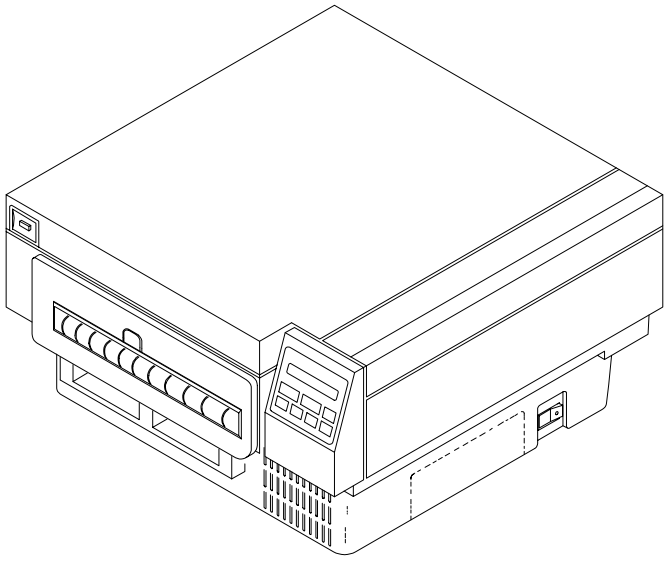
OUTPUT TECHNOLOGY

LaserMatrix®

The Continuous Form Laser Printer

Models LM2405 & LM2406
Operator Guide



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Operator Guide

Part No: 066-00493-01
Rev. F

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Output Technology Corporation — 2310 North Fancher Road
Spokane, WA 99212-1381 — USA
(509) 536-0468

We suggest you use genuine Output Technology supplies and authorized service centers. Contact us at —

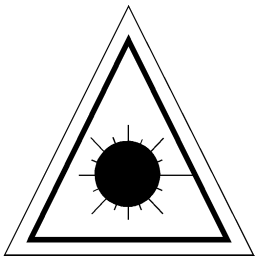
1-800-468-8788 (Voice) or (509) 533-1280 (Fax)

For service, please have your printer model and serial numbers handy — these are located on the right side of the printer.

Output Technology maintains a Bulletin Board System (BBS) service. In the U.S.A., call (509) 533-1217 to access our BBS service for the very latest drivers, firmware, pricing, maintenance and troubleshooting aids, and application information. Also, you can contact us at —

FTP: ftp.output.com/public/output
WWW: http://www.output.com

IMPORTANT SAFETY PRECAUTIONS



DANGER: LASER LIGHT CAN DAMAGE EYES. DO NOT look directly at a laser lamp. DO NOT open the top cover while the printer is operating.

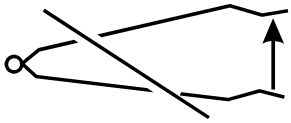
DANGER: LES RAYONS LASER SONT DANGEREUX POUR LES YEUX. NE PAS regarder directement une lampe laser. NE PAS ouvrir le couvercle d'une imprimante en cours d'opération.

VORSICHT: LASERLICHT KANN ZU AUGENSCHÄDEN FUHREN. NICHT direkt auf eine Laserlampe schauen. Bei Betrieb des Druckers NICHT den Gehäusedeckel öffnen.

PELIGRO: LAS RADIACIONES LASER PUEDEN DAÑAR LA VISTA. NUNCA dirija su vista a la lámpara lasérica. NO abra la tapa superior mientras la impresora funcione.

PERICOLO: LA LUCE LASER PUO' RECARE GRAVI DANNI AGLI OCCHI. NON guardare direttamente la lampada laser. NON aprire il coperchio della stampante, quando essa è in funzione.

IMPORTANT SAFETY INSTRUCTIONS, CONTINUED



Do not open, disassemble, or attempt to repair the Laser Scan Unit in top cover. Opening LSU will void U.S. Food and Drug Administration (FDA) certification and may void other certifications.

Ne pas ouvrir, démonter ou essayer de réparer l'unité de numérisation laser du couvercle. L'ouverture de cette dernière annulera la certification de la FDA (Food and Drug Administration) américaine et, éventuellement, d'autres certifications.

Die Laserabtasteinheit (LSU) im Gehäusedeckel nicht öffnen, zerlegen oder versuchen zu reparieren. Durch Öffnen dieser Einheit wird die Bescheinigung der US-Lebensmittelbehörde (Food and Drug Administration, FDA) und unter Umständen auch andere Bescheinigungen ungültig gemacht.

No abra, desarme ni trate de reparar la Unidad Exploradora Lasérica de la tapa superior. Al abrir dicha unidad se anula la certificación de la FDA (Food and Drug Administration de los EE.UU.) y también podrán dejarse sin efecto otras certificaciones.

Non aprire, smontare o tentare di riparare l'unità di scansione laser sul coperchio. La sua apertura invalida la legalizzazione (Food and Drug Administration, FDA) e, possibilmente, altre.

- Follow all warnings and instructions marked on the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
- Place this product on a stable surface such as the LaserMatrix Refolding Stacker.
- Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked by paper or adjacent equipment.
- This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
- This product is equipped with a 3-wire, grounding-type plug, a plug having a third (grounding) pin. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.
- Do not use this product with an extension cord.
- Do not attempt to service this equipment yourself, except for operator replaceable consumables such as toner or paper. Opening or removing covers may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel. In the event of product damage, liquid spillage, or a distinct change in performance requiring service unplug the product from the wall outlet.
- Make sure the power is OFF any time you are connecting or disconnecting the power cable or interface cable.
- The fuser assembly becomes very hot while the printer is operating.

- If any object is accidentally dropped into the printer, turn the power OFF and carefully remove the object.
- Never operate the printer without the supplied ozone filter.

SUPPLIES & SERVICES

Important ! For highest quality results, insist on genuine, factory-approved toner and other consumer replaceable cartridges and consumables.

Output Technology toner contains a specially formulated toner that lasts longer, provides sharper images, and prevents damage of vital components. Obtain factory-approved toner, developer, and drum cartridges, and other consumables from your dealer or directly from the printer manufacturer:

Output Technology Corporation
2310 North Fancher Road — Spokane, WA 99212-1381
Voice 1-800-468-8788 — Fax (509) 533-1280

If you need service, contact us for the name of the nearest certified service agent. Please have your printer model and serial numbers handy — these are located on the side of the printer.

DOC COMPLIANCE STATEMENT

This digital apparatus does not exceed the limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques prescrites dans le règlement sur le brouillage radioélectrique éditcté par le Ministère des Communications du Canada.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that it and the receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from —

The U.S. Government Printing Office, Washington, DC 20402
Stock No. 004-000-00345-4.

Note: Making changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

EPA ENERGY STAR PRINTERS PARTNER

This 2400 Series Printer complies with voluntary standards for low-power consumption as set forth by the U. S. Environmental Protection Agency.

Contents

Print Menu

Configuration Menu

Extended Configuration Menu

Maintenance

Troubleshooting

Programmer’s Reference Guide

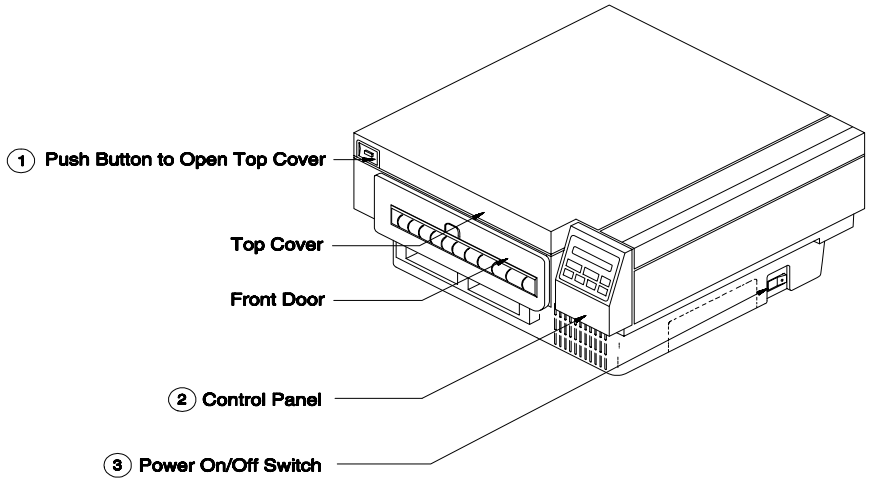
Appendix A - Memory Enhancement

Appendix B - Firmware Upgrades

1—Basics

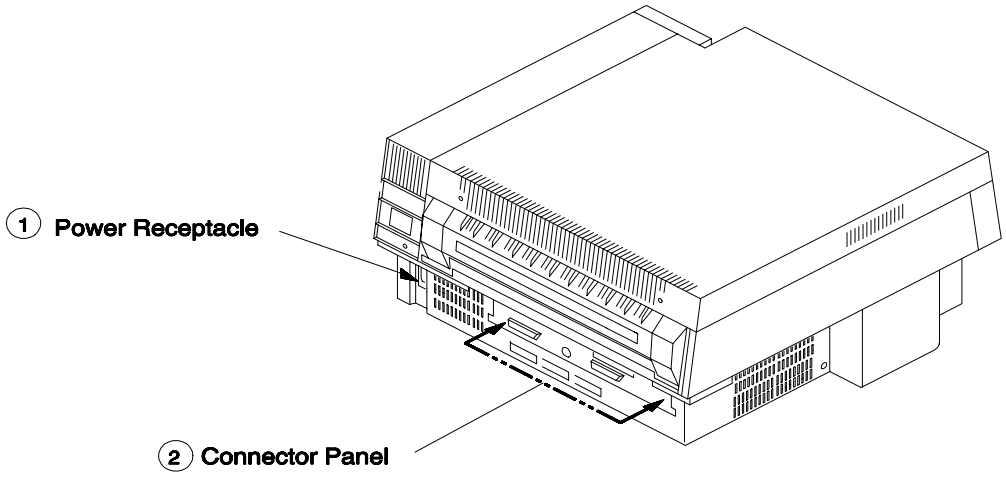
The printer is a high-speed desktop laser page printer using continuous-form media. The printer combines fast, 12- and 24-page-per-minute printing speeds with 300 dpi (dots per inch) print quality.

PHYSICAL FEATURES



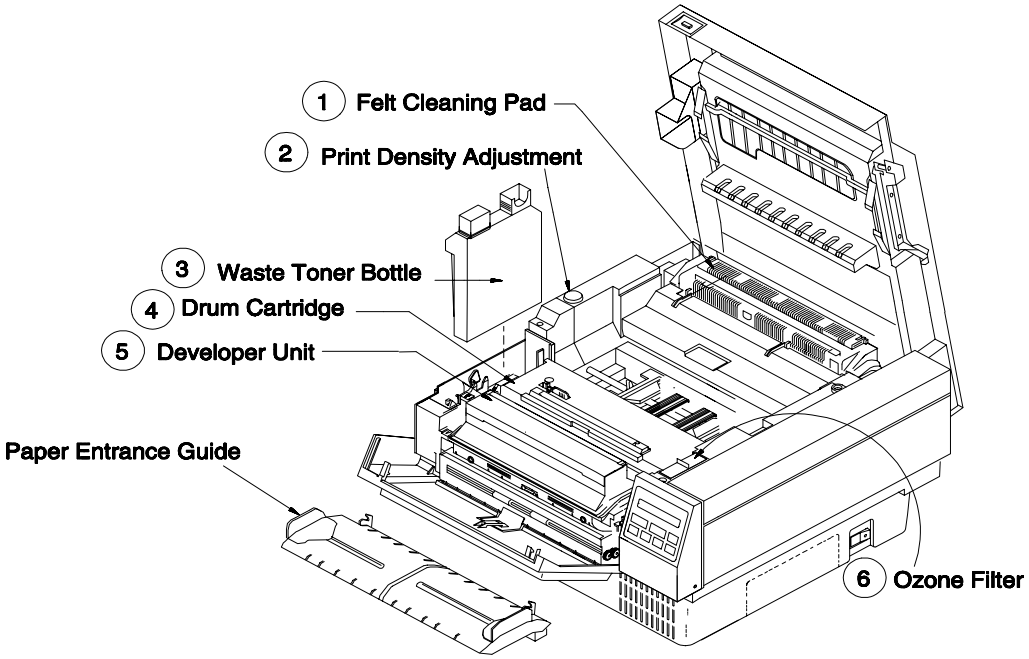
1. See Operator Access, Page 1-3.
2. See Control Panel, Page 1-7.
3. See Power On /Off Switch, Page 1-6

The Printer (Front View) PB0-D



1. See Power Receptacle, Page 1-14.
2. See Connector Panel, Page 1-15.

The Printer (Rear View) PB0-K



1. See Felt Cleaning Pad Replacement, in Section 6, *Maintenance*.
2. See Print Density Adjustment, in Section 6, *Maintenance*.
3. See Waste Toner Bottle Replacement, in Section 6, *Maintenance*.
4. See Drum Cartridge Replacement, in Section 6, *Maintenance*.
5. See Developer Unit Replacement, in Section 6, *Maintenance*.
6. See Ozone Filter Replacement, in Section 6, *Maintenance*.

Operator Access and Consumables

PB0-L3

STARTUP AND PRINTING

A *Check Paper Supply.*

If necessary, load paper. See Loading Paper in Section 2, *Operations*.

B *Close Top Cover.*

Make sure the top cover is closed. If not, hold both sides of the top cover and then gently press the cover down until it snaps into place. Make sure both sides are latched.

C *Turn on printer.*

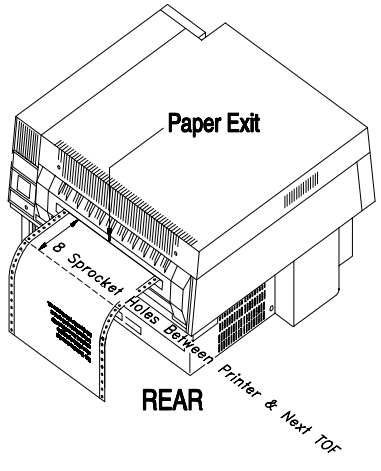
Press the **|** side of the power on/off switch (Page 1-6), located on the right side of the printer near the bottom.

D *Check Top of Form Setting.*

If you plan to print on paper already installed in the printer, the printer begins the next print job at the previously established top of form (TOF).

The next TOF should be four in. (8 sprocket holes) past the printer's paper exit, as shown in the following illustration. (When the printer begins to print, it backs the paper up to print on this TOF.)

If the top of form must be reset, you can reload paper, as described in Loading Paper, in Section 2.



PB0-N

E *If Applicable, Check That Stacker is Ready.*

F *Send Your Print File*

Make sure the READY and ON LINE lights (Pages 1-7 and 1-10) are lit and the operator access top cover and front door are closed, and then send a print file from the host computer to the printer:

- If the printer displays an error or attendance message on the control panel, see Printer Messages in the troubleshooting chart in Section 7.

- If the print is too light or dark, smudged, streaked, or dirty, see Print Quality in the troubleshooting chart.

G ***If Desired, Remove Printout:***

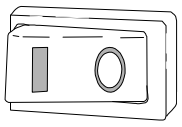
If the DATA light is lit at the end of the print job[1], press **FORM FEED** to print and eject that last page of print data before removing the print job.

When tearing off a completed print job at the exit of the printer, be careful not to pull the paper too hard to cause the top of form to shift.

CONTROLS AND INDICATORS

Power On/Off Switch

This power on/off switch is located on the right side of the printer near the bottom.



JB0-AU

Press **I** side of this switch to turn on printer. Make sure the **O** side (the off side) is depressed when:

- connecting or disconnecting cables
- performing selected maintenance and troubleshooting procedures outlined in Sections 6 and 7

When the printer is turned on, it automatically checks for:

- Paper
- Low toner

1 Normally, a computer application includes a reset command or form feed command to eject the remnant of the last page. If not, the DATA indicator remains lit following the print job. If DATA is lit and you intend to remove the printout, use the **FORM FEED** key to eject this last page. If the printout is not removed at this time, the next print job ejects the last page for you.

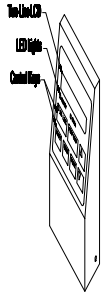
- Cover open
- Missing drum, developer, or waste toner bottle

The printer reports conditions that warrant attention on the control panel display (Page 1-13).

Control Panel

The control panel is located at the right-front corner of the printer. The control panel contains three indicator lights, seven keypad switches, and a two-line liquid crystal display (LCD).

The keypad is used to enter data, select options and modes, and retrieve printer status. Whenever a keypad key is depressed, a beeper sounds out an acknowledgment.



Control Panel PB0-I

READY The READY light is on during normal printer operation. The READY light is on when the printer is ready and capable of printing. When the READY light is off, an appropriate message is displayed on the LCD.

The READY light blinks (with DATA light on) when data bytes are being received or the printer electronics is preparing to print. The READY light

blinks (with DATA off) if the printer is printing a test page, downloading fonts, or if it encounters an error. In the case of an error, a message is displayed on the LCD.

READY and DATA work together to indicate printer status, as shown in the table on Page 1-9.

DATA		The DATA light signals the status of communication.

The DATA light is off when there is no communication with the host, or no information is in the printer's memory waiting to be printed.

The DATA light remains on when printer/host communication is active, or when printer memory contains data or commands waiting to be printed or executed.

READY and DATA work together to indicate printer status, as shown in the table titled Status Indicators.

Note: During diagnostic modes, such as printing diagnostic patterns from the Extended Configuration Menu, DATA *will* ***not light*** *as it normally would when a page is ready to be printed.*

STATUS INDICATORS

READY	DATA	Status
Flashing	**On**	Data bytes are being transferred from a host computer to printer memory; or information is being processed or waiting in memory to be transferred to the paper.
On	**On**	No more data bytes are being received from the host or being processed, but an image remains in printer memory that has not been transferred to the paper. (Press **FORM FEED** to print the page.)
On	**Off**	Printer is idle waiting for a print job. No data bytes are being transferred from the host. Printer memory is empty. All images on paper have been ejected from the printer.
Off	**Off**	Printer is not ready to accept data. A message is displayed on the LCD.
Off	**On**	Information is in memory but cannot be printed due to an error.
Flashing	**Off**	Indicates printing of a test page, accepting of downloaded fonts, or a possible problem determining type of print file. Also indicates a PostScript emulation error (for those printers with a PostScript emulation) resulting in no file being printed.

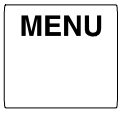
ON LINE toggles the printer between the online mode and offline mode. When the printer is taken off line, the ON LINE light is unlit, and the message Offline is displayed. When the printer is online, the ON LINE light is on and the message Ready is displayed.

ON LINE blinks if the printer is processing data at the time of an offline request[2]. When processing is complete, the offline request will be granted.

If offline, pressing **FORM FEED** always causes the printer to advance the paper by the length of one form. If information for the current page is left in the printer's memory, it will be printed when **FORM FEED** is pressed.

Note: If the last page stored in the printer's memory is not a full page and your software has not sent a command to print it, use the **FORM FEED** *key to print. Information remains stored in memory if the* DATA *light is lit.*

2 Under certain conditions, a printer lock up can occur if control panel keys are pressed while the printer is processing data. Avoid pressing control panel keys when ON LINE is blinking.



Use the **MENU** key to enter the printer menu structure. From the menus, you can select printing options and configuration settings.

There are three menus; the Print Menu, the Configuration Menu, and the Extended Configuration Menu.

To enter the Print Menu, make sure the printer is offline and then press **MENU** for less than 3 seconds while either PCL Print Menu or PS Print Menu is displayed. (See Section 3.) This menu contains standard operating selections for the PCL emulation or print utilities for the PostScript emulation (for printers with a PostScript emulation).

To enter the Configuration Menu, make sure the printer is offline and then press and hold **MENU** for about 3 seconds until Config Menu is displayed. (See Section 4.) This menu contains options for initial printer setup, interface, display language, and other settings.

To enter the Extended Configuration Menu, make sure the printer is offline and then press and hold **MENU** for about 6 seconds until Extended Config is displayed. (See Section 5.) This menu contains extended setup features as well as diagnostic information, test printouts, and maintenance counters that are unique to the printer.

From within each menu, the **MENU** key scrolls through menu items. (The ▲ and ▼ keys scroll through menu item choices.)

Use the **RESET** key to perform one of two types of printer resets: either a short Reset or a long Menu Reset. **RESET**[3] allows you to return to known Print Menu settings and clears temporary data from printer memory.

---

3 Application software routinely resets the printer before and after a print job.

When **RESET** is pressed for either of the following two types of resets, printer command settings, downloaded fonts defined as temporary, and stored print data are cleared.

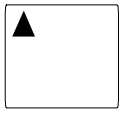
To reset to the last set of active Print Menu settings, momentarily press RESET with printer offline. (When **RESET** is pressed, Reset is momentarily displayed.) After a short pause, the printer returns online. Any Print Menu changes made by printer commands from the host are lost and replaced by your user default settings.

To reset to the factory-defined, Print Menu default settings, press and hold RESET, with printer offline, for about 3 seconds until Menu Reset is displayed. Factory defaults are the printer settings when the printer was manufactured. In addition to resetting the Print Menu, a reset to factory defaults also resets Image Vert and Image Horiz in the *Configuration Menu* (Section 4).

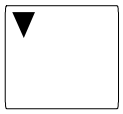
Notes:

- *Except for the* Image Vert *and* Image Horiz *settings, a menu reset does not affect any other Configuration or Extended Configuration Menu settings.*

- *Control panel resets do not erase permanent macros or permanent soft fonts listed on the font page printout. These permanent macros and soft fonts remain in memory until overwritten, deleted by a software command, or the printer is turned off. However, temporary macros and soft fonts, as well as any other data waiting to print, are erased.*



When a menu is displayed, use ▲ (the UP key) and ▼ (the DOWN key) to scroll through the choices for a selected menu item. Each time the ▲ or ▼ key is pressed, the next choice is displayed.



The ▲ and ▼ keys are also used to fine tune the print image position vertically and horizontally. See Shifting Print Image Vertically and Shifting Print Image Horizontally in Section 2.

Use the **STORE** key to select the displayed choice for a menu item. The setting is saved in the printer's memory and becomes the user-defined default.

Note:

- **STORE** *is also used to begin printouts from the Print Menu. (See* Print= *in Section 3.) When* **STORE** *is pressed for a printout option (for example,* Print= Summary*), the printer begins collecting data for the printout. The* DATA *light does not flash as with host-initiated printing; consequently, the printer seems to be inactive between the time* **STORE** *is pressed and printing actually begins.*

- **STORE** *is also used to end diagnostic printouts. (See* Diag Print= *in the Extended Configuration Menu, Section 5.)*

Two-Line Liquid Crystal Display

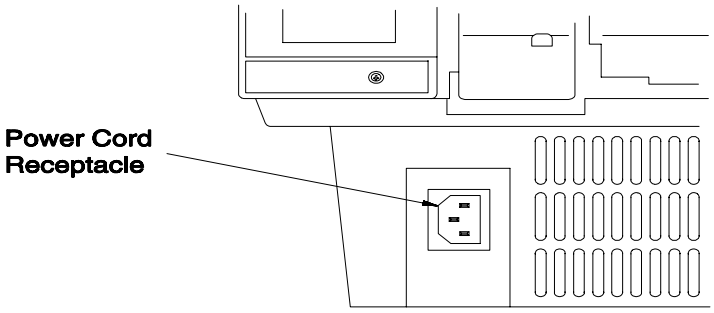
Displays status, maintenance, attendance, and error messages on the first 16-character line. (See Printer Messages in Section 7, *Troubleshooting*.) In menus, an asterisk (*) displayed to the right of a menu option indicates the current choice.

The second 16-character line contains the product name.

CONNECTIONS

Power Receptacle

The power receptacle is located at the right-rear corner of the printer, near the bottom.



Power Receptacle PB0-M

One end of the power cord plugs into the printer receptacle. The other end of the power cord plugs into a standard three-prong, grounded electrical outlet. Plug power cord only into the type of power source indicated on the agency certification label at the right side of the printer.

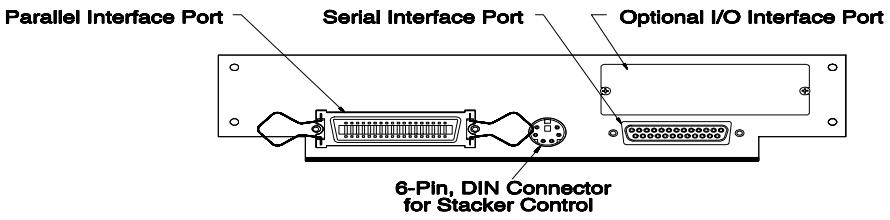
Connector Panel

Interface and stacker control connectors are located at the rear near the bottom of the printer.

Use one of the interface connectors to interconnect the printer and host computer. See the Note that follows.

Use the stacker control connector to interconnect the printer and a compatible paper stacker.[4]

Note: *Always turn the printer off when disconnecting or connecting an interface connector, always use a shielded cable, and always lock the cable connector to the printer connector, as specified in the following paragraphs.*



Rear Connector Panel PB0-F

4 The Floor Standing and Table Top Refolding Stackers are designed specifically for this printer to provide reliable paper stacking.

Parallel Interface

The parallel interface connector is a standard Centronics-type connector with 36 pins. The wire clips on the sides of the connector are used to lock in the cable connector.

Serial Interface

The serial interface connector is a standard RS-232, 25-pin, D-type connector. Normally, thumbscrews attached to the cable connector are used to lock the cable connector to the printer connector.

Optional I/O

Reserved for an unspecified, internal interface. The printer can accept an internal interface designed for the HP LaserJet III printer.

Call for a list of compatible types of optional interfaces for this printer. See the phone numbers listed at the front of this publication.

2 —Operations

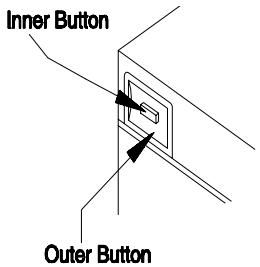
ROUTINE OPERATIONS

Loading Paper (or Other Media)

Note: *The printer automatically senses the leading edge of the first form loaded into the printer.*

- *When loading forms of a different form length, specify the length of the new form under* PSize=... (*Configuration Menu, Section 4) before sending the print job. At the start of that print job, the printer senses the paper's leading edge and set subsequent TOFs based on the* PSize=... *setting.*

- *If the new form size is set by printer commands from the host computer, then the printer stops and displays the message* Load New Forms.[1] *After the new forms are installed, the printer senses the leading edge and set subsequent TOFs based on these printer commands.*

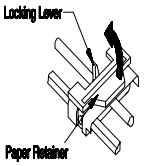


CB0-AK2

1. Unlatch the top cover by pressing in the compound button on the top left corner at the front of the printer.

2. Raise the top cover.

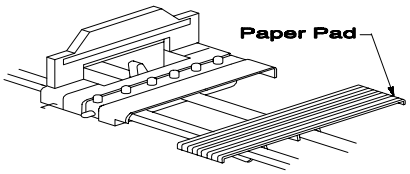
1 The Load New Forms message can be disabled by setting Form Cont= On* in the Extended Configuration Menu.



CB0-AN1

3. If changing to a different form width, reposition tractors to accommodate a change in paper width. To do so, push back on the green locking levers on both tractors and then reposition the tractors to approximately match the new paper. Do not lock the levers as yet.

   The tractors are mounted on a rack and pinion device so that they move as a unit. When one is moved, the other automatically adjusts to the same complementary position.



CB0-AO2

4. Open hinged paper retainers on tractors. Check that each of the two paper pads that straddle the two tractor shafts are approximately halfway between the center and edge of the paper path.

5. Check that the paper has a non-jagged, uncurled leading edge, normally along a horizontal perforation.[2]

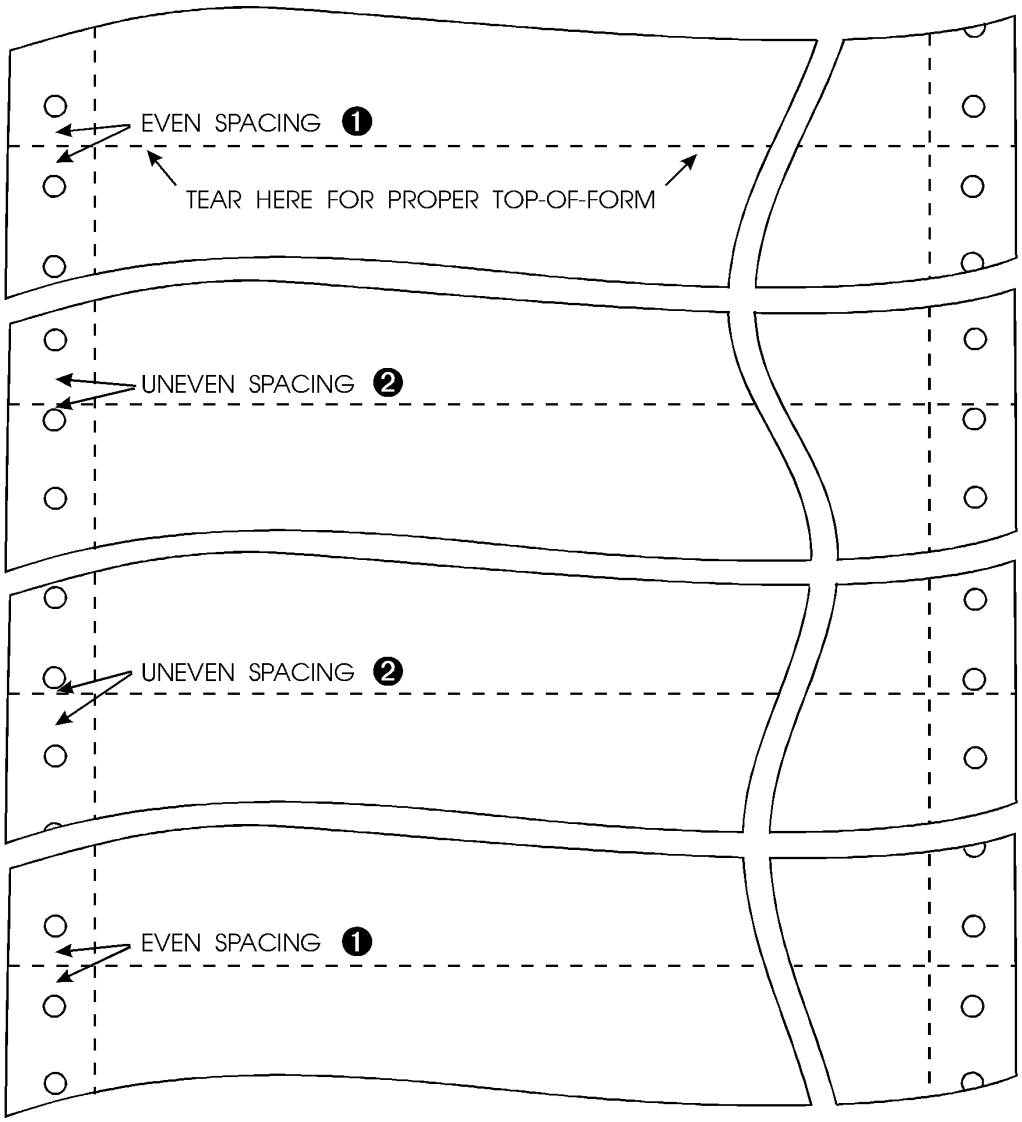
   See the Paper and Label Recommendations on the following page.

2 All horizontal perforations may not be alike. If you are using a form length which is not an exact multiple of $^{1}/_{2}$ in., such as a metric paper size (A4, for example), select the leading horizontal edge where the perf is vertically centered between preceding and succeeding paper sprocket holes. (See illustration on Page 2-4.)

Paper and Label Recommendations*

- **Type:** single-part paper. Paper without laser (clear perf) perforations stacks better.
- **Sheet Width:** 4 to 9.5 in. (approx. 101.6 to 241 mm) which includes tractor strips. Prefer wide sheets.
- **Sheet Length:** Continuous.
- **Tractor Strips:** Standard 4.00 ± 0.25 mm dia. sprocket holes, 1/4 in. from both outer edges of paper, located every 1/2 in. vertically.
- **Paper Weight:** 15-to-24 lb (56 to 90 g/m^2) bond weight. Prefer 24-lb xerographic or lasergraphic paper. Heavier weights, up to 10-point cover stock, can be used, depending on texture, moisture content, and dielectric coefficient.
- **Paper Moisture:** 4-6% by weight.
- **Paper Thickness:** Prefer caliper thickness of 3.2 to 4.5 mil (0.081 to 0.114 mm). Up to 10 mil can be used, depending on paper grade, texture, moisture content, and dielectric coefficient.
- **Paper Conductivity/Surface Electrical Resistance:** 10^8-10^{12} Ω @ 20^o C and 65% relative humidity.
- **Paper Smoothness:** 100-200 Sheffields or 20-30 Bekk.
- **Labels:** Prefer matrix-on, xerographic or lasergraphic paper with an acrylic emulsion adhesive on a kraft carrier. [If synthetic labels rather than paper labels must be used, use polyethylene terephlalate (PET, polyester) labels.] Thickness of label plus carrier should be ≦ 7.5 mil (≦ 2 mm).

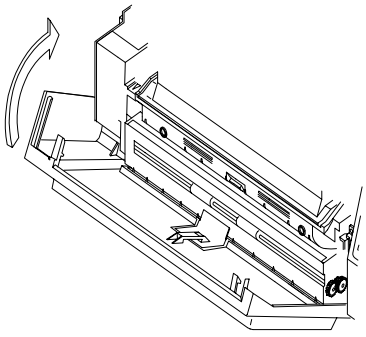
* The printer may not operate reliably or efficiently with all possible forms which fit the paper and label recommendations specified above. For information on other media (fabric, vinyl, plastics, and other heat-sensitive material), consult the media manufacturer. ***Always*** test media before purchasing large quantities.



When Loading Form, Select the First (Leading) Paper Edge Where the Horizontal Perf is Midway Between the Leading and Trailing Sprocket Holes[3]

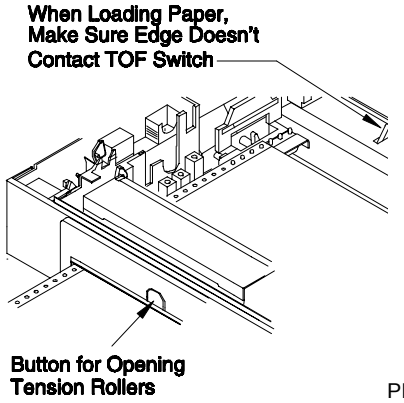
CA0-Q

3 Only necessary for media lengths which are not divisible by $^{1}/_{2}$ in., such as A4, A5, and A6.



PB0-P

6. Close the printer's front door (it should snap shut).



PB0-G2

7. Press and hold the button on the center front of the printer (to open the tension rollers) while inserting paper through entrance. Feed paper until it emerges near tractors.

8. Center paper in the printer and then place sprocket holes (on one edge of paper) onto the corresponding tractor. Do not let the leading edge of the paper extend more than an inch beyond the tractors. Then, close the hinged paper retainer.

9. Place sprocket holes on the other edge of the paper onto the sprockets of the other tractor.

10. Check that the retainers are closed and locking levers on both tractors are pulled forward to lock them. Ensure that the paper is neither stretched nor buckled.

    Note: Adjustment of the tractors is critical for jam-free operation. Make sure the paper is neither wrinkled nor overly tight.

11. Close the top cover.

12. Either turn on the printer or press **ON LINE**.

Note: When you print, Check that your printout is formatted to be at least 3/4 in. from both right and left edges of the sheet.[4] This prevents the tractor's paper retainers from smearing the edges of the printout.

Unloading Paper (or Other Media)

Unloading paper or other media correctly is as important as loading the media properly. And deciding whether to unload media can be more important.

Note: In general, do not leave heat-sensitive media in the printer when not printing. Typical heat sensitive media are labels, plastics, and vinyl.

Media can be unloaded with the printer on or off. We recommend that you unload media, especially labels, while the printer is on.

If the printer is on:

1. Separate the media at the next horizontal perf *before the paper entrance* at the front of the printer.
2. Press **FORM FEED** two or more times to advance the media through the printer.
3. Remove the last form at the rear of the printer.

4 Sheet width is defined as the form width plus right and left, 1/2-in.-wide tractor strips.

If the printer is off:

1. Separate the media at the next horizontal perf *before the paper entrance* at the front of the printer.

2. Open top cover of the printer by pressing in the compound button on the top left corner at the front of the printer and then lifting the cover.

3. Open the paper retainers on the tractors, press the button above the paper entrance on the front door, and then slightly push in on the paper at the paper entrance so that the media lifts off the tractor sprockets.

4. Close the paper retainers after lifting media off the tractor sprockets.

5. While pressing the button at the paper entrance, pull media out through the paper exit on the back of the printer.

Note: *Avoid backing media out through the paper entrance and exit slots:*

- *If you back out labels from the paper entrance, you risk having labels lift off the backing paper.*

- *Unless paper is jammed at the fuser, avoid pulling the paper back into the printer through the paper exit slot.*

Setting Top of Form

Top-of-form (TOF) is automatically sensed when media is loaded in the printer. The printer advances the paper, detects the leading edge of the newly installed forms, and then begins printing.

Subsequent TOFs are set based on the value of the Configuration Menu's PSize= setting.

If the TOF is not set correctly[5], either reload forms (Page 2-1) or offset the page image in relationship to the TOF using the ▲ and ▼ keys, as described in the following paragraphs.

Shifting Print Image Vertically

The printout can be shifted up or down using the ▲ and ▼ keys in either the Configuration Menu or during printing, as explained in the following subsections. This offsetting of the print image allows for minute differences in printers and paper to assure exact print image registration, especially on preprinted forms and labels.

- ▲ is used to raise the print image by as much as 199 scan lines
- ▼ is used to lower the print image by as much as 199 scan lines

Since each scan line of a 300 dpi printer is $^{1}/_{300}$th of an inch, the ± 199 scan line offset range is equivalent to a ± $^{2}/_{3}$ in. vertical shift of the print image in relationship to the TOF.

The offset made using the ▲ and ▼ keys remains in effect until it is changed again, or the printer is reset to factory defaults (by pressing **RESET** for about 3 seconds with the printer offline for a Menu Reset).

Remember: Shifting the printout (the print image) up or down does not alter the printer's perception of TOF. Only the print image shifts in relationship to the predefined TOF. Theoretically, the print image can be moved up into the no-print area on standard forms such that the print image is actually clipped off at the top of the printout.

5 The printer can lose TOF due to an error or an input/output ports change.

Shift Print Image Using the Configuration Menu

1. With printer offline, press the **MENU** key for about 3 seconds until Config. Menu is displayed.

   After the key is released, the printer displays the I/O=... default.

2. Press **MENU** until Image Vert=... is displayed.

3. Press and hold ▲ or ▼ key until the number of scan lines is displayed for raising (+) or lowering (-) the print image.

4. Press **STORE** to lock in the offset setting.

5. Press **ON LINE** to return online.

Shift Print Image While Printing

1. Press and hold both ▲ and ▼, simultaneously, for one to two seconds.

   The display shows the present print image offset setting from the Configuration Menu. The print job continues to print using this offset.

2. Press and hold ▲ or ▼ key until the desired number of scan lines is displayed for raising or lowering the print image.

3. Press **STORE** to lock in the new offset setting.

4. Press **ON LINE**.

   The offset adjustment takes effect when the printer encounters the next TOF, or whenever the **STORE** key is pressed again.

Shifting Print Image Horizontally

The printout can be shifted right or left using the ▲ and ▼ keys in either the Configuration Menu or during printing, as explained in the following subsections.

- ▲ is used to move the print image to the left by as much as 199 dot positions
- ▼ is used to move the print image to the right by as much as 199 dot positions

Since each dot of a 300 dpi printer is $^{1}/_{300}$th of an inch, the ± 199 dot range is equivalent to ± $^{2}/_{3}$ in.

The offset and adjustment made using the ▲ and ▼ keys remain in effect until it is changed again, or the printer is reset to factory defaults (by pressing **RESET** for about 3 seconds with the printer offline for a Menu Reset).

Shift Print Image Using the Configuration Menu

1. With printer offline, press the **MENU** key for 3 seconds until Config. Menu is displayed.

   After the key is released, the printer displays the I/O=... default.

2. Press **MENU** until Image Horiz=... is displayed.

3. Press and hold ▲ or ▼ key until the desired number of scan lines is displayed for shifting the print image left (▲) or right (▼).

4. Press **STORE** to lock in the offset setting.

5. Press **ON LINE** to return online.

Shift Print Image While Printing

1. Press and hold ▲ and ▼, simultaneously, for one or two seconds.

   The display shows the present TOF offset.

2. Press **MENU**.

   The display shows the present horizontal offset, Image Horiz=..., from the Configuration Menu. The print job continues to print using this offset.

3. Press and hold ▲ or ▼ key until the desired number of scan lines is displayed for shifting the print image left (▲) or right (▼).

4. Press **STORE** to lock in the offset setting.

5. Press **ON LINE**.

   The left or right offset adjustment takes effect the next time the printer encounters a new form, or when **STORE** is pressed again.

Setting Up a Page Size

The Configuration Menu allows for selection of either one of several standard forms (Letter, Executive, Legal, A4, A5, A6) or a custom form, as follows:

Note: The page size can also be set up using printer drivers and embedded printer commands:

- *For Microsoft Windows, use the LaserMatrix printer driver; to obtain a free copy, contact the printer manufacturer.*
- *To embed printer commands, see Section 8, Programmer's Reference Guide.*

1. With printer offline, press and hold **MENU** for 3 seconds until Config Menu is displayed.

   After the key is released, the printer displays the I/O=... default.

2. Press **MENU** until PSize=... is displayed.

3. Use ▲ and ▼ to select either a standard page or a custom form size, as detailed in either Standard Page or Custom Form in the following paragraphs.

   Note: If the form size is changed with print data remaining in the print buffer (indicated by the DATA *light remaining lit), the printer prints the contents of the print buffer before changing to the new form size.*

Standard Page

a. Choose from one of the following:

   - Letter ($8^1/_2$ x 11 in.), Executive ($7^1/_4$ x $10^1/_2$ in.), A4 (210 mm x $11^2/_3$ in.), or Legal ($8^1/_2$ x 14 in.) , if Page Units= In*
   - A4 (210 x 297 mm), A5 (148 x 210 mm), or A6 (105 x148 mm) if Page Units= Mm*

b. Press **STORE** to lock in the standard form selection, then press **ON LINE** to return online and to make that selection the new page size.

Note: ***Standard page sizes impose top and bottom no-print zones.***

- *In PCL emulation, this printer, like other PCL printers, enforces a no-print zone of approximately 1/6 in. at the top and bottom of standard page sizes. In addition, the printer imposes built-in (default) top and bottom margins of 1/2 in.*[6]
- *In the optional PostScript emulation, this printer, like a sheet-fed PostScript printer, enforces a no-print zone of approximately 1/5 in. at the top and bottom of the page.*

For more about standard pages versus custom forms, see PSize=... in Section 4, *Configuration Menu*.

c. When the physical form size changes, the fuser temperature may need to be changed in the Extended Configuration Menu. Check the Optimum Fuser Temperature table on Page 2-15.

Custom Form

A custom form allows printing from perf to perf, the entire form length.

a. Choose from the following custom form lengths:

- 1/2 in. to 33 in. in 1/8 in. increments if Page Units= In*
- 12 mm to 838 mm in 1-mm increments if Page Units= Mm*

b. Press **STORE** to lock in the custom form length, then press **ON LINE** to return online.

c. If desired, select a custom form width:

6 The built-in top-and-bottom-margin defaults are overridden by printer commands, normally from an application's printer driver.

Note: If a custom form width is not selected, the printer uses the width of the prior form.

1) Press **ON LINE** to place printer offline.

2) Press and hold **MENU** until Extended Config is displayed, followed automatically by Reset Cnt.= FusPd.

3) Press **MENU** until Frm Width=...* [7] is displayed.

   If the previous form length was a standard form length, such as Letter, Executive, A4, etc., then Frm Width= Off*.

4) Use ▲ and ▼ to select a custom form width between:

   - 3 1/2 in. and 8 in. if Page Units= In.*
   - 89 mm and 203 mm if Page Units= Mm*

5) Press **STORE** to lock in the custom form width, then press **ON LINE** to return online.

For more about standard page versus custom form sizes, see PSize=... in Section 4, *Configuration Menu*.

d. If applicable, load or reload forms.[8]

e. When the physical form size changes, the fuser temperature in the Extended Configuration Menu may need to be changed. Check the Optimum Fuser Temperature table that follows.

---

7 Frm Width=...* only appears in the Extended Configuration Menu if a custom form length is entered for PSize=...* in the Configuration Menu. If a standard page size is selected, Frm Width= ... is not displayed. A custom form width cannot be selected without the selection of a custom form length.

8 Even if the new format will be printed on the paper currently in the printer, the paper may need to be reloaded for top of form.

f. When changing from a standard page size to a custom form (or change from one custom size to another) include a form feed before the start of the next print job.

OPTIMUM FUSER TEMPERATURE

Form Width	Optimum Fuser Temperature for 24 lb Bond Weight Paper[9]
Letter	177°C
Legal	177°C
Executive	177°C
4-5 in. (100-125 mm)	161°C
5-6 in. (125-150 mm)	169°C
6-9 in. (150-240 mm)	177°C
A4	177°C
A5	169°C
A6	161°C

Inserting Optional Font Cartridges

Note: Be sure the printer is off whenever inserting or removing font cartridges. The printer may not recognize the font cartridge if it is inserted after the printer has been on.

Font cartridges only apply to the PCL emulation. Font cartridges must be HP LaserJet III compatible, with the following exclusions:

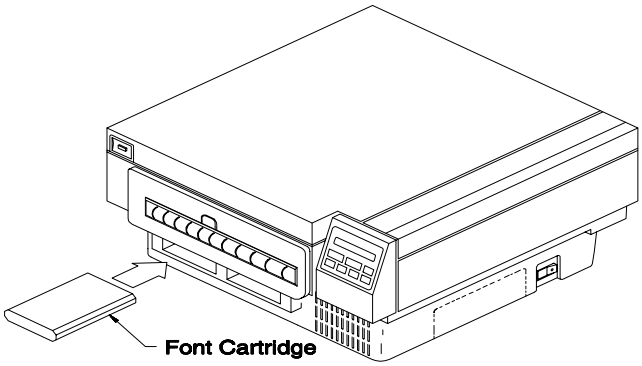
9 The optimum fuser temperature may vary somewhat with the type of media (labels, plastics, vinyl, fabric, and other heat sensitive materials) and its thickness. Consult any addenda to this publication, or contact the manufacturer for recommendations. Also, see Fuser Temp= in Section 5, *Extended Configuration Menu*.

- Do not use font cartridges that contain PCL macro commands.
- Do not use font cartridges that contain both bit-mapped and outline fonts.

Insert the cartridge into either the right or left font cartridge slot in the front of the printer. (See the following illustration.) Slide it all the way into the slot and press firmly until it snaps into place.

Default cartridge fonts automatically show up as Font Src= Right or ...Left in the Print Menu.

To access these fonts, be sure to install them in the system printer driver. Instructions to do this are included in the font cartridge or application user's manual.



Font Cartridge Installation PB0-H

MENUS

The following three sections (Sections 3 through 5) provide details on using the printer's print and configuration menus. Among other things, the menus contain the printer's changeable default settings.

The printer uses three menus containing different levels of changeable options:

- The PCL Print Menu and PS Print Menu are specific to the PCL and PostScript emulations. These contain menu selections appropriate for the chosen emulation:
  - The PCL Print Menu contains basic options for status and utility printouts, font selection, page orientation, and number of copies—all of which are applicable to all PCL-type printers.
  - The PS Print Menu contains an option for status and utility printouts.[10]
- The Configuration Menu applies to both the PCL and PostScript emulations. Although many of the options in this menu parallel those of a PCL printer, others deal with the special continuous-form features of this printer in both PCL and PostScript emulations.
- The Extended Configuration Menu also applies to both PCL and PostScript emulations. This menu contains options and features which are unique to this continuous-form printer and which are not available on sheet-fed printers confined to printing standard page sizes. The Extended Configuration Menu also contains duty cycle statistics to help track periodic maintenance.

10 Typically, PostScript printers do not have menus. Rather, all page description is embedded in text files. PostScript printers do not have default settings.

The PCL Print, PS Print, Configuration, and Extended Configuration Menus maps are shown on the following pages. The underlined settings are the factory defaults.

PCL PRINT MENU*

Print= Summary, Symbols, Fonts

Copies= 1* to 5000

Font Src=[11] Left, Right, Soft, ROM*

Font #=[12] 0* (for ROM Font Source)

Pnt Size=[13] 4.00 to 999.75 (in .25 point increments)

Pitch=[14] 10* (for Font # 0 of ROM)

Orient= Lndscape, RevPort, RevLand, Portrait*

Sym=

Internal Scalable and Nonscalable Fonts		Internal Scalable Fonts Only
Roman-8*	ISO 25	VN Math
ECMA-94	ISO 21	VN Intl
PC8	ISO 17	VN US
PC8 D/N	ISO 16	PS Math
PC850	ISO 15	PS Text
Legal	ISO 14	Math 8
ISO 85	ISO 11	PI Font
ISO 84	ISO 10	MS Publ
ISO 69	ISO 6	Windows
ISO 61	ISO 4	DeskTop
ISO 60	ISO 2	
ISO 57	German	

Lines/Form=[15] 1 to 999 Lines/Form with 60* as the factory default for a Letter-size standard form.

PS PRINT MENU*

Print= Summary, Fonts

---

* Factory defaults are underlined. See Section 3, *Print Menu,* for details.

11 Displays only available sources as options.

12 Range of numbers and the default depend on the selected Font Source.

13 Displayed only if a scalable typeface is selected in Font Source and Font Number. Factory default for a scalable font is 12 points.

14 Displayed only if a font with fixed spacing is selected in Font Source and Font Number. Pitch values can range from .44 to 99.99 (in .25 pitch increments).

15 The preset vertical motion index is 6 lines/in. The default lines/form assumes a preset top and bottom margin of $^1/_2$ in. for standard forms and zero top and bottom margins for custom forms.

CONFIGURATION MENU*

I/O=[16] Serial, Optional[17], Parallel*

- *Baud Rt=* *19.2K, 38.4K 57.6K, 64.0K, 72.0K, 96.0K. 115K, 144K, 192K, 288K, 1200, 2400, 9600**
- *DTR Polarity=* *Lo, Hi**
- *XON=* *Enabled, Robust, Disabled**
- *Data Bits=* *7, 8**
- *Parity=* *Mark, Space, Even, Odd, None**
- *RS-=* *422, 232**
- *Stop Bits=* *2, 1**

Auto Cont= On, Off*

Emu=[18] Auto, PS Emul, LaserJet*

Lang= Italian, Spanish, French, German, English*

Image Vert= -199 to +199 scan lines with 0* as factory default

Image Horiz= -199 to +199 scan lines with 0* as factory default

Page Units= Mm, In*

PSize=[19]

Type	Size (Form = In)	Type	Size (Form= Mm)
Letter*	$8^1/_2$ x 11	A5	148 x 210
Executive	$7^1/_4$ x $10^1/_2$	A6	105 x 148
A4	210 mm x $11^2/_3$	A4*	210 x 297
Custom	.5 to 33 in. in .125-in. increments	Custom	12 to 873 mm in 1-mm increments
Legal	$8^1/_2$ x 14		

Pg Prot.= Off, On*

Landscape= Norm, Rev*

Jam Recover= On, Off*

---

* Factory defaults are underlined. See Section 4, *Configuration Menu*, for details.

16 This menu option may be overridden if APSense= Enable* in the Extended Configuration Menu. The following options in italics appear only if I/O= Serial* or APSense= Enable* in Extended Configuration Menu.

17 Only appears as an option if an optional I/O board has been installed in the optional I/O slot at rear of printer.

18 Auto and PS Emul only appear for those printers with a PostScript emulation. For a printer with PostScript emulation, Emu= Auto* is the factory default.

19 Printer displays options in inches if Page Units= In*, or in mm if Page Units= Mm*. If a custom length is specified, then a form width can be specified under Frm Width=... in the Extended Configuration Menu.

EXTENDED CONFIGURATION MENU*

Reset Cnt=	FusPd, Devlp. See Fuser Pad=... and Devlp. Ft=..., below
VCor.=	0.050 in, Page*
Print Speed=	12ppm, 24ppm*
Special Function=[20]	4, 0*
Fuser Temp=	130C, 138C, 146C, 153C, 161C, 169C, 177C, 184C
Sleep Delay=	0 to 60 minutes in 1-minute increments with 6m* as default
APSense=	Enable, Disable*
Hex Dump=	On, Off*
Frm Width=[21]	3.5 to 8 in. in .125-in. increments (or 89 to 203 mm in 1-mm increments), Off*
Form Cont=	On, Off*
PCL Frm Ctl=	Off, On*
Tot. Ft.=	nnnnnnnn feet, total feet of all media printed by printer engine. Not resetable.
Drum Feet=	nnnnn feet, total feet of all media printed by present drum. Reset by changing drum.
EC FW Ver=	nn-nn, present engine controller firmware version.
RIP FW Ver=	nn-nn, present raster image processor firmware version.
Devlp. Ft=	nnnnn, number of ft printed using the present developer. Can be reset by Reset Cnt= Devlp.
Fuser Pad=	nnnnn, number of ft printed using the present fuser pad. Can be reset by Reset Cnt= FusPd.
Scan Count=	nn scan lines detected per 1/6 in.
Diag Print=	0-3, print pattern

* Factory defaults are underlined. See Section 5, *Extended Configuration Menu*, for details.

20 Special Function Mode 4 prevents the printer from reversing direction on restart.

21 Option is displayed only if PSize stipulates a custom form length in the Configuration Menu. The type and range of selections depends on the In or Mm setting in Page Units=..., also in the Configuration Menu.

3—Print Menu

GENERAL

Maps of the PCL and PostScript Print Menus are shown at the end of Section 2, *Operations*.

Accessing

With the printer offline, press **MENU** momentarily to enter the Print Menu of the active emulation.

Note: *If the printer contains both PCL and PostScript emulations, enter the other emulation by changing the emulation displayed in* Emu= *... in the Configuration Menu.*

The printer displays the message PCL Print Menu or PS Print Menu followed automatically by Print= Summary when **MENU** is released.

Navigating

Press **MENU** to view succeeding options and their present settings. Present settings (present defaults) are indicated by an asterisk (*) following the displayed option setting.

Changing

Use the ▲ and ▼ keys to view other possible settings. Press **STORE** to save the new default setting. Press **MENU** to view more Print Menu options and settings.

Exiting

Press **ON LINE** to return online.

OPTIONS

All of the Print Menu options, except for the summary, font, and symbol printouts in the Print Menu option, deal with defaults. In all cases, printer drivers, such as those in Microsoft Windows, Word Perfect, Microsoft Word, Lotus 1-2-3, and the like, override these default print menu options.

Important! *The default options only apply when the printer is started up and continuously prints unformatted text files containing straight ASCII data. Unless the printer is regularly used for printing unformatted text such as electronic mail messages or .BAT files, it is unnecessary to adjust most print menu settings because the printer driver overrides them to enforce the selections made in the computer application.*

For example, if Souvenir is chosen as the text typeface in a Microsoft Word for Windows document, that file is printed on the printer using that typeface, not the typeface specified in the printer's print menu. (Page 3-13).

Print=

Choose among the following printouts:

- Summary
- Symbols (PCL Print Menu only)
- Fonts

Note: *Use a Letter-size page for printouts. If the form width is too small, the printout may be truncated on the right side.*

Check that the print buffer is empty before starting the printout; that is, make sure that the DATA *light is off and the* READY *light is on and not blinking. Otherwise, data left in the print buffer may be lost.*

Summary Page

The summary page contains a list of the current printer status and menu settings. (See the Summary Page shown in the following illustration.)

Whenever permanent menu changes are made, such as emulation or interface settings, print and post a new summary page for a quick reference to printer status and menu settings.

SUMMARY PAGE

PCL PRINT MENU

Copies:	1	Font Number:	0
Lines Per Form:	60 Lines	Font Point Size:	12.00
Orientation:	Portrait	Font Pitch:	10.00
Font Source:	ROM	Font Symbol Set:	Roman-8

CONFIGURATION MENU

I/O:	Parallel	Emulation:	HP LaserJet III
RS-232/RS-422:	RS-232	Image Shift Vert:	+0/300 inch
Baud Rate:	9600	Image Shift Horiz:	+0/300 inch
Data Bits:	8	Auto Continue:	Off
Stop Bits:	1	Page Protect:	On
Parity:	None	Menu Language:	English
XON/XOFF:	Disabled	DTR Polarity:	High
Page Units:	Inches	Landscape Norm/Rev:	Reversed
Page Size:	Letter	Jam Recovery:	Off

EXTENDED CONFIGURATION MENU

Vertical Corr.:	Page	PCL Form Control:	On
Print Speed:	24 PPM	Load Form:	Off
Fuser Temp:	177 deg C	Fuser Pad Use:	2 feet
Sleep Delay:	6 minutes	OPC Drum Use:	0 feet
Active Port Sense:	Disabled	Developer Use:	1 feet
Page Width:	Letter	Total Use:	2 feet

PRINTER DATA

Print Model:	2405
Font Cartridges Installed:	
Memory Size:	4096K
EC Firmware Version:	01-20
RIP Firmware Version:	05-06
Scan Count:	50

PB0-O1

Symbols (PCL Print Menu Only)

The symbols printout shows all printable characters in the internal symbol set currently selected under Sym= ... (Page 3-17) in the Print Menu. (Symbol sets are not used in the same way in the PostScript language. Consequently, this option does not appear in the PostScript Print Menu.)

The symbol set chart is printed in either a scalable or non-scalable typeface, depending on the selected symbol set, as follows:

- The symbol set printout is always in a non-scalable typeface for Roman-8, ECMA-94, PC-8, PC-8 D/N, PC-850, Legal, or ISO-nn symbol sets.
- The symbol set printout is always in a scalable typeface for the Ventura, PostScript, Math-8, Pi Font, Microsoft Publishing, Windows, or DeskTop symbol set.

A sample symbol set printout is shown in the accompanying illustration for the factory-default, Roman-8 symbol set.

Fonts

In the PostScript emulation, the printer prints a list of the standard 35 PostScript emulation fonts and font samples.

In the PCL emulation, the printer prints line items for all available PCL fonts, their attributes, and font samples for all internal, cartridge, and permanent downloaded fonts. See the PCL Font List example on Page 3-10.

Symbol Set
(Example: Factory Default Roman-8)

	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0				0	@	P	`	p				¯	â	Å	Á	Þ
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
-1			!	1	A	Q	a	q			À	Ý	ê	î	Ã	þ
	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
-2			"	2	B	R	b	r			Â	ý	ô	Ø	ã	·
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
-3			#	3	C	S	c	s			È	°	û	Æ	Đ	µ
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
-4			$	4	D	T	d	t			Ê	Ç	á	å	ð	¶
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
-5			%	5	E	U	e	u			Ë	ç	é	í	Í	¾
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
-6			&	6	F	V	f	v			Î	Ñ	ó	ø	Ì	‗
	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
-7			'	7	G	W	g	w			Ï	ñ	ú	æ	Ó	¼
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
-8			(	8	H	X	h	x			´	¡	à	Ä	Ò	½
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
-9			)	9	I	Y	i	y			`	¿	è	ì	Õ	ª
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
-A			*	:	J	Z	j	z			ˆ	¤	ò	Ö	õ	º
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
-B			+	;	K	[	k	{			¨	£	ù	Ü	Š	«
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
-C			,	<	L	\	l	|			˜	¥	ä	É	š	■
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
-D			-	=	M	]	m	}			Ù	§	ë	ï	Ú	»
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
-E			.	>	N	^	n	~			Û	ƒ	ö	ß	Ÿ	±
	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
-F			/	?	O	_	o	▒			£	ç	ü	Ô	ÿ	
	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

The LaserJet emulation font list can be a useful tool, not only in helping choose a default font (Page 3-13) and symbol set (Page 3-17), but also as a convenient and informative guide for manually embedding typestyles using printer commands. Embedding printer commands for selecting cartridge and downloaded (non-internal) fonts are allowed in many applications.

Many PCL printer drivers used by applications running under DOS are limited in the choices of downloaded and cartridge font selections.[1] Consequently, to include not-so-common fonts, such as OCR-A[2] from a font cartridge, you may have to embed printer commands in the text to select these OCR-A characters. See Section 8, *Programmer's Reference Guide*, for details on using printer commands to specify and select fonts.

The following paragraphs briefly describe the columns of data shown in the PCL Font List on Page 3-10.

Font #. This is the number used to select a default font. [See Font #= ... (Page 3-13) to select a default font number.] The prefix "S" is for permanent soft font, "R" for right font cartridge, "L" for left font cartridge, and "I" for internal (ROM) font, depending on the font source (Page 3-13).

Font ID. This is the ID assigned by a downloading routine when it downloads a soft font to the printer. Font IDs are used only for downloaded fonts accessed by printer font ID commands. PCL fonts can be accessed either by font ID or by a descriptive print command string.

---

1 Operating platforms such as Microsoft Windows, offer a greater range of choices in selecting internal (ROM), cartridge, and downloaded fonts. Windows printer drivers, specifically made for the printer, are available free from the printer manufacturer.

2 Optical Character Recognition Set A. A font used for machine-readable optical text.

Symbol Set. Internal non-scalable fonts are shown in Roman-8, ECMA-94, PC-8, PC-8 D/N, PC-850, and Legal. Internal scalable fonts are listed only in the default symbol set.

Change the symbol set default [Sym= ...* (Page 3-17)] to view internal fonts in ISO, Ventura, Math-8, or another symbol set.

Fix/PS. Fixed-pitch (F) font versus proportionally spaced (P) font. In a fixed pitch font, each character is of uniform width. In a proportionally spaced font, the widths of the characters vary.

Pitch. Character per horizontal inch (cpi). Normally used in describing a fixed font. [See Pitch= ... (Page 3-14) to select a default font pitch.] Note that pitch is not entered for a proportionately spaced font.

Point Size. Describes the height of the tallest character, usually the "|" (pipe) character. The width of each character is a proportion of its height, thus the name proportional font. Point size is normally used in describing proportional fonts. [See Pnt Size= ... (Page 3-14) to select a default font point size.]

Style. Describes the posture of the font. Terms used are *upright* for normal book face, *italics* for slanted, and *condensed*.

Stroke Weight. Describes the gravity or thickness of the character strokes. Terms used are *medium* for book text and *bold* for emphasis.

Name or Typeface. The name of the font.

Default Orient. The native or original orientation of the font. Any font can be rotated into Portrait or Landscape orientation using Orient= ... (Page 3-15).

Print Sample and Escape Sequence. A sample of the font is shown on the first line of the font list, and a printer command string on the second line. The printer command string is used to select the font and its attributes. (See Section 8, *Programmer's Reference Guide,* for the meaning of and instructions for using these printer command strings.)

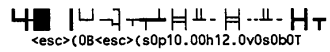
In the printer command string for a scalable font, the underscore character is used to indicate the desired point size of the font. In these cases, replace the underscore with the decimal point size of the scalable font. For example, replace the underline in ...____v... from the font list (Page 3-10) for internal font 7 (designated as I007) with 12 to select 12-point type. Thus, the resulting printer command string to select Font #7 of the internal ROM-based fonts is:

^{E}c(8U^{E}c(s1p12v0s0b4101T

where ^{E}c, also written as <esc>, represents the escape code. Again, see Section 8 for details on using printer command strings.

PCL Font List

Font List

Font #	Font ID	Symbol Set	Fix /PS	Pitch (cpi)	Point Size	Style	Stroke Weight	Name or Typeface	Default Orient	Print Sample & Escape Sequence
"PERMANENT" SOFT FONTS										
LEFT FONT CARTRIDGE										
L001	9Y		F	06.81	16.0	Upright	Medium	Bar 128	Port	 <esc>(9Y<esc>(s0p06.81h16.0v0s0b0T
L002	LINE DRAW		F	10.00	12.0	Upright	Medium	Line Draw	Port	 <esc>(0B<esc>(s0p10.00h12.0v0s0b0T
L003	ROMAN-8		F	16.65	9.5	Upright	Medium	Letr Gothic	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàèëöÅØåæÄÜßÁÐÒ <esc>(8U<esc>(s0p16.65h9.5v0s0b6T
L004	ROMAN-8		F	12.00	12.0	Upright	Medium	Letr Gothic	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàè <esc>(8U<esc>(s0p12.00h12.0v0s0b6T
L005	ROMAN-8		F	10.00	14.0	Upright	Medium	Letr Gothic	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~ <esc>(8U<esc>(s0p10.00h14.0v0s0b6T
INTERNAL FONTS										
I000	ROMAN-8		F	10.00	12.0	Upright	Medium	Courier	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~ <esc>(8U<esc>(s0p10.00h12.0v0s0b3T
I001	ROMAN-8		F	16.67	8.5	Upright	Medium	Line Printer	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàèëöÅØåæÄÜßÁÐÒ <esc>(8U<esc>(s0p16.67h8.5v0s0b0T
I002	ROMAN-8		F	12.00	10.0	Upright	Medium	Courier	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàè <esc>(8U<esc>(s0p12.00h10.0v0s0b3T
I003	ROMAN-8		F	12.00	10.0	Upright	Bold	Courier	Port	**ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàè** <esc>(8U<esc>(s0p12.00h10.0v0s3b3T
I004	ROMAN-8		F	12.00	10.0	Italic	Medium	Courier	Port	*ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123éàè* <esc>(8U<esc>(s0p12.00h10.0v1s0b3T
I005	ROMAN-8		F	10.00	12.0	Upright	Bold	Courier	Port	**ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~** <esc>(8U<esc>(s0p10.00h12.0v0s3b3T
I006	ROMAN-8		F	10.00	12.0	Italic	Medium	Courier	Port	*ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~* <esc>(8U<esc>(s0p10.00h12.0v1s0b3T
I007	ROMAN-8		P		Scale	Upright	Medium	CG Times	Port	ABCDEfghijÀÂ°ÇÑ¡¿£§ê#$@[]^`{|}~123 <esc>(8U<esc>(s1p_v0s0b4101T

CB0-BL

Copies= (PCL Print Menu Only)

Choose a value from 1 to 5000. Copies= 1* is the factory default. Use ▲ and ▼ to set the number of uncollated copies of each printed page. (Pressing and holding ▲ or ▼ causes the displayed count to accelerate.)

To make collated copies, use your application's printer driver.

The Copies= …* setting, like other Print Menu settings, only applies to print jobs which must rely on the printer's default (or previous) Print Menu settings. For example, if you set Copies= 1525* and then send an E-mail message to the printer, the printer prints 1525 copies of the E-mail message.

Printer commands created by software applications, however, take precedence over Print Menu settings such as Copies= …*. But the problem with using these printer commands to specify the number of copies is that PCL is limited to only 99 copies per print job.[3] Consequently, to make more than 99 copies of a print job that does not rely on printer default setting, such as one created by a Windows application, you must select one of the methods described in the following paragraphs.

Method 1: Using Copies=. Print a single copy to a file and then, using a binary editor, delete the copies command (**^Ec & *l* # X**)[4] embedded in the print file by the software application. You can then set the number of copies desired in the Print Menu and then simply copy[5] the print file to the printer.

---

3 The limit was established for earlier HP PCL printers with tray capacities of 100 letter-size pages. For a noncommercial printer, 99 copies is a convenient limit, but not for a commercial printer.

4 Look for the ASCII hexadecimal sequence 1B 26 6C 31 58 near the start of the print file. Delete the sequence.

5 COPY <file> PRN /b. The /b switch is required if the print file contains graphics.

Method 2: Using ^{E}c <SOH> <STX> O T C K # <ETX>. For RIP firmware 07-00 or higher, send this command to the printer to print up to 5000 copies. (Check your RIP firmware version in the Extended Configuration Menu.)

There are two ways to send **^{E}c <SOH> <STX> O T C K # <ETX>:**

- For MS Windows, use an up-to-date version of the MS-Windows, LaserMatrix printer driver.[6]

- Print a single copy to a file, like in Method 1, and then delete the normal PCL copies command (**^{E}c & *l* # X)** using a binary editor. Replace with the ASCII hex string 1B 01 02 4F 54 43 4B # 03, where # is the number of copies. For example, use 1B 01 02 4F 54 43 4B 36 37 38 03 to print 678 copies.

Method 3: Re-iterating the Print Job. This can be accomplished one of two ways:

- Send the print job of 99 (or less) copies to the printer as many times as necessary to satisfy the total copy requirements.

- Send the print job to a file and then create a batch file (or BASIC program) to copy that file enough times to satisfy the total copy requirements.

6 For information on availability of this free driver, contact the printer manufacturer.

Font Src= (PCL Print Menu Only)

Choose the available font source:

- ROM (factory default)
- Left
- Right
- Soft

ROM is for internal fonts stored in the printer.

Left and **Right** are for HP LaserJet compatible font cartridges inserted into the two slots in the front of the printer. If no cartridge is present in the slots, the settings, Left and Right, do not appear as optional settings.

Soft is for soft fonts downloaded from the host to the printer. If no permanent soft fonts have been downloaded, Soft does not appear as an optional setting.

Font #= (PCL Print Menu Only)

Choose the number (such as 0, 1, 2, etc.) assigned to the font desired. Font #= 0* is the factory default for the ROM font source.

The possible font number settings (0, 1, 2, etc.) depend on the selected font source specified by Font Src= ...* (Page 3-13). (The available font number settings are 0-49 for the ROM font source.) Available fonts and their assigned numbers are included on the PCL font list printout, Page 3-10.

Pnt Size=

(PCL Print Menu Only)

Choose the default height in points (72 points ≈ 1 in.)[7] of a proportional default font specified by Font Src= ...* (Page 3-11) and Font #= ...* (Page 3-13).

Point sizes are available for scalable fonts from 4.00 to 999.75 points, in .25-point increments. This setting does not appear for fixed pitch (non-proportional) fonts.

This is 8 point type.
This is 12 point type.
This is 24 point type.

Pitch=

(PCL Print Menu Only)

Choose the pitch of the fixed-pitch (non-proportional) default font specified by Font Src= ...* (Page 3-11) and Font #= ...* (Page 3-13).

Pitches (characters per horizontal inch, or cpi) are specified for fixed-pitch fonts, from .44 to 99.99 cpi, in .25-cpi increments. The pitch option does not appear for proportional fonts.

```
|← 1" →|
xxxxxxxxxx  This pitch is 10 characters per inch.
1234567890

xxxxxxxxxxx  This pitch is 12 characters per inch.
123456789012
```

[7] A font's point size is a measure of the height of its tallest character, typically the "|" (or "pipe") character.

Orient= (PCL Print Menu Only)

Choose the default page orientation:

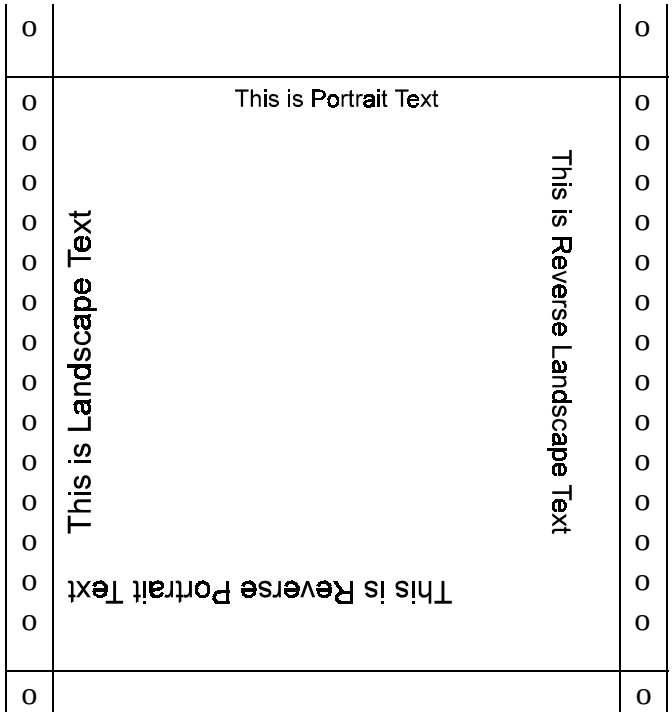
- Portrait (factory default)
- Landscape
- Reverse Portrait
- Reverse Landscape

Page orientation sets the direction characters are printed on the default page:

- **Portrait** prints characters right to left across the paper, perpendicular to the paper feed direction.
- **Reverse Portrait** prints the characters rotated 180° from the normal Portrait orientation.
- **Landscape** prints characters bottom to top along the direction of paper feed.
- **Reverse Landscape** prints the characters rotated 180° from the normal Landscape orientation.

Page orientation affects all fixed, bitmapped, and scalable fonts, even font cartridge and permanent downloaded fonts, even though these fonts may have been defined originally only in another orientation. Once page orientation is chosen, all fonts are printed in the new orientation.

Note: Text orientations cannot be mixed on the same print job using the page orientation menu option.


This is Portrait Text
This is Landscape Text
This is Reverse Landscape Text
This is Reverse Portrait Text
Direction of
Paper Transport

Sym=

(PCL Print Menu Only)

This option allows selection of an available symbol set for the default font specified in Font Src=...* and Font #=...*.

For an internal font, choose one of the symbol sets listed below.

- For any non-scalable default font [8], select from the following:

Roman-8 (factory default)	PC-8 D/N
ECMA-94	Legal
PC-8	German
PC-850	ISO-nn

- For any scalable default font[9], select from the following:

Roman-8 (Factory Default)	Ventura Math
ECMA-94	Ventura International
PC-8	Ventura US
PC-850	PostScript Math
PC-8 Danish/Norwegian	PostScript Text
Legal	Math-8
German	PI Font
ISO-nn	Microsoft Publishing
	Microsoft Windows
	DeskTop

8 For example, Courier and Lineprinter fonts are nonscalable fonts.

9 For example, CG Times and Univers are scalable fonts.

where nn in IS0-nn is one of 17 national-use variations of the standard ASCII symbol set (ISO-6). The 17 ISO variations are listed below:

ISO-2	International Reference Version	ISO-21	German
ISO-4	United Kingdom	ISO-25	French
ISO-6	Standard ASCII (U. S.)	ISO-57	Chinese
ISO-10	Swedish	ISO-60	Norwegian 1
ISO-11	Swedish Names	ISO-61	Norwegian 2
ISO-14	JIS ASCII	ISO-69	French
ISO-15	Italian	ISO-84	Portuguese
ISO-16	Portuguese	ISO-85	Spanish
ISO-17	Spanish		

A chart of the symbol set can be printed by first selecting the symbol set using this Print Menu option, and then selecting Print= Symbol* (Page 3-5).

Lines/Form=

(PCL Print Menu Only)

Choose the number of printable lines per form: from 1 to 999.

For a Letter-size form (the factory-default page size), the factory default for the number of printable lines per form is 60. Assuming a bottom and top margin of $^{1}/_{2}$ in., 60 lines per form translates into 6 lines per vertical inch.

The printer uses 6 lines per in. as the factory default for calculating the default number of printable lines per form.

Form Size (Length)	**Printable Lines/Form** [10] **(Factory Default)**
Executive ($10^{1}/_{2}$ in.)	57
Letter (11 in.)	60
A4 ($11^{2}/_{3}$ in.)	64
Legal (14 in.)	78
Custom (.5 to 33 in.)	3 to 198
A4 (297 mm)	64
A5 (210 mm)	43
A6 (148 mm)	28
Custom (12 to 873 mm)	2 to 206

10 At 6 lines per in., rounded to whole number. Assumes top and bottom margins of $^{1}/_{2}$ in. each for standard pages. No top or bottom margin is included for Custom or Continuous form lengths.

4—Configuration Menu

GENERAL

A map of the Configuration Menu is shown at the end of Section 2, *Operations*.

Accessing

With the printer offline, press and hold **MENU** for about 3 seconds to enter the Configuration Menu.

The printer displays the message Config Menu followed automatically by I/O= ... when **MENU** is released.

Navigating

Press **MENU** to view succeeding options and their present settings. Present settings (present defaults) are indicated by an asterisk (*) following the displayed option setting.

Changing

Use the ▲ and ▼ keys to view other possible optional settings. Press **STORE** to make that the new default settings. Press **MENU** to view more Configuration Menu options and settings.

Exiting

Press **ON LINE** to return online.

OPTIONS

I/O=

Choose the input/output (I/O) interface:

- Parallel (factory default)
- Serial
- Optional (if applicable)

The interface selection may be overridden if APSense= Enable* in the Extended Configuration Menu. When active port sense is enabled, the printer automatically switches to the port on which it senses activity.

Parallel. Enables communication on the parallel interface connector.

Serial. Enables communication on the serial interface connector.

If I/O= Serial* is selected, double-check the serial interface settings in the next seven Configuration Menu options.

Optional. This appears only if an optional interface PCB is installed in the optional interface slot at the back of the printer.

When the printer switches interface ports, the top of form setting may be lost. After changing ports, cycle power off/on and then reload forms.

Serial Options

The following seven Configuration Menu options appear only if I/O= Serial* is selected in the Configuration Menu and/or APSense= Enable* in the Extended Configuration Menu.

Note: Serial interface settings between the printer and host must match.

Baud Rt=

Baud rate determines the rate of information transfer between host and the printer.

Choose from the following:

- 1200
- 2400
- 9600 (factory default)
- 19.2K
- 38.4K
- 57.6K
- 64.0K
- 72.0K
- 96.0K
- 115K
- 144K
- 192K
- 288K

DTR Polarity=

Choose the polarity of the data terminal ready (DTR) signal:

- High (factory default)
- Low

This determines whether the serial interface DTR signal on Pin 20 is active high or low. If active high, Pin 20 is high when the printer is ready for data; if active low, Pin 20 is low when the printer is ready for data.

Note: A high DTR polarity is normal for IBM PC/XT/AT and compatible computers.

XON=

Choose to enable or disable transmission-on (X-ON) software handshaking protocol:

- Disable (factory default)
- Enable
- Robust

Determines type of hardware (DTR) or software (X-ON/X-OFF) protocol. Protocol refers to the handshaking technique used in serial communication.

Disable. Disables X-ON/X-OFF software handshaking and enables DTR hardware handshaking. The printer turns the DTR signal on Pin 20 on/off to control communications between itself and the host.

Enable. Enables X-ON/X-OFF software handshaking and disables DTR hardware handshaking. The printer sends device control codes (transmission on/transmission off control codes) to the host to control communications. X-ON/X-OFF must be enabled for RS-422 serial communications (Page 4-6).

Robust. A variation of X-ON/X-OFF software handshaking. The printer resends X-ON/X-OFF to the host every second while the printer is idle.

Data Bits=

Choose the number of data bits in every information byte:

- 8 (factory default)
- 7

Sets the number of significant data bits in each byte transmitted between the printer and host. Seven data bits are used to send only data byte values 0 through 127. Eight data bits are required for sending data byte values 0 through 255 decimal. Eight data bits are also required for graphics.

Parity=

Choose to enable or disable parity for all transmissions to/from the host computer:

- None (factory default)
- Even
- Mark
- Odd
- Space

The parity bit follows the data byte transmitted between the computer and printer. The printer can use parity to check that all data bits from the computer were received correctly.

None. Means no parity check. Parity is neither added to transmissions to the host computer, nor checked on reception from the host.

Even. For even parity, the number of binary 1 data bits must add up to an even decimal sum. If not, the parity bit is set to binary 1 to make it so.

Odd. All of the binary 1 data bits must add up to an odd decimal sum. If not, the parity bit is set to binary 1 to make it so.

Mark. Parity bit is always binary 1.

Space. Parity bit is always binary 0.

RS-=

Choose the type of serial interface:

- 232 (for RS-232, the factory default)
- 422 (for RS-422)

RS-232 uses two single conductors for sending and receiving data over short distances, normally under 25 feet in length.

RS-422 uses a twisted pair of complementary signals for receive data, and a similar pair for transmit data. (RS-422 serial transmission/reception is used over longer distances.) RS-422 uses X-ON/X-OFF software protocol.

Stop Bits=

Choose the number of stop bits in each serial byte:

- 1 (factory default)
- 2

Defines the number of stop bits that flag the end of each serial character.

Most modern computer hardware and software interface systems need only one stop bit.

Auto Cont=

Choose to automatically continue or halt after a recoverable attendance message:

- Off (factory default)
- On

If Auto Cont= Off*, the attendance message is displayed, printing stops after the print buffer is empty, and the printer goes offline. Pressing **ON LINE** allows printing to continue with the following conditions:

- For Toner Low, or Repl. Drum, the message continues to be displayed until the developer's toner reservoir is refilled or the drum is replaced.
- For Repl. Developer or Repl. Fuser Pad, the message is reset along with the accrued Devlp. Ft=… or Fuser Pad=… count in the Extended Configuration Menu.

If Auto Cont= On*, the printer allows uninterrupted printing with the attendance message displayed on the control panel. The message is cleared when the developer's toner reservoir is refilled, the drum is replaced, or the developer or fuser pad counter is reset.

Emu=

Choose the active emulation:

- LaserJet (factory default for a printer without a PostScript emulation)
- Auto (factory default for a printer with a PostScript emulation)
- PS Emul

LaserJet. The printer emulates Hewlett-Packard LaserJet III printers which employ the PCL 5/HP-GL/2 page description language.

Auto. Allows automatic switching between the LaserJet and PostScript emulations for those printers featuring both emulations. The printer can sense the emulation code and then automatically switch to that emulation. (See Section 8, *Programmer's Reference Guide*, for more detail.)

PS Emul. The printer emulates a PostScript Level One printer.

Lang=

Choose the language for displayed messages:

- English (factory default)
- Italian
- German
- French
- Spanish

Image Vert=

Choose a value in the range of -199 to +199. The factory default is 0.

Note: Vertical image adjustments can also be made online. (See Shifting Print Image Vertically, in Section 2, Operations.)

The vertical image setting adjusts print image up (▲ = +) or down (▼ = -) in relationship to the top of form. The maximum setting of ± 199 allows for a maximum vertical print image adjustment of ± $^{2}/_{3}$ in., where each increment of the setting moves the print image $^{1}/_{300}$ in.

The vertical image setting is retained when power is turned off. Image Vert= ... is reset to zero by Menu Reset.

Image Horiz=

Choose a value in the range of -199 to +199. The factory default is 0.

Note: Horizontal image adjustments can also be made online. (See Shifting Print Image Horizontally, in Section 2, Operations.)

This horizontal image setting adjusts the print image left (▲ = +) or right (▼ = -). The maximum setting of ± 199 allows for a maximum horizontal print image adjustment of ± $^{2}/_{3}$ in., where each increment of the setting moves the print image $^{1}/_{300}$ in.

The horizontal image adjustment is retained when power is turned off. Image Horiz= ... is reset to zero using Menu Reset.

Page Units=

Choose the units for page measurements:

- In. (factory default)
- Mm

Determines the units of measurement for PSize= ... in the next subsection and Frm Width= ... in the Extended Configuration menu.

PSize=

Choose the form size: either a standard page size, such as Letter, Legal, A4, etc. or a custom form length specified in inches or millimeters.

- If Page Units= In* in the previous subsection, the choices are:

  Standard Pages

  - Letter ($8^1/_2$ x 11 in., the factory default)
  - Legal ($8^1/_2$ x 14 in.)
  - A4 (210 mm x $11^2/_3$ in.)
  - Executive ($7^1/_4$ x $10^1/_2$ in.)

  - Custom Form Length[1] between $^1/_2$ in. and 33 in, in $^1/_8$ in. (0.125 in.) increments

- If Page Units= Mm* in the previous subsection, the choices are:

  Standard Pages

  - A4 (210 x 297 mm, the factory default)
  - A5 (148 x 210 mm)
  - A6 (105 x 148 mm)

  - Custom Form Length[2] between 12 mm and 873 mm, in 1 mm increments

Note: *Changing the page size causes any pages that are not yet printed to be printed. The printer then performs a short reset. For a short reset, the printer is reset to the user-defined Print Menu settings. Also, in the case of a LaserJet emulation, temporary macros and macro overlays are erased.*

1 Specify custom form width in Frm Width= ... in the Extended Configuration Menu.

2 Specify custom form width in Frm Width= ... in the Extended Configuration Menu.

Letter, **Legal**, **Executive**, **A4**, **A5**, and **A6** are ***standard page sizes.*** The printable areas on these standard page sizes are equal to those of LaserJet sheet-feed printers:

- For standard page sizes, this printer, like other PCL and PostScript printers, enforces a top and bottom no-print zone. If you specify a standard page size but fail to provide top and bottom margins of at least 1/6 in. (in the PCL emulation) or 1/5 in. (in the PostScript emulation), then any part of each page falling in the no-print zone is not printed.

  Note: In the PCL emulation, the printer contains a preset top margin of 1/2 in. for standard paper sizes. The preset top and bottom margins limit a standard Letter-size (8 1/2 x 11 in.) page, for example, to about 10 in. in length, well within the 10 2/3 limits imposed by the 1/6 in., no-print restriction at the top and bottom of standard PCL pages.

- This printer, like an HP LaserJet printer, restricts the maximum width of the print zone to 8 in. (203 mm). If your print job fails to limit a Letter-size (8 1/2 x 11 in.) page, for example, to 8 in. in width, any part of each page falling in the no-print zone is not printed.

A **Custom** size allows you to specify a customized or special form size. Unlike the standard page sizes, custom form sizes allow printing from perf to perf the entire form length. **The printable length may vary from 1/2 in. to 33 in.** (12 mm to 873 mm). **The printable width may vary up to 8 in.** (203 mm). The custom width is set in the Frm Width=... option in the Extended Configuration Menu.

See Setting Up a Page Size in Section 2, *Operations*, for either a standard page or a custom form.

Pg Prot.=

Choose to enable or disable page protection:

- Off
- On (factory default)

If a page is very complex (many font changes, vector graphics, and other printer command devices), the printer may not have the ability to keep pace with the engine printing process. In such case, the printer displays either Page Too Complex or Wait and then locks up.

Pg Prot.= On* ensures that the Page Too Complex message never occurs. Page protection forces the system to allocate additional memory to create the entire page in memory before beginning the engine print process.

Note: *When you switch from* Pg Prot.= Off* *to* ...On* *the printer erases downloaded fonts and macros, both permanent and temporary. All downloaded fonts and macros must be reloaded.*

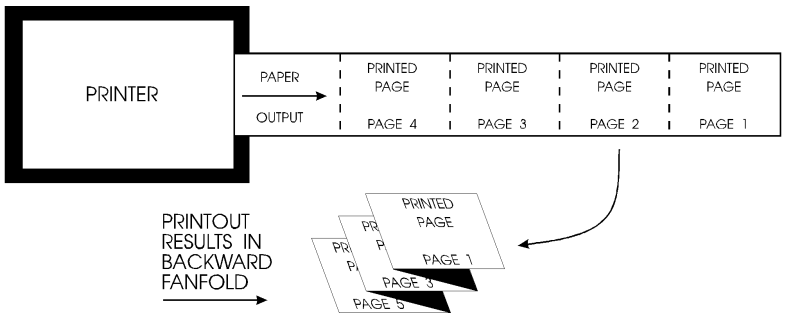
Landscape=

Choose between:

- Rev (factory default)
- Norm

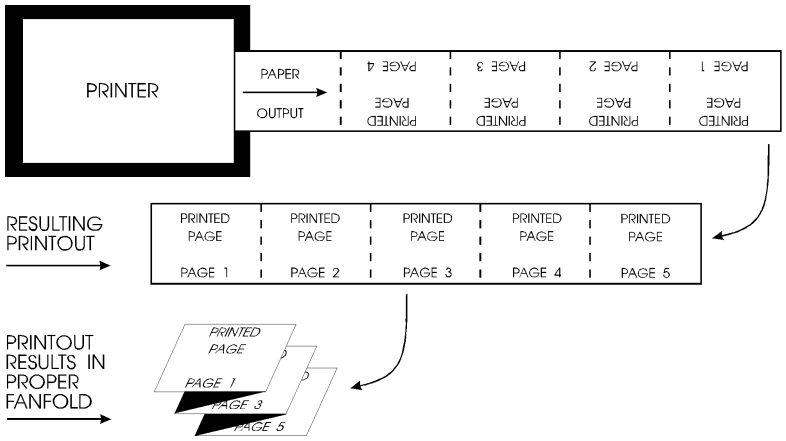
Unlike Orient=Lndscape* and Orient=RevLand* in the Print Menu, Landscape=Norm* and Landscape=Rev* are not reset or overridden by printer commands.

Normal Landscape. A normal landscape printout is shown in the following illustration. Notice that, when refolded, the printout opens from right to left—opposite to that of a book.



Normal Landscape CA0-H

Reverse Landscape. A reverse landscape printout is shown in the next illustration. When refolded, the printout opens like a book for easier reading.



Reverse Landscape CA0-I

Jam Recover=

Choose between:

- Off (factory default)
- On

Off. The printer does not reprint the data in the jam recovery path after 1) the jam is cleared, 2) the paper is reloaded, 3) the printer cover is closed again, and 4) the **ON LINE** key is pressed.

The jam recovery path typically contains about 17 in. of previously printed data[3]. Consider turning off jam recovery to prevent duplicating address labels or negotiable, serialized, or other similar materials.

On. The printer reprints data in the jam recovery path after the jam is sensed, the cover is opened, the jam removed, and the cover is closed again. This helps prevent loss of material in the event that a printout is damaged by the paper jam.

3 The length of the jam recovery path depends on the size of the print buffer. The size of the print buffer depends on the emulation, overall size of printer memory, type and number of soft fonts, and complexity of the page.

5—Extended Configuration Menu

GENERAL

A map of the Extended Configuration Menu is shown at the end of Section 2, *Operations*.

Accessing

With the printer offline, press and hold **MENU** for about 6 seconds to enter the Extended Configuration Menu.

The printer displays the message Extended Config followed automatically by Reset Cnt.= FusPd.

Navigating

Press **MENU** to view succeeding options and their present settings. Present settings (present defaults) are indicated by an asterisk (*) following the displayed option setting.

Changing

Use the ▲ and ▼ keys to view other possible optional settings. Press **STORE** to save the new setting. Press **MENU** to view more Extended Configuration Menu options and settings.

Exiting

Press **ON LINE** to return online.

OPTIONS

Reset Cnt=

Choose between the following:

- FusPd
- Devlp

To reset either the Fuser Pad= ... (Page 5-13) or Devlp. Ft= ... (Page 5-11) count, display the reset count option, press **STORE,** and then open the printer's top cover to replace the fuser pad or developer.

VCor.=

Choose to enable or disable vertical correction every .050 in.:

- Page (Factory Default)
- 0.050 in

The printer corrects for changes in paper transport (caused by heat-related diameter changes in the fuser roller) so that the page image is accurately registered on the page. The printer corrects for this automatically, either every 0.05 in. or at the bottom of each form, as follows:

Page. The printer adds or subtracts scan lines at the end of the form to maintain the expected top of form. Use this when printouts include photographs, fills, and other patterns to prevent noticeable blank or extra scan lines in the image area.

0.050 in. The printer adds or subtracts scan lines every 0.05 in. Prefer this when printing preprinted forms to ensure accurate registration of text, especially near the bottom of long forms. Always use VCor.=0.050 in.* for form lengths of 2 in. or less.

Print Speed=

Choices available are:

- 24 Pages Per Minute (factory default)
- 12 Pages Per Minute

The printer is designed for continuous duty at 24 pages per minute, but some computers may fall behind the processing speed needed to maintain 24 ppm. When this occurs, the printer pauses after printing and fusing the last page, and then waits until the computer completes transmission of the next packet of data. Each time the printer pauses[1] it opens its fuser and then backs up the media to position the next blank top of form on the infeed side of the drum. After the printer receives and rasterizes the next packet of print data, the printer resumes printing.

Besides normal wear and tear, the process of opening the fuser, backing up the printout, and resuming the printout slows down the printing process. If ongoing pauses are a problem, consider slowing the print speed to 12 ppm to reduce their frequency, and possibly enhance throughput.

---

1 Not all printer pauses are the result of slow computer processing. Many times, especially with complicated raster imaging, the printer empties its print buffer before rasterizing the next packet of data. Some speed enhancement is possible by adding more memory to the printer and selecting Jam Recover= Off*. Note that raster imaging delays are common in PostScript processing,

Special Function=

Values 0 through 7 with 0 as default.

Only Special Function Mode 4 is active. Mode 4 prevents the printer from retracting media at the start of print jobs. Use Mode 4 for media that tends to hang up when the printer reverses direction at the start of print jobs. For example, use Mode 4 with labels that easily pre-dispense (come off) when the printer reverses direction. Be advised, however, that Special Function Mode 4 causes blank forms between printer stops and starts.

All other modes (0-3, 5-7) are reserved for presently undefined functions.

Fuser Temp=

Choose a fuser temperature. 177C is the factory default.

Fuser temperatures are as follows:

- 130°C (266°F)
- 138°C (280°F)
- 146°C (295°F)
- 153°C (307°F)
- 161°C (322°F)
- 169°C (336°F)
- 177°C (351°F), factory default
- 184°C (363°F)

Caution ! Use care in selecting the fuser temperature. In general,

- A fusing temperature that is too low shortens the life of the fuser mechanism.
- Failure to lower fuser temperature when switching to lighter/narrower media may result in a non-recoverable fuser failure which *requires* a service call.

Use the following as a guideline in selecting the correct fuser temperature for your paper and label media:

Paper/Label Width[2]	Suggested Fuser Temperature Mode
4 in. to 5 in.	161°C
5 in. to 6 in.	169°C
6 in. to $9^{1}/_{2}$ in.	177°C

Also, consider the following guidelines:

- Choose higher rather than lower fuser temperatures.

  For border-line paper widths, such as 5 in., consider using the higher temperature, 169°C. In general, the higher the temperature, the better the fusing.

- Reserve 184°C for heavy-wide media.

  Avoid using the highest setting, except for heavy-wide media. Continuous duty at 184°C can cause a fuser failure.

- Lower fuser temperature when using heat-sensitive media.

  If you print on heat-sensitive base papers, labels, and non-paper media such as fabric, vinyl, or plastic, consider using a *slightly* lower fuser temperature.

  Labels having heat-resistant adhesive help prevent pre-dispensing, that is, detaching from the carrier during printing. Consider using labels made specifically for continuous-form laser printers. Do not leave label media in the printer when not printing.

  Always test media at various fuser temperatures prior to purchasing the media.

---

2 Including tractor strips. Consult any addenda to this publication when printing on other media, or contact the media manufacturer.

When the printer is not printing, the fuser temperature is allowed to drop to its standby state, a temperature of 50°C (122°F) *below* the fusing temperature. After inactivity for the length of time set as the fuser sleep delay, the printer allows the fuser temperature to drop further to its idle temperature which is 85°C (185°F) *below* the fusing temperature.. (See the following Extended Configuration Menu option.) However, regardless of the fuser sleep delay setting, the fuser is automatically allowed to cool to ambient (room) temperature 60 minutes after the last print job.[3]

Sleep Delay=

Choose a value from 0 to 60 minutes in 1-minute intervals, with 6 minutes as the default.

This determines the interval of inactivity before the fuser is allowed to fall to its idle temperature. The idle temperature is 85°C (185°F) below the specified fuser temperature mode.

APSense=

For active port sensing, choose between:

- Disable (factory default)
- Enable

Disable. The printer communicates only on the I/O= ...* port specified in the Configuration Menu.

Enable. The printer automatically switches to any interface port (serial, parallel, or optional) which is actively receiving data from a host. Port selection is determined on a first come, first served basis.

---

3 The printer complies with Energy Star standards for low power consumption as set forth by the U.S. EPA.

Active Port Sense overrides the I/O selection in the Configuration Menu.

Note: The printer can lose top of form after switching ports.

Hex Dump=

Select the hex dump mode

- Off (factory default)
- On

Off. Use this for normal print jobs.

On. Use this for checking out the hexadecimal values of the data sent to the printer. Subsequent print jobs are printed in this hex mode format until this option or the printer is turned off.

Hex dump pages are preformatted for a standard page size (refer to the following example). A page size of letter or A4 is recommended for proper printing; a form size which is too small will truncate the printout.

Hex dump mode allows you to check printer reception of characters and printer commands. The printout contains a running byte count (in the hexadecimal numbering system), hexadecimal ASCII data for each character, and the corresponding ASCII-assigned symbols.

Byte Count	Data				
	Symbols				
00000	00010	04050	08090	0C0D0	.....
000	203	607	A0B	E0F	.....
00000	10111	14151	18191	1C1D1	.....
010	213	617	A1B	E1F	.....
00000	20212	24252	28292	2C2D2	.!"#$%&'(
020	223	627	A2B	E2F	)*+,-./
00000	30313	34353	38393	3C3D3	012345678
030	233	637	A3B	E3F	9:;<=>?
00000	40414	44454	48494	4C4D4	@ABCDEFGH
040	243	647	A4B	E4F	IJKLMNO
00000	50515	54555	58595	5C5D5	PQRSTUVWX
050	253	657	A5B	E5F	YZ[\]^_

Hex Dump Example

Frm Width=

This option appears only if PSize= ...* in the Configuration Menu specifies a custom form length ($^1/_2$ to 33 in. or 12 to 873 mm).

Use this option to define the logical page width[4] for a custom form.

Choose either Off (factory default) or a value between 3.500 to 8.000 in. or 89 to 203 mm

Regardless of the setting, the logical page is always centered on the media, and the media is always self-centered by the tractor mechanism.

---

4 The logical page width is defined as the width of the printable column. The maximum logical page width is 8 in. on a physical page width of $8^1/_2$ in., not including tractor strips.

Off. The printer uses the logical page width of the previously defined standard (Letter, Legal, Executive, A4, A5, or A6) or custom size.

3.500 to 8.000 in. (or 89 to 203 mm). Specify in. in .0125 in = $^{1}/_{8}$ in. increments; specify mm in 1 mm increments. Units depend on Page Units= ...* setting in the Configuration Menu.

Form Cont=

Choose to continue or discontinue printing when a mismatch is detected in the form or page length. Choose between:

- Off (factory default)
- On

This Form Continue on Mismatch option determines how the printer handles a mismatch between the PSize= ...* setting in the Configuration Menu and a different page or form length embedded in the print stream from the host computer.

Off. The printer stops and displays the message Load New Forms after the page or form length mismatch. After loading new paper, labels, or other media, press **ON LINE** to apply the new page or form length to the newly loaded media. If you press **ON LINE** without loading a new size, the printer applies the new length to the existing media in the printer.

On. The printer automatically applies that new page or form length to the existing paper, labels, or other media in the printer.

In either on or off modes, the printer uses the next top of form (TOF) as the first TOF of the new page or form length. The printer then calculates the positions of subsequent TOFs from the new length.

Note: *This option applies to both the PCL and PostScript emulations. However, if* PCL Frm Ctl= Off*, the* Form Cont= ...* *option is ignored in the PCL emulation. (See the following Extended Configuration Menu option.)*

PCL Frm Ctl=

For the PCL Form Control option, choose:

- Off
- On (factory default)

This option only applies to the PCL emulation.

Off. All changes in standard page and custom form lengths, embedded in the data stream, are ignored. The printer continues to use the page or form length corresponding to the PSize= ...* setting in the Configuration Menu.

On. Changes in standard page and custom form lengths, embedded in the data stream, are allowed. (See Load Form= ..., the preceding Extended Configuration Menu option.)

Tot. Ft.=

Displays the total number of feet of paper transported through the printer. This count cannot be reset by an operator. (See How Counters Count.)

Drum Ft.=

Displays the total number of feet of paper transported through the present drum. When the drum is replaced, the new drum is recognized by the firmware, and the count is reset. (See How Counters Count.)

EC FW Ver=

Displays the version of the engine controller firmware.

RIP FW Ver=

Displays the version of the raster image processor (RIP) firmware.

Devlp. Ft=

Displays the number of feet printed since the last time the count was reset. (See How Counters Count.)

When the count reaches 91,666 feet, the printer displays the message Repl. Developer. If Auto Cont= Off* in the Configuration Menu, then the printer also stops after emptying its print buffer. Press **ON LINE** to reset this counter and resume printing.

Note: *If the developer or fuser pad foot count is manually reset using Reset Cnt (Page 5-2), remember to physically open the printer, replace the developer or pad, and then close the printer's top cover. The count is not reset unless the top cover is physically opened and then closed.*

How Counters Count

You may find unexpected differences in the count reported by counters. For example, after installing the printer, the total foot count begins to increase at a faster rate than the drum foot count. This happens because the total foot count increases for *every* movement of the paper (even a reverse feed at the start of a print job), whereas the drum count accrues only during printing or erasing a latent image on the drum. In brief,

- **Tot. Ft.=** accrues for every movement of the paper, that is, during a form feed, a form retraction at the start of a print job, *and* when actually printing.
- **Drum Ft.** and **Develp. Ft=** accrue only when the laser beam or erase LEDs are on. In other words, only when you print on the media and then erase and clean the drum.
- **Fuser Pad=** accrues only when paper advances, that is, during printing and form feeds. The fuser pad count doesn't advance during reverse form feeds at the start of a print job.

Fuser Pad=

Displays the number of feet printed since the last time the count was reset. (See How Counters Count.)

When the count reaches about 3666 feet, the printer displays the message Repl. Fuser Pad. If Auto Cont= Off* in the Configuration Menu, then the printer also stops after emptying its print buffer. Press **ON LINE** to reset this counter and resume printing.

Note: *If the developer or fuser pad foot count is manually reset using Reset Cnt (Page 5-2), remember to physically open the printer, replace the developer or pad, and then close the printer's top cover. The count is not reset unless the top cover is physically opened and then closed.*

Scan Count=

Displays the total number of scan lines detected in the last $^{1}/_{6}$ in. of paper travel. With a printer resolution of 300 lines-per-inch, 50 scan lines should normally be displayed as the scan count.

The scan counter works in conjunction with the vertical correction feature, the VCor.= ... option (Page 5-2), in the Extended Configuration Menu. Vertical correction occurs either every 0.05 in. or at the end of each form to correct for slight variance in the speed of paper travel.

For example, if Scan Count= 51, meaning 51 scan lines were detected in the last $^{1}/_{6}$ in. of paper travel, the printer duplicates one scan line either in the next 0.05 in. of paper travel or accumulatively at the end of the form. In either case, vertical correction keeps the calculated top-of-form exactly synchronized with the actual top of form.

Diag Print=

Choose 0, 1, 2, or 3.

Press **STORE** to begin the selected diagnostic print pattern. During the diagnostic processing and printing, the control panel displays Store to Stop. Press **STORE** to stop printing.

The diagnostic print patterns (not to scale) are illustrated on the following pages.

Note: *After pressing* **STORE**, *the printer pauses—*Wait *message is* not *displayed and the* DATA *indicator does not light—before printing the diagnostic pattern.*

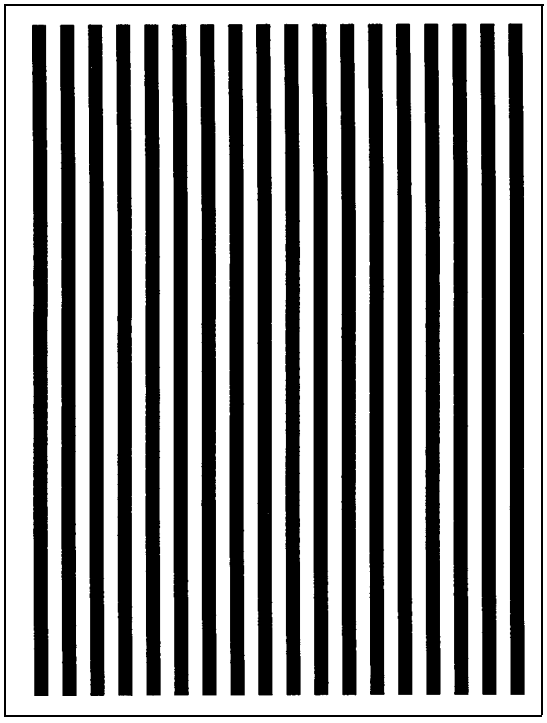
Diagnostic patterns are sized to fit the present standard page or custom form size.

Pattern 0. Prints white/black alternating vertical bars, 16 dots wide.

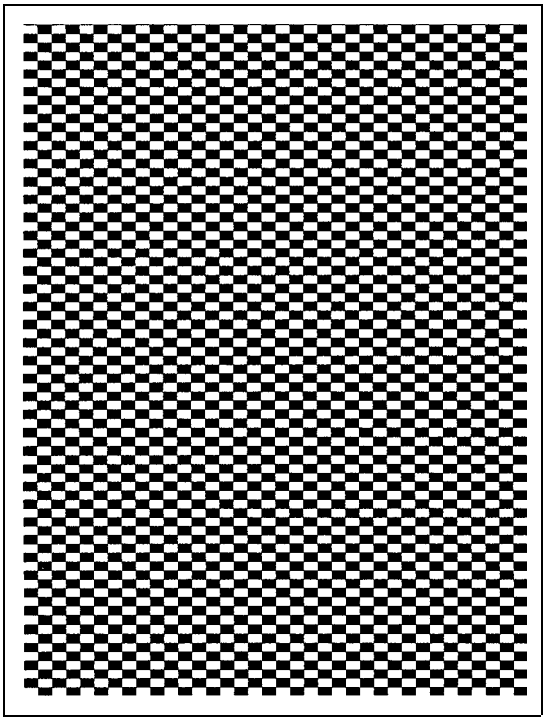
Pattern 1. Prints an alternating white/black checkerboard pattern.

Pattern 2. Prints a single line of dots at the extreme top and bottom, positioned according to the selected form length.

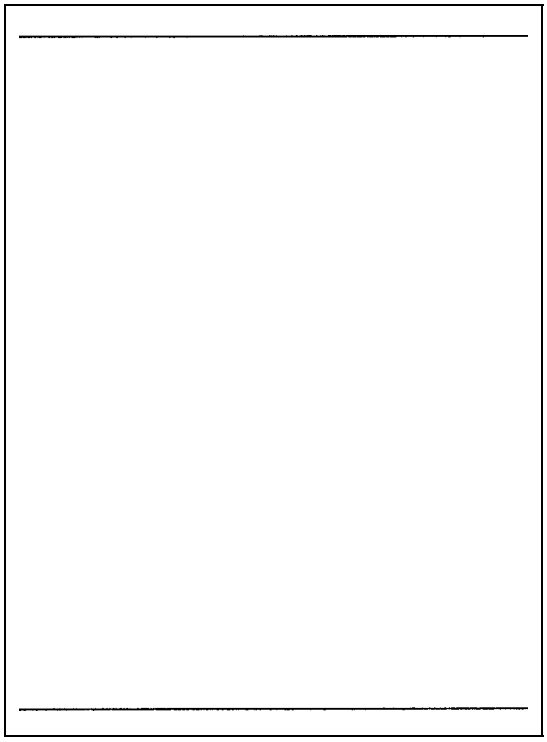
Pattern 3. Prints alternating white and black horizontal lines sixteen dots high.



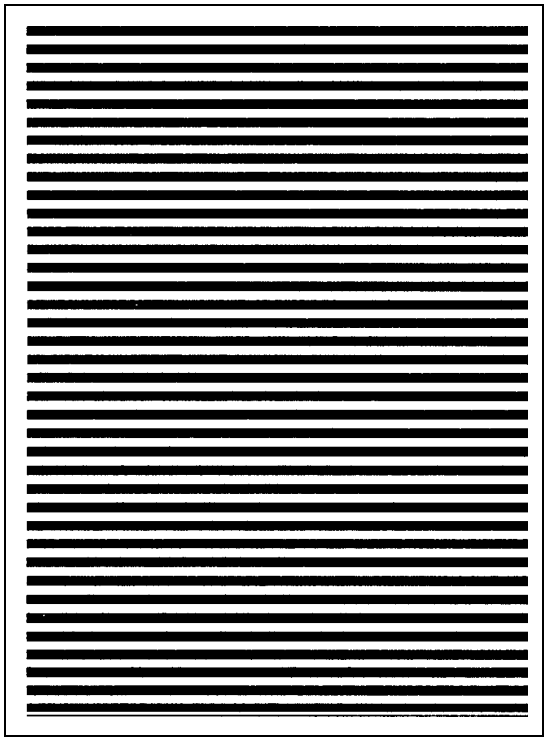
Pattern #0 CA0-AD



Pattern #1 CA0-AE



Pattern #2 CA0-AF



Pattern #3 CA0-AG

6—Maintenance

WARNINGS !

! Turn off printer and unplug power cord before attempting any maintenance procedure.

! Hazardous voltages are present in this printer. Equipment repair must be performed only by service-trained personnel who are aware of the hazards involved.

! Do not operate printer without its ozone filter.

CAUTIONS !

! If you remove the drum cartridge for printer maintenance, place it in its original container or other protective covering and store it in a dark location. Prolonged exposure to strong light will deteriorate the green organic photoconductor coating on the drum.

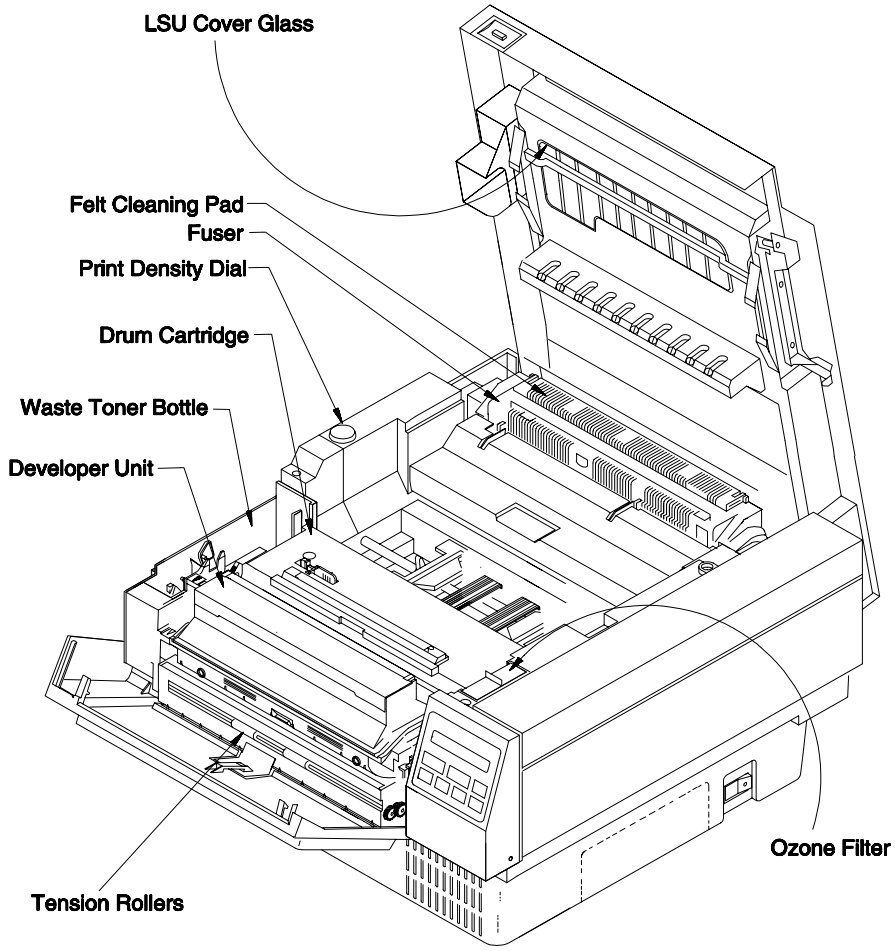
! **Prior to shipping,**

- **remove the developer unit, toner waste bottle, and drum**
- **remove all trace of loose toner inside the printer**

The manufacturer and/or carrier are not liable for damages caused by consumables or toner deposits which remain in the printer during shipment. See Moving or Reshipping the Printer, Page 6-3.

! Never use the fuser exit cover on the back of the printer as a handhold for lifting the printer. Lift the printer only along the sides of the printer.

This maintenance section discusses cleaning, lubrication, replacement, adjustment, and other preventive maintenance tasks involving the following printer components:



Printer Components PB0-Q7

MOVING OR RESHIPPING THE PRINTER

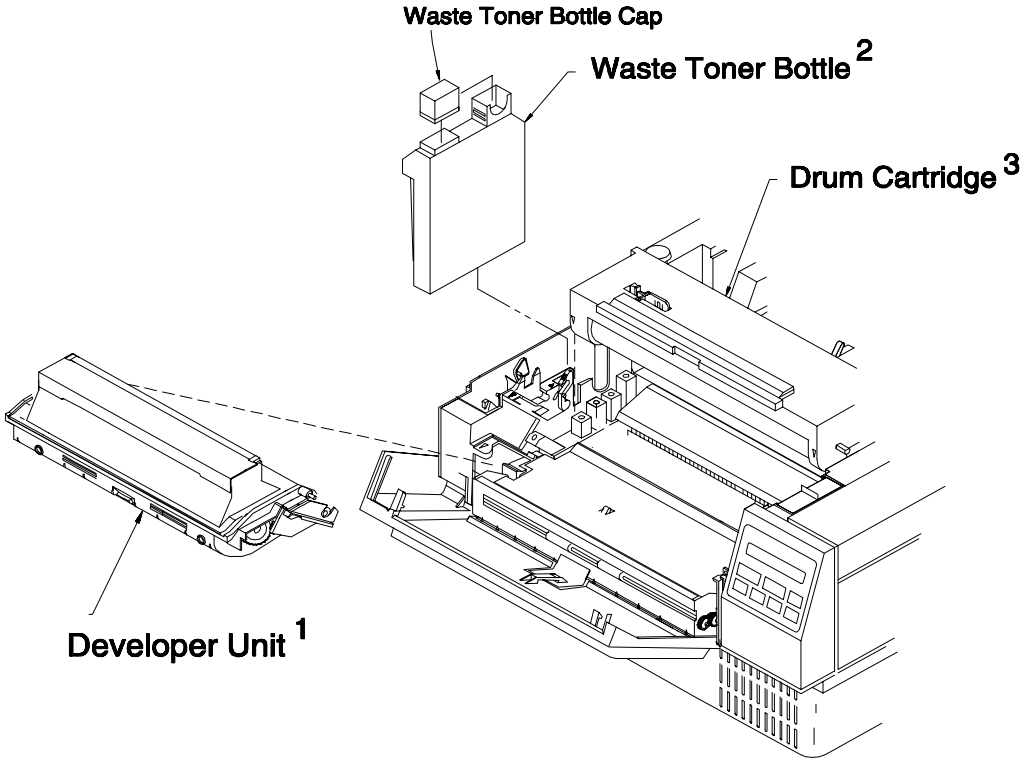
The printer is shipped from the factory *without* consumables installed to prevent in-transit damage to the printer, and to the consumables themselves. Likewise, installed consumables must be removed before reshipping or moving the printer. Failure to do so may cause extensive damage to the printer, specifically, but not limited to, physical damage from loose items inside the printer and damage caused by toner powder from the waste bottle, developer unit, and drum. (See the Important note that follows.) *Remember: The manufacturer and/or carrier are not liable for damages caused by consumables or toner powder that remain in the printer during movement or shipment.*

Follow the illustrated step-by-step procedure on the following pages prior to moving or reshipping the printer.

Important ! Toner powder can damage sensitive components in the printer.

You must clean the *interior* of the printer *before* shipping the printer. If you do not remove all traces of loose toner before shipping the printer, substantial damage will result. In cleaning, pay particular attention to the toner waste bottle area as well as any area affected by toner spills. Use a vacuum cleaner with a fine particle filter (five microns or less) to clean the interior of the printer. See the following step-by-step procedure. (Also see Cleaning Toner Spills, Page 6-10, for more information on cleaning up toner spills.)

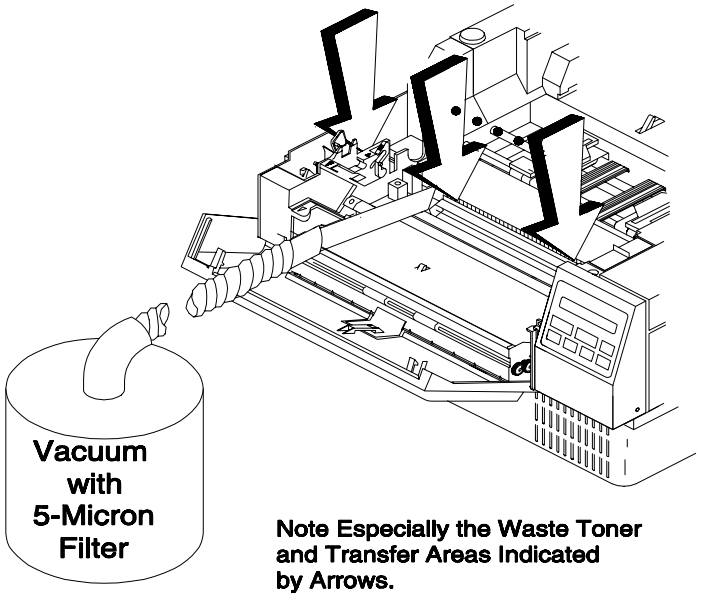
❶ Remove Consumables.



PB0-R2

1. See Removing the developer unit, Page 6-37.
2. See Removing the drum cartridge, Page 6-34.
3. See Removing the waste toner bottle, Page 6-28.

❷ Vacuum Interior.



PB0-S1

❸ Use a Shipping Kit

To best protect your printer during shipping, use a printer shipping kit, available from the printer manufacturer.

STATIC ELECTRICITY

The effort involved in bringing dissimilar objects together and then separating them can cause static electrical buildup in some materials.

Electrostatic discharge (or ESD) occurs if built-up static electricity in one object is released by contact with a dissimilarly charged object. If the oppositely charged or uncharged object is an instrument containing static-

sensitive electronic components, then the ensuing discharge can and will damage that equipment. The ESD damage is permanent.

Static discharge may simply cause electronic equipment, such as the printer, to lock up or behave erratically. Turning power off and on again may solve the immediate problem. But the damage in some way or another is permanent and can cause diminished performance.

Use the following guidelines to protect the printer (and other electronic equipment) from ESD:

- Because low relative humidity tends to encourage static buildup, prefer to keep the relative humidity in the printer room above 40%.

  In general, since warmer environments tend to have higher relative humidity levels, prefer a warmer room to a colder one.

- Store paper at the same temperature and humidity levels of the printer, or allow paper to acclimate overnight before loading that paper in the printer to avoid static problems caused by overly dry paper.

  Besides encouraging static electricity, an overly dry location robs paper of its built-in moisture content. (Typically, 5% of paper weight is water.) When paper loses this built-in moisture, it curls.

- If the site has carpeting, consider using an anti-static spray on the area surrounding the printer (and stacker), or place an anti-static mat under the printer and stacker.

  Wool is notorious for causing static buildup, as are many synthetic carpeting materials. If you use an anti-static spray on the carpet, do not spray the printer, the paper, or the stacker.

  Even the contact of the paper against the control cable at the rear of the printer can cause static transfer from the paper to the cable and back to

the printer. If you use a parallel interface for communication between the host computer and printer, use the right-angle, parallel interface control cable supplied with the printer to make sure the cable doesn't touch the paper.

The printer is electrically grounded to prevent static buildup in the printer itself. But static drains of this type don't preclude damage to the printer when a discharge occurs between the printer and an electrostatically charged printer stand, for example. Ensure that the stand or table on which the printer is placed is grounded to prevent ESD between you, it, and the printer.

PERIODIC MAINTENANCE

The following chart lists maintenance requirements based on the number of feet of printed material. Check the number of feet of printed material (paper, labels, etc.) under Tot. Ft.= ... in the Extended Configuration Menu.

Note: *The replacement intervals quoted in the table are normal expected intervals derived from a properly maintained printer operating in a room temperature, non-seaside environment at 40% humidity. The printer printed 5% toner area coverage on an 8 1/2 x 11 page-form formatted for 9 1/2 x 11 optimum-stock paper, with the print density dial set at 3, and with the fuser temperature setting at 177°C (the default temperature). Your actual replacement intervals for consumables may vary[1], depending on your location, application, type and size of paper/pages/forms, printer settings, the age of the printer engine, and its level of maintenance.*

1 For warranty claims, the manufacturer requires a copy of the printer's summary page.

MAINTENANCE INTERVALS[2]

Maintenance	Feet				
	3666	7333	27,600	91,666	300,000
Clean					
Fuser Heat Roller[3], Page 6-21		•			
Paper Path, Page 6-11			•		
Corona Wires, Page 6-16			•		
LSU Cover Glass, Page 6-20					•
Refill Developer with Toner (only after a Toner Low message), Page 6-24					
Replace —					
Felt Cleaning Pad[4], Page 6-31	•[5]	•			
Waste Toner Bottle[4], Page 6-28		•			
Drum Cartridge[6], Page 6-33			•		
Developer Unit[7], Page 6-37				•	
Ozone Filter[7], Page 6-41				•	
Fuser Heat and Pressure Rollers					•
Tension Rollers					•
Paper Exit Rollers					•

2 The printer should be overhauled at 300,000 feet. Shaded areas designate maintenance that should be performed by qualified service personnel at 300,000 feet.

3 Clean the fuser heat roller whenever the felt cleaning pad is replaced.

4 Replace the felt cleaning pad and waste toner bottle whenever toner is refilled after a Toner Low message.

5 Replace felt cleaning pad every 3666 feet when running nonporous media such as labels, vinyl, plastics, and the like, or when using a fuser temperature of 169°C or less, or a print density setting (Page 6-43) of 4 or more. (The printer displays the message Repl. Fuser Pad at approximately 3666 feet as a reminder to check and/or replace the felt cleaning pad.) NEVER operate the printer without a felt cleaning pad.

6 Replace drum when printer displays Repl. Drum at 27,600 ft. Also, clean paper path and transfer corona wire.

7 The printer displays the message Repl. Developer at 91, 666 feet as a reminder to replace the developer. Use the Devlp. Ft= ... count in the Extended Configuration Menu (or on the summary page) for tracking replacement intervals of the developer and ozone filter. Always replace the developer and ozone filter at the same replacement interval, and NEVER operate the printer without an ozone filter.

CLEANING PROCEDURES

WARNING ! Turn the printer off before cleaning any areas inside the printer.

Caution ! Except as specifically instructed in this publication, avoid using liquids, including soap and water, inside the printer.

Note: A printer cleaning kit is available from the manufacturer.

Perform the following cleaning procedures, as required or at the periodic interval specified in the table, Maintenance Intervals, on Page 6-8.

Cleaning Exterior Surfaces

Most exterior dirt can be cleaned up with a soft cloth dampened with soap and water. (Remember: The cloth should be moist—not dripping wet.) For toner spills, also see Cleaning Toner Spills, Page 6-10.

Avoid petroleum-based cleaners and solvents such as lighter fluid, or paint thinner. If necessary, use a commercial cleaner, such as *409*[8], to clean surfaces. When using a spray, apply the cleaner to a soft cloth and then apply to the printer. Isopropyl alcohol (70%-90%) can be used instead of a commercial cleaner, except as noted on the next page.

8 ***409*** is a brand name of the Clorox Company.

Caution ! DO NOT use alcohol on the control panel. Alcohol, if it seeps behind the control panel overlay, will weaken the adhesive which binds the overlay to the keypad.

Cleaning Toner Spills

If toner is spilled inside the printer, vacuum immediately. Use a vacuum[9] with a fine particle filter (five micron or better) to avoid spreading toner via the vacuum exhaust.

Don't put off cleaning up toner spills. The printer contains four cooling fans which will spread the toner quickly if not removed promptly.

Be thorough: anywhere there is toner there is potential damage. Be sure to vacuum the area around the drum and developer, high-voltage contact springs, the corona wires (Page 6-16)[10], the LSU cover glass (Page 6-20), and 10 erase LEDs on the bottom of the top cover.

Toner can be removed easily from carpets, floors, and clothing when the toner is cool and dry. When hot, however, toner sticks to most surfaces, making cleanup much more difficult. In all cases, vacuum up spills before using liquid cleaners or before laundering. *Avoid solvents and hot water for cleaning*.

9 Such as 3M Model 497 (115 vac) vacuum with a standard, 5-micron toner filter.

10 Be careful when cleaning in the area of the corona wires. Corona wires are easily broken.

Cleaning Paper Path

To clean the paper path, remove paper, drum (Page 6-33), and developer (Page 6-37).

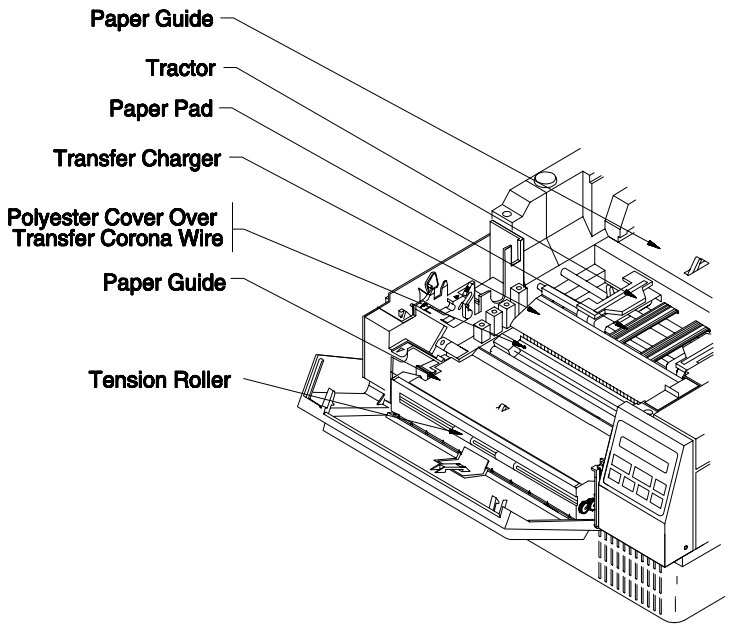
The paper path consists chiefly of the items shown in the following illustration:

- tension rollers
- paper guides
- transfer charger and polyester window covering the transfer corona wire
- tractors and paper pads

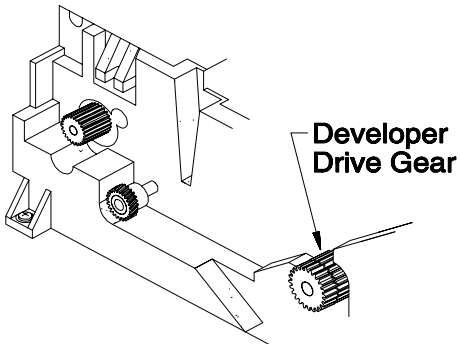
To clean the tension rollers, hold a damp cloth against the rollers while turning the developer drive gear (or one of the other drive gears shown in the illustration on Page 6-12).

Use a vacuum cleaner, preferably one made for use with electronic equipment, or a damp cloth to clean paper dust from sheet metal surfaces. Avoid using compressed air to clear paper dust.

Note: *If you print primarily on labels, clean the paper path on a regular basis. Label paper tends to contain more paper dust than regular paper.*



Cleaning the Paper Path PB0-U2



Developer Drive Gear PB0-V

Cleaning Drum

Cautions ! Failure to comply with these precautions could degrade the quality of print:

- Do not touch the surface of the green cylinder and take care not to scratch it! Any scratch results in a corresponding black mark deposited on the paper.
- Do not expose the green cylinder to light for more than five minutes. The green, organic photoconductor surface of the drum can be damaged by prolonged exposure to bright light.
- **NEVER** pour cleaning agent directly onto the drum, paper path, or fuser. Normally, avoid using liquid cleaners inside the printer. Cleaning agent and toner, if combined inside critical consumables and mechanisms, form an abrasive that can damage the printer and seriously affect print quality. If necessary, reagent-grade isopropyl alcohol and a soft, lint-free cloth may be used to clean the drum. Dry thoroughly before rotating or re-installing the drum. In general though, avoid using liquid cleaners inside the printer.

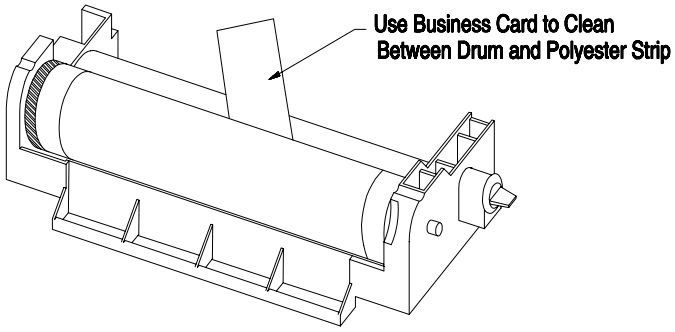
Waste Toner On Drum

If toner dust gets on the green cylinder, it may be blown off, but it is not necessary to do so. The drum cartridge assembly contains a doctor blade that cleans the green cylinder. If the green cylinder is dirty when installed, simply form feed the paper a couple of times to allow the doctor blade to clean the drum before printing begins.

Paper Debris Lodged in Drum Cartridge

Paper can become lodged between the drum and its polyester gasket, thereby causing waste toner to dribble onto the media. The dribbling causes blobs and/or gray, horizontal black stripes on the printout. Most often the dribbling occurs when the fuser closes to begin fixing the print image; closing the fuser provides enough vibration to dislodge the waste toner on, at, or near the paper debris and gasket.

To remove paper debris, use a standard paper business card and run the card between the drum and the polyester gasket, as shown in the following illustration.



Cleaning Paper Debris from Drum CB0-BZ1

Label Stuck to Drum

If a pressure-sensitive label sticks to the drum, remove it using reagent-grade isopropyl alcohol.

Pour the isopropyl alcohol onto a soft, lint-free cloth and gently rub the affected area on the drum to remove the label and its adhesive. Work carefully and diligently: this procedure can take a little time. Switch to a clean cloth occasionally. BE ABSOLUTELY SURE the cleaned area is completely dry before rotating the drum.

Cleaning Corona Wires

The printer uses two corona wires: the transfer corona wire and the charging corona wire. The transfer corona wire is located in the transfer charger assembly, below the drum cartridge. The charging corona wire is located in the top of the drum cartridge.

Keeping corona wires clean is vital for clean, crisp images.

Read and heed the following Cautions before proceeding.

Cautions ! Failure to comply with these precautions could degrade the quality of print:

- Do not use cleaners of any type on corona wires. Cleaners may degrade print quality. Use only the corona cleaning brush supplied with the drum cartridge. Press *gently* when cleaning the corona wires. They are easily broken.
- Do not touch the drum (green cylinder) and take care not to scratch its surface. Do not allow the green cylinder to touch the desktop or other surface. Any scratches will degrade print quality.
- Do not expose the green cylinder to light for more than five minutes. In time, strong light on the drum will cause degraded print quality.

Dirty Charging Corona Wire

The charging corona wire in the drum cartridge pre-charges the drum to -700 vdc. The laser beam selectively discharges portions of the drum so that toner can be attracted to the invisible, latent image.

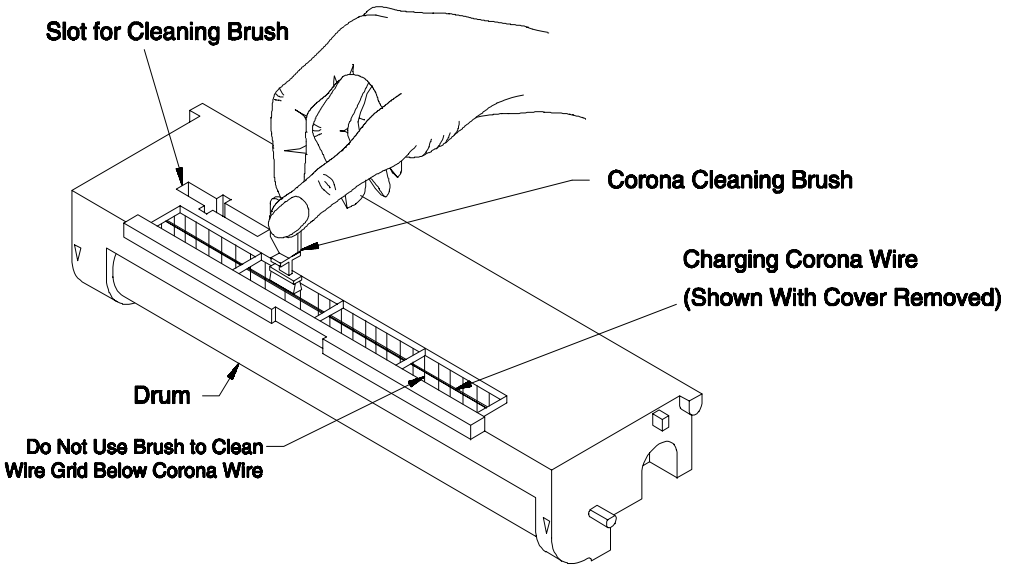
A dirty charging corona wire in the drum cartridge fails to pre-charge that portion of the drum so that toner is attracted to this uncharged area. A dirty charging corona wire causes dark and usually very distinct vertical black streaks on the printout.

Cleaning Charging Corona Wire

To clean the charging corona wire, first read and heed the preceding Cautions, and then proceed as follows:

1. Turn off printer.
2. Open top cover of printer.
3. Locate corona cleaning brush in the drum cartridge and lift off the brush. (See the following illustration.)
4. Lift off plastic cover over charging corona wire.
5. *Gently* (because corona wires are easily broken) move the corona cleaning brush from left to right along each of the four sections of the exposed corona wire.

   Take care not to contaminate the grid below the wire with dirt, but do not attempt to use the brush to clean the grid.



Cleaning the Charging Corona Wire CB0-BR

6. If necessary, use a vacuum cleaner made especially for electronic instruments to clean out the chamber holding the corona wire.

   Be careful not to damage the corona wire.

7. Re-attach plastic cover (left and right ends are indicated by L and R) over the charging corona wire.

Dirty Transfer Corona Wire

The paper lies between the drum and the transfer corona wire. The transfer corona wire is positively charged to pull the toner image from the drum to the paper.

A dirty transfer corona wire has the opposite effect of a dirty charging corona wire. Faded vertical stripes indicate the corona wires may be dirty.

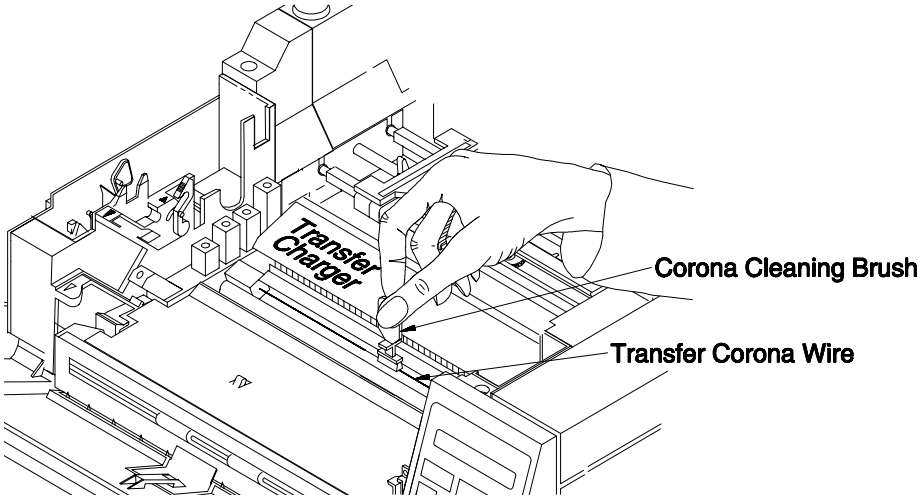
(Even a human hair lying across one end of the corona wire is enough to cause these problems.)

Cleaning Transfer Corona Wire

To clean the transfer corona wire, first read and heed the preceding Cautions, and then proceed as follows:

1. Turn off printer.
2. Open top cover of printer and remove paper.
3. Locate corona cleaning brush in the drum cartridge and lift off the brush. (See the preceding illustration)
4. Lift out drum cartridge (Page 6-33).
5. *Gently* (because corona wires are easily broken) move the corona cleaning brush from left to right along the transfer corona wire in the transfer charger assembly.
6. If necessary, use a vacuum cleaner made especially for electronic instruments to clean out the chamber holding the corona wire.

   Be careful not to damage the corona wire.
7. Re-install drum cartridge.
8. Store corona cleaning brush in slot on top of drum cartridge.
9. Load paper, close top cover, and turn on printer.



Cleaning Transfer Corona Wire
(Developer Unit Removed for Clarity)

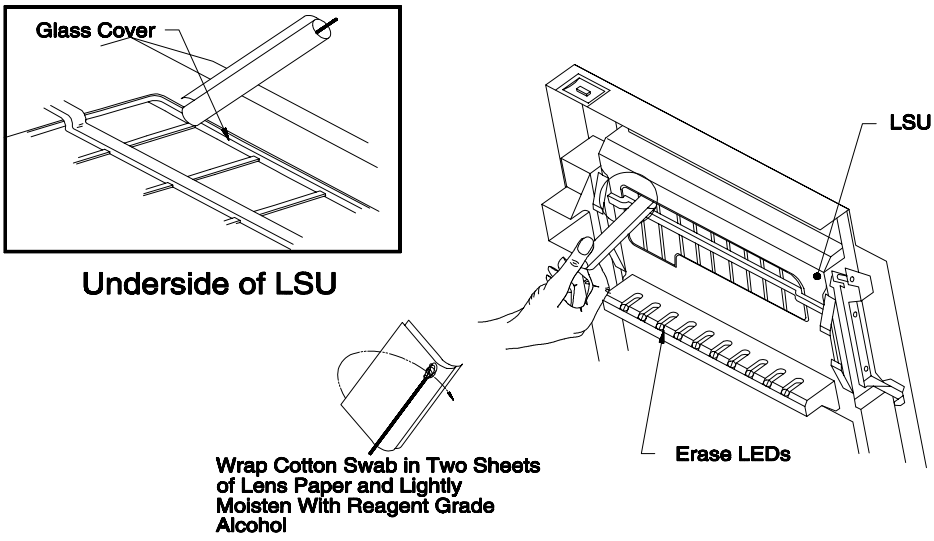
CB0-BS1

Cleaning LSU Cover Glass

A dirty or filmed-over laser scan unit (LSU) cover glass can cause an overall or localized dirty appearance in the printout, along with light print. In many cases, film deposits can form from the use of glass cleaners.

If necessary, clean the cover glass on the underside of the laser scan unit (LSU) using a cotton swab that has been wrapped in two sheets of lens paper and lightly moistened with reagent-grade isopropyl alcohol.

Do not use heavy pressure on the swab. Clean from one end of the glass to the other in one long, gentle stroke, and slowly rotate the swab to prevent streaks. After cleaning the cover glass, use the lens paper to wipe clean the 10 erase LEDs shown in the illustration.



Cleaning the LSU Cover Glass PB0-W1

Cleaning Fuser Heat Roller

Stains or streaks in print may indicate a dirty fuser heat roller. A dirty or damaged fuser heat roller may leave vertically spaced blotches approximately three inches apart on the printout.

Note: *The best way to keep the fuser roller clean is to frequently replace the felt cleaning pad. Most other attempts to clean the fuser—specifically, the fuser heat roller—are not particularly effective, especially if toner has been allowed to bake itself onto the surface of the fuser heat roller over a long period of time. Frequent replacement of the felt cleaning pad helps prevent baked-on toner.*

Caution ! NEVER operate the printer without a felt cleaning pad.

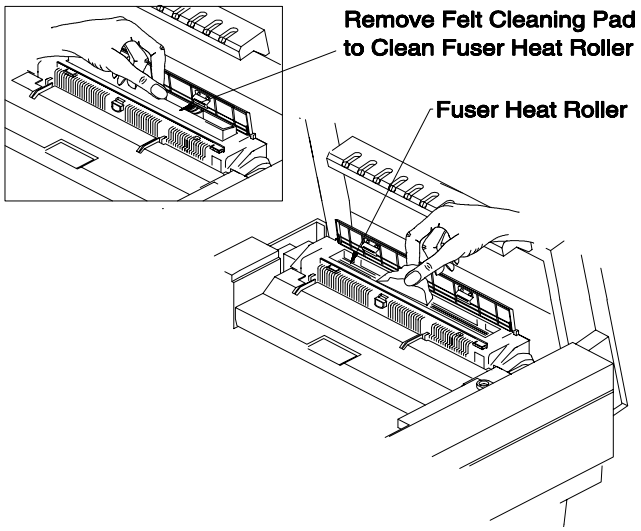
WARNING ! The fuser area becomes very hot. Be sure the fuser is cool before attempting to clean it.

Cleaning Fuser Heat Roller

To clean the fuser heat roller, proceed as follows:

1. Turn off printer.
2. Open top cover.
3. Open hinged cover over felt cleaning pad.
4. Use the green finger holds to lift out the felt cleaning pad.
5. When fuser heat roller has cooled, try wiping the roller clean with a small amount of reagent-grade isopropyl alcohol or acetone on a lint-free cloth. (Refer to the following illustration.)
6. Wipe toward the paper exit side of the roller.
7. Allow the fuser heat roller to dry thoroughly.
8. Drop in a new felt cleaning pad and close cover.

   The felt cleaning pad cover is held down by the printer's top cover.
9. Close top cover.



Cleaning the Fuser Heat Roller PB0-X5

Cleaning Electrical Contacts

Normally, electrical contacts need not be cleaned. If necessary, however, turn off and unplug the printer and then use a small amount of reagent-grade isopropyl alcohol on a lint-free cloth to clean the contacts. Allow to thoroughly dry before closing the printer cover and reconnecting power.

LUBRICATION

Periodic lubrication is not required.

All moving parts are either lubricated for life or require no special periodic lubrication. In fact, unwarranted lubrication could cause damage or impaired performance.

TONER REFILL

When a developer unit is replaced, a special starter toner charge containing a carrier must be added to the toner reservoir. This starter charge is packaged in the developer kit along with the new developer unit. See Developer Unit Replacement, Page 6-37.

When the toner reservoir is refilled, a toner formula *without* carrier must be used, as described below.

Add toner to the developer's toner reservoir only when Toner Low is displayed on the control panel.

WARNING! Toner contains fine particles. Avoid prolonged or repeated breathing of toner. Avoid toner contact with eyes; if contacted flush eyes with water and then contact a physician.

Cautions ! Never add toner unless instructed to by the Toner Low message. If for any reason toner must be replaced, carefully remove old toner from developer and dispose of toner properly.

- Never re-use toner from the waste toner bottle. Waste toner is not fine enough to be recycled through the developer. Also, and most important, waste toner contains contaminants that can damage the developer.
- If toner is spilled, see Cleaning Toner Spills, Page 6-10.
- Avoid extended operation of the printer with a Toner Low message. At some unspecified point, running out of toner can cause pin-hole flaws in the drum which then become chronic black specks on the printout.

Note: When you add toner to the developer unit, also:

- *replace the waste toner bottle (Page 6-28)*
- *replace the felt cleaning pad (Page 6-31)*

  Remember to reset the Fuser Pad= *… count in the Extended Configuration Menu.*

By choosing a print density dial setting of 3 or less, the amount of waste toner can be reduced and the life of the fuser extended. (DO NOT SET BELOW 1.)

Refilling Toner

To refill the developer with toner, proceed as follows:

1. Open top cover of printer.
2. Remove one of two toner bottles from the toner kit.
3. Before removing the bottle's cap and seal, shake the bottle to fluff the toner.
4. Unscrew the cap.

   To prevent a puff of toner from escaping when you remove the toner bottle seal, first puncture the seal slightly with a pin or knife or simply peel back the seal slightly to relieve pressure within the bottle. AVOID SQUEEZING THE BOTTLE.
5. Remove the seal, and then screw on the nozzle from the toner kit.
6. Open the cover on top of the developer unit.

   It clicks open at 90°. See the following illustration.
7. Insert the nozzle into the reservoir and carefully pour in the toner slowly moving the nozzle from side to side to distribute toner evenly.

Caution ! Do not squeeze the toner bottle while pouring. Doing so could cause toner to be blown out of the reservoir, thereby contaminating the printer. If the toner bottle does not completely empty, gently tap the end of the bottle while holding it at an angle over the reservoir.

Note: Despite appearances, toner from a full, 18.2-oz (520-g) toner bottle fits into the developer. Use the nozzle to spread the toner evenly inside the reservoir.

8. Snap the developer cover closed.

9. Remove the nozzle and replace the bottle cap on the empty bottle.

10. Replace the used waste toner bottle with a new one.

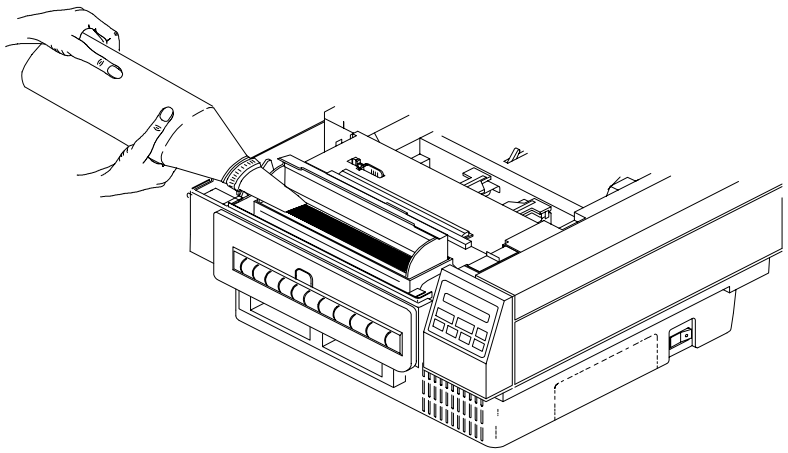
    See Waste Toner Bottle Replacement, Page 6-28.

11. Replace the used felt cleaning pad with a new one.

    See Felt Pad Replacement, Page 6-31.

12. Return spent consumables plus the nozzle to the toner kit box.

    After using both toner bottles, both waste toner bottles, and both felt cleaning pads, ship these spent consumables for proper disposal, as instructed in the toner kit.



Refilling Toner Reservoir PB0-Y1

REPLACEMENT OF CONSUMABLES

Perform the following replacement procedures as required or at the periodic interval specified in the Maintenance Intervals table on Page 6-8.

Waste Toner Bottle Replacement

Replace the waste toner bottle when the toner reservoir is refilled.

Caution ! Never reuse the toner from the waste toner bottle. Waste toner is not fine enough to be recycled through the developer. Also, and most important, waste toner contains contaminants that can damage the developer.

Removing Waste Toner Bottle

To remove the waste toner bottle, refer to the following illustration. Proceed as follows:

1. Open top cover of printer.
2. See the following Caution and then lift out the drum cartridge, taking care not to scatter toner or scratch the drum cylinder.

Caution ! Do not touch the drum (green cylinder) and take care not to scratch its surface. Do not allow the green cylinder to touch the desktop or other surface. Any scratches will degrade the print quality.

Do not expose the green cylinder to light for more than five minutes. Over time, strong light will damage the drum coating, thereby degrading print quality.

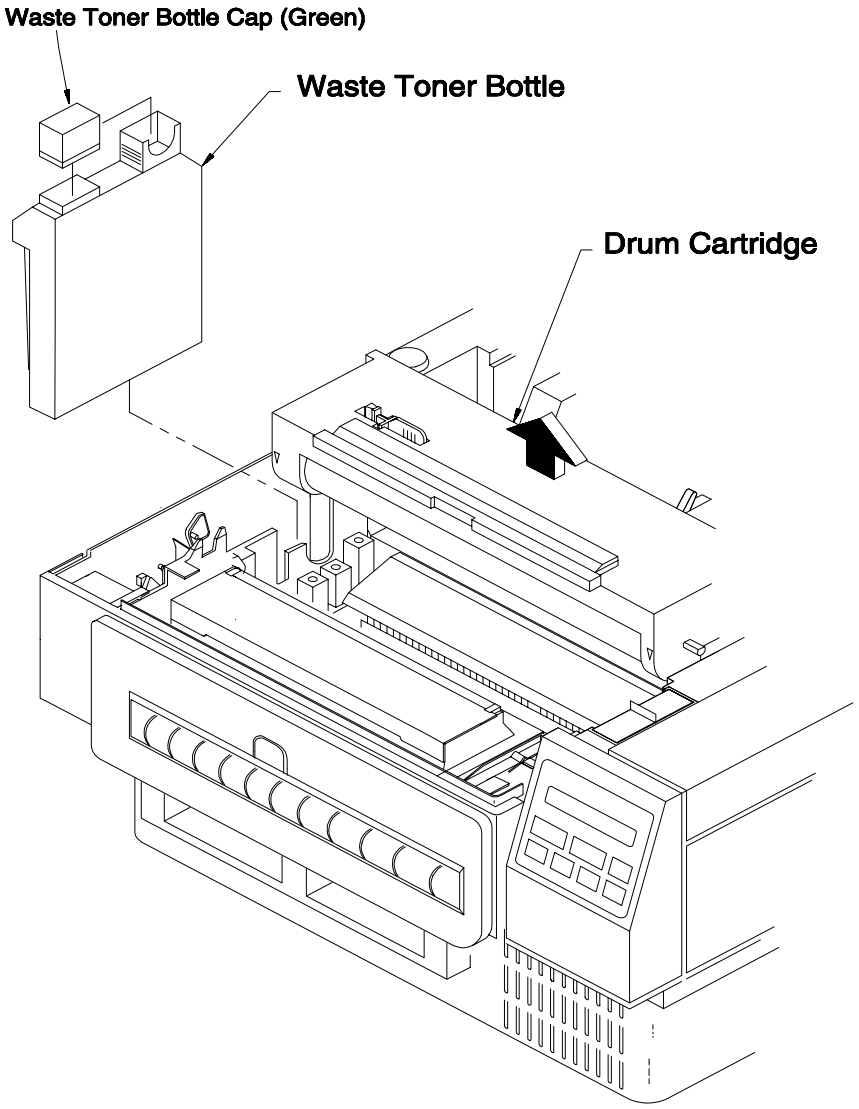
3. Place the green waste toner bottle cap over mouth of bottle.
4. Lift out waste toner bottle.
5. Temporarily, while the waste toner bottle has been removed, place the drum cartridge back into the printer.

Note: *Attempting to use the printer without a waste toner bottle prompts the printer to display the message* Need Toner Cup.

Installing Waste Toner Bottle

To install a waste toner bottle, refer to the illustration below. Proceed as follows:

1. Remove cap on mouth of toner bottle and place on bottle's short, closed-off extension.
2. Lift out drum cartridge, taking care not to scatter toner or scratch the drum cylinder.
3. Insert waste toner bottle as far as it will go into pocket on left side of printer.
4. Re-install the drum cartridge (Page 6-33).



Replacing Waste Toner Bottle PB0-Z1

Felt Cleaning Pad Replacement

Replace the felt cleaning pad when the toner reservoir is refilled.

Caution ! NEVER operate the printer without a felt cleaning pad.

Note: *If the printer consistently prints on labels (or other nonporous media) or on forms six inches or narrower, replace pad every 3666 ft.*

Check the felt cleaning pad frequently when printing on labels or other nonporous media, and also when using:

- *a fuser temperature mode of 169°C or less*
- *a print density dial setting of 4 or more*
- *high dot densities such as in photographs, fills, and dithered backgrounds*

Replace the felt cleaning pad whenever it becomes caked with toner.

Important! No other periodic maintenance concern is more important than frequent replacement of the felt cleaning pad. Frequent changes extend the life of the fuser.

The fuser's felt cleaning pad is impregnated with silicone lubricant which forms a film on the fuser roller to help prevent the toner from sticking. Fuser life can be extended by replacing the felt cleaning pad more often than specified. Check the felt cleaning pad often.

Removing Felt Cleaning Pad

To remove the used felt cleaning pad, refer to the following illustration. Proceed as follows:

1. Turn off printer.
2. Open top cover.
3. Open hinged cover over felt cleaning pad.

WARNING ! The fuser assembly becomes very hot during printing. Take care to hold the felt cleaning pad by the center (green) handle only.

4. Use the green finger holds to lift out felt cleaning pad.

Installing Felt Cleaning Pad

To install a felt cleaning pad, refer to the illustration. Proceed as follows:

1. First, inspect and, if necessary, remove loose toner on top of the fuser roller.

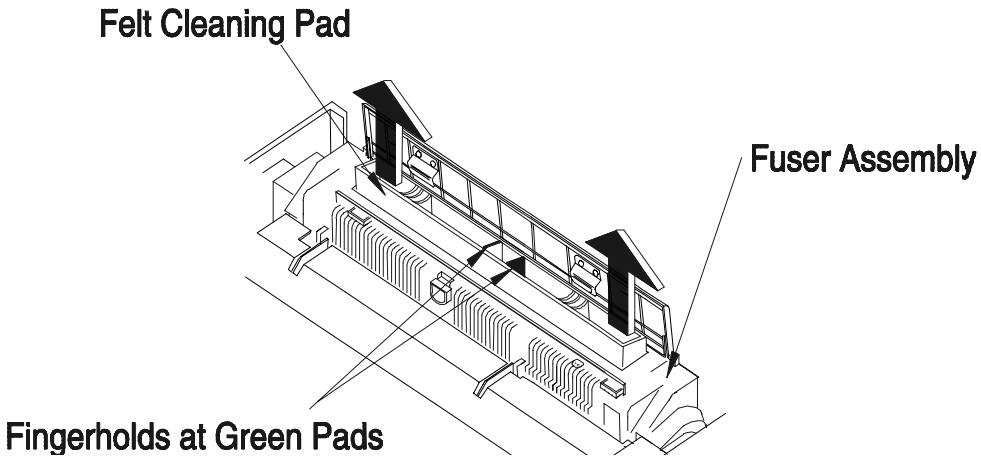
   Use a cotton swab to wipe toner residue toward the paper exit side of roller. Also see Cleaning the Fuser Roller, Page 6-21.

2. Drop in a new felt cleaning pad and close cover.

   The felt cleaning pad cover is held down by the printer's top cover.

3. Close top cover.

4. Reset the Fuser Pad= … counter by selecting Reset Cnt=FusPd in the Extended Configuration Menu and then pressing **STORE**.



Replacing Felt Cleaning Pad PB0-AA1

Drum Cartridge Replacement

Normal maintenance interval for drum cartridge replacement is approximately every 27,600 ft. At 27,600 ft the printer displays the message Repl. Drum as a reminder.[11]

Note: *Replace the drum cartridge when print quality deteriorates and other maintenance procedures do not improve print quality, or when graying, repeating vertical streaks, or repeating blotches occur.*

11 If Auto Cont= Off*, press **ON LINE** to continue printing. The message continues to be displayed until the drum cartridge is replaced.

Replacing Drum Cartridge

To remove the drum cartridge, refer to the following illustration. Open the top cover of the printer and lift out the drum cartridge:

- If the drum cartridge is removed for maintenance on the printer, place the cartridge in its original container or other covering to protect it from light and physical damage.
- If the drum cartridge is being replaced, place the old cartridge in its original container, and follow instructions included with the drum cartridge regarding proper recycling/disposal.

Installing Drum Cartridge

To install a new drum cartridge, refer to the illustration. Proceed as follows:

1. Carefully cut open the foil bag containing the drum cartridge.
2. Remove drum cartridge.

   Keep foil bag and bubble pack; use them to protect the drum cartridge whenever it is removed from the printer.
3. Remove bubble pack from drum cartridge.

Caution! Do not touch the drum (green cylinder) and take care not to scratch its surface. Do not allow the green cylinder to touch the desktop or other surface. Any scratches will degrade the quality of printing.

Do not expose the green cylinder to light for more than five minutes. Over time, strong light will degrade the drum coating and affect print quality.

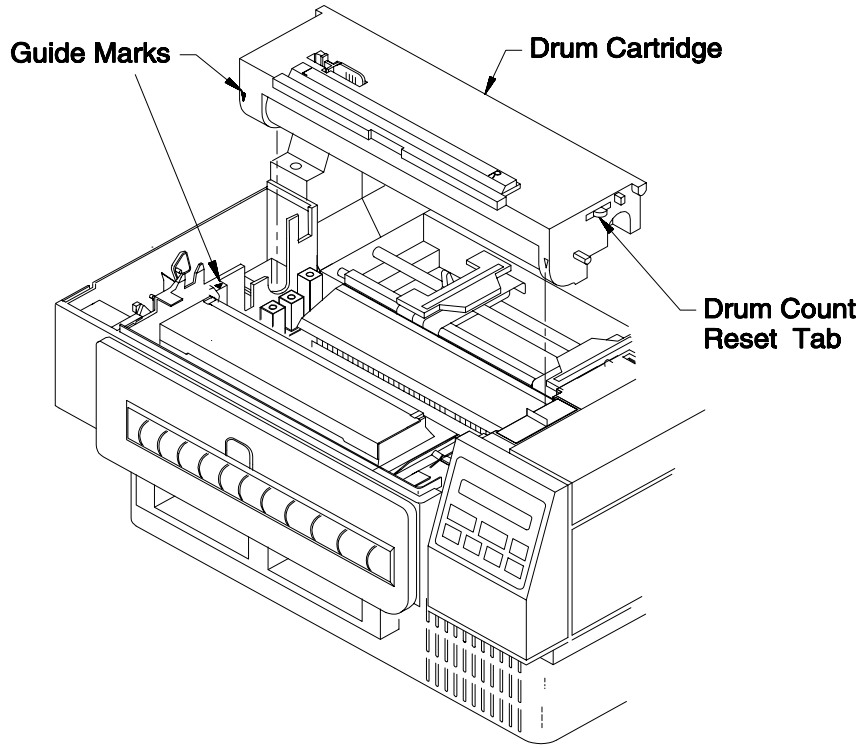
3. Carefully remove tape that covers and supports a small tab on side of cartridge.

   Make sure the tab is not pressed in.

   This tab must remain out in order to reset the printer's drum counter. The tab automatically retracts during printing.

4. Align guide marks (▼) on cartridge and printer and then insert drum cartridge into printer, as shown in the illustration.

   When installed, the drum cartridge is situated directly behind the developer cartridge and is held in place when the top cover is closed.



Replacing Drum Cartridge PB0-AB1

Developer Unit Replacement

Normal maintenance intervals for developer unit replacement is approximately every 92,000 ft. At 91,666 ft the printer displays the message Repl. Developer as a reminder.

Notes:
- *Replace the ozone filter at the same time the developer unit is replaced.*
- *When a developer unit is replaced, a special starter toner charge containing a carrier must be added to the toner reservoir. This starter charge is packaged in the developer kit along with the new developer unit.*

Removing Developer Unit

To remove the developer unit, refer to the following illustration. Proceed as follows:

1. Open top cover and front door of printer.
2. Release the green hook on each side of the developer unit.
3. Hold each side of the developer unit and pull it up at a 45° angle toward the front of the printer.

Caution! Do not turn the developer upside down. Doing so could cause a toner spill.

Installing Developer Unit

To install a new developer unit, refer to the following illustrations. Proceed as follows:

1. Remove developer unit from foil bag.

   Save the bag for disposal of old developer unit.

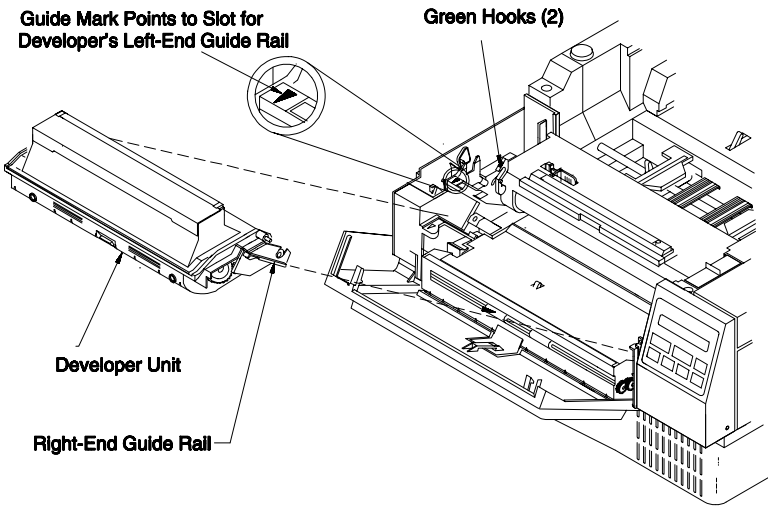
2. Hold the developer unit with the roller directed away from you.

3. Align the left-end guide rail of the developer with the guide mark (▼) on the printer.

4. Insert the developer unit into the printer at approximately a 45° angle and push it into the printer until it snaps into place.

5. Pull forward on the green hooks to lock the developer unit into position.

Note: *After installing a new developer, the first few pages may print light before toner is properly distributed in the new developer.*



Replacing Developer Unit PB0-AC4

6. Reset the Devlp. Ft= … counter by selecting Reset Cnt=Devlp. in the Extended Configuration Menu and then pressing **STORE**.

7. Continue below to fill the toner reservoir with starter toner.

Filling Toner Reservoir With Starter Toner

To fill the toner reservoir with starter toner, refer to the following illustration. Proceed as follows:

WARNING! Toner contains fine particles. Avoid prolonged or repeated breathing of toner. Avoid toner contact with eyes; if contacted flush eyes with water and then contact a physician.

1. Remove starter toner bottle from the developer kit.

2. Before removing the bottle's cap and seal, shake the bottle to fluff the toner.

3. Unscrew the cap.

   To prevent a puff of toner from escaping when you remove the bottle seal, first puncture the seal slightly with a pin or knife or simply peel back the seal slightly to relieve pressure within the bottle. AVOID SQUEEZING THE BOTTLE.

4. Remove the seal, and then screw on the nozzle from the toner kit.

5. Open the cover on top of the developer unit.

   It clicks open at 90°. See the following illustration.

6. Insert the nozzle into the reservoir and carefully pour in the toner slowly moving the nozzle from side to side to distribute toner evenly.

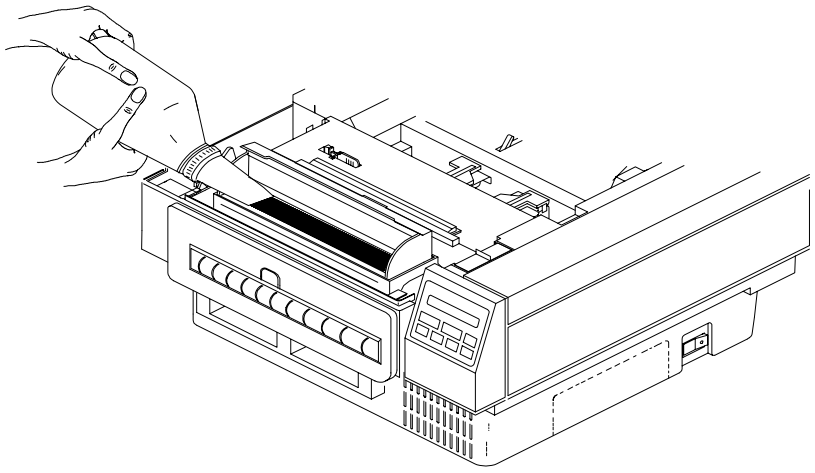
Caution ! Do not squeeze the toner bottle while pouring. Doing so could cause toner to be blown out of the reservoir, thereby contaminating the printer. If the toner bottle does not completely empty, gently tap the end of the bottle while holding it at an angle over the reservoir.

7. Snap the developer cover closed.

8. Remove the nozzle and replace the bottle cap on the empty bottle.

9. Replace the ozone filter. See the following subsection.

10. Place spent consumables (nozzle, empty bottle, old developer, old ozone filter) in the developer kit box. Follow instructions included with the developer kit regarding proper recycling/disposal.



Adding Starter Toner to Developer PB0-AF

Ozone Filter Replacement

Normal maintenance interval for ozone filter replacement is approximately every 92,000 ft.

Note: Replace the ozone filter when the developer unit is replaced.

WARNING ! High voltages used in laser printers create ozone gas that can be harmful. Never operate the printer without an ozone filter!

With the filter installed, the amount of ozone gas emitted is very low, and meets safety agency requirements.

Removing Ozone Filter

To remove the ozone filter, refer to the following illustration. Proceed as follows:

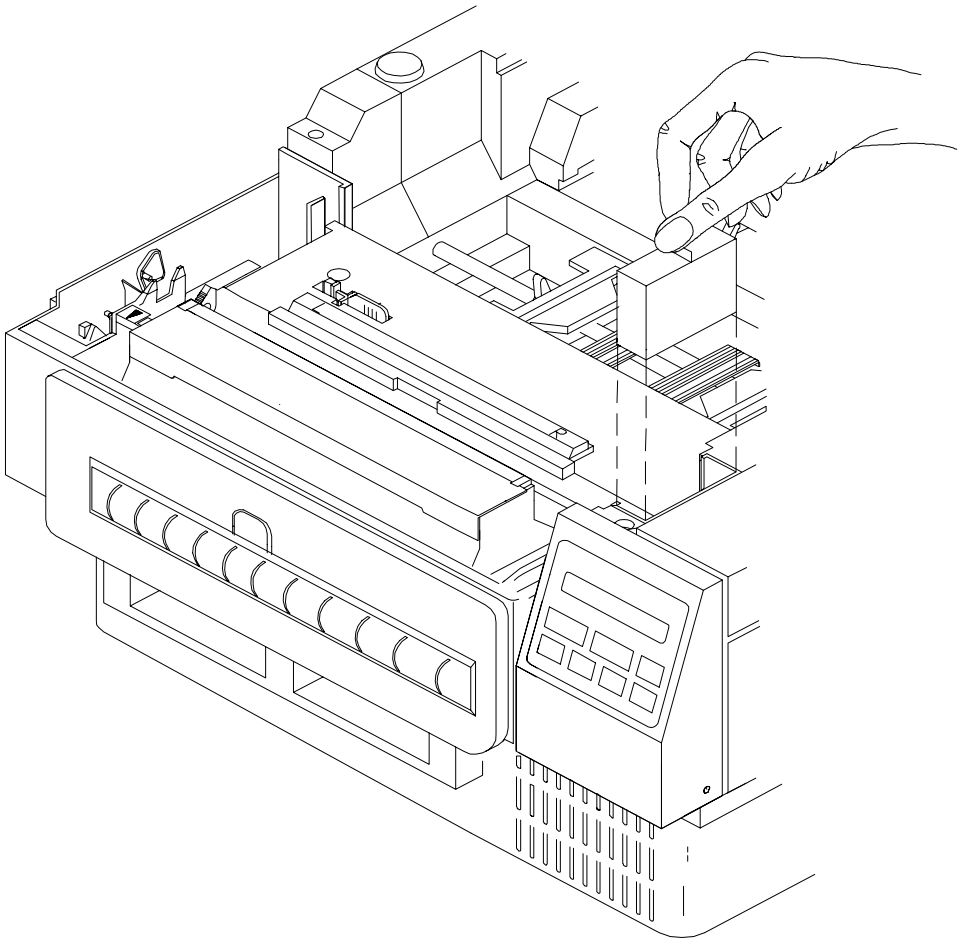
1. Open top cover of printer.
2. Lift tab on top of ozone filter and pull out the filter.

Installing Ozone Filter

To install the ozone filter, refer to the illustration. Proceed as follows:

Caution ! When opening and removing the filter from its storage bag, do not deform the filter.

1. Hold the tab at the top of the filter, and insert it into its holder.
2. Close the top cover.



Replacing Ozone Filter PB0-AD2

PRINT DENSITY ADJUSTMENT

Print density is the relative darkness of the print on the paper. To set the print density:

1. Open top cover of printer.

2. Locate the green print density dial inside printer (see the following illustration).

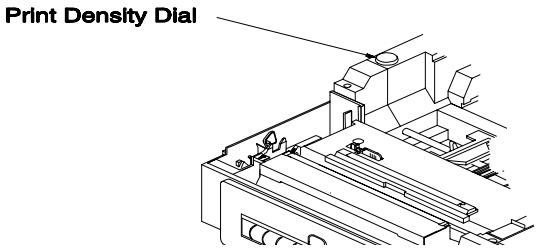
   The normal setting is 3. Turn the dial to a lower number if lighter print is desired; higher for darker print. See the Note and Caution that follow.

3. Close the top cover.

Note: If light print density is acceptable, set the print density dial to settings 2 or 1, but never below 1. Lighter than average print density saves money by using less toner and extending the life of the fuser.

Also, consider a lighter print density setting if the printout appears overly raised or fuzzy. Consider a slightly *lighter setting for low porosity paper or other media, i.e. labels. Also, a lower print density may often improve the readability of barcodes, up to a point.*

Caution ! Darker print may cause a higher amount of toner waste and/or toner buildup on the fuser assembly. Toner buildup due to a high print density adjustment and/or a lower fuser temperature mode (Fuser Temp= in the Extended Configuration Menu) can cause fuser roller wear and Fuser Failure. Consider replacing the felt cleaning pad (Page 6-31) more frequently when using a higher print density setting.



Setting Print Density PB0-AE1

FUSER HEAT AND PRESSURE ROLLER REPLACEMENT

Warning ! Make sure fuser has cooled sufficiently before handling.

To remove the fuser heat and pressure roller assembly, refer to the following illustration. Proceed as follows:

1. Remove paper, disconnect power and interface cables, and open top of printer.
2. Remove fuser's lower heat shield.
3. Remove lamp connector cover by removing one Phillips screw.
4. Disconnect fuser lamp and thermistor connectors.
5. Open fuser exit cover at rear of fuser.
6. Press down on the white, plastic, fuser retaining lever on each side of fuser so that fuser roller assembly is free to move.
7. Lift out the fuser heat and pressure roller assembly.

Installing Fuser Heat and Pressure Roller Assembly

To install the fuser heat and pressure roller assembly, proceed as follows, referring as necessary to the illustration below:

1. Insert the fuser heat and pressure roller assembly.

   Make sure assembly is fully seated and the white, plastic fuser retaining levers are in their fully engaged positions.

2. Install a new felt cleaning pad (Page 6-33).

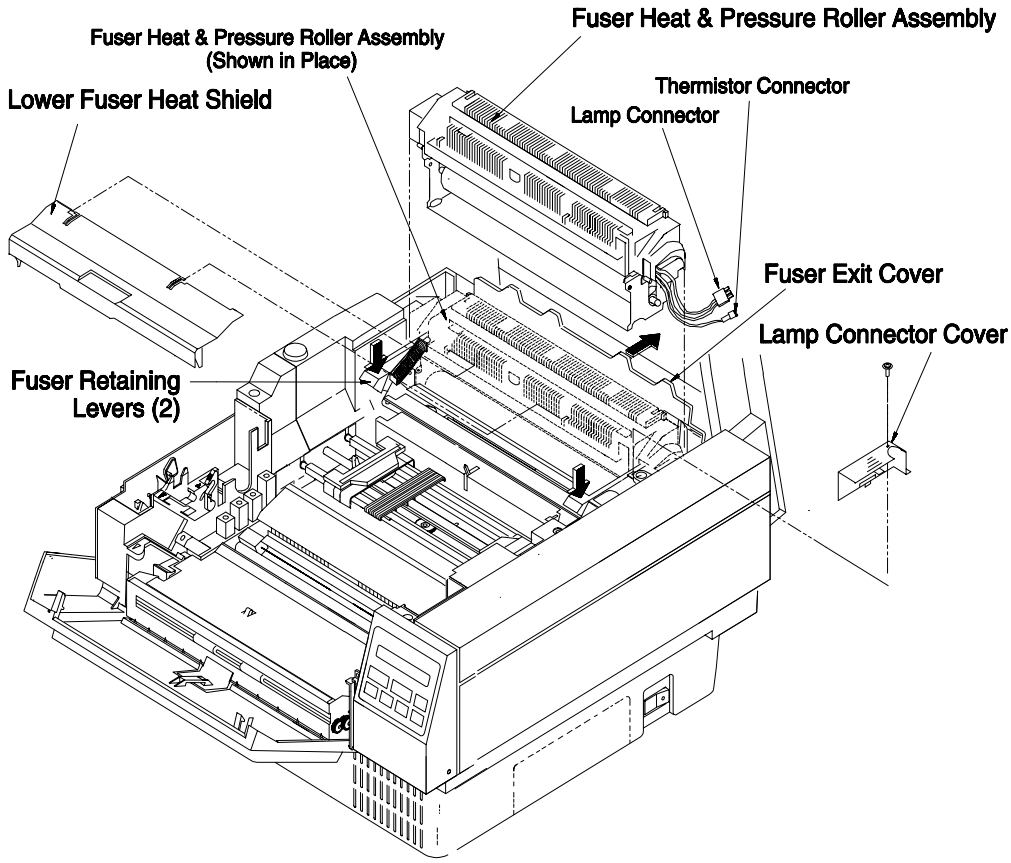
3. Close fuser exit cover at rear of fuser.

4. Reconnect fuser lamp and thermistor connectors.

5. Replace lamp connector cover.

6. Replace the fuser's lower heat shield.

7. Close the top of printer, reconnect power and interface cables, and reload paper.



Fuser Heat and Pressure Roller Replacement PB0-CA

7—Troubleshooting

WARNINGS !

! Hazardous voltages are present in this printer. With the enclosure removed and power applied, hazardous voltage areas are present. Equipment service must be performed only by service-trained personnel who are aware of the hazards involved.

! Do not operate printer without its ozone filter.

CAUTIONS !

! If you remove the drum cartridge for printer maintenance, place it in its original container or other protective covering and store it in a dark location. Prolonged exposure to strong light will deteriorate the green organic photoconductor coating on the drum.

! **Prior to shipping,**

- **remove the developer unit, toner waste bottle, and drum**
- **remove all trace of loose toner inside the printer**

The manufacturer and/or carrier are not liable for damages caused by consumables or by toner deposits which remain in the printer during shipment. See Moving or Reshipping the Printer, in Section 6, *Maintenance*.

! Never use the fuser exit cover on the back of the printer as a handhold for lifting the printer. Lift the printer only along the sides of the printer.

TROUBLESHOOTING CHART

Troubleshooting Chart

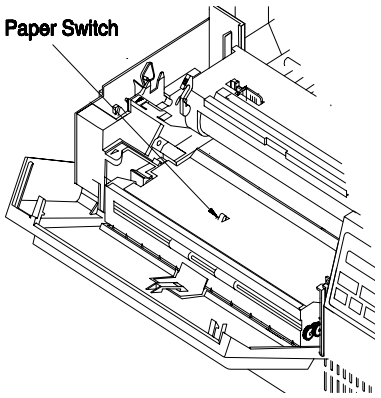
Problem	Probable Cause	Solution
Computer Messages		
Not ready error writing device Abort,Retry,Ignore,Fail?	1. Offline 2. Possible Interface Timeout 3. Wrong Port	1. Check if printer is offline. 2. Change timeout using DOS mode command or the printer driver. 3. Check port compatibility between host and printer.
Printer Messages		
Bad Fuser Motor	Fuser Cam Motor or Cam Positioning Error	Cycle power off and on. If necessary, call for service.
Cover Open	Top Cover of Printer is Open	Close cover.
Error: Font Cart	1. Font Cartridge Was Removed With Printer Online 2. Bad Font Cartridge Slot 3. Bad Font Cartridge	1. Re-install font cartridge and then cycle power off and on. 2. Try the other slot. 3. Replace damaged font cartridge.
Form Speed Error	1. Defective Tractor or Fuser Drive Motor 2. Toner Contamination of Tractor Sensor 3. Overloaded, Weak, or Defective Power Supply	Cycle power off and on. For details on troubleshooting a Form Speed Error, see Page 7-43. If problem persists, call for service.
Fuser Failure **Caution !** The most recently printed pages may contain loose toner.	1. Temperature Too High or Too Low 2. Blown Thermal Breaker 3. Weak Fuser Lamp 4. Low or Wrong Line Voltage 5. Bad Fuser Motor	Cycle power off and on. (See Page 7-41 for details on troubleshooting a Fuser Failure.) If problem persists, call for service.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Laser Failure (May occur after opening and closing printer)	1. Defective Laser Scan Unit (LSU), LSU Interface Cable, Cover Latch 2. Overloaded, Weak, or Defective Power Supply	Cycle power off and on. If problem persists, call for service.
Load New Forms [Only occurs with Form Cont= Off* and PCL Frm Ctl= On*[1] in the Extended Configuration Menu.]	Command from Host Has Specified a Form Length Other Than the One Set in the Configuration Menu	To correct: • load new forms and press **ON LINE** to continue • press **ON LINE** to print the new page format on the present forms in the printer *Note: Simply pressing* **ON LINE** *to continue may result in an incorrect top of form.*

1 PCL Frm Ctl only applies to the PCL emulation.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Load Paper	1. No Paper in Printer 2. Printer Lost Top of Form 3. Media Too Narrow	1. Load paper. Close cover and then press **ON LINE**. 2. Reload paper. 3. The paper switch, shown in the illustration below, is located near the middle of the paper feed slot. If narrow media (less than $3^1/2$ in. in width) is loaded, the paper fails to trip the paper switch, thereby causing this message.  PB0-AG
Memory Error	Printer Memory Error[2]	• For the short term, cycle power off and on and then set page protection on in the Configuration Menu. • For the long term, add memory (Appendix A.)

2 Can occur if the printer's output process lags behind its input process.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Need Print Drum	Drum Cartridge is Missing	Re-install drum cartridge. Close cover and press **ON LINE**.
Need Toner Cup	1. Waste Toner Bottle is Missing 2. Electronics Failure	1. Re-install waste toner bottle. 2. Cycle power off and on. If necessary, call for service.
Offline	The printer is offline and cannot receive data from the host.	Press **ON LINE**.
Opt I/O Error 1[3]	A Nonrecoverable Optional Interface Error. (May cause loss of data. Corresponds to a LaserJet ERROR 42.)	Try one of the following: • press **ON LINE** (if Auto Cont= Off*) to continue printing, if possible • cycle printer power off and on In either case, the error is reset. If the error persists, replace optional interface.
Opt I/O Error 2[3]	A Recoverable Optional Interface Error. (Should not cause loss of data. Corresponds to a LaserJet ERROR 43.)	If Auto Cont= Off* the printer resets error and continues printing after **ON LINE** is pressed.
Opt I/O Error 3[3]	Optional Interface Handshaking Error. (Corresponds to a LaserJet ERROR 69.)	If Auto Cont= Off* the printer resets error and continues printing after **ON LINE** is pressed. If failure persists, replace optional interface.

3 If Auto Cont= On* in the Configuration Menu, printer continues printing, if possible, with the error message displayed.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Page Too Complex	Printer Has Insufficient Memory to Rasterize Page	Try one of the following: • Add more printer memory (Appendix A) • Delete soft fonts and macros • Set Pg Prot.= On* in the Extended Configuration Menu
Paper Jam	1. Paper Jam 2. Lower Fuser Heat Shield is Missing 3. Electronic Malfunction	1. See Paper Jam (Page 7-45). 2. Re-install plastic heat shield. 3. Call for service.
Re-load Paper	Occurs If the Paper Has Not Been Reloaded After: • a Power Failure • Printer is Turned Off and Then On Again During a Print Job • Top Cover is Opened and Closed During an Error Recovery, When DATA is On, or During a Transfer Sequence Test	Reload paper.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Repl. Cartridge	Print Buffer Contained Print Data When the Font Cartridge was Removed	Re-install the font cartridge.
Repl. Developer	Developer Unit Has Exceeded 91,666 Ft	Replace developer unit (and ozone filter) as soon as possible[4]. After replacing the developer and ozone filter, reset the Devlp. Ft= ... count in the Extended Configuration Menu. See Section 5.
Repl. Drum	Drum Cartridge Has Exceeded 27,600 Ft	Install a new drum cartridge as soon as possible. If printing does not continue automatically, press **ON LINE**[5].
Repl. Fuser Pad	Fuser's Felt Cleaning Pad Has Exceeded 3666 Ft	Check the fuser's felt cleaning pad for caked on toner. Replace if necessary[6]. After checking and/or replacing the cleaning pad, reset the Fuser Pad= ... count in the Extended Configuration Menu. See Section 5.

4 Auto Cont= On* in the Configuration Menu allows printing to automatically continue with this maintenance message displayed. If Auto Cont= Off*, press **ON LINE** to continue. Pressing **ON LINE** automatically resets the counter.

5 Auto Cont= On* in the Configuration Menu allows printing to automatically continue with this maintenance message displayed.

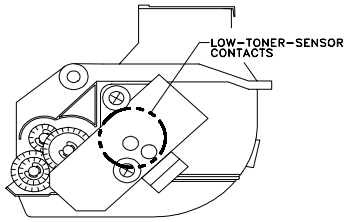
6 Normally, replace the felt cleaning pad only when the developer is refilled with toner. If you continually print on nonporous media, such as labels, replace the felt cleaning pad more often. Check the fuser cleaning pad when Repl. Fuser Pad appears. Auto Cont= On* in the Configuration Menu allows printing to automatically continue with this maintenance message displayed. If Auto Cont= Off*, press **ON LINE** to continue. Pressing **ON LINE** automatically resets the counter.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Reset to Save	Print Menu Changes Were Made While Printer Contained Print Data, Temporary Fonts, or Temporary Macros	Press: • **RESET** to immediately save the new selection and erase buffered data and any temporary fonts or macros. • **ON LINE** to retain old Print Menu selection until the printer encounters a reset or until you press **RESET**.
Self Test Error[7]	Occurs if Printer Fails Power On Sequence Check, Page 7-38	Cycle power off and on. If problem persists, call for service.
Store to Stop	Displayed When Running a Diagnostic Print Pattern	Press **STORE** to stop the printout.

7 A self test error always occurs when powering up the printer for the first time after replacing firmware.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Toner Low	1. Low Toner 2. Bad Electrical Contact Between Developer and Printer Power Supply	1. Refill toner reservoir. 2. Snap the toner reservoir cover shut, and carefully remove the developer. **Caution!** Don't tip the developer. Tipping will cause a toner spill. Clean the two electrical button contacts on the left end of the developer, shown below. Also clean the corresponding electrical finger contacts in the printer.  PB0-AH
	3. Bad Developer Unit	3. Replace developer unit.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Printer Messages, continued		
Wait	1. Fuser is Heating Up or Printer is Recovering From an Error 2. Printer Failure During Complex Rasterization	1. Wait. 2. Cycle power off and on. (Also, see solution for Page Too Complex message.)
Wrong Cartridge	Wrong Font Cartridge was Installed During Font Cartridge Re-installation	Install the correct font cartridge.
Indicators		
• READY Flashing • DATA Off (Printer never prints)	Emulation Incompatibility	Check the host's print file vs. the printer's emulation setting. Also, check host's print driver settings.
Print Quality		
No-Print Areas	1. Paper on Fuser Roller 2. Developer Drive Gear Jam or Broken Gear	1. Check for paper stuck on fuser. 2. Check drive gear (Page 7-51.)
Overall Poor Print Quality	Dirty Corona Wires	Clean corona wires.
Fuzzy or Blurred Image Edges	1. Dirty Corona Wires 2. Print Density Setting Too High 3. Dirty LSU Cover Glass 4. Incompatible Media Worn Out Fuser	1. Clean. 2. Choose a lower print density setting. 3. Clean. If necessary, call for service. 4. Check media against Paper and Label Recommendations in Section 2. Replace fuser heat and pressure rollers.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
No Print in Narrow Vertical Strip	1. If Top Cover Is Not Latched on One Side, Print May Be Lighter on That Side of Printout	1. The drum is held down by the top cover. Make sure cover is latched securely on both sides.
	2. Dirty Transfer Corona Wire or Misaligned Transfer Charger	2. a. Clean corona wire. b. Run a Transfer Sequence Fault Isolation Test (Page 7-39). If the images appear OK on the drum but not on the paper, suspect a misaligned transfer charger. If necessary, call for service.
	3. Dirty LSU Cover Glass	3. Clean.
	4. Thick Media (paper, label, or card stock) or Media Containing Too Much Moisture May Affect Right or Left Side of the Printout	4. Run different media and compare results. Refer to Paper and Label Re-commendations in Section 2.
	5. Defective or Clogged Developer	5. Check for a jammed developer (Page 7-51). If necessary, replace developer.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
No Print in Narrow Vertical Strip (Continued)	6. Worn Drum	6. If a drum has been used extensively to print narrow forms, it may show when media is switched to wide forms. Print may seem lighter from the drum area used in printing the narrow forms.
	7. Piece of Paper or Debris Caught in Developer	7. Check the developer as you would for a jam (Page 7-51), but instead move the toner-coated roller for a short distance in the opposite direction to retrieve any paper caught in the developer.
	8. Dirty or Obscured LSU Cover Glass	8. Check and clean LSU cover glass.
	9. Bad Developer	9. Replace developer.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Light (Graying) Print, Overall	1. Low Toner	1. If Toner Low is displayed, refill developer with toner.
	2. Print Density Setting Too Low	2. Set the print density dial to a higher setting.
	3. Broken Developer Drive Gear	3. Check drive gear (Page 7-51).
	4. Drum Cartridge Nearing End of Life	4. Check Drum Ft= ... in the Extended Configuration Menu. On average, the drum cartridge should be replaced at about 27,600 ft.
	5. Broken or Dirty Transfer Corona Wire	5. Check. If not broken, clean. If necessary, call for service.
	6. Filmed-Over or Worn-Out Fuser Roller	6. Attempt to clean. Replace felt cleaning pad. If necessary, replace fuser heat and pressure rollers.
Light Print (Horizontal Band)	Broken Developer Drive Gear	Check drive gear (Page 7-51).

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Light Print (Wide Vertical Strip)	1. If Top Cover Is Not Latched on One Side, Print May Be Lighter on That Side of Printout	1. The drum is held down by the top cover. Make sure cover is latched securely on both sides.
	2. Dirty Transfer Corona Wire or Misaligned Transfer Charger	2a. Clean corona wire. b. Run a Transfer Sequence Fault Isolation Test (Page 7-39). If the images appear OK on the drum but not on the paper, suspect a misaligned transfer charger. If necessary, call for service.
	3. Dirty LSU Cover Glass	3. Clean.
	4. Thick Media (paper, label, or card stock) or Media Containing Too Much Moisture May Affect the Right or Left Side of the Printout	4. Run different media stock and compare results. Refer to Paper and Label Recommendations in Section 2.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Light Print, Wide Vertical Strip (Continued)	5. Defective or Clogged Developer	5. Check for a jammed developer (Page 7-51). If necessary, replace developer.
	6. Worn Drum	6. If a drum has been used extensively to print narrow forms, it shows when media is switched to wide forms. Print may seem lighter from the drum area used in printing the narrow forms.
Faded Areas, Random	1. Toner Not Distributed Evenly	1. Open the toner reservoir on the developer and carefully redistribute toner.
	2. Low Toner	2. If Toner Low is displayed, refill developer with toner.
	3. Print Density Dial Too Low	3. Set print density dial at higher setting.
	4. Dirty Transfer Corona Wire	4. Clean corona wires.
	5. Paper Quality	5. Choose a different type or source of paper.
	6. Damaged, Dirty, Worn Out, or Contaminated Developer, Drum, or Fuser	6. See Transfer Sequence Fault Isolation Test (Page 7-39) to determine where the fading first occurs. Replace consumable or call for service.
	7. Broken Developer Drive Gear	7. Check drive gear (Page 7-51).

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Dark, Vertical Stripe or Streaks (Anywhere)	• Dirty Charging Corona Wire or Grid • Dielectric Incompatibility of Media • Contaminated Toner • Bad or Contaminated Drum • Power Supply • Dirty Felt Cleaning Pad • Incompatible Media • Fuser • Scratched Drum	Perform a Transfer Sequence Fault Isolation Test (Page 7-39): If streaks appear prior to fusing: a. Clean corona wires. b. If the form has very high dielectric properties the transfer charger may have difficulty pulling the image from the drum to the media. Observe that the image on the drum is OK while the image on the paper appears with radiating lines of toner. c. Replace developer. d. Replace drum. e. Call for service. If streaks appear after fusing: a. Check felt cleaning pad. b. See Paper and Label Recommendations in Section 2. c. Replace fuser heat and pressure rollers.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Dark, Radiating Streaks	Dielectric Incompatibility of Media	If the form has very high dielectric properties the transfer charger may have difficulty accurately transferring the drum image to the media. Observe that the image on the drum is OK while the image on the paper is frayed with radiating lines or traces of toner.
Vertically Compressed Print	Main Drive Motor or Gear Failure Associated with Tension Roller, Developer, or Drum	1. Check for obstruction in tension rollers. 2. Check for developer jam (Page 7-52). If necessary, replace developer. 3. Remove drum and check for squeaking. If necessary, replace drum. 4. Call for service.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Smear	1. Dirty Fuser Roller	1. Remove felt cleaning pad. Clean fuser roller with isopropyl alcohol. Allow to dry and then install a new felt cleaning pad. If necessary, replace fuser heat and pressure rollers.
	2. Dirty Paper Guide	2. Clean paper path.
	3. Dirty Charging Corona Wire	3. Clean corona wires.
	4. Dirty Felt Cleaning Pad	4. Replace felt cleaning pad.
Horizontal Black Line at Top of Form (TOF)	Transfer Charger Latch or Cam Malfunction	Call for service.
Horizontal Lines (Occur randomly when running job containing graphics)	Page Protection Off	Turn on paper protection in Configuration Menu.
Repeating Vertical White Streaks	1. Low Toner	1. If Toner Low is displayed, refill developer with toner.
	2. Dirty Corona Wires.	2. Clean transfer corona wires.
	3. Print Density Too Low	3. Select higher print density.
Uneven Print Density	1. Toner Not Evenly Distributed in Developer	1. Open toner reservoir and carefully redistribute toner.
	2. Low Toner.	2. If Toner Low is displayed, refill developer with toner.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Blemishes , Spots, and Horizontal Lines (On Startup and Stop)	1. Paper Debris or Dust in Drum Causing Toner To Spill onto Media from Drum	1. Clean entrance to drum. (See Section 6, *Maintenance*.) If necessary, replace drum.
	2. Dirty Paper Guide Assembly	2. Clean paper path.
	3. Bad Developer.	3. Replace.
	4. Transfer Charger Latch or Fuser Cam.	4. Call for service.
Dots, Spots, Smudges, Blobs, Blotches, Stains (Random and Overall)	1. Damaged, Dirty, or Contaminated Developer, Drum, Corona Wires, or Fuser	1. Perform Transfer Sequence Fault Isolation Test (Page 7-39).
	2. Paper Quality	2. Choose a different type or source of paper. Prefer uncoated paper; coated papers can appear stained.
	3. Dirt Between the Drum and its Polyester Seal	3. Clean. See Section 6, *Maintenance*.
	4. Low, Contaminated, or Spoiled Toner	4. Low toner can cause the carrier on the toner-coated developer roller to pit the drum thereby causing pin-point black dots on the printout. The same can result from large chunks of toner in a contaminated toner reservoir. If necessary, remove developer and carefully empty toner reservoir. Refill with fresh toner.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Blemishes That Repeat	1. If Every 5 in. on Printout, Suspect the Drum Cartridge	1. Remove the drum cartridge and check for a scratch or nick or pits on the green cylinder. These can be caused by a malfunctioning developer unit. Replace developer unit and/or drum cartridge, if necessary.
	2. If Every $4^{3}/_{4}$ in. on Printout, Suspect a Dirty or Worn Fuser Roller or Felt Cleaning Pad	2. Remove the felt cleaning pad. Attempt to clean fuser roller with reagent-grade isopropyl alcohol. Allow to dry and then install a new felt cleaning pad. If necessary, replace fuser heat and pressure rollers.
	3. If Every $^{7}/_{8}$ in. on Printout, Suspect the Developer Unit	3. Check the developer for a stuck roller (Page 7-51). If problem persists, replace developer unit.
	4. Wavy Patterns: 8 Sets Every 3 Vertical Inches Indicates a Bad LSU	4. Call for service.
	5. Damaged, Dirty, or Contaminated Developer, Drum, or Fuser	5. Perform Transfer Sequence Fault Isolation Test (Page 7-39).

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Quality, continued		
Print Smudges When Rubbed ***or*** Print Rubs Off ***or*** Print Excessively Raised	1. Fuser Temperature Set Too Low 2. Print Density Set Too High 3. Bad Fuser	1. Select a higher Fuser Temp= ... in the Extended Configuration Menu. 2. Choose a lower print density setting. 3. Replace fuser heat and pressure rollers.
Distorted First Line	1. Not a Factory-Approved Drum 2. Broken or Misaligned Gear in Fuser 3. Worn Drum Drive 4. Defective or Worn Drum 5. Worn Tension Roller.	1. Replace drum with a genuine factory replacement. 2. Call for service. 3. Check drum drive gear (Page 7-53) for looseness. Call for service. 4. Replace drum. 5. Call for service.
Print is Sheared Off or Skewed	1. Tractor Not Set Properly 2. Paper Entrance Guide Not Installed or Adjusted 3. Top Cover Not Latched Properly	1. Check. Also, check that tractors are centered properly. If not, see illustration on Page 7-50 to re-center. 2. Install and/or adjust paper entrance guide. 3. Check. If necessary, call for service.
Gray Background (Overall)	Print Density Set Too High	Choose a lower print density setting.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print and Forms Positioning		
Wrong Format[8] (Custom Form Settings in Configuration and Extended Configuration Menus are Ignored)	Print File is Overriding Menu Form Settings	• For PCL emulation, set PCL Form Ctl= Off* in Extended Configuration Menu to force menu form control over that of print file. • For PostScript emulation, form control is always embedded in the header and/or print file. Header and print file form control always takes precedence over printer settings.
Vertical Alignment Varies from Form to Form When Using Custom or Metric Form Sizes	Top of Form Incorrectly Set.	Reload paper. Make sure that the leading edge of the first form is halfway between preceding and following sprocket holes in paper. (See Section 2.)

8 If you use Microsoft Windows, consider using the LaserMatrix print driver which is specifically designed for your printer. Contact the printer manufacturer to obtain your ***free*** copy of this driver.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print and Forms Positioning, continued		
1/6 in. or 1/5 in. Gap at Each Top of Form	Depending on Emulation, the Printer Imposes a No Print Area at the Top and Bottom of Standard Page Sizes	Use PSize in the Configuration Menu to select a custom form size.
Vertical Misalignment	1. Incompatible Form Size Between Printer, Printer Driver, and Application 2. Wrong Top of Form (TOF) Perf Selected When Using Any Form Sizes Not Evenly Divisible By 1/2 in. 3. Media Inadvertently Advanced While Removing Print Job 4. Defective Tractor or Fuser Drive 5. Defective Power Supply	1. In general, regarding printout control, the application is superior to the driver, and the driver is superior to the printer configuration. However, sometimes mismatched form settings and orientations between the three (MS Windows, for example, vs. the Windows Application vs. the Printer) may cause unexpected results. 2. Reload paper (Section 2). Check to determine the proper TOF perf when using A4, A5, or any paper, or form size not evenly divisible by 1/2 in. 3. When tearing off the completed print job, take case not to pull media thus disturbing the printer's top of form alignment. 4. Call for service. 5. Call for service.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print and Forms Positioning, continued		
Registration Shifts Slightly Especially When Using Long Forms	Vertical Correction Every 0.05 In. is Disabled	Set VCor.= 0.050 in* in the Extended Configuration Menu when tight registration is required.
Prints Across Horizontal Perforation	1. Wrong Configuration Setting	1. Check setting of PSize= ... in the Configuration Menu.
	2. Host Changing Forms Settings	2. Check print driver settings of host software. If necessary, use hex dump mode (Page 7-54) to check printer codes sent by host. In the PCL emulation, to force Configuration Menu form control over print file form control, set PCL Frm Ctl= Off in the Extended Configuration Menu. If PCL Frm Ctl= On* then form control in the print file takes president over menu selections.
	3. Printer Lost Actual, Physical Location of the Top of Form	3. If form sizes are changed in the menu and/or driver, and new forms are not loaded, the printer calculates a new top of form position based on the present paper in the printer. Once this occurs, the printer loses its previous reference to existing physical horizontal perforations.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Configuration Settings		
Printer Not Printing As Per Menu	1. Print Menu Settings Being Overridden by Host	1. Normal. Printer commands from the host will override Print Menu settings for number of copies, font selection, orientation, and line spacing.
	2. Configuration and Extended Configuration Forms Control Being Overridden By Host	2. Normal for forms control, unless PCL Frm Ctl= Off* in the PCL emulation. If ...Off*, PCL printer commands from host for forms control (units, length, width, etc.) are ignored.
	3. Menu Reset	3. A menu reset (pressing **RESET** in offline mode for more than 3 sec) resets Print Menu to factory defaults, thereby bypassing the user-defined defaults.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Missing/Repeated/Strange/Unexpected		
Printout Fails to Appear in PostScript (READY may first flash with DATA off. READY will return to steady on but no printout)	1. PostScript Error Has Flushed File(s)	1. This can occur because the PostScript file(s) either a) lack an end-of-transmission (EOT) command (04H) at the beginning and end of each file[9], b) are PostScript level II[10], or c) are corrupted. In the case of corrupted files, cycle power off and on to recover.
	2. PCL Print File Was Sent to Printer in PostScript Mode	2. Check that the emulation selection on the printer and host agree. Send only PCL print files in PCL mode.
Printout Appears in Code	1. A PostScript File Has Been Sent to the Printer Which is Set For PCL Emulation	1. Switch printer from PCL to PostScript emulation.
	2. Hex Dump Mode is On	2. Turn off hex dump mode (Page 7-54) or simply cycle power off and on.
Limit of 99 Copies Per Print Job	Out-of-Date RIP Firmware and/or Printer Driver	See Copies in Section 3, Print Menu, for a detailed explanation.[11]

9 This allows each good file to print, but continues to flush any file that requires code analysis. Try setting Emu= PS Emul rather than Emu= Auto in the Configuration Menu.

10 The optional PostScript emulation supports PostScript level I.

11 Contact the printer manufacturer to obtain new RIP firmware and a free copy of the latest MS-Windows, LaserMatrix printer driver.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Missing/Repeated/Strange/Unexpected, continued		
• READY is Steady On • DATA is Steady On • Printer Operates, But No Printout	PCL Print File Lacks Print Job Terminator	PCL print files must have a PCL reset, eject, or form feed command at the end of the file to begin printout. Either send another print job or use **FORM FEED** to print out the print buffer.
No PostScript Printout	1. No Header with PostScript File 2. Timeout 3. Emu= Auto* or ...LaserJet* in Configuration Menu	1. Send header once after turning on or resetting the printer. With a network, send header with each PostScript file. 2. The host may timeout waiting for the printer to respond. Change timeout using DOS mode command and/or, if possible, your application's printer driver. 3. Change to ...PS Emul*[12].
OTCK (or other PCL codes at top-left corner of first page)	A PCL printer code[13] has been sent to a printer having an older version of RIP firmware	Call one of the phone numbers at the front of this publication to order a RIP firmware upgrade for the printer.

12 Emu= Auto* does not always work due to variations in the PostScript print file structures used by some applications.

13 OTCK, for example, is part of an embedded PCL printer code for setting the number of copies above the LaserJet PCL limit of 99. For more information, see Section 8, Programmer's Reference Guide.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Print Missing/Repeated/Strange/Unexpected, continued		
Last Part of Print Job Is Missing	1. Interface Timeout 2. PCL Print File Lacks Print Job Terminator	1. Change timeout using DOS or, if possible, the print driver. 2. PCL print files must have a PCL reset, eject, or formfeed command at the end of the file to begin printout. Either send another print job or use **FORM FEED** to print out the print buffer.
Form is Duplicated	Normal if you Open and Close Printer while DATA indicator is ON. After opening and closing printer, press **ON LINE** to resume printing**.** The printer repeats up to about 17 in. of the previous page.	To avoid a repeated page, especially when dealing with address labels, serialized media, and the like, turn the printer off and then on again to purge the data. Then reload media.
Graphics		
Fill **and** Dithered Patterns Are Flawed	Vertical Correction Every 0.05 in. is Enabled	VCor.= 0.050 in* in the Extended Configuration Menu may cause scan lines to be added or deleted every 0.05 in. to correct for paper and paper transport variations. Change to VCor.= Page* when using graphics and patterns.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Typeface		
Wrong Typeface (Not the One Selected in the Print Menu)	Commands from Host Overriding Printer Settings	Normal. Printer commands from the host override Print Menu settings.
Wrong Typeface (Not the One Selected in the Text File)	1. Temporary Soft Font Has Not Been Downloaded to the Printer	1. Be sure to download the soft font to the printer before or along with the text file. To make sure the font is being selected in the print file, use the hex dump mode (Page 7-54).
	2. Permanent Soft Font Has Not Been Downloaded to the Printer	2. Be sure to download the soft font to printer before text file. (To make sure the font is available in the PCL emulation, print a font page using the Print Menu.)
	3. Temporary Soft Font is Being Erased by a Reset from the Print Driver	3. To check for a reset code, use the hex dump mode (Page 7-54) or an emulation command printout (Page 7-54).

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Typeface, continued		
Wrong Typeface (Not the One Selected from the Font Cartridge)	1. Font Cartridge Not Installed Properly	1. If the font cartridge is not installed securely, printer will not recognize the cartridge. Instead, the printer substitutes the closest available font. Remember to turn off printer before installing font cartridges.
	2. Incompatible or Defective Font Cartridge	2. Check.
Paper Problems (Positioning, Feeding, Paper Out, Jamming, Scorching, Speed)		
Paper Jam (any media)	1. Media (Paper, Labels, etc.) Misaligned on Tractors	1. See Page 7-44 to clear a jam.
	2. Fuser Problem, Low Paper Quality, Top of Form Sensor, Tractor Sensor	2. Call for service. If paper jams occur frequently, • consider changing paper sources. • check for a bent fuser exit cover. NEVER USE THE FUSER EXIT COVER AS A HANDHOLD FOR LIFTING THE PRINTER.
	3. Tension Roller Jammed	3. Check that tension roller is unobstructed. Clean as required. If necessary, call for service.
Paper Jam (media with die cuts or holes)	When Media Backs Up, Actuator on Paper Sensor Catches on Cutout	1. Avoid media with die cuts or holes near the middle of the media. 2. Consider using Mode 4 under Special Function= in Extended Configuration Menu.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Paper Problems (Positioning, Feeding, Paper Out, Jamming, Scorching, Speed), continued		
Paper Burns, Scorching	1. Wrong Fuser Temperature	1. Check Fuser Temp= ... setting in the Extended Configuration Menu.
	2. Dirty Felt Cleaning Pad	2. Replace felt cleaning pad.
	3. Bad Fuser or Toner Buildup on Temperature Sensor	3. Call for service.
Wrinkled Paper	1. Tractor Not Set Properly	1. Check to see that the tractors are equally centered (Page 7-50). Reload paper.
	2. Fuser Exit Cover is Damaged or Clogged with Debris	2. Check fuser exit cover for debris or damage. NEVER USE THE FUSER EXIT COVER AS A HANDHOLD FOR LIFTING THE PRINTER.
	3. Media Too Light, Too Thin, Too Soft	3. Check Paper and Label Recommendations in Section 2.
	4. Worn Pressure Roller in Fuser	4. Replace fuser heat and pressure rollers.
Printing Slow When Running Windows Applications	MS Windows Not Optimized	Use the LaserMatrix Windows printer driver[14] for all Windows applications. Consult the MS-Windows manual for optimizing Windows.

[14] Contact the printer manufacturer to obtain your ***free*** copy of this printer driver.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Paper Problems (Positioning, Feeding, Paper Out, Jamming, Scorching, Speed), continued		
Pre-dispensing of Labels (Labels come off carrier or liner inside printer)	Labels Being Used are Not Optimized for Lasergraphics	1. See Paper and Label Recommendations in Section 2. Contact the printer manufacturer for detailed label specifications. 2. Consider using Mode 4 under Special Function= in Extended Configuration Menu to prevent media from backing up at start of print job.
Paper Doesn't Feed Reliably (Frequent Tears and/or Paper Jams)	1. Paper Stretched Too Tight 2. Leading Edge is Curled 3. Misaligned Tractor or Top of Form Sensor	1. Release tension on paper by moving tractors slightly closer. 2. Tear off the curled form and try loading the leading edge of the next form. 3. See the illustrations on Page 7-50 to check that tractors are centered. Re-center, if necessary. If necessary, call for service.
Paper Moves 1/2 in. and Then Stops (Form Speed Error message)	Tractor Sensor Contaminated By Toner	The tractor sensor is located under a cover between the waste toner bottle and the print density control knob. This location is prone to toner contamination if a waste toner bottle overflows. The sensor is easily cleaned by removing the cover in front of the print density knob. If necessary, call for service.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Paper Problems (Positioning, Feeding, Paper Out, Jamming, Scorching, Speed), continued		
Paper Doesn't Feed (Both On and Off Line)	1. Obstruction 2. Mechanical or Electronics Failure 3. Waiting for Fuser Too Heat Up	1. Check paper path for obstruction. 2. Call for service. 3. Wait.
Top of Form (TOF) Ignored or Paper Slews to Wrong TOF Setting	1. Wrong Form Length Setting 2. Host Changing Form Settings 3. Electronic Failure	1. Check the PSize= ... setting in the Configuration Menu. 2. Check print driver settings of host software[15]. If necessary, use hex dump mode (Page 7-54) or an emulation command printout (Page 7-54) to check printer commands sent by host. To ignore form length printer commands embedded in PCL print file, set PCL Frm Ctl= Off*. 3. Call for service.
Top of Form (TOF) Sometimes Lost When Automatically Switching Interface Ports	May Occur In Some Host-Printer Setups	Reload media. If necessary set APSense= Off* in the Extended Configuration Menu.
Control Panel		
No Message Displayed No Response to Keys No Fan	Power Problem	Check the power cord and wall receptacle. Make sure that the cord is securely connected to the printer. Give it an extra push.

[15] If applicable, use the Windows LaserMatrix printer driver. To obtain a ***free*** copy of this Windows driver, contact the printer manufacturer.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Control Panel, continued		
No Message Displayed No Response to Keys Fan OK	Electronics Problem	Call for service.
Communications		
Character or Control Problems With Any Interface	1. Printer's PCL Print Menu Settings Have Been Superseded by Host	1. Normal. Host computer commands overrides Print Menu settings for print style, characters set, and the like. (These printer settings are only effective until the host changes the settings using printer commands.)
	2. Printer Off or Off line	2. Check.
	3. Configuration Settings.	3. In PCL emulation, check setting of PCL Frm Ctl= ... in the Extended Configuration Menu. For either emulation, use the hex dump mode (Page 7-54) or an emulation command printout (Page 7-54) to check commands sent to printer.
	4. Wrong Interface or Emulation	4. Check interface and emulation settings.
	5. Electronics Failure	5. Call for service.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Communications, continued		
Problems When Using Serial Interface Only: • Garbled text • No printout • Printer prints a few pages and quits	1. Wrong Serial Interface Settings 2. Loose or Bad Interface Cable 3. Bad Data 4. Electronics Failure	1. Host and printer settings for baud, data bits, parity, and stop bits must be the same. Check serial interface settings in Configuration Menu. 2. Check. If necessary, replace interface cable. 3. Check data using hex dump mode (Page 7-54). 4. Call for service.
Problems When Using Parallel Interface Only	1. Incorrect Characters 2. Bad Data 3. Electronics Failure	1. Loose or bad interface cable. Check and reset cable. If necessary, replace interface cable. 2. Check data using hex dump mode (Page 7-54). Lost data or no data may be caused by nonstandard parallel interface timing. 3. Call for service.
Top of Form (TOF) Sometimes Lost When Automatically Switching Interface Ports	May Occur In Some Host-Printer Setups	Reload media. If necessary set APSense= Off in the Extended Configuration Menu.

Troubleshooting Chart, continued

Problem	Probable Cause	Solution
Noises		
Chattering, Grinding, Ratcheting, or Slipping Noise	1. High-Torque Developer or Waste Toner Auger With an Obstruction May Cause Stepper Motor and/or Gears to Slip. Usually Very Noisy.	1. First, check the developer unit and the drum cartridge for proper installation. If necessary, remove and check for binding. The drum should turn easily when the large gear at the end of the drum is turned. If the drum binds or squeaks, replace it. Check the developer unit using the procedure in No. 2 below.
	2. Toner Packed Too Tight	2. Check for a developer jam (Page 7-51) If necessary, replace developer.
Whirring	Fan	Normal.
Squeaking	1. Developer or Drum Drive	1. Remove drum and developer. Check. Replace if necessary.
	2. Worn or Defective Tension Roller	2. Call for service.

TROUBLESHOOTING PROCEDURES

Power On Sequence Check

When printer power is turned on, expect the following events. If the printer fails any portion of this sequence, it displays the message Self Test Error.

The boxes on the left indicate the primary responsible controller PCB[16]: EC stands for the engine controller PCB and RIP stands for raster image processor PCB.

EC	RIP	
✓		1. Fans operate.
✓		2. The printer sounds out two short and one long beep if printer memory and firmware pass the check.

If the memory check is not passed, the printer displays the message Self Test Error. The printer may sound out a series of cascading up/down tones which indicate a memory error.

Note: Cascading tones occur with checksum errors following firmware replacement. In those cases, press **ON LINE** *or cycle power off and on again. If necessary, call for service.*

✓		3. The printer checks that the top cover is closed.
	✓	4. The printer lights the READY and ON LINE lights.
✓		5. The printer checks for paper, paper jam, drum, waste toner bottle.

16 Printed Circuit Board.

If item is missing or if paper is jammed, the printer sounds out three short beeps and then displays Load Paper, Paper Jam, Need Print Drum, or Need Toner Cup.

EC	RIP	
✓		6. Next, the printer turns on the main drive motor. The sound of a motor and its gears is heard as the printer prepares the developer and drum.
✓		7. The printer checks the erase lamps in the top cover and the heat lamp in the fuser is turned on.
✓		8. Toner is checked, and if low, the printer reports Toner Low.
✓		9. The laser scan unit (LSU) is checked. If not functioning properly, the printer reports Laser Failure.
✓		10. If the fuser fails to reach the preset fuser temperature in two minutes from being turned on, the printer displays the message Fuser Failure.
	✓	11. The printer waits for the first print job from the host.

Transfer Sequence Fault Isolation Test

After running a transfer sequence fault isolation test media must be reloaded. The transfer sequence fault isolation test causes a loss of top of form resulting in a Re-load Paper message.

1. Send a print job, or print a summary page or a diagnostic print pattern.

2. While printing, open top of printer and inspect the loose toner pattern between the developer and the fuser.

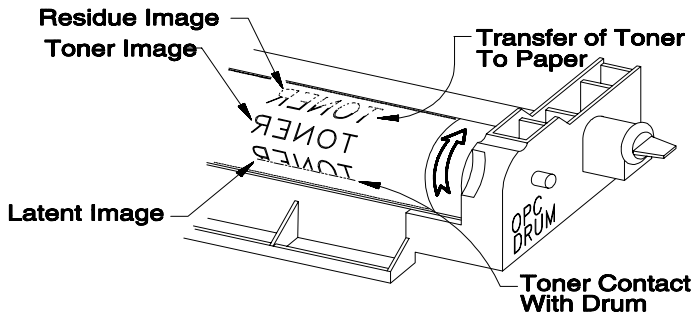
   - If poor print quality appears between the developer and fuser, suspect a problem with the tension roller, developer, drum, transfer

station, or corona wires. Clean the tension roller and corona wires. (See Section 6, *Maintenance*.) Check for a developer jam (Page 7-51). If necessary, call for service.

- If the print quality appears normal between the developer and fuser, suspect a dirty or worn fuser. Replace the felt cleaning pad. If necessary, replace the fuser heat and pressure rollers.

3. Carefully remove the drum.

4. Check the toner image on the drum. (See the following illustration.)



Drum Imaging CB0-BJ1

Normally, it is easy to see where the latent image (also called the laser written image) picks-up toner from the developer and where the toner image is transferred to the page. There should be only a very light image or toner residue left on the drum as it continues around to be cleaned as it enters the cartridge. If the toner image on the drum is light prior to transfer to the paper, suspect:

- A dirty LSU cover glass.

  Clean the cover glass.

- Low toner.

Check that toner is filled and distributed evenly.

- Low print density dial setting.

  Adjust to a higher setting.

- A jammed developer gear (if so, the print quickly fades out entirely).

  Check for a jammed developer using the procedure on Page 7-51. If necessary, replace developer.

  Also, check for a broken drive gear by holding one of the gears that drive the drum and then trying to turn the developer drive gear. (See the illustration on Page 7-53.)

Fuser Failure and Form Speed Error Messages

Fuser Failure and Form Speed Error messages can be caused by a variety of printer ills. These are discussed in the paragraphs that follow; the other control panel messages are covered under Printer Messages (Page 7-3) in the Troubleshooting Chart.

Fuser Failure

Fuser Failure can be temporary or permanent.

A temporary fuser failure occurs when the fuser is incapable of maintaining the preset fuser temperature (Fuser Temp= ...) as set in the Extended Configuration Menu. It can be cleared by cycling power off and on.

Several factors may contribute to the inability of the fuser to maintain a fusing temperature:

- Thick media or media with a high moisture content may act like a heat sink to rob the fuser of heat.
- A weak fuser lamp may not supply enough heat.
- The line voltage may not be adequate, or the power source might be incorrect, powering a 230 vac printer from a 115 vac outlet, for example.

A permanent fuser failure can occur when the fuser temperature is too high rather than too low, as in the case of a temporary failure, and is often caused by a tripped fuser thermal breaker.

Temporary failures due to a fuser temperature that is too low can lead to a permanent failure due to high fuser temperature if not corrected. A low fuser temperature allows toner to build up and bake onto the fuser heat roller and its thermistor. The built-up toner insulates the fuser from the fuser's thermistor which causes the temperature of the fuser to rise. Under normal circumstances, the thermistor regulates power to the fuser's heat lamp and shuts it off if the temperature gets too high. If the temperature continues to rise, the thermal breaker blows before the thermistor can shut off power to the fuser's heat lamp, which causes a permanent fuser failure. A blown thermal breaker must be replaced by a service technician.

The best insurance against a permanent fuser failure is preventing toner buildup on the fuser. To prevent toner buildup,

- Select the correct Fuser Temp= ... in the Extended Configuration Menu.
- Keep the print density setting at 1, 2, or 3,. but never below 1.

- Stick with media recommended by the manufacturer (see Paper and Label Recommendations in Section 2).
- Replace the fuser cleaning pad often to prevent loose toner from adhering to the fuser.

Form Speed Error

The Form Speed Error message occurs in the following situations:

- A defective or toner covered tractor sensor.
- A weak or defective tractor or fuser drive motor.
- A broken Laser Scan Unit (LSU) interface cable, cover latch, or defective LSU.

Dirty or Defective Tractor Sensor. If the tractor sensor becomes dirty or defective, the printer may detect too many laser scan lines per $^{1}/_{6}$ in. of paper travel, and therefore cause the failure.

The tractor sensor is located under a cover between the waste toner bottle and the print density control knob. This location is prone to toner contamination if a waste toner bottle overflows. The sensor is easily reached for cleaning by removing the cover in front of the print density knob.

Tractor or Fuser Drive Motors. Anything that interferes with these drive motors causes this message.

Top Cover and LSU. Some other causes for Form Speed Error involve the top cover and LSU. A defective cover latch, a defective cover

interlock switch or actuator, a bad laser scan unit (LSU), and even opening and closing the printer can cause this problem.

It is normal for speed-related errors to occur when opening and closing the cover. This is due to changes in the speed of the LSU imaging mirror when the top cover is raised or lowered; the controller detects the speed variation and triggers the message. A defective (bouncy or intermittent) top cover interlock switch or a damaged or worn interlock switch actuator on the underside of the top cover (about midway along the right side) can also trigger the error message.

Additionally, a bad or intermittent LSU cable can cause a form speed error message. Often, if the cable is bad, Form Speed Error occurs when the printer cover is opened or closed.

Paper Jam and Wrinkling

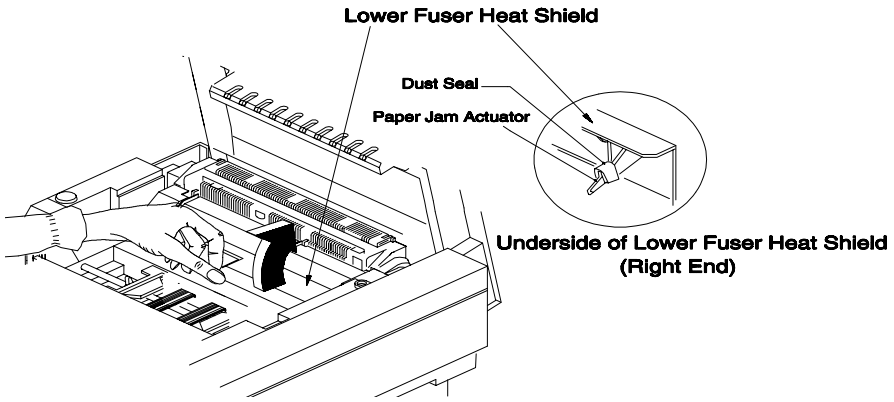
The printer reports a Paper Jam on the control panel.

Paper jams occur when paper hangs up between the tractors and the fuser exit cover. When this happens, the paper buckles and then dislocates either the lower fuser heat shield or an actuator on the fuser exit cover, illustrated on the following page. Sensors detect displacement of the shield and actuator.

A jam can occur for several reasons:

- Improperly set tractors
- Paper path obstruction
- Overall poor quality or uniformity of paper

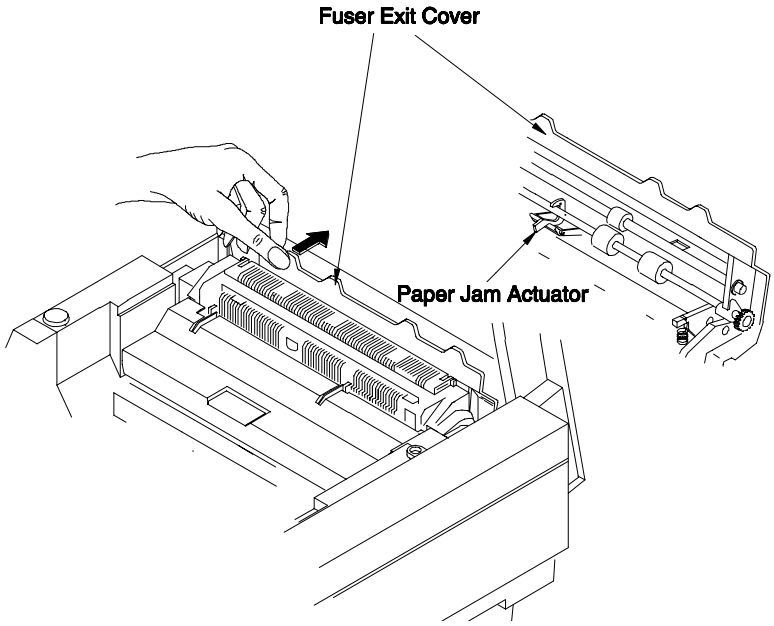
- Torn paper, broken perforations, or distorted sprocket holes[17]
- Poor paper feeding[18] or stacking
- A dirty, broken, or worn tension roller
- Worn fuser or tractor mechanism



Paper Jam Sensor (Fuser Heat Shield) PB0-AI1

17 Paper Jam will also occur if paper is installed but the top-of-form switch has not been actuated within a time-out limit after turning on the printer.

18 Always use and properly adjust the paper entrance guide.



Paper Jam Sensor (Fuser Exit Cover) PB0-AS

Clearing a Jam

Notes:

- *If* Jam Recover= On* *in the Configuration Menu, be aware that any data in the jam recovery path is reprinted after the jam is cleared and the printer returned online.*
- *Pages that have not passed through the fuser contain loose toner. Carefully remove and dispose of these pages to prevent loose toner from falling into the printer, or getting on your hands or clothing. If toner is spilled, refer to Cleaning Toner Spills in Section 6, Maintenance.*

WARNING ! The fuser area is hot!

Caution ! Do not pull jammed paper from the rear of the printer!

When paper jams in this printer, it tends to fold itself into an accordion-like shape. Clearing the jam by pulling the paper out of the fuser exit cover, that is, from the rear of the printer, causes the accordion-like folds to catch on and possibly damage the fuser exit cover.

Refer to the following illustration to clear a paper jam.

1. Open the top cover.
2. Open the fuser exit cover at the inside rear of the printer.

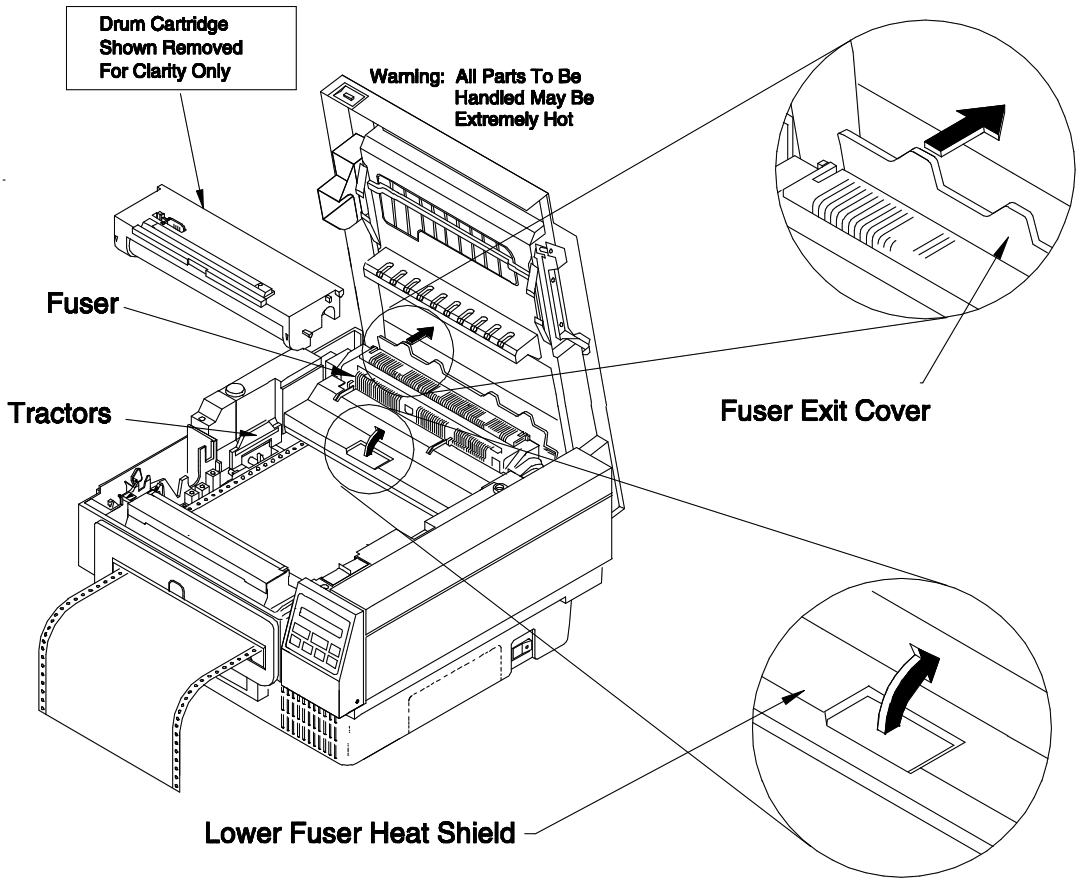
   Refer to the following illustration.

3. Slowly pull the jammed paper from between the two rollers.

   Tear the paper at the perforation nearest the drum cartridge. Note that the toner is not fused and is still in powder form. Carefully remove and dispose of these pages to prevent loose toner from falling into the printer or getting on your hands or clothes.

4. If necessary, remove any paper tractor feed strips by pulling them out from between the rollers.
5. Close the fuser exit cover.
6. Re-install paper.
7. Close the top cover and then press **ON LINE**.

   Printing resumes. The information lost on the jammed page is first automatically reprinted, then normal print continues.



Clearing A Paper Jam PB0-AJ2

Wrinkled Paper

Stress on paper as it enters or leaves the fuser can cause wrinkling.

Note: Wrinkling can occur with very light weight or stretchy media. Stretchy media is paper or other material with relatively long or soft fibers that allow the material to distort (wrinkle) when pulled through the printer.

1. Check that the paper exit path is unhindered.

   The rollers in the fuser exit cover may cause a herringbone wrinkle if the paper path is not clear.

2. Check tractor settings to make sure paper is neither too tight nor too loose.

3. Check that tractors are properly directing paper into fuser.

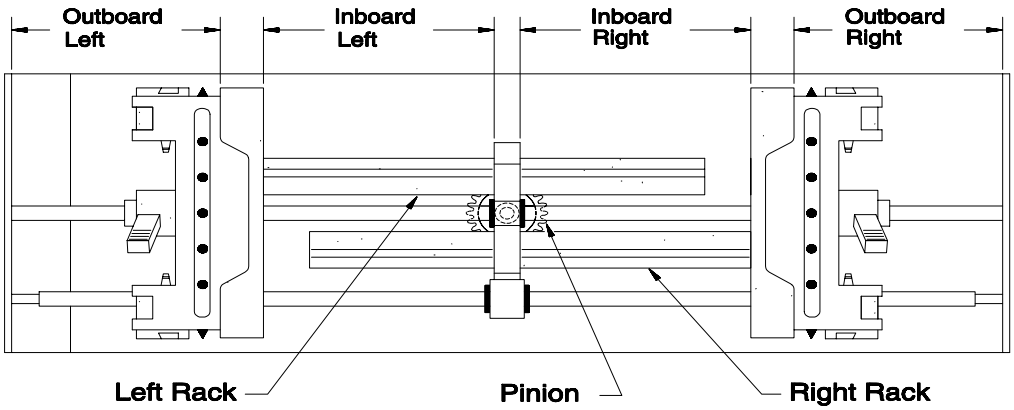
4. Check that the paper entrance guide is installed and adjusted to the width of the paper.

5. Check the self-centering tractor mechanism, as described below.

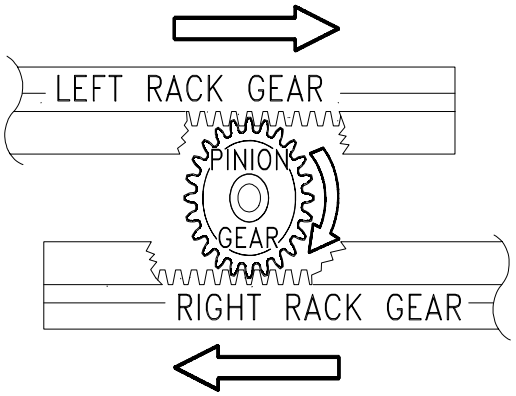
The tractors adjust simultaneously on a rack and pinion device so that the tractors always center the media in the printer.

If the self-centering mechanism is properly aligned, then the inboard and outboard dimensions adjacent to the tractors, as shown in the following illustration, should be equal—meaning that inboard right equals inboard left, and outboard right equals outboard left. If not, move the tractors so that the tractor with the lesser outboard dimension is at its extreme end. To adjust the other tractor so that it is at its extreme end, lift up slightly on

the rack attached to that tractor so that it clears the pinion, move the tractor to the end, and then release the rack to re-mesh with the pinion.



Tractor Alignment (Top View) CB0-BV1



Rack and Pinion Device CB0-BW

Developer Jam

Note: A developer jam may cause a gear-like grinding noise.

Form Speed Error, light print overall, or horizontal strips of light print occur if the developer's roller jams. To fix a stuck developer,

1. Make sure that the toner reservoir is closed and snapped shut.
2. See the Caution below and then remove the developer unit.

   Caution ! DO NOT tip the developer. Tipping the developer end-to-end or top-to-bottom will cause a toner spill. If toner is spilled, see Cleaning Toner Spills, in Section, 6, *Maintenance*.

3. Notice the drum gear at the end of the toner-blackened developer roller.

   See the following illustration.

4. With your thumb, turn the developer gear as shown.
5. If the gear does not turn readily, rotate the gear backwards by two thumb passes and then forward again by 10 passes to free up the jam.

   Note: Rotate the roller in the opposite direction only to help un-jam the developer; continuing to rotate the roller in the opposite direction causes toner buildup on the roller which can cause a jam.

   If the gear will not move, replace the developer.

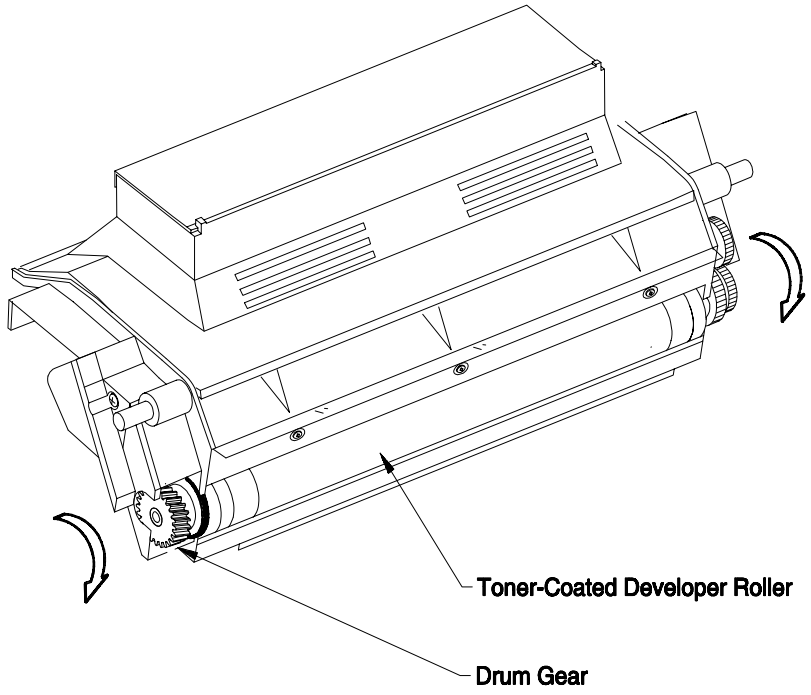
6. Next check the developer drive gear, located in the printer to the right of an in-place developer.

   See the illustration on Page 7-53.

7. Hold the drum drive gear stationary and try turning the developer drive gear.

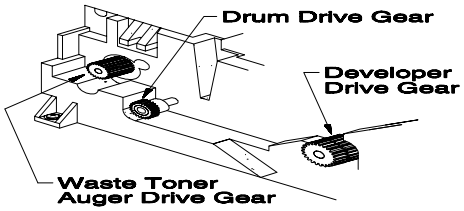
   If the developer drive gear slips without turning the drum drive gear, call for service to repair drive train[19].

8. Re-install the developer.



Checking Out a Developer Jam PB0-AK

19 Likewise, check for slip between the drum drive and waste toner auger drive gears by holding one stationary and attempting to turn the other.



Checking for Developer/Drum Drive Train Slippage CB0-BY1

TROUBLESHOOTING AIDS

Diagnostic Patterns

A printout of a diagnostic pattern can isolate form length and print quality problems, and can help resolve data versus printer problems.

Select the diagnostic pattern using Diag Print= ... in the Extended Configuration Menu.

Hex Dump Mode

The hexadecimal (hex) dump mode is used for checking:

- proper receipt of characters by the printer
- control commands
- nonprintable codes

Control commands are covered in more detail in Section 8, *Programmer's Reference Guide*.

In the hex dump mode, the printer does not execute the printer commands it receives from the host. Instead, the printer prints out these printer command strings as if they were regular ASCII characters. Essentially, the printer reports that it received the command characters.

Set Hex Dump= On* in the Extended Configuration Menu to begin the hex dump mode.

Emulation Command Printouts

Printer command printouts are similar to and used interchangeably with hex dump printouts.

Printer commands (PCL control commands or PostScript language commands) can be printed out in ASCII format to help in troubleshooting command-related problems dealing with printer drivers, communications, and printer setup routines.

PCL Display Mode

The display mode is a method of verifying printer commands sent from the host in PCL format. The most significant difference between the PCL display mode and the hex dump mode is that the display mode is entered using a PCL printer command, **^{E}c Y**. (**^{E}c** stands for the ASCII escape code, 27 decimal or 1B hexadecimal.)

In the display mode, the printer treats all printer commands as printable characters. All printer commands are functionally ignored, with two exceptions:

- A carriage return (CR) is printed and then a carriage return and line feed are performed.
- The display off printer command (**^{E}c Z**) is printed and then executed, that is, the display mode is turned off.

To print the printer commands as symbols, however, a PC-8 Symbol Set must be selected using either **^{E}c (1 Ø U** or **^{E}c (1 1 U**. The PC-8 Symbol Sets are the only resident character sets for the PCL emulation which assign printable characters to all control codes. For the escape code, ^{E}c (ASCII code 27), for example, the printer prints an arrow, ←, followed by the escape sequence characters.

Use the following BASIC program to set up the printer to display printer commands. Note that the End of Line Wrap command, **^{E}c & s Ø C**, is included to prevent text from printing off the right edge of the page.

ASCII Commands:	^{E}c (1 Ø U	Select PC-8 Symbol Set
	^{E}c & s Ø C	End of Line Wrap On
	^{E}c Y	Display Mode On
BASIC Program:	`LPRINT CHR$(27);''(1ØU'';CHR$(27);''&sØC'';CHR$(27);''Y'';`	

The printer print all characters and commands until the printer is either turned off or until a Display Off command, **^{E}c Z**, is sent to the printer.

PostScript Language Display

PostScript language commands can be printed out as ASCII script. To do so, set the printer to the LaserJet emulation before sending the PostScript file to the printer. The printer recognizes the PostScript commands as if they were straight ASCII text.

Before sending a PostScript print file to be printed in ASCII text, make sure that:

- the printer is set to the PCL emulation, Emu= LaserJet* in the Configuration Menu.
- PCL line wrap is on.

PCL line wrap can be turned on using the PCL control command **^{E}c & s Ø C**. The End of Line Wrap command is included to prevent text from printing off the right edge of the page.

Note: *PostScript error handlers can also be useful tools. These cause PostScript errors to be printed out on the page.*

8—Programmer's Reference Guide

INTRODUCTION

This printer supports *most* commands used in HP LaserJet III and/or Apple LaserWriter II NTX printers. One very special difference is that HP LaserJet and Apple LaserWriter printers are sheet feeders with paper trays, and this laser printer uses continuous forms.

Continuous-Form Vs Cut-Sheet Laser Printers

A continuous-form laser printer combines the convenience of continuous-form dot-matrix printers with the speed and quality of a laser. With a continuous-form laser printer allows various form widths ($3^1/_2$ in. to 8 in. in $^1/_8$ in. increments) and lengths ($^1/_2$ in. to 33 in. in $^1/_8$ in. increments[1]) can be selected. Unlike a tray-fed printer, you're not limited to specific cut-sheet sizes of paper.

This section discusses with special forms control, and other commands and programming capabilities built into your printer.

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1 Alternately, length can be specified as 12 mm to 873 mm in 1 mm increments.

PCL Nomenclature & Conventions

In the PCL printer commands used throughout this section, the following nomenclature and conventions apply:

- The escape code is denoted by ^{E}c, or ASCII decimal 27, in PCL 5 escape control sequences.
- For readability, the arguments of some ^{E}c commands are shown separated by spaces. (Spaces are never sent to the printer as part of these escape code sequences.) For PJL, certain white spaces (ASCII decimal 32) are required, and are specifically identified where required.
- In this guide, the ASCII equivalent for a space is designated by <SP>, a line feed by <LF>, a carriage return by <CR>, a start of header is designated by <SOH>, a start of text by <STX>, and an end of text by <ETX>.
- In most cases, character case is significant. For example, if "P" is shown as part of the command, an uppercase "P" must be sent.
- PCL 5 escape sequences, where the first two characters *after* ^{E}c are the same, may be combined using a single escape sequence to form an escape code string. The following escape code sequences,

  ^{E}c(s0P ^{E}c(s10H ^{E}c(s12V ^{E}c(s0S ^{E}c(s0B ^{E}c(s3T

  can be written as **^{E}c(s0p10h12v0s0b3T**. Note that, in an escape string, lowercase characters are used to identify each attribute except the last. Do not forget that in forming these escape strings, the ASCII-equivalent uppercase codes must be replaced with the lowercase codes.
- A variable parameter is denoted by #. In the commands strings, # represents one or more alphameric characters; in the decimal string, # represents the ASCII decimal equivalent.

References

If you plan to provide special application programming for your printer, you should obtain one or more of the following reference publications:

PCL 5 References

Hewlett-Packard, *PCL 5 Printer Language Technical Reference Manual*, 1990

Steven J. Bennett, Peter G. Randall, *The LaserJet III Companion*, (New York: Brady Publishing, 1991)

PostScript References

Adobe Systems Incorporated, *PostScript Language Reference Manual* (Red Book), (Reading, MA: Addison-Wesley, 1991)

Adobe Systems Incorporated, *PostScript Language Tutorial and Cookbook* (Blue Book), (Reading, MA: Addison-Wesley, 1991)

Adobe Systems Incorporated, *PostScript Language Program Design* (Green Book), (Reading, MA: Addison-Wesley, 1990)

Ross Smith, *Learning PostScript (A Visual Approach)*, (Berkeley, CA: Peachpit Press, 1990)

PCL5 PRINTER COMMAND ENHANCEMENTS

PCL 5 printer command differences between this printer and an HP LaserJet III are outlined in the paragraphs that follow.

The detailed formats of the printer commands are arranged by ASCII value through this section. The list that follows is arranged by function.

The printer supports all HP LaserJet III PCL 5 commands except for **^Ec & l # H**, which specifies the paper source, and those variations of **^Ec & l # A** which apply to envelope sizes. Because the printer uses continuous forms, the only valid parameter setting for **^Ec & l # H** is # = 0. (Sending **^Ec & l 0 H** to the printer causeS the present page to be ejected.) The printer ignores all other values of # for **^Ec & l # H**.

Note: *The character that follows the "&" in the* **^Ec & l # H** *and* **^Ec & l # A** *commands is the lowercase letter "L".*

PCL 5 PRINTER COMMANDS
— Over & Above Those Available in an HP LaserJet III —

Function	Command	Page
Job Control		
Exit Language/Enter PJL	^{E}c % – 1 2 3 4 5 X	8-21
Number of Copies[2]	^{E}c <SOH> <STX> O T C K # <ETX>	8-7
Page Control		
Page Size[3]	^{E}c & *l* # A	8-9
Page Eject[3]	^{E}c & *l* # H	8-20
Page Length[3]	^{E}c & *l* # P	8-20
Vertical Correction[2]	^{E}c <SOH> <STX> O T C V # <ETX>	8-8
Engine Control		
Fuser Temperature[2]	^{E}c <SOH> <STX> O T C F # <ETX>	8-6
Special Function[2]	^{E}c <SOH> <STX> O T C P # <ETX>	8-7
Fuser Sleep Delay[2]	^{E}c <SOH> <STX> O T C S # <ETX>	8-8
Emulation Control		
Switch to PostScript	^{E}c <SOH> <STX> B E G I N 2 <ETX>	8-6
Switch to PCL 5	^{E}c <SOH> <STX> B E G I N 3 <ETX>	8-6

2 The “O” following the STX command is the uppercase letter O.

3 The “*l*” in the escape string is the lowercase letter L.

^{E}c <SOH> <STX> B E G I N 2 <ETX> — Switch to PostScript

ASCII:	^{E}c	<SOH>	<STX>	B	E	G	I	N	2	<ETX>
Decimal:	27	1	2	66	69	71	73	78	50	3

If printer has not been preset for auto emulation, this command causes the printer to switch unconditionally to the optional PostScript emulation.

^{E}c <SOH> <STX> B E G I N 3 <ETX> — Switch to PCL 5

ASCII:	^{E}c	<SOH>	<STX>	B	E	G	I	N	3	<ETX>
Decimal:	27	1	2	66	69	71	73	78	51	3

If printer has not been preset for auto emulation, this command causes the printer to switch unconditionally to the PCL 5 emulation.

^{E}c <SOH> <STX> O T C F # <ETX> — Fuser Temperature

ASCII:	^{E}c	<SOH>	<STX>	O	T	C	F	#	<ETX>
Decimal:	27	1	2	79	84	67	70	#	3

Causes the engine controller to heat up the fuser to one of eight fusing temperatures during printing. (***Fuser Temperature 6*** is the factory setting.)

# = 0: 130º C	# = 4: 161º C
# = 1: 138º C	# = 5: 169º C
# = 2: 146º C	# = 6: 177º C (factory setting)
# = 3: 153º C	# = 7: 184º C

For more on fuser temperatures, see Fuser Temp=... in the Extended Configuration Menu.

^{E}c <SOH> <STX> O T C K # <ETX> — Number of Copies

ASCII:	^{E}c	<SOH>	<STX>	O	T	C	K	#	<ETX>
Decimal:	27	1	2	79	84	67	75	#	3

Sets the number of copies (#) to be printed from 1 to 5000. The printer ignores the command if # ≤ 0.

Use this command when the number of copies exceeds 99. (PCL limits the number of copies that can be designated by sending an **^{E}c & *l* # X** command to 99 copies.)

Note: *The number of uncollated copies can be set between 1 and 5000 in the Print Menu. However, most computer software applications override this quantity at the start of the print job.*

^{E}c <SOH> <STX> O T C P # <ETX> — Special Function

ASCII:	^{E}c	<SOH>	<STX>	O	T	C	P	#	<ETX>
Decimal:	27	1	2	79	84	67	80	#	3

= 0: **No Blanks** (factory setting). The printer reverses the media between noncontiguous print jobs to prevent blank forms between jobs. Use Special Function Mode 0 to save media, especially when using pre-registered, pre-serialized, negotiable, or similar materials, or where waste of any kind is highly undesirable.

= 4: **No Reverse**. The printer never reverses the media. Use Special Function Mode 4 for media that tends to hang up when the printer reverses direction at the start of noncontiguous print jobs. For example, use Mode 4 with labels that easily detach when the printer reverses direction, or when using media with cut-out or raised areas that hang up on paper sensors and guides.

Note: *Do not change special function modes during a print job. Doing so causes the printer to stop printing, go offline, and display the message* Re-load Paper.

^{E}C <SOH> <STX> O T C S # <ETX> — Fuser Sleep Delay

ASCII:	^{E}C	<SOH>	<STX>	O	T	C	S	#	<ETX>
Decimal:	27	1	2	79	84	67	83	#	3

Specifies the number of minutes of inactivity before the fuser is allowed to fall to its idle temperature. The idle or sleep temperature is about 85º C *below* the fuser operating temperature selected using the Fuser Temperature command (Page 8-6).

The fuser sleep delay # can be 00 to 60 minutes in one-minute intervals. (The factory setting is # = 06 minutes.) Always enter a leading zero when specifying nine minutes or less.

^{E}C <SOH> <STX> O T C V # <ETX> — Vertical Correction

ASCII:	^{E}C	<SOH>	<STX>	O	T	C	V	#	<ETX>
Decimal:	27	1	2	79	84	67	86	#	3

= 0: **Page** (factory setting). The printer compensates for vertical drift at the end of every page.

= 1: **0.050 in.** The printer compensates for vertical drift every 0.05 in.

Variations in fuser temperature can cause a paper speed variance that, if not reconciled, causes the image to drift.

The printer corrects for this variance either once every 0.05 in. or *all at once* at the end of every page. In either case, the printer detects and determines the variance by monitoring the number of scan lines printed every 0.05 in. of paper movement. If the printer tends to print *more* than 50 lines per $^{1}/_{6}$ in. (because of a *higher* fuser temperature), then it adds filler lines, either by duplicating one or more scan lines every 0.05 in. (# = 1) or by inserting blank scan lines at the end of the printed page (# = 0), to maintain the proper top of form.

Note: *Normally, choose vertical correction every 0.05 in. (# = 1) on preprinted forms, some labels, and the like. Always choose # = 1 when form length ≤ 2 in. Choose correction at the end of the form (# = 0) when printing all types of graphics,* especially *those requiring dithered features.*

Do not change vertical correction setting in the middle of a print job. Do so only at the start of the print job, that is, during print job initialization. Switching in the middle of the print job yields unpredictable results.

^{E}c & *l* # A	**Page Size**

ASCII:	^{E}c	&	*l*	#	A
Decimal:	27	38	108	#	65

Sets the physical page size. This in turn defines the size of the logical page. (Letter page size is the factory setting.) The values of # are:

# = 1:	Executive ($7^{1}/_{4}$ x $10^{1}/_{2}$ in.) with top & bottom no-print area of $^{1}/_{6}$ in.
# = 2:	Letter ($8^{1}/_{2}$ x 11 in.) with top & bottom no-print area of $^{1}/_{6}$ in.
# = 3:	Legal ($8^{1}/_{2}$ x 14 in.) with a top & bottom no-print area of $^{1}/_{6}$ in.
# = 26:	A4 (210 mm x $11^{2}/_{3}$ in.) with top & bottom no-print area of $^{1}/_{6}$ in. (This is the standard size for A4 continuous forms.)
# = 80,81, 90,91:	Ignored. Envelope sizes are not supported.
# = 300-560:	$^{1}/_{2}$ in. to 33 in. in $^{1}/_{8}$-in. increments with no top & bottom no-print area. To determine the value of #, multiply the formlength in inches by 8 and add 296: # = [(formlength in in.) * 8] + 296.
# = 600-1426:	12 mm to 838 mm[4] in 1-mm increments with no top & bottom no-print area. To determine the value of #, add the formlength in mm to 588; # = (formlength in mm) + 588.
# = 2000:	A5 (148 mm x 210 mm) with top & bottom no-print area of $^{1}/_{6}$ in.
# = 2001:	A6 (105 mm x 148 mm) with top & bottom no-print area of $^{1}/_{6}$ in.

4 The Configuration Menu allows a form length up to 873 mm.

= 2002: A4 (210 mm x 297 mm) with top & bottom no-print area of $^{1}/_{6}$ in. (Most A4 continuous forms are 210 mm x $11^{2}/_{3}$ in.)

Note: Sending this command causes any unprinted pages to be printed, then resets the top margin, text length, and left/rights margins to their defaults, and disables macro overlays. The active position moves to the left edge of the logical page at the top margin.

This printer offers two categories of page sizes: standard and custom. The standard page sizes are formatted identically to LaserJet sizes, with the addition of A5, A6, and an added variation of A4. The custom page sizes, on the other hand, allow you to take full advantage of your continuous-form laser printer.

The following standard and custom page size definitions apply:

- A **Standard Portrait** page size is defined using the Page Size command (**^Ec & l # A**, where # = 1, 2, 3, 26, 2000, 2001, or 2002) and the Orientation command (**^Ec & l # O**, where # = 0) which defines the rotational position of the logical page on the physical page.

- A **Standard Landscape** page size is defined using the Page Size command (**^Ec & l # A,** where # = 1, 2, 3, 26, 2000, 2001, or 2002) and the Orientation command (**^Ec & l # O**, where # = 1).

- A **Custom Portrait** page size is defined using the Page Size command (**^Ec & l # A**, where # = 300-560 or 600-1426), the Orientation command (**^Ec & l # O**, where # = 0), and Frm Width=... from the Extended Configuration Menu.

- A **Custom Landscape** page size is defined using the Page Size command (**^Ec & l # A**, where # = 300-560 or 600-1426), the Orientation command (**^Ec & l # O**, where # = 1), and Frm Width=... from the Extended Configuration Menu.

The following pages show pictorially the principal relationships between **Physical Page**, **Printable Area**, and **Logical Page**, as they apply to standard and custom, portrait and landscape page sizes.

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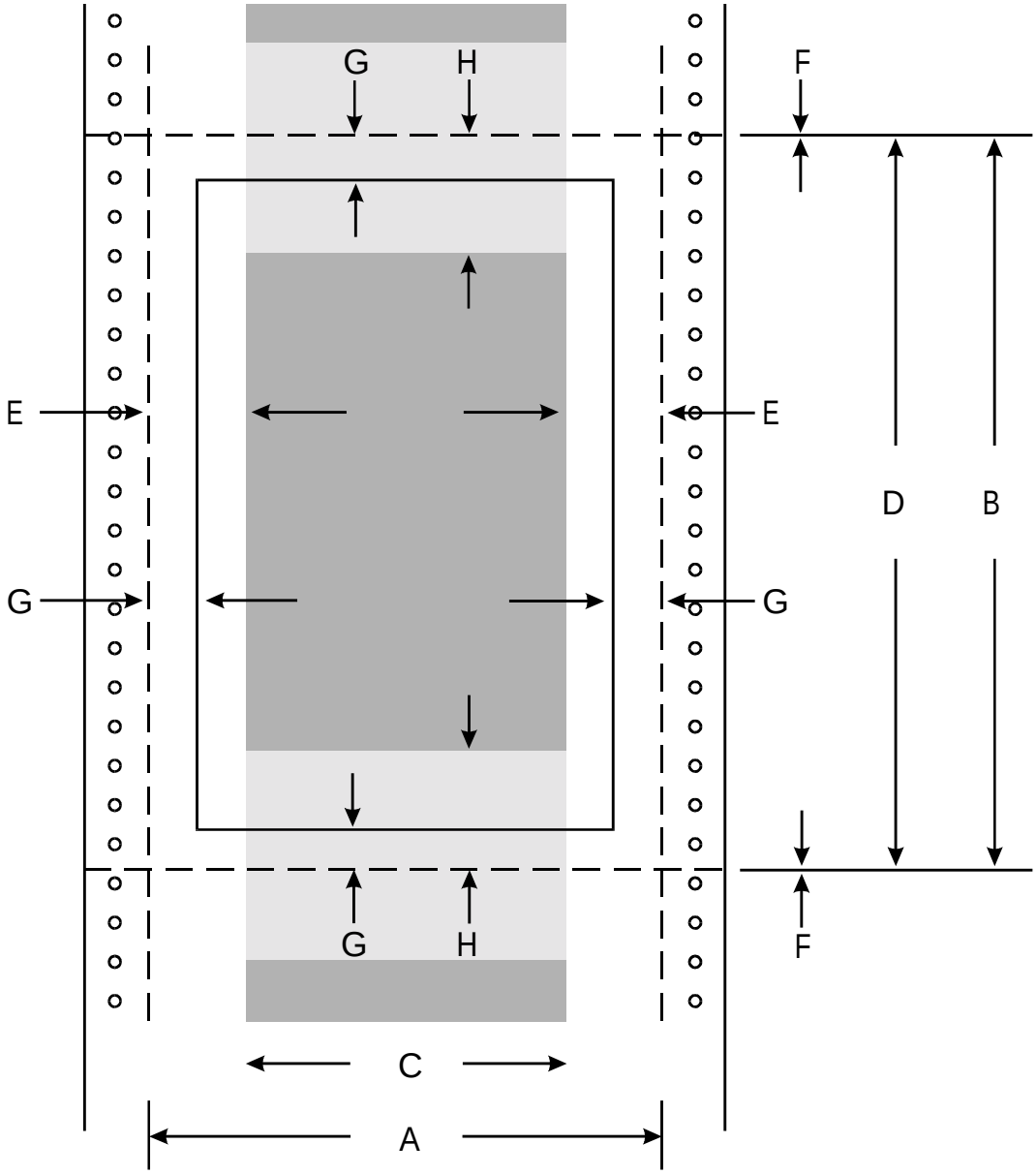
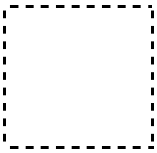


Standard Portrait CC1-C

LEGEND



Physical Page, Normally Bordered by Perforations

Printable Area, Where Printer Engine Can Physically Print Dots for Standard Page Sizes

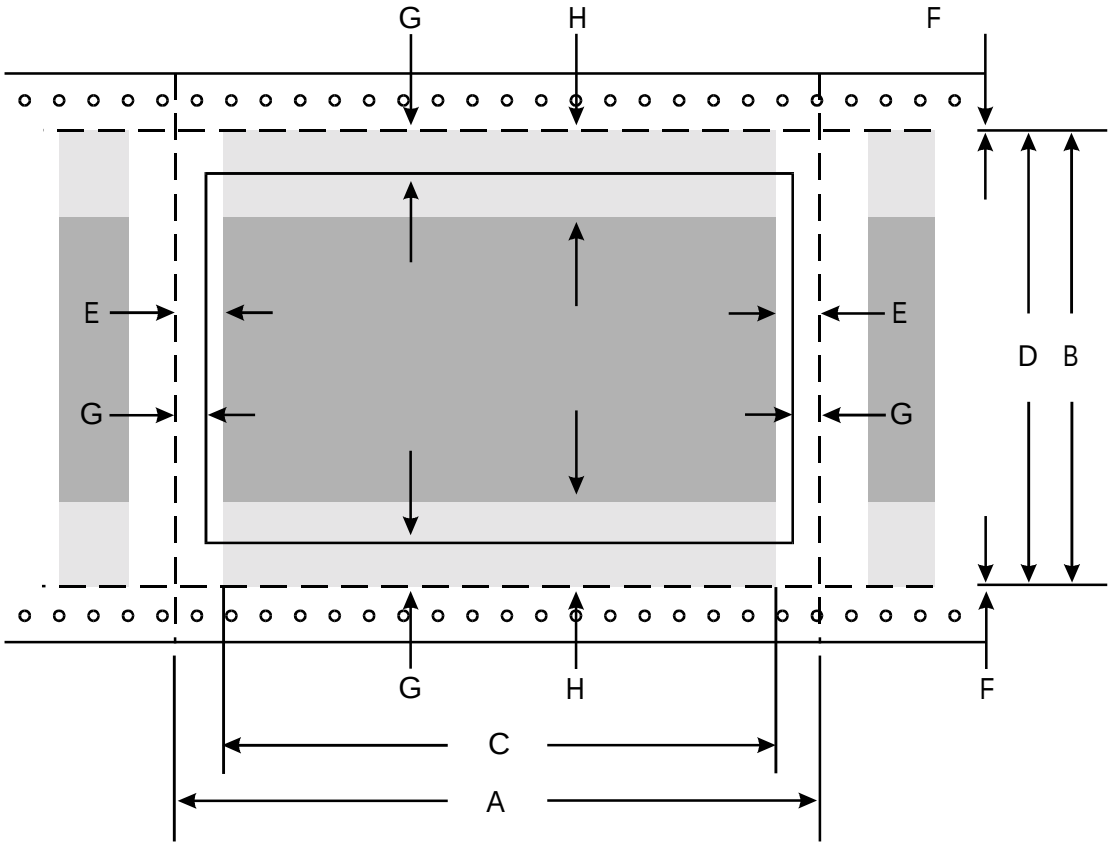
Logical Page, Where PCL Cursor Can Be Positioned (not necessarily a printable position)

HP-GL/2 *Default* Picture Frame, Use ^{E}c * c # X and ^{E}c *c # Y to Change Frame Settings

A = Physical Page Width
B = Physical Page Length
C = Logical Page Width
D = Max. Logical Page Length
E = Distance Between the Side Edges of Physical Page and the Logical Page
F = Distance Between the Top/Bottom Edge of the Physical Page and the Logical Page
G = Distance Between the Edge of the Physical Page and the Printable Area
H = Distance Between Edge of Physical Page and Default HP-GL/2 Picture Frame

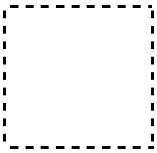
STANDARD PORTRAIT PAPER SIZES IN DOTS (300 Dots Per Inch)

Paper Size	A	B	C	D	E	F	G	H
Letter (8.5" x 11")	2550	3300	2400	3300	75	0	50	150
Legal (8.5" x 14")	2550	4200	2400	4200	75	0	50	150
Executive (7.25" x 10.5")	2175	3150	2025	3150	75	0	50	150
A4 (210 mm x 11$^{2}/_{3}$")	2480	3500	2338	3500	71	0	50	150
A4 (210 mm x 297 mm)	2480	3507	2338	3507	71	0	50	150
A5 (148 mm x 210 mm)	1748	2480	1677	2480	71	0	50	150
A6 (105 mm x 148 mm)	1240	1748	1098	1748	71	0	50	150



Standard Landscape CC1-D

LEGEND



Physical Page, Normally Bordered by Perforations

Printable Area, Where Printer Engine Can Physically Print Dots for Standard Page Sizes

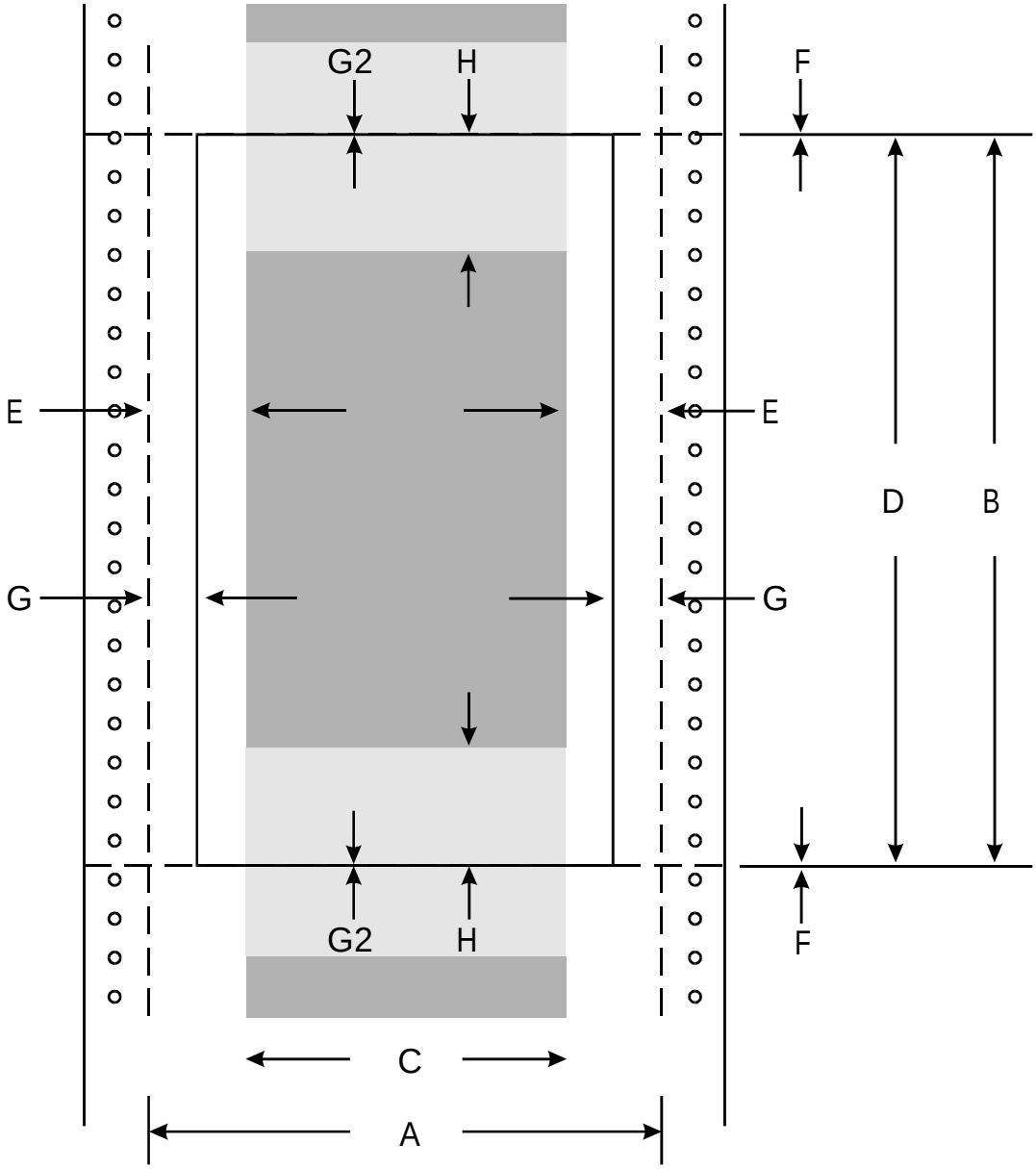
Logical Page, Where PCL Cursor Can Be Positioned (not necessarily a printable position)

HP-GL/2 *Default* Picture Frame, Use ^{E}c * c # X and ^{E}c *c # Y to Change Frame Settings

A = Physical Page Width
B = Physical Page Length
C = Logical Page Width
D = Max. Logical Page Length
E = Distance Between the Side Edges of Physical Page and the Logical Page
F = Distance Between the Top/Bottom Edge of the Physical Page and the Logical Page
G = Distance Between the Edge of the Physical Page and the Printable Area
H = Distance Between Edge of Physical Page and Default HP-GL/2 Picture Frame

STANDARD LANDSCAPE PAPER SIZES IN DOTS (300 Dots Per Inch)

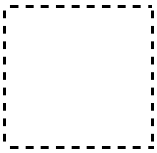
Paper Size	A	B	C	D	E	F	G	H
Letter (11" x 8.5")	3300	2550	3180	2550	60	0	50	150
Legal (14" x 8.5")	4200	2550	4080	2550	60	0	50	150
Executive (10.5" x 7.25")	3150	2175	3030	2175	60	0	50	150
A4 ($11^{2}/_{3}$" x 210 mm)	3500	2480	3380	2480	60	0	50	150
A4 (297 mm x 210 mm)	3507	2480	3389	2480	59	0	50	150
A5 (210 mm x 148 mm)	2480	1748	2362	1748	59	0	50	150
A6 (148 mm x 105 mm)	1748	1240	1630	1240	59	0	50	150



Custom Portrait

CC1-A

LEGEND



Physical Page[5], Defined by the User in 1/8 in. or 1 mm Increments.

Printable Area[5], Where Printer Engine Can Physically Print Dots.

Logical Page[5], Where PCL Cursor Can Be Positioned (not necessarily a printable position)

HP-GL/2 *Default* Picture Frame, Use ^{E}c * c # X and ^{E}c *c # Y to Change Frame Settings

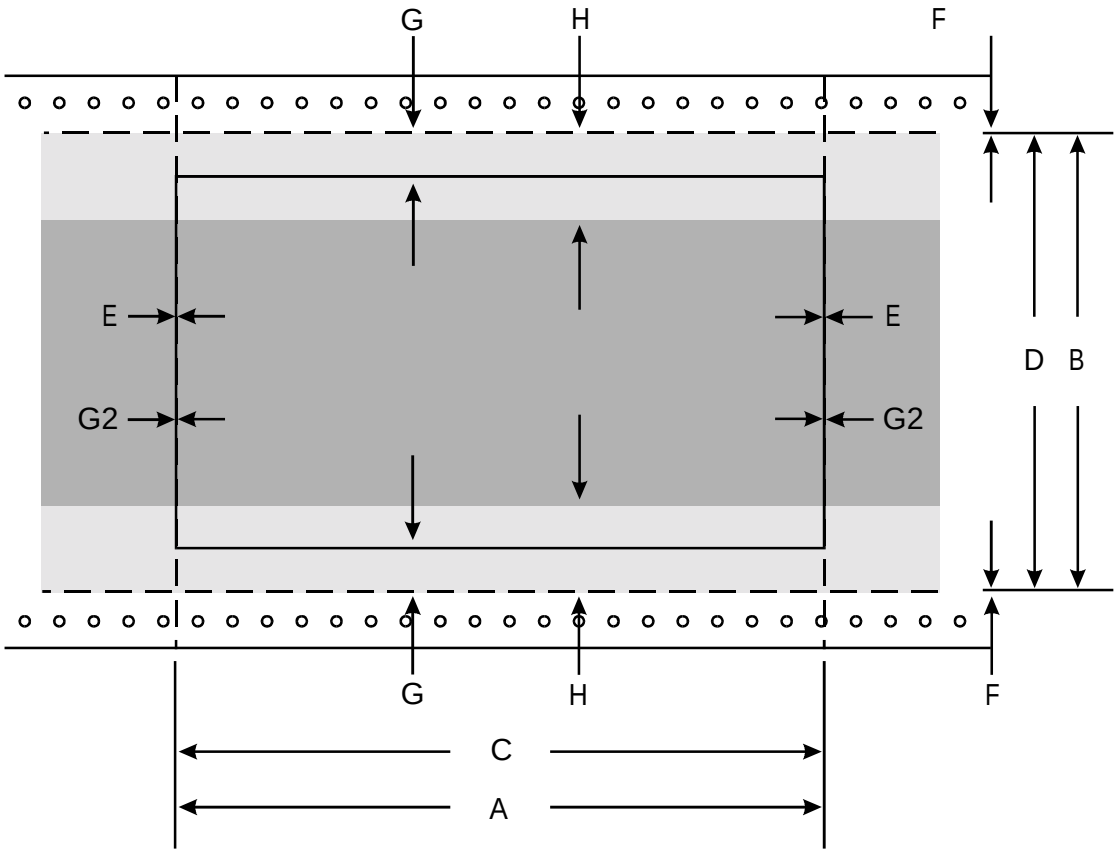
A = Physical Page Width[6]
B = Physical Page Length[6]
C = Logical Page Width
D = Max. Logical Page Length
E = Distance Between the Side Edges of Physical Page and the Logical Page
F = Distance Between the Top/Bottom Edge of the Physical Page and the Logical Page
G = Distance Between the Left/Right Edge of the Physical Page and the Printable Area
G2=Distance Between the Top/Bottom Edge of the Physical Page and the Printable Area
H = Distance Between Edge of Physical Page and Default HP-GL/2 Picture Frame

CUSTOM MIN./MAX. PORTRAIT PAPER SIZES IN DOTS (300 Dots Per Inch)

Paper Size	A	B	C	D	E	F	G	G2	H
Min. English (3.5" x 5")	1050	150	1050	150	0	0	0	0	150
Min. Metric (89 mm x 12 mm)	1051	142	1051	142	0	0	0	0	150
Max. English (8 1/6" x 33")	2550	9900	2400	9900	75	0	50	0	150
Max. Metric (207 mm x 838 mm)	2480	9898	2338	9898	71	0	50	0	150

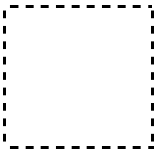
5 For custom page widths equal to or less than 8 1/6 in., the Physical Page, Printable Area, and Logical Page are identical.

6 Physical Page Length is defined by ^{E}c & *l* # A. Physical Page Width is defined using Form Width in the Extended Config Menu.



Custom Landscape CC1-B

LEGEND



Physical Page[7], Defined by the User in 1/8 in. or 1 mm Increments.

Printable Area[7], Where Printer Engine Can Physically Print Dots.

Logical Page[7], Where PCL Cursor Can Be Positioned (not necessarily a printable position)

HP-GL/2 *Default* Picture Frame, Use ^{E}c * c # X and ^{E}c *c # Y to Change Frame Settings

A = Physical Page Width[8]
B = Physical Page Length[8]
C = Logical Page Width
D = Max. Logical Page Length
E = Distance Between the Side Edges of Physical Page and the Logical Page
F = Distance Between the Top/Bottom Edge of the Physical Page and the Logical Page
G = Distance Between the Top/Bottom Edge of the Physical Page and the Printable Area
G2=Distance Between the Left/Right Edge of the Physical Page and the Printable Area
H = Distance Between Edge of Physical Page and Default HP-GL/2 Picture Frame

CUSTOM MIN./MAX. LANDSCAPE PAPER SIZES IN DOTS (300 Dots Per Inch)

Paper Size	A	B	C	D	E	F	G	G2	H
Min. English (5" x 3.5")	150	1050	150	1050	0	0	0	0	150
Min. Metric (12 mm x 89 mm)	142	1051	142	1051	0	0	0	0	150
Max. English (33" x 8")	9900	2550	9900	2400	60	0	75	0	150
Max. Metric (838 mm x 203 mm)	9898	2480	9898	2397	59	0	75	0	150

7 For custom page lengths equal to or less than 8 1/6 in., the Physical Page, Printable Area, and Logical Page are identical.

8 Physical Page "Width" is defined by ^{E}c & *l* # A. Physical Page Length is defined using Form Width in the Extended Configuration Menu.

^{E}c & l # H — Page Eject

ASCII:	^{E}C	&	l	#	H
Decimal:	27	38	108	#	72

Causes the present page to be ejected. The only valid value of # is zero. All other values are ignored.

^{E}c & l # P — Page Length (number of lines)

ASCII:	^{E}C	&	l	#	P
Decimal:	27	38	108	#	80

Specifies the length of the physical page size, rounded downward to the nearest $^{1}/_{8}$ in. *or*, if applicable, to $11^{2}/_{3}$ in. This in turn sets the logical page.

The number of lines is specified by #. [The factory setting is 66 lines, which at the factory vertical motion index (VMI) setting of 6 lines per in., specifies an 11-in. form with a top and bottom no-print area of $^{1}/_{6}$ in.] For example, if # = 12 and if the VMI had been set to 6 lines per in., then the printer sets page length to 2 in.:

$$\frac{\text{Page Length in Lines}}{\text{VMI}} = \text{Page Length in Inches}$$

$$\frac{\text{12 Lines/Page}}{\text{6 Lines/In}} = \text{2 In./Page}$$

Notes:

- *Unlike a cut-sheet printer, this printer allows for very flexible, continuous-form, page-length control. Since HP LaserJet printers are limited to a maximum of four cut-sheet sizes (Executive, Letter, Legal, or A4), this command may cause very different results on this printer versus an HP LaserJet printer. For example, if # = 12, this command causes an HP LaserJet to print an Executive ($7^1/4$ in. x $10^1/2$ in.) page.*
- *If the page length set using this command equals one of the standard page sizes (Executive, Letter, Legal, A4, A5, or A6), the printer includes a no-print area of $^1/6$ in. at the top and bottom of the page. (Also, see* **^{E}c & l # A**, *Page 8-9.)*
- *The space between lines is defined by the current vertical motion index (VMI). (If the current VMI is zero this command is ignored.)*
- *The page length in inches must be greater than ½ in. If not, the Page Length command is ignored.*
- *This command causes the current page to be printed; resets text length and top, left, and right margins to their default values; and disables macro overlays.*

^{E}c % – 1 2 3 4 5 X	**Exit Language/Enter PJL**

ASCII:	^{E}C	%	–	1	2	3	4	5	X
Decimal:	27	37	45	49	50	51	52	53	88

If Emu= LaserJet* or ...PS, this command causes the printer to exit the PCL 5 or PostScript emulation and enter the printer job language (PJL). (**^{E}c % – 1 2 3 4 5 X** has no affect if Emu= Auto*.)

PJL commands are covered in the next subsection.

PRINTER JOB LANGUAGE

Printer Job Language (PJL) is used for exiting one emulation and entering another (for those printers that include the PostScript emulation). Enter PJL using the **^{E}c % – 1 2 3 4 5 X** command (Page 8-21).

Three PJL commands are available: the PJL Comment command, the Enter PCL 5 Language command, and the Enter PostScript Language command. An example is provided at the end of this section showing how these commands are used in switching emulations and entering comments.

Note:

- *A line feed <LF> is used in the formats that follow to terminate the PJL commands. A carriage return/line feed <CR><LF> can also be used.*
- *No other PJL commands, other than the three described in the following paragraphs, are supported by the printer. Other PJL commands used by HP LaserJet III printers may cause errors.*

@PJL COMMENT

ASCII:	@ P J L <SP> C O M M E N T <SP> # <LF>
Decimal:	64 80 74 76 32 67 79 77 77 69 78 84 32 # 10

The comment command allows downloaded files to be annotated with embedded, non-executing, nonprinting comment strings. (The comment string is represented by #. CoMmEnT may be upper and/or lower case; PJL must be upper case.)

Note: The PJL Comment command is analogous to a %% PostScript comment.

@PJL ENTER LANGUAGE = PCL

ASCII: @ P J L <SP> E N T E R <SP> L A N G U A G E = P C L <LF>
Decimal: 64 80 74 76 32 69 78 84 69 82 32 76 65 78 71 85 65 71 69 61 80 67 76 10

Use this command to enter/return to the PCL 5 emulation. (Optional spaces <SP> can be placed just before and/or just after =. *ENTER Language* and *Pcl* may be upper and/or lower case; *PJL* must be upper case.)

@PJL ENTER LANGUAGE = POSTSCRIPT

ASCII: @ P J L <SP> E N T E R <SP> L A N G U A G E = P O S T S C R I P T <LF>
Decimal: 64 80 74 76 32 69 78 84 69 82 32 76 65 78 71 85 65 71 69 61 80 79 83 84 83 67 82 73 80 84 10

Use this command to enter/return to the PostScript emulation. (Optional spaces <SP> can be placed just before and/or just after =. *ENTER Language* and *PostScript* may be upper and/or lower case; *PJL* must be upper case.)

Example[9]: The following program uses PCL 5 (and HPGL) to print out a banner PostScript Print Jobs (5-5-96) prior to entering PostScript emulation.

```
EC%-12345X
@PJL COMMENT ********************************** <LF>
@PJL COMMENT   PostScript Print Jobs (5-5-96)   <LF>
@PJL COMMENT ********************************** <LF>
@PJL Enter Language = PCL<LF>
EcE
EC%0B
IN;SP1;
PA1010,3000;
PW2.2;
PD7120,3000,7120,8310,1010,8310,1010,3010;
PU;
PA2680,6040;
SD1,277,2,1,4,20,5,0,6,3,7,52;
DT*;
SS;LBPostScript Print Jobs*;
PA3480,5040;
LB5-5-96*;
EC%0A
EcE
EC%-12345X
@PJL COMMENT ********************************** <LF>
@PJL COMMENT ********* End of Banner ********* <LF>
@PJL COMMENT ********************************** <LF>
@PJL ENTER LANGUAGE = PostScript<LF>
     –
     –
     –
```

9 For ease of reading, most commands have been entered on separate lines.

EMULATION CONTROL

If the printer contains both PCL 5 and PostScript emulations, then it features automatic and manual switching between these emulations.

Select LaserJet, PS, or Auto from the Configuration Menu. When set to Auto, the printer automatically switches to the PCL 5 (LaserJet) or PostScript (PS) emulation based on the contents of the first .5 Kbyte of data sent from the host.

The printer marks the start of this .5 Kbyte search from each occurrence of either a PCL reset code (**^Ec E**)[10] or a PostScript end of transmission code <EOT>[11]:

- The printer automatically switches to PCL 5 emulation if it encounters any escape code (ASCII decimal 27) within the first .5 Kbyte of characters sent to the printer.
- The printer automatically switches to PostScript emulation if it encounters a %% comment or another end-of-transmission code (ASCII decimal 4) within the first .5 Kbyte of characters sent to the printer.

Switching in this way works with text files created by most modern software applications (word processors, desk-top publishers, and the like), but not with all.

---

10 Although Hewlett-Packard suggests that PCL files begin and end with **^EcE**, remember that using this causes loss of previously downloaded temporary fonts and macros. In such case, the application software should be set up to download fonts and macros with every file. If this is not possible, another emulation switching technique must be employed.

11 The PostScript end of transmission code is written as either <CTRL>D or <EOT>.

Under certain circumstances, automatic switching may be problematic. Automatic switching will not or might not occur when 1) downloading ASCII text files that do not contain printer control codes, 2) using print screen processes, either out of DOS or otherwise, 3) using some application files, especially user-created files, that are not printer specific, and 4) using PCL type management software that does not download fonts with every print file.

There are several semi-automatic methods of ensuring that emulation switching occurs under these circumstances:

- If a commercial software application is in use, look for choices such as Reset Printer Prior to Printing? and/or Download Preamble (or Header) With Each File?. Answering Yes to both queries causes emulation switching when the text file is sent to the printer.

- In a software application, even if you are using printer default selections (for fonts, for example), reselect those defaults at the start of your text. In many cases, the application software includes a reset or change code that triggers the emulation switching.

- If the software application supports the switching features of a HP LaserJet IIISi, select that driver. The printer employs the same emulation switching technique employed by an HP LaserJet IIISi.

- If you are using DOS to copy (download) a print file directly to the printer, consider including the copy command as part of a batch file that first copies one of the following to the printer:

  – **Ec** **<SOH>** **<STX>** **BEGIN3** **<ETX>** to switch to PCL 5 emulation.

  – **Ec** **<SOH>** **<STX>** **BEGIN2** **<ETX>** to switch to PostScript emulation.

  Formats for these printer commands are detailed on Page 8-6.

Although these commands can be embedded in a text file, they can cause unpredictable results if the file is printed on a different printer. The commands would probably be ignored by the new printer. If this is a problem, however, consider the method described below.

- Consider using HP's printer job language (PJL) commands for switching between PCL and PostScript emulations. PJL is designed for switching between PCL and PostScript in a HP LaserJet IIISi. This printer supports PJL switching:

  ^Ec%–12345X@PJL<SP>ENTER<SP>LANGUAGE<SP>=<SP>PCL<LF>
  to switch to PCL 5 emulation.

  ^Ec%–12345X@PJL<SP>ENTER<SP>LANGUAGE<SP>=<SP>POSTSCRIPT<LF>
  to switch to PostScript emulation.

Appendix A—Memory Enhancement

WARNINGS !

! Hazardous voltages are present in this printer. With the enclosure removed and power applied, hazardous voltage areas are present. Equipment service must be performed only by service-trained personnel who are aware of the hazards involved.

CAUTIONS !

! The printer circuit boards (PCBs) inside the printer contain static-sensitive components. To reduce the possibility of static discharge and damage to these PCBs, touch the printer chassis before touching these PCBs or their connectors.

When handling PCBs, do not touch their edge connectors. Handle PCBs only by their side edges or the plastic ejectors located on the two outside corners of the PCBs. In the case or the raster image processor (RIP) controller PCB use the connector panel for holding and transporting the PCB.

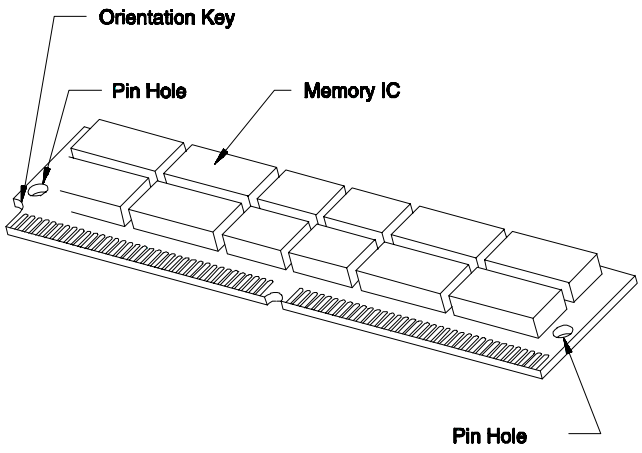
Place PCBs in or on conductive plastic bags or surfaces only, such as antistatic bags or antistatic mats. ***Failure to use these precautions may damage or destroy PCB components.***

! **Prior to moving the printer, remove the developer unit, toner waste bottle, and drum.**

CAUTIONS (Continued)

- **!** Whenever you remove the drum cartridge, place it in its original container or other protective covering and store it in a dark location. Prolonged exposure to strong light deteriorates the green organic photoconductor coating on the drum.
- **!** Never use the fuser exit cover on the back of the printer as a handhold for lifting the printer. Lift the printer only along the sides of the printer.

Additional printer memory of 1, 4, or 8 Mbytes can be installed using a memory module called a SIMM (single inline memory module).



SIMM PCB (Typical) CA0-BA1

Add memory using a 72-pin, 70-nanosecond IBM PS/2-compatible SIMM, such as the one shown at the left. Contact a computer dealer to order your SIMM from such manufacturers as IBM, Micron, Toshiba, Hitachi, NEC, Oki, Mitsubishi, Samsung, and others. Make sure that the SIMM uses 70-nanosecond components.

Note: The number and orientation of memory integrated circuits (ICs) may vary from that shown in the illustration.

To remove or install a SIMM PCB, first remove the RIP controller PCB as described in the following subsection.

RIP CONTROLLER PCB REPLACEMENT

To remove the RIP controller PCB, proceed as follows:

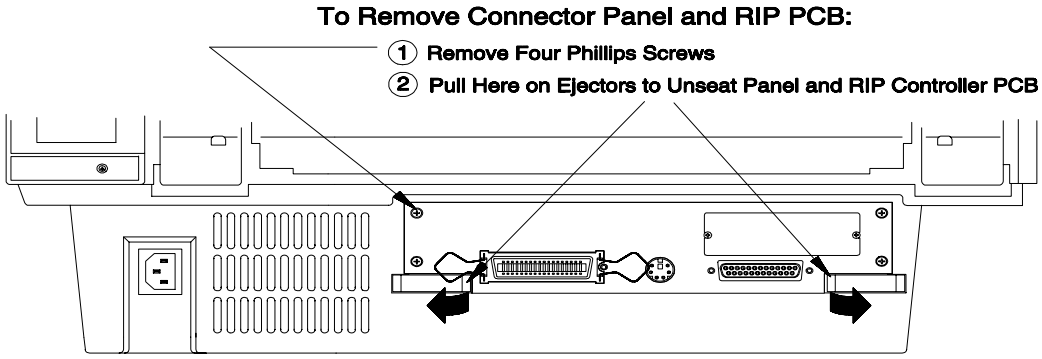
1. Remove paper, turn off printer, and disconnect power, interface, and stacker cables at rear of printer.

2. Position the printer so that the rear connector panel is easily accessible, with at least a foot and a half of free space available.

3. Remove the four Phillips screws at the corners of the connector panel.

   See the following illustration.

4. Pull out on both plastic ejectors, as shown, to unseat the connector panel together with the raster image processor (RIP) controller PCB.



Connector Panel (Rear View of Printer) PB0-AL

5. See the Caution below and then slowly pull out the panel and PCB and place it flat on a static-free surface or antistatic bag.

Caution ! When handling PCBs, do not touch components on the PCB nor the connector fingers on the rear edge of the PCB:

- If an antistatic wrist strap is available, use it and connect the other end to an electrical ground.
- If you have a wire connected to alligator-type electrical clips, connect the clip to the connector panel and the other end to electrical ground.
- If there is no other antistatic protection available, touch the chassis with one hand while handling the PCB with the other.

To install the RIP controller PCB, proceed as follows:

1. Carefully slide the RIP controller PCB into the printer until the rear edge connectors butt against the connectors inside the printer.
2. Push evenly against both plastic ejectors to fully seat the PCB (wiggling the panel/PCB helps).
3. Re-secure the connector panel, re-attach cables, and then test the printer.

SIMM PCB REPLACEMENT

The SIMM connector is located along the left edge of the RIP controller PCB. If the printer already has a SIMM PCB installed, it must be removed before adding more printer memory.

To remove a SIMM PCB, proceed as follows:

1. Remove the RIP controller PCB, as described in the preceding subsection.

2. Note that the SIMM connector has two small release tabs, one on each side, as shown in the following illustration.

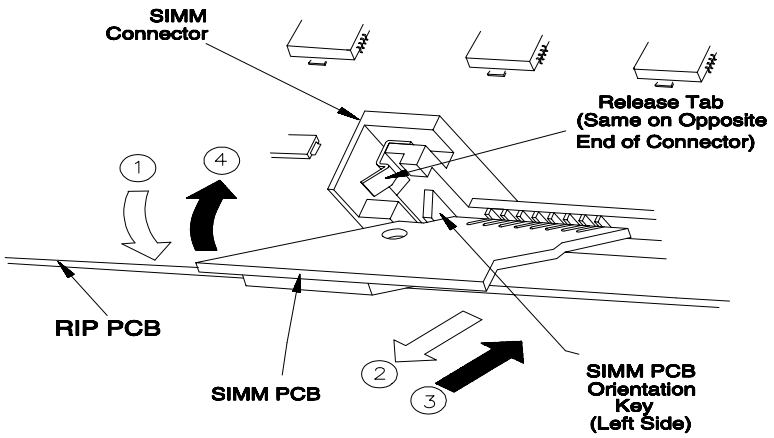
3. Using your thumbnails or fingertips, gently push both tabs away from the SIMM until the SIMM releases and springs down.

   See arrow ① in the illustrations.

4. Touching the SIMM only along its edges, remove the SIMM by extracting it in-line with the released angle.

   See arrow ② in the illustrations.

5. If available, place the SIMM in an antistatic bag to protect it from static discharge during handling.



SIMM Removal (① ②) & Installation (③ ④) PB0-AM

To install a SIMM PCB, proceed as follows:

1. Remove the RIP controller PCB, as described above.
2. Note the position of the SIMM orientation key.

   Refer to the first illustration in this appendix.
3. Touching the SIMM only along its edges, angle and slide the SIMM into the connector.

   See arrow ③ in the preceding illustration.
4. Pivot the SIMM up (perpendicular to the PCB), softly snapping it into position.

   See arrow ④ in the illustrations.
5. Re-install the RIP controller PCB as described in RIP Controller PCB Replacement.

Appendix B—Firmware Upgrade

WARNINGS !

! Hazardous voltages are present in this printer. With the enclosure removed and power applied, hazardous voltage areas are present. Equipment service must be performed only by service-trained personnel who are aware of the hazards involved.

CAUTIONS !

! The printer circuit boards (PCBs) inside the printer contain static-sensitive components. To reduce the possibility of static discharge and damage to these PCBs, touch the printer chassis before touching these PCBs or their connectors.

When handling PCBs, do not touch their edge connectors. Handle PCBs only by their side edges or the plastic ejectors located on the two outside corners of the PCBs. In the case or the raster image processor (RIP) controller PCB use the connector panel for holding and transporting the PCB.

Place PCBs in or on conductive plastic bags or surfaces only, such as antistatic bags or antistatic mats. ***Failure to use these precautions may damage or destroy PCB components.***

! **Prior to moving the printer, remove the developer unit, toner waste bottle, and drum.**

CAUTIONS (Continued)

! Whenever you remove the drum cartridge, place it in its original container or other protective covering and store it in a dark location. Prolonged exposure to strong light deteriorates the green organic photoconductor coating on the drum.

! Never use the fuser exit cover on the back of the printer as a handhold for lifting the printer. Lift the printer only along the sides of the printer.

The printer contains two types of firmware[1]:

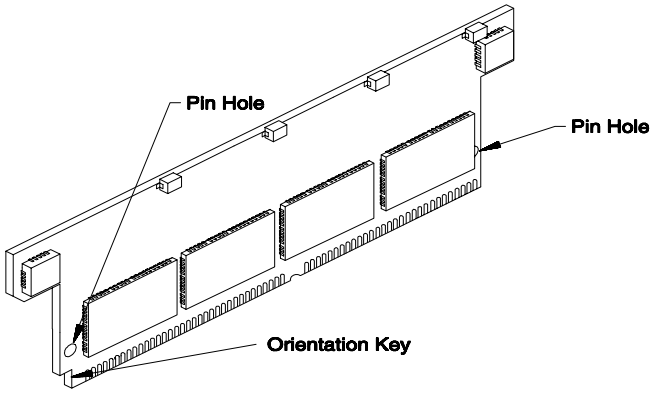
- The raster image processor (RIP) firmware controls the processing of data from the computer to the print media. The RIP firmware is located on a mini-PCB which is inserted into a connector on the RIP controller PCB.
- The engine controller (EC) firmware controls the mechanics of the printer. The EC firmware is located on a single ROM IC which is inserted into an IC socket on the EC PCB.

To remove or install any firmware first the RIP controller PCB must be removed as explained in RIP Controller PCB Replacement in Appendix A.

1 Firmware is the name used to describe software residing on one or more computer memory chips called read only memory (ROM) integrated circuits (ICs).

UPGRADING RIP FIRMWARE

The RIP firmware PCB is shown in the following illustration.



RIP Firmware PCB PB0-AT

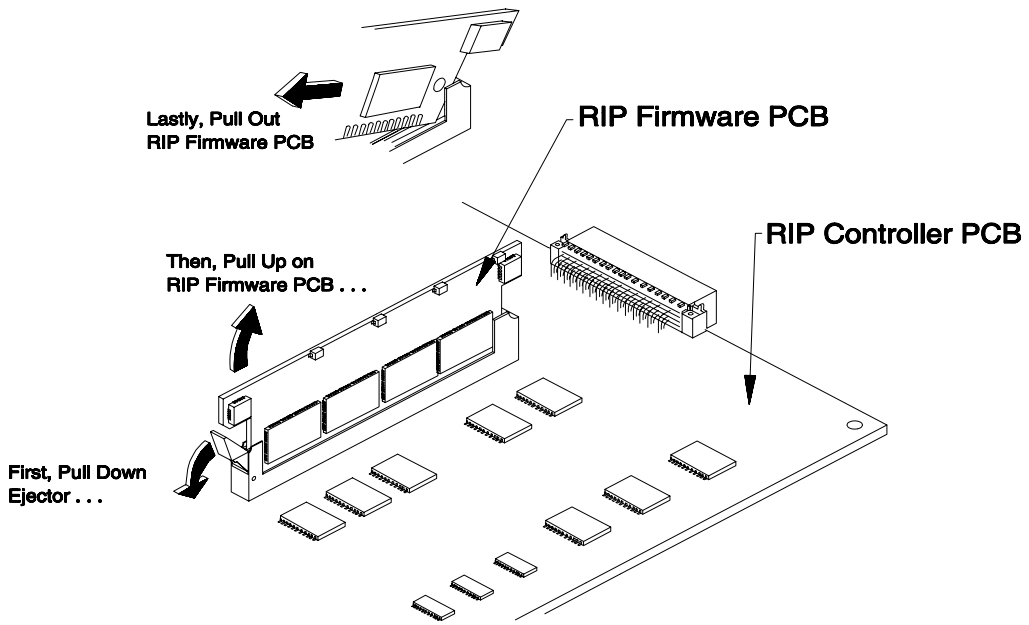
To remove the RIP firmware PCB, proceed as follows:

1. Remove the connector panel and RIP controller PCB as explained in RIP Controller PCB Replacement in Appendix A.

2. Pull down on the ejector, as shown in the following illustration, so that the ejector is at an angle of about 45º.

3. Touching only along the edges of the RIP firmware PCB, pivot the end nearest the ejector upward and then pull out the PCB.

4. If available, place this mini-PCB in an antistatic bag to protect it against electrostatic discharge during handling.



RIP Firmware Removal PB0-AO1

To install RIP firmware, proceed as follows:

1. Make sure that the ejector on the RIP firmware connector is positioned at an angle of about 45º.

2. Note the orientation key on the RIP firmware PCB. The orientation key on this mini-PCB should face the ejector on the RIP controller PCB.

3. Touching only along the edges of this mini-PCB. rest this mini-PCB on the connector on the RIP controller PCB.

4. Push down evenly on both ends of the mini-PCB to seat it evenly in its connector.

5. Make sure that the ejector is rotated to its full vertical position.

6. Press down on the mini-PCB to make sure it is fully seated and sitting evenly in its connector.

9. Re-install the RIP controller PCB as described in Appendix A.

UPGRADING EC FIRMWARE

The EC firmware resides in a socketed ROM IC located on the EC PCB which, in turn, is located in a shelf below the RIP controller PCB.

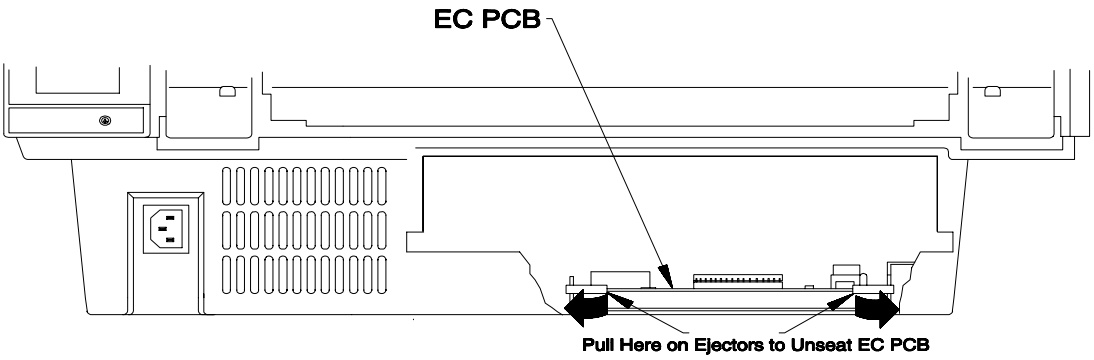
To remove the EC firmware, proceed as follows:

1. Remove the connector panel and RIP controller PCB as explained in RIP Controller PCB Replacement in Appendix A.

2. Use both hands to pull out on both plastic ejectors, shown in the following illustration, to unseat the EC PCB from the printer.

Caution ! When handling PCBs, do not touch components or edge connectors. As with the RIP controller PCB, use an antistatic wrist strap when handling the EC PCB and the EC firmware IC. If an antistatic wrist strap or mat is not available, touch an electrical ground (such as the metallic portion of the printer chassis or the bare metal handle of a filing cabinet, for example) when you touch PCBs or their components. Doing otherwise can cause static electrical damage.

3. Use the plastic ejectors to slowly pull the EC PCB out of the printer.



EC PCB (Cut-Away View of Rear Connector Panel) PB0-AU

4. Place the PCB on a static-free surface or antistatic bag.

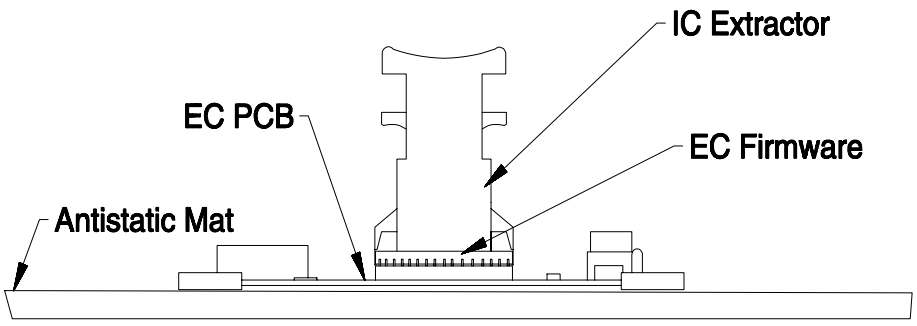
5. See the Caution below along with the following illustration before extracting the EC firmware IC from the EC PCB.

Caution ! DO NOT attempt to pull up an IC using your fingers. You will damage the electrical contacts on the sides of the IC.

Use an IC extractor to remove the firmware IC; or slip the small blade of an electrically grounded pocket knife under the IC, between the underside of the IC and its socket, and slowly pry up the IC, working first on one end of the IC and then the other.

6. Place the EC firmware IC on a Chipstrip™ (or equivalent) pad[2] to protect it from static damage.

2 Commonly called match books, they resemble a book of matches containing an antistatic form pad surrounded by a cardstock cover.



EC Firmware Removal PB0-AQ

To install EC firmware, proceed as follows:

Note: *EC Firmware is contained on a read only memory IC which is shipped to the user on a* Chipstrip™ *(or equivalent) pad*[3].

Caution ! When handling PCBs and ICs, do not touch components or edge connectors or other electrical contacts. Use an antistatic wrist strap when handling the RIP and EC controller PCBs, and the EC firmware IC. If an antistatic wrist strap or other form of electrostatic protection is not available, touch an electrical ground (such as the metallic portion of the printer chassis or the bare metal handle of a filing cabinet, for example), when touching PCBs or their components. Doing otherwise will cause static electrical damage.

3 See the previous footnote.

1. Note the proper orientation of the EC firmware IC in relationship to the socket.

   The notch in the IC must be oriented to coincide with the notch in the IC socket.

2. Place the electrical fingers of the IC onto the socket, and make sure they are aligned with the electrical receptacles of the socket.

3. Press down lightly and evenly on top of the IC so that the fingers begin to engage the receptacles, and then press down firmly on the IC to completely seat the IC.

4. Recheck that all fingers are engaged in their receptacles.

5. Re-slide the EC controller PCB into the card slides in the printer until its rear edge butts against the edge connector inside the printer.

6. Push evenly near both corners of the PCB to seat the PCB.

   The ejectors should automatically fold back to the edge of the PCB.

7. Re-install the RIP controller PCB.

   See RIP Controller PCB Replacement in Appendix A.

Note: *When power is turned on after replacing firmware, the printer halts with a* Self-Test Error. *This occurs because the printer detects a mismatch between the previous checksum (the arithmetic sum of all non-volatile RAM bytes) and the new checksum. To remedy, simply turn power off and then on again to restart the power-up procedure using the new expected checksum.*