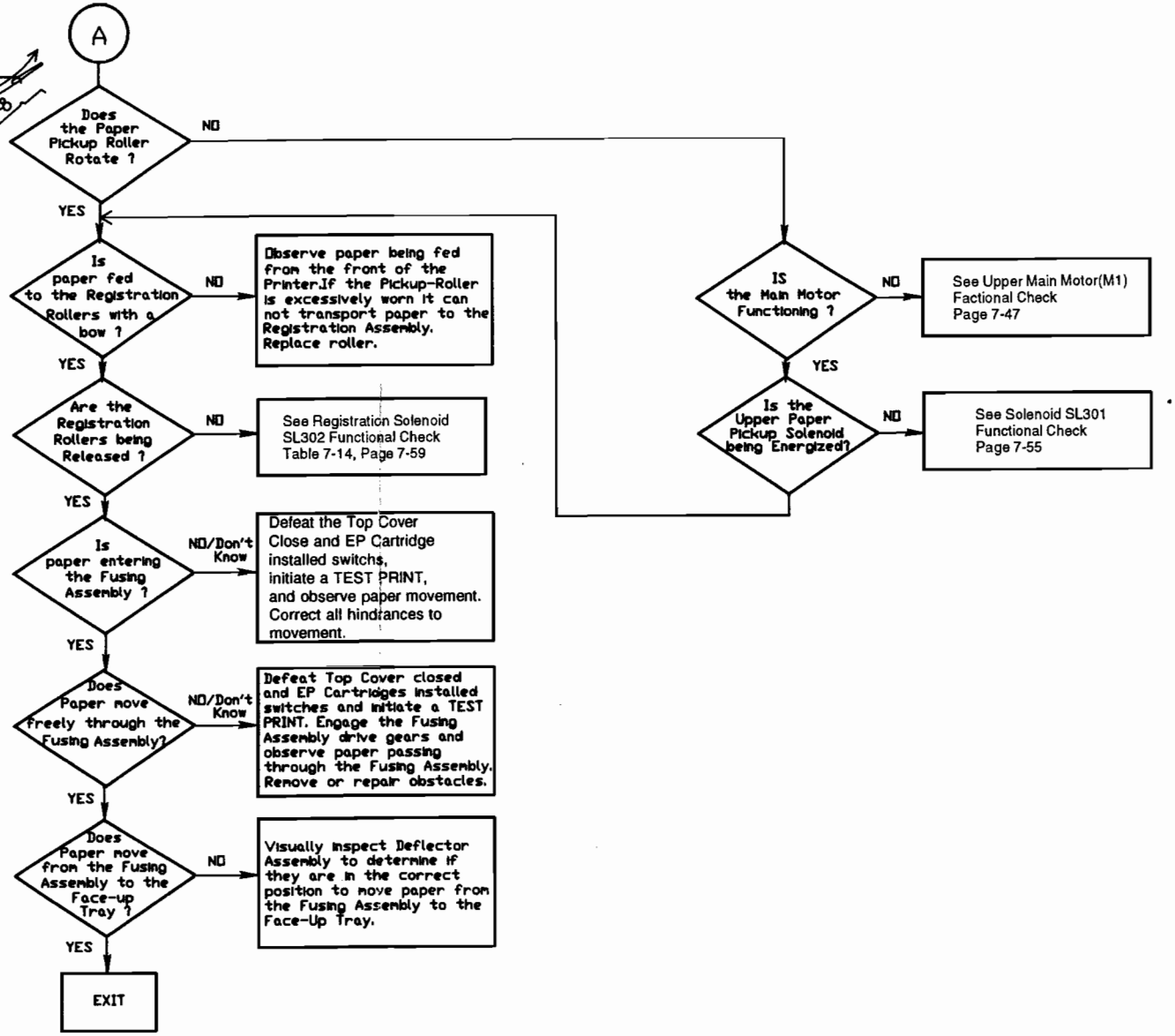
SENSOR	ELECTRICAL CHECK	PAGE #
Exit	PS 331	7-63
SWITCHBACK	PS4	7-65
Duplex	PS3	7-66

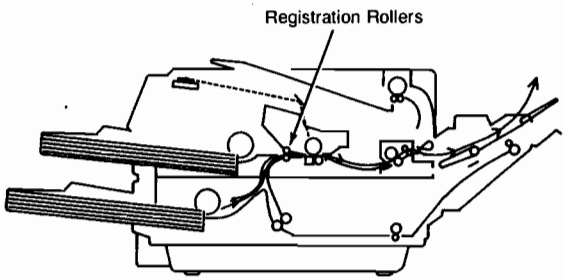
Upper Paper Tray
to Face-up Tray

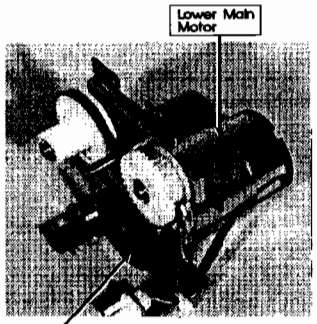










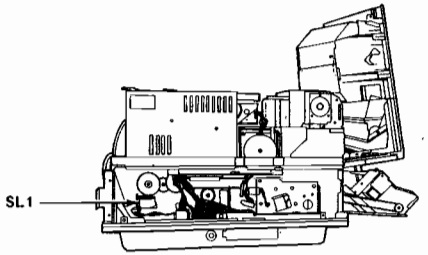


The Lower Main Motor is enabled for one second at Printer Power-Up, during a TEST PRINT operation.

If the black Timing Disc spins, the lower Main Motor works.

The Lower Paper Feed Solenoid should be energized long enough for the Feed Roller to rotate two times.

The paper should be fed to the registration rollers with a slight bow.



1. Select the Lower Paper Tray from the printer's Front Panel.
2. Perform a front Panel SELF-TEST.

B

Does the Lower Main Motor work? — NO → See the Lower Main Motor (M2) Electrical Check Page 7-48

YES

Is SL1 being energized ? — NO → See the SL 1 Functional Check Page 7-56

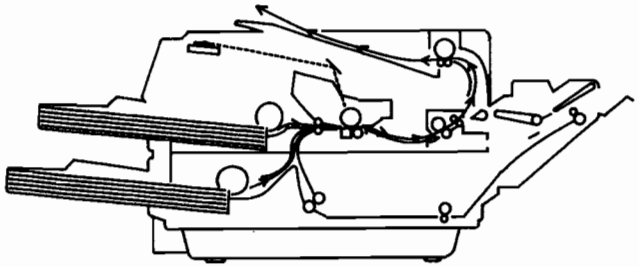
YES

Is the paper being fed completely to the Registration Rollers? — NO → See the Lower Paper Feed Roller Visual Check. Page 7-57 Replace the Lower Feed Roller if excessively worn

YES

A

Return to Flowchart 7-4 and continue through the remainder of the Paper Path.



The upper portion of the printer Face-down Output tray receives its drive from the Fusing Assembly. Ensure the gears are positioned correctly to receive drive.

NOTE
You should not be in this flowchart until you have verified that paper can feed from both the Upper and Lower Paper Trays to Face-up output tray.

1 Paper Knob to 9:00 Position
2 Press TEST PRINT Key.

C

Is Upper Drive Coupling Gear in correct position?

NO → Correct or replace gears.

YES

Are the Deflector Pawls currently positioned to guide paper from the Fusing Assembly to Face-down Output Stacker?

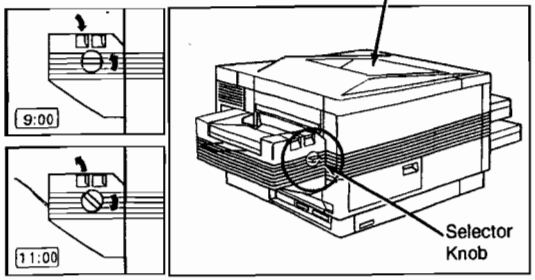
NO → Correct Deflection Pawls

YES

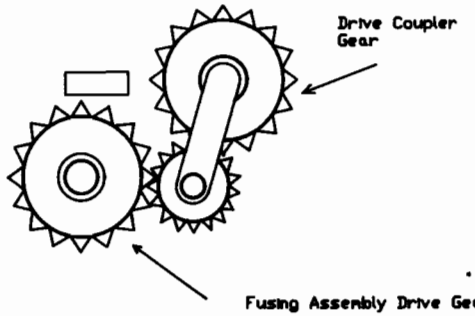
Can Paper be manually fed through the Face-down Stacker?

NO/Don't Know → Manually insert paper in upper paper path and rotate Drive Gear to feed paper through path , correct obstructions.

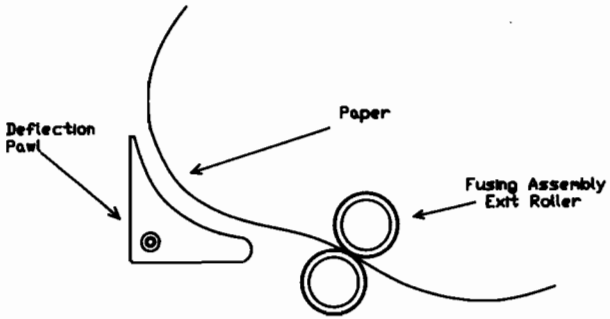
EXIT



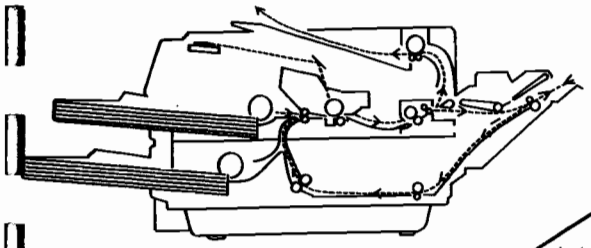
The (Selector) knob should be in the 9:00 position to move paper to the face down tray.



e.g. Correct positioning of the Drive Coupler Gears.



Correct position of deflector pawls for entering Face-down Stacker.



1 Place the printer in index mode.
2 Perform a front panel SELF TEST.

D

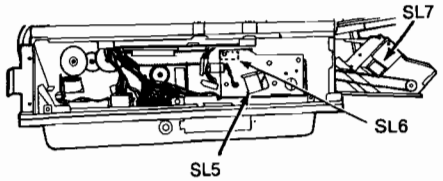
You should not be here if you have not verified operation in all the other paper paths!

Is SL7 being energized?

NO → Observe operation perform the Deflector Solenoid (SL7) Electrical Check Page 7-74

YES

The energizing of SL7 guides paper from the Fusing Assembly into the Switchback Assembly.



SL6 should be de-energized at this time!

Is SL5 being energized?

NO → Perform the Switchback Drive Control (SL5) Electrical Check Page 7-71

The energizing of SL5 enables the switchback drive rollers providing paper movement in the switchback assembly.

YES

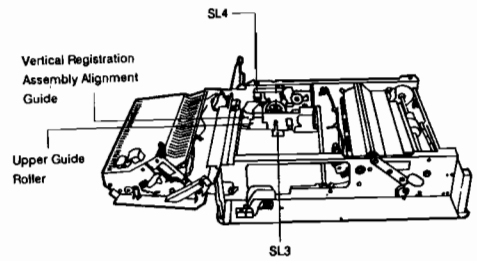
Is SL6 being energized?

NO → Perform the Direction Solenoid (SL6) Electrical Check Page 7-72

When the switchback paper sensor (PS4) detects the trailing edge of the paper SL6 is energized and the switchback drive rollers pull the paper into the duplex paper path.

YES

D1



D1

Paper should be entering the Duplex Paper Path.

The Vertical Registration Assembly adjust to the width of the paper indicated by the paper tray switches.

Is the Vertical Registration Guide set to the correct paper width ?

NO/Don't Known → Soleniod SL4 controls the positioning of the guides. See the Vertical alignment guide check on page 7-94

YES

The energizing of SL3 pinches the upper guide roller against the lower guide roller, thus gripping the paper.

Is SL3 being energized?

NO → Perform the Paper alignment guide roller (SL3) electrical check. Page 7-70

YES

Is SL2 being energized?

NO → Perform the Duplex Drive Roller (SL2) Electrical Check. Page 7-68

YES

The paper should now be transported by the Registration Rollers.

EXIT

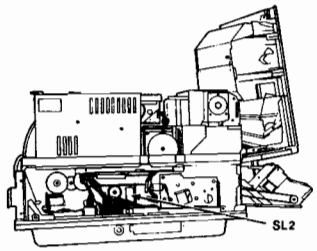
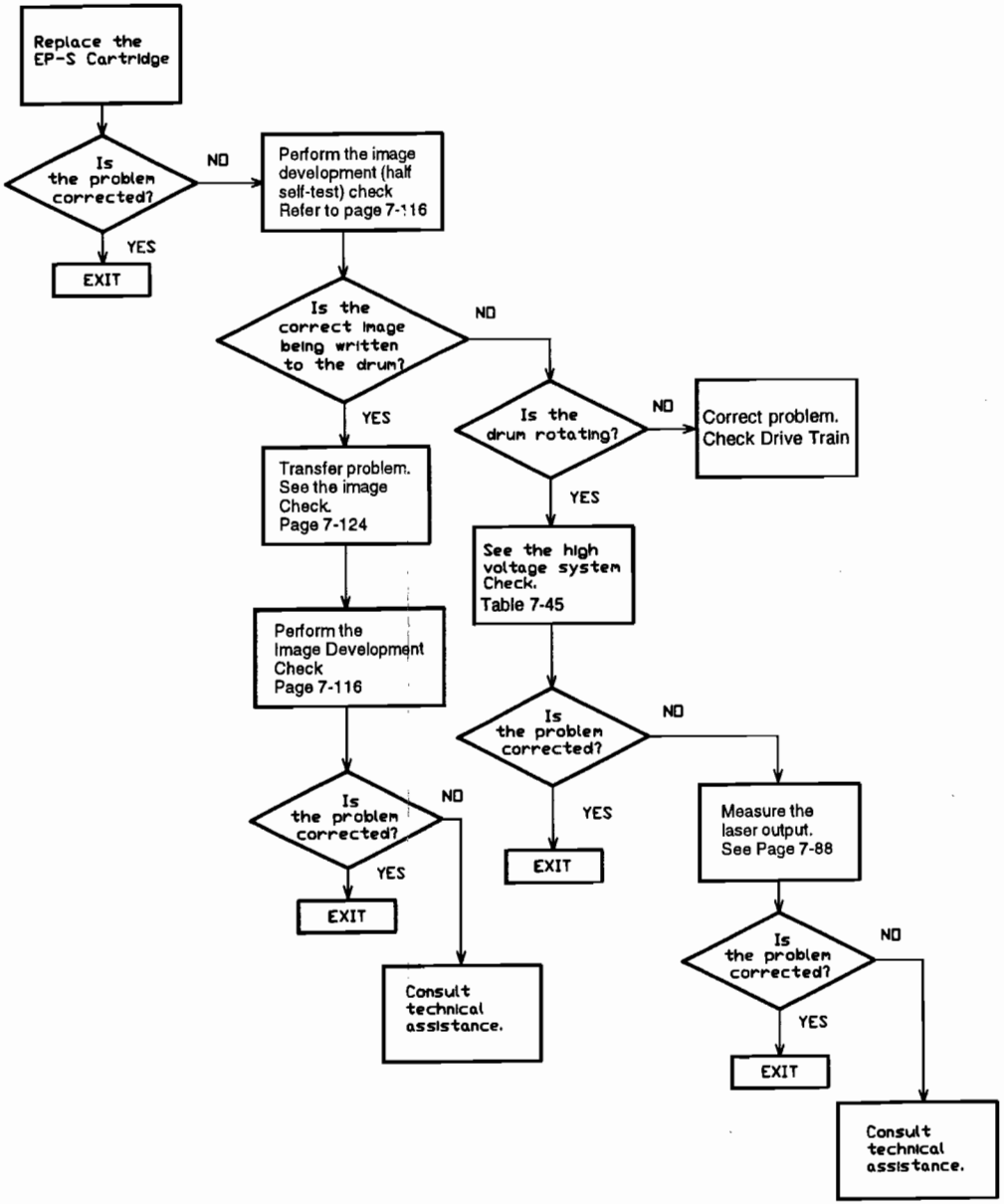


Image Formation



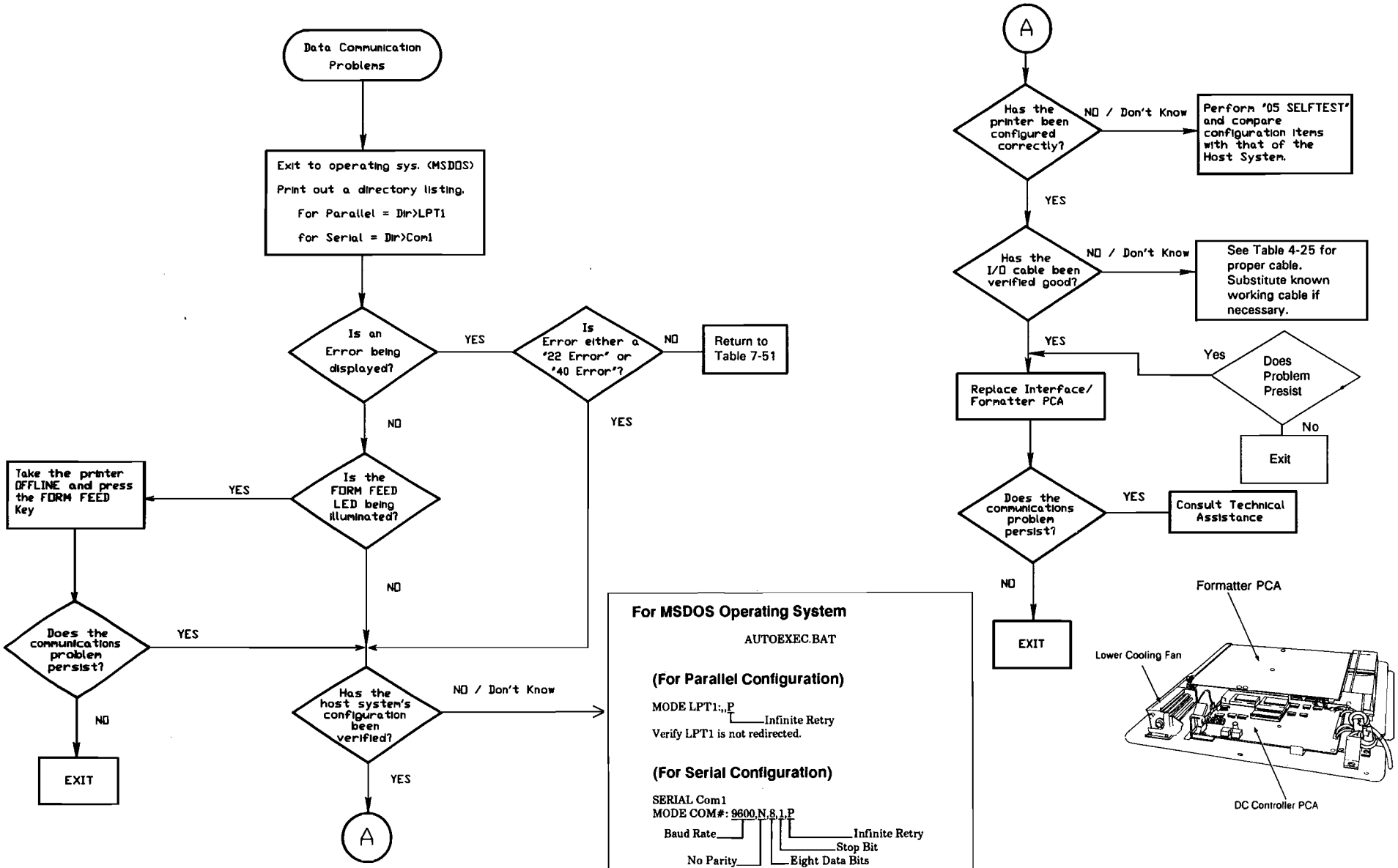
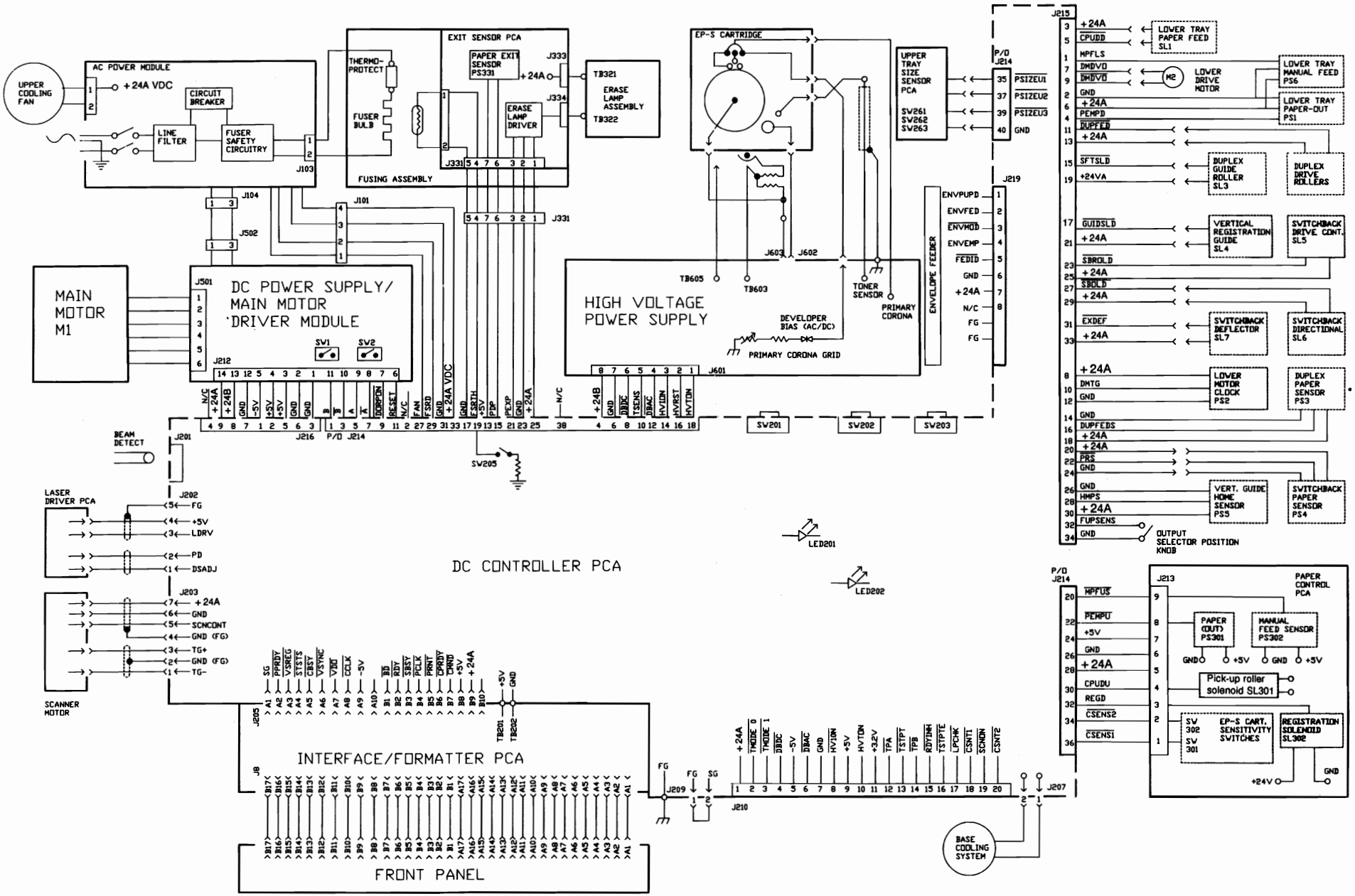

Data Communication Problems
Exit to operating sys. (MSDOS)
Print out a directory listing.
For Parallel = Dir>LPT1
for Serial = Dir>Com1
Is an Error being displayed?
YES
Is Error either a '22 Error' or '40 Error'?
NO
Return to Table 7-51
NO
YES
Is the FORM FEED LED being illuminated?
YES
Take the printer OFFLINE and press the FORM FEED Key
NO
Does the communications problem persist?
YES
NO
EXIT
Has the host system's configuration been verified?
NO / Don't Know
YES
A
For MSDOS Operating System
AUTOEXEC.BAT
(For Parallel Configuration)
MODE LPT1:,,P
Infinite Retry
Verify LPT1 is not redirected.
(For Serial Configuration)
SERIAL Com1
MODE COM#: 9600,N,8,1,P
Baud Rate
No Parity
Eight Data Bits
Stop Bit
Infinite Retry
A
Has the printer been configured correctly?
NO / Don't Know
Perform '05 SELFTEST' and compare configuration items with that of the Host System.
YES
Has the I/O cable been verified good?
NO / Don't Know
See Table 4-25 for proper cable. Substitute known working cable if necessary.
YES
Replace Interface/ Formatter PCA
Yes
Does Problem Presist
No
Exit
Does the communications problem persist?
YES
Consult Technical Assistance
NO
EXIT
Formatter PCA
Lower Cooling Fan
DC Controller PCA

Chart 7-10
Main Wiring Diagram



7-4. PRINTER MESSAGE TROUBLESHOOTING

Message Summary Table

Table 7-2, "Printer Messages," is a list of all status, attendance, error, and service messages affecting the HP 33447 and HP 33459 printers. HP 33459-specific messages are overprinted in color. When two items appear in the "MESSAGE" column, the first is the HP 33447 display message and the second is the HP 33459 display message. This list identifies the action required to correct the situation identified by the message.

Table 7-2. Printer Messages

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
Blank Display	Refer to "Blank Display" section. (Table 7-3)
00 READY	Proceed; printer is ready to use.
02 WARMING UP	Wait until printer signals ready.
02 WARMING UP (Continuously)	Refer to "02 WARMING UP (continuous) Message" section. (Table 7-4)
04 SELF TEST	Continuous Self Test printing.
05 SELF TEST	Self Test in progress.
06 PRINTING TEST	Self Test printing.
06 FONT PRINTOUT	Printing sample characters from available fonts.
07 RESET	Returns all printer settings to Printing Menu settings and clears buffered pages, temporary soft fonts, and macros.
08 COLD RESET	Returns both Configuration and Printing Menu selections to the factory settings. See Chapter 3, table 3-1.
09 MENU RESET	Returns all Printing Menu items to factory settings and clears buffered pages, temporary soft fonts, and macros. See Chapter 3, Section 3-3.
10 RESET TO SAVE	Press and hold (RESET) (until 07 RESET appears) to confirm the acceptance of Printing Menu selections (temporary fonts, macros and buffered data will be deleted), or press (CONTINUE) or (ON LINE) (no changes to any selections will be made at this time). See Chapter 3, Sections 3-3 and 3-4.
UC/LC TRAY EMPTY	Add media to the input tray. If problem continues, refer to the "UC/LC Message" section. (Table 7-5)
12 PRINTER OPEN	Close the Top Cover Assembly. If problem continues, refer to the "12 PRINTER OPEN Message" section. (Table 7-7)
13 PAPER JAM	Open printer, clear any paper within the printer, and press (CONTINUE) or (ON LINE) to reprint the page. If problem persists, refer to "13 PAPER JAM Message" section. (Table 7-8)

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
14 NO EP CART	Install an EP-S Cartridge. If problem continues, refer to the "14 NO EP CART Message" section. (Table 7-17)
15 ENGINE TEST	Engine test with printout produced by pressing the Test Print button.
16 TONER LOW	Replace EP-S Cartridge. If problem continues, refer to "16 TONER LOW Message" section. (Table 7-18)
17 MEMORY CONFIG (HP 33459 Only)	Indicates memory reconfiguration in operation as a result of setting Page Protection ON.
20 ERROR 20 MEM OVERFLOW	Indicates a memory overflow; too much data is being sent to the printer and the printer has run out of memory. Pressing the [CONTINUE] key causes the printer to print only the information it has received. If the error persists, it may be necessary to *simplify* the print job (i.e., fewer fonts and less graphics information) or have the customer purchase additional memory.
21 ERROR 21 PRINT OVERRUN	Indicates that the information being sent to the printer is too complex for the printer (i.e., the formatting capabilities of the printer can not keep up with the formatting instructions being sent to it by the computer). If the error persists, it may be necessary to *simplify* the job (i.e., reduce the number of characters or different fonts used, reduce the number of pixels addressed or cursor repositions, or reduce addressing the same pixel location multiple times). With the HP 33459, this problem can also be resolved by adding at least one additional memory PCA and setting PAGEPROTECT=[LTR, LGL or A4].

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
22 ERROR 22 I/O CNFIG ERR	Indicates that the host computer and the printer are not communicating properly Refer to Section 7-6, "Interface Troubleshooting." **Note:** The printer supports the XON/XOFF (DC1/DC3) and DTR (Data Terminal Ready) handshake protocols. Both signals are sent from the printer during data transmission.
40 ERROR	Indicates that an error occurred during the transfer of data from the computer to the printer. Refer to Section 7-6, "Interface Troubleshooting," for help. **Note:** This error occurs if the computer is powered down while the printer is on line or when attempting to use baud rates which do not match.
41 ERROR	Indicates that a temporary error occurred in the printed page (see Table 7-20). If this error occurs, press the (CONTINUE) key and the printer will repeat the page. Refer to Table 7-20 ("41 ERROR Checks") in the "51 ERROR Message" section if the error persists. **Note:** This error most frequently occurs when a Beam Detect Error occurs. If the printer cannot correct the error condition after two seconds, a Beam Detect Malfunction (51 ERROR) will occur.
42 ERROR 42 OPT INTERFACE	Indicates a communications problem has occurred between the Formatter PCA and the optional interface. Press the (CONTINUE) key to resume printing. Reseat the Optional I/O PCA. If the error persists, refer to the documentation for the optional interface.
43 ERROR 43 OPT INTERFACE	Indicates a communications problem has occurred between the Formatter PCA and the optional interface. If the error persists, refer to the documentation for the Optional I/O PCA.
50 SERVICE	Power off the printer for a minimum of 10 minutes. If the problem continues, refer to the "50 SERVICE Fuser Malfunction" section. (Table 7-19)

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
51 ERROR	Indicates loss of laser beam for over 2 seconds. Refer to the "51 ERROR Message" section. (Table 7-21)
52 ERROR	Indicates scanner motor unable to maintain proper speed. Refer to the "52 ERROR Scanner Malfunction" section. (Table 7-22)
53 ERROR (HP 33447 only)	The 53 ERROR indicates that the optional memory installed in the printer is NOT compatible with the Interface PCA. Use HP memory only.
53-1 ERRORUNIT (HP 33459 only)	An error was detected on the optional memory card in the front (right) slot. Verify that the correct revision level ("B" or greater) of memory is installed in the printer.
53-2 ERRORUNIT (HP 33459 only)	An error was detected on the optional memory card in the rear (left) slot. Verify that the correct revision level ("B" or greater) of memory is installed in the printer. Use HP memory only.
55 ERROR	Indicates a communications problem between the DC Controller PCA and the Formatter PCA. Undefined status has been exchanged between the two PCA's or a status request has gone unanswered. Perform the Test Print operation to verify DC Controller functionality. If the message persists, check for any cable damage, reseat J216, DC voltages (see fig. 7-3), replace the DC Controller.
56 ERROR	The output selector knob is not in the duplex position. Turn the knob to the "9:00" position.
57-1 ERRORUNIT (HP 33459 Only)	The memory card in the front (right) slot cannot be configured because it exceeds memory capacity.
57-2 ERRORUNIT (HP 33459 Only)	The memory card in the rear (left) slot cannot be configured because it exceeds memory capacity.

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
61 SERVICE	Indicates a checksum error was detected during Self Test in the Formatter PCA 's program ROM. If the message persists, replace the Formatter PCA.
62 SERVICE	Indicates a checksum error was detected in the Formatter PCA's internal font ROM. If the message persists, replace the Formatter PCA.
63 SERVICE	Indicates an error was detected in either the Formatter PCA's Dynamic RAM or an Optional Memory PCA (if installed). Remove any Optional Memory PCAs (if installed) and retest for the error. If the error message persists, replace the Formatter PCA.
64 SERVICE	Indicates a laser scan buffer error. Attempt to clear the error by power cycling the printer. If the error persists, replace the Formatter PCA.
65 SERVICE	Indicates a dynamic RAM controller error. Attempt to clear the error by power cycling the printer. If the error persists, replace the Formatter PCA.
67 SERVICE	Indicates a miscellaneous hardware or address error on the Formatter PCA. Verify that all cables, font cartridges, and accessories are seated. If the error persists, replace the Formatter PCA.
68 ERROR (HP 33459 Only)	Indicates a *recoverable* error has been detected in NVRAM (Non-Volatile RAM). Press (CONTINUE) to clear, then verify the Control Panel menu settings: one or more menu items have been reset to their factory default settings during error recovery. If this condition persists, replace the Formatter PCA.

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
68 SERVICE (HP 33447 and HP 33459) 68 READY/SERVICE (HP 33459 Only)	Indicates a NVRAM (Non-Volatile RAM) *failure* has occurred requiring replacement of the Formatter PCA. The printer can be operated without NVRAM until that time. Press (CONTINUE) to clear the display. *All* Control Panel values are set to their factory default settings. The 00 READY message becomes 68 READY/SERVICE to remind the user of the problem.
69 SERVICE	Indicates a timeout error has occurred between the Formatter PCA and the Optional I/O PCA. Refer to the I/O Interface documentation. Remove the Optional I/O PCA and retest. If the message persists, replace the Formatter PCA.
70 ERROR (HP 33459 Only)	The firmware cartridge was not designed for this printer. Turn the printer OFF, then back ON. If the error persists, verify with the cartridge vendor whether the cartridge was specifically designed for this printer.
71 ERROR (HP 33459 Only)	The firmware cartridge was not designed for this printer. Turn the printer OFF, then back ON. If error persists, verify with the cartridge vendor whether the cartridge was specifically designed for this printer.
72 SERVICE (HP 33459 Only)	The font cartridge was removed too quickly after it was inserted. Turn the printer OFF, then back ON. This message can also result from a bad font cartridge or bad connectors on the Formatter PCA.

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
79 SERVICE	An unexpected error has been encountered. Document error message. Turn the printer OFF, then back ON. If the message persists, proceed as follows: **Solid:** Remove memory PCAs and font, macro, and personality cartridges one at a time. If the problem persists and the printer has an Optional I/O PCA installed, try a different interface (parallel or serial) if possible. If the problem continues, replace the Formatter PCA. **Intermittent:** Have the *customer* remove, for a period of time, any non-HP hardware/firmware products attached to the printer. If the problem continues during this test period, replace the Formatter PCA. Error message documentation should be returned with the defective component.
EC LOAD [envelope size]	A user request has been made for an envelope size not currently installed in the printer or the tray is out of envelopes. Load the correct envelope in the envelope tray. Insert a loaded tray and select the loaded envelope size from the Control Panel or press (CONTINUE) to override. If the problem continues, see the "UC/LC LOAD Message" section. (Table 7-5) ([Envelope size] may be one of the following: COM10, MONARC, C5 or DL.)
CONFIG LANGUAGE (HP 33459 Only)	This message is the result of holding down the (ENTER) key while powering on the printer. Following SELF TEST, the user will need to select the desired display language using the (+), (−), and (ENTER) keys.
PC LOAD [paper size]	This message is displayed whenever there is a user request for a paper size that is not currently installed in the printer (per the Tray Size switches) or the input tray is out of media. Insert the proper loaded tray into the printer or press (CONTINUE) to override. If the problem persists, see the "UC/LC LOAD Message" section. (Table 7-5) ([Paper size] may be one of the following: A4, EXEC, LETTER, or LEGAL.)

Table 7-2. Printer Messages (continued)

MESSAGE	SYMPTOMS AND RECOMMENDATIONS
PE FEED [envelope size] or PE FEED ENVELOPE	A user request has been made to manually feed an envelope of the indicated size. Feed the envelope through the manual feed slot or press (CONTINUE) to feed from the tray. If the manual feed operation is not working as expected, perform the "Manual Feed Sensor (PS302) Functional Check" described on page 7-36.
PF FEED [paper size]	A user request has been made to manually feed paper of the indicated size. Feed paper through the manual feed slot or press (CONTINUE) to feed from the tray. If the manual feed operation is not working as expected, perform the "Manual Feed Sensor (PS302) Functional Check" described on page 7-36.
ENVELOPE=[env. size] (HP 33447) PE TRAY=[envelope size] (HP 33459)	This message is displayed whenever an envelope tray is inserted in the printer. The user must tell the printer what size envelopes are being used by scrolling through the choices (using the (+) and (-) keys) and pressing the (ENTER) key to make the new selection. Press (ON LINE) or (CONTINUE) to proceed. If an envelope tray is not being used when this message occurs, reseat the tray. If the problem continues, see "Tray Size Switches Functional Check" in this section. ([Envelope size] may be one of the following: COM10, MONARC, C5 or DL.)
FC	Font cartridge(s) were removed or replaced while the printer was off line and contained buffered data. Reinsert cartridge(s) and press the (CONTINUE) or (ONLINE) key. If the problem continues, try another font cartridge before replacing the Formatter PCA.
FC NO FONT (HP 33459 Only)	Font cartridge(s) could not be read by the printer. Reinsert cartridge(s) and press the (CONTINUE) or (ONLINE) key. If the problem continues, try another font cartridge before replacing the Formatter PCA.
FE CARTRIDGE	A cartridge has been removed while the printer was on line. Turn printer OFF, reinsert the cartridge, and turn printer ON. If the problem continues, try another cartridge before replacing the Formatter PCA.

Blank Display

All information displayed on the printer's Control Panel is generated by the Formatter PCA. The Formatter PCA enables all voltages and display information to the Control Panel, and the Control Panel cable connects the Formatter PCA to the Control Panel.

A blank display panel is the result of one of the following malfunctions:

- Service Mode was initiated with no follow through.
- The printer *cannot* generate sufficient voltages to illuminate (enable) the display panel.
- The display panel, its related cabling, or its drive circuitry is defective.

Note

The test pattern produced by pressing the Test Print Button is exclusively created by the DC Controller PCA. The printer's Control Panel and Formatter PCA may be removed from the printer and the test would still be functional. If a print engine Test Print pattern can be created once the fuser reaches its operating temperature and all voltages are correct, the problem is more likely a defective Control Panel, Control Panel cable, or Formatter PCA.

Table 7-3. Blank Display

CHECKS	ACTION
1. Is the printer's ON/OFF switch set to ON?	Power ON printer.
2. Is AC power available at the input power receptacle?	Verify input power.
3. Is the power cord fully inserted in the rear of the printer?	Verify.
4. Is the Lower Cooling Fan operational? (Indicates +5 and +24A voltages are present.)	If no airflow can be detected at the lower right rear of the printer (below the Power Switch), proceed with the DC Voltage Functional Check which follows this table.
5. Are the +5V and GND screws on the Formatter PCA loose or missing?	Verify that screws are fully tightened and that voltage is available to the Formatter PCA.
6. Are the display electronics malfunctioning? Try a test print before replacing the DC Controller to verify that the DC Controller is defective.	Perform the following steps and power-cycle the printer after each step: 1. Remove any I/O cables to the host system. 2. Reseat the Control Panel Cable. 3. Replace the Control Panel. 4. Replace the Formatter PCA. 5. Replace the Control Panel Cable. 6. Replace the DC Controller PCA.

DC Voltage Functional Check

The DC Power Supply Assembly receives AC voltage from the AC Power Module and converts this power into four DC voltage levels. The presence of these DC voltages may be checked at connector J210 on the DC Controller PCA (see Figure 7-3).

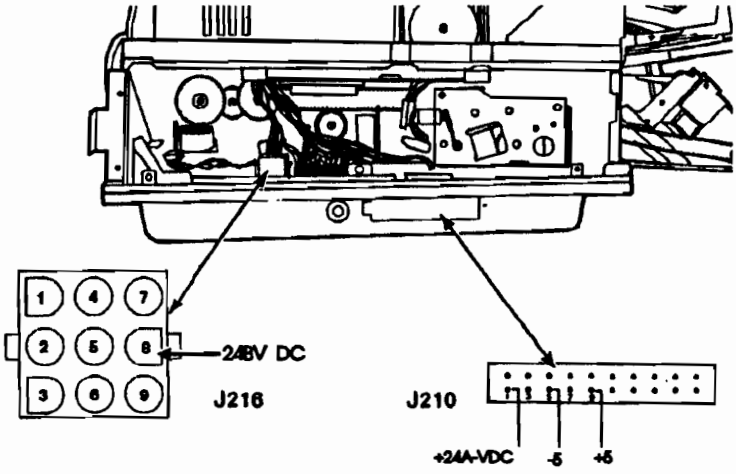


Figure 7-3. J210 and J216 Location

The J210 connector is located on the right side lower base of the printer next to the Test Print Button. Using a DVM, verify the +24A, 24B −5, and +5 voltages (±5%) are present at the specified pins using chassis ground as a reference.

If ALL of these voltages are missing:

1. Check Fuse F1 on the DC Power Supply Assembly. (See Figure 7-4.)
2. Ensure the CORRECT AC Power Module and DC Power Supply Assembly are installed for the available AC line voltage. See Chapter 8 for the correct part numbers.
3. Perform the "AC Power Functional Check".

If ANY of these voltages are missing:

1. Ensure the proper AC Power Module and DC Power Supply Assembly are installed per the available AC line voltage.
2. Remove any accessory memory, font/firmware cartridges, or optional I/O.
3. Replace the DC Power Supply Assembly.
4. Replace the DC Controller PCA.

Note

The absence of any voltage may be the result of a defective component elsewhere in the printer. If this is suspected, disconnect one cable at a time from the DC Controller PCA and power cycle the printer until the voltage comes up. Use the printer wiring diagram (see page 7-16) to then identify the defective assembly.

AC Power Functional Check

The AC Power Module distributes AC power to the DC Power Supply Assembly and to the Fusing Assembly. If *any* DC voltages are present in the printer, AC power is also present and the following procedures can be omitted.

Verify that AC power is being input to the DC Power Supply Assembly as follows:

1. Power the printer OFF and remove the Main Body Covers.
2. Remove the printer's Front Support Plate. Connect a voltmeter to J502-1 and to J502-3 of the DC Power Supply Assembly (see Figure 7-4).

3. Power on the printer. If the expected AC line voltage is not present at this point, replace the AC Power Module or the cable between the two assemblies.

If line voltage is present, verify that Fuse F1 is not open. If Fuse F1 is good, the entire AC voltage path has been verified. Resume the DC Voltage Functional Check.

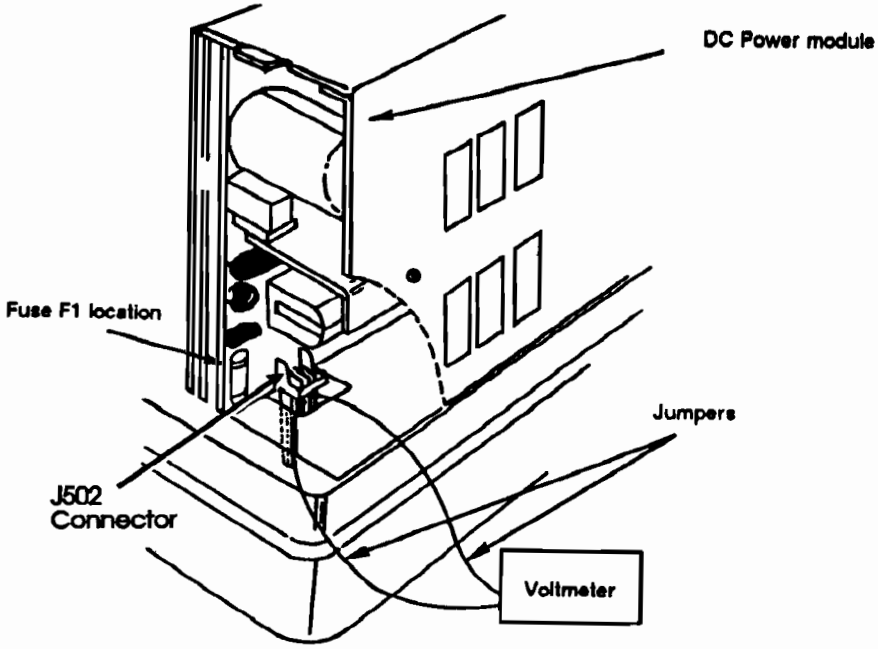


Figure 7-4. Fuse F1 Location

"02 WARMING UP" (continuous) Message

During normal operation, the printer displays a 00 READY message within 90 seconds of power-on. If the 02 WARMING UP message persists for longer than 90 seconds, check the following:

Table 7-4. 02 WARMING UP (continuous) Checks

CAUSES	ACTION
1. Are there host system interface problems?	Disconnect the interface cable from the printer, power printer OFF, then ON. May be caused by a parallel cable connected to a serial port or vice-versa, both serial and parallel cables attached, or a bad host interface.
2. Is J209 (jumper) installed on the DC Controller?	Install jumper.
3. Is the Control Panel cable fully connected?	Reseat/replace the Control Panel cable.
4. Is the Control Panel Assembly inoperative?	Replace the Control Panel Assembly.
5. Is the Formatter PCA inoperative?	Replace the Formatter PCA.

"UC/LC LOAD" Message

Two conditions result in the TRAY EMPTY OR UC/LC LOAD messages; first, the absence of either input tray and, second, the absence of media in either tray. The tray is sensed as the tray identifier tabs contact one or more of the three tray identifier microswitches in the tray input cavity of the printer. Under normal conditions, the UC/LC LOAD message is also generated when a paper or envelope size other than what is loaded in the printer is called for by the user or software.

The Paper Sensing Arms are located in the paper input areas of the printer. During normal operation, the Paper Sensing Arm flag rests on the media installed in the paper tray. The Sensing Arm flag is attached to a shaft. The opposite end of the shaft is a photointerrupter that rotates through the sensors on the Paper Control PCA. These sensors are:

- PS301 Paper out-upper tray.
- PS1 Paper out-lower tray.
- PS302 Manual feed-upper tray.
- PS6 Manual feed-lower tray.

The presence of paper in the paper tray is sensed by the paper sensor arm. During normal operation the sensor arm rests on top of the paper in the tray. At this point the sensors are not blocked.

When the tray is empty, the arm swings through the opening in the tray. As the arm moves, the photointerrupter attached to the sensor shaft rotates and blocks the sensor diode PS301 on the paper control PCA (upper tray) or PS1 for the lower tray.

The same Paper Sensing Arm is used for manual feed operation. When media is inserted in the manual feed slot atop the input tray cover, the photointerupter rotates toward the rear of the printer and blocks a sensor on the Paper control PCA. This indicates to the DC Controller PCA that media is in position for manual feed. The Sensors used for this operation are PS302 for the upper tray and PS6 for the lower tray.

Note

The following checks are applicable to both "false paper out" or "undetected paper out" conditions. The undetected paper out condition will normally result in a 13 PAPER JAM error with no paper in the input tray.

Table 7-5.
"TRAY EMPTY" or "UC/LC LOAD" Message Checks

CHECKS	ACTION
1. Is there any media in the paper tray?	Install media.
2. Are the proper paper trays fully inserted in the printer?	Push the tray into the printer until it contacts the tray identifier microswitches.
3. Are any of the tray identifier protrusions broken on either paper tray?	Inspect the tray for damage. If damaged, replace the tray (See Figure 7-11).
4. Is either Paper Sensing Arm broken? (See Figure 7-5)	Inspect the arms for damage; if broken, replace the arm.
5. Is anything hindering movement of either Paper Sensing Arm?	Verify that the Sensing Arms swing through their full range of motion.
6. Is sensor PS301/PS1 on the Paper Control PCA functional?	See the PS301/PS1 Functional Check which follows.
7. Are all paper tray size sensing microswitches functional?	See "Tray Size Switches (SW201/261, SW202/262, SW203/263) Functional Check" which follows.
8. Does the Control Panel's Paper/Envelope setting match the tray being used?	Correct setting to match tray type.
9. Is the expected tray size being called for?	Check the software application.
10. Is the READY indicator flashing?	Wait for a change in the display message after it stops flashing.

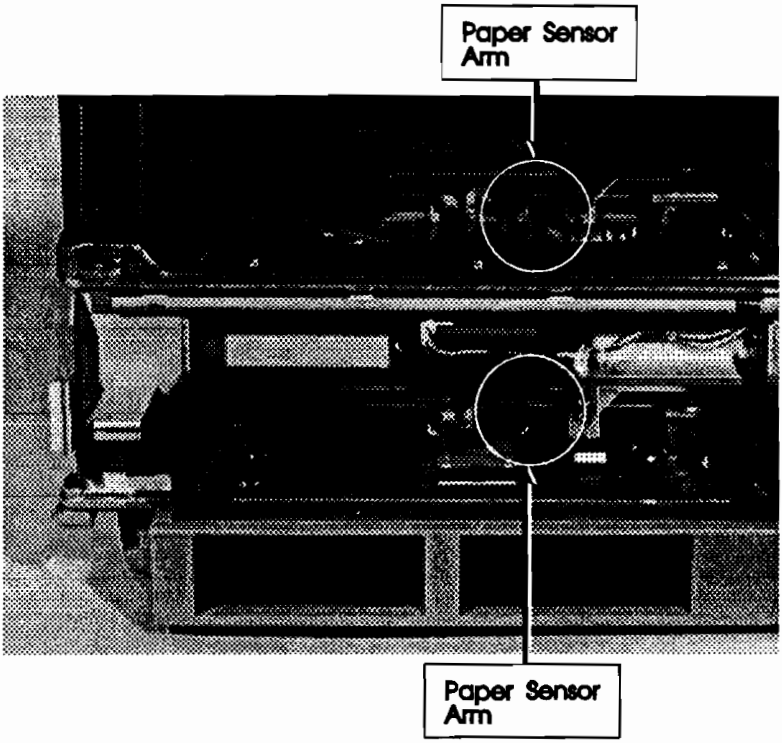


Figure 7-5. Paper Sensing Arm

Paper Out Sensors (PS301/PS1) Functional Check

The paper sensor arms are located in the paper input areas of the printer. During normal operation the paper sensor arm rests on the paper installed in the paper tray. Each sensor arm is attached to a shaft. The opposite end of the shaft is a photointerrupter that rotates through the sensors PS301 (paper out) and PS302 (manual feed) on the Paper Control PCA for the upper tray; PS1 (paper out) and PS6 (manual feed) are located directly above the lower tray.

When the paper tray is empty, the sensor arm swings through an opening in the base plate of the paper tray allowing the photointerrupter to rotate and block sensor PS301 or PS1.

The same sensor arm is also used during manual feed operation. When paper is inserted in the manual feed tray, the top portion of the photointerrupter rotates towards the front of the printer and blocks sensor PS302 on the Paper Control PCA or PS6 (lower paper sensor assembly) for the lower paper tray. This indicates to the DC Controller PCA that paper is in position for manual feed. To check the functional operation of the Paper Out Sensors (via the Control Panel display), proceed as follows:

1. While the printer is ON and not in Manual Feed mode (i.e., Manual Feed indicator off), remove the input tray from the printer.
2. PUSH the Paper Sensing Arm flag (either upper or lower) toward the *rear* of the printer while observing the printer's display.
3. With the other hand, PUSH on the left-most paper tray identifier switch SW203 (lower tray) or SW263 (upper tray), being careful not to push the Sensing Arm flag at this time. (See Figure 7-5.) If the printer does not return to the READY state at this point:
   a. Replace the Paper Control PCA (PS301) for the upper tray. Change the Lower Paper Sensor Assembly for problems associated with the lower Tray.
   b. Replace the DC Controller.

If PS301/PS1 is functioning correctly, the display will alternate from UC/LC LOAD to 00 READY as the Sensing Arm is moved.

If the display does not alternate, the fault is either a bad Paper Control PCA (PS301/PS1) or a bad DC Controller PCA.

Manual Feed Sensor (PS302)/PS6 Functional Check

To check the operation of the Manual Feed sensors PS302 (upper tray) or PS6 (lower tray) via the Control Panel display, proceed as follows:

1. After powering up the printer with 00 READY in the display, change menu item MANUAL FEED= to ON and PAPER= to LETTER (HP 33459 only).The MANUAL indicator should now be ON.
2. Take the printer off line and remove the appropriate input tray. Note that the printer should remain in a READY state at this point.
3. Press the (PRINT FONTS) key. The FORM FEED indicator should be ON and the 06 FONT PRINTOUT message should be followed by a PF FEED LETTER message.
4. With one hand, PUSH on the left-most tray identifier switch (SW203), being careful not to push the Sensing Arm Flag at this time (see Figure 7-6). If the pickup roller begins to move at this point:
   a. Replace the Paper Control PCA (PS302) for problems associated with the upper paper tray. Replace PS6 for problems associated with the lower paper tray.
   b. Replace the DC Controller PCA.
5. With the other hand, PUSH the Paper Sensing Arm flag toward the *rear* of the printer. If the Pickup Rollers do not move at this point:
   a. Replace the Paper Control PCA (PS302/PS6).
   b. Replace the DC Controller PCA.

Tray Size Switches (SW261/201, SW262/202, SW263/203) Functional Check

The paper tray size microswitch levers are located on the lower right side of each paper tray cavity. The microswitches indicate the presence and size of the installed paper tray to the DC Controller. The switches are activated by protrusions located on the rear of the paper tray. When the tray is inserted, the protrusions activate (engage) the microswitches (refer to Figure 7-6 below.)

Table 7-6. Configuration of Tray Size Sensing Switches

Paper Tray Size	SW261(201)	SW262(202)	SW263(203)
Executive	ON	ON	ON
A4	ON	ON	OFF
Legal	OFF	OFF	ON
Envelope (Size set via Control Panel)	OFF	ON	ON
Letter	ON	OFF	OFF
No Tray Installed	OFF	OFF	OFF

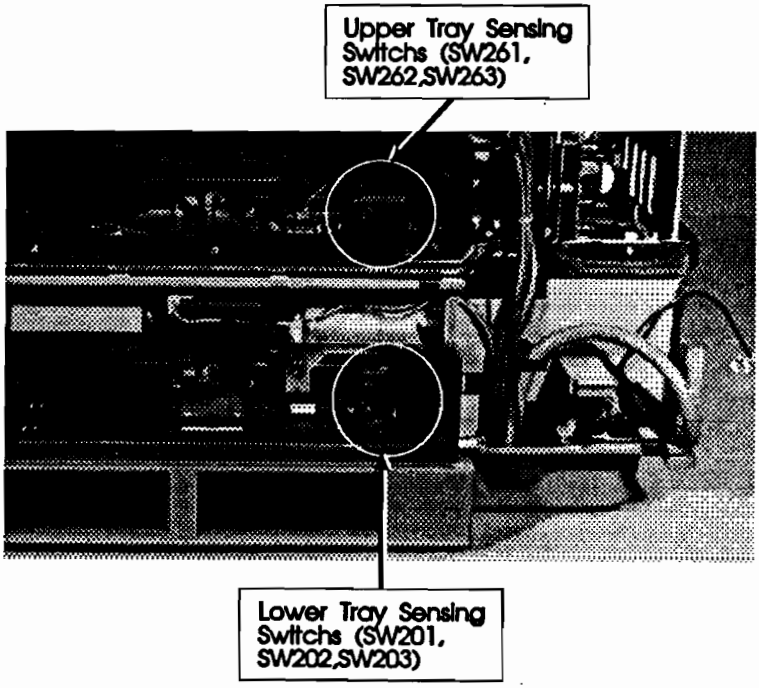


Figure 7-6. Tray Size Sensing Microswitches Locations

Note

The following Operational Checks apply to both the upper and lower paper trays. Switches 261, 262, and 263 are associated with the upper tray. Switches 201, 202, and 203 are associated with the lower tray.

Tray Size Switch Operational Check

To check the operation of these switches (via the printer's Control Panel display), perform the following:

1. Power on the printer and allow it to warm up (to `00 READY`). Remove the paper tray and ensure printer is not in the Manual Feed mode.
2. With one hand, gently push the Paper Sensing Arm.
3. With the other hand, PUSH switch SW263/203 (the left-most microswitch) while observing the Control Panel display. (See Figure 7-6).
4. When the switch is functioning properly, the display will change to `00 READY`.
5. Repeat above procedure, but push switch SW261/201 (the right-most microswitch). The display should change to `00 READY`.
6. Repeat above procedure, but push switches SW262/202 and SW261/201 (the right two switches) simultaneously. The display should change to `ENVELOPE=[size]` (HP 33447) or `PE TRAY=[size]` (HP 33459).

If the display does not change as specified, replace the DC Controller PCA, the Paper Tray Size Sensor PCA or the switch lever arms as appropriate.

"12 PRINTER OPEN" Message

The 12 PRINTER OPEN error indication tells the operator to close the printer's Top Cover Assembly. The DC Controller PCA detects this condition due to the absence of the +24B Vdc supply. When the printer's Top Cover Assembly is closed, a protrusion on the cover extends into the DC Power Supply Assembly and closes the switch within this module. The closing of this switch provides +24B Vdc to the DC Controller PCA. On the DC Controller PCA, the +24B Vdc power is distributed to the High-Voltage Power Supply Assembly and to a +3.2 Vdc regulator on the PCA. The output from the +3.2 Vdc regulator is the power source for digital-to-analog circuitry on the DC Controller PCA.

Table 7-7. "12 PRINTER OPEN" Checks

CHECKS	ACTION
1. Is the Top Cover Assembly open?	Ensure the Top Cover Assembly is firmly closed.
2. Is the protrusion on the Top Cover Assembly which activates the DC Power Supply microswitch missing or broken?	Visually inspect. Correct if missing or broken.
3. Is the printer plugged into the correct power source?	Verify printer power rating. Refer to Chapter 1, Section 1-2, of this manual.
4. Are the DC Power Supply connectors fully seated?	Visually inspect. Reseat module if necessary.
5. Is the DC Power Supply Assembly defective?	See the "+24B Vdc Electrical Check" following.
6. Is the DC Controller PCA defective?	See the "+24B Vdc Electrical Check" following.

+24B Vdc Functional Check

For an explanation of the source of the +24B Vdc power, read the overview for the "12 PRINTER OPEN" message on the previous page.

To verify if the +24B Vdc power supply is functional, proceed as follows:

1. Remove the access cover(s) to the test connector (J210, next to the Test Print Button).
2. Using a voltmeter with frame ground as a reference, monitor the voltage at J210-11 while manually activating the printer Top Cover Assembly closed microswitch (see Figure 7-7 and Figure 7-8). The measured voltage should toggle from zero to +3.2 Vdc (±5%) as the switch is activated. If the voltage is present, yet the message persists, replace the DC Controller PCA.

   If the voltage is not present, +24B Vdc (±5%) can be measured at J216-8 while activating the Top Cover Assembly closed microswitch (see Figure 7-7).

   If +24B is not present, replace the DC Power Supply Assembly. If +24B is present but +3.2 V is not, the DC Controller PCA is defective.

J216 Voltages

Pin no.	Color	Supply
1	Gray	+5Vdc
2	Brown	+5Vdc
5	Brown	+5Vdc
8	Red	+24VB[1]
9	Red	+24VA

1 The Top Cover must be closed or MS1 or 2 defeated to generate this voltage.

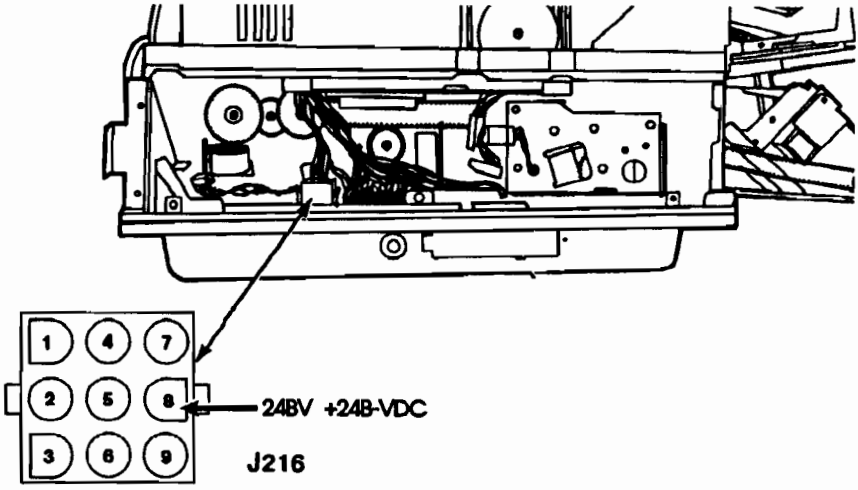


Figure 7-7. Measuring the +24B VDC

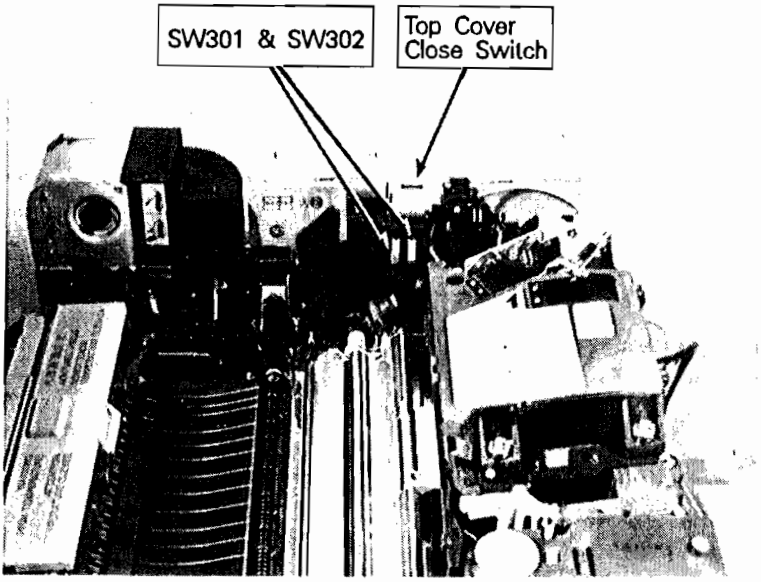


Figure 7-8.
EP-S Cartridge Sensitivity Switches
Top Cover Closed Microswitch

"13 PAPER JAM" Message

Any paper movement problem results in a 13 PAPER JAM error message. Paper movement is monitored by (3) paper sensors. These are:

- PS331 Paper Exit Sensor located in the Fusing Assembly.
- PS4 Switchback Paper Sensor located in the Switchback Assembly.
- PS3 Duplex Paper Sensor located above the duplex drive rollers.

The following conditions result in a Paper Jam error message:

1. The upper main motor (M1) is non-functional (no paper movement).
2. Paper is present in any of the three sensors during printer power-up (either PS331, PS3 or PS4).
3. Paper is present in the Fusing Assembly at power-ON and the fuser temperature is lower than 150° C.
4. A non-functional paper sensor which the printer may perceive as the presence of paper.
5. The paper does not reach or clear exit sensor PS331 in time.
6. When duplex printing, the paper does not reach or clear the Switchback Paper Sensor (PS4) in time.
7. When duplex printing, the paper does not reach the Duplex Paper Sensor (PS3) in time.

Paper Jam Detection

To effectively troubleshoot a paper jam problem, the position of the leading and lagging edges of the media must be noted. The rest of this section is subdivided according to the position of any jammed paper (or other media) in the printer.

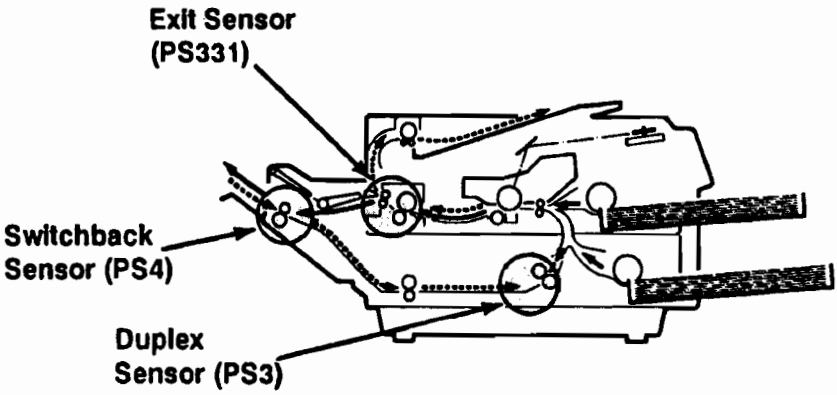


Figure 7-9. Paper Motion Sensors

Paper movement through the printer can be observed by initiating a TEST PRINT operation with the Top Cover Assembly open. To do this, open the Top Cover Assembly and defeat the Top Cover Interlock Switch. With one hand, hold down one of the Drum Sensitivity Microswitches (see Figure 7-8) and, with the other, press the TEST PRINT button on the lower right side of the printer. This should feed paper up to the point it enters the Fusing Assembly. By holding down the fusing system drive lever (see Figure 7-18), the paper will continue through the Fusing Assembly as well. Note that there will be a momentary pause in paper movement, followed by an ERROR 51 indication. This is normal operation since the Laser Shutter Arm, normally engaged by the EP-S Cartridge, does not allow laser light to reach the beam detect cable.

This test does not work from the lower paper tray or in the duplex mode.

Table 7-8. "13 PAPER JAM" Checks

CHECKS	ACTION
1. Is there media in the input tray?	If not, refer to "Paper Out Sensor (PS301) Functional Check" earlier in this section.
2. Does the error occur at initial power-on or whenever the Top Cover Assembly is closed?	If so, clear any media from the Fusing Assembly. If the problem persists, see Table 7-15, "Paper Exit Sensor (PS331) Check."
3. Can the printer support the media being used?	Retest using supportable media. (See the User's Manual for media information.)
4. Does the leading edge of the media reach the Registration Rollers?	If not, begin with Table 7-9, "Paper Feed Area Checks."
5. Does the media enter the Fusing Assembly?	If not, see Table 7-14, "Registration/Transfer Area Checks."
6. Does the media actually (visibly) jam after reaching the Fusing Assembly?	Yes: See Table 7-15, "Exit Area Checks." If not ensure that the proper paper is being used then perform the paper tray size switch functional check. If the problem persists, see table 7-15.

Possible Paper Movement Sequence Problems

PROBLEM	ACTION
1. Wrong size (length) media being used.	Replace with correct size media.
2. Tray size sensing switches/tabs defective.	See "Tray Size Switches (SW201, SW202, SW203) Functional Check" in the following section.
3. Mechanical problem with Exit Sensor Flag.	See Table 7-15, "Exit Area Checks," in the following section.
4. Electrical problem with PS331.	See Table 7-16, "Paper Exit Sensor (PS331) Functional Check," in the following section.
5. Delivery jam.	See Table 7-15, "Exit Area Checks," in the following section.

Paper Feed Area Checks

The following procedures are designed to help identify any component(s)—from the Input Tray to the Registration Rollers—that are failing or marginal, causing paper feed problems that result in a "13 PAPER JAM" indication.

Table 7-9. Paper Feed Area Checks

CHECKS	ACTION
1. Is the Main Motor Functional?	See Table 7-10, "Main Motor Checks."
2. Is the Paper Tray defective?	See Table 7-11, "Paper Tray Checks."
3. Is the Paper Pickup Solenoid (SL301) operational?	See Table 7-12, "SL301 Checks."
4. Are the Feed Roller and Separation Pad Assemblies operational?	See Table 7-13, "Paper Feed Mechanical Checks."

Table 7-10. Main Motor Checks

CHECKS	ACTION
1. Is the Main Motor connector firmly seated into J3 on the DC Power Supply Assembly?	Visually inspect. Reseat connector if necessary.
2. Is the DC Power Supply Assembly correctly seated into its connector.	Visually inspect. Verify that all pins are making contact with their connectors and that no pins are bent or damaged.
3. Is the DC Power Supply Assembly defective?	See the following Functional Check.
4. Is the Main Motor defective?	See the following Functional Check.
5. Is the DC Controller PCA defective?	See the following Functional Check.

Main Motor (M1) Functional Check

The Main Motor drives all moving components in the paper path (see Chapter 5, Section 5-3, Figures 5-13 and 5-15). The printer's Main Motor is a four-phase stepping motor controlled by the submicroprocessor on the DC Controller PCA. Motor operation begins when the Print ($\overline{\text{PRNT}}$) signal is generated by the main microprocessor on the DC Controller PCA. Four output control signals from the DC Controller PCA (A, $\overline{\text{A}}$, B, and $\overline{\text{B}}$) are input to the DC Power Supply Assembly and are used to control the Main Motor. During normal operation, the Main Motor is enabled three seconds prior to paper being delivered to the Registration Rollers. The Main Motor remains enabled until all printing is completed and all paper has been moved to the output tray.

The Main Motor, under normal conditions, is driven for one second at printer powerup.

To verify that the Main Motor is operational, perform the following:

1. With the printer powered ON, open the printer Top Cover Assembly.
2. Defeat the Top Cover Assembly Interlock and EP-S Cartridge Installed/Drum Sensitivity Microswitches as shown in Figure 7-8.
3. Press the TEST PRINT button and observe the Main Motor and the gear train.

If the fuser temperature is greater than 150° C (00 READY on Control Panel), motor operation begins as soon at the Test Print button is pressed. If the Main Motor is not operating, change the following assemblies in the order listed:

1. DC Power Supply Assembly.
2. DC Controller PCA.
3. Main Motor.

Note

If the Test Print button does not appear to be operational, ensure that Manual Feed has not been selected (i.e., set to ON) and that the fuser is warmed up (00 READY on the Control Panel display).

Lower Main Motor (M2) Functional Check

The Lower Main Motor (M2) provides all drive for the duplex paper path via a gear train linked with three drive belts. The Lower Drive Motor is enabled any time a PRNT command is received and for one second during power-up.

A photosensor (PS2) attached to the motor shaft provides feedback to the DC Controller, which synchronizes the two motors. Speed regulation is necessary to synchronize the duplex paper path with the upper body motor paper path. LED 201 on the DC Controller PCA indicates that the two motors are synchronized.

Lower Main Motor Functional Check

1. Turn the printer OFF.
2. Remove the lower right side panel.
3. Check that the black timing disc on the lower motor shaft rotates for one second at power-up or whenever the printer is printing.
4. If the motor does not turn check that it has drive voltage at J215-pin 7. This voltage should switch to 8Vdc with reference to frame ground when the motor is enabled.
5. If the motor gets no drive voltage, verify all cable connections, and if necessary, replace the DC Controller PCA.
6. If the motor has drive voltage but does not turn, replace the lower drive motor.

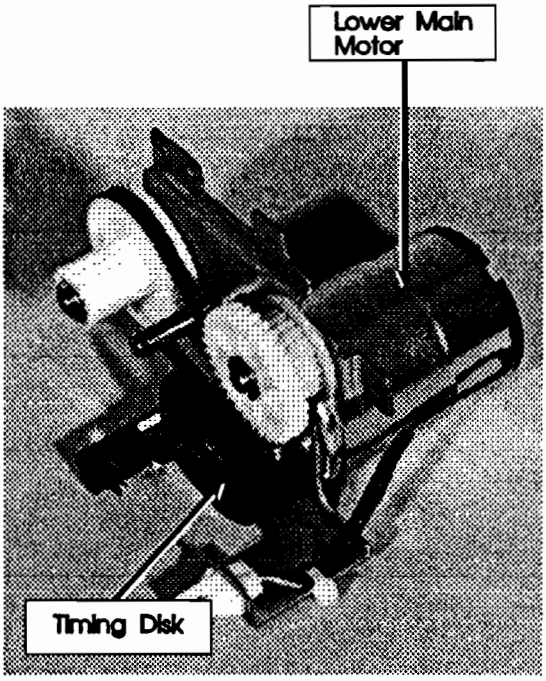


Figure 7-10. Lower Main Motor (M2)

Paper Tray Checks

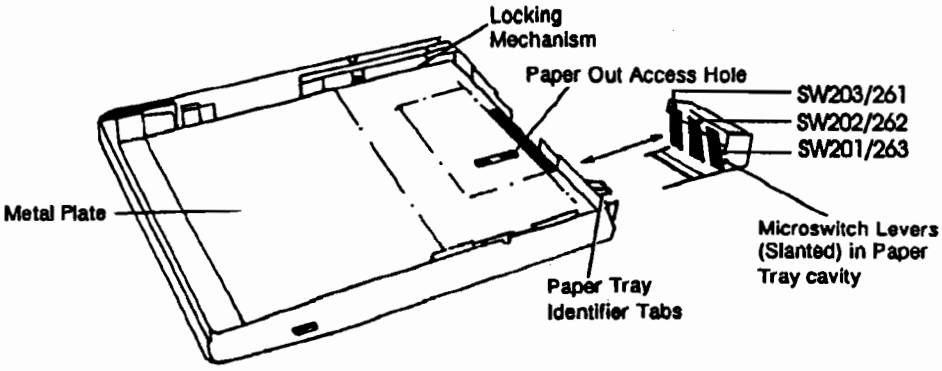


Figure 7-11. Paper Tray

The following table describes checks for potential paper tray problems. These checks apply to either the upper of lower paper trays.

Table 7-11. Paper Tray Checks

CHECKS	ACTION
1. Is there too much paper in the paper tray?	If there is too much paper in the tray, unnecessary pressure may be placed on the Paper Pickup Roller resulting in a paper jam. Remove the excess paper. (Note: This condition may have permanently damaged the Pickup Roller clutch.)
2. Is the paper tray fully inserted in the printer?	Push the paper tray fully into the printer. If the tray is not square with the printer, remove the tray, locate the problem, and correct it.
3. Is the paper tray lid fully seated on the main body of the paper tray?	Seat the paper tray lid.
4. Does the metal plate (bottom of tray) move up and down freely?	With the tray removed from the printer, verify that nothing is hindering the tray plate's movement. If the plate does not move freely, replace the tray.
5. Does the printer's lift mechanism lift the tray's metal plate up when the tray is installed in the printer?	While installing the tray in the printer, observe if the plate moves up, positioning the paper against the Paper Pickup Roller. If the lift mechanism does not lift the paper, correct or replace the mechanism.
6. Are any of the tray identifier tabs broken?	Examine the tray for damage. If any tab is broken, replace the tray.
7. Are any of the tray identifier microswitch levers damaged?	Examine the paper tray cavity in the printer for microswitch lever damage. If the levers are damaged, replace them.

Paper Feed Mechanical Checks

The purpose of solenoid SL301 is to allow the Paper Pickup Roller to pick one sheet of paper from either paper tray or the manual feed tray, and advance the paper to the Registration Rollers. Since the Registration Rollers are not turning at this time, the paper will be bowed slightly as it enters the Registration Rollers (see Figure 7-13).

Paper pickup operation is initiated by the DC Controller's main microprocessor. The Cassette Pickup Drive (CPUD) signal from the microprocessor energizes the pickup solenoid (SL301) (see Figure 7-12). Energizing this solenoid engages the paper pickup clutch. The paper pickup clutch allows the Paper Pickup Roller to make one rotation, (two rotations to select paper from the lower tray), pick up one sheet of paper and advance the paper to the Registration Rollers. The Separation Pad acts to prevent more than one page being advanced to the Registration Rollers should more than one piece of paper leave the input tray.

HINT

If an overfilled paper tray results in subsequent paper jams, the Feed Roller Assembly has probably suffered permanent damage and will require replacement.

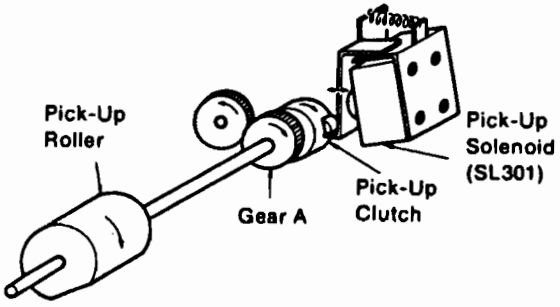


Figure 7-12. Feed Roller Assembly

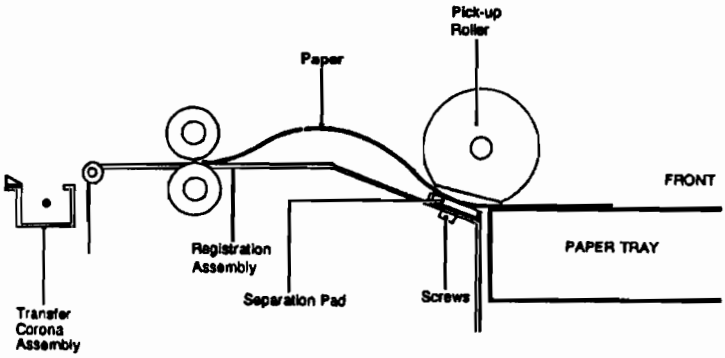


Figure 7-13. Paper Positioned in the Upper Registration Rollers

Table 7-12. SL301 Checks

CHECKS	ACTION
1. Is anything hindering SL301's motion?	Visually inspect the solenoid.
2. Does the Paper Pickup Roller rotate?	Remove the paper tray and watch the Paper Pickup Roller while performing a Self-Test. If the roller doesn't turn, refer to the procedures following this table.
3. Are all the pins of the Paper Control PCA seated properly into the DC Controller PCA connector?	Visually inspect and correct as necessary.
4. Is SL301 operational?	Perform the following checks.

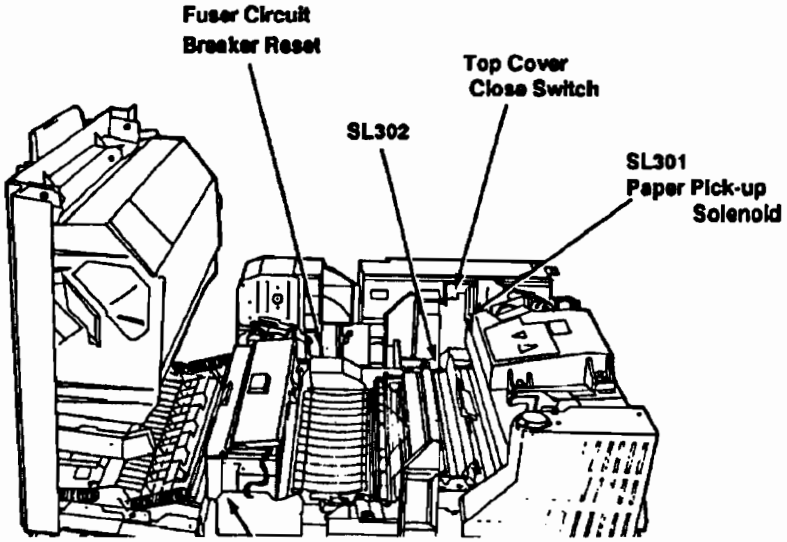


Figure 7-14. Paper Pickup Solenoid (SL301) Location

SL301 Functional Check

With the Main Body Cover Assembly (top cover panel only for the HP 33459) removed, observe the Upper Pickup Roller while the printer is performing its Test Print function. Observe whether solenoid SL301 is being energized. If solenoid SL301 is energized, the Main Motor (M1) is operating, and the Pickup Roller *does not* turn one full revolution, replace the Feed Roller Assembly. If solenoid SL301 is not being energized, perform the following electrical check.

SL301 Electrical Check

Remove the Bottom Covers. Solenoid SL301 may be electrically checked, using frame ground as a reference, by monitoring J213-04 (CPUD) while performing a TEST PRINT. The voltage should switch from 0 Vdc to +5 Vdc (enabled). If the voltage changes but SL301 is NOT being energized, replace the Paper Control PCA (on which SL301 is mounted). If the voltage does not change, replace the DC Controller PCA. **Note:** Since this is a momentary signal, an oscilloscope may be required to view it.

Table 7-13. Paper Feed Mechanical Checks

CHECKS	ACTION
1. Does the paper have a slight bow (buckle) when it contacts the Registration Rollers?	If the roller is picking paper, yet the paper is not entering the Registration Rollers, the Feed Roller Assembly is either worn or installed incorrectly. Replace the Feed Roller Assembly and Separation Pad. See the following "Feed Roller Assembly Functional Check" for verification.
2. Is the flat surface of the Paper Pickup Roller facing the Separation Pad?	If the flat portion of the roller does not face the pad when in the idle state, the roller is installed incorrectly or is defective. Replace the Feed Roller Assembly as described in Chapter 6.
3. Is more than one page being fed to the Registration Rollers?	Multiple pages being fed from the input tray is a result of the media having a poor cutting edge, a worn Separation Pad, or a damaged paper tray. Resolve as appropriate.

Lower Paper Pickup Solenoid (SL1)

SL1 controls the printer's lower paper feed roller. When the lower paper tray is selected and a $\overline{\text{PRNT}}$ command has been received by the printer, SL1 is energized approximately three seconds after the main motors have been enabled. This is long enough to allow the lower paper feed rollers to make two complete rotations. Two rotations are necessary so that the paper can be fully moved to the registration rollers with a slight buckle.

SL301 Electrical Check

Using FRAME GROUND as a reference, measure the voltage at pin J215-05 ($\overline{\text{CPUDD}}$) on the DC Controller PCA while selecting a sheet of paper from the lower tray. If the voltage changes but SL1 is not energized, verify all connections, then replace SL1 if necessary.

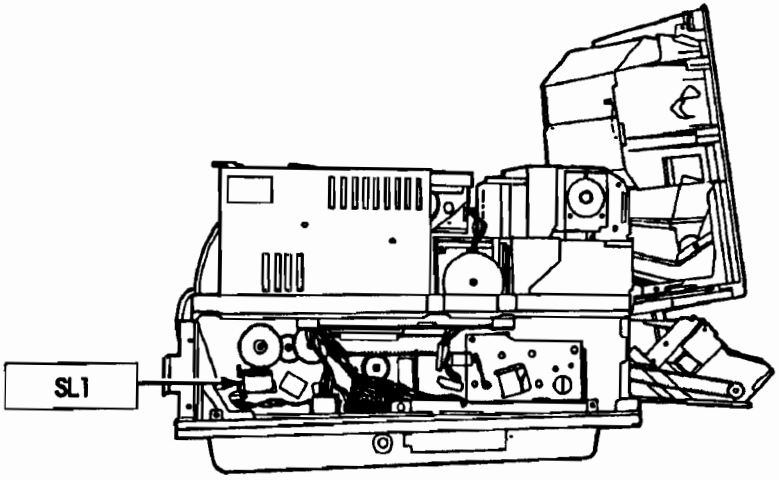


Figure 7-15. SL1 Lower Paper Pickup Solenoid

Feed Roller Assembly Functional Check: Upper or Lower Tray

The Feed Roller Assemby pulls paper from the paper trays to the Registration Assembly. The top feed roller makes one rotation to properly position the paper, the lower feed roller makes two rotations to position the paper.

If the Feed Roller Assembly is excessively worn, paper will not be pulled completely to the Registration Rollers. To verify, measure the distance from where the trailing edge of the paper momentarily stops to the front of the paper tray (see Figure 7-16). For the upper tray, the trailing edge of the paper should stop about 3.5 inches (95mm) from the front fence of the paper tray. The paper in the lower tray should stop 8 inches (200mm) from the front fence of the paper tray. If the paper has not advanced the specified distance, replace the Feed Roller Assembly and Separation Pad.

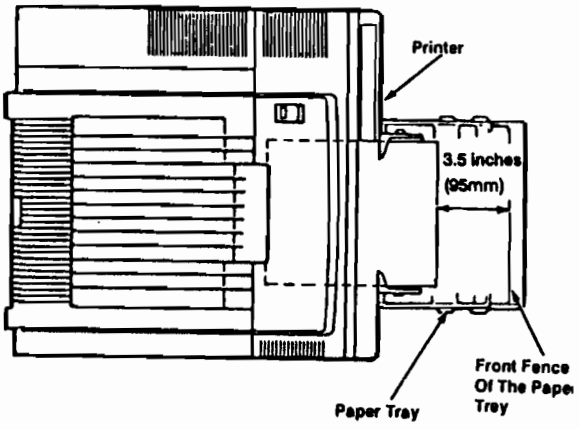


Figure 7-16. Feed Roller Wear Specifications

Registration/Transfer Area Checks

The Registration Assembly aligns the leading edge of the paper with the print image on the photoconductive drum. Drive to the Registration Rollers is provided by the Main Motor via the Registration Roller clutch (SL302). During normal operation, the Main Motor is continuously operational after receiving the print ($\overline{\text{PRNT}}$) command. The Registration Rollers are not rotating since they are held in position by solenoid SL302's locking lever.

Following Main Motor startup, the Feed Roller Assembly first feeds paper to the Registration Rollers. When the image on the photosensitive drum and the leading edge of the paper (which is being held in the Registration Rollers) are aligned, the DC Controller enables the REGD (Registration Roller Clutch Drive) signal that energizes solenoid SL302. The energizing of this solenoid engages the Registration Roller clutch, thereby allowing the rollers to advance the paper so that the image may be properly transfered to the paper at the transfer station.

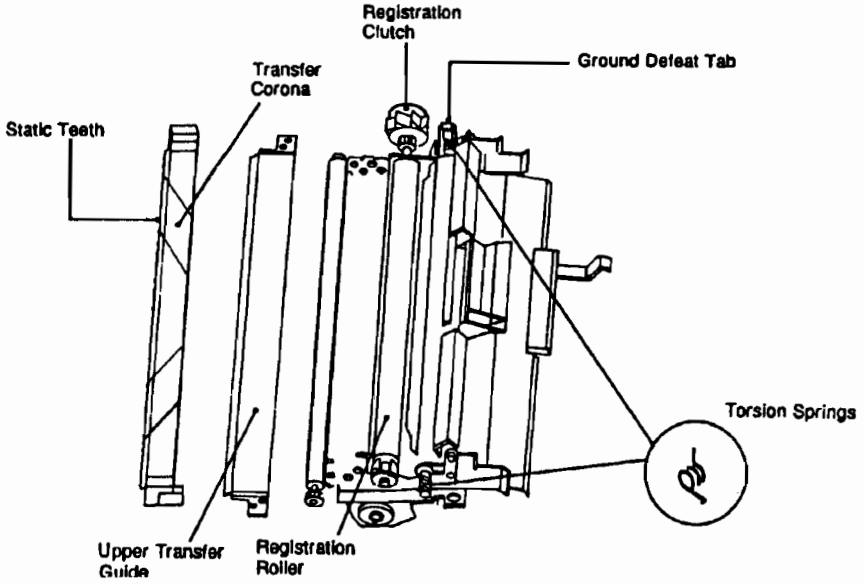


Figure 7-17. Registration Assembly

Table 7-14. Registration/Transfer Area Checks

CHECKS	ACTION
1. Are there any obstructions in the transfer area paper path?	Open the Top Cover Assembly of the printer and visually inspect the transfer area.
2. Are the Registration Roller torsion springs in place?	Visually inspect the springs. Correct if they are not in position. (See Figure 7-17).
3. Is the Upper Transfer Guide deformed?	Inspect the guide. **Hint:** a quick check would be to lift up on the registration locking lever and verify if several sheets of paper (i.e., 2 or 3) can easily be slid under the Transfer Guide.
4. Is the Transfer Corona monofilament line hindering the paper path?	Visually inspect the Transfer Corona Assembly and replace if necessary.
5. Are any of the drive gears excessively worn, dirty, or damaged?	Inspect the gears. Replace if necessary.
6. Is the Main Motor operational?	Perform the printer Self Test and visually observe if the motor is rotating. See the "Main Motor (M1) Functional Check" (Table 7-10).
7. Is anything preventing the energizing of solenoid SL302 on the Paper Control PCA?	See "SL302 Functional Check" following this table.
8. Are the Registration Assembly and clutch operational?	See the "Registration Assembly Functional Check" which follows.

SL302 Functional Check

With the printer ON, open the printer's Top Cover Assembly. Defeat the printer's Top Cover Assembly and EP-S Cartridge installed interlock switches (see Figure 7-8). While performing a TEST PRINT, observe solenoid SL302. If the solenoid is not being energized, perform the following electrical check.

SL302 Electrical Check

Remove the Bottom Cover(s). Using FRAME GND as a reference, measure J213-03 (REGD) on the DC Controller PCA while performing a TEST PRINT. The voltage level should switch from 0 Vdc (disabled state) to +5 Vdc (enabled). If the voltage does not switch, replace the DC Controller PCA. If the voltage switches, but the solenoid is not energizing, replace the Paper Control PCA.

Registration Assembly Functional Check

If (1) SL302 is operating properly, (2) the Main Motor is functional, and (3) paper (or other media) *is not moving smoothly* through the Registration Assembly, the clutch or rollers may be excessively worn. If this is suspected, replace the Registration Assembly.

Note

A worn Feed Roller Assembly may also "catch" paper as the Registration Assembly is trying to move the paper through the printer. This normally results in an intermittent (i.e., once every 50 to 100 pages) overprint "band" on the page. See Table 7-41 for information on overprint.

Exit Area Checks

The exit area of the printer consists of the Fusing Assembly, Delivery Assembly, and Face-Up (Rear) and Face-Down (Top) Output Trays. Paper first enters the exit area of the printer at the Fusing Assembly. In the Fusing Assembly, the paper is guided between the fusing and pressure rollers where the toner image is permanently fused to the paper. As paper exits the Fusing Roller, the separation Pawls pick the paper off the Fusing Roller. A Paper Exit Arm Flag and an associated sensor (PS331) detect paper as it enters and exits the Fusing Assembly. The main microprocessor on the DC Controller uses this signal ($\overline{\text{PDP}}$) for monitoring paper jams.

The paper then encounters the Pawls (claws) which route the paper to the desired output tray. In the downward position, paper is guided to the Face-Down (Top) Output Tray. In the upward position, paper is guided to the Face-Up (Rear) Output Tray. Their position is controlled by the position of the Face-Up (Rear) Output Tray. The

delivery rollers in the Top Cover Assembly feed the paper to the Face-Down (Top) Output Tray.

Drive for the Fusing Assembly is achieved when the printer Top Cover Assembly is closed. Closing the cover forces a molded protrusion in the rear portion of the Top Cover Assembly to push against a lever on the right end of the Fusing Assembly (see Figure 7-27). Pushing down this lever causes the main drive gears of the Fusing Assembly to engage with the drive gear train from the Main Motor. Drive to the Top Cover Assembly is provided by the Fusing Assembly when the Top Cover Assembly is closed via the Delivery Coupler Assembly (see Figure 7-18).

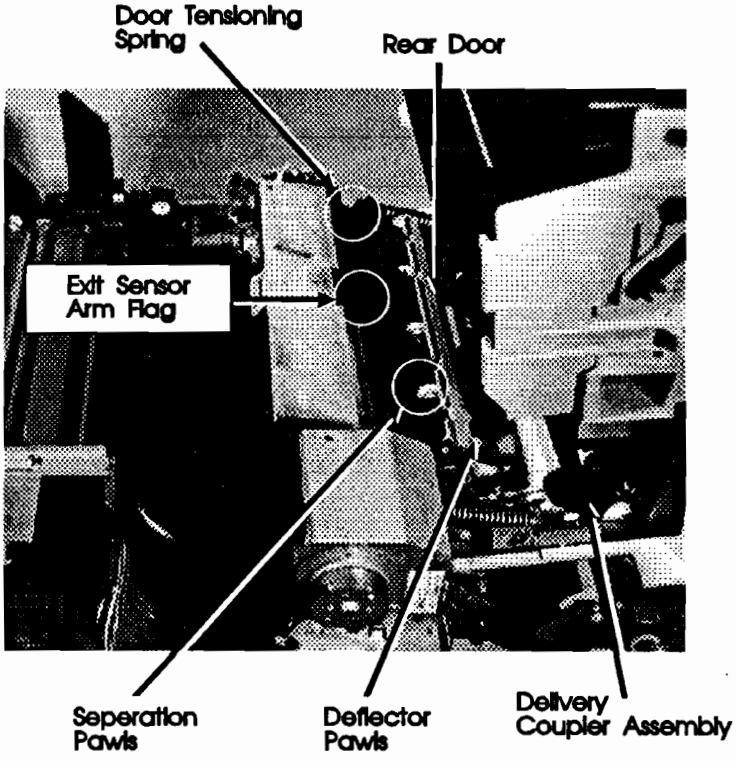


Figure 7-18. Paper Exit Area

Table 7-15. Exit Area Checks

CHECKS	ACTION
1. Are there any obstructions in the paper path?	Inspect the Fusing Assembly and the Fusing Roller for obstructions.
2. Are the Fuser Separation Pawls correctly attached to the rear fuser door with the tension springs?	Visually inspect and clean if necessary.
3. Are the right and left fuser rear door tensioning springs in position?	Visually inspect. Replace if damaged or missing.
4. Are the Paper Exit Sensor Arm and photointerrupter damaged or broken? Is anything hindering the Paper Exit Sensor Arm's motion?	Visually inspect, (refer to Figure 7-9). Replace if damaged.
5. Does the Paper Exit Sensor indicate the presence of paper to the DC Controller PCA?	See the "Paper Exit Sensor (PS331) Functional Check" following this table.
6. Is the Deflector Pawl Assembly correctly positioned?	When paper is directed to the Top Tray, the front of the deflectors point downward.When paper is directed to the Rear Output Tray, the front of the pawls face forward.
7. Is the Delivery Coupler Assembly correctly positioned?	The gears should be pointing downward as shown in Figure 6-50. Is the gear tensioning spring riding on the metal frame of the hinge bracket? If the gears are out of position or the spring tab is bent or damaged, correct or replace. **Note:** Earlier Delivery Coupler Assemblies were manufactured with the spring riding on the top bracket surface. Newer assemblies are designed so that the spring rides on the rear bracket surface.
8. Is the Delivery Assembly damaged or excessively worn?	Replace as necessary.

Paper Exit Sensor (PS331) Functional Check

The Paper Exit Sensor PS331 is located on the Exit Sensor PCA (see Figure 7-19). This sensor and an associated Exit Sensor Arm detect paper motion as the paper enters and exits the Fusing Assembly. The main microprocessor on the DC Controller uses this exit flag signal ($\overline{PDP}$) for monitoring paper movement through the printer.

Table 7-16. Paper Exit Sensor (PS331) Check

CHECKS	ACTION
1. Is the Exit Sensor Arm or photointerrupter damaged or broken?	Visually inspect and replace as necessary.
2. Does the Exit Sensor indicate the presence of paper to the DC Controller PCA?	Perform the following Operational and Electrical checks.

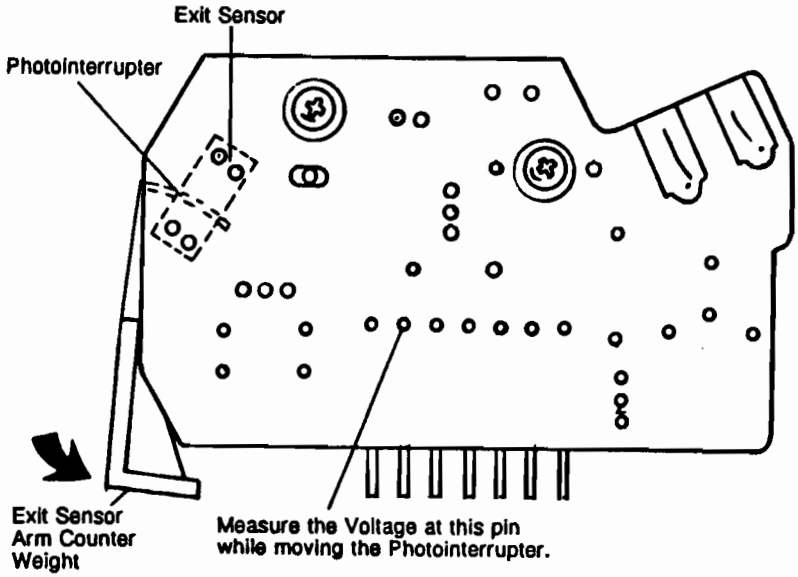


Figure 7-19. Paper Exit Sensor Check

PS331 Operational Check

This will simulate a paper jam:

1. Power off the printer.
2. Remove the printer's Main Body Covers (left cover only on the HP 33459).
3. Push and hold the bottom of the Exit Sensor Arm counterweight fully forward (toward the front of the printer) and power ON the printer.
4. If PS331 is functioning properly, the printer will display a 13 PAPER JAM error after completing its warmup cycle. Power the printer OFF and allow the sensor arm to rotate to its normal position.

The printer should now power up to the 00 READY state. If the sensor is not functioning in this manner, perform the electrical check.

PS331 Electrical Check

Use the following procedure to perform the electrical check:

1. Remove the Bottom Cover(s).
2. Using FRAME GND as a reference, measure the voltage at J331-6 (PDP) on the DC Controller PCA while moving the Exit Sensor Arm counterweight back and forth. The voltage should toggle from 0 Vdc to +5 Vdc.
3. If the voltage does not change states when the Exit Sensor Arm is moved, replace the Exit Sensor PCA. If the voltage changes but the printer continues to report "false" paper jams, replace the DC Controller PCA.

You may also measure the voltage on the Paper Exit Sensor PCA as shown in Figure 7-19 while moving the Exit Sensor Arm. The voltage should toggle from 0 Vdc to +5 Vdc as referenced to frame ground. If the voltage does not change states while the photointerrupter is moved, replace the Exit Sensor PCA. If the voltage does change but the problem persists, the cable between the Fusing Assembly and the DC Controller—or the DC Controller itself—may be at fault.

PS4 Switchback Sensor Functional Check

PS4 is located in the switchback assembly and monitors paper motion in the assembly. The sensor is used to detect the trailing edge of the paper during a duplex operation. When the trailing edge is sensed, the directional solenoid reverses paper motion in the switchback assembly.

PS4 Visual Check

1. Turn the printer OFF.
2. While holding the PS4 sensor flag down, turn the Printer ON.
3. If PS4 is functioning correctly the printer will come up with a "13 PAPER JAM" error. Cycle the power to clear the error. If the printer does not function as described, perform the following electrical checks.

PS4 Electrical Checks

1. Access the DC Controller PCA, J215, pin 22 ($\overline{PRS}$).
2. The voltage at pin 22 should toggle from 0 to 5Vdc, with reference to frame ground, as PS4 is toggled.
3. If the voltage does not change, verify wiring continuity is good, then, if necessary, change PS4.

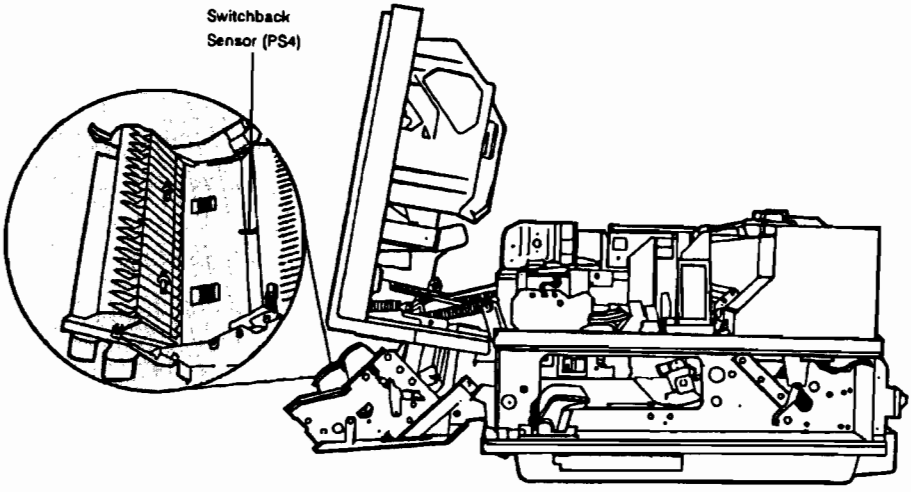


Figure 7-20. PS4 Switchback Sensor

PS3 Duplex Sensor Functional Check

The duplex paper sensor PS3 is located above the duplex drive rollers and monitors paper movement in the duplex paper path. PS3 detects the leading edge of the paper during a duplex print operation and is also used to detect paper jams. When PS3 detects the leading edge of the paper it enables the duplex drive rollers which advance the paper onto the registration assembly.

PS3 Functional Test

1. Turn the printer OFF
2. Open the Duplex Access door on the left side of the printer and turn the green lever CCW to raise the upper duplex paper guide.
3. Place a small piece of paper under the PS3 sensor flag.
4. Turn the green lever CW to lower the duplex paper guide.
5. Turn the printer ON.
6. If the sensor is working properly a "13 PAPER JAM" will be displayed.
7. Remove the paper and restart the printer to clear the error.
8. If the printer does not perform as described, perform the following electrical check.

PS3 Electrical Test

1. Access the DC Controller PCA J215, pin 16 (DUPFEDS).
2. The voltage at pin 16 should toggle between 0 and 5 Vdc, with reference to frame ground, as PS3 is toggled.
3. If the voltage does not change with the switch, verify that the wiring is good, then, if necessary, replace the photosensor PS3.

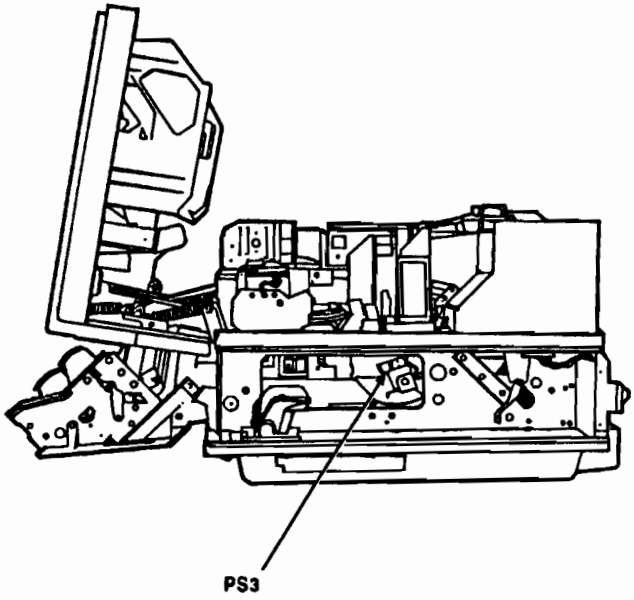


Figure 7-21. PS3 Duplex Sensor

PS2 Lower Drive Motor Timing Sensor Test

The lower drive motor timing sensor (PS2) synchronizes the lower main motor (M2) with the upper main motor (M1) and thereby synchronizes the upper and lower paper paths. Failure of PS2 causes the abnormal noises when when the lower motor is energized, and this failure also causes paper jams at the input area.

The lower drive motor timing sensor is located on the lower motor timing disc. This sensor monitors the holes in the timing disc (see Figure 7-10).

Lower Timing Sensor Check

Check that the PS2 connector is firmly seated. Check also that the disc rotates freely, with out interfering with the sensor during motor operation.

PS2 Lower Timing Motor Electrical Check

1. Access the DC Controller PCA J215, pin 10 (DMTG).
2. The voltage at pin 10 should toggle from 0 to 3Vdc, with reference to frame ground, when the disc is rotating. The voltage at pin 10 should remain at 0 when the disc is still.
3. If the voltage at pin 10 does not change, replace the photosensor PS2. If the signal is noisy replace the DC Controller PCA.

Duplex Pickup Roller Clutch (SL2)

The duplex pickup roller clutch solenoid (SL2) controls the motion of the duplex drive rollers. The duplex drive rollers advance paper from the printer's duplex paper path to the registration assembly. Drive roller operation begins when SL2 is energized ($\overline{\text{DUPFED}}$), releasing the drive roller clutch, thus initiating roller movement.

Solenoid SL2 is energized twice during a print operation. First, when PS3 detects paper, SL2 is energized for about two seconds. This interval allows paper to advance to the registration rollers so that paper movement is controlled by the duplex drive roller. The solenoid is energized a second time which forces the paper into the registration roller for uniform registration and into the main paper path to receive the duplex image.

The Duplex Drive Roller Clutch may fail prematurely when the printer is consistently used to print on paper greater than 20 pound. Indications of a failing Duplex Drive Roller Clutch are:

- Intermittent paper jams in which the paper stops prior to reaching the Fusing Assembly Exit Sensor.
- Paper jams that occur **only** while duplex printing.
- The duplexed image is shifted up the page.

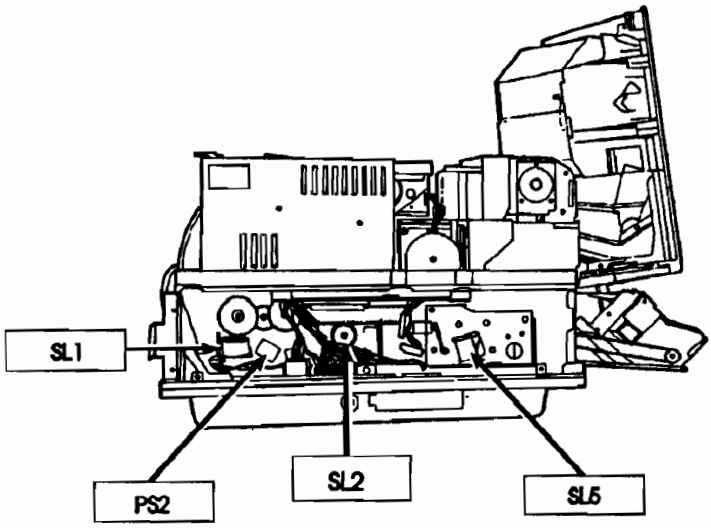


Figure 7-22.
Lower Pickup Roller Clutch Solenoid (SL1)
Lower Drive Motor Timing Sensor (PS2)
Duplex Pickup Solenoid (SL2)
Switchback Drive Roller Solenoid (SL5)

SL3 Paper Alignment Pressure Roller Solenoid

During a duplex print operation, as paper enters the duplex path, it encounters a set of guide rollers set at a slight angle to the paper path. SL3 energizes about four seconds after the paper switches direction. This causes the upper and lower guide rollers to grip and advance the paper. Because the rollers are set at an angle to the paper path the left edge of the paper is pushed against the vertical registration assembly guide. This ensures that the paper is vertically aligned to receive the duplex image. The guide rollers will advance the paper onto the duplex drive rollers.

SL3 Functional Test

1. Turn the printer OFF and open the left side door.
2. Turn the green handle 90 degrees CCW to lift the upper duplex guide.
3. Turn the printer ON and select duplex mode from the front panel.
4. Initiate a front panel self test.
5. Watch the upper white guide roller as paper feeds out of the switchback and into the duplex paper path. You should hear SL3 energize and see the white guide roller drop about 1/4 inch to simulate proper operation.
6. If the lower guide does not drop, perform the following elecrical check.

Note

Since the upper guide plate is open, the guide cannot grip the paper and you will receive a "13 PAPER JAM" error message.

SL3 Electrical Check

1. Select duplex mode from the front panel.
2. Initiate a self test.
3. Access J215, pin 15 on the DC Controller ($\overline{\text{SFTSLD}}$).
4. The voltage at pin 15, with reference to frame ground, should switch from +24Vdc to 0Vdc as the solenoid is engaged.
5. If the voltage switches, but the solenoid does not pick-up, replace the solenoid.
6. If the voltage DOES NOT change, replace the DC Controller PCA.

SL5 Duplex Mode Solenoid

Solenoid SL5 drives the switchback rollers. SL5 is located in the Switchback Drive Assembly and is only energized during duplex print operations.

SL5 Functional Test

1. Remove the lower right side cover.
2. Select duplex mode form the front panel and initiate a self-test.
3. Watch SL5. It should pick up about 4 seconds after the deflector solenoid SL7 picks up. If SL5 is not being energized, preform the electrical check.

SL5 Electrical Test

1. Access J215, pin 23 on the DC Controller PCA ($\overline{\text{SBROLD}}$).
2. Select Duplex Mode from the front panel.
3. Perform the front panel self-test.
4. During the duplex print opertion the voltage at pin 23, with reference to ground, should switch from +24Vdc to 0Vdc as the solenoid is enabled.
5. If the voltage changes but the solenoid does not pick up, replace the solenoid.
6. If the voltage DOES NOT change, replace the DC Controller PCA.

Reverse Drive Solenoid SL6

SL6 reverses the drive of the switchback rollers during a duplex print operation. When PS4 detects the trailing edge of the paper, solenoid SL6 picks up and reverses the direction of the switchback drive rollers. This pulls the paper from the switchback assembly back into the duplex paper path.

SL6 Functional Test

1. Remove the lower right side cover.
2. Select Duplex Mode from the front panel.
3. Initiate a self-test or a "05 Self-Test".
4. Watch SL6. SL6 should pick up about 6 seconds after the deflector solenoid SL5 picks up, or when photosensor PS4 detects the trailing edge of the paper.
5. If SL6 is not being energized, perform the following electrical test.

SL6 Electrical Tests

1. Access J215, pin 27 ($\overline{\text{SBOLD}}$), on the DC Controller PCA.
2. Select Duplex Mode from the front panel.
3. Perform the front panel self-test.
4. During a duplex print operation, the voltage at pin 27, with reference to frame ground, should change from +24Vdc to 0Vdc as the solenoid SL6 is enabled.
5. If the voltage level changes, but SL6 does not engage, replace SL6.
6. If the voltage level DOES NOT change, replace the DC Controller PCA.

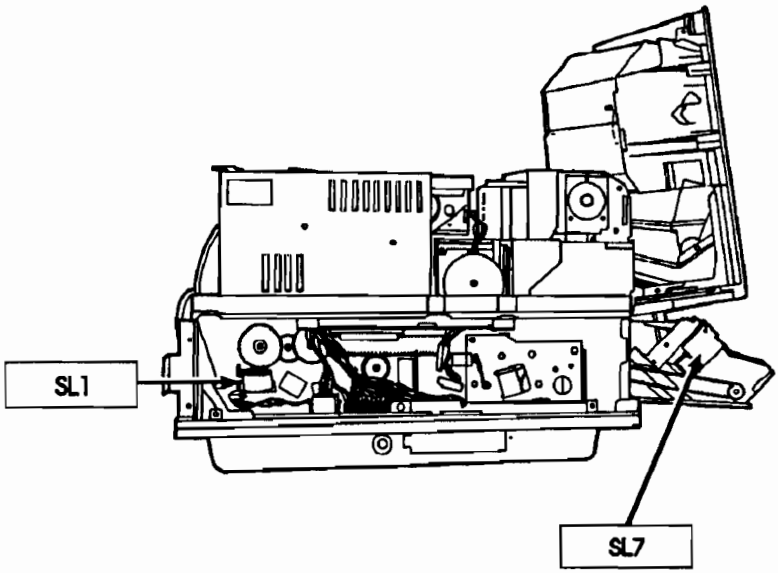


Figure 7-23. Deflector Solenoid SL7

SL7 Deflector Solenoid

The deflector pawls are located on the printer's upper body (top cover) and are positioned where the paper exits the fusing assembly. Solenoid SL7 moves a set of deflector pawls that are attached to a shaft near the fusing assembly exit. These pawls deflect paper into the face-up tray, the switchback assembly (if the printer is in duplex mode) or the face-down tray.

SL7 Functional Tests

1. Turn OFF the printer and remove the right side cover.
2. Place the output selector knob in the face-down/duplex position (position 2).
3. Push the SL7 plunger down and watch that the white shaft and lever move the deflector pawls.
4. Turn the printer ON. Select duplex mode from the front panel and initiate a self-test.
5. Watch that SL7 energizes about seven seconds into the self-test and that the solenoid moves the deflector pawls.

SL7 Electrical Tests

1. Access J215, pin 31 ($\overline{\text{EXDEF}}$) on the DC Controller PCA.
2. During a duplex print operation, the voltage at pin 31, with reference to frame ground, should change from +24 to 0 Vdc.
3. If the voltage changes, but the solenoid does not engage, replace the solenoid.
4. If the voltage does not change, replace the DC Controller.

"14 NO EP CART" Message

The 14 NO EP CART installed message occurs when neither of the drum sensitivity switches (SW301 and SW302) on the Paper Control PCA is activated. When the EP-S Cartridge is installed and the Top Cover Assembly is closed, the EP-S Cartridge drum sensitivity tabs contact microswitches SW301 and SW302 on the Paper Control PCA (see Figure 7-24). The input from these switches is fed directly to the submicroprocessor on the DC Controller PCA. This microprocessor uses these signals to regulate laser power output.

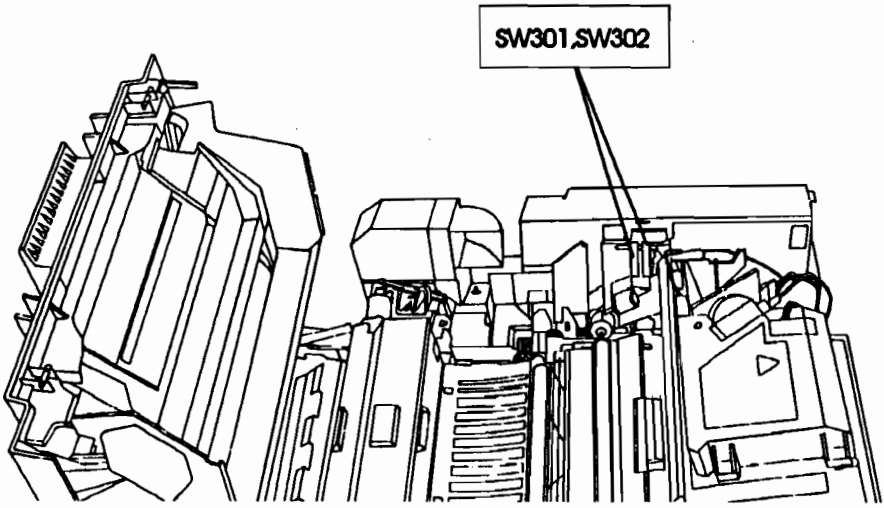


Figure 7-24. EP-S Cartridge Sensitivity Switches

Table 7-17. "14 NO EP CART" Checks

CHECKS	ACTION
1. Is an EP-S Cartridge installed in the printer?	Install cartridge if necessary.
2. Is there at least one sensitivity tab on the EP-S Cartridge?	Visually inspect. The EP-S Cartridge must have at least one sensitivity tab. If the cartridge has no tab, replace the EP-S Cartridge. Refer to figure 7-35.
3. Is the Paper Control PCA firmly seated into its connector?	Visually inspect. Ensure that none of the pins are bent or damaged.
4. Is the Paper Control PCA defective?	See the "Drum Sensitivity Switches (SW301 and SW302) Functional Check" following this table.
5. Is DC Controller PCA defective?	See the "Drum Sensitivity Switches (SW301 and SW302) Functional Check" following this table.

Drum Sensitivity Switches (SW301 and SW302) Functional Check

The EP-S Cartridge Drum Sensitivity microswitches (SW301 and SW302) are located on the Paper Control PCA. Test the switches as described below. If either switch is bad, the Paper Control PCA must be replaced.

1. Open the printer's Top Cover Assembly.
2. Defeat the Top Cover Assembly closed interlock switch in the DC Power Supply Assembly (see Figure 7-7).
3. Press switch SW301 (see Figure 7-24). The display should change from `14 NO EP CART` to `00 READY`.
4. Release SW301 and the Top Cover Assembly interlock switch and repeat steps 2 and 3, testing SW302. Again, the display should change from `14 NO EP CART` to `00 READY`.

If this test fails, either the Paper Control PCA or DC Controller PCA is defective. Proceed with the following Electrical Check to determine the failing component.

Drum Sensitivity Switches (SW301 and SW302) Electrical Check

Verify that the EP-S Cartridge In-Place/Drum Sensitivity microswitches are functional as follows:

1. Remove the printer's bottom covers.
2. Using FRAME GND as a reference, measure J213 pin 1 ($\overline{\text{CSENS1}}$) and J213 pin 2 ($\overline{\text{CSENS2}}$), respectively, on the DC Controller PCA. The measured voltage level should change from +5 Vdc (switch open) to 0 Vdc (switch closed) as referenced to frame ground.
3. If the voltages DO NOT change while the switches are pressed, replace the Paper Control PCA. If the voltage levels change but the error message persists, replace the DC Controller PCA.

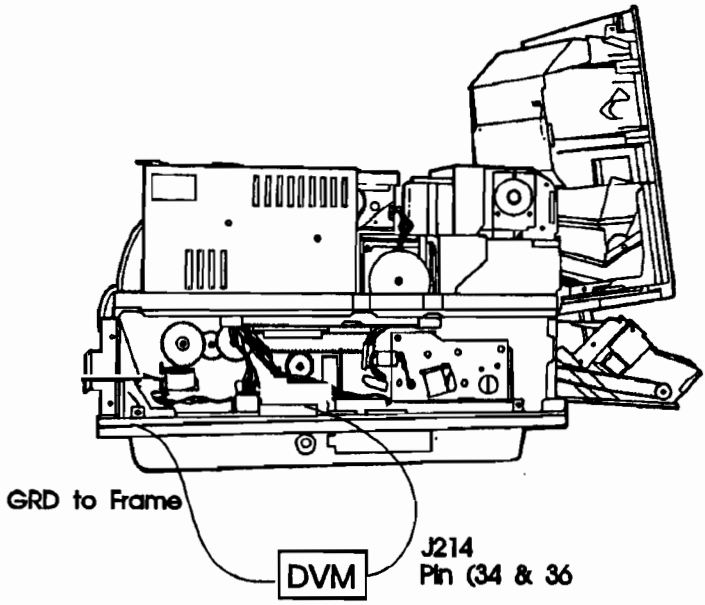


Figure 7-25. SW 301/SW 302

"16 TONER LOW" Message

A toner sensing mechanism is located in the toner cavity of the EP-S Cartridge. The function of this mechanism is similar to an antenna, sensing the AC developer bias voltages applied to the developer mixture by the High-Voltage Power Supply Assembly. The output sensed by this antenna is input back to the High-Voltage Power Supply (TSENS), where it is amplified and input to the DC Controller to be compared against a preset threshold value. If the toner level in the cartridge falls below the minimum level and, consequently, the monitored voltage level falls below the threshold level, the 16 TONER LOW message is displayed.

Table 7-18. "16 TONER LOW" Checks

CHECKS	ACTION
1. Is the EP-S Cartridge out of toner?	Shake the EP-S Cartridge. If the message persists, replace the cartridge.
2. Are the toner level sensor connectors damaged?	Inspect connectors for damage. If damaged, correct or replace.
3. Is the EP-S Cartridge defective?	Replace the EP-S Cartridge if visibly damaged.
4. Is the high-voltage connector cable, from the base of the printer (J601) to the DC Controller PCA, fully seated or damaged?	Visually inspect. Reseat or replace if necessary.
5. Is the High-Voltage Power Supply Assembly defective?	See the "Toner Low Functional Check" following this table.
6. Is the DC Controller PCA defective?	See the "Toner Low Functional Check" following this table.

Toner Low Functional Check

Since there is no good way to measure whether the toner low sensing system is malfunctioning (i.e., the warning message is constantly being displayed or is never displayed), replace the following components in the order listed:

1. EP-S Cartridge.
2. High-Voltage Power Supply Cable (from the DC Controller).
3. High-Voltage Power Supply Assembly.
4. DC Controller PCA.

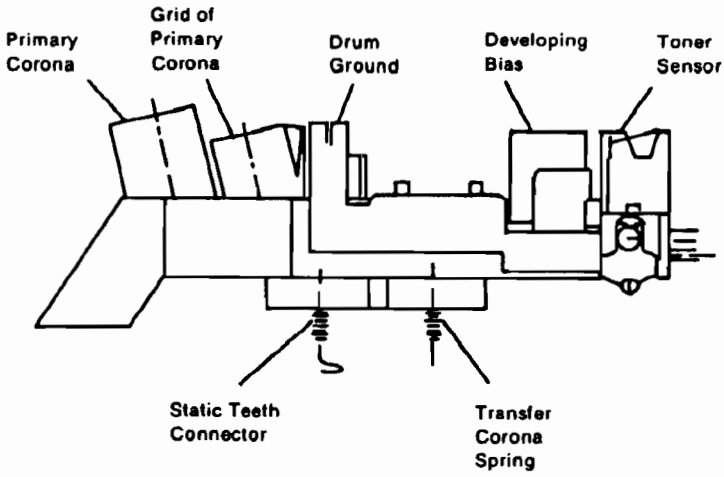


Figure 7-26. High-Voltage Power Supply Assembly Connector

"41 ERROR" Message

Two displays, 41 ERROR and 51 ERROR, indicate a laser beam detect problem. The 41 ERROR is displayed when the beam is "lost" for less than 2 seconds. An error condition of greater than 2 seconds will result in a 51 ERROR message. See the "51 ERROR Message" section for a discussion of the 41 ERROR message condition.

"50 SERVICE" Fuser Malfunction

Warning **The fusing assembly is HOT. Allow the assembly to cool before attempting to service.**

The purpose of the fusing system is to maintain a constant temperature on the Fusing Roller so that the toner image is permanently fused to the paper. A high intensity fusing lamp, located in the center of the Fusing Roller, provides the high temperature required for the fusing process. While the printer is in standby mode, a temperature of 165° C is maintained on the Fusing Roller. While the printer is in printing mode, a temperature of 180° C is maintained.

The main components of the fusing system are the fusing lamp and its associated fusing and pressure rollers, a Thermistor, Thermoprotector, and the AC controller/safety circuitry in the AC Power Module. AC voltage is applied to the fuser bulb via the AC Power Module circuitry which is regulated by the FUSER DRIVE ($\overline{\text{FSRD}}$) signal from the DC Controller PCA. Feedback to the DC Controller is provided by the Thermistor Signal (FSRTH). The thermoprotection switch is designed for over temperature protection and opens when the temperature reaches 210° C. Overcurrent protection for the fusing system is provided by circuit breaker CB101 on the AC Power Module (see Figure 7-27).

For troubleshooting the printer when resting on its side, microswitch SW205 on the DC Controller PCA provides additional fusing system protection When the bottom cover of the printer is removed, the microswitch closes and a resistor is placed in parallel to the Thermistor circuitry. This resistance simulates the Fusing Roller at temperature and this prevents the fusing lamp from operating under this condition. The following conditions result in a fusing error:

1. A temperature below 140° C.
2. A temperature above 230° C.
3. A condition wherein a temperature of 165° C is NOT reached within 90 seconds after power-up.

If any of the fusing error conditions occur, the DC Controller posts a 50 SERVICE error. *The error cannot be cleared* until the printer has been powered down for a ten-minute interval.

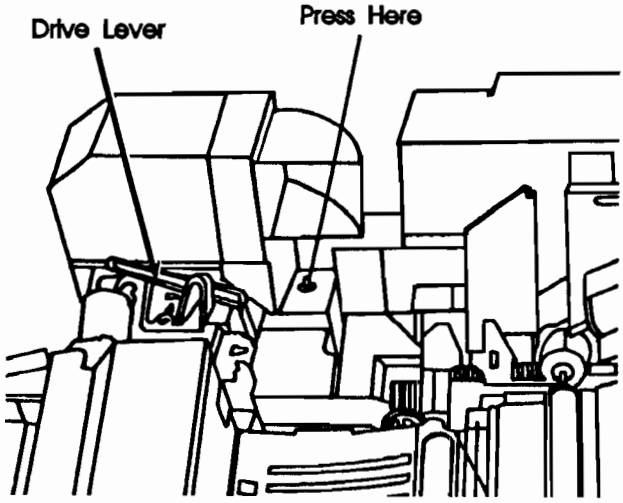


Figure 7-27. Fuser Circuit Breaker Reset

Table 7-19. "50 SERVICE" Fuser Malfunction Checks

CHECKS	ACTION
1. Is the Fusing Assembly correctly seated into its connectors on the AC Power Module and base plate (right and left ends)?	Visually inspect. Ensure the connectors are properly seated (no bent pins or pins outside their receptacles).
2. Is the circuit breaker on the AC Power Module tripped?	Reset breaker. (See Figure 7-27). If the breaker trips again, replace the Fusing Assembly or the AC Power Module.
3. Is the Thermistor defective?	Perform the Thermistor Functional Check which follows.
4. Is the Fuser Bulb open?	Perform the Thermoprotector/Fuser Bulb Functional Check which follows.
5. Is the Thermoprotector open?	Perform the Thermoprotector/Fuser Bulb Functional Check which follows.
6. Are the cable assemblies defective?	If the fault is intermittent, replace the Fusing Assembly Cable to the DC Controller. If the fault persists, replace the AC Power Module cable to the DC Controller.
7. Is the AC Power Module defective?	Replace the AC Power Module.
8. Is the DC Controller PCA defective?	Replace the DC Controller PCA.

Thermistor Functional Check

Under normal operating conditions, Thermistor resistance decreases as its operating temperature increases. Because of this characteristic, it is difficult to measure an accurate resistance value for the Thermistor. However, some conclusions may be made concerning the condition of the printer Thermistor with a resistance check. Measure the Thermistor value using the following Electrical Check.

1. Power off the printer.
2. Remove the protective cover from the left side of the Fusing Assembly to access the Exit Sensor PCA.
3. Measure the Thermistor's resistance at J332, pins 1 and 2 (see Figure 7-28). At ambient room temperature (72° F, 23° C), the resistance should be approximately 1,130 kohms. If the printer has

been operating for some time, the resistance value will be much lower. If the Thermistor appears to be either open or shorted, replace the Thermistor/Exit Sensor PCA.

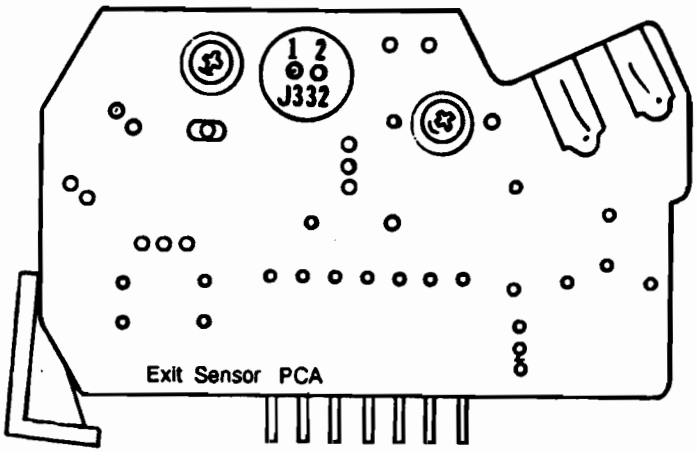


Figure 7-28. Thermistor Resistance at J332

Thermoprotector/Fuser Bulb Electrical Check

The Fuser Bulb and the Thermoprotector are wired in series. To quickly check these components, perform the following electrical check procedure:

1. Remove the Fusing Assembly.
2. Using an ohm meter, check for continuity at the two pin connector (J103) at the right side of the Fusing Assembly (see Figure 7-29).
3. If an open condition is detected, either the Fuser Bulb or the Thermoprotector is open. To differentiate between an open Fuser Bulb and an open Thermoprotector, proceed as follows:
   a. Remove the screw securing the left side of the Fuser Bulb connector to the Thermoprotector connector.
   b. Verify the continuity of the bulb from its connector wire to the rear connector of the two pin connector.

If the bulb is open, replace the complete Fusing Assembly. If the bulb appears good, but the serial continuity measurement indicates an open condition, replace the Thermoprotector.

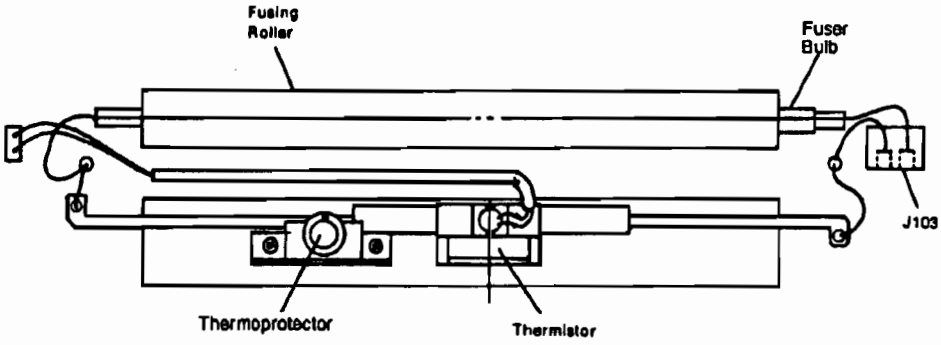


Figure 7-29. Thermoprotector/Fuser Bulb Check

"51 ERROR" Message

Two displays, 41 ERROR and 51 ERROR, indicate a laser beam detect problem. The 41 ERROR is displayed when the beam is "lost" for less than 2 seconds. An error condition of greater than 2 seconds will result in a 51 ERROR message.

A 41 ERROR (temporary Beam Detect Error) may occur during laser scanning operation. This error results when the beam detect signal falls outside the timing window established by the DC Controller PCA. If this situation occurs longer than an interval of two seconds, a 51 ERROR beam detect malfunction will occur.

The BEAM DETECT ($\overline{BD}$) signal is the horizontal synchronization signal indicating the beginning of a scan line. Once beam detect synchronization is achieved, video data may be transferred from the Formatter PCA to the DC Controller PCA to turn the laser diode on and off, thereby writing print data (in the form of dots) on the photosensitive drum.

At the beginning of printer operation, the DC Controller enables the Laser/Scanning Assembly and sets up a timing window. The DC Controller expects to receive a beam detect signal during this window. Once received, all data transfer is synchronized from the last beam detect signal.

A "Beam Detect Malfunction" (**51 error**) indicates that the laser beam is not being detected. Typical causes for the beam detection to fail are; a defective DC Controller or Laser Scanner, broken optical fiber, or condensation on the mirror. Mirror condensation occurs when the printer is moved from a cold to a warm room. If the printer is allowed to stand for a few hours the condensation should dissipate.

To prevent exposure to laser light, an interlock shutter has been incorporated into the design of the Laser/Scanning Assembly. The Laser Shutter Arm is located on a pivoting shaft below the Laser/Scanning Assembly. When the Top Cover Assembly of the printer is open or the EP-S Cartridge is missing, a blocking shutter within the Laser/Scanning Assembly blocks the path of laser light. A small tab on the edge of the EP-S Cartridge must contact the pivoting shutter lever before laser light is allowed to exit the laser cavity.

Table 7-20. "41 ERROR" Checks

CHECKS	ACTION
1. Is the printer's Feed Guide Assembly clean?	Thoroughly clean the Feed Guide Assembly.
2. Is the EP-S Cartridge defective?	Replace the EP-S Cartridge and retest the printer.
3. Is the Transfer Corona clean?	Physically remove the Transfer Corona Assembly and clean thoroughly or replace if necessary. Clean the base of the printer below the Transfer Corona.
4. Is the Transfer Corona Roller grounding block positioned properly so as to provide a ground path to the roller?	Verify proper installation as in Figure 7-17 in Chapter 7.
5. Does the Registration Assembly float with respect to ground when the Top Cover Assembly is closed?	Verify that the ground defeat tab on the EP-S Cartridge is not damaged. With the ground defeat lever on the right side of the Registration Assembly (Figure 7-17) pushed down, resistance between the Registration Assembly and ground should be 15 Mohm (± 5%). If the resistance is less than 15 Mohm, ensure the Registration Assembly is properly installed and clean as necessary to resolve the problem.
6. Are the two 15 Mohm resistors and/or the 1 kohm resistor under the Registration Assembly open?	Perform a resistance check. Note that in order to measure the 15 Mohm resistors with a standard DVM on the "kohm" scale, the two resistors may have to be measured in parallel at 7,500 kohm ±5%.
7. Is jumper J209 installed on the DC Controller PCA?	Verify and install if necessary.
8. Is static electricity a problem?	Verify humidity to be at least 20% RH.
9. Does the error persist?	Refer to the "51 ERROR Beam Detect Checks" table which follows (Table 7-21).

Table 7-21. "51 ERROR" Beam Detect Checks

CHECKS	ACTION
1. If intermittent, have checks 1-8 in Table 7-20 ("41 ERROR Checks") been performed?	Perform verification procedures.
2. Is −5 Vdc present?	Check voltage. If missing, replace the DC Power Supply. If −5 V is still absent, replace the DC Controller PCA.
3. Is the laser shutter protrusion tab on the EP-S Cartridge broken or damaged?	Visually inspect (see Figure 7-34). Replace the EP-S Cartridge if necessary.
4. Is the laser shutter interlock mechanism damaged?	Carefully inspect the Laser Shutter Arm mechanism. Replace the mechanism if damaged.
5. Is the Fiber Optic Cable between the Laser/Scanning assembly and J201 of the DC Controller PCA correctly seated into each respective assembly?	Visually inspect the cable for damage and ensure that it is seated properly. If necessary, remove the Fiber Optic Cable and shine a light through the cable to verify light continuity. Replace the cable if damaged. **Warning: Do not use the laser light to perform this test.**
6. Are connectors J202 on the DC Controller and J451 on the Laser Drive PCA properly seated?	Inspect connectors and wiring. Reseat or replace cables if necessary.
7. Is +5 Vdc present at J451-1 of the Laser Drive PCA?	Verify voltage with voltmeter. If voltage is not present, replace cable to DC Controller.
8. Is the Laser Unit defective?	Verify the laser power level per the following instructions. If the laser power is acceptable, replace the DC controller PCA.
9. Is the Laser/Scanning Cable Assembly damaged?	Closely inspect cable assembly. Examine for damaged wire crimps at the connector ends of the assembly. Replace harness assembly if damage is suspected.
10. Has the printer been moved from a cold to a warm room?	Allow the printer to stand until any condensation can dissipate.

Laser Power Verification

Required Tools

The following special tools are required for this verification procedure:

- Laser Power Checker # TKN-0198-000CN
- Digital Voltmeter (+/– 200mV DC Range)

Laser Power Output Check

The laser power circuitry is not adjustable. However, if it becomes necessary to verify the laser output, use the following procedures.

Warning

DO NOT place anything in the Laser/Scanning Assembly access hole other than the Laser Checker Tool. Although the laser beam is invisible, the reflected beam could possibly damage the eye.

---

1. Switch the printer power to OFF and open the Top Cover Assembly.
2. Remove the printer's Main Body Cover Assembly (on HP 33459, the top cover panel).
3. Heed the Laser Safety Label attached to the top of the Laser/Scanning Assembly to avoid possible injury.
4. Keep the Control Panel connector attached to the printer so the display can be read.
5. Open the plate covering the access hole for the laser power checker tool on the Laser/Scanning Assembly. Install the laser power checker tool into the opening (see Figure 7-30).
6. Connect the laser power tool leads to a digital multimeter and set the range to 200 mV DC.
7. Defeat the top-cover-in-place microswitch. Press down *both* EP-S Cartridge Drum Sensitivity Microswitches (SW301 and SW302).
8. Switch the printer's power ON.

Note

When the laser tool is installed in the printer, only one page of the Self Test will run before a 51 ERROR (Beam Detect Malfunction) appears on the printer's display panel. The laser power checker tool must have been calibrated within the last year to be effective.

9. With the laser tool installed (see Figure 7-30), the interlock switches defeated, and the voltmeter connected, perform a self test and verify the laser output.

The measured output should be 17.6 (± 1.6) millivolts. If this laser power cannot be measured, replace the following assemblies in the order listed:

1. Laser/Scanning Assembly.
2. DC Controller PCA.
3. Laser/Scanning Cable Assembly to the DC Controller.

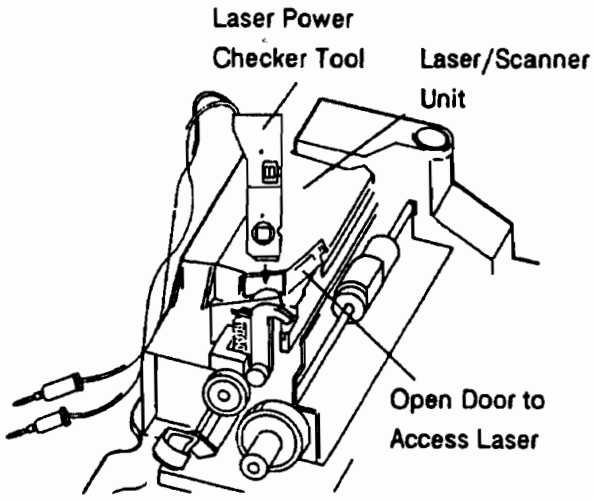


Figure 7-30. Installing Laser Power Checker Tool

"52 ERROR" Scanner Malfunction

The scanner motor is a flat, brushless, +24 Vdc motor. Motor operation is completely controlled by the DC Controller main microprocessor and motor speed is controlled by the SCANNER CONTROL (SCNCONT) signal. Motor speed is monitored via the FG– and FG+ feedback signals. LED 201 on the DC Controller PCA is illuminated when the scanner motor is at its operational speed.

The scanner motor is enabled briefly when the printer is powered-up (during the printer's power-on Self Test) or whenever the PRINT ($\overline{\text{PRNT}}$) command is received by the Formatter PCA. The motor makes a distinctive sound, identified as a "variable pitch whirring noise," when starting up. (The Main Motor noise is much more subtle and does not perceptibly vary in pitch.)

Scanner Motor Functional Check

While performing Test Print, *listen* for the distinct noise of the scanner motor starting up. If this noise can not be detected, replace the following assemblies in the order listed:

1. Laser/Scanning Assembly.
2. Laser/Scanning Cable Assembly to the DC Controller.
3. DC Controller PCA.

Table 7-22. Scanner Malfunction Checks

CHECKS	ACTION
1. Are the scanner motor connectors—J401 on the Scanner Motor PCA and J203 on the DC Controller PCA—firmly seated in their connectors?	Visually inspect. Ensure that connectors are properly seated. If the cable is damaged, replace the cable.
2. Is the J209 jumper in place on the DC Controller PCA?	Verify.
3. Is the problem intermittent?	Replace the cable assembly to the DC Controller.
4. Does the scanner motor run at all times after power-on, but before printing?	Replace the cable assembly to the DC Controller.
5. Is +24 Vdc present on J401-5 of the scanner motor PCA?	Measure the voltage. If voltage is not present, replace the cable to the DC Controller PCA.
6. Is the scanner motor defective?	See the "Scanner Motor Functional Check" on the previous page.
7. Is the DC Controller defective?	See the "Scanner Motor Functional Check" on the previous page.

"53 ERROR" Ram Error Message

This error message applies to the HP 33447 ONLY. It is NOT a valid error message for the HP 33459. The "53 ERROR" indicates that the optional memory installed in the printer is NOT compatible with the Formatter PCA. HP Memory PCA's at revision level B are compatible with the HP 33447 formatter PCA.

"54 ERROR" Message

The 54 ERROR means that the alignment guide encoder is not able to find its home pulse and therefore is not able to position the alignment guide correctly.

During a duplex print operation the printer's duplex alignment guide adjusts to the width of the duplexed media. This is necessary to ensure that the images on both sides of the media are aligned vertically with respect to one another. The alignment guide adjusts to three positions: letter/legal, A4 (for European width papers), and executive.

The alignment guide mechanism consists of a drive clutch and solenoid (SL4), a HOME positioning photosensor encoder and photosensor (PS5) and a cam.

The alignment guide homing process is as follows:

Approximately 0.1 seconds after the trailing edge of the paper clears the switchback paper sensor (PS5), SL4 is energized. This allows the cam to rotate and move the alignment guide to its innermost position (home) then back to the position indicated by the paper tray size switches. The photosensor (PS5) provides the "home" pulse and position count so that the printer always knows the position of the drive cam.

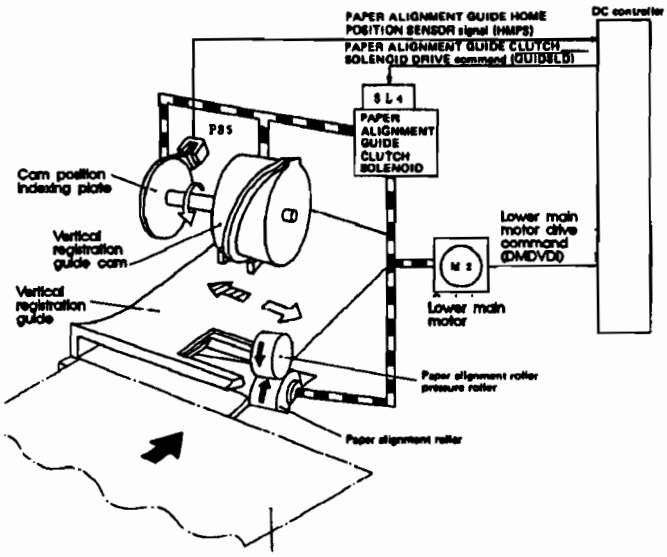


Figure 7-31. Alignment Guide Servo Loop

Functional Check PS5

The microprocessor polls PS5 before printing the first piece of media at power-up and before the first sheet of media is printed when a different media size is selected. PS5 is NOT active for each piece of media printed.

The alignment guide system can be tested as follows:

1. Open the duplex access cover and turn the green knob 90 degrees CCW.
2. Check that nothing is blocking the travel of the alignment guide and that the guide can travel freely without binding.
3. Turn the printer ON.
4. Select Duplex Mode from the front panel and initiate a front panel self-test.
5. Watch the white paper alignment guide. As media feeds out of the switchback, the alignment guide should move towards the center of the printer and then to the correct position for the selected paper size.
6. If the alignment guide does not move, check SL4 before proceding.

Alignment Guide System Electrical Test

1. Access J215, pin 28 (HMPS) on the DC Controller PCA.
2. Turn the printer ON and select duplex mode from the front panel.
3. Initiate a front panel self-test.
4. As the guide moves, the voltage at pin 28 should change from +5Vdc to 0Vdc as the guide moves.
5. If the alignment guide moves, but the voltage at pin 28 doesn't change, check all connections, then if necessary, change the photosensor (PS5).
6. If the voltage does change, but the "54 ERROR" persists, change the DC Controller PCA.

SL4 Positioning Solenoid

The Vertical Registration Solenoid (SL4) engages the drive to the Alignment Guide. It is NOT enabled for every piece of media. SL4 is energized only at power-up or when the switchback rollers reverse.

SL4 Functional Test

1. Access J215, pin 19 ($\overline{\text{GUIDSLD}}$) on the DC Controller.
2. Turn the printer ON, select duplex mode and initiate a front panel self-test.
3. As the paper leaves the switchback and enters the duplex path, the voltage at pin 19 should change from +24Vdc to 0Vdc, with reference to frame ground.
4. If the voltage changes but the solenoid does not engage, replace the solenoid.
5. If the voltage does not change, check all wiring, then, if necesary, change the DC Controller.

"55 ERROR" Message

The "55 ERROR" message occurs when the command information can not be exchanged between the print engine (DC Controller PCA) and the Formatter PCA. If this error occurs, cycle the power to the printer, then if the error persists, change the following PCA's in the order given:

1. Formatter PCA.
2. DC Controller PCA.

"56 ERROR" (Duplex Inhibited)

The "56 ERROR" indicates that the Output Selector Knob was in the wrong position while the printer was trying to perform a duplex print operation. If this error occurs check:

1. The position of the Output Selector Knob and that it engages MS1 properly.
2. The condition of MS1.
3. That the left cover is properly installed.

7-5. IMAGE FORMATION TROUBLESHOOTING

Introduction

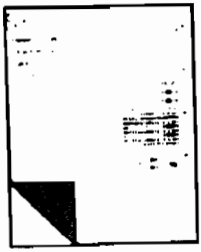
The quality of the printer's output is always subject to the judgment of the particular user. This section of the manual is intended to assist the service representative in defining print quality and understanding what factors may affect print quality.

The print samples depicted in Figure 7-32 and Figure 7-33 illustrate some print quality defects and their possible causes. It is impossible to illustrate all possible print quality defects since there are too many variables in the printing process. It is recommended that the service representative keep copies of print quality defects with an explanation of their causes for future reference.

Image defects in the list below are covered in the tables which follow:

- Black pages.
- Very Faint Print.
- Speckled Print.
- Vertical White Streaks.
- Right-hand Text Missing.
- Faulty Registration.
- Random Horizontal Black Lines.
- Slightly Faint Print.
- Suede Print.
- Smeared Print/Improper Fusing.
- Distorted Print.
- Repetitive Defects.
- Black Pages with Horizontal White Strips.
- Image Skew.
- Improperly Sized Image.
- Vertical Dark Streaks.
- Character Voids.
- Background.
- Smudged Horizontal Band with Overprint.
- Black Stripe on Right Side of Page.
- White or Blank Pages.

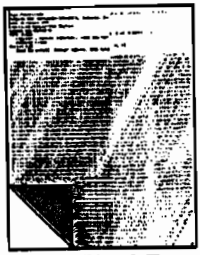
Black Pages



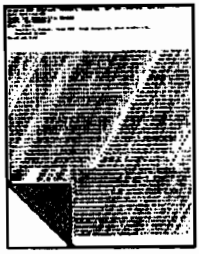
Very Faint Print

Speckled Print

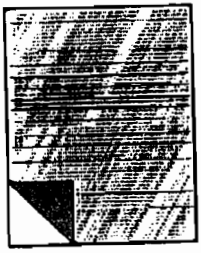
Vertical White Streaks



Right-Hand Text Missing/Distorted



Faulty Registration

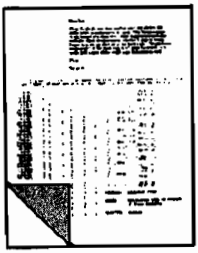


Random Horizontal Black Lines

Slightly Faint Print

Suede Print

Smeared Print/ Improper Fusing



Distorted Print

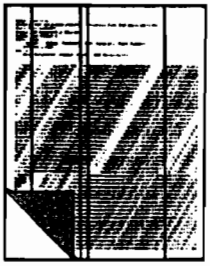
Repetitive Defects

Figure 7-32. Image Defect Summary

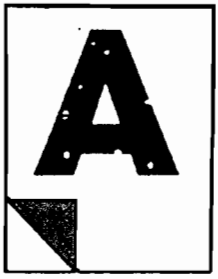
Black Pages with Horizontal White Strips

Image Skew

Improperly Sized Image

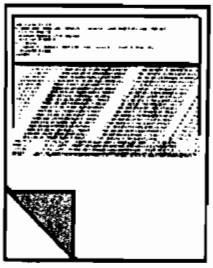


Vertical Dark Streaks



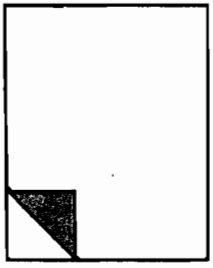
Character Voids

Background



Smudged Horizontal Band with Overprint

Black Stripe on Right Side of Page



White or Blank Pages

Figure 7-33. Image Defect Summary

Table 7-23. Black Pages

POSSIBLE CAUSE	WHY	ACTION
1. No Primary Corona. (Blotchy with undefined border.)	The Primary Corona applies a negative charge to the drum's surface which repels the less-negatively-charged toner, except in those areas exposed to the laser light. Without the Primary Corona's charge, because of the erase lamps the drum's surface would be neutral, attracting the less-negatively-charged toner and, therefore, creating a totally black image.	Replace the EP-S Cartridge. If the problem persists, refer to Table 7-45, "High-Voltage Systems Checks."
2.Scanning Cable Assembly. (Defined border)	Low-level signals exchanged between the Laser/Scanning Assembly and the DC Controller may be affecting laser output.	Replace the Laser/Scanning Cable Assembly.
3.Scanning Assembly. (Defined border)	Circuitry in the assembly is causing the laser to run out of control.	Replace the Laser/Scanning Assembly.
4. DC Controller PCA. (Defined border)	If the laser drive circuitry is damaged so that the laser is always on, the surface of the drum would be constantly discharged by the laser.	Replace the DC Controller PCA followed by the Formatter as required. **Hint:** Disconnect the Formatter from the DC Controller and perform a Test Print to determine the source.

Table 7-24. Very Faint Print

POSSIBLE CAUSE	WHY	ACTION
1. Empty EP-S Cartridge.	No toner is available for print.	Replace the EP-S Cartridge. See Note.
2. Weak or no Transfer Corona current.	The Transfer Corona's purpose is to apply a positive charge to the back of the paper to attract the negatively charged toner image from the drum to the paper.	Perform the "Image Development (Half Self Test) Functional Check" following these tables and proceed as directed.
3. Weak or no developer bias.	If no developer bias is available, toner is not attracted to the drum's discharged areas.	Refer to Table 7-45, "High- Voltage System Checks."
4. Paper.	The paper moisture content, conductivity, finish, etc., may not be acceptable for use in the electrophotographic process.	Try a known type and source of paper.
5. Drum ground path interrupted.	A dirty or damaged drum ground contact will not allow electrical discharge or laser-exposed areas.	Clean or repair the drum ground contacts.

A new EP-S cartridge weighs 1350 gms (47.5 oz). *If the EP-S cartridge weighs less than 1120 gms. (42 oz.) it is empty and should be replaced.*

Table 7-25. Speckled Print

POSSIBLE CAUSE	WHY	ACTION
1. No Primary Corona Grid.	The purpose of the Primary Corona Grid is to ensure that the Primary Corona deposits a uniform negative charge to the surface of the drum. If the grid is not functioning properly, uneven charges are deposited on the drum's surface. The random areas of uneven charges appear as dark blotches in the print.	Replace the EP-S Cartridge. If the problem persists, refer to Table 7-45, "High-Voltage System Checks."

Table 7-26. Vertical White Streaks

POSSIBLE CAUSE	WHY	ACTION
1. Dirty Beam-to-Drum Mirror.	The Beam-to-Drum Mirror reflects the laser light from the scanner to the surface of the photoconductive drum. If the mirror is dirty, the laser light is blocked and the image is not written properly on the drum.	Carefully clean the Beam-to- Drum Mirror. A quality camera lens cleaning fluid and tissue can be used if necessary. The mirror may be easily accessed by moving the mirror shutter to the right and folding it up out of the way.
2. Dirty Transfer Corona.	The purpose of the Transfer Corona is to apply a positive charge to the back of the paper to attract the negatively charged toner image from the drum to the paper. If portions of the Transfer Corona are extremely contaminated or blocked, vertical streaks would occur in the printed output.	Clean the Transfer Corona housing and wire per instructions in Chapter 4, Section 4-4.
3. EP-S Cartridge.	No toner is available for print.	Replace the EP-S Cartridge.
4. Laser/Scanning Assembly.	The focusing lenses within the Laser/Scanning Assembly may be contaminated, blocking (or diffusing) the laser light.	Replace the Laser/Scanning Assembly.

Table 7-27. Right-Hand Text Missing

POSSIBLE CAUSE	WHY	ACTION
1. EP-S Cartridge.	No toner available for print.	Replace the EP-S Cartridge.
2. Beam-to-Drum Mirror incorrectly installed.	The Beam-to-Drum Mirror reflects the laser light from the scanner's polygonal mirror to the surface of the photoconductive drum. If the mirror is installed incorrectly (end-for-end) or is not fully resting on the mirror supports, the scan plane of the laser will not be parallel. The resulting image written on the drum will be distorted, missing, or out of parallel alignment.	Verify that the mirror is resting firmly on the moulded plastic supports. Note that the mirror is spring loaded and should rest squarely on the supports. If the mirror had been removed during maintenance, ensure that the mirror has been correctly reinstalled. Refer to Chapter 6 for proper mirror installation.
3. Bent Top Cover Assembly Hinge Brackets.	If the Top Cover Assembly Hinge Brackets are bent, the Beam-to-Drum Mirror will not reflect the laser beam to the drum properly.	Replace the Top Cover Assembly Hinge Brackets.

Table 7-28. Faulty Registration

CAUSE	WHY	ACTION
1. Worn Feed Roller Assembly.	If the Paper Pickup Roller or associated clutch is sufficiently worn, the leading edge of the paper may not reach the Registration Rollers in time.	Replace the Feed Roller Assembly.
2. Registration Assembly.	The Paper Pickup Roller positions the leading edge of the paper at the Registration Rollers. If these rollers do not grab the paper at the proper time and move it smoothly through the printer (due to worn rollers, springs, or clutch), misregistration will occur.	Replace the Registration Assembly.
3. Drive Gears.	If any gear within the gear drive train becomes excessively worn or is excessively dirty, erratic paper movement would result, leading to image misregistration.	Closely examine the gears along the paper path for wear and contamination. Clean and inspect the gears. Replace any defective gear.
4. Paper Tray.	The paper tray may be preventing the paper from freely moving through the printer.	Verify that the tray is correctly loaded. Verify that the tab in the upper left corner of the tray is not bent. Verify that the paper tray is fully seated into the printer. Switch trays with another printer to verify that the problem follows the tray. Replace the paper tray.
5. Paper.	The surface of the paper may be too smooth for the pickup roller to move the paper through the paper path.	Change paper. Try a brand of paper that is known to be good.

Table 7-29. Random Horizontal Black Lines

POSSIBLE CAUSE	WHY	ACTION
1. Defective or improperly seated Fiber Optic Cable.	Horizontal black lines could occur in the event of a beam detect error (41 ERROR). In this condition (i.e., the microprocessor is expecting beam detect, but never receives it), the processor turns on the laser continuously, searching for beam detect. If beam detect has not occurred after two seconds, a 51 ERROR message is displayed on the Control Panel. If the Fiber Optic Cable is damaged or disconnected, the beam would be blocked from the microprocessor and an error would result.	Replace the Fiber Optic Cable.
2. Laser/Scanning Assembly.	If the beam detect mirror within the assembly becomes misaligned or damaged, beam detect would not consistently be provided to the DC Controller PCA.	Replace the Laser/Scanning Assembly.
3. DC Controller PCA.	See previous explanations.	Replace the DC Controller PCA.

Table 7-30. Slightly Faint Print

CAUSE	WHY	ACTION
1. EP-S Cartridge.	No toner available for print.	Replace the EP-S Cartridge.
2. Print Density set improperly.	The higher the Print Density Dial setting, the smaller the amount of toner that will be transferred to the EP drum.	Turn the Print Density Dial to a lower setting (i.e., toward "1"). Replace the HVPS if no effect.
3. Drum Sensitivity Switches.	Malfunctioning microswitches may cause the microprocessor to adjust the laser power level incorrectly.	Perform the "Drum Sensitivity Switches (SW301 and SW302) Functional Check" in Section 7-4.
4. Erase Lamp Assembly.	Slightly faint print may result over time if the erase lamps are malfunctioning.	Perform the "Erase Lamp Functional Check" following.
5. Low laser power.	Low laser power would result in an inadequately discharged surface on the photoconductive drum.	Verify the laser power output. Refer to "Laser Power Verification" in Section 7-4.
6. Paper.	The paper may not be acceptable to the electrophotographic processes.	Try a known source and type of paper. Refer to the User's Manual for guidance on selecting paper.
7. Transfer Corona.	Corona functionality may not be at peak.	Clean the Corona Assembly.

Table 7-31. Suede Print

POSSIBLE CAUSE	WHY	ACTION
1. DC Controller PCA.	If the laser drive circuitry is malfunctioning and turning the laser on and off at incorrect intervals, suede print may be observed.	Perform a Test Print to isolate the DC Controller from the Formatter PCA. If the defective print occurs during the Test Print function, assume a defective DC Controller PCA and replace it.
2. Formatter PCA.	If the Formatter PCA is defective, the PCA may be instructing the DC Controller PCA to turn the laser on and off at incorrect times.	Perform a Test Print to isolate the DC Controller PCA from the Formatter PCA. If the test print is acceptable but the Control Panel test operation is unacceptable, replace the Formatter PCA.

Table 7-32. Smeared Print/Improper Fusing

POSSIBLE CAUSE	WHY	ACTION
1. Fusing Assembly.	The print will smear if the Fusing Assembly is not hot enough to bond the toner to the paper.	Perform the "Fusing Check" at the end of this section.
2. Bent Static Teeth.	The static teeth remove the charge from the paper so that it won't stick to the photoconductive drum. If the static teeth are defective, the print could become smeared prior to the paper entering the Fusing Assembly.	Examine the static teeth for defects. If the teeth are bent or defective, replace the Transfer Corona Assembly.
3. Media.	The media may not be acceptable for the EP process and for laser printing.	Verify that the media meets specifications as shown in the User's Manual.
4. Dirty Fuser Cleaning Pads.	Dirty fuser cleaning pads may contaminate of the Fusing Roller and smear the print.	Replace the Fuser Cleaning Pad.
5. Worn Gears.	If the EP-S Drum and paper are not moving at the same speed the characters may be smudged.	Replace the EP-S Cartridge, Feed Drive Assembly, 19- and 57-Tooth Gears, Main Motor, or Fusing Assembly as necessary.
6. Foreign object in paper path.	Something is smearing the unfused toner image on the surface of the paper.	Remove any foreign material. Try a new EP-S Cartridge.

Table 7-33. Distorted Print

POSSIBLE CAUSE	WHY	ACTION
1. Paper Path.	If any component within the paper path is preventing the paper from moving at a uniform rate, the print image would be affected (e.g., the main motor rotating too fast or too slow, the transport gears excessively worn, etc.). Characters that are either too tall or too short (in the direction of paper motion) are usually a result of drive mechanism problem.	Closely examine the paper transport rollers along the paper path for wear. Replace if excessive wear is observed. Inspect and replace the EP-S Cartridge, Feed Drive Assembly, 19- and 57-Tooth Gears, Main Motor and Drive Assembly, or Fusing Assembly as necessary.
2. Laser/Scanning Assembly.	Wavy, irregular-shaped characters, or irregular line margins in the scan direction of printing are usually a result of a defective Laser/Scanning Assembly.	Replace the Laser/Scanning Assembly.
3. Laser/Scanning Cable Assembly.	See explanation above.	Replace the Cable Assembly.
4. High-Voltage Corona stays on.	Improper charges on the EP drum surface can cause image distortion.	See Table 7-45, "High-Voltage System Checks."

Table 7-34. Repetitive Defects

POSSIBLE CAUSE	WHY	ACTION
1. EP-S Cartridge.	The circumference of the photoconductive drum (EP drum) is 3.75 inches. The circumference of the developer roller is 2 inches. If a defect appears in the print image at these intervals, assume the defect is associated with the EP-S Cartridge.	Replace the EP-S Cartridge. Refer to the "Repetitive Image Defect Ruler" drawing in Section 7-7 for additional hints.
2. Fusing Assembly.	The Fusing Roller's circumference is approximately 3.125 inches. If a defect appears at this interval, assume the defect is associated with the Fusing Assembly.	Clean the Fusing Assembly rollers. Replace the assembly if necessary.
3. Dirty Roller.	Any dirty roller along the paper path may result in a pattern of repetitive print image defects.	Examine and clean rollers along the paper path. Refer to "Repetitive Image Defect Ruler" drawing in Section 7-7.
4. Bad High-Voltage Power Supply Assembly or DC Controller.	A defective HVPS may leave inadequate charges on the EP drum or may not properly charge the developer roller. If the Primary or Transfer Coronas are left on when the printer is idle, repetitive image defects will temporarily appear.	Replace the HVPS. If the problem persists, replace the DC Controller.

Table 7-35. Black Pages with Horizontal White Stripes

POSSIBLE CAUSE	WHY	ACTION
1. Defective (damaged) Fiber Optic Cable.	This unique printout results from a defective or damaged Fiber Optic Cable. The pattern results from the printer's firmware attempting to locate Beam Detect (the horizontal synchronization signal). The white horizontal lines result from retry efforts by the firmware (e.g., the turning on/off of the laser) in an attempt to locate Beam Detect. The black areas show where the laser is continuously on, discharging the surface of the drum. This printout is usually associated with a 51 ERROR.	Ensure the Fiber Optic Cable is properly seated. If the error persists, replace the Fiber Optic Cable.
2. Laser/Scanning Assembly or DC Controller PCA.	See explanation in step 1 above.	Replace the Laser/Scanning Assembly followed by the DC Controller PCA, if necessary.

Table 7-36. Image Skew

POSSIBLE CAUSE	WHY	ACTION
1. Paper Tray.	If paper is carelessly installed in the paper tray or the paper tray is loosely installed in the printer, paper movement will be hindered as the paper enters the Registration Assembly.	Verify that the tray is correctly loaded. Verify that the tab in the upper left corner of the tray is not bent. Verify that the paper tray is fully seated into the printer. Switch trays with another printer to verify that the problem follows the tray.
2. Worn Feed Roller Assembly.	If the Paper Pickup Roller or associated clutch is sufficiently worn, the leading edge of the paper may be skewed before it reaches the Registration Rollers.	Replace the Feed Roller Assembly.
3. Registration Assembly torsion springs.	The Registration assembly torsion springs apply equal pressure to both sides of the registration assembly. Unequal pressure on the paper will cock the paper as it travels through the printer and cause the print to be skewed.	Verify that the springs are installed correctly. If they are and the print is still skewed, replace the Registration Assembly.

Table 7-37. Improperly Sized Image

POSSIBLE CAUSE	WHY	ACTION
1. Paper Tray Microswitches.	The paper tray microswitches indicate what size paper tray is installed. This information is used to format the print image to the size of the paper installed in the tray. If the paper tray microswitches are defective, the image will be formatted incorrectly.	Perform the "Tray Size Switches (SW201, SW202, SW203) Functional Check" in Section 7-4. Check that the correct envelope size is selected if appropriate.

Table 7-38. Vertical Dark Streaks

POSSIBLE CAUSE	WHY	ACTION
1. Dirty Primary Corona wire.	A dirty Primary Corona wire will leave areas under the contaminated portion with an inadequate charge to repel unwanted toner.	Clean the Primary Corona wire.
2. Bad EP-S Cartridge.	Contaminants lodged within the cartridge can cause non-uniform characteristics.	Replace the EP-S Cartridge.
3. Incompatible forms	During forms manufacture, inks or other finishing processes may interfere with the electrophotographic (EP) or fusing process.	Change type of form. **Hint:** Check the Fuser Cleaning Pad for contaminant buildup.

Table 7-39. Background Scatter

POSSIBLE CAUSE	WHY	ACTION
1. Dirty Primary Corona wire.	A dirty Primary Corona wire will prevent adequate charging of the EP drum's surface to repel toner.	Clean the Primary Corona wire.
2. Defective EP-S Cartridge.	The EP-S Cartridge may be internally damaged.	Replace the EP-S Cartridge.
3. Bad paper lot.	The paper moisture content, conductivity, or surface finish may be incompatible with the electrophotographic process.	Try a different paper lot (see the Owner's Manual for paper specifications).
4. Print Density set incorrectly.	If the Print Density is set incorrectly, then background scatter can result, particularly with envelopes.	Adjust the Print Density as shown in the User's Manual.
5. Inside of printer dirty.	If toner dust has leaked out of the EP-S-Cartridge, this problem can occur.	Clean the inside of the printer (see Chapter 4, Section 4-3.)

Table 7-40. Character Voids

POSSIBLE CAUSE	WHY	ACTION
1. Bad transparencies.	Transparencies will exhibit this problem if they are not designed for proper toner adhesion.	Use Hewlett-Packard-approved transparencies (refer to the User's Manual.
2. Bad paper lot.	The surface of the paper may be too smooth for proper toner adhesion.	Try a known paper from a known source (refer to the User's Manual.
3. Poor fusing.	Toner may not be properly fused to the media.	Perform the "Fusing Check" at the end of this section.
4. EP-S Cartridge	Fusing may not occur correctly	Replace Fusing Assembly.

Table 7-41. Smudged Band with Overprint

POSSIBLE CAUSE	WHY	ACTION
1. Worn Feed Roller Assembly.	The plastic idler wheels can grab the paper feed D-roller as the Registration Assembly is trying to pull paper through the printer. If the D-roller is turned sufficiently, it can momentarily prevent normal paper movement.	Replace the Feed Roller Assembly and Separation Pad.

Table 7-42. Black Stripe on Right Side of Page

POSSIBLE CAUSE	WHY	ACTION
1. Dirty Primary Corona wire.	Drum surface cannot be charged where corona wire is contaminated.	Clean Primary Corona wire (see Chapter 4, Section 4-4).

Table 7-43. White or Blank Pages

POSSIBLE CAUSE	WHY	ACTION
1. EP-S Cartridge.	No toner is available for print.	Remove sealing tape.
2. Broken Transfer Corona wire or no Transfer Corona voltage.	Without Transfer Corona voltage, toner cannot be attracted from the surface of the drum to the paper.	Perform the "Image Development (Half Self Test) Functional Check" which follows to check all other EP processes.
3. No Developing Bias.	With no Developing Bias charge toner will not be attracted to the drum.	Refer to Table 7-45, "High-Voltage System Checks."
4. No drum ground path.	With no ground path the drum cannot be discharged. The negative charge on the drum will repel toner and leave a white page.	Refer to Table 7-45, "High-Voltage System Checks."
5. Drum is not rotating.	If the drum does not rotate, the page will be white because the EP process functions will not have occurred.	Perform the "Drum Rotation Functional Check" which follows.
6. High-Voltage System shorted-to-ground.	When the Transfer Corona is shorted-to-ground, the current-limiting circuitry within the High-Voltage Power Supply Assembly disables all EP process functional voltages.	Thoroughly clean or replace the Transfer Corona Assembly.
7. Bad Laser Scanning Cable Assembly.	Low-level signals exchanged between the Laser/Scanning Assembly and the DC Controller may be affecting laser output.	Replace the Laser/Scanning Cable Assembly.
8. Bent Top Cover Assembly Hinge Brackets.	With bent Hinge Brackets, the Beam-to-Drum Mirror may improperly reflect the laser beam or the drum drive gear may not engage.	Replace the Top Cover Assembly Hinge Brackets.
9 . Blocked Laser Beam.	If the Beam-to-Drum Mirror or EP-S Cartridge shutters do not open when the EP-S Cartridge is installed, the beam will not reach the drum, resulting in an all-white page.	Verify the laser beam is not blocked.

Image Development (Half Self Test) Functional Check

The EP process can be subdivided into the following stages (see Chapter 5, Section 5-2):

- Cleaning (Physical and Electrostatic).
- Conditioning (Primary Corona and grid).
- Writing (Laser Modulation).
- Development (Formation of the Toner Image).
- Transfer (Transfer Corona charge to transfer the image to paper).

The purpose of the Half Self Test Check is to determine which of the EP processes are functioning. Perform the test as follows:

1. Press the (TEST PRINT) button.
2. After the paper has advanced halfway through the printer (the leading edge of the paper should have advanced at least past the Transfer Corona), open the Top Cover Assembly.
3. Open the EP-S Cartridge's drum shield to view the drum's surface.

If a dark and distinct toner image is present on the drum's surface, assume that the first four functions of the EP process are functioning, concentrate troubleshooting efforts to a transfer problem, and proceed to Table 7-46. If the drum image is faint, verify proper laser power per the "Laser Power Verification" in Section 7-4, followed by the "High-Voltage System Checks," (Table 7-45) in this section. If NO image is present on the photoconductive drum, concentrate troubleshooting efforts on the earlier stages of the EP process as follows:

Drum Rotation Functional Check

The photoconductive drum, located in the EP-S Cartridge, must rotate for the EP process to function. The photoconductive drum receives its drive from the Main Motor gear train. To verify whether the drum is rotating, proceed as follows:

1. Open the printer's Top Cover Assembly. Open the EP-S Cartridge's drum shield (cover) to view the photoconductive drum.
2. With a felt-tipped marker, draw a line on the *edge* of the drum (away from the print image area). Note the position of the line.

3. Close the printer and power it on. The one-second start-up sequence should rotate the drum enough to move the mark. Open the printer and inspect the drum. Verify that the mark drawn in Step 2 of this procedure has moved.

If the mark has not moved, inspect the gear train to ensure that it is meshing with the EP-S Cartridge gears. If the Main Motor and drive gears appear to be functional and yet the EP drum does not move, the Top Cover Assembly Hinge Brackets may have been bent and require replacement.

Beam-to-Drum Mirror Assembly Functional Check

In order for the laser beam to reach the surface of the EP drum after it exits the Laser/Scanning Assembly, it must reflect off a properly positioned Beam-to-Drum Mirror. The mirror is normally blocked by the Mirror Shutter Assembly. When an EP-S Cartridge is installed, it contacts a lever on the left side of the Mirror Shutter Assembly, allowing the shutter to fall away from the mirror when the Top Cover Assembly is closed.

With the Top Cover Assembly opened to its 45° position and the EP-S Cartridge removed, gently push the bottom of the shutter locking assembly on the left side of the Mirror Shutter Assembly. If the shutter does not fall away from the mirror, check for the source of the binding and resolve. (See Figure 7-34).

Ensure that the Mirror Assembly is installed properly between the EP-S Cartridge Guide and the Top Cover Assembly and that it is positioned on its guide pins as described in Chapter 6.

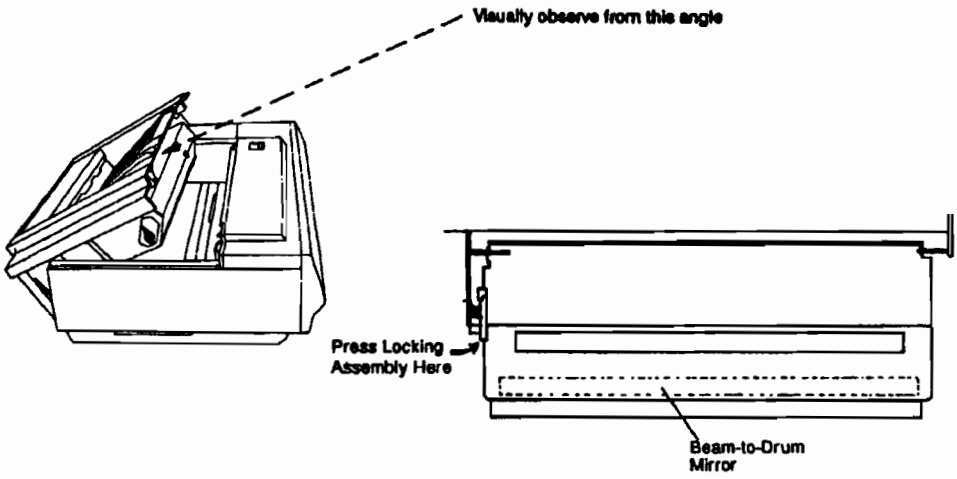


Figure 7-34. Beam-to-Drum Mirror Assembly

EP-S Cartridge Guide Functional Check

Whenever an EP-S Cartridge is installed in the EP-S Cartridge Guide in the Top Cover Assembly, protrusions on the right side of the guide are used to open two shutters on the top side of the EP-S Cartridge: the Erase Lamp Shutter and the Beam Shutter. As the Top Cover Assembly is closed, a protrusion in the base of the printer opens the drum shutter (or shield) on the bottom of the EP-S Cartridge.

With the Top Cover Assembly open at 45°, slowly slide an EP-S Cartridge in to the cartridge guide and, looking over the top of the EP-S Cartridge, note whether both shutters are opening properly. If all is well, the surface of the EP drum should be visible when looking directly over the top of the installed EP-S Cartridge (see Figure 7-34).

High-Voltage Power Supply Assembly

The High-Voltage Power Supply Assembly provides the necessary voltages for the printer's electro-photographic processes. Chapter 5 of this manual provides a summary of functional theory describing how the EP process works. The +24B Vdc supply is used to power the High-Voltage Power Supply Assembly. A summary of the major components of the high-voltage system and their functions is given in the table below.

Table 7-44. High-Voltage Power Supply Assembly Summary

COMPONENT	FUNCTION
1. Primary Corona.	Deposits a negative charge on the drum's surface.
2. Primary Corona Grid.	The grid ensures that the negative charges provided by the Primary Corona are applied evenly to the drum's surface. The grid is tied to ground potential through a varistor in the High-Voltage Power Supply Assembly. The varistor to bleeds off excess corona current and maintains a uniform, fixed voltage on the drum's surface.
3. Drum ground.	Provides a discharge ground path for the drum's surface charge through the photoconductor after being struck by the laser or the erase lamps.
4. Developing bias.	The developing bias is a negative DC voltage superimposed on a square wave. This bias is applied to the developer roll in the EP-S Cartridge. Toner particles obtain this negative bias by rubbing against the developer roll. The AC bias on the developer helps the toner overcome the magnetic attraction of the developer roll.
5. Transfer Corona.	Deposits a positive charge to the back of the paper to attract the negatively charged toner from the drum's surface.
6. Toner Sensing.	Provides a variable voltage level to the DC Controller, depending on the toner level in the EP-S Cartridge.
7. Static Teeth.	A high negative potential is applied to a row of static teeth. These negatively charged teeth assist in discharging the positive charge placed on the paper at the transfer station. The result of this discharge action is to weaken the paper's attraction to the photoconductive drum.

Table 7-45. High-Voltage System Checks

CHECKS	ACTION
1. Are the connectors for the Primary Corona, Drum Ground, Developing Bias, Toner Level Sensor damaged, corroded, dirty, or missing? Check the EP-S Cartridge also.	Visually inspect each item. If any are damaged, correct as necessary. Replace the High-Voltage Power Supply if the connection is unable to be corrected. Ensure that all wires are connected to their respective terminals.
2. Is the Primary Corona wire broken, resulting in black pages?	Inspect. (See Figure 7-35.) If broken, replace the EP-S Cartridge.
3. Are the Light-Blocking shutters on the EP-S Cartridge opening? (A closed laser shutter will result in white pages.)	Inspect the EP-S Cartridge's top to verify that the shutter tabs are not broken or damaged (See Figure 7-35). Inspect the Top Cover Assembly to verify that the plastic protrusions which open the EP-S Cartridge shutters are not damaged.
4. Is the protective shutter concealing the Top Cover's reflecting mirror being released when the EP-S Cartridge is installed?	Install the EP-S Cartridge. Visually inspect to see if the mirror's protective shield swings open as the Top Cover Assembly is closed.
5. Is the Beam-to-Drum Mirror dirty?	Inspect the mirror. If dirty, clean per the procedure described in Chapter 4.
6. Is the High-Voltage Power Supply Assembly correctly seated into its connector to the DC Controller PCA?	Visually inspect. If necessary, remove the assembly to verify that all pins are in their respective connectors.
7. Is connector J211 on the DC Controller PCA properly connected?	Remove the bottom cover and visually inspect the connector. Reseat or replace if necessary.
8. Do the EP-S Cartridge's sensitivity switches function?	Refer to the "Drum Sensitivity Switches (SW301 and SW302) Functional Check" in Section 7-4.
9. Do the Erase Lamps function?	Perform the "Erase lamp functional Check" which follows.
10. Do the Primary Corona, Developer AC Bias, and Developer DC Bias signals function?	Perform the "Primary Corona," "Developer AC Bias," and "Developer DC Bias" functional checks which follow.

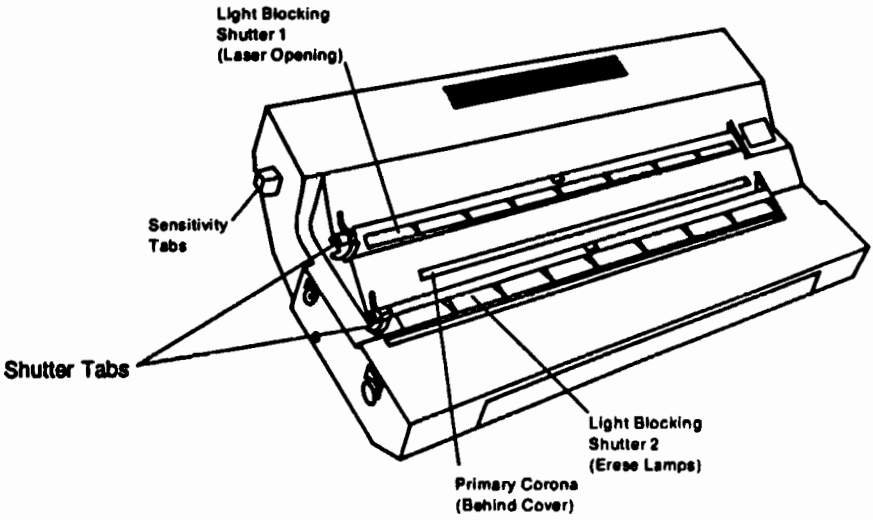


Figure 7-35. EP-S Cartridge

Primary Corona Functional Check

Verify that the Primary Corona ($\overline{\text{HV1ON}}$) enable signal on the High-Voltage Power Supply Assembly is functioning as follows:

1. Using a voltmeter and frame ground as a reference, measure the voltage level at J210-8 (Test Connector, see Figure 7-36) on the DC Controller PCA while performing a Test Print. The voltage level should switch between +18.0 Vdc (disabled state) and 0.0 Vdc (enabled state) one second after the print cycle begins. If the voltage at J210-8 does not switch, replace the DC Controller PCA. If the signal line is being switched but the Primary Corona does not appear to be functioning (i.e., producing black pages), replace the EP-S Cartridge followed by the High-Voltage Power Supply Assembly.

Developer AC Bias Functional Check

Verify that the Developer AC Bias ($\overline{\text{DBAC}}$) enable signal on the High-Voltage Power Supply Assembly is functioning as follows:

1. Using a voltmeter and frame ground as a reference, measure the voltage level at J210-6 (Test Connector, see Figure 7-36) on the DC Controller PCA while performing a Test Print. The voltage level should switch between +18.0 Vdc (disabled state) and 0.0 Vdc (enabled state) three seconds after the print cycle begins. If the voltage at J210-6 does not switch, replace the DC Controller PCA. If the signal line is being switched but the developer AC bias does not appear to be functioning (i.e., producing very faint print), replace the EP-S Cartridge followed by the High-Voltage Power Supply Assembly.

Note

The absence of the Developer AC Bias will also result in a perpetual 16 TONER LOW condition.

Developer DC Bias Functional Check

Verify that the Developer DC Bias ($\overline{\text{DBDC}}$) enable signal on the High-Voltage Power Supply Assembly is functioning as follows:

1. Using a voltmeter and frame ground as a reference, measure the voltage level at J210-4 (Test Connector, see Figure 7-36) on the DC Controller PCA while initiating the printer Self Test. The voltage level should switch between +18.0 Vdc (disabled state) and 0.0 Vdc (enabled state) one second after the print cycle begins. If the voltage at J210-4 does not switch, replace the DC Controller PCA. If the signal line is being switched but the developer DC bias does not appear to be functioning (i.e., producing extremely faint or white pages), replace the EP-S Cartridge followed by the High-Voltage Power Supply Assembly.

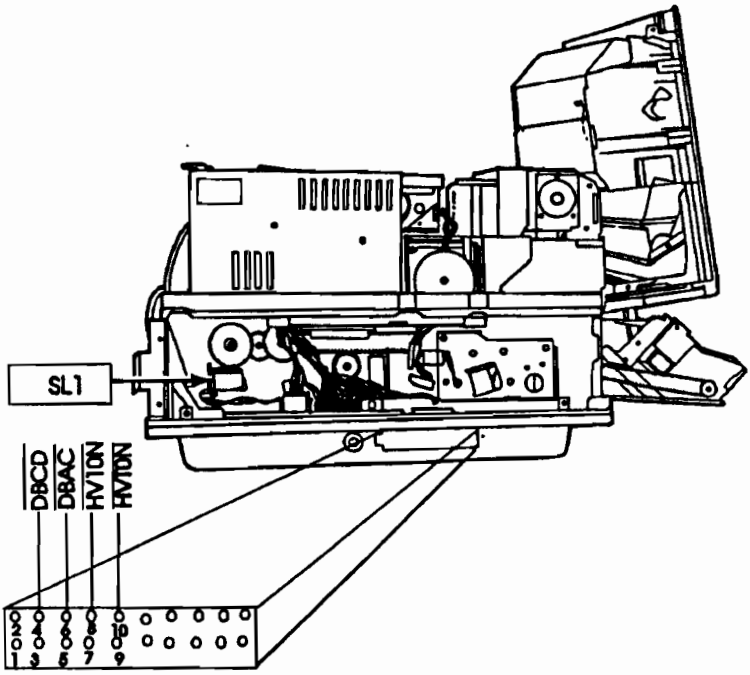


Figure 7-36. J210 Test Points

Transfer Corona

The Transfer Corona applies a positive charge to the back of the paper during the transfer process to attract the toner image from the surface of the photoconductive drum to the paper. The High-Voltage Power Supply Assembly provides the voltage applied to the Transfer Corona Assembly. The main microprocessor on the DC Controller PCA enables the Transfer Corona via the HIGH-VOLTAGE TRANSFER ON ($\overline{\text{HVTON}}$) signal, which occurs approximately two seconds after the PRNT command is issued by the Formatter PCA. The Transfer Corona remains on until all printing is complete.

Table 7-46. Transfer Corona Checks

CHECKS	ACTION
1. Is the High-Voltage Power Supply Assembly correctly seated into its connectors to the DC Controller PCA?	Visually inspect. If necessary, remove the assembly to verify that all pins are in their respective connectors.
2. Is the Transfer Corona wire broken?	Inspect. If the wire is broken, replace the assembly.
3. Is the drum ground connector (see Figure 7-26.) damaged?	Inspect. Replace the High-Voltage Power Supply Assembly if necessary.
4. Are the Transfer Corona Assembly spring connectors (located on the bottom of the High-Voltage Power Supply Assembly connector arm) dirty or bent?	Remove the High-Voltage Power Supply Assembly. Inspect the Transfer Corona spring connections (see Figure 7-26.) Straighten or clean the connectors if necessary.
5. Is the DC Controller PCA defective?	See the "Transfer Corona Functional Check" which follows.

Transfer Corona Functional Check

Verify that the Transfer Corona enable signal ($\overline{\text{HVTON}}$) on the High-Voltage Power Supply Assembly is functioning as follows:

1. Using a voltmeter and frame ground as a reference, measure the voltage level at J210-10 (Test Connector, see Figure 7-36) on the DC Controller PCA while initiating the printer Self Test. The voltage level should toggle between +18.0 Vdc (disabled state) to 0.0 Vdc (enabled state) two seconds after the print cycle begins. If

the voltage at J210-10 does not toggle, replace the DC Controller PCA. If the signal line is being switched but the Transfer Corona does not appear to be functioning (i.e., producing a clear image on the drum but faint or white pages), replace the High-Voltage Power Supply Assembly followed, if necessary, by the Transfer Corona Assembly.

Erase Lamp Functional Check

The Erase Lamps receive their operating voltage through connectors J333 and J334 on the Exit Sensor PCA.

1. Remove the Main Body Covers or, at a minimum, the left cover panel.
2. Remove the EP-S Cartridge and close the Top Cover Assembly.
3. Power on the printer.
4. Observe the Erase Lamps through the left side opening. If the lamps are functioning, an orange glow may be observed for about one second following powerup. If the orange glow is not observed, verify that the Erase Lamp contacts are fully contacting the Exit Sensor PCA. If the lamps still appear to be malfunctioning, replace the following assemblies in the order listed:
   a. Exit Sensor PCA.
   b. Erase Lamp Assembly.
   c. DC Controller PCA.
   d. Cable assembly between the Exit Sensor PCA and the DC Controller PCA.

Image Quality Check

Perform an "Image Quality Check" as follows:

1. Ensure that a properly stored, reliable copier bond paper (e.g., Xerox 4024, Canon NP, etc.) is installed in the printer.
2. Run several copies of the Service Mode Self Test. (See Chapter 3, Section 3-7, for instructions.)
3. Inspect the solid and shaded gradient areas in the four corners of the Service Mode Self Test printout. The solid areas should be uniform in density with no fading from one side of the printout to the other. The four corner gradient patterns should appear uniform. If uniform density is not being observed, perform the following:
   a. Shake the EP-S Cartridge vigorously.
   b. Clean the Transfer and Primary Corona wires (see Chapter 4, Section 4-4).
   c. Ensure that the Beam-to-Drum Mirror is clean. See chapter four.

If the preceding actions do not correct the density problems, replace the EP-S Cartridge, followed by the Transfer Corona Assembly and/or the High-Voltage Power Supply Assembly.

Paper Overview

The major variable in the print quality formula is paper. Table 7-47 provides a list of paper checks that should be made prior to troubleshooting for printer malfunctions.

Table 7-47. Paper Checks

CHECKS	ACTION
1. Are the print quality problems related to a specific type of paper?	Both printers are specifically designed to work with high quality copier bond papers. Try using an alternate brand of paper to determine if print quality problems are associated with a specific type of paper.
2. What is the printer's operating environment like with respect to: ■ Temperature. ■ Humidity. ■ Sunlight exposure. ■ Cleanliness.	Paper assumes the properties of its environment (e.g., if the operating environment is excessively humid, the paper absorbs this humidity). Examine the environment to determine whether any of the items listed could affect the paper.
3. Are the correct paper handling practices being observed?	Paper should be stored in a clean, temperature controlled, and humidity controlled environment. Review the user's paper storage practices to determine if any specific practice may result in a paper problem.
4. Does the paper meet the paper specifications?	Review the paper checks listed in the User's Manual.

Paper Curl

Paper curl is inherent in the laser printing process because paper is subjected to heat on one surface causing it to dry and shrink more than the opposite surface. The curl is always towards the source of heat (i.e., toward the Fusing Roller).

Paper curl cannot be eliminated, but the following recommendations may help minimize its impact.

Table 7-48. Paper Curl

CHECKS	ACTION
1. Try using the printer's Face-Up (Rear) Output Tray.	By using the printer's Face-Up (Rear) Output Tray, the paper is transported through a straighter paper path after it has been subjected to the heat from the fusing station. This paper path tends to be less stressful on the paper, decreasing its tendency to curl.
2. Try turning the paper over.	The manufacturing process for paper results in two paper surfaces, the "wire side" and the "felt side." Because the felt side of the paper is usually the smoothest, it is the preferred print image surface. Depending upon the type of manufacturing process, one side of the paper may have a "manufactured curl." If you are experiencing paper curl with one surface of the paper, turn the paper over and see if excess curl is limited to a particular surface of the paper.
3. Review paper handling and storage conditions.	Over time, paper assumes the characteristics of its storage environment (e.g., if it is stored in a humid environment, the paper assumes this humidity, etc.). Review paper specification storage requirements. Evaluate actual storage conditions to determine if any of the environmental conditions could possibly result in paper curl. Note: Excessively "wet" paper (greater than 4 - 6% moisture content) will exhibit greater curl when heated.
4. Try using a different type of paper.	All papers are manufactured differently (e.g., different textures, moisture content, drying processes, material content, etc.). After changing types of paper, note if the tendency to curl is associated with any one specific type of paper.

Density Check

The perception of density (blackness) is subjective. For a service representative to evaluate the customer's print quality with respect to density, both the service person and the customer must judge the suspect problem from the same point of view. The following variables must be clarified or defined before a true evaluation can occur:

Table 7-49. Density Check Factors

ITEM	CONSIDERATION
1. Paper.	Paper is one of the largest variables that may affect the perception of a density problem. 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. When addressing suspected density problems, both the service representative and the customer must evaluate the problem from the same reference point. It is important, therefore, that all density evaluations be made using the same type, if not the same lot, of paper. It is recommended that all evaluations be made using Xerox 4024 or Canon NP copier bond paper.
2. Density Adjustment Dial.	The printer's Density Adjustment Dial changes the developer DC bias and, therefore, the amount of toner attracted to the drum. For evaluating suspect density problems, ensure that all print samples are printed with the Density Dial set to the "5" (mid-range) position. (See Chapter 4, Section 4-9.)
3. Environmental Conditions.	Although difficult to duplicate, factors such as printer location (with respect to sunlight, humidity, and temperature) should not be ruled out regarding their contribution to print quality.

Table 7-49. Density Check Factors (continued)

ITEM	CONSIDERATION
4. Perceived Density versus Optical Density.	A difference in perceived density versus optical density is often evident when someone is asked to judge bold print versus italic print. In most cases, bold print is judged to be more dense just because the stoke weight is heavier and not because the toner is "blacker." 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 Service Mode Self Test Printout.
5. EP-S Cartridge.	A new EP-S Cartridge will appear to print slightly darker than the last pages of a fully used (approximately 4,000 pages) cartridge. This is due to the individual dot sizes being slightly larger on a well used cartridge. This condition is the result of a progressive "blooming" effect caused by the continued working of the laser on the drum's photoconductive material.
6. Resolution Enhancement. (HP 33459 only.)	The Resolution Enhancement feature of the HP 33459 and the density adjustment affect each other. See Chapter 3, Section 3-4, for proper adjustment procedures.

Registration Check

Registration is defined as the printer's ability to accurately position the printed image on the paper. The border printed on the Control Panel or Service Mode Self Test printout defines the print image area. This border also provides a convenient reference to measure print image registration. The following registration tolerances are allowed with the HP 33447 and HP 33459 printers.

Table 7-50. Registration Specifications

TOLERANCE	LOCATION
4.2mm ± 2.5mm	Leading edge of the paper to the horizontal first line of dot row.
4.2mm ± 2mm (HP 33447)	Left edge of the paper to the first vertical dot row (for letter size paper).
4.2mm ± 2mm (HP 33447)	Left edge of the paper to the first vertical dot row (for A4 size paper).
6.4mm ± 2mm (HP 33459)	Left edge of the paper to the first vertical dot row (for letter size paper).
6.0mm ± 2mm (HP 33459)	Left edge of the paper to the first vertical dot row (for A4 size paper).

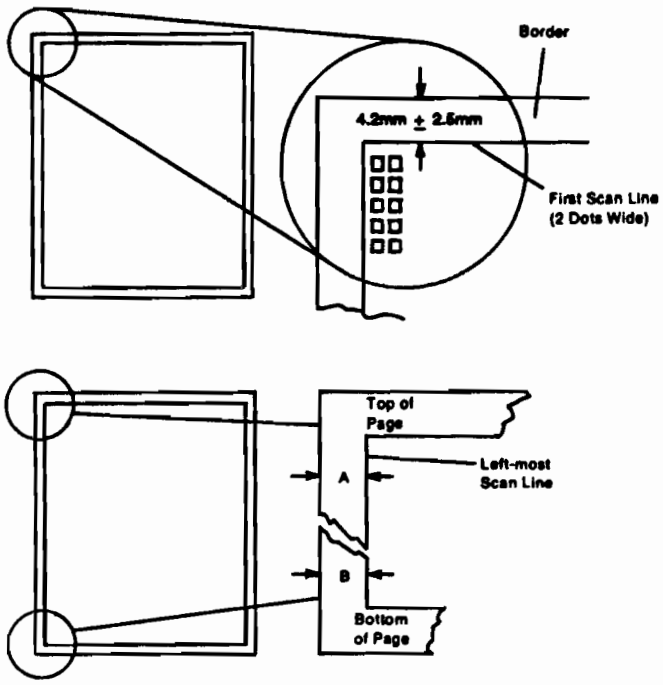


Figure 7-37. Registration Specifications

Skew Tolerance

All vertical lines should be parallel to the left edge of the paper. In Figure 7-37, dimension A should not vary from dimension B by more than 1.5mm (0.06 in.) over a paper length of 260mm (10.25 inches).

Procedure

Run the printer Control Panel continuous Self Test (Ø4 SELF TEST).

If misregistration is suspected, measure the left and top margins and compare the measured values with the listed specifications. If, in comparison, misregistration is confirmed, proceed as follows:

1. Closely examine the paper path gear train. Inspect for worn or excessively dirty gears. Replace or clean if necessary.
2. Inspect the Paper Pickup Roller. If worn, replace the Feed Roller Assembly and Separation Pad.
3. Verify that the torsion springs are correctly mounted on the Registration Assembly.
4. If the preceding actions do not correct the misregistration problem, replace the Registration Assembly.

Note

There are no adjustments for skew or registration problems.

Fusing Check

The Fusing Assembly permanently bonds toner to the paper. To verify that the printer is correctly fusing the print image, proceed as follows:

1. Run ten continuous copies of the Control Panel Self Test.
2. Place the printout on a firm surface and, using your fingertips, vigorously rub the first and the tenth printout. Inspect for any evidence of smearing. The text should be permanently fused on both printouts. No smearing should occur.

If the level of fusing from the first printout varies from that of the tenth printout, clean the Fusing Assembly's Thermistor and repeat the fusing check. If the difference in levels of fusing persists, replace the Thermistor/Exit Sensor PCA.

If smearing occurs in all printouts, replace the Fusing Assembly.

If the problem continues, replace the DC Controller PCA.

Note

If the Thermistor Bypass Switch is not engaged when the Bottom Cover is in place, a "50 Error" will occur and cannot be cleared until the switch is engaged.

7-6. INTERFACE TROUBLESHOOTING

Communications Check

Note

Communication problems are normally the customer's responsibility. Time spent attempting to resolve these problems may not be covered by the product's 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.

If the printer is not connected to an MS-DOS-based host, proceed to Table 7-51 (Communications Checks).

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:	<*Prompt*> COPY CON: LJTEST [ENTER]
Type:	LASERJET COMMUNICATIONS OK! [ENTER]
Press:	CTRL Z (press the [CONTROL] key and the letter Z simultaneously)
Press:	[ENTER]
Displayed:	1 file(s) copied
Type:	<*Prompt*> PRINT LJTEST [ENTER]
Displayed:	name list dev [PRN]
Press:	[ENTER]

The printer should print a page with the following text: "LASERJET COMMUNICATIONS OK!" If the Communications Check fails, proceed as follows.

AUTOEXEC.BAT Standard Configuration Test

If the previous check did not produce the desired result, ensure that the AUTOEXEC.BAT file contains the following statements for serial interface communications:

MODE COM2 96 , N , 8 , 1 , P

In sequence, the parameters of this statement means:

COM2	PC Serial Communications Port 2.
96	Baud Rate ÷ 100 (9600).
N	Parity (none).
8	Word length (data bits)
1	Number of stop bits.
P	Continuous retries on time-out errors.

This statement redirects LPT1 output to the COM2 port:

MODE LPT1:=COM2:

Note

If COM2 is not available on your computer, substitute COM1 for COM2 in the above statements.

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 B or the pamphlet, *Your Guide to Setting up Your LaserJet IIID*, for the appropriate cable.

If the problem persists, proceed with the following checks in Table 7-51.

Table 7-51. Communications Checks

CHECKS	ACTION
1. Is your computer configured to the parameters described in the configuration instructions?	These parameters are required to communicate with the printer. Verify your 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. Does the printer's baud rate match that of the computer's communications port?	Run the printer's Self Test to verify the baud rate setting. At the computer, verify that the baud rate is correctly set in any configuration files. **Note:** A baud rate problem may also yield a printer 40 ERROR.
3. Are you using the correct cable for communications between the computer and the printer?	See the cable wiring. **Hint:** On an RS-232 cable, pins 2 and 3 may need to be reversed at the printer-end of the cable.
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 either negative going or positive going. DTR polarity is set at the printer's Control Panel. The XON may be set to normal (only transmitted when data is needed) or Robust XON (transmitted every second). This feature is also configurable from the Control Panel. DTR is available at pin 20 and XOFF is transmitted from pin 2 of the printer.

Table 7-51. Communications Checks (continued)

CHECKS	ACTION
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. Do all the current Control Panel Configuration Menu items match the host system's parameters?	Make appropriate changes. If host system changes are made, be sure to reboot the system or otherwise ensure the changes are in effect.
8. Does the printer have a bad interface port?	If possible, try a different printer interface than the one having a problem and reconfigure the printer and host.
9. 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 the host system and printer are still not communicating and steps 1 through 9 have been completed, replace the Formatter PCA and reconfigure the printer. If the problem persists, 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 the Formatter PCA. This circumstance is not covered by Hewlett-Packard warranty.

7-7. TROUBLESHOOTING AIDS

HP 33447/33459
Diagnostic Tool Instructions

caution

This diagnostic tool (part no. 33447-67906) is Electro-Static Discharge (ESD) sensitive. Use this tool at an ESD-protected workstation only.

This tool is provided to simplify the troubleshooting process and to accomodate advanced troubleshooting procedures by monitoring:

- DC Power Supply voltages from the DC Controller PCA.
- High voltage circuit enable switches.
- Solenoid drive signals from the DC Controller PCA.
- Photosensor signals.

Installing the Diagnostic Tool

1. Unplug the printer.
2. Move the printer to an ESD safe workstation.
3. Remove the lower right side panel.
4. Unplug P214 and P215 from the DC Controller PCA.
5. Connect P2 from the diagnostic tool to J214.
6. Connect P1 from the diagnostic tool to J215.
7. Connect P214 into the cable with J2.
8. connect P215 into the cable with J1.
9. Power on the printer.

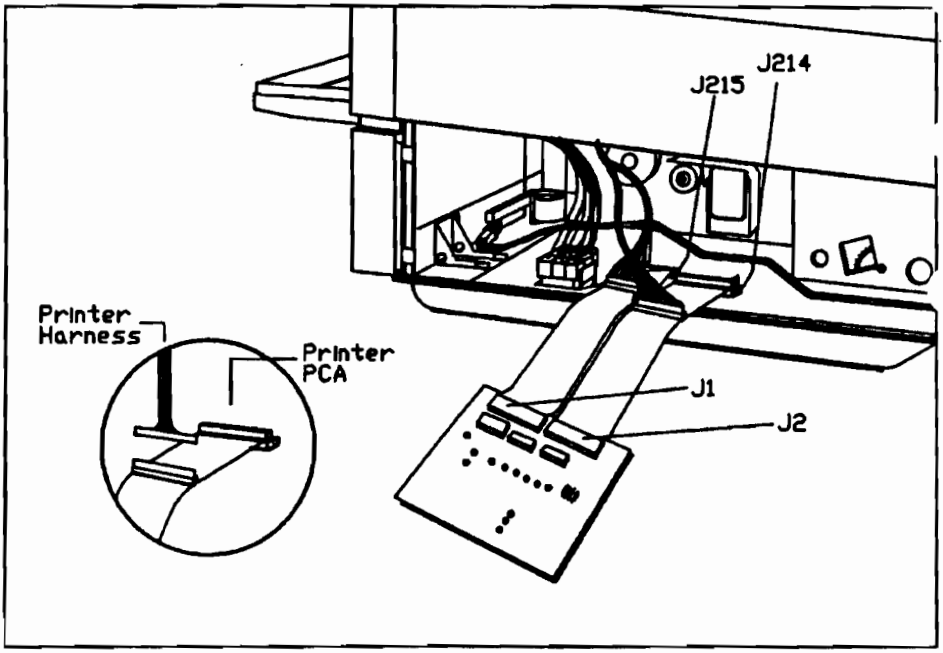


Figure 7-38. Installing the Diagnostic Tool

Monitored Functions

The signals the diagnostic tool can monitor are:

- DC Voltage Levels
- High Voltage levels
- Solenoid Drive Signals
- Photosensor outputs

DC Voltage Levels

Three LEDs indicate that signal level voltages are available:

- +5VDC is indicated by the illumination of the GREEN LED.
- +24 volt "A" supply is indicated by the illumination of a RED LED. This LED will not light until the voltage level is greater than 21 Vdc.

- +24 volt "B" supply is indicated by the illumination of a RED LED. This indicator will not light until the voltage is greater than +21 Vdc and the top cover is CLOSED.

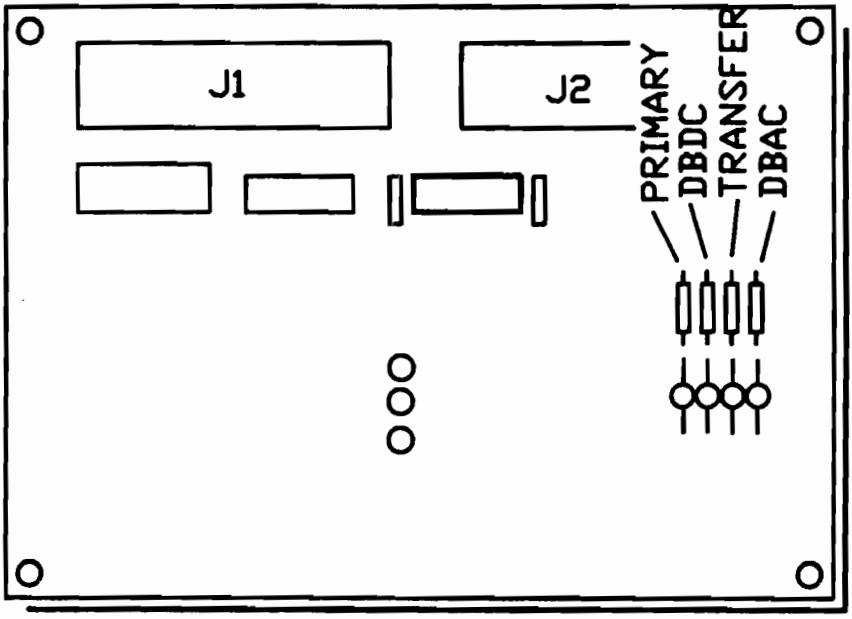


Figure 7-39. DC Voltage Indicators

High Voltage Indicators

Four indicators illuminate consecutively when high voltage is enabled on the DC Controller. When printing begins the LEDs light in the following order:

1. PRIMARY-Primary Corona Voltage Enable Signal
2. DBDC-Developer Bias DC Voltage Enable Signal
3. TRANSFER-Transfer Corona Voltage Enable Signal
4. DBAC-Developer Bias AC Voltage Enable Signal

After printing ends the high voltage is disabled in the following order.

1. DBAC
2. TRANSFER

3. PRIMARY

4. DBDC

Note

If the LEDs fail to turn on or off in the correct order, or fail to turn on or off at all, the DC Controller may be defective.

Solenoid Drive Signals

There are nine LEDs that indicate the condition of each solenoid. Monitoring the conditions of these solenoids will help to quickly solve any solenoid related problem.

- SL 301 The upper Paper Feed Clutch Solenoid is enabled to allow paper to be selected from the upper paper tray.
- SL 1 The lower Paper Feed Clutch Solenoid is enabled to allow paper to be selected from the lower paper tray.
- SL 302 The Registration Clutch Solenoid is enabled to allow paper to be fed though the registration rollers.
- SL 7 The Switchback Assembly Deflector Solenoid is enabled to allow paper to be guided through the switchback assembly.
- SL5 The Switchback Drive Control Clutch Solenoid is enabled to engage the switchback guide rollers.
- SL6 The Switchback Directional Control Solenoid is enabled to reverse the direction of the switchback drive rollers.
- SL3 The Vertical Registration Guided Roller Solenoid is enabled to push the upper guide roller against the lower guide roller.
- SL2 The Duplex Drive Roller Clutch Solenoid is enabled to allow paper to move from the duplex paper path to the registration rollers.
- SL4 The Vertical Registration Assembly Guide Clutch Solenoid is enabled to adjust the guide to the correct paper size as indicated by the paper tray switches.

Photosensor Outputs

There are nine photosensors that indicate the presence of paper at each station. Proper use of the diagnostic tool can locate faulty photosensors and help to quickly clear up paper path problems.

The nine photosensors are:

1. PS2 This LED indicates that the lower motor is synchronized with the upper motor. This LED may be either on or off depending on where the motor stopped. If this LED changes states it is working correctly.
2. PS4 Switchback Paper Sensor. Paper in the switchback assembly triggers this photosensor.
3. PS5 Indicates that the Vertical Registration Assembly Guide is in the HOME position.
4. PS301 Indicates that paper is in the upper Manual Feed Assembly.
5. PS302 Indicates that paper is in the lower Manual Feed Assembly.
6. PS1 Indicates that the lower paper tray is empty or missing.
7. PS6 Indicates that paper is in the lower Manual Feed Assembly.
8. PS3 Indicates that paper is present at the duplex rollers.
9. PS331 Indicates that the trailing edge of the paper has left the fusing assembly.

Solenoid Timing

The following list shows the sequence in which the printer solenoids are enabled during an initial "05 SELF TEST".

1. Main Motor Enabled
2. SL301 enabled (Upper Paper Feed Clutch Solenoid) OR
3. SL1 enabled (Lower Paper Feed Clutch Solenoid).
4. SL302 enabled (Registration Clutch Solenoid)
5. SL7 enabled (Switchback Assembly Deflector Solenoid)
6. SL5 enabled (Switchback Drive Control Clutch Solenoid)
7. SL6 enabled (Switchback Directional Control Solenoid)

8. SL4 enabled (Vertical Registration Assembly Guide Solenoid)
9. SL3 enabled (Vertical Registration Guide Roller Solenoid)
10. SL2 enabled (Duplex Drive Roller Clutch Solenoid-Advance)
11. SL2 enabled (Duplex Drive Roller Clutch Solenoid-Feed)
12. SL302 enabled (Registration Clutch Solenoid-second side)

Note

- SL301 is enabled to feed paper from the upper tray
- SL1 is enabled to feed paper from the lower tray
- SL4 is enabled once during power-up or once if the paper tray is changed.

Repetitive Defect Ruler, HP 33447 and HP 33459

Repetitive print defects are usually associated with a specific roller within the printer or the EP-S Cartridge. The following diagram illustrates the diameters of the main printer rollers in a linear format. To use the diagram, align the first occurrence of the defect with the top of the "ruler" and measure to the next occurrence of the defect to determine the roller in question.

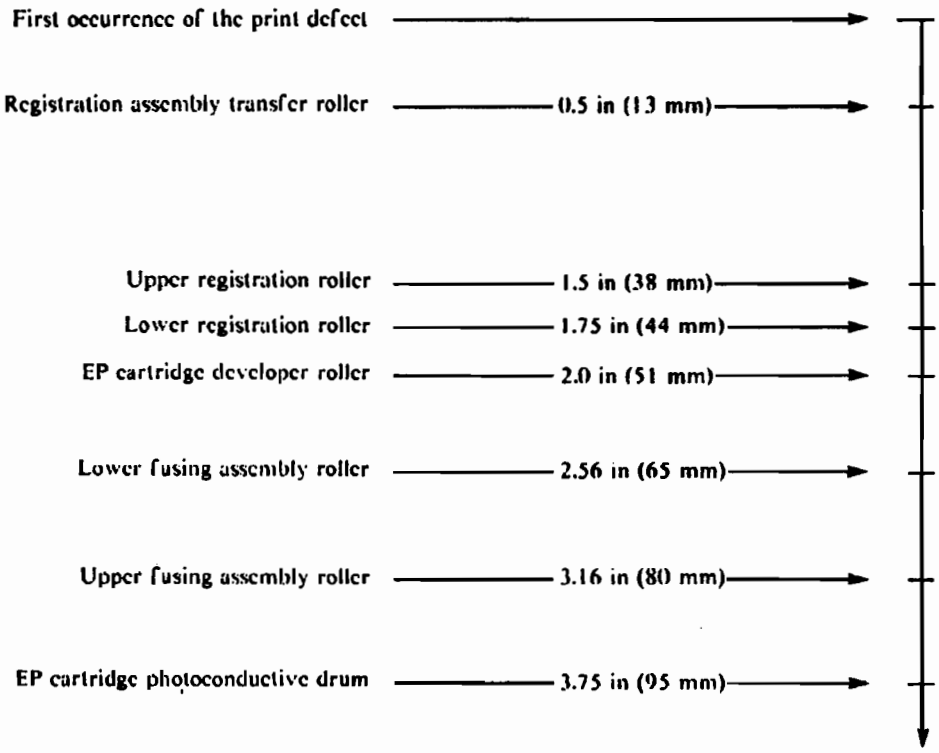


Figure 7-40. Repetitive Defect Ruler

DC Controller Signal Listing Chart, HP 33447 and HP 33459

Table 7-52. LED 201 and SW201, 202, 203, and 205

NAME	FUNCTION
LED 201	Scanning motor at correct speed.
SW 201 (lower tray) / SW 261 (upper tray)	"Right" paper tray size switch.
SW202 (lower tray) / SW 262 (upper tray)	"Middle" paper tray size switch.
SW203 (upper tray)/ SW 263 (lower tray)	"Left" paper tray size switch.
SW205	Bottom cover is installed (Thermistor Bypass Switch).

Table 7-53. Signal Listing

Pin No.	Color	Name	Description
Connector J201			
J201	Varies	BD	Beam Detect indicates the beginning of a raster scan line.
Connector J202			
J202-01	Red	DSADJ	Photodiode sensitivity adjustment bias.
J202-02	White	PD	Photodiode feedback signal to indicate laser beam power.
J202-03	Red	$\overline{\text{LDRV}}$	Laser diode current source, modulated by the video signal from the Formatter PCA.
J202-04	White	+5 Vdc	
J202-05	Green	FG	Frame Ground.
Connector J203			
J203-01	Red	FG–	Scanner motor tachometer feedback.
J203-02	Green	GND(FG)	
J203-03	White	FG+	Scanner motor tachometer feedback.
J203-04	Green	GND(FG)	
J203-05	Yellow	SCNCONT	Scanner motor speed control; signal level varies to maintain proper motor speed.
J203-06	Red	GND	
J203-07	White	+24VA	+24A Vdc
Connector J205			
J205-A1	n/a	SG	Signal Ground (not used).
J205-A2	n/a	$\overline{\text{PPRDY}}$	Printer Power Ready.
J205-A3	n/a	$\overline{\text{VSREQ}}$	Vertical Sync Request.
J205-A4	n/a	$\overline{\text{STATS}}$	DC Controller status.

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
J205-A5	n/a	$\overline{\text{CBSY}}$	Formatter sending command to DC Controller.
J205-A6	n/a	$\overline{\text{VSYNC}}$	Vertical sync pulse.
J205-A7	n/a	$\overline{\text{VDO}}$	Video data from Formatter.
J205-A8	n/a	$\overline{\text{CCLK}}$	Command strobe from Formatter.
J205-A9	n/a	-5V	-5Vdc (not used).
J205-A10	n/a		Not used.
J205-B1	n/a	$\overline{\text{BD}}$	Beam Detect—Horizontal sync pulse.
J205-B2	n/a	$\overline{\text{RDY}}$	Printer ready.
J205-B3	n/a	$\overline{\text{SBSY}}$	DC Controller sending status to Formatter.
J205-B4	n/a	$\overline{\text{PCLK}}$	Status strobe from DC Controller PCA.
J205-B5	n/a	$\overline{\text{PRNT}}$	Initiates printing operation.
J205-B6	n/a	$\overline{\text{CPRDY}}$	Formatter PCA Power Ready.
J205-B7	n/a	$\overline{\text{CMND}}$	Formatter Command.
J205-B8	n/a		Not used.
J205-B9	n/a	+24VA	+24A Vdc (not used).
J205-10	n/a	FG	Frame Ground (not used).
Formatter PCA Voltage Connectors			
TB201	n/a	+5V	+5 Vdc
TB202	n/a	GND	

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
Connector J206			
J206-01	Red	+24V	+24A Vdc.
J206-02	Blue	GND 24V	Return for +24A Vdc.
J206-03	Yellow	PEXP	Preconditioning Erase Lamps signal enables the Erase Lamps.
J206-04	Pink	FSRTH	Fuser Thermistor resistance provides a representative Fuser temperature signal to the DC Controller.
J206-05	Blue	GND	
J206-06	Lt. Blue	$\overline{\text{PDP}}$	Paper Delivery (Paper Exit) signal indicates that paper is present in the Fuser Assembly (PS331).
J206-07	Brown	+5V	+5 Vdc.
Connector J207			
J207-01	Red	+24VA	Lower Cooling Fan drive voltage. (+24 Vdc)
J207-02	White	GND	
Connector J208			
J208-01	Lt. Blue	FAN	Enables the Upper Cooling Fan during printing.
J208-02	Pink	$\overline{\text{FSRD}}$	Fusing Roller Heater Drive pulse enables the Fuser Bulb. Signal may only be observed with an oscilloscope.
J208-03	Blue	GND	
J208-04	Red	+24VA	+24A Vdc
Connector J209			
J209-01	Varies	FG	Frame Ground (Note: Jumper always installed.)
J209-02	Varies	SG	Signal Ground

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
Connector J210 (Test Connector)			
J210-01	n/a	+24VA	+24VA Vdc
J210-02	n/a	$\overline{\text{TMODE0}}$	Test Mode Control Line 0.
J210-03	n/a	$\overline{\text{TMODE1}}$	Test Mode Control Line 1
J210-04	n/a	$\overline{\text{DBDC}}$	DC voltage added to developing bias when Low.
J210-05	n/a	-5V	-5 Vdc
J210-06	n/a	$\overline{\text{DBAC}}$	AC voltage added to developing bias when Low.
J210-07	n/a	GND	
J210-08	n/a	$\overline{\text{HV1ON}}$	High-Voltage (DC) applied to Primary Corona when Low.
J210-09	n/a	+5V	+5Vdc
J210-10	n/a	$\overline{\text{HVTON}}$	High voltage (DC) applied to Transfer Corona when Low.
J210-11	n/a	+3.2V	+3.2Vdc
J210-12	n/a	$\overline{\text{TPA}}$	Selects a test pattern to be printed with TPB and TSTPTE.
J210-13	n/a	$\overline{\text{TSTPT}}$	Low when the TEST PRINT switch is pressed.
J210-14	n/a	$\overline{\text{TPB}}$	See TPA.
J210-15	n/a	$\overline{\text{RDYINH}}$	Printer forced ready when Low.
J210-16	n/a	$\overline{\text{TSTPTE}}$	See TPA.
J210-17	n/a	$\overline{\text{LPCK}}$	Laser forced to operate at a power level selected by CSNT1 & CSNT2 when Low.
J210-18	n/a	$\overline{\text{CSNT1}}$	Laser Power Selected with CSNT2.
J210-19	n/a	$\overline{\text{SCNON}}$	Scanner motor starts when L.
J210-20	n/a	$\overline{\text{CSNT2}}$	See CSNT1.

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
Connector J214			
J214-01	Orange	B	Upper Motor Drive Signal.
J214-02	N/C		
J214-03	Yellow	$\overline{B}$	Upper Motor Drive Signal.
J214-04	Red	+24V B DC	.
J214-05	Pink	A	Upper Motor Drive Signal.
J214-06	Blue	Ground	.
J214-07	Lt. Blue	$\overline{A}$	Upper Motor Drive Signal.
J214-08	Orange	$\overline{DBDC}$	Developer Voltage DC Voltage
J214-09	Violet	$\overline{doropn}$	Top Cover open
J214-10	Yellow	TSENS	Toner Low Sensing Voltage
J214-11	Yellow	Reset	
J214-12	Violet	$\overline{DBAC}$	Developer Bias AC Voltage
J214-13	Brown	+5 Vdc	
J214-14	Grey	$\overline{HV1ON}$	Primary Corona Voltage
J214-15	Lt. Blue	PDP	Fusing Assembly Exit Sensor
J214-16	Pink	HVRST	High Voltage Reset
J214-17	Blue	Frame Grnd	
J214-18	Lt. Blue	$\overline{HVTON}$	Transfer Corona Voltage
J214-19	Pink	FSRTH	Thermistor (fusing roller) Feedback voltage.
J214-20	Orange	$\overline{MPFUS}$	Manual Paper Feed Sensor
J214-21	Yellow	PEXP	Erase Lamps

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
J214-22	Yellow	$\overline{\text{PEMPU}}$	Upper paper tray out sensor.
J214-23	Blue	Frame Grnd	
J214-24	Brown	+5 Vdc	
J214-25	Red	+24 Vdc	24 Vdc "A" supply voltage
J214-26	Blue	Frame Grnd	
J214-27	Lt. Blue	Fan	Upper cooling fan
J214-28	Red	+24 Vdc	+24 Vdc "A" supply Voltage
J214-29	Pink	$\overline{\text{FSRD}}$	Fusing Roller Heater Drive (Pulsed).
J214-30	Pink	CPUDU	Upper Paper Feed Clutch Solenoid.
J214-31	Blue	Frame Grnd	
J214-32	Lt. Blue	Registration Clutch Solenoid	
J214-33	+24 Vdc	+24 Vdc "A" supply voltage.	
J214-34	Orange	$\overline{\text{CENS2}}$	EP-S Cartridge sensitivity tab sensor.
J214-35	Orange	$\overline{\text{PSIZEU1}}$	Upper paper tray size sensor.
J214-36	Yellow	$\overline{\text{CSENS1}}$	EP-S Cartridge sensitivity tab sensor.
J214-37	Yellow	$\overline{\text{PSIZEU2}}$	Upper paper tray size sensor.
J214-38	N/C		
J214-39	Pink	$\overline{\text{PSIZEU3}}$	Upper paper tray size sensor.
J214-40	Blue	Frame Grnd	

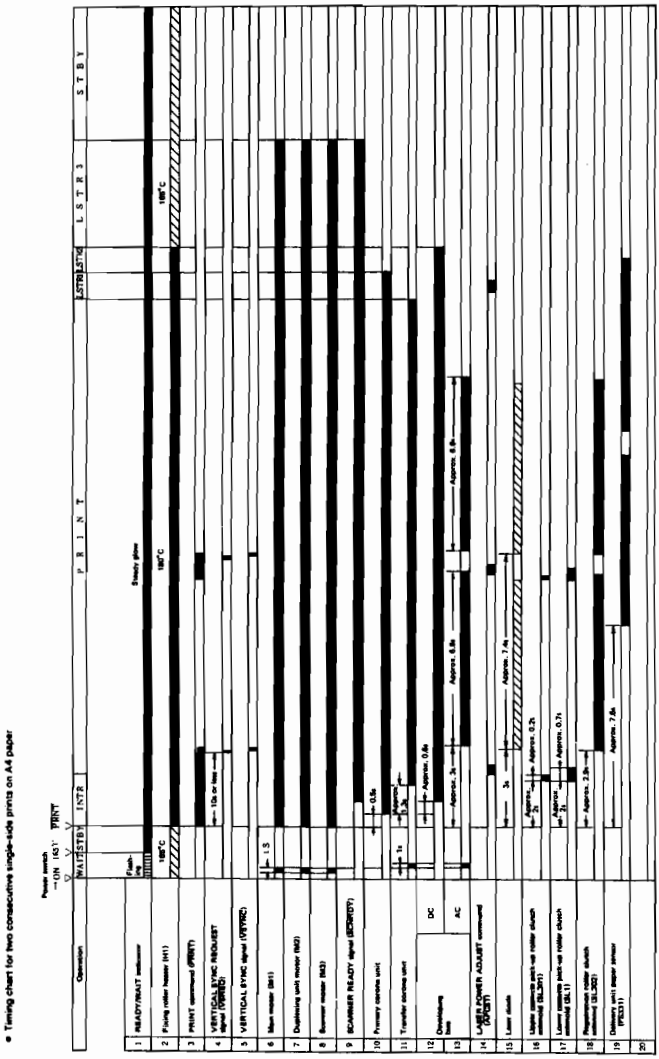
Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
Connector J215			
J215-01	Pink	MPFLS	Lower Paper Tray Manual Feed
J215-02	Blue	GND	
J215-03	Red	+24 Vdc	+24 Vdc "A" supply voltage
J215-04	Yellow	PEMPD	lower Paper Tray Paper Tray paper out sensor.
J215-05	Lt.Blue	$\overline{\text{cpudd}}$	Lower paper feed clutch signal
J215-06	Red	+24 Vdc	
J215-07	Pink	DMDVO	Lower motor Drive High. Signal may only be observed with an oscilloscope.
J215-08	Red		
J215-09	Lt. Blue	$\overline{\text{DMDVO}}$	Lower Main Motor Drive signal.
J215-10	Pink	DMTG	Lower Motor Clock.
J215-11	Violet	$\overline{\text{DUPFED}}$	Duplex Drive Roller Clutch Solenoid
J215-12	Blue	GND	
J215-13	Pink	+24VB	+24B Vdc
J215-14	Blue	+GND	
J215-15	Yellow	$\overline{\text{SFTSLD}}$	Duplex guide roller low
J215-16	Orange	DUPFEDS	Duplex paper sensor high
J215-17	Red	+24 Vdc	
J215-18	Red	+24 Vdc	
J215-19	Lt. Blue	$\overline{\text{GUIDSLD}}$	Vertical Registration Guide.
J215-20	Red	+24 Vdc	
J215-21	Red	+24 Vdc	
J215-22	Pink	$\overline{\text{PRS}}$	Switchback Paper Sensor.

Table 7-53. Signal Listing (continued)

Pin No.	Color	Name	Description
J215-23	Violet	$\overline{\text{SBROLD}}$	Switchback Drive Roller Clutch Solenoid.
J215-24	Blue	GND	
J215-25	Red	+24 Vdc	
J215-26	Blue	GND	
J215-27	Yellow	$\overline{\text{SBOLD}}$	Switchback Directional Control Solenoid.
J215-28	Yellow	HMPS	Vertical Registration Assembly Home Pulse.
J215-29	Red	+24 Vdc	
J215-30	Red	+24 Vdc	
J215-31	Lt. Blue	$\overline{\text{EXDEF}}$	Switchback Assembly Deflector Solenoid.
J215-32	Orange	FUPSENS	Output Selector Knob Position.
J215-33	Red	+24 Vdc	
J215-34	Blue	GND	
Connector J216			
J216-01		+5V	
J216-02		+5V	
J216-03		Grnd	
J216-04		CPUD	
J216-05		+5V	
J216-06		GND	
J216-07		Grnd	
J213-08		+24VB	
J216-09		+24VA	

Signal Timing Chart, HP 33447 and HP 33459



* Timing chart for two consecutive single-side prints on A4 paper

Figure 7-41. HP 33447/HP 33459 Signal Timing Chart

• Timing chart for two consecutive double-side prints on A4 paper (upper cassette feed)

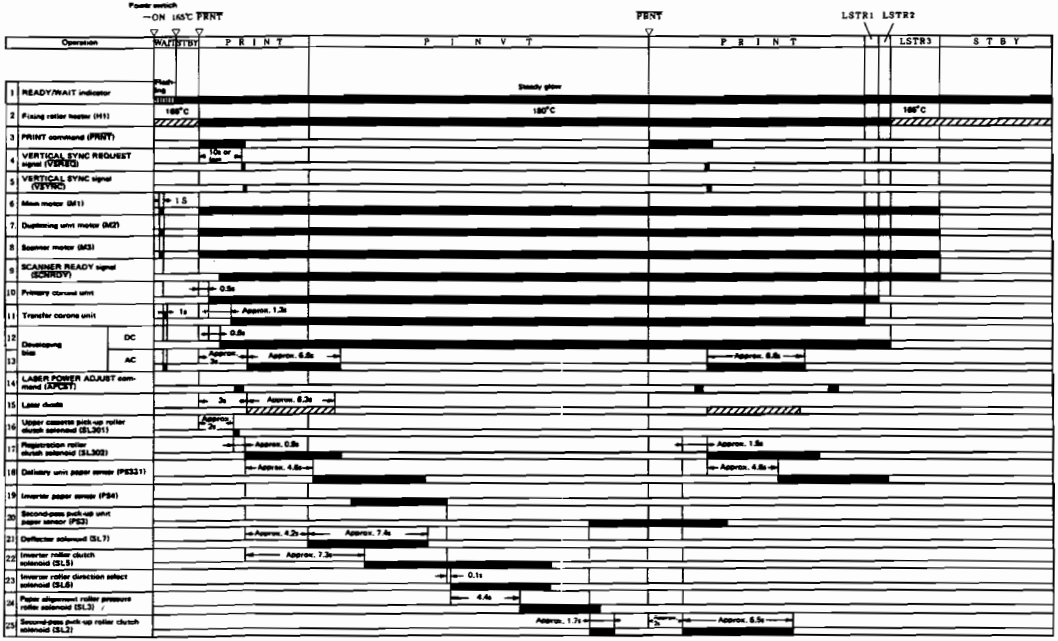


Figure 7-42. HP 33447/HP 33459 Signal Timing Chart

8

PARTS AND DIAGRAMS

8-1. HOW TO USE THE PARTS LISTS

The figures in this chapter illustrate the major subassemblies and the component parts of the HP 33447 and HP 33459 printers. Each figure is followed by a table which lists the item number for each part given in the illustration, the associated part number for the item, the quantity required, any special notes, and the description of that part. While looking for a part number, pay special attention that the part chosen has the correct voltage rating for the machine under repair.

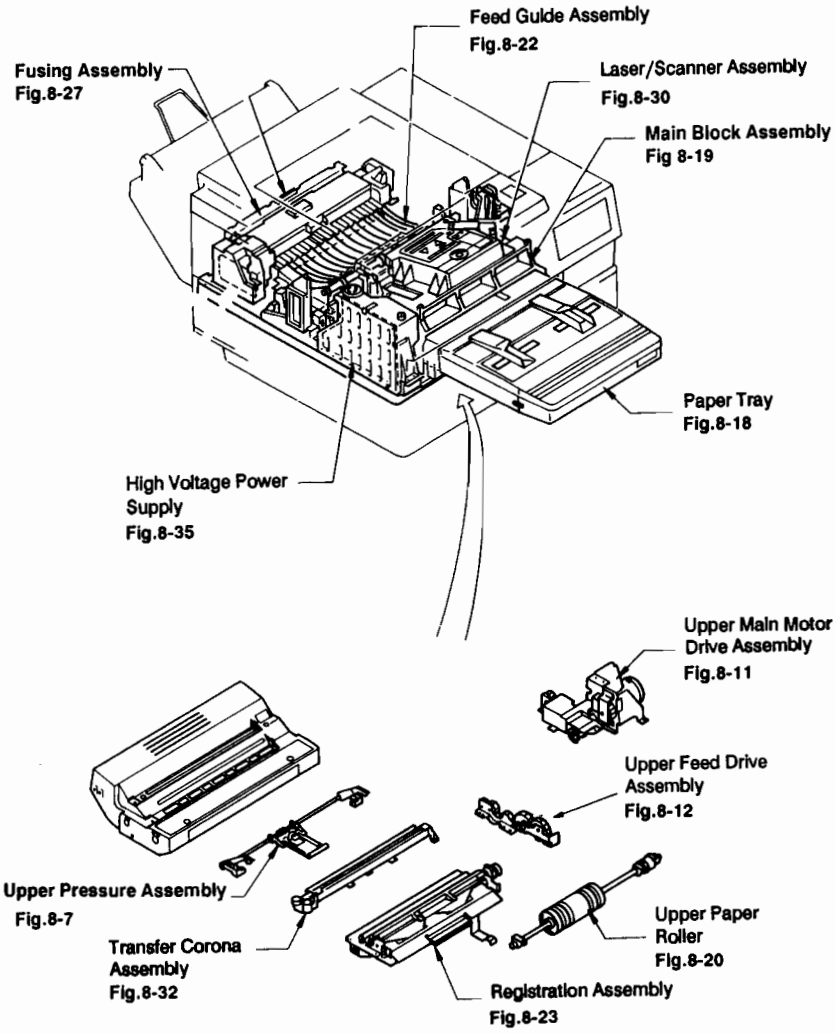
Part numbers with no indicator in the *Source* column are stocked and can be ordered through Hewlett-Packard's Support Material Organization (SMO). Parts marked with an "S" in the *Source* column are special order parts which can be "hotlined" through SMO but have an eight-week lead time. Parts that have no reference designator or part number are not field-replaceable and cannot be ordered through SMO.

The following table identifies common hardware used in the HP 33447 and HP 33459 printers:

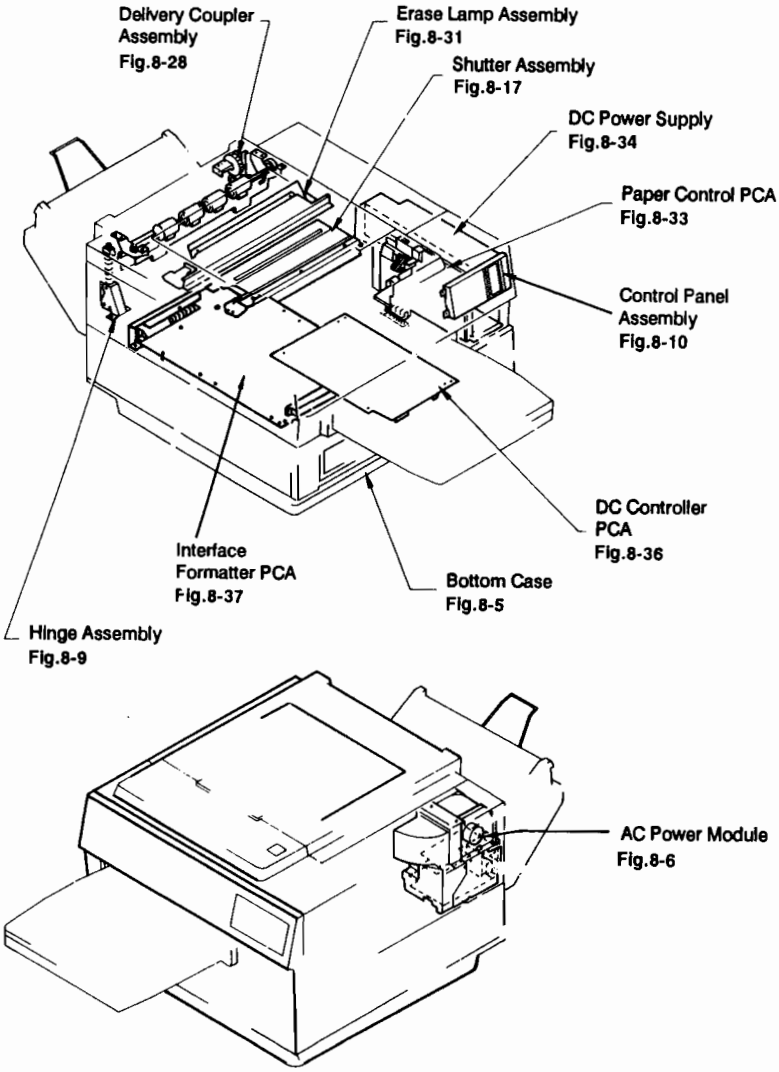
Table 8-0. Table 8-0. COMMON HARDWARE

EXAMPLE	DESCRIPTION	PART NUMBER
	Coated (black) pan-head Phillips machine screw.	Use plated screws. (See below)
	Plated (silver-colored) pan-head Phillips machine screw.	M3x6 - XB1-2300-606CN M3x8 - 0515-1895 M4x6 - XB1-2400-606CN M4x8 - 0515-1912
	Coated (black) washer-head Phillips machine screw.	M3x6 - XB6-7300-609CN M3x8 - XB6-7300-809CN
	Plated (silver-colored) washer-head Phillips machine screw.	M3x6 - XA9-0267-000CN
	Coated (black) self-tapping Phillips screw for plastic.	M3x6 - XB4-7300-609CN M4x10 - XB4-7401-009CN
	Plated (brass-colored) Phillips shoulder screw.	XA9-0342-000CN
	Plated (silver-colored) Phillips screw with captive star washer.	XA9-0389-000CN

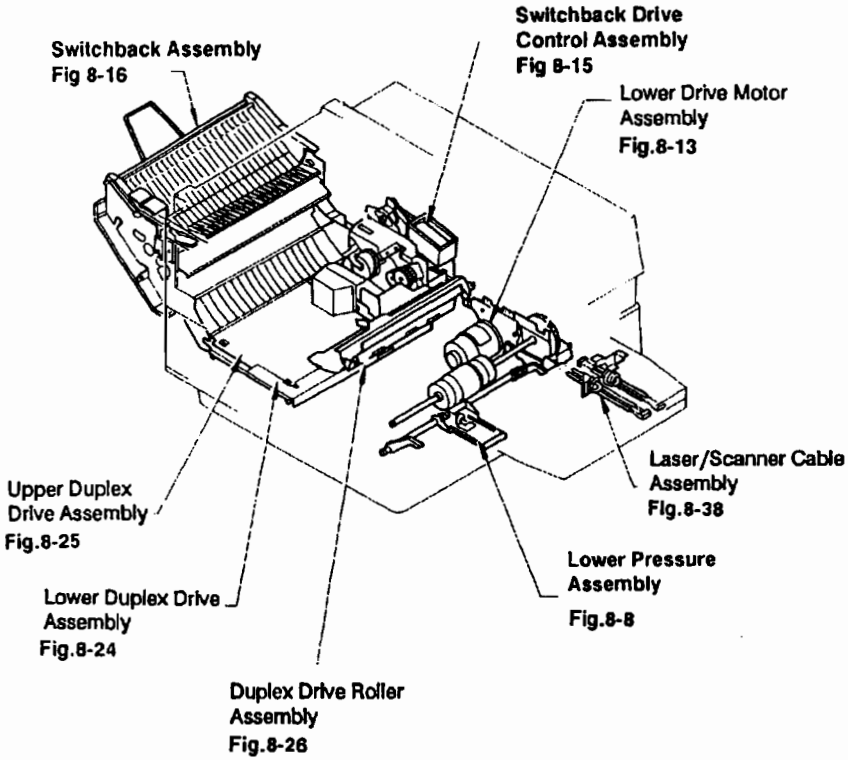
8-2. PARTS LIST



Main Assemblies (1 of 3)



Main Assemblies (2 of 3)



Main Assemblies (3 of 3)

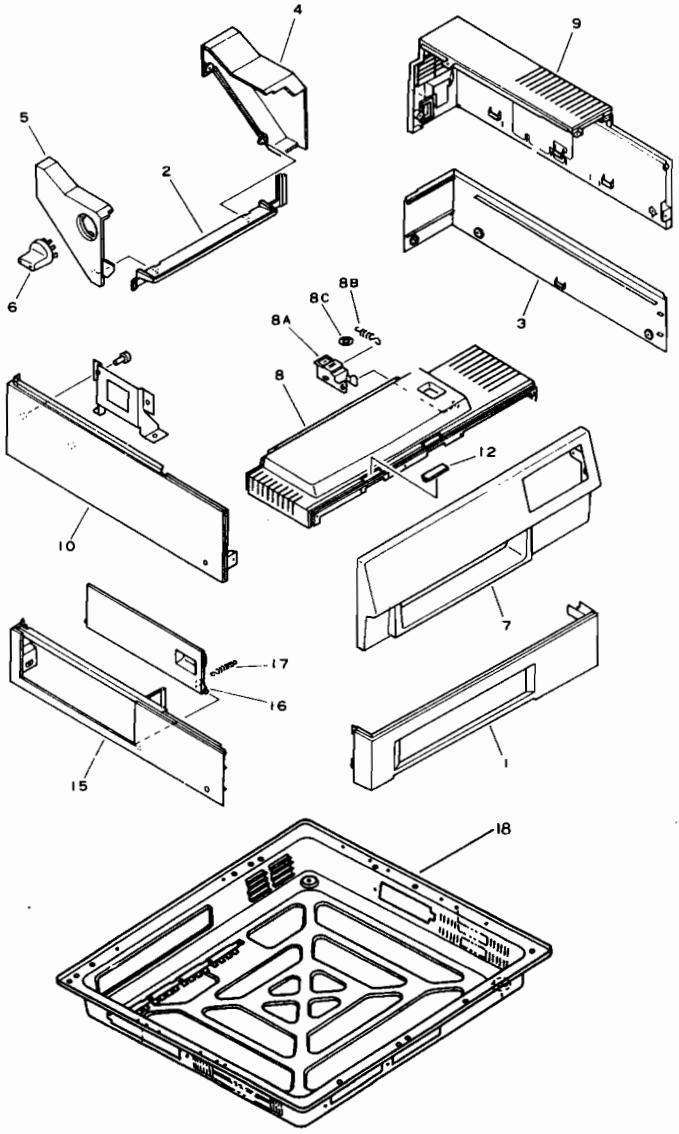


Figure 8-1A. External Covers - HP 33447

Table 8-1A. EXTERNAL COVERS - HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-7179-000CN	1		PANEL, FRONT LOWER
2	RA1-7120-000CN	1		PANEL, REAR
3	RA1-7121-020CN	1		PANEL, RIGHT LOWER
4	RA1-7128-000CN	1		COVER, RIGHT
5	RA1-7129-000CN	1		COVER LEFT
6	RA1-7130-000CN	1		KNOB
7	RA1-7116-000CN	1		PANEL, FRONT UPPER
8	RG9-0619-000CN	1		PANEL, TOP
8A	RA1-4235-000CN	1		RELEASE BUTTON
8B	RS1-2149 000CN	1	S	SPRING, TENSION
8C	XA9-0135-000CN	1		NUT, PUSH
9	RF1-2369-000CN	1		PANEL, RIGHT
10	RA1-4234-000CN	1		PANEL, LEFT
12	RA1-7132-000CN	2		PLATE, BLANKING
15	RA1-7117-000CN	1		PANEL, LEFT LOWER
16	RA1-7118-000CN	1		DOOR, LEFT
17	RS1-2205-000CN	1		SPRING, TENSION
18	RF1-2371-000CN	1		COVER, BOTTOM

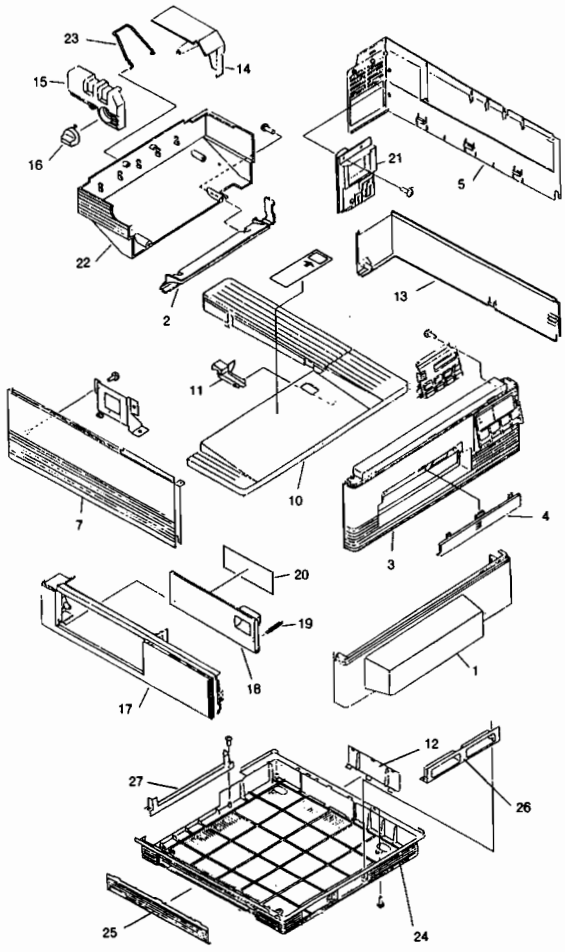


Figure 8-1B. External Covers - HP 33459

Table 8-1B. EXTERNAL COVERS - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-8394-000CN	1		PANEL, FRONT LOWER
2	RA1-8390-000CN	1		PANEL, REAR
3	RF1-2606-000CN	1		PANEL, FRONT UPPER
4	RA1-8400-000CN	1		PANEL, BLANKING
5	RF1-2575-000CN	1		PANEL, RIGHT UPPER
7	RF1-2576-000CN	1		PANEL, LEFT UPPER
10	RF1-2613-000CN	1		PANEL, TOP
11	RA1-8278-000CN	1		RELEASE BUTTON
12	RA1-8285-000CN	1		PANEL, TEST COVER
13	RA1-8389-000CN	1		PANEL, RIGHT LOWER
14	RF1-2611-000CN	1		COVER, RT, SW/BK ASS'Y
15	RF1-2610-000CN	1		COVER, LEFT, SW/BK ASS'Y
16	RA1-8402-000CN	1		KNOB
17	RF1-2612-000CN	1		PANEL, LEFT LOWER
18	RA1-8412-000CN	1		DOOR, LEFT
19	RS1-2205-000CN	1		SPRING, TENSION
20	RS1-8733-000CN	1	S	LABEL, JAM INSTRUCTION
21	RA1-8286-000CN	1		GUIDE, FAN
22	RA1-8396-000CN	1		COVER, LWR SW/BK ASS'Y
23	RA1-8419-000CN	1		TRAY EXTENDER
24	RF1-2608-000CN	1		PANEL, BOTTOM
25	RA1-8284-000CN	1		PANEL, MEMORY
26	RA1-8290-000CN	1		GUIDE, FONT CARTRIDGE
27	RA1-8401-000CN	1		GUIDE, I/O SUPPORT

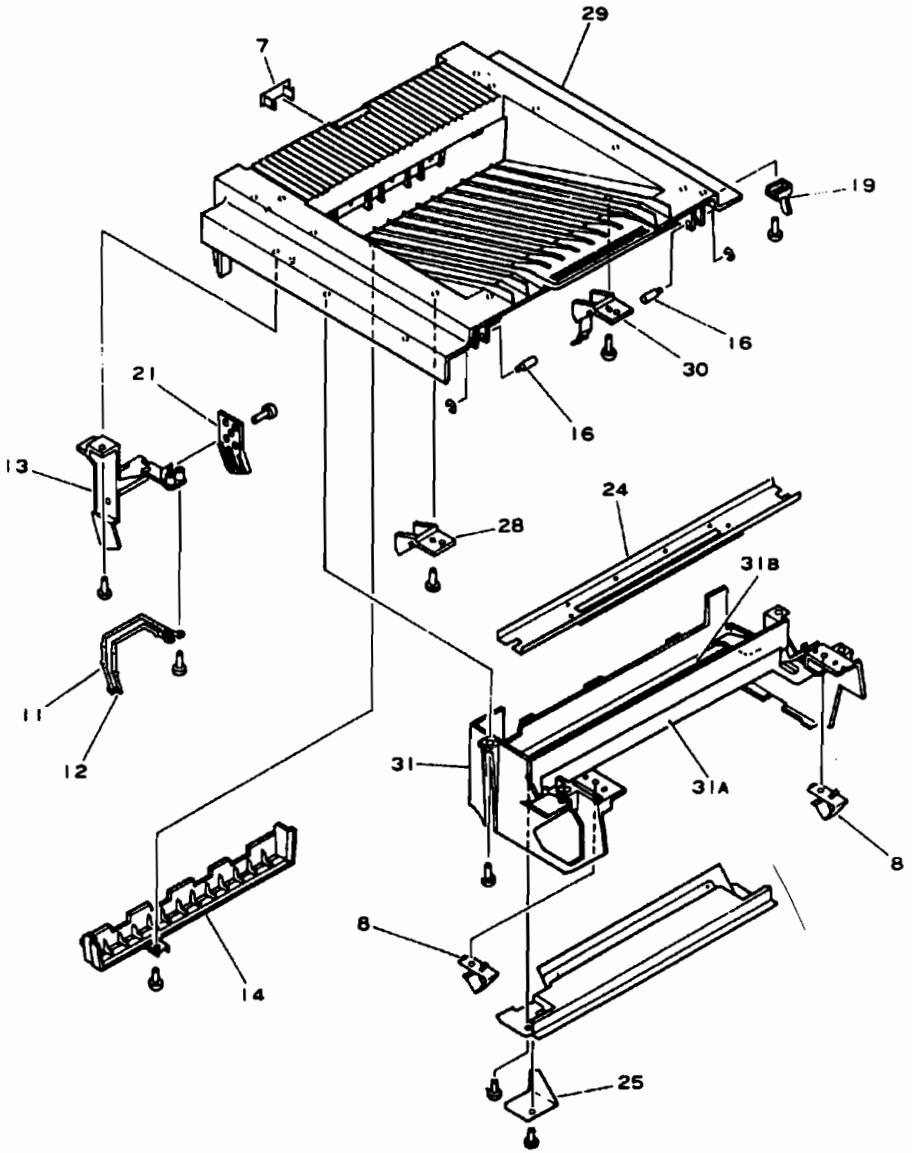


Figure 8-2A. Upper Main Body - HP 33447 (1 of 2)

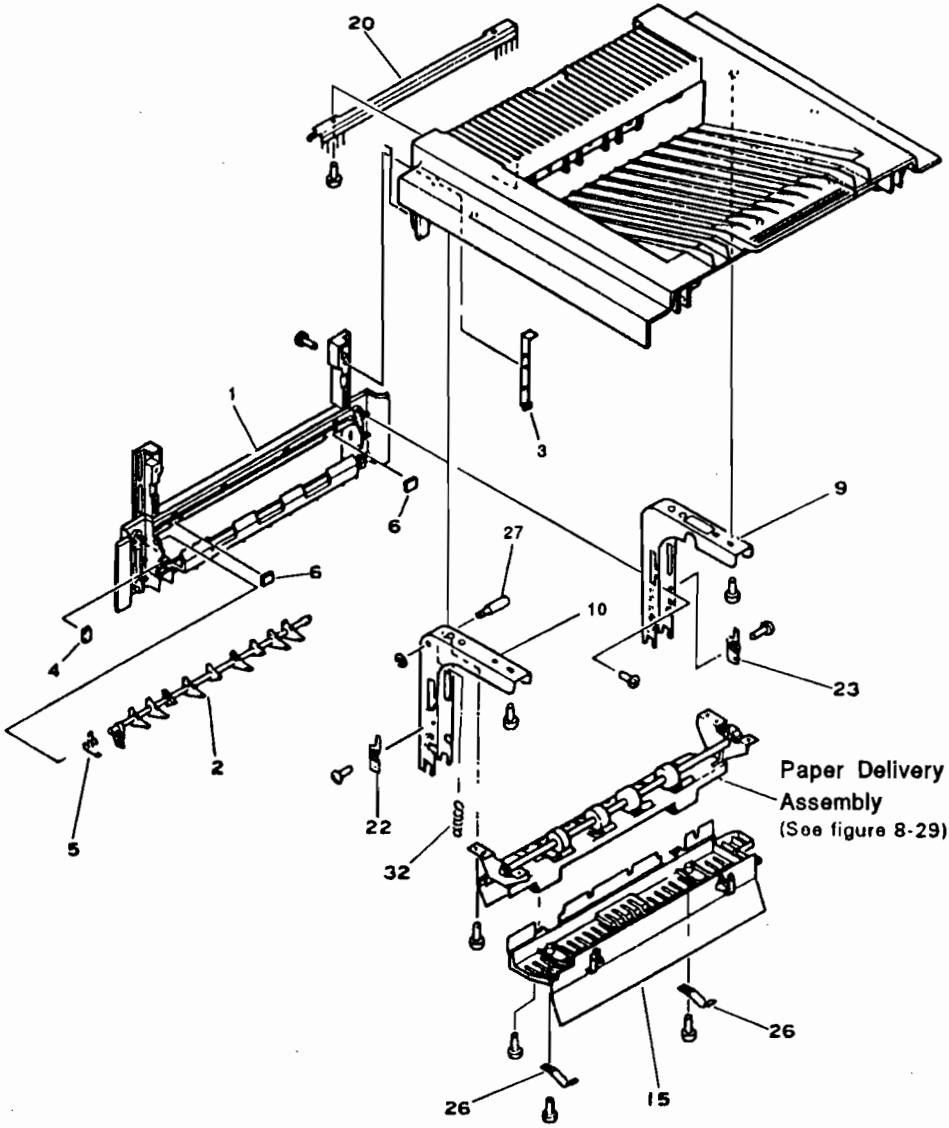


Figure 8-2A. Upper Main Body - HP 33447 (2 of 2)

Table 8-2A. UPPER MAIN BODY - HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-7115-000CN	1		PANEL, DELIVERY
2	RA1-6143-000CN	1		FLAPPER DELIVERY
3	RA1-6144-000CN	2	S	PLATE
4	RA1-6145-000CN	1	S	CUSHION
5	RA1-6146-000CN	1		SPRING, TORSION
6	RA1-6147-000CN	2	S	CUSHION
7	RA1-7131-000CN	1		COVER
8	RA1-4025-000CN	2	S	SPRING, LEAF
9	RA1-4030-000CN	1		PLATE, RIGHT HINGE BRACKET
10	RA1-4033-000CN	1		PLATE, LEFT HINGE BRACKET
11	RA1-4034-000CN	1		SPRING A, GROUNDING
12	RA1-4035-000CN	1		SPRING B, GROUNDING
13	RA1-4036-000CN	1		ARM, CONNECTOR
14	RA1-4294-000CN	1		COVER, LOWER DELIVERY
15	RA1-4038-000CN	1		COVER, FUSER INSULATING
16	RA1-4042-000CN	2	S	SHAFT, LOCK
19	RA1-4046-000CN	1		LEVER, INTERLOCK
20	RA1-4047-000CN	1		ELIMINATOR, STATIC CHARGE
21	RA1-4048-000CN	1		COVER, CONNECTOR ARM
22	RA1-5256-000CN	1		PLATE, LEFT LOCK
23	RA1-7151-000CN	1		PLATE, RIGHT LOCK
24	RG0-0052-000CN	1		MIRROR ASSEMBLY
25	RA1-4079-000CN	1	S	COVER, LAMP ASSEMBLY
26	RA1-4045-020CN	2	S	SPRING, LEAF
27	RA1-5258-000CN	1	S	SHAFT, SPRING
28	RF1-0926-000CN	1	S	SPRING, LEFT MIRROR
29	RF1-0977-000CN	1		PANEL, TOP COVER ASSEMBLY
30	RF1-0929-000CN	1	S	SPRING, RIGHT MIRROR
31	RF1-0947-000CN	1		GUIDE, EP-S CARTRIDGE
32	RS1-2152-000CN	1		SPRING, TENSION

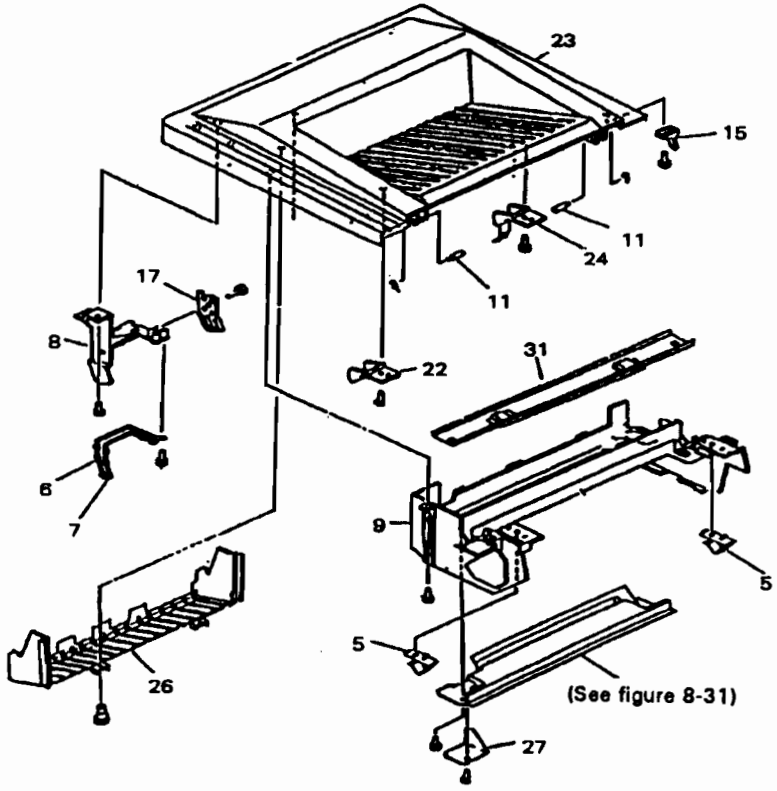


Figure 8-2B. Upper Main Body - HP 33459 (1 of 2)

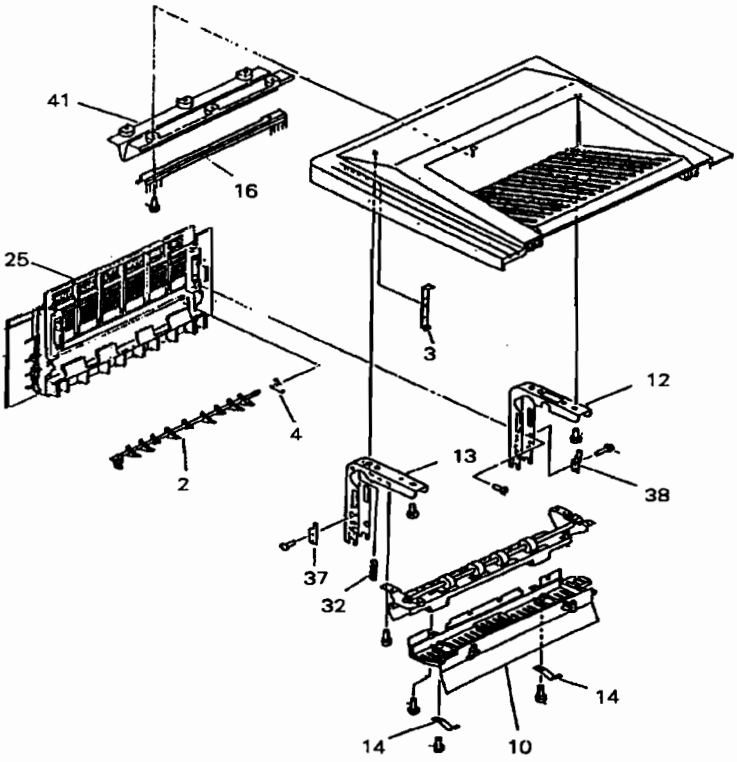


Figure 8-2B. Upper Main Body - HP 33459 (2 of 2)

Table 8-2B. UPPER MAIN BODY - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
2	RA1-6143-000CN	1		DEFLECTOR PAWL ASSEMBLY
3	RA1-6144-000CN	2	S	PLATE, SWITCHBACK SUPPORT
4	RA1-6146-000CN	1		SPRING, TORSION
5	RA1-4025-000CN	2	S	SPRING, LEAF
6	RA1-4034-000CN	1		SPRING A, GROUNDING
7	RA1-4035-000CN	1		SPRING B, GROUNDING
8	RA1-4036-000CN	1		ARM, CONNECTOR
9	RF1-0947-000CN	1		GUIDE, EP-S CARTRIDGE
10	RA1-4038-000CN	1		COVER, FUSER INSULATING
11	RA1-4042-000CN	2	S	SHAFT, LOCK
12	RA1-4030-000CN	1		PLATE, RIGHT HINGE BRACKET
13	RA1-4033-000CN	1		PLATE, LEFT HINGE BRACKET
14	RA1-4045-020CN	2	S	SPRING, LEAF
15	RA1-4046-000CN	1		LEVER, INTERLOCK
16	RA1-4047-000CN	1		ELIMINATOR, STATIC CHARGE
17	RA1-4048-000CN	1		COVER, CONNECTOR ARM
22	RF1-0926-000CN	1	S	SPRING, RIGHT, MIRROR
23	RF1-2579-000CN	1		PANEL, TOP COVER ASSEMBLY
24	RF1-0929-000CN	1	S	SPRING, LEFT, MIRROR
25	RF1-2609-000CN	1		COVER, REAR DELIVERY
26	RA1-8287-000CN	1		COVER, LOWER DELIVERY
27	RA1-4079-000CN	1	S	COVER, LAMP ASSEMBLY
31	RG0-0052-000CN	1		MIRROR ASSEMBLY
32	RS1-2152-000CN	1		SPRING, TENSION
37	RA1-5256-000CN	1	S	PLATE, LEFT LOCK
38	RA1-7151-000CN	1	S	PLATE, RIGHT LOCK
41	RA1-8276-000CN	1		COVER, UPPER DELIVERY

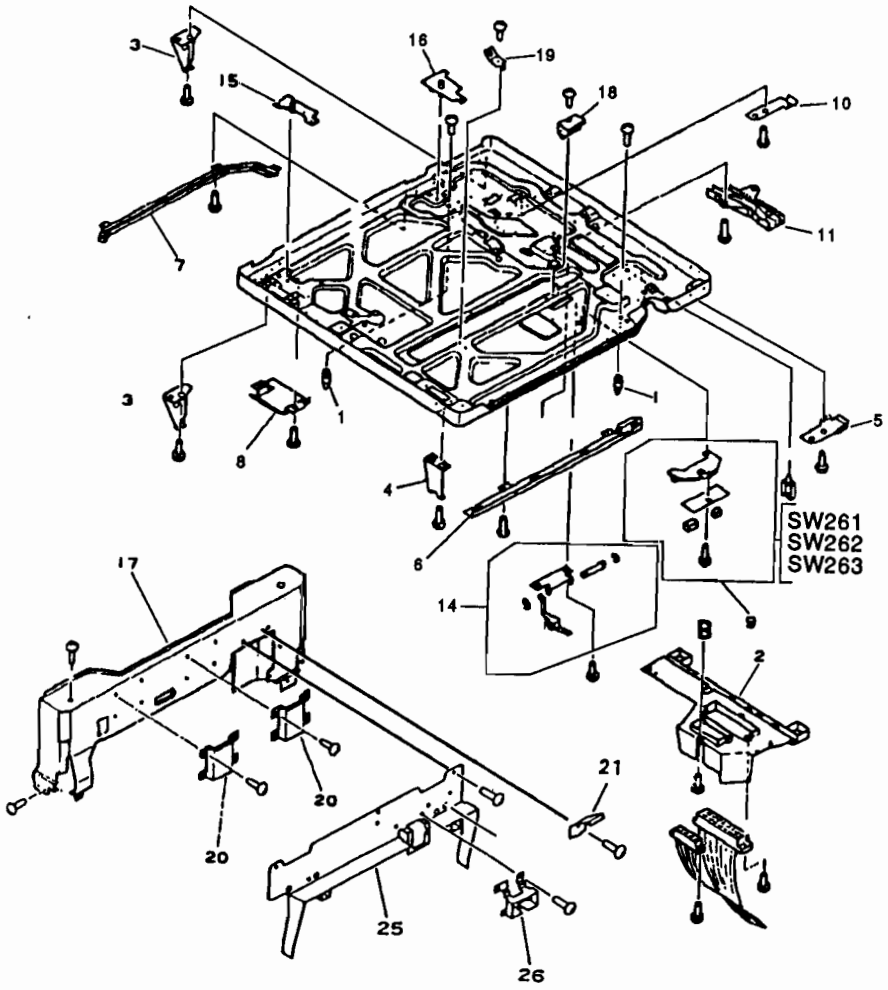


Figure 8-3. Chassis Assembly HP 33447/33459

Table 8-3. CHASSIS ASSEMBLY - HP 33447/33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-6189-000CN	2	S	PIVOT
2	RA1-6190-000CN	1	S	MOUNT, CONNECTION
3	RA1-6191-000CN	2	S	PLATE, MOUNT A
4	RA1-6192-000CN	1	S	PLATE, MOUNT B
5	RA1-6194-000CN	1	S	PLATE, TERMINAL A
6	RA1-6195-000CN	1	S	PLATE, COVER FRONT
7	RA1-6196-000CN	1	S	PLATE, REAR COVER
8	RA1-6197-000CN	1	S	COVER, CONNECTOR
9	RG9-0605-000CN	1		SIZE SENSOR PCB ASS'Y
10	RA1-6199-000CN	1	S	PLATE, TERMINAL, B
11	RA1-6200-000CN	1	S	STRAIN RELIEF
14	RG1-1339-000CN	1		UPPER SIZE SENSING ASS'Y
15	RA1-4167-000CN	1	S	PIN, LEFT FUSING ASS'Y
16	RA1-4168-000CN	1	S	PIN, RT. FUSING ASS'Y
17	RA1-6331-000CN	1	S	PLATE, FRONT SUPPORT
18	RA1-4638-000CN	1	S	COVER, LEVER
19	RA1-4317-000CN	1	S	SPRING, LEAF
20	RA1-6332-000CN	2	S	PLATE (HP33447)
21	RA1-8011-000CN	1	S	PLATE, GROUNDING (HP33459)
25	RA1-8148-000CN	1	S	GUIDE, ENVELOPE FEEDER (HP33459)
26	RA1-8149-000CN	1	S	PLATE, CONNECTOR GUIDE (HP33459)

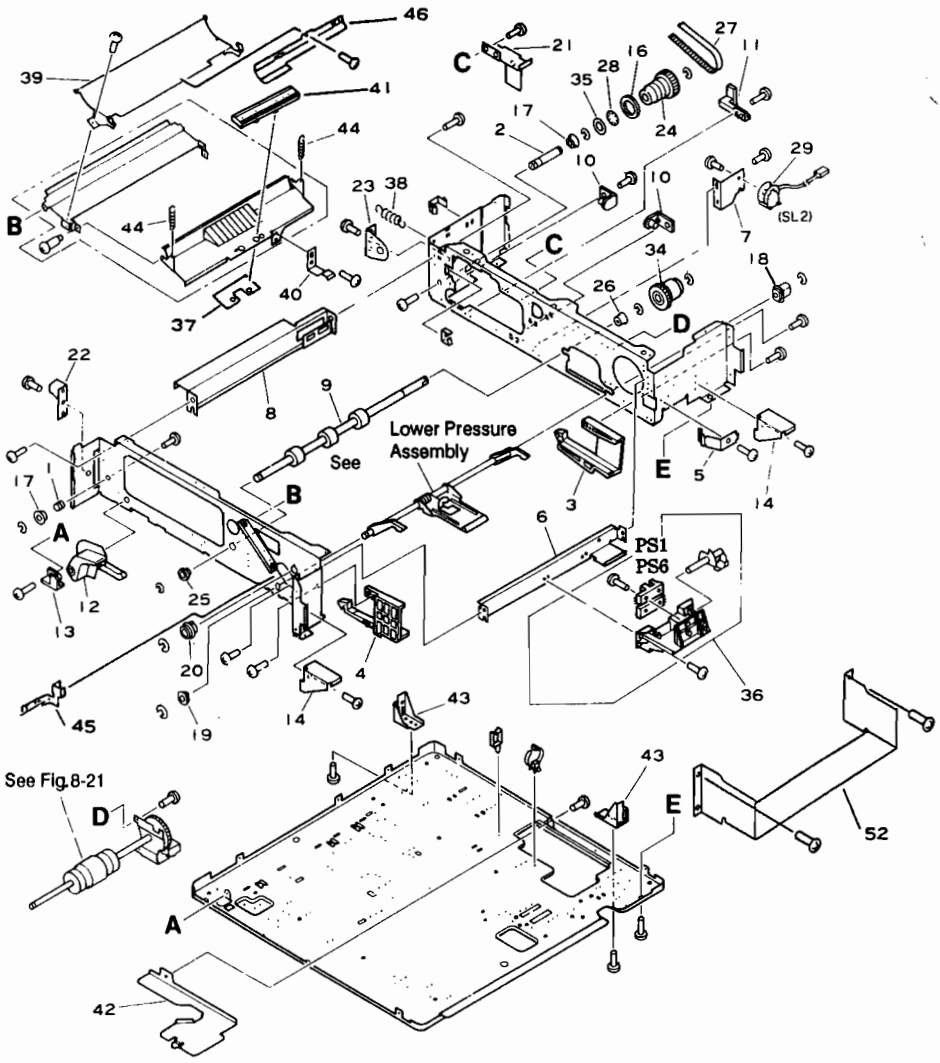


Figure 8-4. Lower Main Body HP

Table 8-4. LOWER MAIN BODY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RS1-5142-000CN	1	S	PIVOT, RIGHT
2	RS1-5143-000CN	1	S	PIVOT, LEFT
3	RA1-6167-000CN	1	S	CASSETTE GUIDE, RIGHT
4	RA1-6168-000CN	1	S	CASSETTE GUIDE, LEFT
5	RA1-6169-000CN	1	S	SPRING, LEAF
6	RA1-6170-000CN	1	S	PLATE
7	RA1-6173-000CN	1	S	MOUNT, SOLENOID
8	RA1-6174-000CN	1	S	CROSS MEMBER
9	RA1-6304-000CN	1		SHAFT, ROLLER
10	RA1-6305-000CN	2	S	PLATE, HINGE
11	RA1-6306-000CN	1	S	HOLDER, SHAFT
12	RA1-6308-000CN	1	S	LEVER, RELEASE (HP33447)
12	RA1-8415-000CN	1	S	LEVER, RELEASE (HP33459)
13	RA1-6309-000CN	1	S	HOLDER, LEVER
14	RA1-6313-000CN	2	S	PLATE, SUPPORT (HP33447)
14	RA1-8417-000CN	2	S	PLATE, SUPPORT (HP33459)
16	RA1-6318-000CN	1	S	WASHER
17	RS1-1025-000CN	2	S	BUSHING
18	RS1-1027-000CN	1	S	BUSHING
19	RS1-1028-000CN	1	S	BUSHING
20	RS1-1030-000CN	1	S	BUSHING
21	RA1-6293-000CN	1	S	COVER, BELT
22	RA1-6330-000CN	1	S	PLATE
23	RA1-6339-000CN	1	S	PLATE, MOUNT

Table 8-4. LOWER MAIN BODY (continued)

REF	PART NUMBER	QTY	SRC	DESCRIPTION
24	RS1-3038-000CN	1		GEAR, 25T
25	FS1-1188-000CN	1	S	BUSHING
26	FS1-1213-000CN	1	S	BUSHING
27	XF9-0203-000CN	1		BELT TIMING, 140T
28	XD9-0087-000CN	1	S	LOCK WASHER
29	RH7-5013-000CN	1		SOLENOID, 24 VDC
34	RA1-6322-000CN	1		CLUTCH
35	RA1-6323-000CN	1	S	FLANGE, PULLEY
36	RG1-1341-000CN	1		LOWER PAPER SENSOR ASS'Y
37	RA1-7150-000CN	1	S	PLATE, BALANCE
38	RS1-2212-000CN	1	S	SPRING, TENSION
39	RF1-2314-000CN	1	S	GUIDE, (3)
40	RA1-6211-000CN	1	S	SPRING, LEAF
41	RF1-2548-000CN	1		PAD, SEPARATION
42	RA1-6310-000CN	1	S	COVER, PCB CONNECTOR
43	RA1-6312-000CN	2	S	PLATE, SUPPORT
44	RA1-3871-000CN	2	S	SPRING, TENSION
45	RF1-2312-000CN	1	S	DAMPER
46	RA1-6213-000CN	1	S	PLATE, GUIDE
52	RA1-8416-000CN	1	S	PLATE, REINFORCEMENT (HP33459)

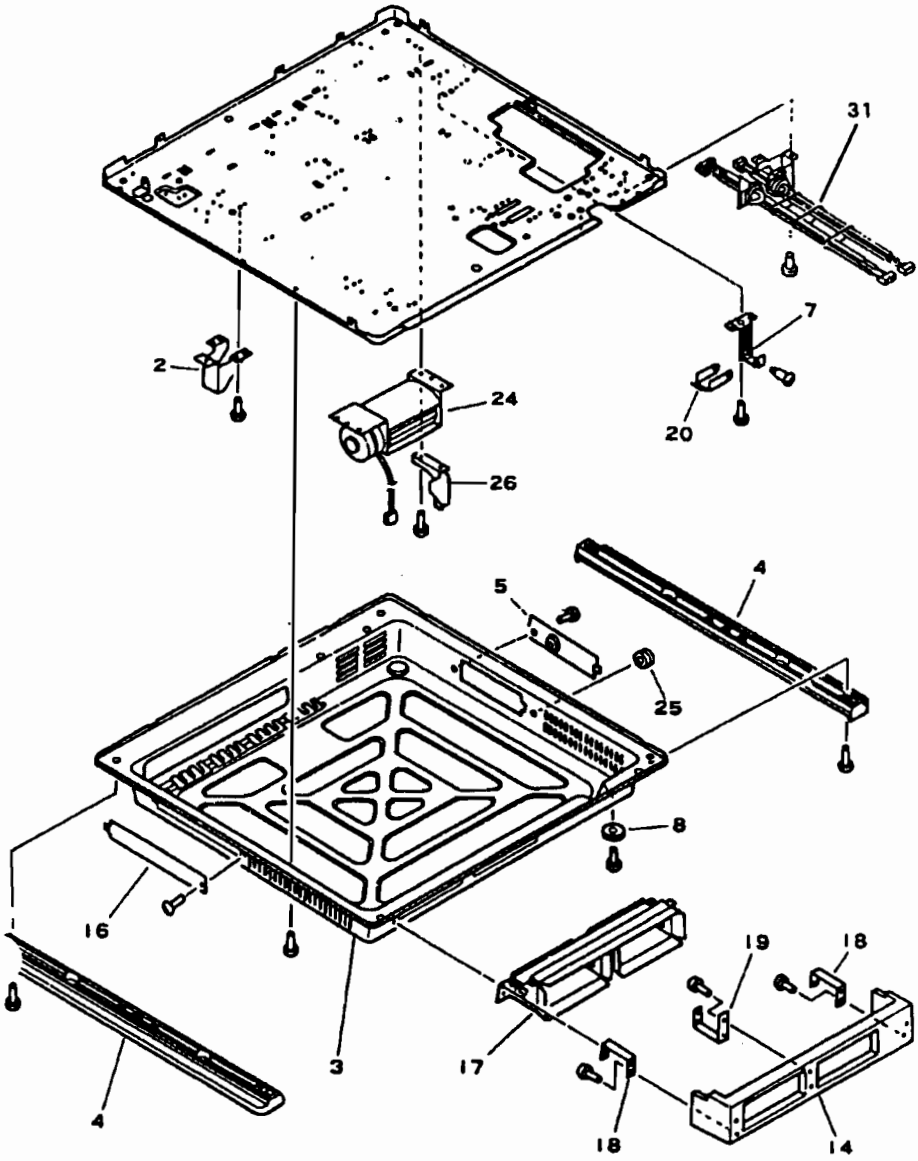


Figure 8-5A. Bottom Case - HP 33447 (1 of 2)

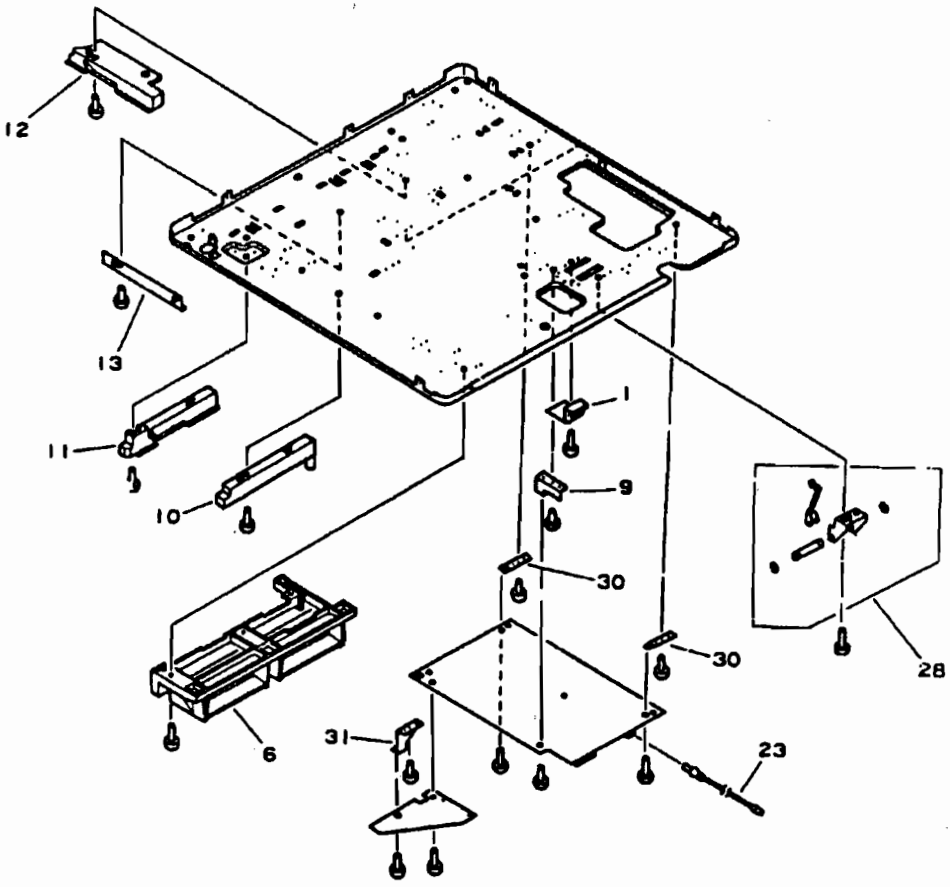


Figure 8-5A. Bottom Case - HP 33447 (2 of 2)

Table 8-5A. BOTTOM CASE - HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-6180-000CN	1		COVER, SENSOR LEVER
2	RA1-6181-000CN	2	S	PLATE, MOUNT
3	RF1-2371-000CN	1		COVER, BOTTOM
4	RA1-7122-000CN	2		KNOB
5	RA1-7123-000CN	1	S	PLATE, BLANKING
6	RA1-7135-000CN	1	S	GUIDE, FONT CARTRIDGE
7	RA1-6315-000CN	1		MOUNT, SWITCH LEVER
8	RA1-6329-000CN	4		FOOT
9	RA1-4120-000CN	2	S	SUPPORT, PCB
10	RA1-4132-000CN	1	S	GUIDE, FRONT, D-RAM PCA
11	RA1-4133-000CN	1	S	GUIDE, REAR, D-RAM PCA
12	RA1-4134-000CN	1	S	GUIDE, RIGHT, EXPANSION PCA
13	RA1-4135-000CN	1	S	GUIDE, LEFT, EXPANSION PCA
14	RA1-4285-000CN	1		PANEL, FONT CARTRIDGE
15	FA9-1449-000CN	4	S	SCREW, M3X6 W/WASHER
16	RA1-4296-000CN	1		PLATE, D-RAM
17	RA1-4148-000CN	1		SHIELD, FONT CARTRIDGE
18	RA1-4149-000CN	2		SUPPORT, PANEL A
19	RA1-4150-000CN	1		SUPPORT, PANEL B
20	RA1-5404-000CN	1	S	PLATE, LEVER
23	RH2-5075-000CN	1		FIBER OPTIC CABLE
24	RH7-1056-000CN	1		FAN, LOWER COOLING
25	RA1-7137 000CN	1	S	CAP, BLANKING
26	RA1-5490-000CN	1	S	STAND
28	RG1-1337-000CN	1		LWR SIZE SNSR ASS'Y
30	RA1-6326-000CN	2	S	MOUNT, PCB
31	RG1-2067-000CN	1		CABLE ASS'Y, LASER SCANNER

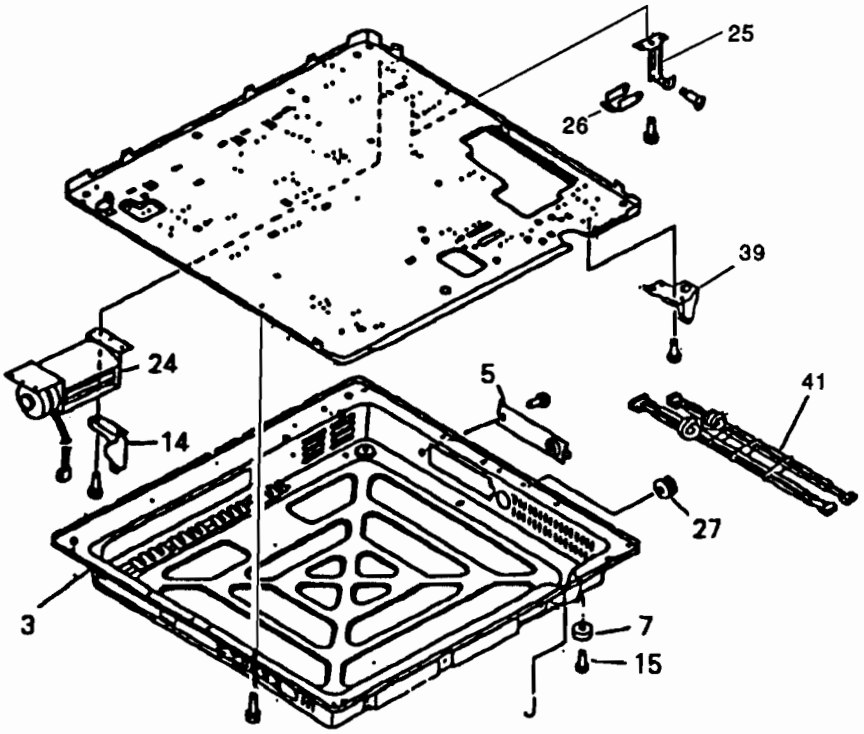


Figure 8-5B. Bottom Case - HP 33459 (1 of 2)

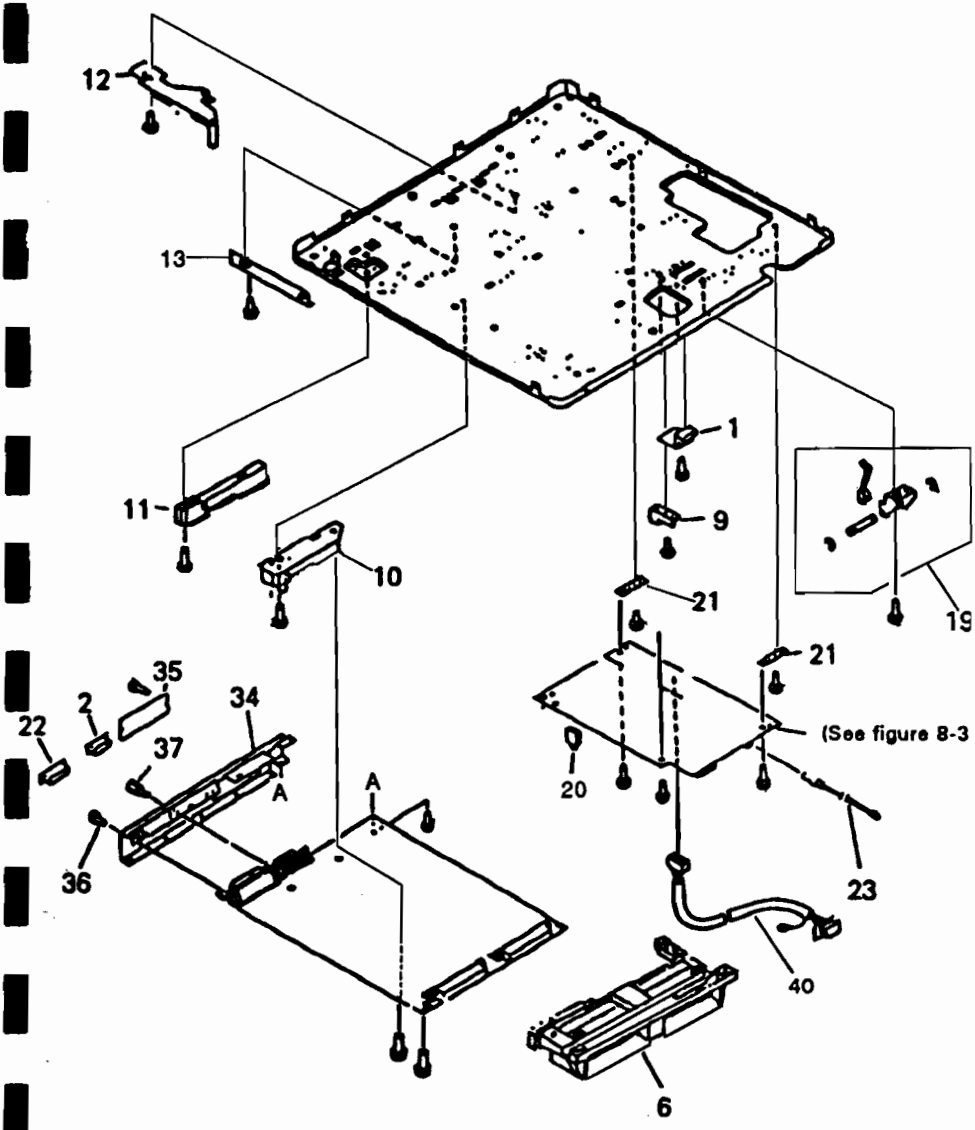


Figure 8-5B. Bottom Case - HP 33459 (2 of 2)

Table 8-5B. BOTTOM CASE - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-6180-000CN	1		COVER, SENSOR LEVER
2	RA9-0637-000CN	1		CAP, DUST
3	RF1-2607-000CN	1		COVER, BOTTOM
5	RA1-8425-000CN	1	S	PLATE, BLANKING
6	RA1-8418-000CN	1		GUIDE, FONT CARTRIDGE
7	RA8-2456-000CN	1		FOOT, RUBBER
9	RA1-4120-000CN	1		SUPPORT, PCA
10	RA1-8289-000CN	1		GUIDE,FRONT DRAM PCA
11	RA1-8292-000CN	1		GUIDE,REAR DRAM PCA
12	RA1-4134-000CN	1		GUIDE, RIGHT EXPANSION PCA
13	RA1-4135-000CN	1		GUIDE, LEFT EXPANSION PCA
14	RA1-5490-000CN	1		STAND
15	FA9-1449-000CN	4	S	SCREW, M3X6 W/WASHER
19	RG1-1337-000CN	1		LOWER SIZE SENSOR ASS'Y
20	RH2-5051-000CN	1		CONNECTOR
21	RA1-6326-000CN	2	S	MOUNT, PCA
22	WS9-0104-000CN	1		CAP, DUST
23	RH2-5109-000CN	1		OPTICAL FIBER
24	RH7-1056-000CN	1		FAN, 24VDC
25	RA1-6315-000CN	1		MOUNT, SWITCH LEVER
26	RA1-5404-000CN	1		PLATE, LEVER
27	RA1-7137-000CN	1		CAP, BLANKING
34	SA4-6201-050CN	1		PLATE, FORMATTER SUPPORT
35	SA4-6202-000CN	1		PLATE, DUST
36	XBI-1301-003CN	2	S	SCREW, M3X10
37	XA9-0400-000CN	2	S	NUT, THREADED HEX
39	RA1-8154-000CN	1		STAND
40	RG1-1946-000CN	1		CABLE ASS'Y, ENV. FEEDER
41	RG1-2067-000CN	1		CABLE ASS'Y, LASER/SCANNER

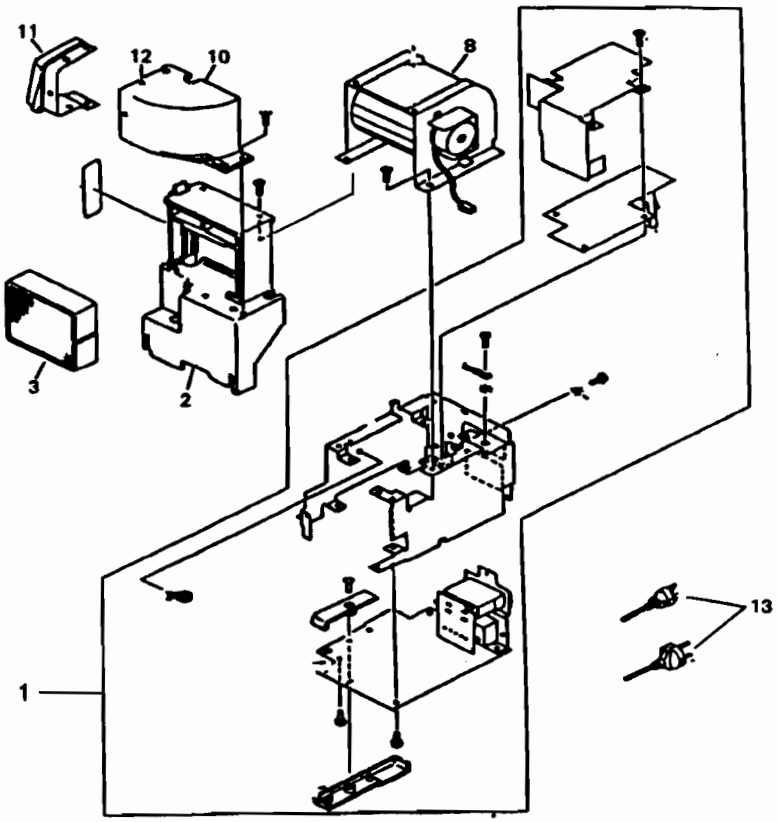


Figure 8-6. AC Power Module and Upper Cooling Fan - HP 33447 and HP 33459

Table 8-6. AC POWER MODULE AND UPPER COOLING FAN

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG9-0319-000CN	1		AC PWR MOD. 100/115V
1	RG9-0325-060CN	1		AC PWR MOD. 220/240V
2	RF1-2133-060CN	1		MOUNT, OZONE FILTER
3	RF1-2130-000CN	1		OZONE FILTER
8	RH7-1074-000CN	1		FAN, UPPER COOLING
10	RA1-7361-000CN	1	S	DUCT, EXHAUST
11	RA1-7362-000CN	1	S	HOOD, EXHAUST
12	RA1-5424-000CN	3	S	CLIP, HOOD
13	See note below			POWER CORD

Note: Refer to the *Computer Users Catalog* from DMK for HP power cord ordering information. A portion of this catalog is reproduced below.

Power cords

Part no.	8120-1348 Black** 8120-1378 Gray**	8120-1351*	8120-1369*	8120-1689*	8120-2104*
Plug					
Voltage rating	125V	250V	250V	250V	250V

*Order from HP sales office. **These power cords are 2.4m (7.5 ft.) long.

Power Cord Configurations

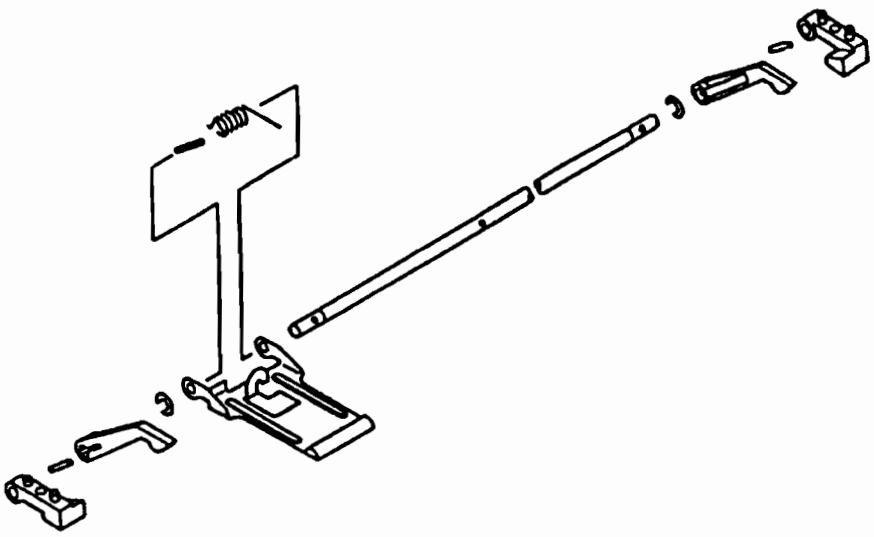


Figure 8-7. Upper Pressure Assembly - HP 33447 and HP 33459

Table 8-7. UPPER PRESSURE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0935-000CN	1		PRESSURE ASSEMBLY

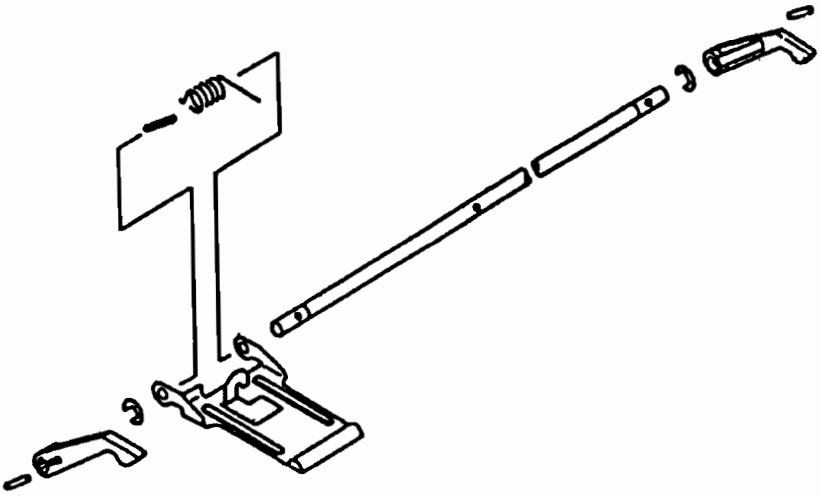


Figure 8-8. Lower Pressure Assembly - HP 33447 and HP 33459

Table 8-8. LOWER PRESSURE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1355-000CN	1		LOWER PRESSURE ASSEMBLY

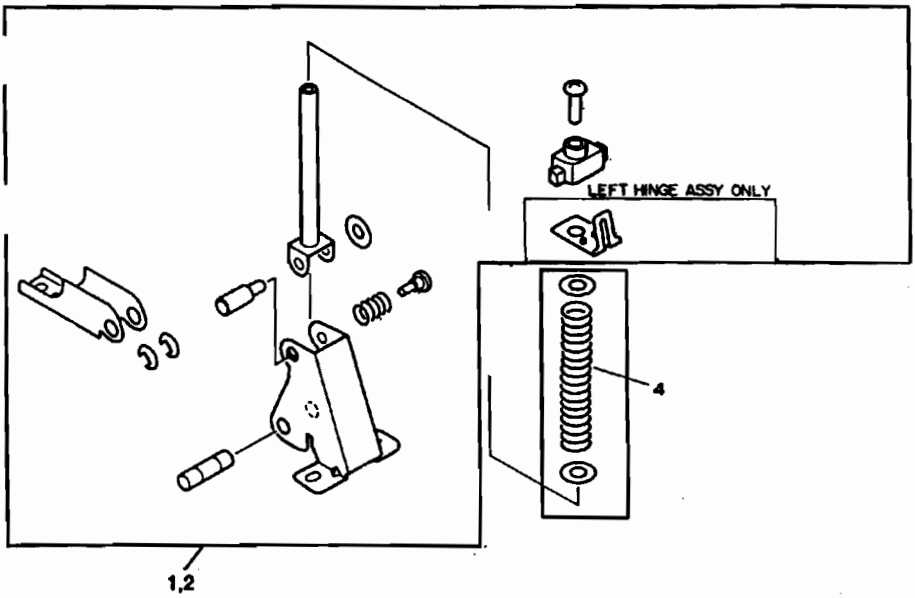
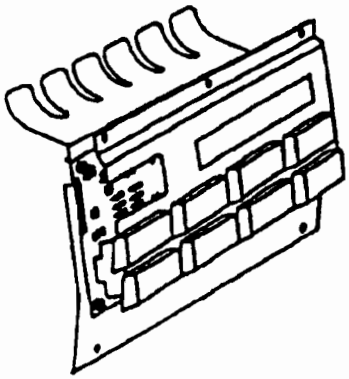


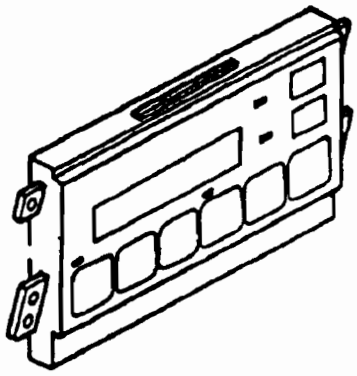
Figure 8-9. Hinge Assembly - HP 33447 and HP 33459

Table 8-9. HINGE ASSEMBLY - HP 33447 and HP33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1435-000CN	1		HINGE ASSEMBLY, RIGHT
2	RG1-1436-000CN	1		HINGE ASSEMBLY, LEFT
4	RS1-2110-000CN	2		SPRING, HINGE ASSEMBLY



33459



33447

Figure 8-10. Control Panel Assembly - HP 33447 and HP 33459

Table 8-10A. CONTROL PANEL ASSEMBLY - HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RH6-0009-000CN	1		CONTROL PANEL ASSEMBLY

Table 8-10B. CONTROL PANEL ASSEMBLY - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1989-000CN	1		CONTROL PANEL ASSEMBLY

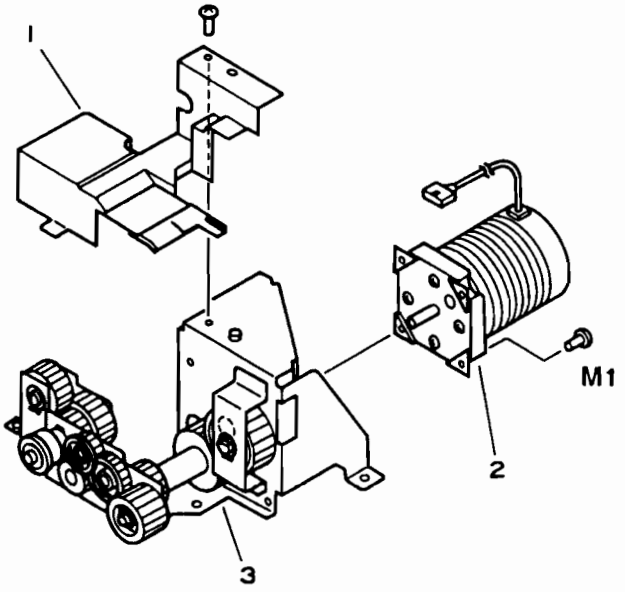


Figure 8-11.
Upper Main Motor and Drive Assembly - HP 33447 and HP 33459

Table 8-11. UPPER MAIN MOTOR AND DRIVE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RF1-0998-050CN	1		COVER, GEAR
2	RH7-1048-000CN	1		MOTOR, MAIN DRIVE
3	RG1-0943-000CN	1		MAIN MOTOR DRIVE ASSEMBLY

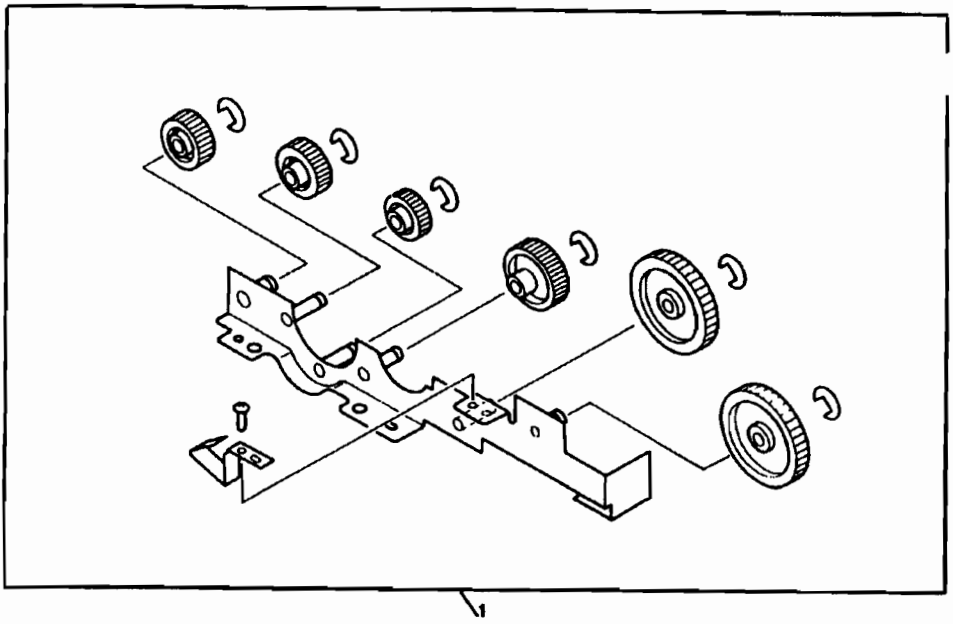


Figure 8-12. Upper Feed Drive Assembly - HP 33447 and HP 33459

Table 8-12. UPPER FEED DRIVE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0934-000CN	1		UPPER FEED DRIVE ASSEMBLY

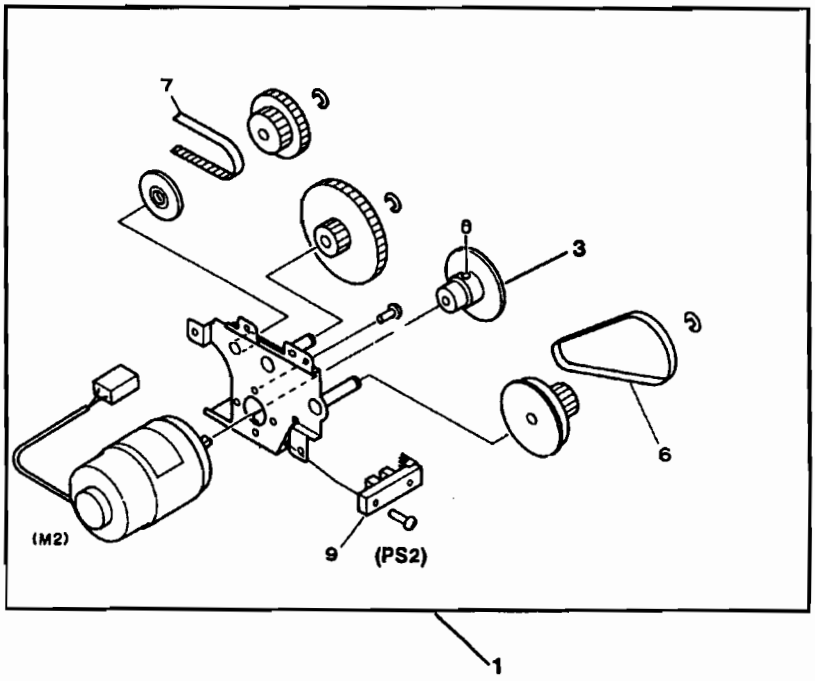


Figure 8-13. Lower Feed Drive Assembly - HP 33447 and HP 33459

Table 8-13. LOWER FEED DRIVE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1347-000CN	1		LOWER DRIVE MOTOR ASS'Y
3	RS1-3039-000CN	1		PULLEY
6	XF9-0201-000CN	1		BELT, TIMING (180T)
7	XF9-0202-000CN	1		BELT, TIMING (339T)
9	FH7-7052-000CN	1		PHOTOSENSOR (PS2)

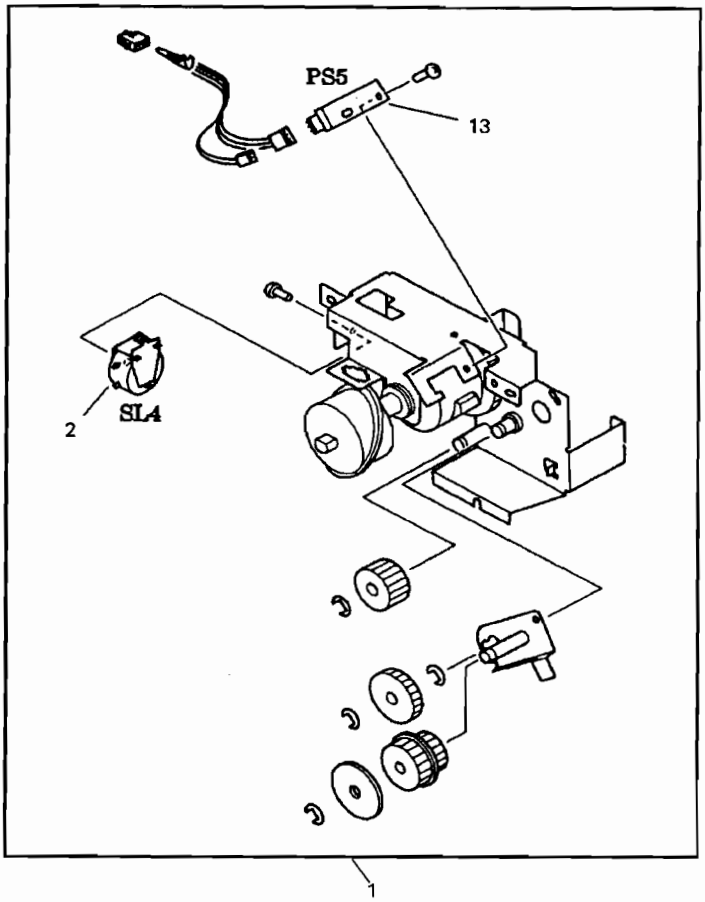


Figure 8-14.
Vertical Registration Drive Assembly
HP 33447 and HP33459

Table 8-14. VERTICAL REGISTRATION DRIVE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1348-000CN	1		GUIDE, DRIVE ASSEMBLY
2	RH7-5013-000CN	1		SOLENOID, 24 VDC (SL4)
3	FH7-7038-000CN	1		PHOTOINTERUPTER UNIT (PS5)

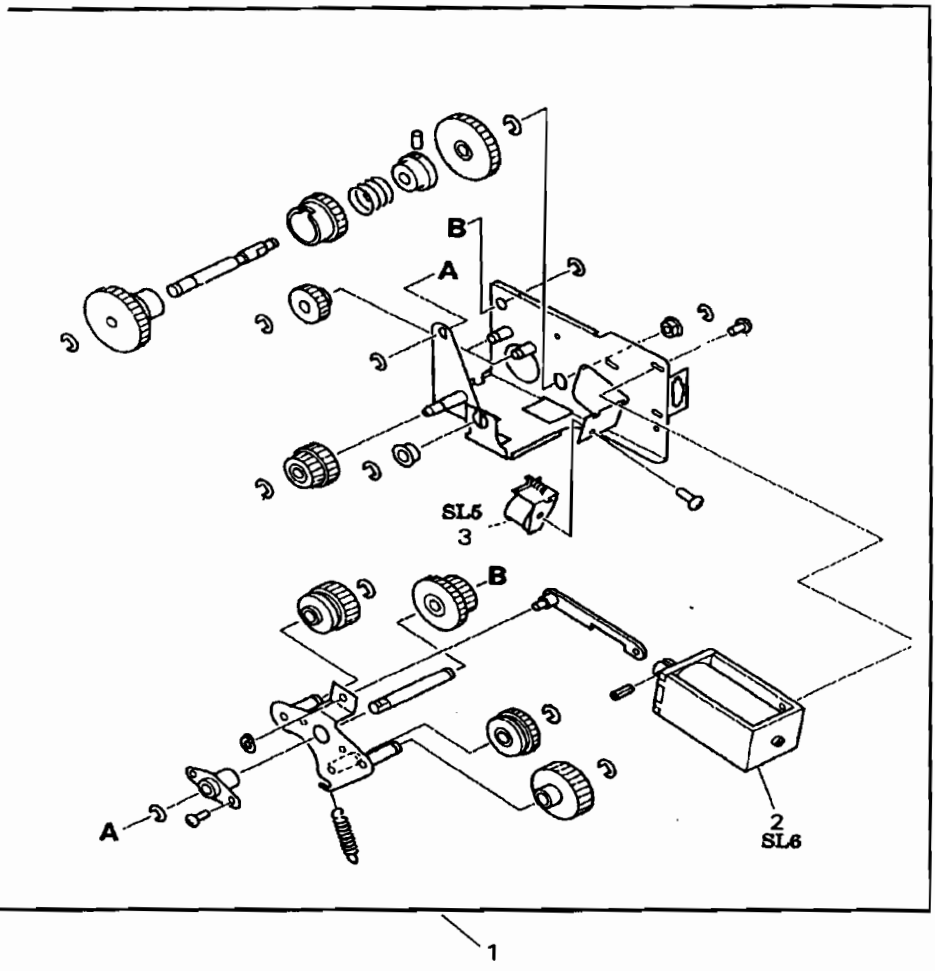


Figure 8-15. SWITCHBACK DRIVE CONTROL ASSEMBLY

Table 8-15. Switchback Drive Control Assembly - HP 33447 and HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1349-000CN	1		SWITCHBACK DRIVE ASS'Y
2	RH7-5017-000CN	1		SOLENOID, DIRECTIONAL (SL6)
3	RH7-5020-000CN	1		SOLENOID, CLUTCH (SL5)

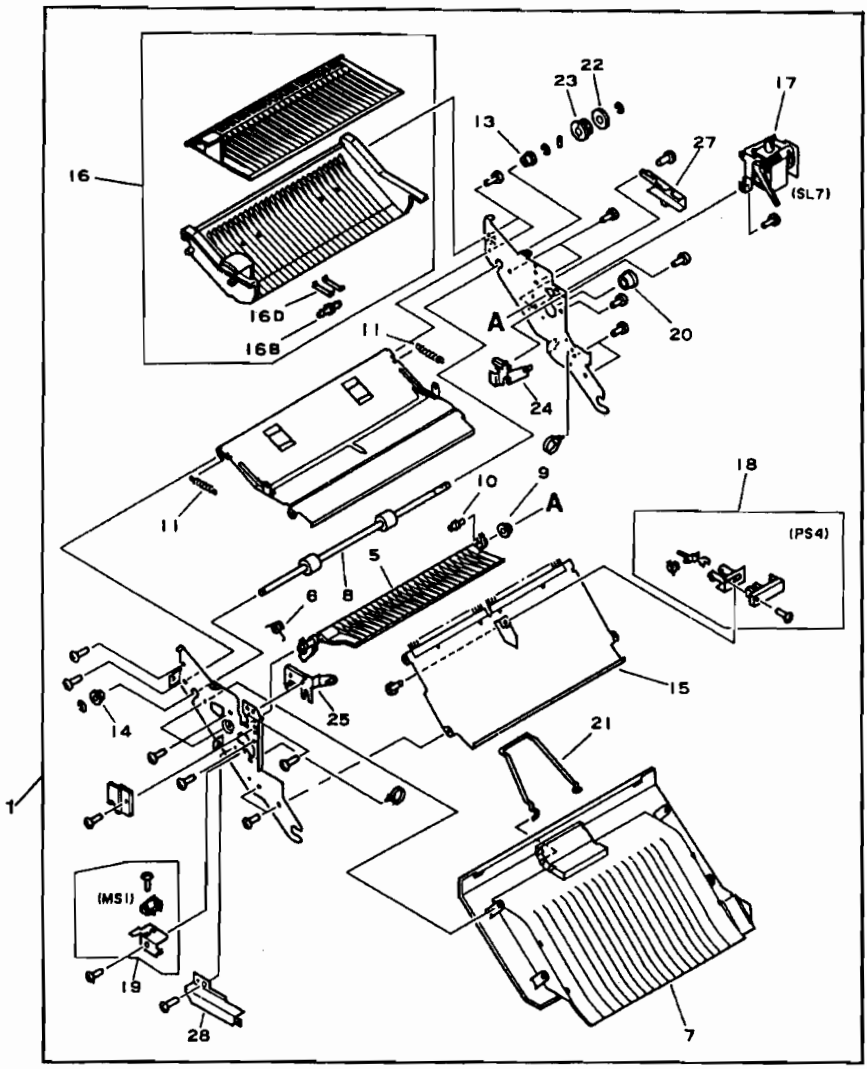


Figure 8-16A. Switchback Assembly - HP 33447

Table 8-16A. SWITCHBACK ASSEMBLY HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1350-000CN	1		SWITCHBACK ASSEMBLY
3	RF1-2313-000CN	1		GUIDE, 1
5	RA1-6265-000CN	1		FLAPPER
6	RA1-6266-000CN	1		SPRING, TORSION
7	RA1-6267-000CN	1		GUIDE, LOWER
8	RA1-6268-000CN	1		ROLLER
9	RA1-6273-000CN	1	S	BUSHING
10	RA1-6274-000CN	1		ROLLER
11	RS1-2206-000CN	2		SPRING, TENSION
13	FS1-1213-000CN	1	S	BUSHING
14	FS1-1188-000CN	1	S	BUSHING
15	RF1-2075-000CN	1		GUIDE, 2
16	RG1-1351-000CN	1		FACE-UP TRAY ASS'Y
16B	RA1-6280-000CN	2		ROLLER
16D	RA1-6282-000CN	4		SPRING, LEAF
17	RG1-1352-000CN	1		FLAPPER SOLENOID ASS'Y (SL7)
18	RG1-1353-000CN	1		SWITCHBACK SENSOR ASS'Y
19	RG1-1357-000CN	1		FLAPPER SENSOR ASS'Y
20	WT2-0171-000CN	1	S	BUSHING
21	RA1-8419-000CN	1	S	GUIDE, SUPPORT
22	RA1-6269-000CN	1	S	WASHER
23	RA1-3037-000CN	1		PULLEY
24	RF1-2071-000CN	1	S	HOLDER, RIGHT
25	RF1-2072-000CN	1	S	HOLDER, LEFT
27	RA1-6275-000CN	1		PLATE, RIGHT GUIDE
28	RA1-6276-000CN	1		PLATE, LEFT GUIDE

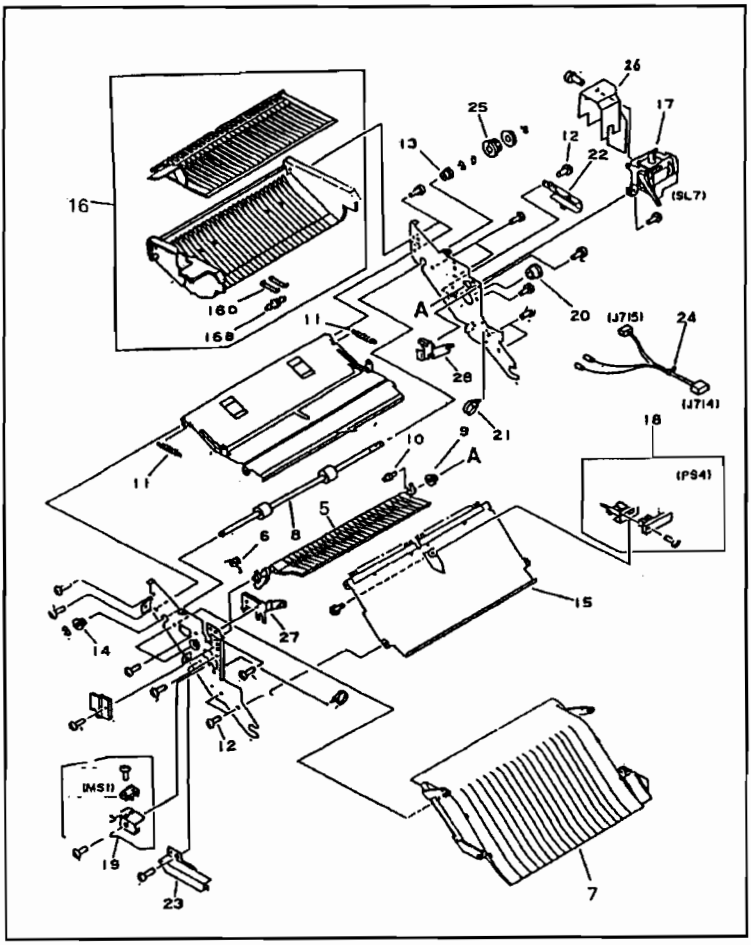


Figure 8-16B. Switchback Assembly - HP 33459

Table 8-16B. SWITCHBACK ASSEMBLY - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1992-000CN	1		SWITCHBACK ASSEMBLY
3	RF1-2313-000CN	1		GUIDE, 1
4	RA1-6263-000CN	1		RETAINER, FLAPPER
5	RA1-7124-000CN	1		FLAPPER
6	RA1-6266-000CN	1		SPRING, TORSION
7	RA1-8399-000CN	1		GUIDE, LOWER
8	RA1-6268-000CN	1		ROLLER
9	RA1-6273-000CN	1	S	BUSHING
10	RA1-6274-000CN	1		ROLLER
11	RS1-2206-000CN	2		SPRING, TENSION
13	FS1-1213-000CN	1	S	BUSHING
14	FS1-1188-000CN	1	S	BUSHING
15	RF1-2075-050CN	1		GUIDE, 2
16	RG1-1993-000CN	1		FACE-UP TRAY ASS'Y
16B	RA1-6280-000CN	1		ROLLER
16D	RA1-6282-000CN	1		SPRING, LEAF
17	RG1-1352-000CN	1		FLAPPER, SOLENOID ASS'Y
18	RG1-1353-000CN	1		INVERTER SENSOR ASS'Y
19	RG1-1357-000CN	1		FLAPPER, SENSOR ASS'Y
20	WT2-0171-000CN	1	S	BUSHING
21	RA1-8419-000CN	1	S	GUIDE, SUPPORT
22	RA1-6275-000CN	1		PLATE, GUIDE, RIGHT
23	RA1-6276-000CN	1		PLATE, GUIDE, LEFT
24	RG1-1322-000CN	1	S	CABLE
25	RS1-3037-000CN	1	S	PULLEY
26	RA1-7985-000CN	1	S	PLATE
27	RF1-2072-020CN	1	S	HOLDER, LEFT
28	RF1 2071-000CN	1	S	HOLDER, RIGHT
29	RA1-6269-000CN	1	S	WASHER

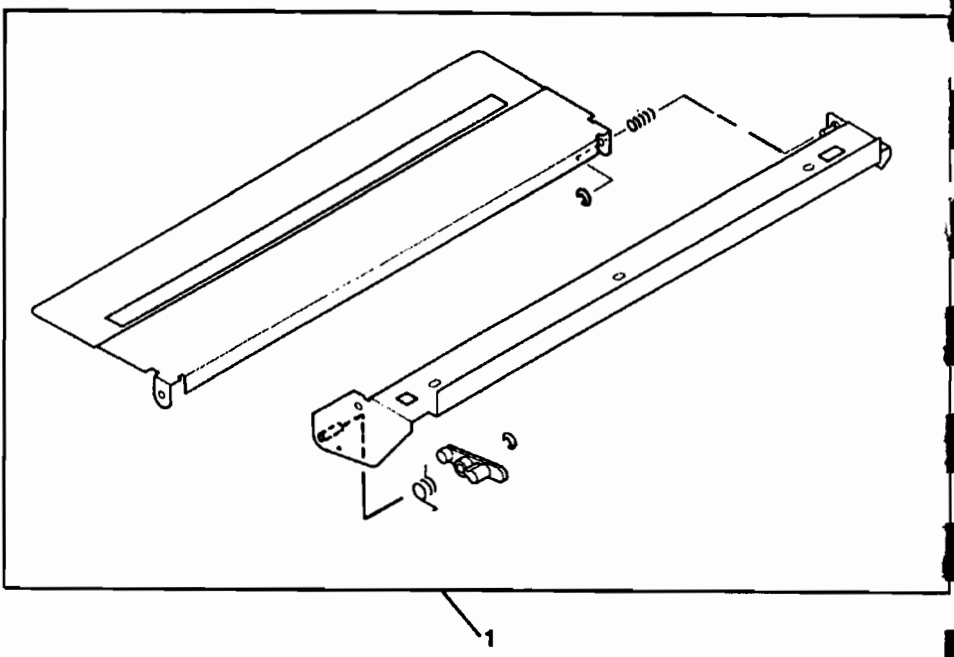


Figure 8-17. Mirror Shutter Assembly - HP 33447 and HP 33459

Table 8-17. MIRROR SHUTTER ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0929-000CN	1		MIRROR SHUTTER ASSEMBLY

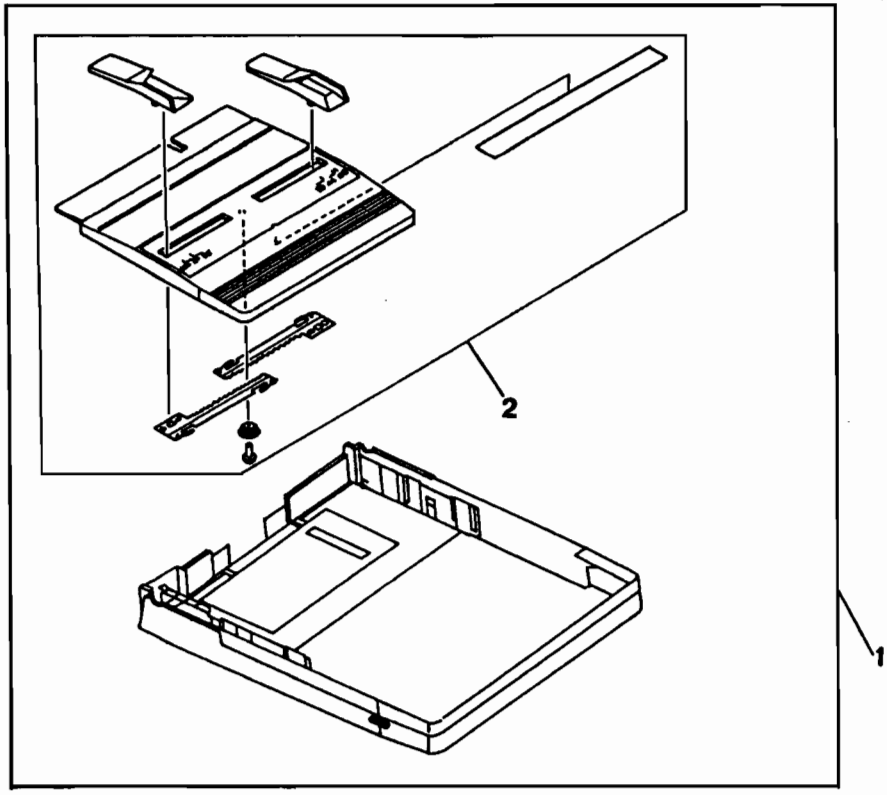


Figure 8-18A. Paper Tray Assembly - HP 33447

Table 8-18A. PAPER TRAY ASSEMBLY - HP 33447

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	92295B			TRAY, LETTER SIZE (8.5x11in)
1	92295C			TRAY, LEGAL SIZE (8.5x14in)
1	92295D			TRAY, A4 SIZE (210x297mm)
1	92295E			TRAY, EXECUTIVE SIZE (182x257mm)
1	92295F			TRAY, ENVELOPE
2	92295R			COVER, INPUT TRAY
2	92295S			COVER, LEGAL TRAY
3	92295U			COVER, ENVELOPE FEEDER

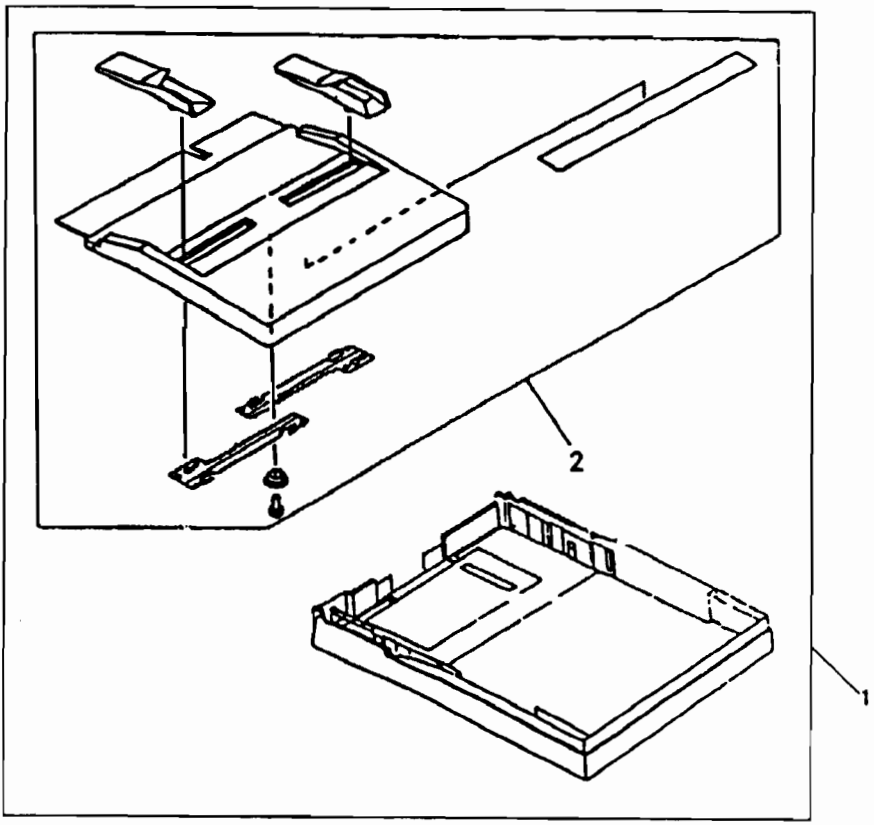


Figure 8-18B. Paper Tray Assembly - HP 33459

Table 8-18B. PAPER TRAY ASSEMBLY - HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	92297B			TRAY, LETTER SIZE (8.5x11in)
1	92297C			TRAY, LEGAL SIZE (8.5x14in)
1	92297D			TRAY, A4 SIZE (210x297mm)
1	92297E			TRAY, EXEC SIZE (182x257mm)
1	92297F			TRAY, ENVELOPE
2	92297R			COVER, INPUT TRAY
2	92297S			COVER, LEGAL TRAY
3	RF1-2659-000CN			COVER, ENVELOPE FEEDER

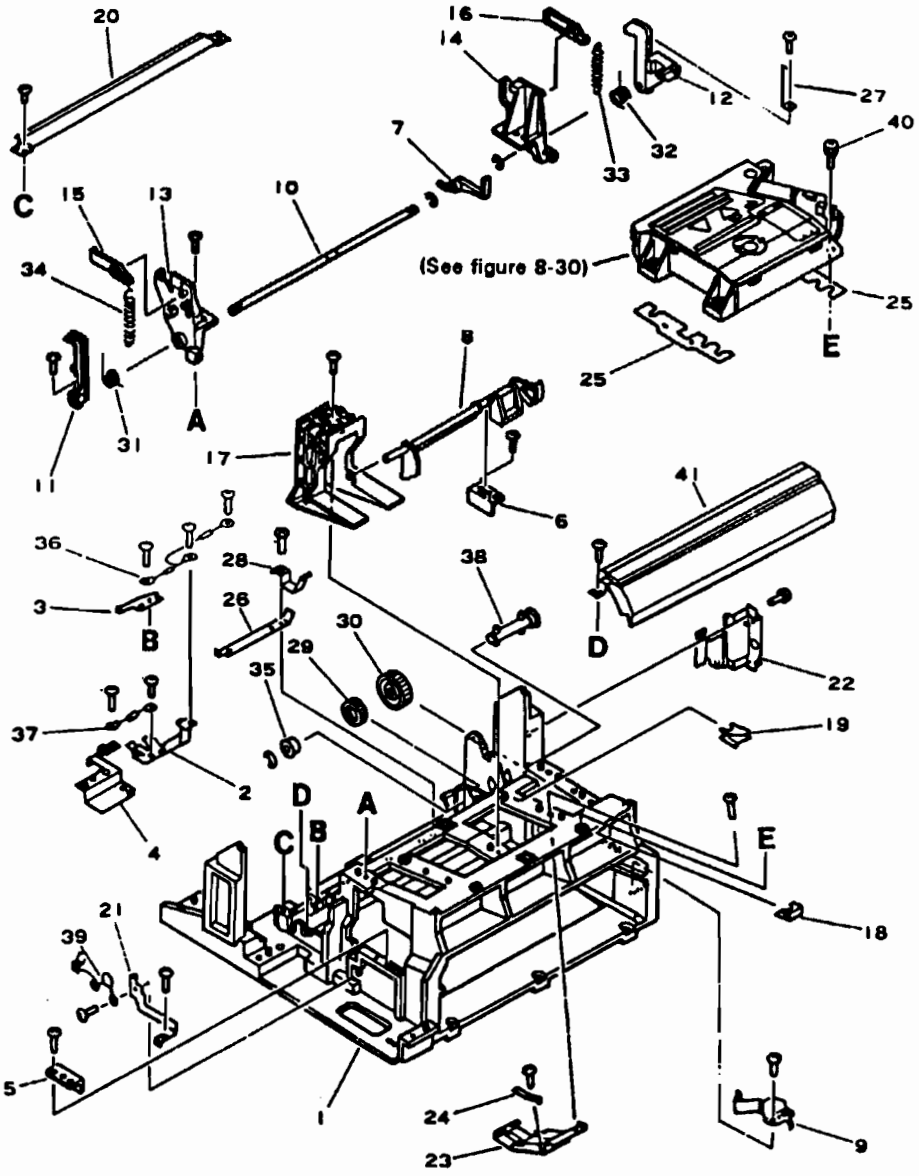


Figure 8-19. Main Body Assembly - HP 33447 and HP 33459

Table 8-19. MAIN BODY ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RA1-6134-000CN	1		BLOCK, MAIN BODY
2	RA1-3822-000CN	1	S	PLATE, GROUNDING A
3	RA1-5479-000CN	1	S	PLATE, GROUNDING B
4	RA1-3824-000CN	1	S	PLATE, GROUNDING C
5	RA1-3825-000CN	1	S	GUIDE, CASSETTE LEFT
6	RA1-3826-000CN	1		GUIDE, CASSETTE RIGHT
7	RA1-3827-000CN	1		ARM, LASER SHUTTER
8	RA1-3828-040CN	1		ARM, PAPER SENSING
9	RF1-2129-000CN	1	S	SPRING, LEAF
10	RA1-3830-000CN	1	S	SHAFT, HOOK
11	RA1-3831-000CN	1		HOOK, LEFT COVER LATCH
12	RA1-3832-000CN	1		HOOK, RIGHT COVER LATCH
13	RA1-3833-000CN	1		GUIDE, LEFT COVER LATCH HOOK
14	RA1-3834-000CN	1		GUIDE, RIGHT COVER LATCH HOOK
15	RA1-3835-000CN	1		LIFTER, LEFT
16	RA1-3836-000CN	1		LIFTER, RIGHT
17	RA1-3837-000CN	1		GUIDE, AUXILIARY
18	RA1-3838-000CN	1		NUT, SCANNER, A
19	RA1-3839-000CN	1		NUT, SCANNER, B
20	RA1-3864-000CN	1		GUIDE, UPPER TRANSFER
21	RA1-4318-000CN	1	S	PLATE, GROUNDING
22	RA1-4319-000CN	1	S	PLATE, BLOCK SUPPORT
23	RA1-4320-000CN	1	S	COVER, LASER SHUTTER
24	RA1-4321-000CN	1	S	SPRING, LEAF

Table 8-19. MAIN BODY ASSEMBLY (continued)

REF	PART NUMBER	QTY	SRC	DESCRIPTION
25	RA1-5396-000CN	n/a	S	WASHER, SHIM
26	RA1-5480-000CN	1	S	PLATE, GROUNDING
27	RA1-6084-000CN	1	S	PLATE, HOOK SUPPORT
28	RA1-6340-000CN	1	S	SPRING, LEAF
29	RS1-0105-000CN	1		GEAR, 19 TOOTH
30	RS1-0106-000CN	1		GEAR, 57 TOOTH
31	RS1-2095-000CN	1		SPRING, TORSION
32	RS1-2096-000CN	1		SPRING, TORSION
33	RS1-2097-000CN	1		SPRING, TENSION
34	RS1-2112-000CN	1	S	SPRING, TENSION
35	XG3-6010-303CN	1		BEARING, BALL
36	RF1-2118-000CN	1		RESISTOR ASS'Y, 15 MOHM 1/4W
37	RF1-0841-000CN	1		RESISTOR, 1 KOHM 1/4W
38	RF1-0988-000CN	1		SHAFT, DRUM DRIVE
39	RF1-2163-000CN	1	S	CAPACITOR
40	XA9-0375-000CN	4		SCREW, M3x25
41	RF1-2073-000CN	1	S	GUIDE, PAPER PICKUP ASS'Y

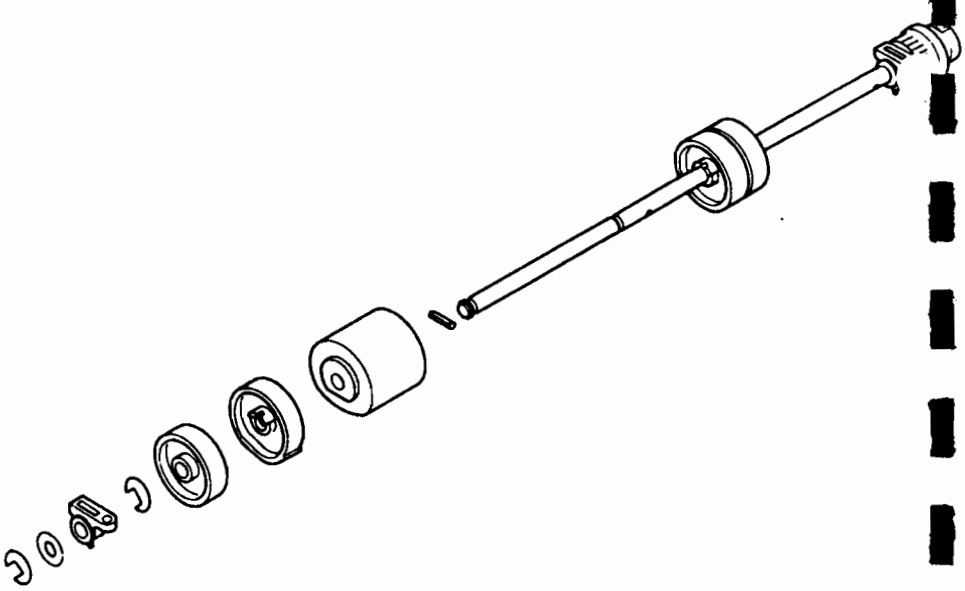


Figure 8-20. Upper Feed Roller Assembly - HP 33447 and HP 33459

Table 8-20. UPPER FEED ROLLER ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0931-000CN	1		UPPER FEED ROLLER ASSEMBLY (HP33447)
1	RG1-2499-000CN	1		UPPER FEED ROLLER ASSEMBLY (HP33459)

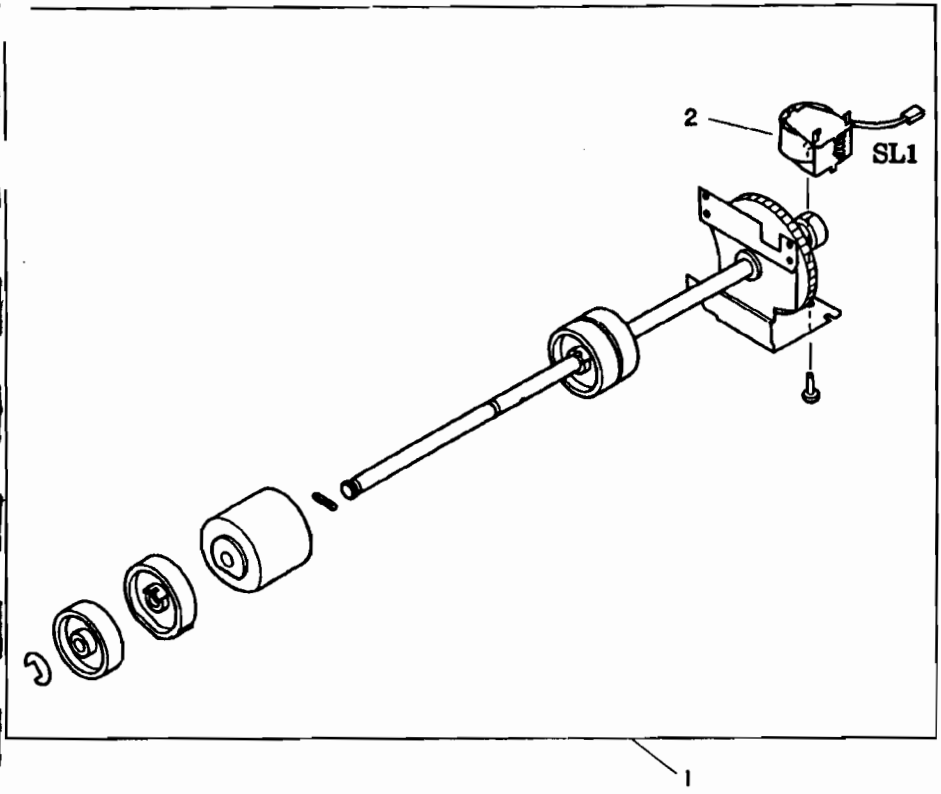


Figure 8-21. Lower Feed Roller Assembly - HP 33447 and HP 33459

Table 8-21. LOWER FEED ROLLER ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1340-000CN	1		LOWER FEED ROLLER ASSEMBLY
2	RH7-5013-000CN	1		SOLENOID, 24VDC (SL1)

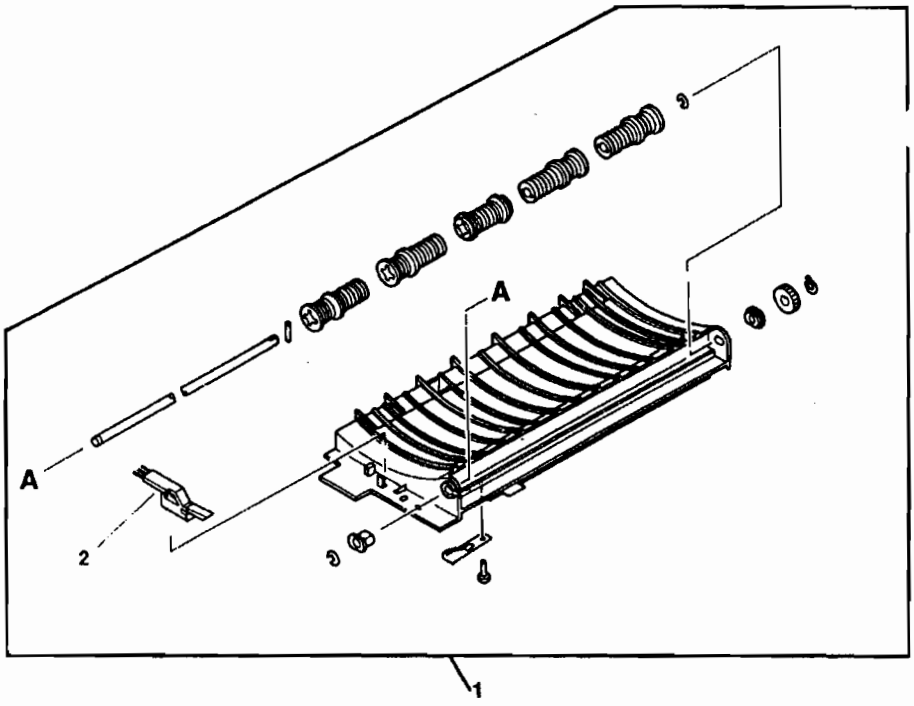


Figure 8-22. Feed Guide Assembly - HP 33447 and HP 33459

Table 8-22. FEED GUIDE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0938-000CN	1		FEED GUIDE ASSEMBLY
2	RF1-1177-000CN	1		CLEANER

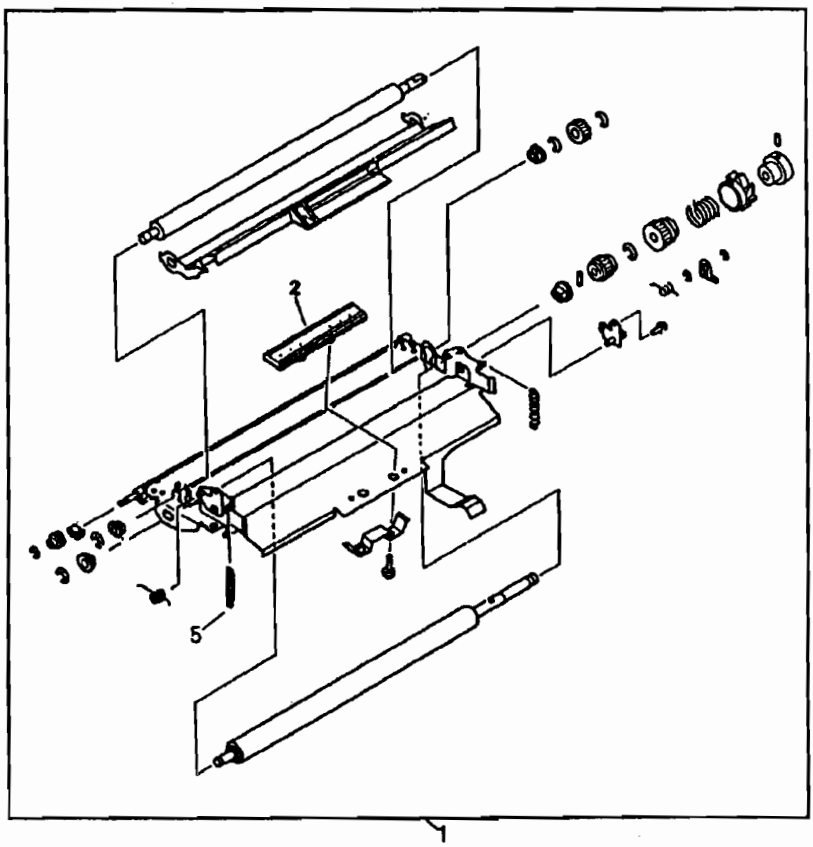


Figure 8-23. Registration Assembly - HP 33447 and HP 33459

Table 8-23. REGISTRATION ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1326-000CN	1		REGISTRATION ASSEMBLY
2	RF1-1145-020CN	1		PAD, SEPARATION
5	RA1-3871-000CN	2		SPRING, TENSION

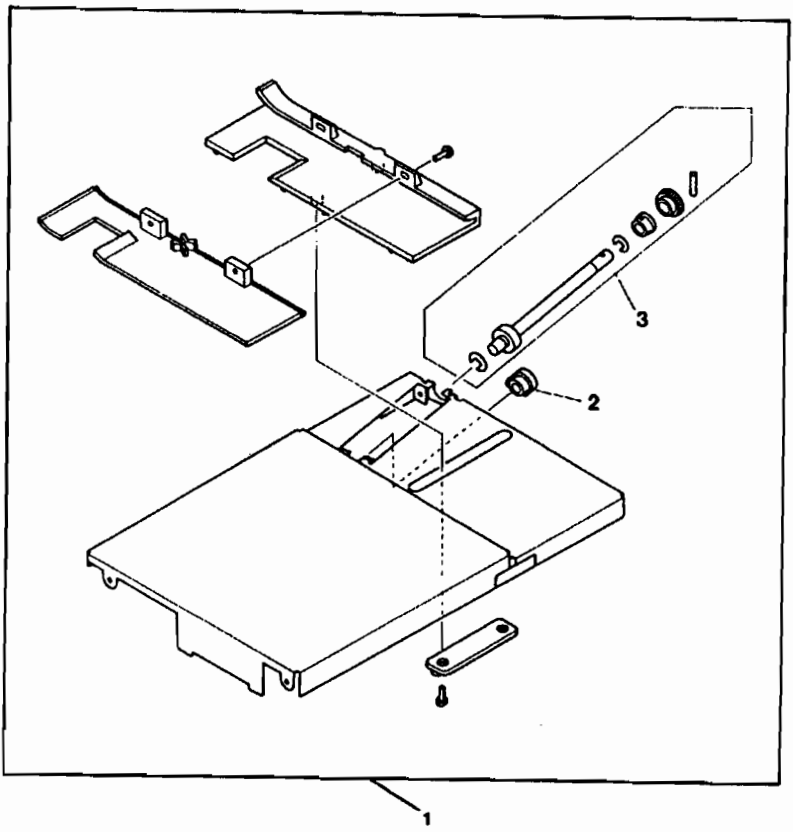


Figure 8-24. Lower Duplex Guide Assembly - HP 33447 and HP 33459

Table 8-24. LOWER DUPLEX GUIDE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-2498-000CN	1		LWR DUPLEX GUIDE
2	RS1-1032-000CN	1		BUSHING
3	RG1-1356-000CN	1		PAPER ALIGNMENT ROLLER

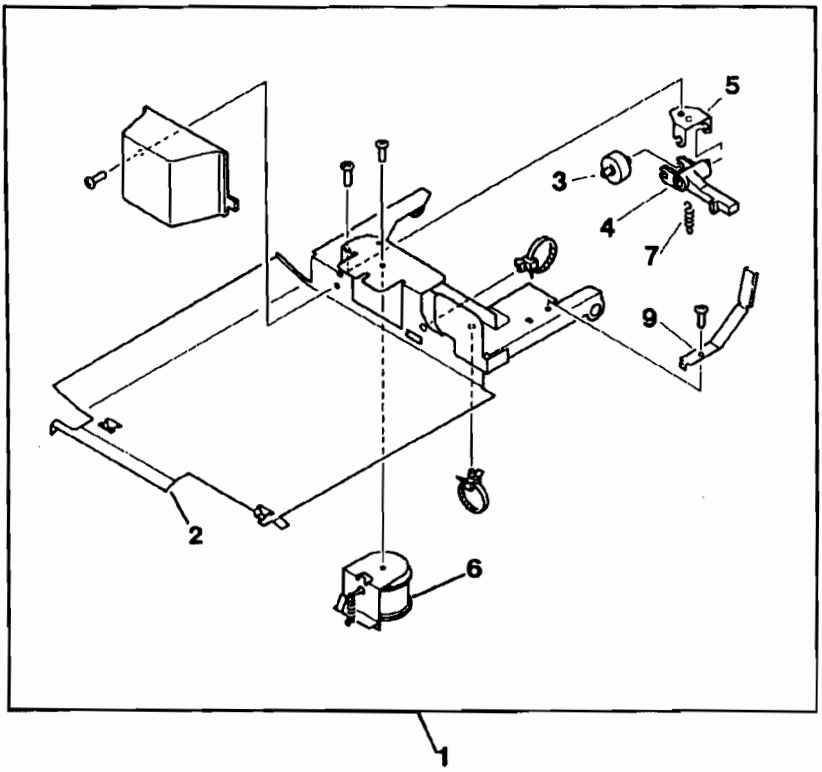


Figure 8-25. Upper Duplex Drive Assembly - HP 33447 and HP 33459

Table 8-25. UPPER DUPLEX DRIVE ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1344-000CN	1		UPPER DUPLEX GUIDE ASS'Y
2	RA1-6220-000CN	1		GUIDE, FEEDER, UPPER
3	RA1-6221-000CN	1		ROLLER
4	RA1-6222-000CN	1	S	HOLDER, ROLLER
5	RA1-6224-000CN	1	S	MOUNT, ROLLER
6	RH7-5018-000CN	1		SOLENOID, 24VDC (SL3)
7	RS1-2209-000CN	1	S	SPRING, TENSION
9	RA1-6225-000CN	1	S	SPRING, LEAF

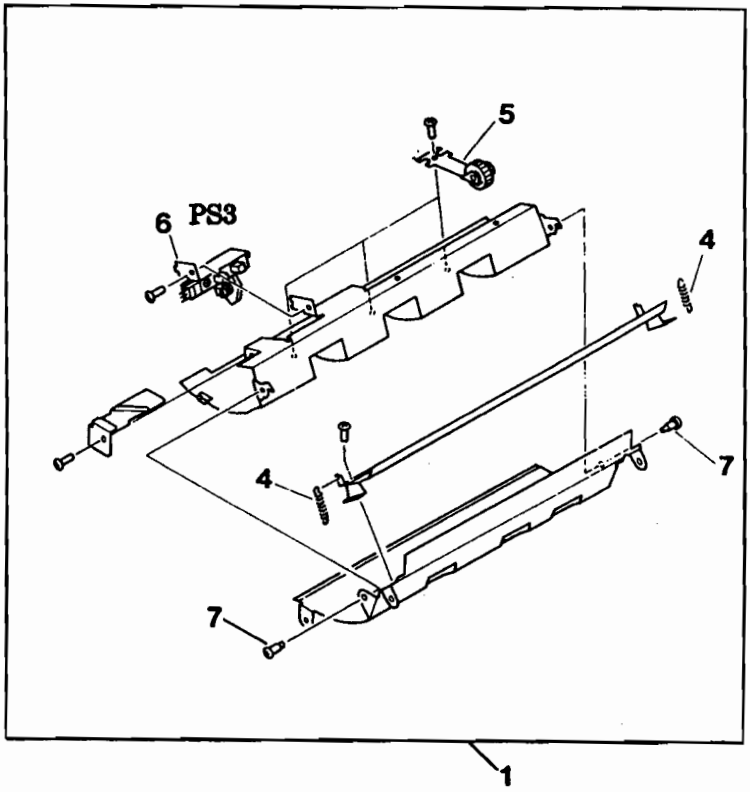


Figure 8-26. Duplex Drive Roller Assembly - HP33447 and HP33459

Table 8-26. DUPLEX DRIVE ROLLLER ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1345-060CN	1		DUPLEX DRIVE ROLLER ASS'Y
4	RS1-2208-000CN	2	S	SPRING, TENSION
5	RF1-2065-000CN	1		ROLLER, UPPER
6	RG1-1354-000CN	1		PAPER FEED SENSOR ASS'Y
7	XA9-0411-000CN	4		SCREW, SHOULDER (M3)

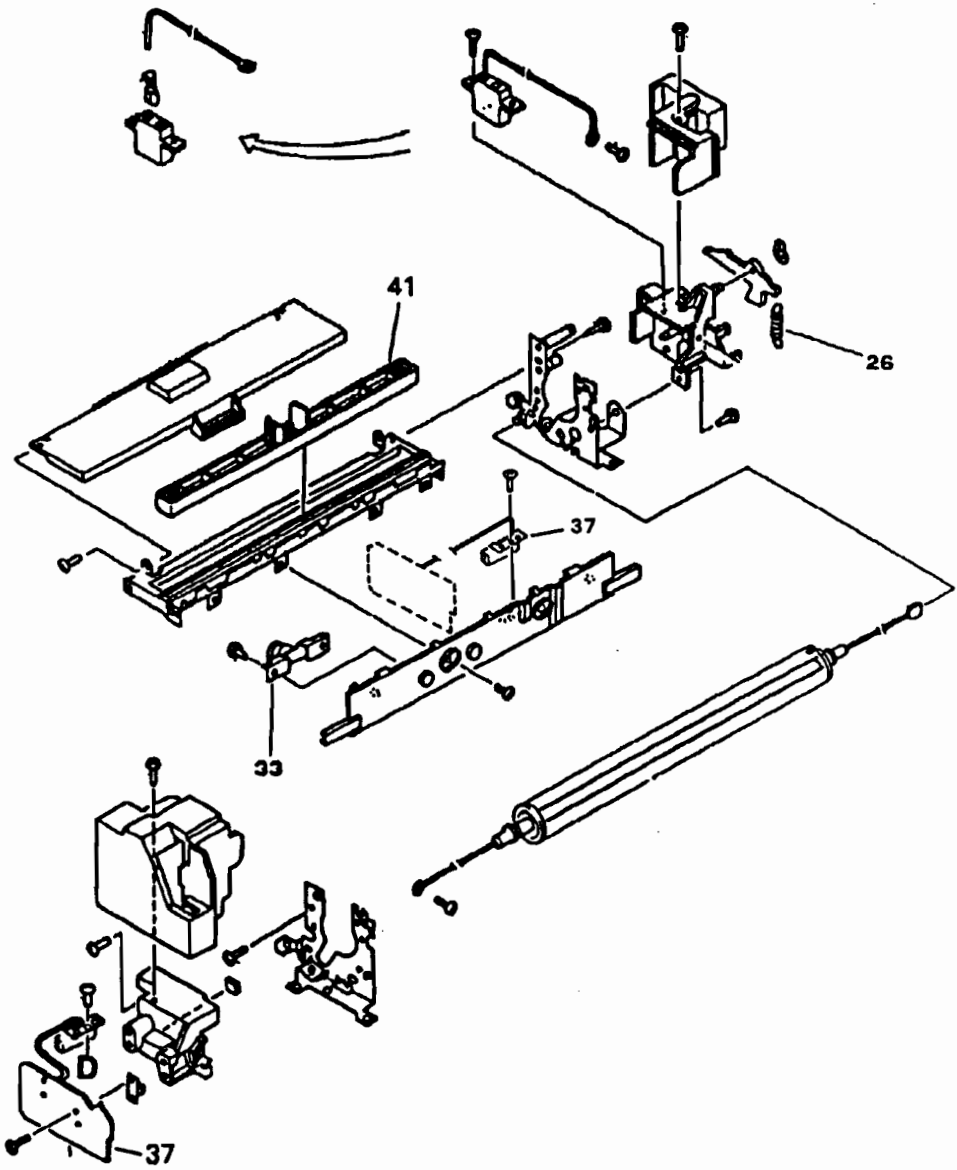


Figure 8-27. Fusing Assembly (1 of 3) - HP 33447 and HP 33459

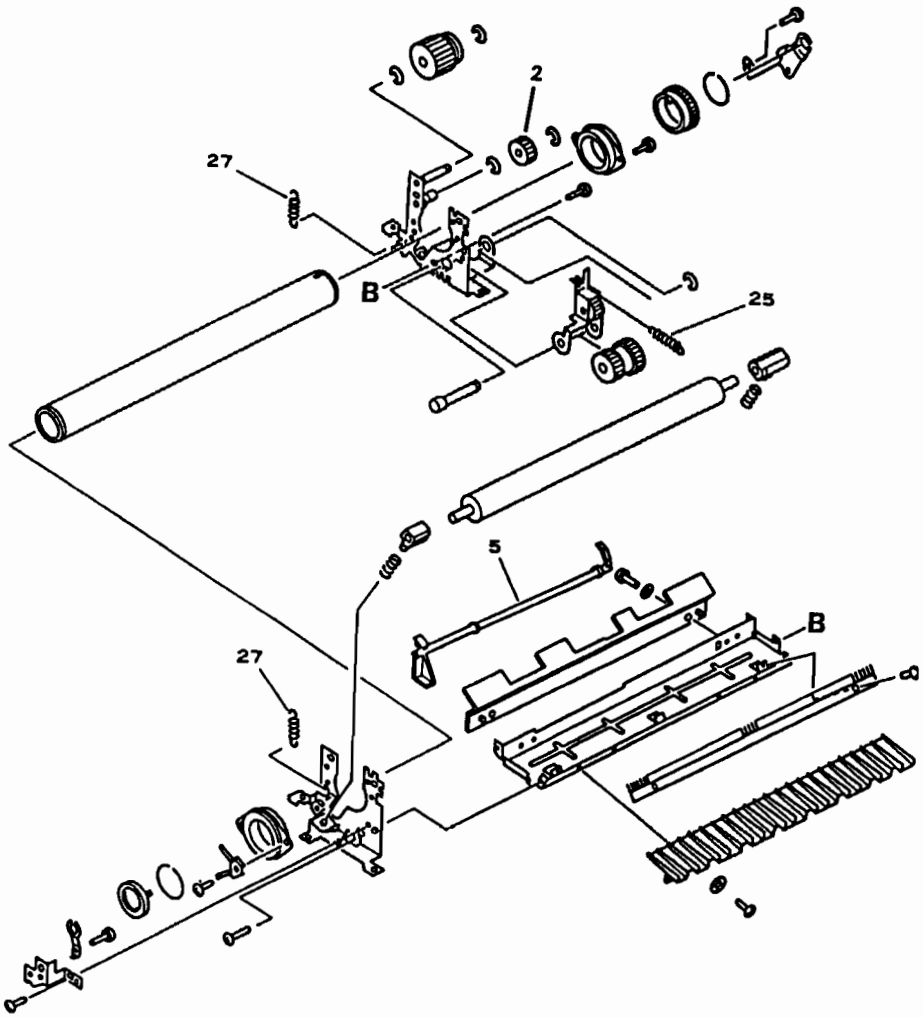


Figure 8-27. Fusing Assembly (2 of 3) - HP 33447 and HP 33459

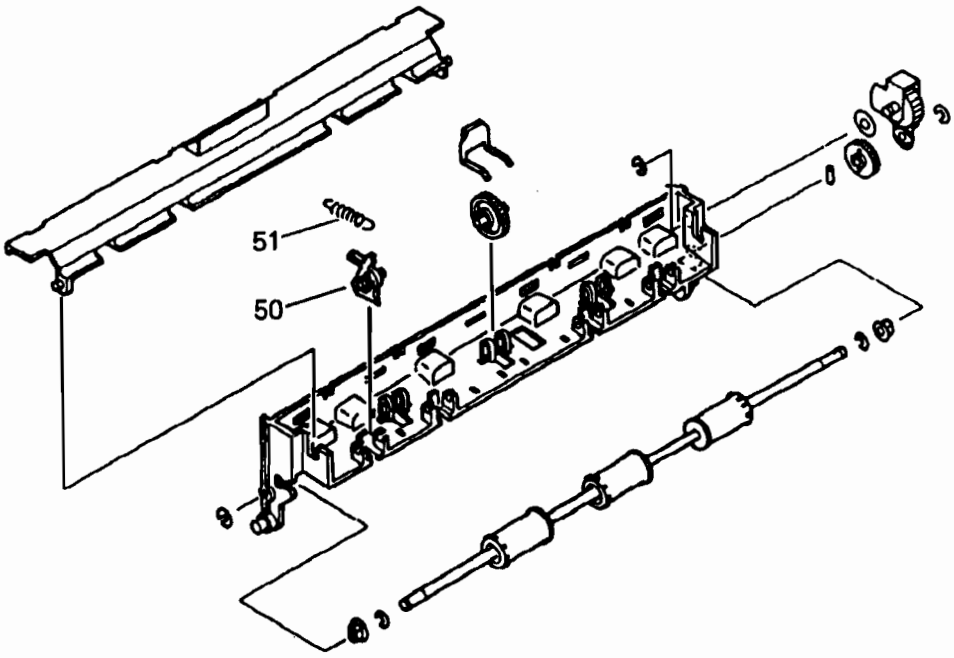


Figure 8-27. Fusing Assembly (3 of 3) - HP 33447 and HP 33459

Table 8-27. FUSING ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0939-230CN	1	New	FUSING ASSEMBLY (100/115V)
1	33440-69003	1	Rebuilt	FUSING ASSEMBLY (100/115V)
1	RG1-0940-120CN	1	New	FUSING ASSEMBLY (220/240V)
1	33440-69009	1	Rebuilt	FUSING ASSEMBLY (220/240V)
5	RA1-3942-000CN	1		ARM, EXIT SENSOR
25	RS1-2104-000CN	1		SPRING, TENSION
26	RS1-2105-000CN	1		SPRING, TENSION
27	RS1-2109-000CN	2		SPRING, TENSION
37	RG1-0719-000CN	1		THERMISTOR/EXIT SENSOR PCA
33	RF1-0842-000CN	1		THERMOPROTECTOR
41	RG1-0966-030CN	1		PAD, FUSER CLEANING
50	RA1-3971-000CN	4		PAWL (CLAW), SEPARATION
51	RS1-2106-000CN	4		SPRING, PAWL TENSION
n/a	CK-0544-000CN			LUBRICANT, CONDUCTIVE

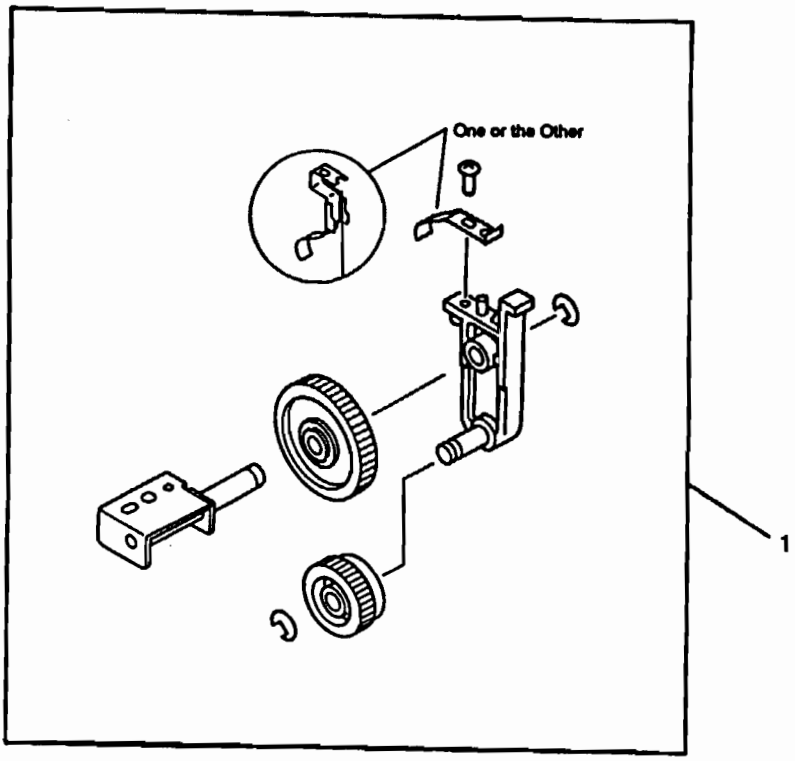


Figure 8-28. Delivery Coupler Assembly - HP 33447 and HP 33459

Table 8-28. DELIVERY COUPLER ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0967-000CN	1		DELIVERY COUPLER ASSEMBLY

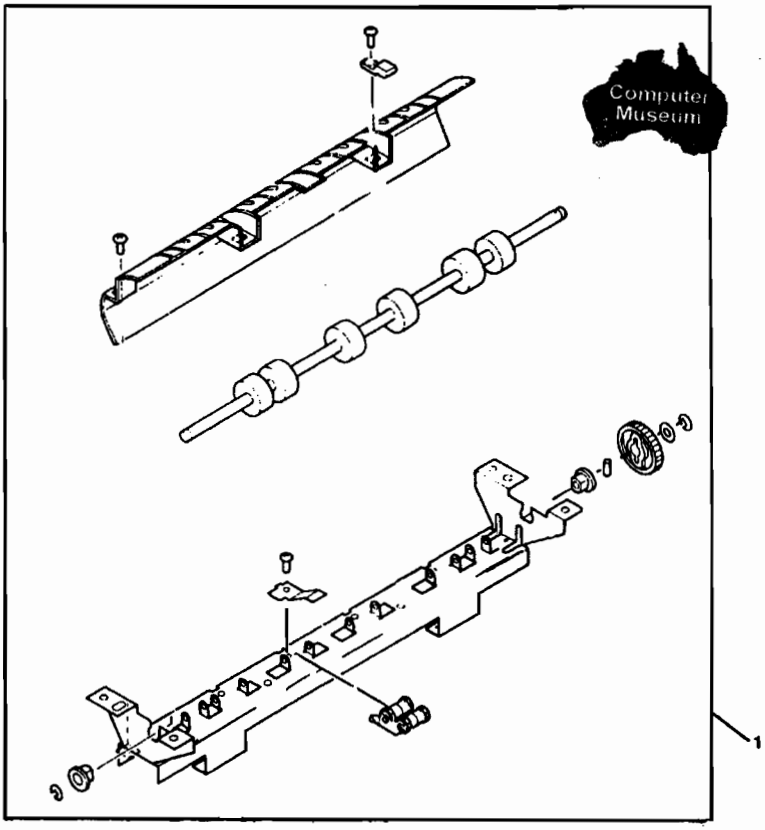


Figure 8-29. Delivery Assembly (Face-Down Tray) HP 33447 and HP 33459

Table 8-29. DELIVERY ASSEMBLY (Face-Down Tray)

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0945-000CN	1		DELIVERY ASSEMBLY

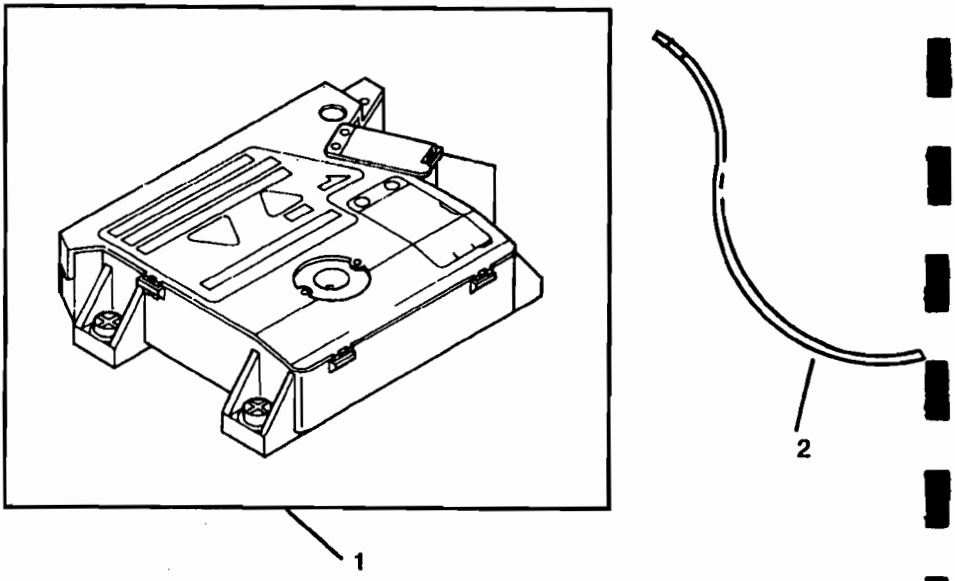


Figure 8-30. Laser Scanning Assembly - HP 33447 and HP 33459

Table 8-30. LASER SCANNING ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG0-0050-030CN	1		LASER/SCANNING ASSEMBLY
2	RH2-5075-000CN	1		FIBER OPTIC CABLE (HP 33447)
2	RH2-5109-000CN	1		FIBER OPTIC CABLE (HP 33459)

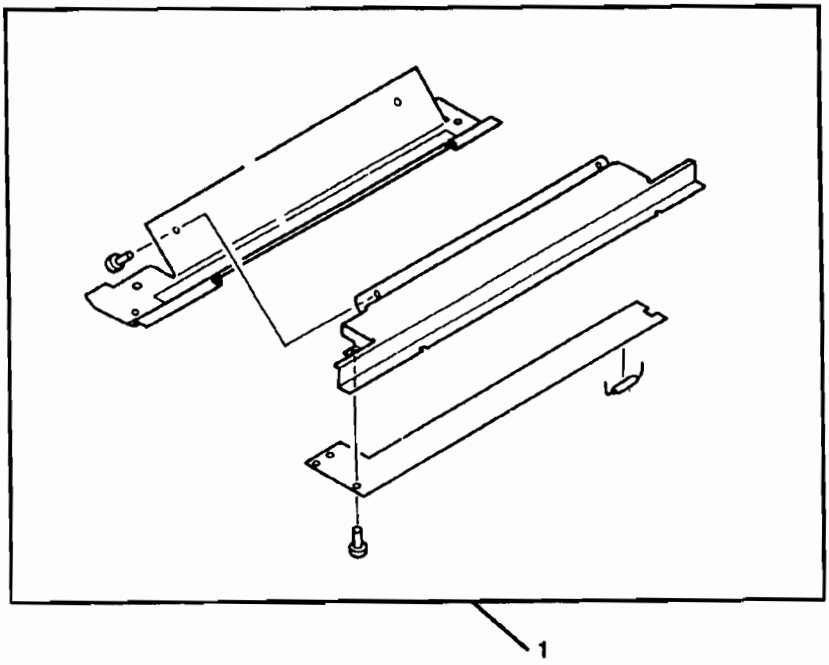


Figure 8-31. Erase Lamp Assembly - HP 33447 and HP 33459

Table 8-31. ERASE LAMP ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0946-000CN	1		ERASE LAMP ASSEMBLY

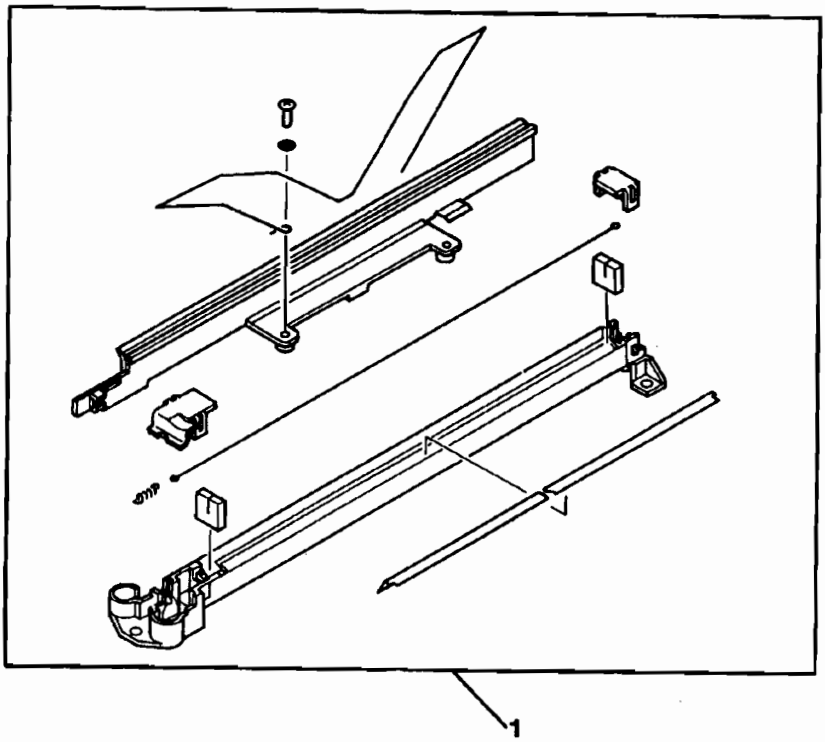


Figure 8-32. Transfer Corona Assembly - HP 33447 and HP 33459

Table 8-32. TRANSFER CORONA ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0933-060CN	1		TRANSFER CORONA ASSEMBLY

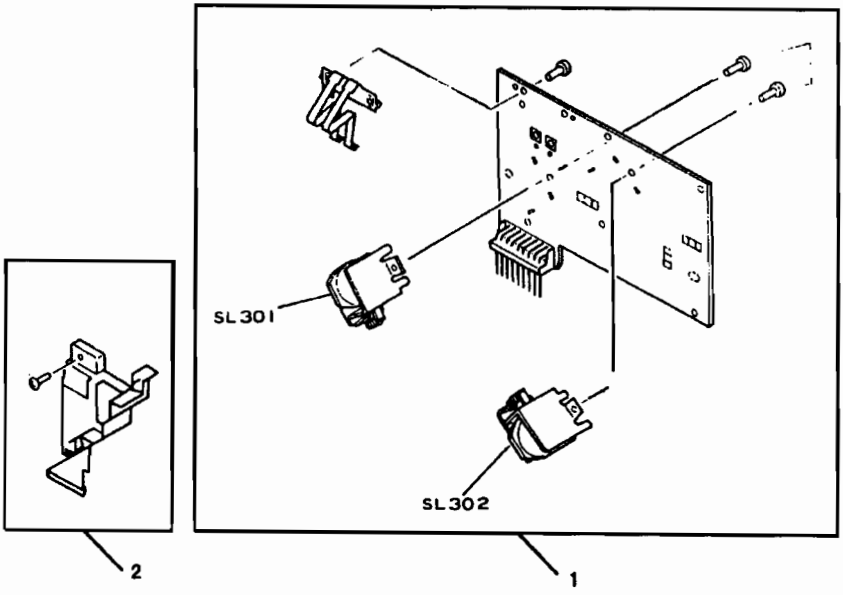


Figure 8-33. Paper Control PCA - HP 33447 and HP 33459

Table 8-34. PAPER CONTROL PCA

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0718-000CN	1		PAPER CONTROL PCA (HP33447)
1	RG1-2549-000CN	1		PAPER CONTROL PCA (HP33459)
2	RA1-4599-000CN	1		COVER, PAPER CONTROL PCA

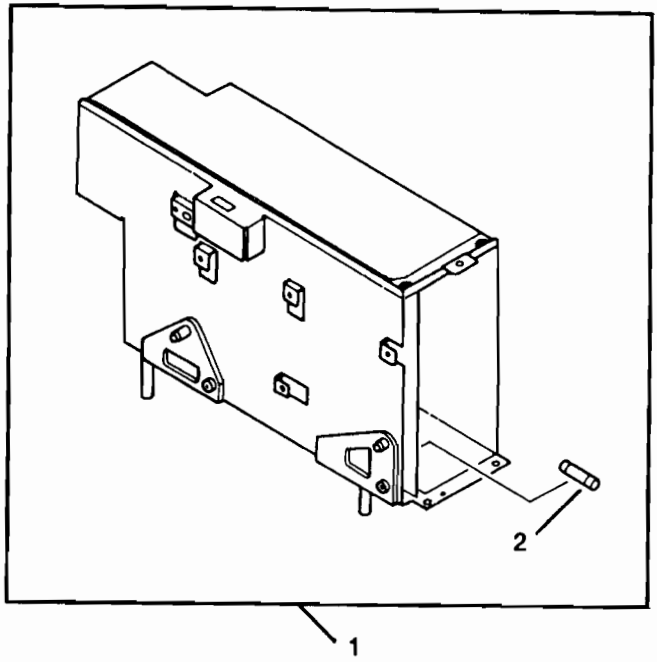


Figure 8-34. DC Power Supply Assembly - HP 33447 and HP 33459

Table 8-34. DC POWER SUPPLY ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1310-000CN	1		DC POWER SUPPLY 100/115V (HP 33447)
1	RG1-1312-000CN	1		DC POWER SUPPLY, 240V (HP 33447)
1	RG1-2007-000CN	1		DC POWER SUPPLY 100/115V (HP 33459)
1	RG1-2009-060CN			DC POWER SUPPLY, 240V (HP 33459)
2	WD1-0222-000CN	1		DC POWER FUSE 250V/3.15A
2	WD1-0224-000CN	1		DC POWER FUSE 125V/6.3A

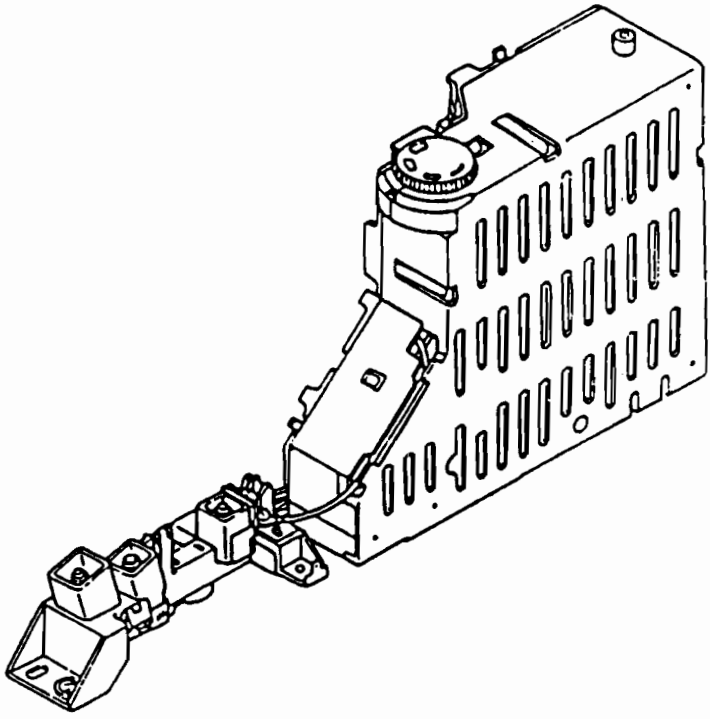


Figure 8-35.
High-Voltage Power Supply Assembly - HP 33447 and HP 33459

Table 8-35. HIGH-VOLTAGE POWER SUPPLY ASSEMBLY

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-0936-110CN	1		HIGH-VOLTAGE POWER SUPPLY ASSEMBLY

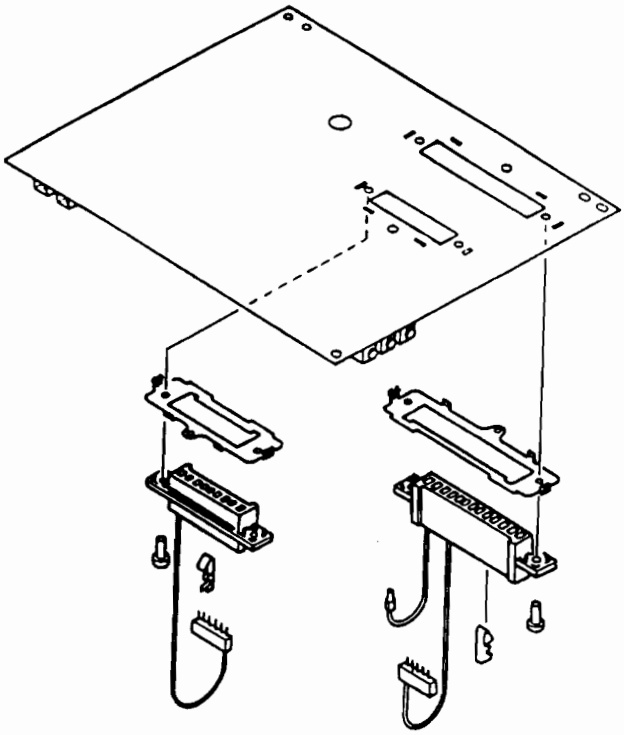


Figure 8-36. DC Controller PCA - HP 33447 and HP 33459

Table 8-36. DC CONTROLLER PCA

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	RG1-1278-000CN	1	New	DC CONTROLLER PCA (33447)
1	RG1-1970-000CN	1	New	DC CONTROLLER PCA (33459)

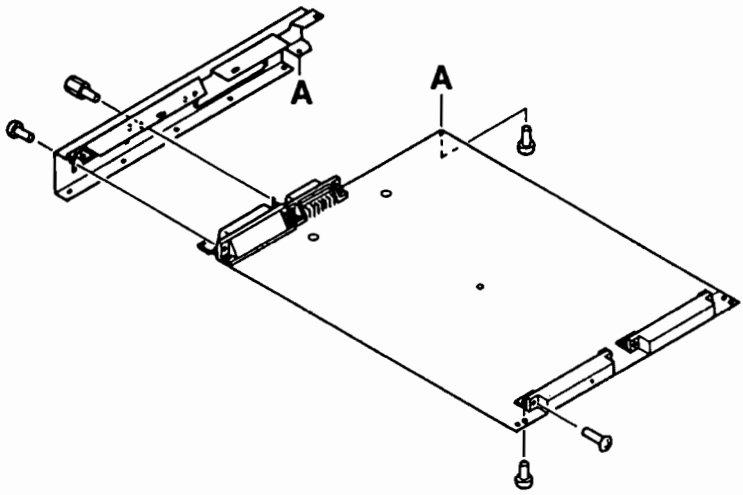


Figure 8-37. Formatter PCA

Table 8-37. FORMATTER PCA - HP 33447/HP 33459

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	33446-69001	1	Rebuilt	INTERFACE PCA (HP 33447)
1	33446-60001	1	NEW	INTERFACE PCA (HP 33447)
1	33451-60001	1	New	FORMATTER PCA (HP 33459)
1	33451-69001	1	Rebuilt	FORMATTER PCA (HP 33459)

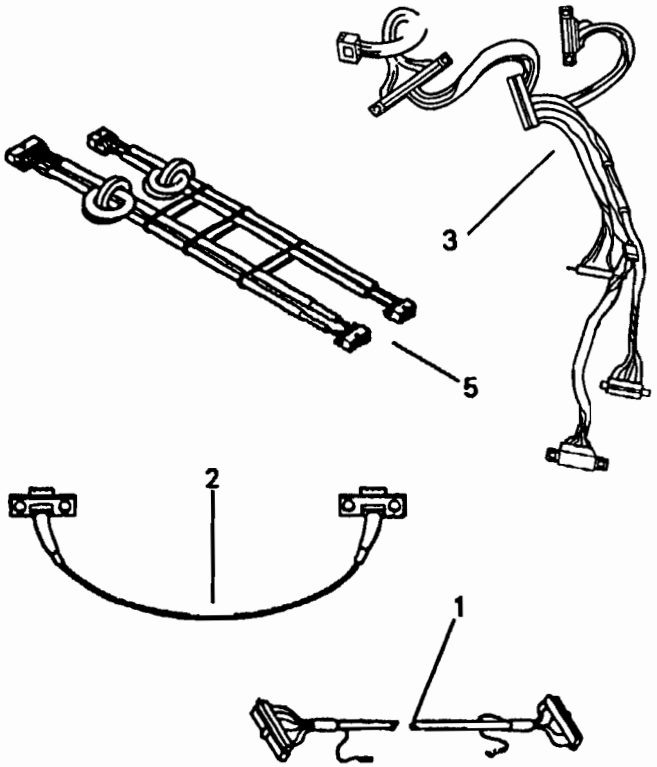


Figure 8-38. Control Panel Cable Assembly - HP 33447 and HP 33459

Table 8-38. CONTROL PANEL CABLE ASSEMBLY AND CONNECTOR CABLES

REF	PART NUMBER	QTY	SRC	DESCRIPTION
1	SG5-4022-000CN	1		PANEL CABLE ASSEMBLY
2	RG1-0905-000CN	1		AC POWER MODULE/DC POWER SUPPLY CABLE
3	RG1-1318-000CN	1		UPPER MAIN CABLE HARNESS (100/115V)
3	RG1-1632-000CN	1		UPPER MAIN CABLE HARNESS (240)
3	RG1-1319-000CN	1		LOWER MAIN CABLE HARNESS
5	RG1-1370-000CN	1		LASER/SCANNING CABLE ASSEMBLY (HP33447)
5	RG1-2067-000CN	1		LASER/SCANNING CABLE ASSEMBLY (HP33459)

Glossary

Application
A software program or group of programs, for example, Wordstar and Lotus 1-2-3, for solving common business tasks.

Assembly
A collection of printer components assembled into a single replaceable unit.

Attendance Message
A Control Panel display message asking that the user perform a requested task, such as loading paper, before printing continues.

Baud Rate
The data transfer rate between the computer and the printer. The computer and the printer must be configured at the same baud rate. It can be set between 300 and 19,200 baud, depending upon the type of computer used.

Bitmapped Font
A particular collection of symbols with fixed character size and shape.

Beam Detect Mirror
Reflects 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 Beam Detect signal.

Cold Reset
Used to return the user default settings for both the Printing and I/O Configuration Menus back to the initial factory settings.

Component
A single part of the printer that does not have any attached parts.

Configuration
The process of specifying certain settings to allow the 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. An "MS-DOS" computer is configured through MODE commands in the AUTOEXEC.BAT file.

Configuration Menu
One of two Control Panel menus accessed using the (MENU) key. The Configuration Menu contains printer configuration settings such as communication parameters, Resolution Enhancement levels, and memory configuration.

Control Panel
The main printer access and display panel used to modify the printer's printing and configuration information as well as to display printer status. Usually, the computer's software application can send signals to modify the printer's printing information (lines-per-page, font type used, page orientation, etc.). Refer to Chapter 3, Section 3-2, "Unpacking and Installation," for more information.

Cotton Bond
A type of paper which includes a percentage of cotton fibers. It is usually used when a "high-quality" paper is desired.

DC Controller PCA
Synchronizes all printer operations by monitoring and supplying voltages to all electro-mechanical assemblies inside the printer.

Default
A printer setting used in the absence of a software application selection.

Dots-per-inch (DPI)
The number of horizontal and vertical dots produced by a printer inside the area of a square inch. The HP 33447 and HP 33459 printers are capable of producing a vertical dot every 1/300th of an inch and a horizontal dot every 1/300 of an inch.

Downloading

Refers to the process of transferring fonts or macros stored on disks to the printer's memory. These transferred fonts and macros are stored in the printer until it is turned off or they are removed by a software printer command.

Dual I/O Interface

The HP 33447 and HP 33459 printers come with two interface ports, serial and parallel. The serial port can be configured as either RS-232 or RS-422.

Electrostatic Discharge (ESD)

Electrical charges generated by friction that are displaced to another object. Electronic components can be permanently damaged by Electrostatic Discharge.

Embedded Printer Commands

Printer commands written by the user directly into a software file.

Escape Sequences

Software commands to the printer. The printer distinguishes these commands from regular text by the presence of an , a special control code which precedes the character string.

EP-S Cartridge

Contains items such as the cleaning blade, primary corona, photosensitive drum, 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 4,000 pages.

Error Message

A Control Panel display message that informs the user when the printer stops due to a data or print error.

Face-Up Tray

A tray, which can be opened at the rear of the printer, which supports printed pages stacked in face-up, reverse order.

Factory Default Settings

The Control Panel menu settings that are programmed into the printer at the factory. These settings are used as defaults unless they are changed by user Control Panel selections or overridden by print commands sent through a software application.

Flowchart

A diagram used to provide detailed sequential direction through a linear 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 derived from a specific typeface. 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 floppy disks.

Font Cartridge

A plug-in device containing additional fonts. 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.

Front Panel

Referred to in previous documents as the printer's "front," "display," or "pushbutton" panel, it is now referred to as the Control Panel. (The "front cover panel" or simply "front panel" is the front portion of the Main Body Covers.)

Internal Fonts

The fonts resident in the printer when shipped from the factory.

Keys

The HP 33447 and HP 33459 printers have eight Control Panel keys used to access specific functions of the printer (see Chapter 3).

Laser Beam

Amplified light waves that are concentrated by the Laser PCA to produce an intense beam of light which writes on the EP drum to produce an image.

Laser Printing Process

The stages of the Laser Printing Process which must each function independently and be coordinated with all other printer processes

to form an image (see Chapter 5, Section 5-2, "Image Formation System").

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 the user select printing defaults such as the number of copies to print and the default font. The Configuration Menu lets the user select configuration items, such as parallel or serial I/O configuration.

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 indicator is on.

Orientation

Orientation refers to the direction of print on the page. Printing across the narrower dimension of a page is called portrait orientation printing. The word *portrait* is derived from portraits of people which are usually vertical in format. Printing across the wider dimension of a page is called landscape orientation printing. The term *landscape* is derived from pictures of the landscape which are usually horizontal in format.

Output Tray

Two output trays are available with the HP 33447 and HP 33459 printers: the Face-Up (Rear) Output Tray and the Face-Down (Top) Output Tray.

Page Count

The HP 33447 and HP 33459 printers keep a record of the number of pages they print. This record is called the Page Count. Each time the printer is turned off, the Page Count is rounded down to the closest increment of ten. To alter the Page Count, the technician must be in the Service Mode. Page Count is displayed as part of the Self-Test Printout.

Page Protection

Reserving a block of printer memory to prevent 21 PRINT OVERRUN errors when composing very dense or complex graphics and text (see Chapter 3, Section 3-4, "Using the Printing and Configuration Menus").

Paper Jam

A paper jam describes what happens when paper gets stuck somewhere inside the printer's paper path. Paper jams can be caused by toner buildup in the Fusing Assembly, faulty photosensors, worn printer parts, or poor or improperly handled media.

Paper Path

The route the paper takes during the printing process. It begins at the paper pick-up area and ends when the paper exits the printer at the paper output tray.

Permanent Soft Fonts

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. (Resetting the printer does *not* clear a permanent font from memory.) (See *downloading*.)

Photosensitive Drum

The Photosensitive Drum in the *EP-S Cartridge* 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 the presence of paper inside the printer.

Pitch

The number of characters printed per horizontal inch. Pitch applies only to fonts with *fixed spacing*.

Point Size

The height of a font. Point size is measured from slightly above the top of uppercase letters to slightly below the bottom of lowercase descenders, such as the tail of the letter "y." There are 72 points per inch.

Primary Corona

The Primary Corona, located inside the EP-S Cartridge, is used to neutralize the photosensitive drum's surface charge and place a uniform charge back onto the drum. Refer to Chapter 5, Section 5-2, "Image Formation System."

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 filled areas that are not totally covered. The print density can be adjusted in LaserJet printers.

Print Period

The print period begins when the DC Controller PCA receives a $\overline{\text{VDO}}$ signal from the Interface/Formatter PCA and ends when the last line of print data is transmitted.

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.

Proportional Spacing

The horizontal spacing between characters based upon the character's relative width, rather than a fixed cell size. The width of each character cell varies.

Resolution Enhancement (RET) (HP 33459 only)

An HP 33459-only feature that improves the 300 dpi print quality standard.

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 is recommended.

Rotating Scanner Mirror
This mirror, part of the Laser/Scanning Assembly, is used to scribe and reflect the laser beam onto the photosensitive drum.

Scalable Type
Scalable type refers to characters (generated from a specific typeface) that can be scaled to virtually any desirable size or pitch. This provides significantly expanded font capabilities with only a few typefaces (from which the font shapes are generated). This feature is built into the HP 33459.

Self Test
Used to verify proper printer operation (see Chapter 3, Section 3-6, "Self Tests").

Service Message
This is a Control Panel display message that informs the user when a printer part fails to perform correctly.

Service Mode
While in Service Mode, the user can print a Chart A printout, Service Mode Self Test printout, and change the Page Count.

Set-Up Strings
Embedded commands, usually for initializing the printer, that precede any other print data.

Soft Font
Soft fonts are fonts created or stored on disks. They can be transferred to the printer's memory where they remain available to be used until the printer is turned off.

Solenoid
An electrically directed mechanism used to control the movement of gears inside the printer.

Spacing
The distance between individual printed characters. All fonts have either *fixed* or *proportional* spacing.

Standby Period
This is the period of time just after power up, after the self test has executed and the Fusing Assembly has reached its operating temperature. The printer is READY but has not received the first

print command (PRNT) from the Interface/Formatter PCA. Note that this is characteristic of a READY printer with no Main or Scanner Motor operating.

Status Message
Control Panel display messages that keep the user informed of the printer's current operating status.

Stroke Weight
The thickness of a printed font: for example, light, medium,and bold.

Style
The slant of a font: for example, *upright* (normal text) or *italic* (slanted text).

Symbol Set
A unique grouping of all the available characters in a font. Each symbol set is defined with a specific set of applications in mind. For example, the LEGAL symbol set includes special characters used in the law profession.

Temporary Font
A font that resides in printer's memory until the user prints a font list, resets the printer, powers the printer off, or clears or replaces it using a software command. Temporary fonts are not listed on the font printout because they are erased when the font list is generated.

Test Print
Used to verify proper operation of the print engine controlled by the DC Controller PCA.

Toner
Toner is a dry mixture of powdered "ink" capable of being electrically charged and attracted to discharged areas on the revolving photosensitive drum in the EP-S Cartridge (see Chapter 5, Section 5-2, "Image Formation System").

Treatment
Treatment is the emphasis placed on a font, such as italic or bold. Treatment describes both style and stroke weights.

Typeface

The design aspect of fonts from which symbol sets are created (see *scalable type*).

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*.

Warm-up Period

The warm-up period covers the time from switching the printer's power ON until the fusing temperature reaches 165° C.

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