



Maintenance Manual

Printronix P7000 Series of Line Matrix Printers

P7000 Series of Line Matrix Printers
Maintenance Manual



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Der Außsteller der Konformitätserklärung ist die Printronix.....(1)

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

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--

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(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis: Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.



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1

Maintenance Overview

Printronix P7000 Printers

P7000 printers are the latest line matrix printers to feature PSA3™ (Printronix System Architecture, third generation). This innovative printer architecture puts all data and printer control electronics on one of two available “Hurricane” controller boards: V5 and V6. Up to 32 MB of flash memory on this board permits rapid access to stored printer control languages (emulations) and very fast processing of print data. A variable-speed shuttle and micro-step paper feed control enable P7000 printers to print a wide range of horizontal and vertical dot densities, making these printers ideal for high-volume print jobs.

The controller board, card cage, and some parts of the ribbon drive system in P7000 printers are new designs and are not electrically or mechanically compatible with earlier Printronix line matrix printers. (For maintenance information about earlier Printronix printers, see page 471.)

The principal differences among the various P7000 models are the number of hammers on the hammer bank, whether the printer is mounted on a pedestal or housed in a floor cabinet, and the maximum possible print speed. In this manual, all items described apply to all models except where noted. (See Table 1 on page 19.)

Although technically sophisticated, a P7000 printer is easy to use. The mechanical controls that the operator can adjust are colored blue for quick identification. The operator can select every printer function either at the printer control panel or by sending control codes to the printer in the data stream from the host computer. For added security—and to protect special printer configurations—the operator can program which key combination locks and unlocks the **ENTER** key on the control panel.

Optional Features Enhance Graphics and Forms Handling

The PGL® and VGL Printronix emulations, bundled together as IGP®, are easy to use but highly versatile graphics programming languages that load into the printer’s memory and simplify the creation of graphic images. The PSA3 architecture enables multiple emulations and graphic options to be run without additional graphic processors or protocol converters.

Depending upon the model, various types of paper stacker are available to handle any throughput requirements. (See “Forms Handling” on page 21.)

Order The Correct Spares

When you replace worn or damaged printer components, make sure you order the correct spares for the model you are servicing. The next section shows you how to identify a P7000 printer.

How To Identify A P7000 Printer

A P7000 printer has a black or gray finish and the PSA3 logo on the printer cover. Every printer also has a model number, which is an alphanumeric code that identifies the printer type, its housing, and its maximum rated print speed. The model number and serial number of the printer are on the identification label next to the input/output ports at the rear of the printer. Figure 1 shows how to interpret a model number.

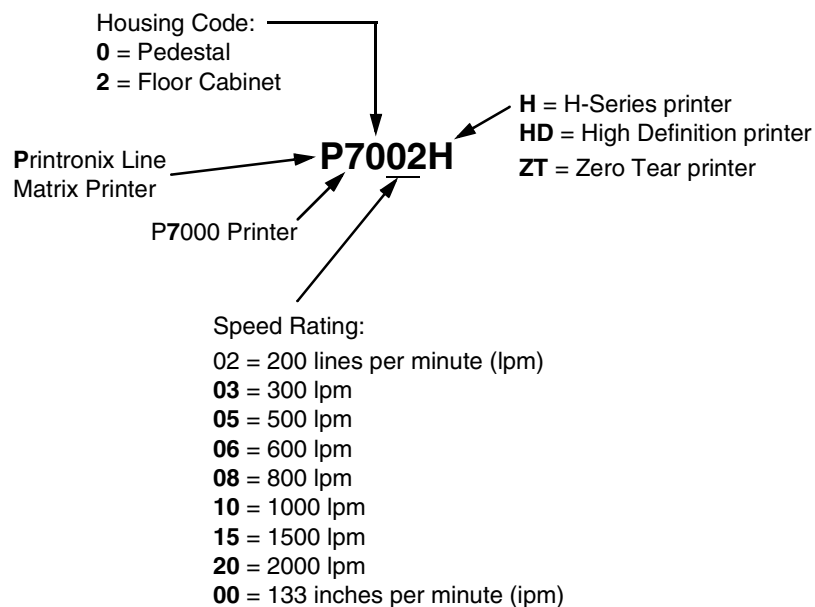


Figure 1. How to Interpret a Model Number

Table 1 lists the models in the P7000 series. Remember that the speeds listed are the highest attainable under controlled test conditions. The speed of printing for “real world” print jobs is affected by the interaction of many variables and varies from print job to print job. For more information, see “Printing Rates” on page 302.

Table 1. P7000 Printers

Model Number	Maximum Print Speed	Enclosure	Hammer Bank
P7002H	200 lpm	Pedestal	28 Hammers
P7002HZT	200 lpm	ZT Pedestal	28 Hammers
P7202H	200 lpm	Cabinet	28 Hammers
P7003H	300 lpm	Pedestal	60 Hammers
P7003HZT	300 lpm	ZT Pedestal	60 Hammers
P7203H	300 lpm	Cabinet	60 Hammers
P7005	500 lpm	Pedestal	28 Hammers
P7005ZT	500 lpm	ZT Pedestal	28 Hammers
P7205	500 lpm	Cabinet	28 Hammers
P7006H	600 lpm	Pedestal	102 Hammers
P7006HZT	600 lpm	ZT Pedestal	102 Hammers
P7206H	600 lpm	Cabinet	102 Hammers
P7008H	800 lpm	Pedestal	126 Hammers
P7008HZT	800 lpm	ZT Pedestal	126 Hammers
P7208H	800 lpm	Cabinet	126 Hammers
P7010	1000 lpm	Pedestal	60 Hammers
P7010ZT	1000 lpm	ZT Pedestal	60 Hammers
P7210	1000 lpm	Cabinet	60 Hammers
P7015	1500 lpm	Pedestal	102 Hammers
P7015ZT	1500 lpm	ZT Pedestal	102 Hammers
P7215	1500 lpm	Cabinet	102 Hammers
P7220	2000 lpm	Cabinet	126 Hammers
P7000HD	133 ipm	Pedestal	126 Hammers
P7000HDZT	133 ipm	ZT Pedestal	126 Hammers
P7200HD	133 ipm	Cabinet	126 Hammers

H-Series Printers

H-Series models print the ideogrammic symbols used in China, Hong Kong, South Korea, and Taiwan. (See Table 2.) These Kanji/Hanzi/Hangul printers are indicated by the letter H in the model number suffix. (See Figure 1 and Table 1.) H-Series printers have specially designed platens and unique shuttle assemblies which are only used in H-Series and HD Series printers. These assemblies are not interchangeable with any other Printronix printers.

Table 2. H-Series Character Sets

Character Set	Where Used
GB	China
BIG-5, with an additional 3000 Cantonese characters	Hong Kong
BIG-5 TCA DCI (1st and 2nd segments) DCI (3rd segment) CNS	Taiwan
KSC 5601	South Korea

HD Printers

HD (High Definition) printers use a Windows printer driver with the LQ1600K emulation to print scalable alphabetic characters in high resolution print quality. Using the same shuttles mechanisms as the P7X08H H-Series printers, HD models print alphabetic character sets as graphic page images instead of in linear character streams. For this reason, the speed of HD printers is measured in inches per minute (ipm) instead of lines per minute (lpm). (See Table 1 and Figure 1.)

Zero Tear (ZT) Printers

Zero Tear (ZT) printers are pedestal models equipped with special hardware and software that permits them to print small jobs or single sheets without losing a sheet between print jobs. A ZT printer automatically presents the current print line to a tear bar when it finishes printing and presents the perforation of the last form printed to the tear bar. When it receives more data from the host computer, the printer pulls the form down to the print station and resumes printing.

ZT printers are covered in Appendix E (page 437).

Printer Configuration Code

Every printer has a configuration code which specifies the printer's cabinet type, controller board revision level, V8 ASIC revision level, and MECA ASIC revision level. The configuration code is included in the configuration printout. Figure 2 shows how to interpret the printer's configuration code.

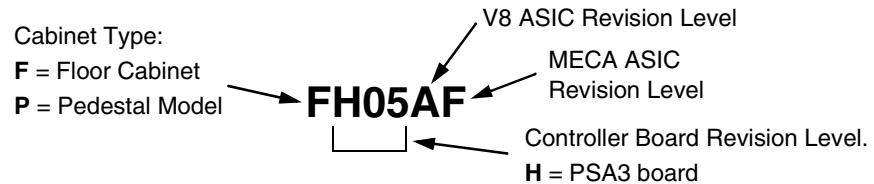


Figure 2. How to Interpret the Printer's Configuration Code

Forms Handling

Pedestal Models

Pedestal models provide access to printed forms from the top cover with a tear-at-perforation edge for ejected forms or a paper exit at the rear of the top cover. Pedestal printers also have a wireform paper tray attached to the front of the pedestal and a wireform catch basket attached either to the back of the pedestal or to the back of the printer top cover.

Cabinet Models

Cabinet models can be equipped with four kinds of paper stacking device:

- The fixed paper fence is a wireform divider that separates the source paper stack from the printed output stack, and is used in combination with hanging chains that guide printed forms downward.
- For improved performance at higher print speeds, the chains are used with a moveable fence called the "passive paper stacker," which can be positioned to match the form's length.
- The front access paper stacker consists of a shelf that holds the input paper and a sliding tray that receives the printed forms. The sliding tray pulls forward, permitting the user to both load and unload paper from the front of the printer. This option is helpful in locations where access to the rear of the printer is limited or impossible.
- For more demanding applications, an optional power stacker is available. (The power stacker is covered in Appendix D on page 387.)

These devices are summarized in Table 3.

Table 3. Paper Stackers Used On Cabinet Models

Printer	Fixed Paper Fence	Passive Paper Stacker	Front Access Stacker	Power Paper Stacker
P7205	Standard	Option	Option	Option
P7210	Not Used	Standard	Option	Option
P7215	Not Used	Standard	Option	Option
P7220	Not Used	Standard	Option	Option

Important Maintenance Notes

To ensure the best performance of the printer, remember these maintenance principles when you service it. Failure to observe these guidelines can result in damage to the equipment:

- **Do not adjust the platen gap unless**
 - 1) the original shuttle assembly or platen has been replaced with a new or rebuilt unit, or
 - 2) you are instructed to do so in a troubleshooting procedure.
- **Never bend or try to adjust (“tweak”) the hammer springs.** The hammer springs are precisely aligned and the hammer tips are delicate. Always handle hammer springs by the thick mounting base.
- **Use only the ribbons specified in the *User’s Manual*.** Using ribbons not made by Printronix can lead to degraded print quality, expensive damage to the printer, and can void the owner’s warranty.
- **Never close the forms thickness lever (platen lever) too tightly.** Closing the forms thickness lever too tightly can lead to smeared print, degraded print quality, paper jams, and damage to the platen and shuttle assembly.

Notices

For your safety and to protect valuable equipment, always read and comply with all information highlighted under notices.

The heading of a notice indicates the kind of information it contains, as explained below:

WARNING Describes a condition that could hurt you.

CAUTION Describes a condition that could damage equipment or data.

IMPORTANT Information vital to proper operation and maintenance of the printer.

NOTE: Tips for efficient operation, maintenance, and troubleshooting.

About This Manual

This is a field service maintenance manual, intended for use by trained service personnel. It is designed so that you can quickly locate the maintenance information you need to restore the printer to operation.

This manual does not explain how to install, operate, or configure the printer. For that information, refer to the *Quick Setup Guide* and the *User's Manual*.

This manual does not explain how to program application software for operation with the printer. Programming information for the printer languages used by the printer is in the appropriate programmer's reference manual:

- *LinePrinter Plus® Programmer's Reference Manual*
Defines host control codes for the LinePrinter Plus emulations.
- *Character Sets Reference Manual*
Information about and examples of the character sets available in Printronix line matrix printers.
- *Network Interface Card User's Manual*
Information about network protocols, configuration, and network operation.
- *Coax/Twinax Programmer's Reference Manual*
Defines host control codes and character sets for the optional coax/twinax emulation (CT).
- *ANSI® Programmer's Reference Manual*
Defines host control codes and character sets for the ANSI emulation.
- *IPDS™ Twinax Emulation Programmer's Reference Manual*
An overview of Intelligent Printer Data Stream™ (IPDS) features, commands, and diagnostics.
- *IGP®/PGL® Programmer's Reference Manual*
Describes the optional IGP Printronix emulation. The IGP Printronix emulation allows the user to create and store forms; generate logos, bar codes, and expanded characters; create other graphics, and merge graphics with alphanumeric data as a document is printed.
- *IGP/VGL Programmer's Manual*
Describes the optional Code V™ Printronix emulation. The Code V Printronix emulation allows the user to create and store forms; generate logos, bar codes, and expanded characters; create other graphics, and merge graphics with alphanumeric data as a document is printed.

How To Use This Manual

Taking a systematic approach to maintenance tasks will help you restore the printer to operation as quickly as possible:

1. Locate the procedure or information you need in the Table of Contents or Index.
2. Read the entire procedure before you do it.
3. Gather the parts and tools you will need.
4. Make sure you understand all notices before you start a task. (Notices are defined on page 22.)

Printing Conventions In This Manual

Control panel keys and indicators are highlighted in **UPPERCASE BOLD PRINT**.



Example: Press the **CANCEL** key, then press the **ON LINE / CLEAR** key.

Messages that appear on the LCD (Liquid Crystal Display) are set off by quotation marks (" ").

Example: Press the **ON LINE / CLEAR** key. "OFF LINE" appears on the LCD.

Control panel key combinations are indicated by the + (plus) symbol.

Example: Press **▲ + ▼**.

means press the  key and the  key at the same time.

IMPORTANT

The Safety Notices on page 25 apply at all times when you are working on the printer. Please read them now.

Safety Notices







- WARNING** Always disconnect the AC power cord from the printer or power source before performing any maintenance procedure. Failure to remove power could result in injury to persons or damage to equipment. If you must apply power during maintenance, you will be instructed to do so in the maintenance procedure.
- WARNING** Always disconnect the AC power cord before cleaning the printer.
- WARNING** To prevent injury from electric shock, wait at least one minute after shutting off power before removing the power supply circuit board. Wear a properly grounded static wrist strap when handling the power supply board. Handle the board by the sides. Do not touch components or flex the board during removal/installation.
- WARNING** Over time, the upper edge of the paper ironer can become sharp. To avoid cutting yourself, handle the paper ironer on the sides.
- WARNING** Hold the printer cover securely while disengaging the dashpot.

Hinweise zur Sicherheit

- VORSICHT** Bevor Sie anfällige Wartungsarbeiten durchführen, müssen Sie zuerst immer das Netzkabel aus der Steckdose ziehen. Wird das Netzkabel nicht herausgezogen, können Verletzungen oder Geräteschäden entstehen. Falls die Wartungsarbeit Stromzufuhr erfordert, wird im Wartungsablauf darauf hingewiesen.
- VORSICHT** Ziehen Sie das Netzkabel aus der Steckdose, bevor Sie den Drucker reinigen.
- VORSICHT** Um Verletzungen durch Elektroschocks zu vermeiden, warten Sie mindestens eine Minute nach Stromausschaltung, bevor Sie die elektrische Schaltkarte entfernen. Bitte immer einen geerdeten, statischen Handgelenkriemen tragen, wenn Sie die elektrische Schaltkarte handhaben. Halten Sie die Karte nur an den seitlichen Auswurfshebeln. Während des Herausnehmens/Installierens dürfen die Komponenten der Karte nicht berührt oder gebogen werden.
- VORSICHT** Die obere Kante der Papierschiene wird mit der Zeit scharf. Halten Sie die Schiene deshalb an den Seiten, damit Sie sich nicht schneiden.
- VORSICHT** Behalten Sie die Druckerabdeckung sicher im Griff, wenn Sie das Gasfederpaket entfernen.

Controls And Indicators

Electrical Controls

Switch or Indicator	Function	Active Online	Active Offline
Power Switch	Turns printer on and off: 1 = on, 0 = off. This switch is also a circuit breaker.		
Status Indicator	On when the printer is online, off when the printer is offline. Flashes to indicate a fault or warning.	✓	✓
LCD	Liquid Crystal Display. Displays printer status messages, fault messages, and menus which permit user to set various configurations.	✓	✓
ON LINE / CLEAR	Toggles the printer online and offline. Clears the printer after a fault is corrected and returns the printer to offline state. Pressing CLEAR silences the audible alarm (if enabled).	✓	✓
PAPER ADVANCE	Prints any data in the buffer then moves paper to the next Top Of Form as defined by the currently active form length.	✓	✓
VIEW / EJECT	Cabinet: moves last data printed to the tractor area for viewing. "Printer in View" displays. Press UP or DOWN key to move paper vertically in 1/72 inch increments. (Refer to the Up and Down key functions.) Press VIEW/EJECT again to move the paper back to the adjusted print position. Pedestal: moves bottom of last printed form to the tear bar position. "READY TO TEAR/EJECT TO RETURN" displays. Press UP or DOWN key to move the paper vertically in 1/72 inch increments. (Refer to the Up and Down key functions.) Press VIEW/EJECT again to move the paper to the top of the next available form.	✓	✓
CANCEL	Clears all data from the print buffer (if enabled in the MAINT/MISC menu).		✓
	Displays next higher level of a configuration menu. In VIEW mode, moves paper up 1/72 inch. (See VIEW / EJECT key.)	✓	✓
	Displays next lower level of a configuration menu. In VIEW mode, moves paper down 1/72 inch. (See VIEW / EJECT key.)	✓	✓
	Displays the next option in a configuration menu.		✓
	Displays the previous option in a configuration menu.		✓
SET TOF	Moves paper downward from TOF (Top Of Form) alignment mark to the print station and sets this as the first line of print on a page, independent of forms length. If there are data in the buffers, the printer slews to the page position where printing left off and prints the data.		✓
PRT CONFIG	Prints the current printer configuration.		✓
JOB SELECT	Allows selection of the active configuration or print mode (typeface) of the printer. The functionality of this key depends on the current setting of the "Job Select/Print Mode" under the "MAINT/MISC" menu. (Refer to the <i>User's Manual</i> .)		✓
ENTER	Enters an option displayed on the LCD into the printer's non-volatile memory. Starts and stops printer tests, sets a value, or prints the configuration. This key is locked and unlocked by a user-selectable key combination. (Refer to the <i>User's Manual</i> .)		✓
 + ON LINE (IPDS emulation only)	When pressed in offline state, if data are in the printer buffer the printer goes online, prints one page, then returns to offline. Can be repeated until the end of a print job. Only one page prints each time you press ▲ + ON LINE. If no data are in the printer buffer, the printer is placed in online mode. (This key combination does not work if the printer is in the fault state.)		
	Resets the printer by reloading the power-up configuration and resetting the internal state.		

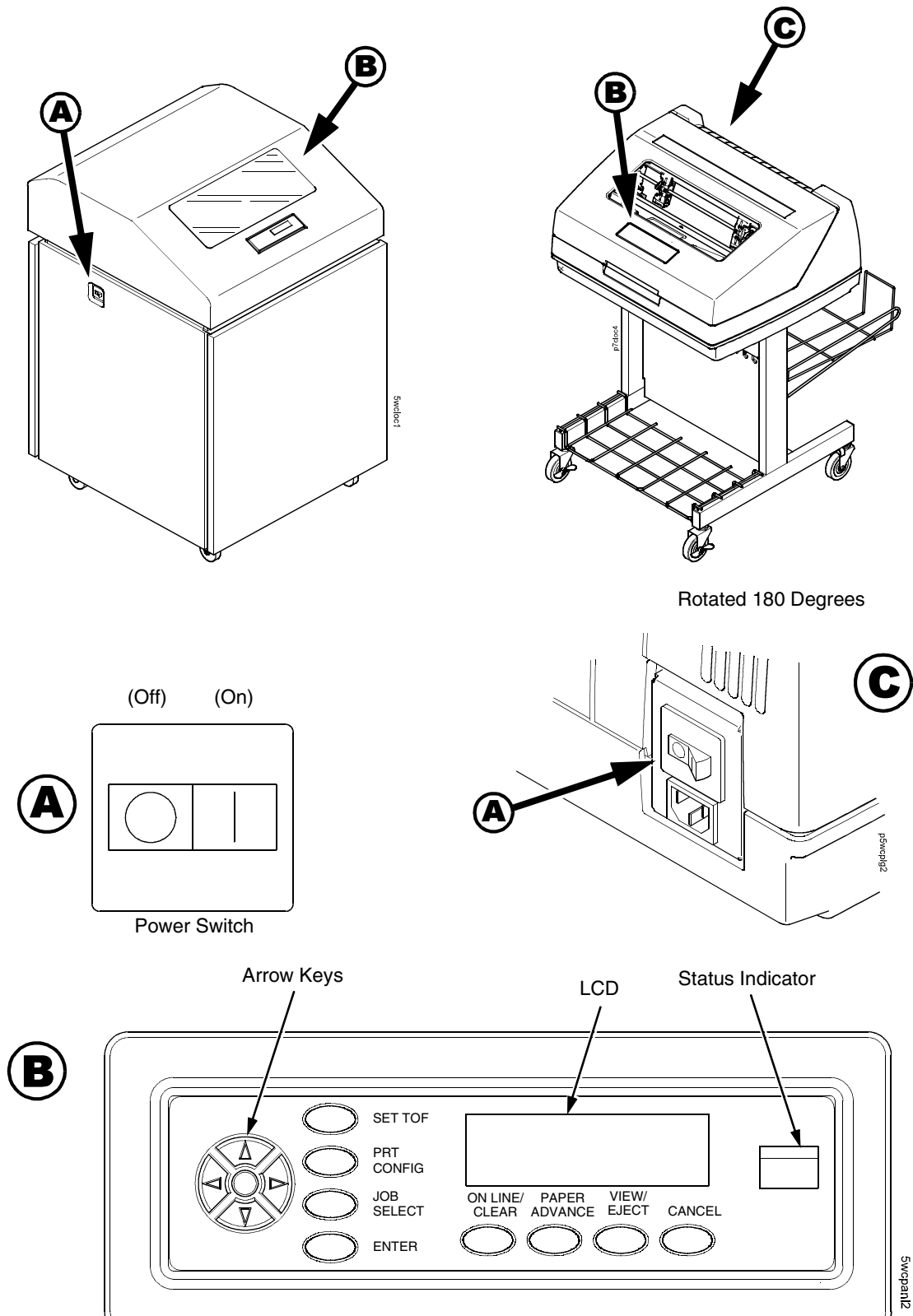
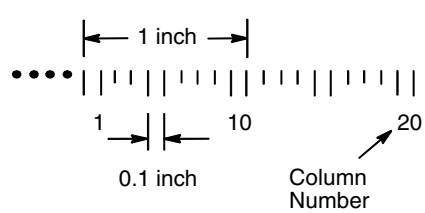


Figure 3. Electrical Controls

Mechanical Controls

Control or Indicator	Function
Paper Supports	Help prevent paper jams by supporting inner sections of paper. They are positioned manually by sliding them along the tractor shafts.
Forms Thickness Lever	Sets the platen for paper and forms of different thicknesses. This lever must be fully opened (raised) to load paper, unload paper, and move paper with the vertical position knob.
Forms Thickness Pointer and Scale	Indicates the relative thickness of forms and paper. Align pointer with A for thin (single-part) forms, B for thicker forms, and so on.
Forms Thickness Lever and Platen Stop Assembly	The forms thickness lever closes the platen to the relative thickness of the paper. The platen stop assembly returns the platen to the lever adjustment made by the user.
Tractors (2)	Hold and feed paper. Used to set side margins and position the paper horizontally.
Tractor Locks (2)	Lock tractors in position.
Vertical Position Knob	Used to set top of form or the first line to be printed. Open the forms thickness lever and rotate this knob to move paper vertically.
Ribbon Loading Path Diagram	Instructions showing how to load the ribbon correctly.
Paper Scale	<p>A horizontal scale graduated in tenths of an inch, useful for setting paper margins and counting text columns. (See below.)</p> 

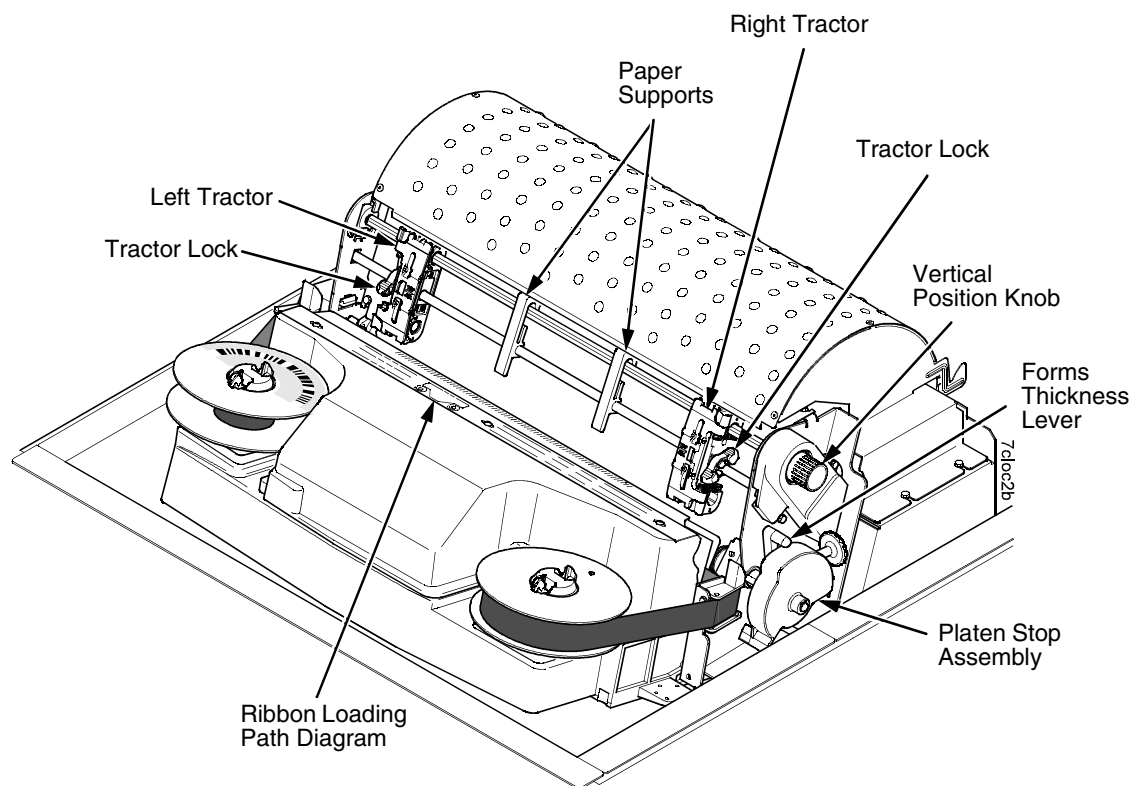


Figure 4. Mechanical Controls

Tools And Test Equipment

For field level maintenance of the printer, you will need these tools:

- Adapter, 1/4 in. hex to 1/4 in. square, Utica® HW-18
- Alcohol, anhydrous
- Allen Wrench, 1/16 inch
- Allen Wrench, 3/32 inch
- Allen Wrench, 5/32 inch
- Allen Wrench, 7/64 inch
- Allen Wrench, 5/64 inch
- ESD Wrist Strap
- Feeler Gauge, Flat, 0.010 inch
- Feeler Gauge, Flat, 0.011 inch
- Feeler Gauge, Flat, 0.012 inch
- Feeler Gauge, Flat, 0.013 inch
- Feeler Gauge, Flat, 0.040 inch
- Field Kit, Tester, P5 Power Supplies, Generic, (P/N 178083-001)
- Force Gauge, (Chatillon™ NY, Gauge-r, 0-20 lb., CAT 719-20)
- Force Gauge, “Fish Scale” type, 0-16 oz.
- Hardware Kit, P5XXX Mech, ZTP (P/N 178573-001)
- Hex bit, 3/16 in., torque screwdriver
- Hex bit, 3/32 in., torque screwdriver
- Hex bit, 5/32 in., torque screwdriver
- Hex bit, 5/64 in., torque screwdriver
- Lubricant, Bearing (Printronic P/N 101805-001)
- Nut Driver, 1/4 inch
- Nut Driver, 5/16 inch
- Nut Driver or Open End Wrench, 7/32 inch
- Open End Wrench, 5/16 inch
- Pliers, Grip Ring, External
- Screwdriver, flat tip
- Screwdriver, Phillips, #1
- Screwdriver, Phillips, #2
- Screwdriver, Torque, Utica TS-35
- Tie Wraps, 4 inch and 8 inch
- Torx® T-10, T-15 Driver

Plugging In The Printer

Power Cord Requirements

In compliance with international safety standards, a P7000 printer is equipped with a three-pronged electrical plug on the power cord. When this power cord is plugged into a correctly wired AC power outlet, the ground conductor ensures that the printer chassis is at ground (earth) electrical potential.

WARNING **Failure to properly ground the printer can result in electrical shock to the operator.**

Never use adapter plugs that have no grounding prong. Never remove the grounding prong from the power cable plug. If an extension cord is required, make sure it is a three-wire cable with a properly grounded plug.

Interface Cable Requirements

To comply with Electromagnetic Compatibility (EMC) regulatory requirements all interface cables must be of a minimal quality level, be the correct length, and be properly installed.

RS-232 port and parallel port cables must meet the following specifications:

- The cable design must be double shielded with a copper braid over an aluminum mylar foil and not just a conductive foil spiral wrapped around a drain wire.
- The shield must terminate coaxially (360 degrees) to a metal connector housing and not be terminated by just a simple wire lead.
- Cable length, including connectors, must be three meters or less.
- The cable connector anchor screws must be securely seated in the printer receptor hardware.

For reference purposes only, two Centronics parallel port cables that have been tested and found to comply with these requirements are a Belkin® P/N F2A046-10 and a Primelogic P/N PLU 2823224. Other electrically equivalent cables are acceptable.

Printronix Customer Support Center

The Printronix Customer Support Center offers technical support with:

- Installation
- Configuration and setup
- Loading supplies and operating the printer
- Specifications of the proper ribbons, forms, and paper
- Answers to post-sale service support questions

IMPORTANT

Please have the following information available before you call the Printronix Customer Support Center:

- Model number of the printer
- Serial number (located on the back of the printer)
- Installed options (i.e., interface and host type if applicable to the problem)
- Configuration printout (Press **PRT CONFIG** on the control panel, then press **ENTER**)
- Is the problem with a new installation or an existing printer?
- Description of the problem (be specific)
- Good and bad samples that clearly show the problem (faxing of these samples may be required)

Americas (714) 368-2686

Europe, Middle East, and Africa (31) 24 6489 311

Asia Pacific (65) 6548 4114

<http://www.printronix.com/support.aspx>

Printronix Supplies Department

Contact the Printronix Supplies Department for genuine Printronix supplies.

Americas (800) 733-1900

Europe, Middle East, and Africa (33) 1 46 25 1900

Asia Pacific (65) 6548 4116
or (65) 6548 4182

<http://www.printronix.com/supplies-parts.aspx>

Maintenance Training For Printronix Products

Upon request Printronix offers Product Maintenance Training Classes designed to enhance the knowledge of service personnel. Taught by experienced professional instructors, these classes include:

- Theory of operation
- Hands-on work with the products
- Diagnosis of equipment failures
- Preventive and corrective maintenance requirements and procedures

Customized classes designed to meet specific needs are also available upon request. Call Customer Training at (714) 368-2595 or visit the Printronix web page at **www.primtronix.com**.

2

Preventive Maintenance

Cleaning The Printer

The printer is designed to require very little maintenance. Aside from normal replenishment of paper and ribbons, the only preventive maintenance necessary is periodic cleaning. Periodic cleaning, especially of the ribbon guides and ribbon path, contributes to increased printer life and reliability, and helps sustain superior print quality.

Because operating conditions vary so widely, the user must determine how often to clean the printer. But, since there is no guarantee that the user *will* clean the printer regularly, you should clean the printer every time you are called to service it.

NOTE: A cabinet model printer is illustrated in this chapter, but the cleaning procedures presented here pertain to all models.

WARNING Always disconnect the AC power cord before cleaning the printer.

CAUTION Do not use abrasive cleaners, particularly on the window.
Do not drip water into the printer. Damage to the equipment will result.
Do not spray directly onto the printer when using spray solutions. Spray a cloth, then apply the dampened cloth to the printer.
Do not vacuum circuit boards.

Cleaning The Outside Surfaces

1. Set the printer power switch to O (Off).
2. Disconnect the AC power cord from the printer or the power source.
3. Remove the paper.
4. Remove the ribbon.
5. Dampen a clean, lint-free cloth with water and a mild detergent or window cleaning solution. Make the cloth damp, not wet. Wipe down the outside surfaces of the printer.
6. Dry the outside surfaces with a clean, lint-free cloth.
7. Open the printer cover.
8. Using a soft-bristled, non-metallic brush (such as a toothbrush), brush paper dust and ribbon lint off the tractors, shuttle cover assembly (air shroud), base casting, and ribbon guides. Vacuum up the residue. (Figure 5.)
9. Wipe the splined shaft with a soft cloth.

CAUTION To avoid corrosion damage, use only alcohol when cleaning printer mechanical elements and make sure the cleaning solution contains no water.

10. Using a cloth dampened (not wet) with alcohol, clean the ribbon guides.
11. Wipe the two lenses of the ribbon bar code sensor with a clean, lint-free cloth or cotton swab.
12. Vacuum up dust and residue from the lower cabinet.
13. Wipe the interior of the lower cabinet with a clean, lint-free cloth dampened with water and a mild detergent or window cleaning solution.
14. Dry the cabinet interior with a clean, lint-free cloth.
15. Clean the shuttle frame assembly, as described in the next section.

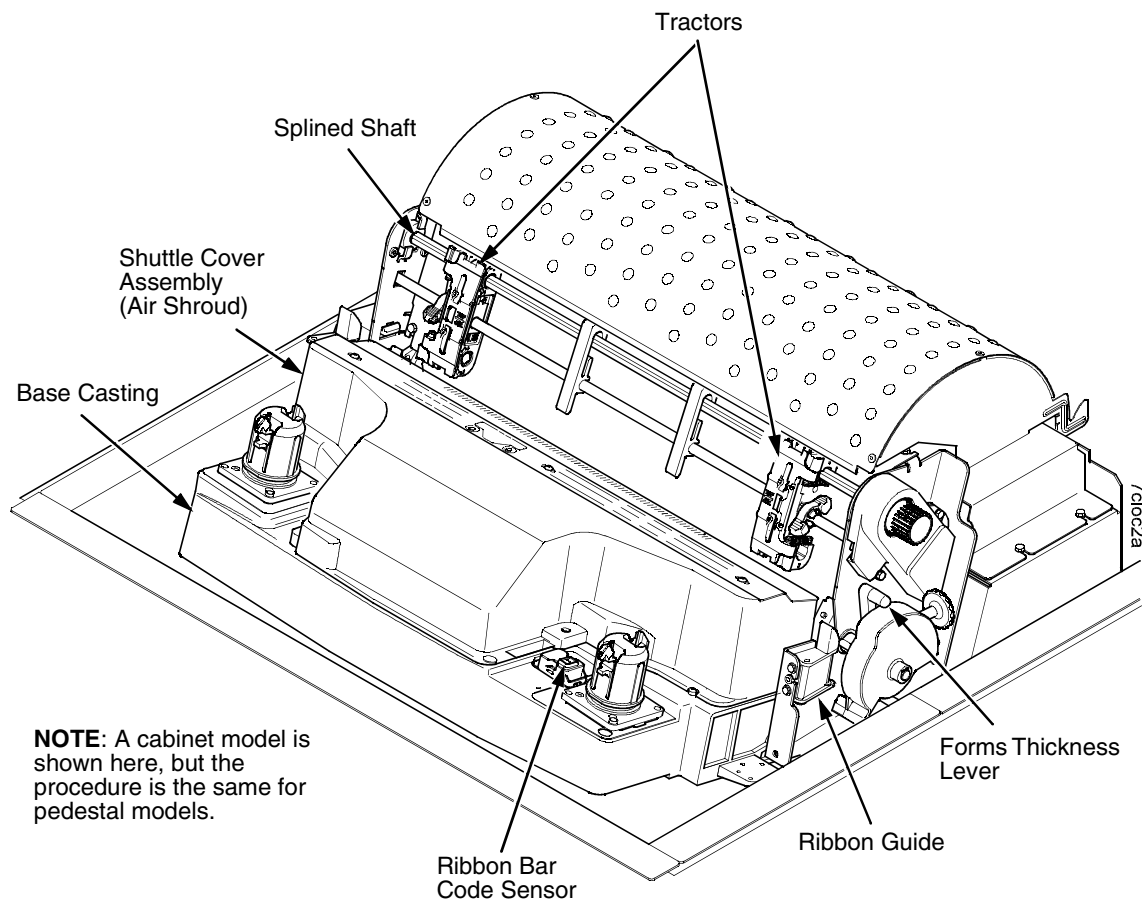


Figure 5. Where to clean inside the cabinet or top cover.

Cleaning The Shuttle Frame Assembly

1. Remove the shuttle cover assembly (page 210).
2. Remove the shuttle frame assembly (page 251).
3. Remove the paper ironer(s) (page 232).

WARNING Over time, the upper edge of the paper ironer can become sharp. To avoid cutting yourself, handle the paper ironer on the sides.

4. Moisten a clean, soft cloth with alcohol. Wipe the paper ironer(s) to remove lint, ink, and paper residue.
5. Install the paper ironer(s) (page 232).
6. Remove the hammer bank / ribbon mask cover assembly (page 209).

CAUTION The ribbon mask is easily bent. When handling and cleaning the ribbon mask be careful not to crease or kink it.

7. Moisten a clean, soft cloth with alcohol. Wipe the hammer bank cover and ribbon mask to remove lint, ink, and paper residue. Clean the holes in the cover strips.

CAUTION Do not use solvents or liquids to clean the hammer tips. Clean the hammer tips gently—too much pressure can chip them.

8. Using a stiff, non-metallic brush (such as a toothbrush), *gently* brush the hammer tips to remove lint and ink accumulations. (Figure 6.) Vacuum up any residue.

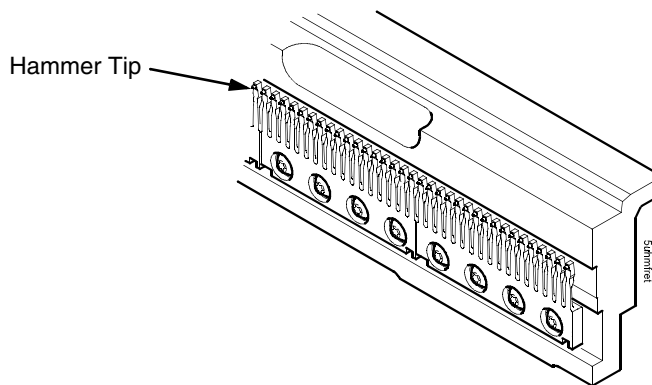


Figure 6. Cleaning the Hammer Tips

CAUTION The hammer bank contains a strong magnet. To prevent damage to the hammer tips, do not let the hammer bank cover assembly snap into place as the hammer bank magnet attracts it. Any impact of the cover against the hammer bank can break hammer tips.

9. Install the hammer bank / ribbon mask cover assembly (page 209).
10. Install the shuttle frame assembly (page 251).
11. Install the shuttle cover assembly (page 210).
12. Clean the card cage fan assembly, as described in the next section.

Cleaning The Card Cage Fan Assembly

1. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
2. Vacuum the card cage fan assembly and surrounding areas to remove paper particles, dust, and lint. (Figure 7.)
3. Install the ribbon.
4. Cabinet Models: Install the paper path (page 233)
Pedestal Models: Install the top cover assembly (page 211).
5. Return the printer to normal operation (page 161).

NOTE: A cabinet model is shown here, but the procedure is the same for pedestal models.

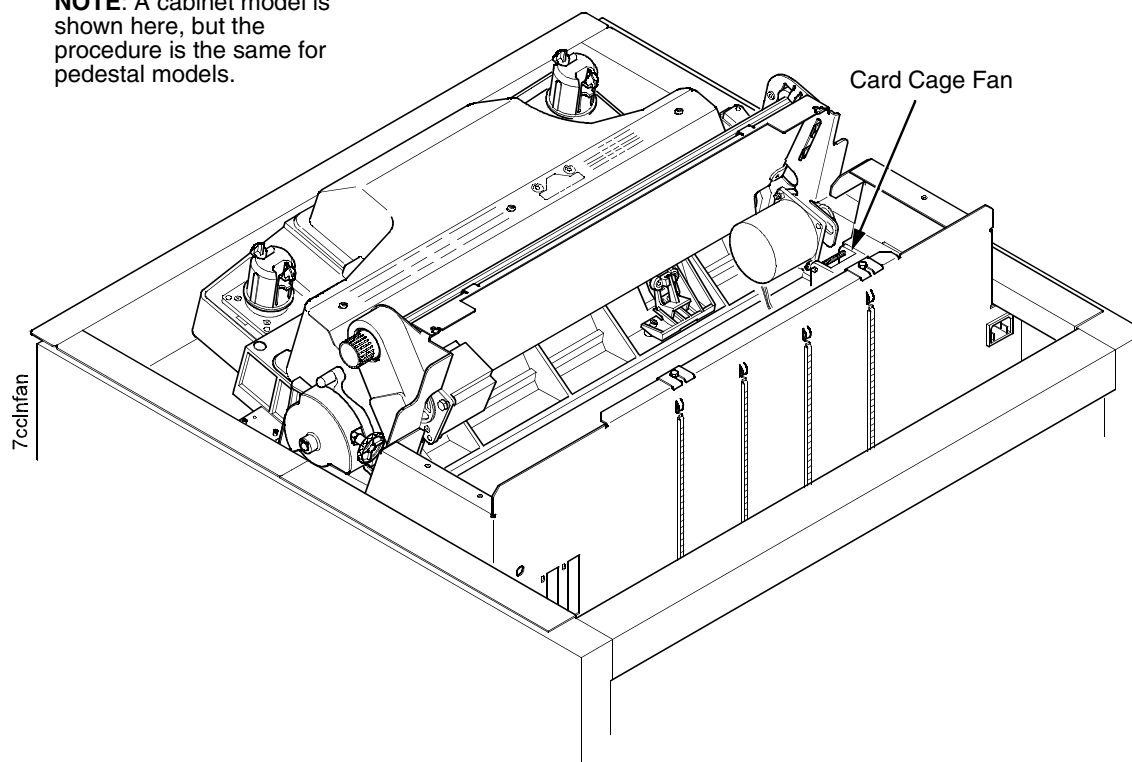


Figure 7. Cleaning the Card Cage Fan Assembly

3

Troubleshooting

Introduction

This chapter lists fault messages and general symptoms, and provides procedures for troubleshooting printer malfunctions.

NOTE: Because you must operate the printer to check its performance and sometimes you may have to reconfigure it, always have the *User's Manual* handy when you troubleshoot. This manual does not cover printer operation or configuration.

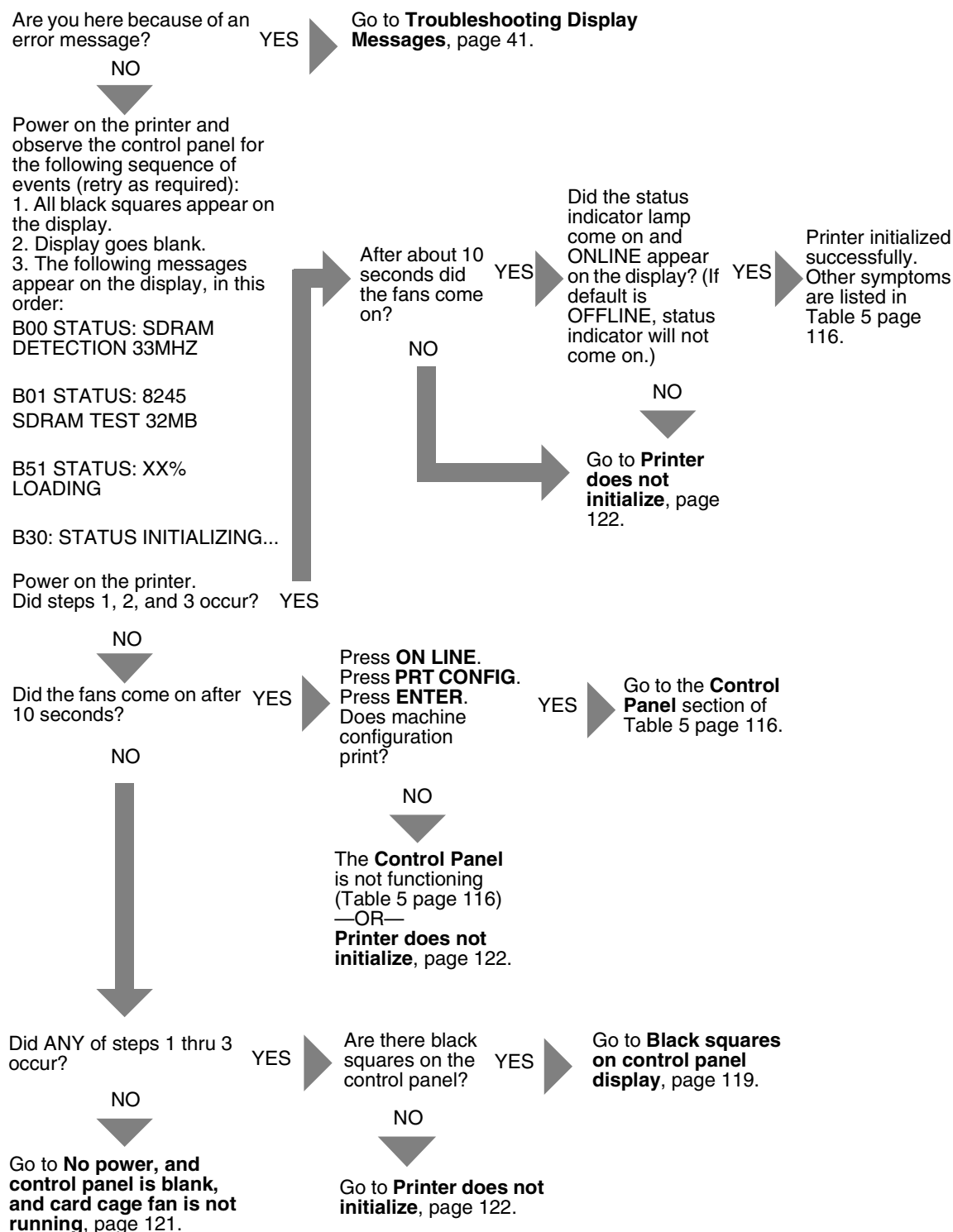
Troubleshooting Aids

Troubleshooting is faster and more effective if you understand the equipment and make use of all available tools.

This manual has a number of troubleshooting aids to help you isolate printer malfunctions:

- “Start Here” Logic Tree page 40
- Troubleshooting Display Messages page 41
- Message List page 42
- Troubleshooting Other Symptoms page 115
- General Symptom List page 116
- Communications Failures page 139
- Diagnostic Printer Tests page 141
- Boot Diagnostics Menu page 147
- Factory Menu page 150
- Exception Menu page 152
- Hex Code Printout page 153
- ASCII Character Set page 156
- Appendix A: Wire Data page 323

Start Here...



Troubleshooting Display Messages

WARNING Always disconnect the AC power cord from the printer before doing a maintenance procedure. Failure to do so could result in injury to you or damage to equipment. If you must apply power during maintenance, you will be instructed to do so in the maintenance procedure.

Three kinds of messages appear on the Liquid Crystal Display (LCD):

- Status messages
- Configuration menus with associated options
- Fault messages

Most fault messages are cleared from the LCD by correcting the fault condition then pressing the **CLEAR** key.

Some fault messages can only be cleared by shutting down and restarting the printer. These fault messages are indicated by an asterisk (*) after the message.

If printer logic circuits detect a fault condition, three things happen:

- The status indicator on the control panel flashes on and off.
- The audible alarm beeps if it is enabled. (Press **CLEAR** to silence the alarm.)
- The control panel LCD displays a fault message.

List Of Messages

Find the message in the **Message List** below and follow the suggested procedure. After correcting an error, press the **CLEAR** key to clear the message and place the printer in the offline state.

If an error is not cleared, the printer will try to print again but will display the error message until the error is cleared.

Table 4. Message List

Message	Explanation	Solution
06 HOST REQUEST	Status message: in the CT emulation, the host computer or printer controller requires attention.	Not a printer problem.
08 HOLD PRINT TIMEOUT	Status message: in the CT emulation, the printer was offline more than 10 minutes and the "Intervention Required" parameter is set to "Send to Host."	Press ON LINE .
8.5V POWER FAIL *	8.5 Volt Power Failed. Internal power failure.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board. 3. Power on the printer. If the message appears, replace the shuttle frame assembly.

Table 4. Message List

Message	Explanation	Solution
15 COMM CHECK	Communication Check: a message that appears in the CT emulation meaning the line is not active on a twinax interface.	<ol style="list-style-type: none"> 1. Power off the printer. Reseat the twinax host data cable connection and twinax I/O cable connection at the CT board. 2. Disconnect the twinax auto-termination cable from the printer. Test the cable for the resistances shown in Appendix A. If the resistances are incorrect, replace the twinax auto-termination cable. 3. Power on the printer. Send a print job to the printer. Verify that all other devices on the twinax line are working properly. (Refer to line problem determination procedures, as recommended by the host system.) 4. If the message is gone, the host has reestablished communication with the printer. If all other twinax devices work properly and the message still appears, replace the CT board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
15V CTL FAIL*	Controller Voltage Failure.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job again. If the message appears, remove the hammer bank logic cable, inspect it for damage, and test it for continuity. (See Appendix A.) Replace the hammer bank logic cable if it is damaged or fails the continuity test. 2. Cycle Power. Run the print job again. If the message appears, download the emulation software again (page 177). 3. Cycle power. Run the print job again. If the message appears, replace the flash memory. 4. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board. 5. Check the resistance of connectors P106/LRIB M and P107/RRIB M. (Refer to the Main Wire Harness Test Tables in Appendix A.) If ribbon motor resistance is not correct, replace the motor and/or the intermediate cable, if installed. 6. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 7. Power on the printer. If the message appears, replace the shuttle frame assembly.
22 INVALID ADDR	Invalid Address: poll time-out on the twinax interface indicating the unit address is not recognized by printer.	Have the system administrator make sure the printer address is correct.

Table 4. Message List

Message	Explanation	Solution
23.5V CTL FAIL*	23.5 Volt Controller Failed: a voltage failure on the controller board.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the flash memory. 3. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board. 4. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 5. Power on the printer. If the message appears, replace the shuttle frame assembly.
31 PAPER OUT TIMEOUT	In the CT emulation with a coax interface, a time-out message is sent to the host if paper is not loaded within 10 minutes after CLEAR was pressed to clear a paper out fault.	<ol style="list-style-type: none"> 1. Load paper. Run a print test. If the message appears, replace the paper detector switch assembly. 2. Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
32 PAPER JAM TIMEOUT	In the CT emulation with a coax interface, a time-out message is sent to the host if paper motion has not occurred for 10 minutes after CLEAR was pressed to clear a paper jam fault.	<ol style="list-style-type: none"> 1. Clear the paper jam. Press CLEAR. 2. Press PAPER ADVANCE several times and check that forms feed without erratic motion, noise, or pin-hole damage. If forms do not feed, go to Paper feeds poorly, page 133. If forms feed, go to step 3. 3. Press VIEW once and check that forms move up. Make sure the forms thickness lever is not set too tightly. 4. Press VIEW again and check that the forms thickness lever rotates and the paper moves down. If the forms thickness lever does not rotate and/or the paper does not move down, refer to Reverse paper feed: platen does not open, page 135. 5. Check the paper tension between the tractors. Adjust the right tractor so that it does not pull paper too tightly or leave it too loose. The right tractor should hold the paper under slight tension. 6. Check the dynamic paper tension. 7. Inspect the ribbon mask for bends or deformation that block the paper path or prevent paper from exiting the pedestal top cover. Replace a damaged hammer bank cover assembly. 8. Check the condition and tension of the platen open belt. Adjust the platen open belt. Replace the belt if it is damaged.

Table 4. Message List

Message	Explanation	Solution
32 PAPER JAM TIMEOUT (continued)		<p>9. Inspect the tractors and tractor door springs for damage, excessive wear, and equal door closing tension. If either tractor is worn, damaged, or exhibits uneven door closing tension, replace both tractor assemblies.</p> <p>10. Check the condition and tension of the paper feed belt. Adjust the paper feed belt. Replace the belt if it is damaged.</p> <p>11. Check the platen gap. Adjust the platen gap if necessary.</p> <p>12. Clean the paper motion detector with a cotton swab and alcohol. At the control panel, set the paper motion detector (PMD) fault setting to DISABLE. Load paper. Run a print test and observe how the paper feeds. If the message appears, replace the controller board. Record the message and return it with the defective board. If the message does not appear, replace the paper detector switch assembly and set the paper motion detector (PMD) to ENABLE.</p>

Table 4. Message List

Message	Explanation	Solution
33 PLATEN OPEN TIMEOUT	In the CT emulation with a coax interface, the forms thickness lever has been open for at least one minute.	<ol style="list-style-type: none">1. Load paper. Close the forms thickness lever. Press CLEAR.2. Run a print test. If a platen open or close platen message appears, power off the printer. Remove the paper path or pedestal top cover. Disconnect connector P107 from the controller board. Check continuity of the platen interlock switch cable from P107 to the switch. Replace the platen interlock switch assembly if it fails continuity test.3. Run a print test. If a platen open or close platen message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
34 RIBBON STALL TIMEOUT	In the CT emulation with a coax interface, the ribbon has not moved for 10 minutes after CLEAR was pressed to clear the ribbon drive fault.	<ol style="list-style-type: none"> 1. Set the forms thickness lever to match the thickness of the paper being used, but not too tightly. 2. Inspect the ribbon guides for ink buildup, which can inhibit ribbon movement. Clean the printer. 3. Inspect the hammer bank cover/ ribbon mask for bending or damage. Replace if bent or damaged. 4. Check the platen gap: if too small, it can inhibit ribbon movement. Adjust the platen gap. 5. Power off the printer. Remove the paper path or pedestal top cover. Disconnect P106 and P107 from the controller board. Check the resistance of LRIB M in P106 and RRIB M in P107. (Refer to the Main Wire Harness Test Tables in Appendix A.) If ribbon motor resistance is not correct, replace the motor. If the resistance is correct, disconnect the ribbon motor cables from the motors and check continuity. Replace a cable if it fails the continuity test. 6. Power on the printer. Run a diagnostic print test. If the RIBBON STALL message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
48V CIRCUIT* See User Manual	Either the power supply is not generating a proper 48 Volts or the controller board is not detecting a 48 Volt output from the power supply board.	<ol style="list-style-type: none"> 1. Make sure the power supply board is correctly connected to the controller board. 2. Power on the printer. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
48V PWR FAIL*	48 Volt Power Failed: an internal power failure.	<ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Check that power supply connector P101 is fully seated in connector J101 on the controller board. 2. If the printer has the CT board, make sure it is correctly seated in the controller board. 3. Power on the printer. If the message appears, replace the hammer bank logic cable assembly (P108) and the power cable assembly (P105). (Refer to Appendix A.) 4. Power on the printer. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 5. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board. 6. Power on the printer. If the message appears, replace shuttle frame assembly.

Table 4. Message List

Message	Explanation	Solution
426 BC READ ERR See User Manual	Bar code read error: The printer does not detect the presence of the ribbon bar code sensor.	<ol style="list-style-type: none"> 1. Power down the printer. Remove the ribbon and wipe the two lenses of the ribbon bar code sensor with a lint-free cloth or cotton swab. 2. Install the ribbon and power on the printer. If the message appears again, replace the ribbon. 3. Power on the printer. If the message appears again, power down the printer and remove the paper path or top cover to gain access to the card cage. Make sure the cable from the ribbon bar code sensor to connector J122 on the controller board is undamaged and has a good connection to J122. 4. Power on the printer. If the message appears again, power down the printer and replace the ribbon bar code sensor. 5. Power on the printer. If the message appears again, power down the printer and replace the controller board. Record the message and return it with the defective board.
733 DP FIFO Busy*	There is a timing problem in the Engine Controller firmware.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the flash memory. 3. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
ACCESS NULL PTR*	Access Null Pointer: The processor tried to access a pointer that contains nothing (null).	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
ACTIVATE LOST	The printer detects a twinax protocol communication error and reports the error.	<ol style="list-style-type: none"> 1. Power off the printer. Disconnect the AC power cord from the printer. Reseat the twinax host data cable connection and the twinax I/O cable connection at the CT board. 2. Disconnect the twinax auto-termination cable from the printer. Test the cable for the resistances shown in the Main Wire Harness Test Tables in Appendix A. If resistances are not correct, replace the twinax auto-termination cable. 3. Connect the power cord to the printer. Power on the printer. Send a print job to the printer. If the message appears, replace the twinax cable. 4. Send a print job to the printer. If the message appears, go to Communications Failures, page 139.
A TO D OVERRUN*	Analog to Digital Overrun. The analog-to-digital converter overflowed.	Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
B00 STATUS: SDRAM DETECTION 166MHZ	Status message: the printer has begun its boot-up routines and is checking for the presence of SDRAM.	No action required.
B01 STATUS: 8245 SDRAM TEST 32MB	Status message: printer boot-up routines are testing SDRAM.	No action required.

Table 4. Message List

Message	Explanation	Solution
B02 STATUS: SDRAM PASSED	Status message informing the operator that the printer finished testing SDRAM.	No action required.
B10 ERROR: NO DRAM DETECTED*	Boot-up routines did not detect the presence of the SDRAM DIMM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, power down and check that there is an SDRAM DIMM installed on the controller board. If not, install the SDRAM. If so, reseal the SDRAM DIMM. 2. Power up the printer. If the message appears, replace the SDRAM DIMM. 3. Power up the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B11 ERROR: RAM TEST FAILED*	SDRAM failed the boot initialization test.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power up the printer. If the message appears, replace the SDRAM DIMM. 3. Power up the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B12 ERROR: PROGRAM MISSING*	The printer does not see a program in flash memory.	There is no program in printer memory. Download an emulation.
B13 ERROR: NOT COMPATIBLE*	The printer is not compatible with the downloaded program.	Load the correct emulation software option(s) for this printer.
B19 ERROR: DC RETURNED*	This message indicates an incorrectly assembled and tested machine.	Cycle power. If the message appears again contact the printer manufacturer and report this message.

Table 4. Message List

Message	Explanation	Solution
B20 STATUS: 00% DOWNLOAD MODE	Status message informing the operator that software is being downloaded through the printer's parallel port using the three-key download activation (page 180). The percentage indicates the approximate amount loaded into the printer.	No action required.
B21 STATUS: PRINTER RESET	Status message informing the operator that the printer is undergoing a system reset.	No action required.
B22 ERROR: DECOMPRESS SIZE*	Flash memory has not passed boot initialization tests.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the flash SIMM. 2. Power on the printer. If the message appears, replace the flash SIMM. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B23 ERROR: DECOMPRESS CKSUM*	Flash memory has not passed boot initialization tests.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the flash SIMM. 2. Power on the printer. If the message appears, replace the flash SIMM. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B30 STATUS: INITIALIZING...	Status message: the printer is running its initialization routines after startup and successful memory tests.	No action required.

Table 4. Message List

Message	Explanation	Solution
B35 STATUS: WAITING FOR EC STATUS	Status message: the DC on the controller board is waiting for communication with the EC. If this message does not clear within a few seconds there is an electrical or electronic problem on the controller board.	Cycle power. If the message appears again, replace the controller board. Record the message and return it with the defective board.
B40 ERROR: SDRAM EEPROM CKSUM BAD*	Flash memory has not passed boot initialization tests.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the flash SIMM. 2. Power on the printer. If the message appears, replace the flash SIMM. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B41 ERROR: DIMM MEMORY NOT SDRAM*	The DRAM DIMM installed on the controller board is not Synchronous DRAM (SDRAM).	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B42 ERROR: SDRAM ROWS NOT ALLOWED*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
B43 ERROR: SDRAM TOO MANY BANKS*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B44 ERROR: SDRAM NOT 64 BITS WIDE*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B45 ERROR: SDRAM IS WRONG VOLTAGE*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
B46 ERROR: SDRAM HAS MIXED SIZES*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B47 ERROR: SDRAM LARGER THAN 256M*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B49 ERROR: SDRAM # LOGICAL BANKS*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
B50 ERROR: SDRAM LOGIC COMB BANKS*	Printer boot initialization tests detect incorrect SDRAM.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B51 STATUS: XX% LOADING	Status message: printer boot-up routines are loading printer system software into flash memory and SDRAM.	No action required.
B52 ERROR: 12C DID NOT COMPLETE	There is a problem on the 12C bus which allows the SDRAM DIMM to communicate with the GPIO or CT interface.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, replace the GPIO, if installed. 2. Power on the printer. If the message appears, replace the CT board, if installed. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
B53 ERROR: 12C NO ARBITRATION	There is a problem on the 12C bus which allows the SDRAM DIMM to communicate with the GPIO or CT interface.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, replace the GPIO, if installed. 2. Power on the printer. If the message appears, replace the CT board, if installed. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
B54 ERROR: SDA LINE STUCK LOW	The SDRAM or a PCI card is shorting out the serial data bus on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears again, reseal the SDRAM DIMM. 2. Power on the printer. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
BARCODE DAMAGED Reverse Ribbon	The sensor detects a bar code, but it is not complete. This fault condition is entered into the Error Log (not the Ribbon Log).	<ol style="list-style-type: none"> 1. If the bar code label appears damaged, reverse the ribbon spools on the ribbon hubs. If the bar code label appears undamaged, clean the sensor lens with a damp cloth or swab. 2. Make sure the forms thickness lever is not too tight, which can restrict ribbon motion. Loosen it if necessary. 3. Press Clear and run the print job again. If the message reappears, replace the ribbon. 4. Press Clear and run the print job again. If the message appears, replace the sensor.
BARCODE MISSING Install New RBN	The ribbon sensor does not detect the presence of the ribbon spool, indicating a missing label or a damaged sensor. (This fault condition is entered into the Ribbon Log as "Ribbon Not Recognized.")	<ol style="list-style-type: none"> 1. Verify that the bar code labels and ribbon sensor are present and undamaged. If the labels are missing, replace the ribbon. If the labels are present and undamaged, clean the sensor lens with a damp cloth or swab. 2. Press Clear and run the print job again. If the message reappears, replace the ribbon. 3. Press Clear and run the print job again. If the message appears, replace the sensor.

Table 4. Message List

Message	Explanation	Solution
BC SENSOR ERR See User Manual	Bar code read error: The printer does not detect the presence of the ribbon bar code sensor.	<ol style="list-style-type: none"> 1. Power down the printer. Remove the ribbon and wipe the two lenses of the ribbon bar code sensor with a lint-free cloth or cotton swab. 2. Install the ribbon and power on the printer. If the message appears again, replace the ribbon. 3. Power on the printer. If the message appears again, power down the printer and remove the paper path or top cover to gain access to the card cage. Make sure the cable from the ribbon bar code sensor to connector J122 on the controller board is undamaged and has a good connection to J122. 4. Power on the printer. If the message appears again, power down the printer and replace the ribbon bar code sensor. 5. Power on the printer. If the message appears again, power down the printer and replace the controller board. Record the message and return it with the defective board.
BUFFER OVERRUN	The print buffer has overflowed on a serial interface. The printed output may contain random * (asterisk) characters. Make a configuration printout.	<ol style="list-style-type: none"> 1. Verify that the printer matches the host serial interface configuration settings for Data Protocol, Baud Rate, Data Bits, Stop Bits, Parity, Data Terminal Ready, and Request to Send. Set printer serial interface parameters to match those of the host. 2. Send a print job to the printer. If the message appears, go to Communications Failures, page 139.

Table 4. Message List

Message	Explanation	Solution
CLEAR PAPER JAM	Paper jam.	<ol style="list-style-type: none"> 1. Inspect the paper path for jams. Clear jams. Load paper. 2. Press PAPER ADVANCE several times and check that forms feed without erratic motion, noise, or pin-hole damage. If forms do not feed, go to Paper feeds poorly, page 133. If forms feed, go to step 3. 3. Press VIEW once and check that forms move up. Make sure the forms thickness lever is not set too tightly. 4. Press VIEW again and check that the forms thickness lever rotates and the paper moves down. If the forms thickness lever does not rotate and/or the paper does not move down, refer to Reverse paper feed: platen does not open, page 135. 5. Check the paper tension between the tractors. Adjust the right tractor so that it does not pull paper too tightly or leave it too loose. The right tractor should hold the paper under “slight” tension. 6. Check the dynamic paper tension. 7. Inspect the ribbon mask for bends or deformation. Replace if damaged. 8. Check and adjust the platen open belt. Replace the belt if it is damaged. 9. Inspect the tractors and tractor door springs for damage, excessive wear, and equal door closing tension. If either tractor is worn, damaged, or exhibits uneven door closing tension, replace both tractor assemblies

Table 4. Message List

Message	Explanation	Solution
CLEAR PAPER JAM (continued)		<p>10. Check the condition and tension of the paper feed belt. Adjust the paper feed belt. Replace the belt if it is damaged.</p> <p>11. Check and adjust the platen gap.</p> <p>12. Clean the paper motion detector with a cotton swab and alcohol. At the control panel, set the paper motion detector (PMD) fault setting to DISABLE. Load paper. Run a print test and observe how the paper feeds. If the message appears, replace the controller board. Record the message and return it with the defective board. If the message does not appear, replace the paper detector switch assembly and set the paper motion detector (PMD) to ENABLE.</p>

Table 4. Message List

Message	Explanation	Solution
CLOSE PLATEN	The forms thickness lever is open.	<ol style="list-style-type: none"> 1. Load paper. Close the forms thickness lever. 2. Power off the printer. Remove the paper path or pedestal top cover. Disconnect connector P107 from the controller board. Check continuity of the platen interlock switch from P107/PLO to the switch. Replace the switch assembly if it fails the continuity test. (Refer to Appendix A, Switch Assembly, Platen Interlock.) 3. With the forms thickness lever closed (position A), hold a 0.011 inch (0.028 cm) feeler gauge between the switch and the body of the forms thickness lever, gently press down on the switch, and tighten the two screws. 4. Check and adjust the platen open belt. Replace the belt if it is damaged. 5. Disconnect connector P106 from the controller board. Check the resistance of connector P106/ PLAT M. (See the Main Wire Harness Test Tables in Appendix A.) Replace the platen open motor if it fails the resistance test. 6. Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
CTL VOLT FAIL *	Controller Voltage Failure. 15 V failure on the controller board.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the flash memory. 3. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board. 4. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 5. Power on the printer. If the message appears, replace the shuttle frame assembly.
D50 Status %XX Clearing Flash	Status message: The printer is clearing its flash memory, where %XX represents the percentage completed.	No action required.
D51 Status %XX Programming...	Status message: The printer is loading firmware, where %XX represents the percentage completed.	No action required.
D55 Status: Send Program to EC	Status message: The printer is loading the engine controller program into the engine controller (EC).	No action required.
DIAGNOSTIC PASSED	Status message: the printer passed its memory and hardware initialization tests.	No action required.
DO NOT POWER OFF	Status message: the printer is performing an operation that must be completed before you can cycle power.	No action required, but do not power the printer off until the operation is completed.

Table 4. Message List

Message	Explanation	Solution
DP FIFO Busy*	There is a timing problem in the Engine Controller firmware.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the flash memory. 3. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
DRVR CIR BAD*	Driver Circuit Bad: the hammer coil count test failed.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, press CLEAR. 2. Power off the printer. Remove the shuttle cover. At the shuttle frame assembly, disconnect the hammer bank logic and power cables. Power on the printer. If "HB NOT INSTALLED" appears on the LCD, replace the shuttle frame assembly. If "HB NOT INSTALLED" does not appear on the LCD, replace the controller board.
E00 EXE @ ADDR0 See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E01A TYPE 0x40 See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E01B TYPE 0x60 See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E02 MACHINE CHK See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03A DSI HASH L See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03B DSI HASH S See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E03C DSI BAT PL See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03D DSI BAT PS See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03E DSI CXIWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03F DSI CXOWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E03G DSI ECXIWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E03H DSI ECXOWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E04A ISI NO TRA See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E04B ISI DIRECT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E04C ISI PROTEC See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E06 NOT ALIGNED See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E07 ILLEGAL INS See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E08 FLOATINGPNT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E12 SYSTEM CALL See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E13 TRACE INT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E16 ITRANS MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E17 DLOAD MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E18 DSTORE MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E19 BREAKPOINT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E20 SYS MANAGE See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E30 DEBUGGER See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E31A EVENT 0 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31B EVENT 1 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31C EVENT 2 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31D EVENT 3 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E31E EVENT 4 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31F EVENT 5 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31G EVENT 6 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E31H EVENT 7 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E32A CND 0 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32B CND 1 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32C CND 2 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32D CND 3 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E32E CND 4 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32F CND 5 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32G CND 6 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E32H CND 7 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.

Table 4. Message List

Message	Explanation	Solution
E33 WRITE BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E34 TRACE CMPLT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E99 UNKNOWN INT See User Manual	An illegal or unsupported instruction was attempted in the application program.	<ol style="list-style-type: none"> 1. Cycle Power. Run the print job. If the message appears again, access the exception menu and record the displayed messages (page 152). 2. Power off the printer. Provide this fault message and the messages you recorded from the exception menu to your next higher support facility.
E Net Test Unavailable	The ethernet PCBA did not initialize correctly.	Cycle power. Wait for "E Net Ready" to display, then retry operation. If it still fails, replace the ethernet PCBA.
ERROR OCCURRED FLUSHING QUEUES *	An interim message that displays while the printer discards host data it cannot use because a fault condition exists. While this message displays, the asterisk (*) rotates.	Wait. When the asterisk (*) stops rotating, a different fault message will appear: troubleshoot the final message.

Table 4. Message List

Message	Explanation	Solution
ERROR: CPLD NOT PROGRAMMED	The Complex Programmable Logic Device (CPLD) on the controller board is not programmed. The EC cannot read the version bits in the CPLD which tell the EC which configuration version is installed.	Cycle power. If the message appears again, replace the controller board. Record the message and return it with the defective board.
ERROR: DC PROGRAM NOT VALID	The printer cannot find the data controller program or the validation checksum is corrupt.	<ol style="list-style-type: none"> 1. Download the program again (page 177). 2. If the message appears, replace the flash memory SIMM.
ERROR: DRAM AT ADDRESS XXXXXXXX	The printer found a defective memory location.	<ol style="list-style-type: none"> 1. Replace the DRAM DIMM. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
ERROR: EC PROGRAM NOT VALID	The printer cannot find the engine controller program or the validation checksum is corrupt.	<ol style="list-style-type: none"> 1. Download the program again (page 177). If the message occurs again, replace all flash memory SIMMs. 2. Power on the printer. Download the emulation. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
ERROR: EC STOPPED AT STATE XXXX	Where XXXX is a number from 0000 to 0010. The Engine Controller has stopped and is in the state identified by the number displayed. If the EC stops at state 0000 at power-up, replace the controller board. Record the message and return it with the defective board.	<ol style="list-style-type: none"> 1. Power off the printer. Remove the flash memory SIMM and SDRAM DIMM. Inspect the SIMM and DIMM sockets on the controller board. If any socket pins are bent or damaged, replace the controller board. 2. Install the flash SIMM and SDRAM DIMM, making sure they are fully and correctly seated. Power on the printer. Download the emulation (page 177). If the message appears, replace the flash SIMM. 3. Power on the printer. Download the emulation. If the message appears, replace the SDRAM DIMM. 4. Power on the printer. Download the emulation. If the message appears, replace the controller board. Record the message and return it with the defective board.
ERROR: FLASH DID NOT PROGRAM	The printer encountered an error trying to program flash memory.	Download the program again (page 177). If the message occurs again, replace the flash memory.
ERROR: FLASH NOT DETECTED	The printer could not find flash memory.	Check flash memory on the controller board. If present, reseal the flash SIMM; if missing, install flash SIMM.

Table 4. Message List

Message	Explanation	Solution
ERROR: LOCKED SN=nnnnnnnnnnnnnnnn	Where nnnnnnnnnnnnnnnn is the serial number of the printer's security key. The SPX gets "locked" to the printer as the first part of the security key reprogramming process. The "lock" consists of copying the printer's security key serial number into the flash memory of the SPX, which prevents the SPX from being used on other printers. It also enables the customer to retry upgrading the same printer if the SPX was removed before reprogramming is complete.	<ol style="list-style-type: none"> 1. Remove the SPX from the Debug Port. 2. Cycle printer power.
ERROR: NO DRAM DETECTED	The printer could not find any DRAM.	<ol style="list-style-type: none"> 1. Check SDRAM on the controller board. If present, reseal SDRAM DIMM; if missing, install SDRAM. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
ERROR: NVRAM FAILURE	The non-volatile SRAM on the controller board has failed.	Replace the controller board. (Do NOT attempt to replace NVRAM.) Record the message and return it with the controller board.
ERROR: PROGRAM NEEDS MORE DRAM	The printer requires more DRAM in order to run the downloaded program.	Add DRAM or use a smaller emulation program.
ERROR: PROGRAM NEEDS MORE FLASH	The printer requires more flash memory in order to run the downloaded program.	Add flash memory or use a smaller emulation program.
ERROR: PROGRAM NOT COMPATIBLE	The printer is not compatible with the downloaded program.	Use the correct emulation software option(s) for this model printer.
ERROR: PROGRAM NOT VALID	The printer does not see a program in flash memory.	There is no program in printer memory. Download the emulation.

Table 4. Message List

Message	Explanation	Solution
ERROR: SECURITY KEY NOT DETECTED	The security key is not present or has failed.	<ol style="list-style-type: none"> 1. Check the security key at connector J9 on the controller board. If the key is absent, install the correct key. If a security key is present, replace it. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
ERROR: SHORT AT ADDRESS XXXX	Hardware failure in SDRAM or controller circuitry.	<ol style="list-style-type: none"> 1. Download the program again. 2. If the message occurs again, replace the controller board. Record the message and return it with the defective board.
ERROR: WRITING TO FLASH	Hardware or software fault in flash memory.	<ol style="list-style-type: none"> 1. Replace flash memory. 2. If message occurs with new memory, replace the controller board. Record the message and return it with the defective board.
ERROR: WRONG CHECKSUM	The printer received the complete program but the checksum did not match. The data may have been corrupted during download.	<ol style="list-style-type: none"> 1. Power off the printer. Download the program again from the beginning. If the messages appears, replace the DRAM. 2. Download the program using a new software diskette. If the messages appears, replace the flash memory. 3. Download the program. If the messages appears, replace the controller board. Record the message and return it with the defective board.
ERROR: WRONG OEM OR PRINTER TYPE	The SPX inserted in the debug port is not intended for this model printer or this OEM.	<ol style="list-style-type: none"> 1. Remove the SPX from the Debug Port. 2. Cycle printer power.
Ethernet Adapter Being Initialized	Status message indicating that the ethernet interface is running its boot-up procedure.	No action required.

Table 4. Message List

Message	Explanation	Solution
ETHERNET DETECTED	Status message indicating that the PrintNet ethernet interface has established communication.	No action required.
ETHERNET INITIALIZING	Status message that indicates that the internal Network Interface Card is processing the boot procedure. (May occur with older versions of microcode.)	No action required.
EXCESS RIBBON WEAR Install New RBN	Status message that displays when ribbon reaches the end of its service life, whether the Integrated Print Management System is enabled or not.	Install a new ribbon.

Table 4. Message List

Message	Explanation	Solution
EXHAUST FAN FLT	<p>Exhaust Fan Fault. Sensors cannot detect current in the fan circuit.</p> <p>NOTE: For cabinet models only.</p>	<ol style="list-style-type: none">1. Cycle power. If the message appears, press CLEAR.2. Check that the exhaust fan is connected to exhaust fan cable connector J307. Connect the fan cable connector.3. Power off the printer. Remove the paper path. Disconnect connector P107 from the controller board. Test connector P107/EHF for shorts or opens. (See the Main Wire Harness Test Tables in Appendix A.) Replace components that fail test.4. Make sure connector P107/EHF has a good connection at J107 on the controller board.5. Inspect for obstructions of airways and vents. Check for items beneath the printer blocking cabinet vents. Remove obstructions. Make sure cabinet exhaust fan vents are not blocked.6. Power on the printer. Check for fan operation. If the message appears or the fan does not work, replace the exhaust fan.7. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
FIRMWARE ERROR	Application software tried to perform an illegal printer function or damaged memory is detected on the controller board. If the message appears at power-up, replace the controller board. Record the message and return it with the defective board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the flash memory. 3. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board. 4. Power on the printer. Run the print job again. If the message still appears, there is an application software error. Use your local support procedure to request assistance.
FM HEADER ERROR	Frame Header Error. Application software has violated header parameters.	Not a printer problem. The system administrator should correct applications data or configuration.
FRAMING ERROR	The printed output may contain random ! (exclamation point) characters.	<ol style="list-style-type: none"> 1. Make a configuration printout. Set printer serial interface parameters to match host configuration settings for Data Protocol, Baud Rate, Data Bits, Stop Bits, Parity, Data Terminal Ready, and Request to Send. 2. Send a print job to the printer. If the message appears, go to Communications Failures, page 139.
GRF CHK ERROR PRESS STOP	Graphic Check Error: in the CT emulation over a twinax interface, the printer received a non-printable character.	Press CLEAR then press ON LINE .

Table 4. Message List

Message	Explanation	Solution
H00: PCI SLOT ? See User Manual	The controller board is not communicating with a PCI card. This could indicate a bad PCI card, poor connection, or problem in the PCI bus.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, power down and reseal the PCI card. 2. Power on the printer. If the message appears, move the PCI card to the other PCI slot. 3. Power on the printer. If the message appears, replace the PCI card. 4. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
H01: PCI J12 See User Manual	The controller board is not communicating with the PCI card in PCI slot J12. This could indicate a bad PCI card, poor connection, or problem in the PCI bus.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, power down and reseal the PCI card. 2. Power on the printer. If the message appears, move the PCI card to PCI slot J13. 3. Power on the printer. If the message appears, replace the PCI card. 4. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
H02: PCI J13 See User Manual	The controller board is not communicating with the PCI card in PCI slot J13. This could indicate a bad PCI card, poor connection, or problem in the PCI bus.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, power down and reseal the PCI card. 2. Power on the printer. If the message appears, move the PCI card to PCI slot J12. 3. Power on the printer. If the message appears, replace the PCI card. 4. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
<Online, etc. ... > Half Speed Mode	This is a status message, not an operational state. The controller samples the operating temperature of key components of the print mechanism. When higher than normal temperatures are sensed, the print speed is automatically reduced by 50% and the message sent the LCD. When the components cool down, the print speed returns to 100% and the message clears. Periodic appearance of this message is normal for extremely dense print jobs, such as "All Black" plot. If this message often appears, the printer may be operating in a severe environment. A severe environment has an ambient temperature at or above 40° Celsius (104° Fahrenheit) or is dirty enough to clog air vents. The printer must never be run at ambient temperatures greater than 40° Celsius (104° Fahrenheit). Inspect the printer environment for severity, and if the printer is located in such an environment relocate it to a cooler, cleaner area.	<ol style="list-style-type: none"> 1. Advise the user to move the printer to cooler, cleaner location. 2. Check the kinds of print jobs the user is running: look for very dense graphics and layouts. Advise the user to run jobs in smaller batches. 3. Power off the printer. Remove the paper path or pedestal top cover. Check all fan cable connections. 4. Power on the printer. Verify that all fans operate. Replace any fan that does not operate. 5. Inspect vents and fan airways for obstructions. Look underneath cabinet models for items blocking the cabinet exhaust vents. Remove any obstructions from vents and airways. 6. Install the paper path or pedestal top cover. Load paper. Run the "All E's" print test for 5 to 10 minutes. If the message appears, replace the shuttle frame assembly. 7. Run the "All E's" print test for 5 to 10 minutes. If the message appears, replace the controller board. Record the message and return it with the defective board. 8. If the printer is a P7X08H, P7000HD, or P7220, set the coil temperature (page 185).
HAM. COIL OPEN*	Hammer Coil Open. Electrical malfunction of one or more hammer coils.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, replace the shuttle frame assembly. 2. Power on the printer. Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
HAMMER COIL BAD #, #, #, #, ... etc.	Hammer coil(s) number #, #, etc. failed the current test at power-up. Check that the hammer bank cables are connected.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, replace the shuttle frame assembly. Record the message and return it with the defective assembly. 2. Power on the printer. If the message appears, replace controller board. Record the message and return it with the defective assembly.
HAMMER SHORT * See User Manual	Electrical malfunction of one or more hammer coils.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, replace the shuttle frame assembly. 2. Power on the printer. Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board.
HB NOT INSTALLED*	Hammer Bank Not Installed. Self-test routines do not detect hammer coils at printer start-up. Power off the printer. Verify that the shuttle frame assembly is installed.	<ol style="list-style-type: none"> 1. Install the shuttle frame assembly. 2. Remove the paper path or pedestal top cover. Verify that the hammer bank logic cable is connected to connector J108 on the controller board and to the shuttle frame assembly. 3. Power on the printer. If the message appears, replace the hammer bank logic cable. 4. Power on the printer. If the message appears, replace the shuttle frame assembly. 5. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
HMR BANK FAN FLT	Hammer Bank Fan Fault. Sensors cannot detect current in the fan circuit.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, press CLEAR. If the message does not clear, go to step 2. 2. Power off the printer. Remove the paper path or pedestal top cover. Disconnect connector P107 from the controller board. Test connector P107/HBF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Appendix A.) Replace components that fail test. 3. Make sure P107/HBF has a good connection at J107 on the controller board. 4. Inspect for obstructions of airways and vents. Remove obstructions. 5. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
ILL EXT BUS ACC*	Illegal External Bus Access. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
ILL INST ACCSS*	Illegal Instruction Accessed. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
ILLGL OPR ACCSS*	Illegal Operand Accessed. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
Incompat E-Net Remove NIC	The ethernet NIC for a thermal printer has been installed in this printer.	Remove the installed NIC and replace it with the correct card for this printer.
Incompat WLAN Remove NIC	The wireless NIC for a thermal printer has been installed in this printer.	Remove the installed NIC and replace it with the correct NIC for this printer.
INTAKE FAN FAULT	Sensors cannot detect current in the card cage fan circuit.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, press CLEAR. If the message does not clear, go to step 2. 2. Power off the printer. Remove the paper path or pedestal top cover. Disconnect connector P106 from the controller board. Test connector P106/CCF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Appendix A.) Replace components that fail test. 3. Make sure P106/CCF has a good connection at J106 on the controller board. 4. Inspect for obstructions of airways and vents. Remove obstructions. 5. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
INTERRUPT UNUSED VECTOR 00	This message is generated when the controller board gets an interrupt it does not understand. The problem can be created by electrical noise, by a software problem, or by a hardware problem.	<ol style="list-style-type: none"> 1. Cycle power. If this message occurred once and never again, you can ignore it. If the message reappears or appears consistently check the grounding of the printer. If the machine is correctly grounded, replace the controller board. 2. Power on the printer. Cycle power. If the message appears, suspect an application software error. Request assistance from your local support group. Install the original controller board.
INVALID ACTIVATE	The printer detects a twinax protocol communications error and reports the error. Power off the printer. Disconnect the AC power cord from the printer. Check the twinax host data cable and twinax I/O cable connection at the CT board.	<ol style="list-style-type: none"> 1. Reseat the twinax host data cable connection and the twinax I/O cable connection at the CT board. 2. Disconnect the twinax auto-termination cable from the printer or from the last device on this twinax port. Test the cable for the resistances shown in the Main Wire Harness Test Tables in Appendix A. If resistances are not correct, replace the twinax auto-termination cable. 3. Connect the power cord to the printer. Power on the printer. Send a print job to the printer. If the message appears, replace the twinax cable. 4. Send a print job to the printer. If the message appears, go to Communications Failures, page 139.

Table 4. Message List

Message	Explanation	Solution
INVALID COMMAND	The printer detects a twinax protocol communications error and reports the error. Power off the printer. Disconnect the AC power cord from the printer. Check the twinax host data cable and twinax I/O cable connection at the CT board.	<ol style="list-style-type: none"> 1. Reseat the twinax host data cable connection and the twinax I/O cable connection at the CT board. 2. Disconnect the twinax auto-termination cable from the printer. Test the cable for the resistances shown in the Main Wire Harness Test Tables in Appendix A. If resistances are not correct, replace the twinax auto-termination cable. 3. Connect the power cord to the printer. Power on the printer. Send a print job to the printer. If the message appears, replace the twinax cable. 4. Send a print job to the printer. If the message appears, go to Communications Failures, page 139.
LO DRV. SHORT*	Lower Driver Short. Circuit(s) on the hammer bank or in the hammer bank power cable are shorted to ground.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, press CLEAR. If message does not clear, replace the hammer bank logic cable and the hammer bank power cable. 2. Power on the printer. If the message appears, replace the shuttle frame assembly. 3. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
LOAD PAPER	The printer is out of paper.	<ol style="list-style-type: none"> 1. Load paper. Press CLEAR. If message does not clear, go to the next step. 2. Check for black or colored backing on the paper being used in printer. The paper out detector is optical and may not detect paper with a black or dark backing facing the detector. Try paper with a white or light back. If paper with white/light back works and black/dark paper does not, replace the paper detector switch with the optional black back forms switch assembly. (See page 284, item 3.) 3. Power off the printer. Remove the paper path or pedestal top cover. Remove the barrier shield (cabinet model) or the barrier shield and paper guide (pedestal model). Check that the paper detector switch assembly is securely mounted in its bracket. 4. Check that connector P106/PMD is fully seated in connector J106 on the controller board. 5. Load paper. Power on the printer. Replace the paper detector switch assembly if message appears. 6. Load paper. Power on the printer. Replace the controller board if message appears. Record the message and return it with the defective board.
LOADING PROGRAM FROM PORT XX%	Status message: the new emulation program is loading into printer RAM. XX% indicates how much of the program has loaded.	No action required.

Table 4. Message List

Message	Explanation	Solution
LOADING PROGRAM INTO FLASH	The printer has deleted the previous program from flash memory and is loading the new program into flash memory.	No action required.
NEW SPX DETECTED PRESS ENTER	The printer detects an SPX in its debug port and the SPX is valid for this printer.	Press the ENTER key. The following actions occur: <ol style="list-style-type: none"> 1. The SPX copies the printer's security key serial number into its flash memory. 2. The printer reprograms its security key with the information stored in the SPX. 3. The printer verifies that the key was programmed as intended. 4. The SPX overwrites itself so that it cannot be used again.
NON VOLATILE MEMORY FAILED	Large emulations reduce the amount of space available for saving configurations, which means that sometimes fewer than 8 configurations can be saved. If this message appears when saving a configuration, it means the printer is out of memory. Previously saved configurations will still be available, but the one that was "saved" when the message appeared is not in memory. If this message appears at power-up, it means the flash memory is defective.	<ol style="list-style-type: none"> 1. If the message appears at power-up, replace the flash memory. 2. If the message appears while saving a configuration, the printer is out of memory and will not save that or subsequent configurations. (Previously saved configurations are still okay.) 3. If the message appears after replacing/increasing memory, replace the controller board. (Do NOT attempt to replace NVRAM.)
OLD RIBBON Install New RBN	The sensor detects a ribbon that was previously declared to be at the end of its service life (message 146 or 302).	Install a new ribbon.
ONLINE 28 CU NOT ENAB	Controller Unit Not Enabled. Poll time-out error. The printer was not polled for one minute across a coax interface.	Check cable connection and host system. (Refer to line problem determination procedures, as recommended by the host system.)

Table 4. Message List

Message	Explanation	Solution
ONLINE 8344 FAILED	Link-level code test detects a hardware failure on the CT board.	Replace the CT board. Record the message and return it with the defective board.
ONLINE CU TIMED OUT	Controller Unit Timed Out. The printer was not enabled for one minute or more on a coax interface.	Check cable connection and host system. (Refer to line problem determination procedures, as recommended by the host system.)
PAP BAD TABLE*	Paper Bad Table. The paper feed process on the controller board has a corrupted table.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP BSY TOO LNG*	Paper Busy Too Long. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Run the print job again. If the message appears, power off the printer. Remove the paper path or pedestal top cover. Make sure connectors P106 and P107 are fully seated on the controller board. Make sure the MPU cable, the hammer bank logic cable, and the hammer bank power cable are undamaged and have good connections. Replace as necessary. (Refer to Appendix A.) 3. Power on the printer. Run the print job again. If the message appears, replace the shuttle frame assembly. 4. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PAP FD DRVR CIR* See Manual	Paper Feed Driver Circuit. The paper feed driver circuit on the controller board is drawing too much current.	<ol style="list-style-type: none">1. Cycle power. If the message appears, replace the controller board. Record the message and return it with the defective board.2. Power on the printer. If the message appears, replace the paper feed motor.
PAP FIFO OVERFL*	Paper First In First Out Overflow. Firmware error on the controller board.	<ol style="list-style-type: none">1. Cycle power. Run the print job again. If the message appears, download the emulation software again.2. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PAP FIFO UNDRFL*	Paper First In First Out Underflow. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Run the print job again. If the message appears, power off the printer. Remove the paper path or pedestal top cover. Make sure connectors P106 and P107 are fully seated on the controller board. Make sure the MPU cable, the hammer bank logic cable, and the hammer bank power cable are undamaged and have good connections. Replace as necessary. (Refer to Appendix A.) 3. Check hammer phasing. Try using a lower phasing value; sometimes this message indicates too high a hammer phase value. 4. Power on the printer. Run the print job again. If the message appears, replace the shuttle frame assembly. 5. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 6. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PAP ILLGL ST*	Paper Illegal State. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP INCMPL ENER*	Paper Incompletely Energized. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP INVLD CMD*	Paper Invalid Command. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP INVLD PARM*	Paper Invalid Parameter. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PAP NOT SCHED*	Paper Not Scheduled. The paper feed process is not scheduling on the controller board, and the printer cannot feed paper.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the MPU cable assembly. 3. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 4. Power on the printer. Run the print job again. If the message appears, replace the shuttle frame assembly. 5. Power on the printer. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP NT AT SPEED*	Paper Not At Speed. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PAP UNEXP INT*	Paper Unexpected Interrupt. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PARAMETER ERROR	Illegal parameter value received in a command code over a coax/twinax interface.	<ol style="list-style-type: none"> 1. Press CLEAR then press ON LINE. 2. Run the print job that generated the error message. If the message appears, check the host data for invalid characters. 3. Ask the system operator to verify that the printer's Device ID is set to the correct emulation with respect to the host configuration. 4. Run the print job that generated the error message. If the message appears, go to Communications Failures, page 139.
PARITY ERROR	The printed output may contain random ? (question mark) characters. Make a configuration printout.	<ol style="list-style-type: none"> 1. Verify that the printer matches host serial configuration settings for Data Protocol, Baud Rate, Data Bits, Stop Bits, Parity, Data Terminal Ready, and Request to Send. 2. Send a print job to the printer. If the message appears, replace the serial data cable. 3. Send a print job to the printer. If the message appears, go to Communications Failures, page 139. 4. If the printer is in a twinax environment, check the error log for parity error entries and inspect the customer's cable hook-ups. Connect all communications cables correctly. 5. Send a print job to the printer. If the message appears, replace the twinax auto-termination cable ("T" connector). 6. Send a print job to the printer. If the message appears, replace the CT.

Table 4. Message List

Message	Explanation	Solution
PLAT INV CMD*	Platen Invalid Command. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PLAT INV PARM*	Platen Invalid Parameter. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PLAT INV STATE*	Platen Invalid State. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
PLEASE WAIT... RESET IN PROGRESS	Status message: the printer finished loading the program into flash memory and is automatically resetting itself.	No action required.
POWER SAVER MODE	This is a status message. The printer is in low-energy idle state, all fans and higher voltages are off, only +5Vdc logic circuits are active.	No action required. (To revive the printer from power saver mode press the PAPER ADVANCE key.)

Table 4. Message List

Message	Explanation	Solution
POWER SUPPLY HOT	<p>The printer has sensor circuits that sample the operating temperature of key components of the power supply. When higher than normal temperatures are sensed, print speed is automatically reduced. If the printer runs at reduced speed for an extended period of time, the POWER SUPPLY HOT message is sent to the LCD and printing stops, allowing printer components to cool down. Pressing the CLEAR key resumes the print task. Check the operating environment. A severe environment is one with an ambient temperature at or above 40° Celsius (104° Fahrenheit) or is dirty enough to create blockage of the cabinet fan vents. The printer must never be run at ambient temperatures greater than 40° Celsius (104° Fahrenheit). If the printer is located in such an environment, relocate it to a cooler, cleaner area.</p>	<ol style="list-style-type: none"> 1. Inspect printer environment for severity. Advise the user to move the printer to cooler, cleaner location. 2. Check the kinds of print jobs the user is running: look for very dense graphics and layouts. Advise the user to run jobs in smaller batches. 3. Power off the printer. Remove the paper path or pedestal top cover. Check that the plastic power supply guard/air deflector is correctly positioned over the power supply board. <u>WARNING: DO NOT TOUCH THE POWER SUPPLY</u>, but hold your hand close enough to check for heat radiating off the power supply board. If the power supply is noticeably hot, let it cool down, then replace it. 4. Check that all fan cables are connected. 5. Inspect vents and fan airways for obstructions. Look underneath cabinet models for items blocking the cabinet exhaust vents. 6. Install paper path or pedestal top cover. Load paper. Power on the printer. Run the “All E’s” print test for 5-10 minutes. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PRINTER HOT	This message indicates internal temperatures over 60° Celsius (140° Fahrenheit). Print jobs will not create such temperatures, so immediately determine that the fans are operating and that all air vents are unobstructed. It is crucial that the exhaust vents on the floor of the cabinet remain unblocked, since hot air from inside the printer is vented through the cabinet floor. Nothing must be stored under the printer. Then check the operating environment. A severe environment is one with an ambient temperature at or above 40° Celsius (104° Fahrenheit) or is dirty enough to create blockage of the cabinet fan vents. The printer must never be run at ambient temperatures greater than 40° Celsius (104° Fahrenheit). If the printer is located in such an environment, relocate it to a cooler, cleaner area.	<ol style="list-style-type: none"> 1. Controller board sensors report high temperatures on the board. Inspect printer environment for severity. Advise the user to move the printer to cooler, cleaner location. 2. Power off the printer. Remove the paper path or pedestal top cover. Check that all fan cables are connected. 3. Inspect vents and fan airways for obstructions. Look underneath cabinet models for items blocking the cabinet exhaust vents. Remove any obstructions from vents and airways. 4. Install paper path or pedestal top cover. Load paper. Power on the printer. Run the "All Black" print test for 1/4 page. If the message appears, replace the controller board. Record the message and return it with the defective board.
PRINTER UNDER REMOTE CONTROL	Status message: The printer is under the control of the PrintNet Enterprise (PNE) remote printer management software.	No action required.
PROTECTED INSTR*	Protected Instruction. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
PWR SUPP VOLT*	Power Supply Voltage. The power supply has failed.	Replace the power supply board.
QUEUE OVERRUN	In the CT twinax emulation, the print buffer has overflowed. Send a print job to the printer.	<ol style="list-style-type: none"> 1. If the message appears, replace the CT board. Record the message and return it with the defective board. 2. Send a print job to the printer. If the message appears, replace the twinax data cable and the twinax auto-termination cable assembly ("Smart T").
RESTORING BOOT CODE	Normal download initialization message.	No action required.
REMOVE USED SPX THEN PRESS ENTER	Status message: An SPX is depleted because it has successfully reprogrammed the security key on the controller board.	<ol style="list-style-type: none"> 1. Remove the SPX from the Debug Port. 2. Press the ENTER key. The printer will reboot itself.
RIB INVLD CMD* See User Manual	Ribbon Invalid Command. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
RIBBON AT END POINT Change Ribbon	Integrated Print Management System software has determined that the ribbon is out of ink.	Install a new ribbon.

Table 4. Message List

Message	Explanation	Solution
RIBBON STALL	The controller board does not detect ribbon movement.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, power off the printer. Check that both ribbon hubs are securely mounted on the ribbon motor shafts. If either hub is cracked or otherwise damaged, replace both ribbon hubs. 2. Inspect the ribbon mask for excessive ink build-up or a torn/bunched ribbon. Clean the ribbon mask and replace the ribbon as required to insure unobstructed movement of the ribbon between the ribbon mask and hammer bank cover. 3. Check the platen gap and adjust if required. If the gap is too narrow, it can restrict ribbon movement through the ribbon mask. 4. Remove the paper path or pedestal top cover. Reseat the cable connections of both ribbon drive motors. 5. Power on the printer. Using a screwdriver, short across the ribbon guide screws to reverse ribbon hub motion. Check for a ribbon drive motor that will not wind the ribbon. If the ribbon will not wind in one or both directions, replace the defective ribbon drive motor(s). If the ribbon winds in both directions, replace the controller board and download new function code. Record the message and return it with defective board.
RIBBON UNDER 2% Change RBN Soon	Status message indicating the Integrated Print Management System is enabled and the ribbon ink level is 2%.	Install a new ribbon.

Table 4. Message List

Message	Explanation	Solution
SCS COMMAND ERROR	In the CT emulation, the printer received undefined control character (hex 40).	<ol style="list-style-type: none"> 1. The printer clears the error. 2. Run the print job that generated the error message. If the message appears, verify that there are no invalid control codes in the host data. 3. Ask the system operator to verify that the printer's Device ID is set to the correct emulation with respect to the host configuration. 4. Run the print job that generated the error message. If the message appears, go to Communications Failures, page 139.
SECURITY VIOLATION	Security code of the security key at J9 on the controller board does not match the code of the firmware on the controller board.	<ol style="list-style-type: none"> 1. Remove the paper path or pedestal top cover. Check that the security key is correctly installed. 2. Install correct key for the customer's emulations. 3. Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board.
SECURITY KEY NOT DETECTED	The security key is not present or has failed.	<ol style="list-style-type: none"> 1. Check the security key at connector J9 on the controller board. The security key is a 3-pin jumper connector. If it is absent, install the correct key. If a key is present, replace it. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board.
SF ERROR	Structured Field Error. Application software has violated structured data field parameters.	Not a printer problem. Have the system administrator correct applications data or configuration.

Table 4. Message List

Message	Explanation	Solution
SHUT DRVR CIR* See User Manual	The shuttle driver circuit on the controller board is drawing too much current.	<ol style="list-style-type: none"> 1. Power down the printer. Remove the paper path or top cover to gain access to the card cage. Make sure the shuttle data and power cables are undamaged and have good connections at the shuttle and the controller board. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board. 3. Power on the printer. If the message appears, replace the shuttle frame assembly.
SHUTL INV CMD*	Shuttle Invalid Command. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
SHUTL INV PARM*	Shuttle Invalid Parameter. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
SHUTL OVR SPEED*	The shuttle is oscillating too rapidly.	Adjust the gap between the MPU and the shuttle motor flywheel to 0.010 ± 0.001 inch (0.254 ± 0.025 mm). (See page 276.)

Table 4. Message List

Message	Explanation	Solution
SHUTTLE JAM	The shuttle is not moving or is moving at the wrong speed. Check the forms thickness lever: if it is set too tightly, it can slow the shuttle enough to trigger the fault message.	<ol style="list-style-type: none"> 1. Set the forms thickness lever to match the thickness of paper, but not too tightly. 2. Check and adjust the platen gap. 3. Inspect the ribbon mask for deformation that snags and interferes with shuttle movement. Correctly install the hammer bank cover assembly or replace a deformed cover assembly. 4. Run a print test. If the message appears, power off the printer. 5. Remove the shuttle cover and paper path or the pedestal top cover. Inspect the shuttle mechanism for obstructions. Check that all cables are attached at the shuttle and the controller board. Make sure the MPU cable is not pinched. (Refer to the Interconnection Diagrams in Appendix A.) Reseat all cables. Check the resistance of the MPU at connector P107. (Refer to the Main Wire Harness Test Tables in Appendix A.) Replace the MPU if it fails the test. 6. Run a print test. If the message appears, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 7. Run a shuttle test and observe shuttle movement. If the shuttle oscillates too slowly, adjust the gap between the MPU assembly and the flywheel to 0.010 ± 0.001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 inch-pounds (2.03 N•m). 8. Run a print test. If the message appears, replace the MPU and the MPU cable assembly.

Table 4. Message List

Message	Explanation	Solution
SHUTTLE JAM (continued)		<ol style="list-style-type: none"> Run a print test. If the message appears, replace the controller board. Record the message and return it with the defective board. Run a print test. If the message appears, replace the shuttle frame assembly.
SHUTTLE STALL	See SHUTTLE JAM (page 106).	See SHUTTLE JAM (page 106).
SHUTTLE TYPE NOT SUPPORTED*	The shuttle type was not detected at power-up or the shuttle installed in the printer is not supported by the firmware.	<ol style="list-style-type: none"> Power down the printer. Remove the paper path or top cover to gain access to the card cage. Make sure the shuttle data and power cables are undamaged and have good connections at the shuttle and the controller board. Power on the printer. If the message appears, download the emulation software again (page 177). Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board. Power on the printer. If the message appears, replace the shuttle frame assembly.
SOFTWARE ERROR* CYCLE POWER	Application software tried to perform an illegal printer function or damaged logic circuits were detected on the controller board.	<ol style="list-style-type: none"> Cycle power. If the message appears, power off the printer. Disconnect the input data line from the host computer. Power on the printer. If the message appears, download the emulation software again (page 177). Cycle power. Run the print job again. If the message appears, replace the controller board. If the message is gone, there is an application software error. Request assistance from your local support group.

Table 4. Message List

Message	Explanation	Solution
SPX FOUND, ERROR: KEY NOT DETECTED	The controller board does not have a security key.	<ol style="list-style-type: none"> 1. Remove the SPX from the Debug Port. 2. Power down the printer. 3. Install the security key.
SPX NOT NEEDED OPTIONS ENABLED	The user has attempted to use the SPX to turn on printer options that are already enabled. In such a case the SPX does not copy the security key serial number into its memory and does not deplete itself.	<ol style="list-style-type: none"> 1. Remove the SPX from the Debug Port. 2. Cycle printer power.
STACK OVERFLOW*	Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
STACK UNDERFLOW*	Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.

Table 4. Message List

Message	Explanation	Solution
STACKER FAULT	<p>Two situations can trigger this message:</p> <ol style="list-style-type: none"> 1. The stacker elevator is obstructed while attempting to move up or down. The message will always occur if the user presses the ELEVATOR UP key on the stacker control panel to move the elevator and the elevator is blocked so that it cannot move to the top of its travel. 2. Controller hardware tells firmware that an over-current condition exists. This will only occur if the controller board or the stacker motors are bad. 	<ol style="list-style-type: none"> 1. Open the cabinet rear door and check for obstructions preventing elevator movement. Remove any obstructions. 2. Power on the printer. Operate the power stacker and check that: <ol style="list-style-type: none"> a) all motors are operating, b) the paddles are rotating, c) the elevator moves smoothly and without obstruction, d) the timing belts are undamaged and the belt pulleys are not slipping, e) the extension springs are attached and undamaged (not bent or stretched), f) the drive rollers are not damaged, g) the constant force springs are tightly mounted and undamaged. Tighten pulley setscrews and/or replace damaged components as necessary. 3. Adjust the stacker rails if they are not vertical and parallel. 4. Check the stacker limit switches. (See page 126.) If the limit switches are OK, go to the next step. 5. Disable the power stacker unit under the Printer Control menu. (Refer to the <i>User's Manual</i>.) If the message occurs, replace the controller board and download new function code. 6. Power off the printer. Remove the paper path. Disconnect stacker cables from the controller board, stacker assy, and the stacker control panel (see Figure 82, page 405). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. (See Appendix A.) Replace cables that are damaged or fail continuity test. If the cables are OK, replace the stacker motors.

Table 4. Message List

Message	Explanation	Solution
STACKER FULL	Status message: the power paper stacker is full.	<ol style="list-style-type: none">1. Unload the stacker.2. Check the stacker limit switches. (See page 126.) If the limit switches are OK, go to the next step.3. Power off the printer. Remove the paper path. Disconnect stacker cables from the controller board, stacker assembly, and the stacker control panel (see Figure 79, page 402). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. (See Appendix A.) Replace any cable that is damaged or fails continuity test.

Table 4. Message List

Message	Explanation	Solution
STACKER JAM	This message is triggered if there is paper inside the throat of the stacker elevator, but the elevator is not moving.	<ol style="list-style-type: none"> 1. Open the cabinet rear door and check for obstructions preventing elevator movement. Remove any obstructions. 2. Check that the wheel of the stacker paper motion detector rests against the rear brace of the paper throat. Also make sure the wheel rotates freely. If necessary, gently bend the brace toward the paper motion detector wheel until the wheel contacts the brace. Clean the stacker paper motion detector. 3. Power on the printer. Operate the power stacker and check that: <ol style="list-style-type: none"> a) all motors are operating, b) the paddles are rotating, c) the elevator moves smoothly and without obstruction, d) the timing belts are undamaged and the belt pulleys are not slipping, e) extension springs are attached and not bent or stretched), f) drive rollers are not damaged. Tighten setscrews and replace damaged components as necessary. 4. Power off the printer. Remove the paper path. Disconnect stacker cables from the controller board, stacker assembly, and stacker control panel. Check cables for cuts, breaks, or damaged pins. Check continuity of cables. (See Appendix A.) Replace any cable that is damaged or fails continuity test.

Table 4. Message List

Message	Explanation	Solution
TCB CORRUPTED*	Task Control Block Corrupted. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
TCP Port Busy	Error message reported by the Printer Manager when ethernet interface option is installed. The network address given in the printer properties was reached, but the printer port is "busy." When the port setting is "Serial" the printer manager software cannot interact with the ethernet card, although the card will respond to other TCP/IP utilities.	<ol style="list-style-type: none"> 1. Power on the printer. 2. If the printer is online, press the ON LINE key to place the printer offline. 3. On the control panel, press the ▲ + ▼ keys to unlock the ENTER key. 4. Press the ▲ + ▼ + ◀ + ▶ keys simultaneously to enter the Factory Menu. 5. Press ▶ until you reach the PRINTER MGMT menu, then press ▼. 6. Press ▶ until you reach the "Diagnostics Port" option, then press ▼. 7. Press ▶ until you reach "Debug ethernet", then press ENTER. 8. Press ON LINE to return the printer to the online state. 9. Save the changes and set up a new power-up configuration, if necessary. The Printer Manager should now be able to access the printer. For other communication errors, print out the E-Net Test Page (page 145) and verify the IP address, subnet mask, gateway address, and TCP port settings.

Table 4. Message List

Message	Explanation	Solution
UNDEF INTERRUPT*	Undefined Interrupt. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
UNDFNED OPCODE*	Undefined Opcode. Firmware error on the controller board.	<ol style="list-style-type: none"> 1. Cycle power. Run the print job again. If the message appears, download the emulation software again (page 177). 2. Cycle power. Run the print job again. If the message appears, replace the controller board. Record the message and return it with the defective board.
UNKNOWN RBN1 Install New RBN	The sensor detects a bar code, but the ribbon model is not permitted on this printer.	Install a new ribbon.
UNKNOWN RBN2 Install New RBN	The sensor detects a bar code, but the region code does not match the printer.	Install a new ribbon.
UP DRV. SHORT*	Upper Driver Short. Hammer driver circuits on the controller board are shorted to ground.	<ol style="list-style-type: none"> 1. Cycle power. If the message appears, press CLEAR. If the message does not clear, replace the hammer bank logic cable and the hammer bank power cable assemblies. 2. Power on the printer. If the message appears, replace the controller board. Record the message and return it with the defective board. 3. Power on the printer. If the message appears, replace the shuttle frame assembly.

Table 4. Message List

Message	Explanation	Solution
WAITING FOR ETHERNET ADAPTER	This status message appears when the printer is first powered on if the optional ethernet NIC is installed. An ethernet adapter must be detected early in the power up sequence so the printer can tell the adapter it has been detected and continue with its own power up sequence. Compared to the printer, the ethernet adapter takes a long time to complete its internal diagnostic tests, so the boot code allows the adapter to power up in parallel with the printer to reduce its effect on overall boot time	No action required.

Troubleshooting Other Symptoms

WARNING Always disconnect the AC power cord from the printer before doing a maintenance procedure. Failure to do so could result in injury to you or damage to equipment. If you must apply power during maintenance, you will be instructed to do so in the maintenance procedure.

Use standard fault isolation techniques to troubleshoot malfunctions not indicated by display messages. These techniques are summarized below:

1. Ask the operator to describe the problem.
2. Verify the fault by running a diagnostic printer test or by replicating the conditions reported by the user.
3. Look for a match in the **General Symptom List**, which begins on page 116. If you find a match, go to the troubleshooting procedure and follow the numbered instructions.
4. If you cannot find the symptom in the **General Symptom List**, use the Half-Split Method to find the malfunction:
 - a. Start at a general level and work down to details.
 - b. Isolate faults to half the remaining systems at a time, until the final half is a field-replaceable part or assembly. (Troubleshooting aids are listed on page 39.)
5. Replace the defective part or assembly. Do not attempt field repairs of electronic components or assemblies. Most electronic problems are corrected by replacing the printed circuit board assembly, sensor, or cable that causes the fault indication. The same is true of failures traced to the hammer bank: replace the entire shuttle assembly because it is not field repairable.
6. Test printer operation after every corrective action.
7. Reinstall any parts you replaced earlier that did not solve the problem.
8. Stop troubleshooting and return the printer to normal operation when the reported symptoms disappear.

General Symptom List

Table 5 is a list of possible printer problems that are not indicated by messages on the LCD. Troubleshooting procedures are included for each symptom.

If you encounter a problem that is not listed in Table 5, troubleshoot using the Half-Split Method described on page 115.

Table 5. General Symptom List

Symptom	Solution
Communications Failures	See page 139.
Ribbon	
Ribbon folding or feed problems	<ol style="list-style-type: none"> 1. Make sure the ribbon is correctly installed and the ribbon spools are fully seated on the ribbon hubs. 2. Check that the ribbon runs between the ribbon mask and hammer bank cover. Check that the hammer bank cover is installed correctly. 3. Check that the ribbon spools are not rubbing against the shuttle cover assembly. Install the shuttle cover assembly correctly, so that the spools do not rub against it. 4. Inspect the paper print path for paper chaff, ink residue, and debris. Clean the shuttle frame assembly. 5. Clean the ribbon guides. 6. Power on the printer. Run a print test and observe ribbon movement across the left and right ribbon guides. Adjust the right and left ribbon guides if necessary. 7. Observe ribbon movement at both left and right ribbon posts as the metal end strip crosses each ribbon post. If the metal strip moves past either post without reversing the direction of the ribbon, power down the printer. Remove the paper guide assembly or pedestal top cover. Reseat connectors P106/LRP and P107/RRP on the controller board. 8. While shorting across each ribbon post with the ribbon metal strip or a screwdriver, check for continuity in connector P106/LRP pins 10 and 12, and connector P107/RRP pins 14 and 16. (Refer to the Main Wire Harness Test Tables in Appendix A.) Replace a ribbon post that fails the continuity test. 9. Check and clean the platen gap if necessary.

Table 5. General Symptom List

Symptom	Solution
Jams	
CLEAR PAPER JAM message instead of LOAD PAPER when printer is out of paper	<ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Remove the barrier shield (cabinet model) or the barrier shield and paper guide (pedestal model). Check that the paper detector switch assembly is securely mounted in its bracket. Clean the paper detector switch if necessary. 2. Check that connector P106/PMD is fully seated in connector J106 on the controller board. 3. Load paper. Power on the printer. Replace the paper detector switch assembly if either message appears. 4. Inspect the paper ironer. If the paper ironer has slipped up into the print line, reposition the paper ironer. 5. Load paper. Power on the printer. Replace the controller board if either message appears. Record the message and return it with the defective board.
CLEAR PAPER JAM message will not clear and paper does not move	<ol style="list-style-type: none"> 1. Remove the paper path or pedestal top cover. Make sure connector P107/PAPR M is fully seated in connector J107 on the controller board. 2. Check the condition and tension of the paper feed timing belt. Adjust the paper feed timing belt. Replace the belt if it is damaged. 3. Check the dynamic paper tension. 4. Load paper. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper moves correctly in both directions. Replace the paper feed motor if the message appears or the paper moves erratically. 5. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper moves correctly in both directions. Replace the controller board if the message appears or the paper moves erratically. Record the message and return it with the defective board.

Table 5. General Symptom List

Symptom	Solution
CLEAR PAPER JAM message will not clear but paper moves	<ol style="list-style-type: none">1. Power off the printer. Remove the paper path or pedestal top cover. Check that connector P106/PMD is fully seated in connector J106 on the controller board.2. Remove the barrier shield (cabinet model) or the barrier shield and paper guide (pedestal model). Check that the paper detector switch assembly is securely mounted in its bracket. Clean the paper detector switch if necessary.3. Check that the paper detector switch assembly is securely mounted to the mechanism base. Tighten the two screws securing the paper detector switch assembly to the mechanism base.4. Check that the motion detector wheel rotates. Replace the paper detector switch assembly if the wheel does not rotate.5. Load paper. Power on the printer. Replace the paper detector switch assembly if the message appears.6. Load paper. Power on the printer. Replace the controller board if the message appears. Record the message and return it with the defective board.

Table 5. General Symptom List

Symptom	Solution
Control Panel	
Black squares on control panel	<ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Disconnect the control panel cable from the panel and from J110 on the controller board. Check continuity of the cable. (See Appendix A.) Replace the control panel cable if it fails continuity test. Connect the cable. Power on the printer. If the symptom appears, replace the control panel. 2. If the printer has the CT board, make sure it is correctly seated in the controller board. 3. Power off the printer. Make sure the flash memory is seated properly in J10 and J11 on the controller board. Regardless of memory configuration, J10 must be used. 4. Power on the printer. If black squares appear on the LCD, the flash memory could be blank. Replace the flash SIMM in J10 with a new flash SIMM with the boot program installed. 5. Power on the printer. If the symptom appears, replace the control panel. 6. Power on the printer. If black squares appear on the LCD, replace the controller board. Record the message and return it with the defective board. If the LCD displays characters correctly, download the emulation software again (page 177).
Control panel blank	<ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Check all cable connections into the controller board; make sure the control panel cable is seated in connector J110 on the controller board. 2. If the printer has the CT board, make sure it is correctly seated in the controller board. 3. Power on the printer. Inspect the control panel display and cooling fans. If the control panel is blank and the cooling fans come on, replace the control panel cable assembly and/or the control panel, as required. 4. Power on the printer. If the control panel is blank and the fans do not come on, replace the controller board.

Table 5. General Symptom List

Symptom	Solution
Control panel keys do not work	<ol style="list-style-type: none">1. Power on the printer. Check the operation of the control panel keys. Replace the control panel assembly if the keys do not work.2. Power on the printer. Check the operation of the control panel keys. Replace the control panel cable assembly if the keys do not work.3. Power on the printer. Check the operation of the control panel keys. Replace the controller board if the keys do not work.
Control panel display shows garbled, broken characters	<ol style="list-style-type: none">1. Remove the paper path or pedestal top cover. Check cable connections into the controller board. Make sure the control panel cable is seated in connector J110 on the controller board.2. Make sure the SDRAM DIMM is seated properly in its slot on the controller board. Reseat and re-latch the SDRAM DIMM.3. Power on the printer. Inspect the control panel display. If the control panel shows broken characters, replace the SDRAM.

Table 5. General Symptom List

Symptom	Solution
Power Failures	
No power, and control panel blank, and card cage fan not running	<ol style="list-style-type: none"> 1. Check that the AC power outlet has power. Restore AC power if necessary. 2. Unplug the printer AC power cord from the printer (leave it plugged into the power outlet) and check for AC power at the printer end of the cord. If there is no power through the AC power cord, replace it. Plug the AC power cord into the printer and power outlet. 3. Remove the paper path or pedestal top cover. Verify that the AC-In power cable and the AC power input cables are connected to the on/off switch-circuit breaker. (See Figure 52, page 286.) Make sure all ground connections are clean and tight. 4. Check that AC-in power cable connector P1 is connected to J1 on the power supply board. Reseat the connector. 5. Check that power supply cable connector P101 is connected to J101 on the controller board. Reseat the connector. 6. Check all cable connections on the controller board. 7. If the printer has the CT board, make sure it is correctly seated in the controller board. 8. Disconnect AC-in power supply cable connector P1. Set the circuit breaker to 1 (on). Measure AC voltage at pins 1 and 2 of connector P1. If no voltage, replace the circuit breaker. If there is voltage, replace the power supply board.

Table 5. General Symptom List

Symptom	Solution
Printer does not initialize	<p>NOTE: Power-on initialization is explained on page 157.</p> <ol style="list-style-type: none"> 1. Power off the printer. Remove the paper guide or pedestal top cover. Reseat all cable connectors on the controller board, especially connectors P106 and P107. 2. Check the shuttle for electrical shorts (page 189). 3. If the printer has the CT board, verify that the user is running CT emulation software. If the printer does not have the CT board, go to step 7. 4. If the printer has the CT board, check that the user has enough flash memory installed to handle the emulation software. (See Figure 33 on page 228, and the Boot Diagnostics Menu on page 147.) Install flash memory and download emulation software if necessary. 5. If the printer has the CT board, make sure it is correctly seated in the controller board. 6. Power on the printer. If the fans run but the printer does not initialize, replace the CT board. 7. Power on the printer. If the fans do not run and the printer does not initialize, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 8. Power on the printer. If the fans run but the printer does not initialize, replace the controller board. 9. Power on the printer. If the problem persists, replace the shuttle frame assembly. 10. Power on the printer. If the problem persists, replace the control panel and cable.

Table 5. General Symptom List

Symptom	Solution
Power Stacker	
Printer does not detect presence of power stacker	<ol style="list-style-type: none"> 1. Check that the power stacker is enabled under the Printer Control menu. (Refer to the <i>Setup Guide</i>.) If the power stacker enable/disable option does not appear in the menu, go to the next step. 2. Open the rear cabinet door. Check that the ON/OFF indicator lamp is lit. If the ON/OFF indicator is not lit, go to step 3. If the ON/OFF indicator is lit, press the ON LINE key and check that the ON LINE indicator lights. If the ON LINE indicator comes on, the stacker is detected by the printer. If the ON LINE indicator does not come on, go to step 4. 3. <ol style="list-style-type: none"> a) Power off the printer. b) Unfasten the cable clamp holding the stacker control panel cables. c) Disconnect the stacker power cable from the back of the stacker control panel. (See Figure 79, page 402.) d) Locate pin 1 of connector P106. (See the cable assembly drawing in Appendix A.) e) Power on the printer. f) At connector P106 check for +48 volts DC between pins 1 and 2 and +5 volts DC between pins 3 and 4. If the voltages are correct, replace the stacker control panel. If the voltages are not correct, power off the printer, remove the paper path, and disconnect the stacker power cable from the controller board. (See Figure 82, page 405.) Check the continuity of the stacker power cable between P105 and P106. If the cable fails the continuity test, replace it. If the cable is OK, replace the controller board. 4. Power off the printer. Remove the paper path. Disconnect stacker cables from the controller board, stacker assembly, and the stacker control panel (see Figure 79, page 402). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. (See Appendix A.) Replace any cable that is damaged or fails continuity test. Reconnect all stacker cables to the controller board, stacker, and stacker control panel. 5. Power on the printer. Check that the ON LINE indicator lights on the stacker control panel. If the ON LINE indicator does not light, replace the stacker control panel. 6. Power on the printer. Check that the ON LINE indicator lights on the stacker control panel. If the ON LINE indicator does not light, replace the controller board.

Table 5. General Symptom List

Symptom	Solution
Stacker “chatters” at upper or lower limit	<ol style="list-style-type: none"> 1. Power off the printer. Unload paper. Open the rear cabinet door and check that stacker motion is not obstructed by the control panel cable or other obstruction. Remove obstruction or reroute the stacker control panel cable as necessary. 2. Verify that the stacker rails are vertical and parallel. Adjust the stacker rails if necessary: they must be vertical and parallel. 3. Move the elevator up and down by hand and check that the limit switches are being tripped at the highest and lowest limits of elevator travel. 4. Power on the printer. Operate the power stacker. (Refer to the <i>Operator's Guide</i>.) While the stacker is operating, check that: <ol style="list-style-type: none"> a) all motors are operating, b) the paddles are rotating, c) the elevator moves smoothly and without obstruction, d) the timing belts are undamaged and the belt pulleys are not slipping, e) the extension springs are attached and undamaged (not bent or stretched), f) the drive rollers are not damaged, g) the constant force springs are tightly mounted and undamaged. Tighten pulley setscrews and/or replace damaged components as necessary.

Table 5. General Symptom List

Symptom	Solution
Stacker does not stack properly	<ol style="list-style-type: none"> 1. Check for and remove obstructions preventing elevator movement. 2. Check for misaligned stacker rails. Adjust the stacker rails if they are not vertical and parallel. 3. Power on the printer. Operate the power stacker. (Refer to the <i>Operator's Guide</i>.) While the stacker is operating, check that: <ol style="list-style-type: none"> a) all motors are operating b) the paddles are rotating c) the elevator moves smoothly and without obstruction d) the timing belts are undamaged and the belt pulleys are not slipping e) the extension springs are attached and undamaged (not bent or stretched) f) the drive rollers are not damaged g) the constant force springs are tightly mounted and undamaged Tighten pulley setscrews and/or replace damaged components as necessary. 4. Check the stacker limit switches. (See page 126.) If the limit switches are OK, go to the next step. 5. Check the stacker motors. (See page 127.) If the stacker motors are OK, go to the next step. 6. Remove the paper path. Disconnect stacker cables from the controller board, stacker assembly, and the stacker control panel (see Figure 79, page 402). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. (See Appendix A.) Replace any cable that is damaged or fails continuity test. Reconnect all stacker cables to the controller board, stacker, and stacker control panel.
Stacker elevator does not move	See "Stacker does not stack properly"
Stacker elevator moves by itself	<ol style="list-style-type: none"> 1. Power off the printer. Inspect all stacker LEDs for dust, chaff, or dirt. (See Figure 105 through Figure 107, page 430 through page 434.) Clean the stacker LEDs and the sight tubes in the LED mounts. 2. Power on the printer. If the stacker elevator moves by itself, replace the stacker LEDs. (See Figure 105 through Figure 107, page 430 through page 434.)

Table 5. General Symptom List

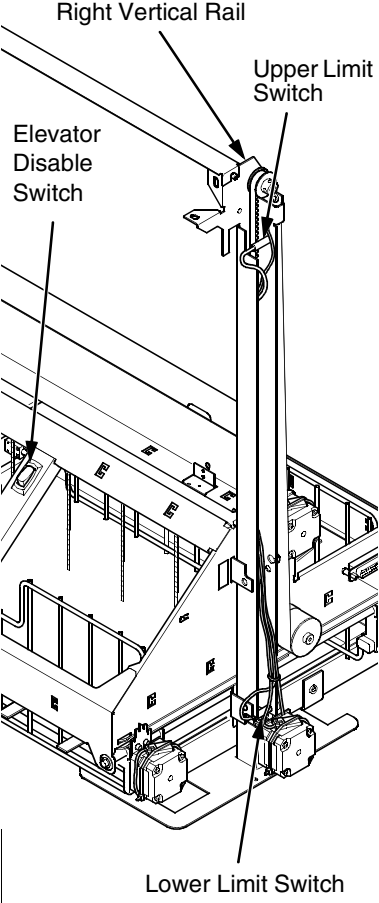
Symptom	Solution
<p>Stacker limit switch check</p> 	<p>NOTE: This procedure tests the upper and lower limit switches on the right vertical rail. These magnetic switches are normally closed. You can quickly check their functionality with a small, powerful magnet.</p> <p>You will usually be referred to this procedure from other troubleshooting procedures. When you have completed this check procedure, return to the procedure that sent you here.</p> <ol style="list-style-type: none"> 1. Power on the printer. Open the rear cabinet door. Unload the power stacker. 2. Press the Elevator Disable Switch and manually lift the elevator all the way to the top of its travel. 3. Position a small, powerful magnet between the belt and vertical rail so that it is in front of the exposed face of the lower limit switch. Tape or otherwise secure the magnet in position so that your hands are clear of the vertical rail and elevator. <ol style="list-style-type: none"> a. With the magnet secured next to the lower limit switch press the ELEVATOR DOWN key on the stacker control panel. b. If the elevator does NOT move, the lower limit switch is OK. Remove the magnet and go to step 4. c. If the elevator moves, release the ELEVATOR DOWN key, power down and unplug the printer, and replace the lower limit switch. 4. Press the Elevator Disable Switch and manually move the elevator all the way down to the bottom of its travel. 5. Position a small, powerful magnet between the belt and vertical rail so that it is in front of the exposed face of the upper limit switch. Tape or otherwise secure the magnet in position so that your hands are clear of the vertical rail and elevator. <ol style="list-style-type: none"> a. With the magnet secured next to the upper limit switch press the ELEVATOR UP key on the stacker control panel. b. If the elevator does NOT move, the upper limit switch is OK. Power down, unplug the printer, remove the magnet, and return to the procedure that sent you to this check procedure. c. If the elevator moves, release the ELEVATOR UP key, power down and unplug the printer, and replace the upper limit switch.

Table 5. General Symptom List

Symptom	Solution
Stacker motor check	<p>NOTE: This procedure tests the four stacker motors and their cables. You will usually be referred to this procedure from other troubleshooting procedures. When you have completed this procedure, return to the procedure that sent you here.</p> <ol style="list-style-type: none"> 1. Power off the printer. 2. Open the rear cabinet door. 3. Unfasten the cable clamp holding the stacker control panel cables. 4. Disconnect stacker rail cable connector P107 from connector J3 on the back of the stacker control panel. (See Figure 79, page 402.) 5. Disconnect stacker frame cable connector P102 from connector J4 on the rear of the stacker control panel. (See Figure 79, page 402.) 6. Locate pin 1 of connector P102 and connector P107. (See the cable assembly drawings in Appendix A, page 367 and page 370.) 7. Check both cables for pin damage, continuity, and shorts. 8. Check all motors for 15.2 ± 1.5 Ohms on both phases. (Refer to the power stacker control panel PCBA pinout drawing on page 348.) 9. Replace any cable that is damaged or fails continuity test. Replace any motor that fails the resistance test.
Stacker not operating	See "Printer does not detect presence of power stacker," page 123.

Table 5. General Symptom List

Symptom	Solution
Print Quality	
Characters or dots are missing, smeared, too light, or too dark.	<ol style="list-style-type: none"> 1. Check the forms thickness lever: if it is set too loose or too tightly print quality can be affected. Set the forms thickness lever to match the thickness of the paper being used. 2. Check the paper tension between the tractors. Adjust the right tractor so that it does not pull paper too tightly or leave it too loose. The right tractor should hold the paper under "slight" tension. 3. Inspect the shuttle frame assembly for print chaff, debris, or ink residue that could be causing the problem. Clean the shuttle frame assembly. 4. Check the ribbon for folds or tears. Check that the ribbon guides are tight and the ribbon tracks straight across them. Rewind or install new ribbon. If the ribbon does not track straight across the ribbon guides, adjust the ribbon guides. If the ribbon guides are loose, tighten them. If the ribbon guides are damaged, replace them. 5. Power off the printer. Remove the shuttle cover. Remove the shuttle frame assembly. Inspect the ribbon mask for bends or deformation that adversely affect paper feeding. Make sure the hammer bank cover assembly is correctly installed on its mounting pegs. Check the shuttle frame assembly for broken hammer springs, hammer tips, or contaminations. Replace any damaged hammer spring assemblies. Replace the hammer bank cover assembly if it is deformed or damaged. 6. Check the platen gap. Adjust the platen gap if necessary. 7. Remove the paper guide assembly or pedestal top cover. Make sure Connectors P105 and P108 have good connections on the controller board. Make sure connectors P04 and P05 have good connections at the shuttle frame assembly. Reseat connectors P04, P05, P105, and P108. 8. Power on the printer. If the problem still occurs, replace the hammer bank logic cable and the hammer bank power cable. 9. Power on the printer. If the problem still occurs, replace the shuttle frame assembly. 10. Power on the printer. If the problem still occurs, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 11. Check the shuttle for electrical shorts (page 189).

Table 5. General Symptom List

Symptom	Solution
Characters or dots are missing, smeared, too light, or too dark. (continued.)	12. Power on the printer. If the problem still occurs, replace the controller board.
Characters are compressed on first line of a form	Adjust the tension of the tractor belts (page 188).
Horizontal misalignment of characters (Dots or characters move left or right from dot row to dot row or line to line)	<ol style="list-style-type: none"> 1. Take the printer offline and print a test pattern of All H's. If characters shift left or right from line to line, there might be a proportional spacing problem. If the pattern of H's prints correctly (that is, all the columns line up), contact your support group or configuration help desk, because a configuration change may be necessary. If the pattern of H's did not print OK, go to the next step. 2. Check the hammer phasing. Adjust hammer phasing if necessary. 3. Check the dynamic paper tension. 4. Inspect the shuttle frame assembly area for ink residue, paper chaff, or debris. Clean the shuttle frame assembly. 5. Check the MPU gap. Using a feeler gauge, adjust the gap between the MPU assembly and the flywheel to 0.010 ± 0.001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 inch-pounds (2.03 N•m). 6. Power on the printer. Run a print test. If the symptom is not gone, replace the MPU. 7. Power on the printer. Run a print test. If the symptom is not gone, replace the controller board. 8. Power on the printer. Run a print test. If the symptom is not gone, replace the shuttle frame assembly.

Table 5. General Symptom List

Symptom	Solution
Randomly misplaced dots	<ol style="list-style-type: none"> 1. Power off the printer. Check the platen gap. Adjust the platen gap if necessary. 2. Remove the paper guide assembly or pedestal top cover. On the left rear wall of the card cage, make sure the nut which secures the line filter ground line and the AC In Power Supply cable lead to the ground stud is tight. (See Figure 52, page 286.) 3. Disconnect the AC power cord and check the ground leads for continuity. Replace the AC power cord if it fails continuity test. 4. Make sure the printer is plugged in to a grounded power outlet. Power on the printer. Run a print test. If the problem occurs, replace the hammer bank logic cable. 5. Power on the printer. Run a print test. If the problem occurs, replace the flash memory and SDRAM. Download the emulation software again. 6. Power on the printer. Run a print test. If the problem occurs, replace the controller board. 7. Power on the printer. Run a print test. If the problem occurs, do the power supply operational check (page 194). If the power supply fails the check, replace it. If it passes the check, go to the next step. 8. Power on the printer. Run a print test. If the problem occurs, replace the shuttle frame assembly.

Table 5. General Symptom List

Symptom	Solution
<p>Vertical misalignment of characters:</p> <ol style="list-style-type: none"> 1. Dots or characters move up or down from dot row to dot row or line to line 2. Incorrect spacing from dot row to dot row or line to line 3. Characters randomly compressed and/or enlarged 	<ol style="list-style-type: none"> 1. Load paper. Press PAPER ADVANCE and check that paper feeds smoothly. Press VIEW to verify that paper moves in both directions. Check the forms thickness lever: if it is set too loose or too tightly print quality can be affected. Set the forms thickness lever to match the thickness of the paper being used. 2. Check the condition and tension of the paper feed timing belt. Adjust the paper feed timing belt. Replace the belt if it is damaged. 3. Check the platen gap. Adjust the platen gap. 4. Inspect the tractors and tractor door springs for damage, excessive wear, and equal door closing tension. If either tractor is worn, damaged, or exhibits uneven door closing tension, replace both tractor assemblies. 5. Check the dynamic paper tension. 6. Remove the paper guide assembly or pedestal top cover. Make sure connector P107/PAPR M is fully seated in connector J107 on the controller board. 7. Load paper. Power on the printer. Run a print test. If the problem occurs, replace the paper feed motor. 8. Run a print test. If the problem occurs, replace the controller board. 9. Run a print test. If the problem occurs, replace the power supply board.

Table 5. General Symptom List

Symptom	Solution
Printer Operation	
Downloads consistently fail	<p>NOTE: Most download problems are detected by software during the procedure and communicated by LCD messages. If downloads fail consistently with no messages or with erratic messages, suspect a hardware failure.</p> <ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Check the I/O cable connections from the host to the printer. Check the parallel cable connection at J112 on the controller board. Inspect all cables for damaged, bent, broken, or burnt pins. Replace any damaged cables. Reconnect all I/O cables; make sure all connections are clean and tight. 2. Remove the flash SIMM. Inspect the SIMM sockets on the controller board. If any socket pins are bent or damaged, replace the controller board. 3. Check that customer has the right size SIMM for the emulation. (See page 227) Install the SIMM that support the emulation software. 4. Power on the printer. Download the emulation (page 177). If the download fails, activate the Boot Diagnostics Menu (page 147) and run MISC. TOOLS MENU / RUN MEMORY TESTS. If memory fails test, replace the SDRAM. If memory tests OK, replace the flash SIMM.
Boot code won't copy	<ol style="list-style-type: none"> 1. Power off the printer. Remove the flash SIMM. Inspect the flash SIMM socket on the controller board. If any SIMM socket pins are bent or damaged, replace the controller board. 2. Make sure the blank SIMM is the same size as the SIMM to be copied. Install the SIMM, making sure it is fully and correctly seated. Power on the printer. From the Boot Diagnostics menu, select and run MISC. TOOLS MENU / COPY BOOT CODE. (See page 147.) If the DESTINATION NOT DETECTED message appears, the blank SIMM is not a type supported by the boot code on the original SIMM. If SOURCE LARGER THAN DESTINATION appears, the blank SIMM is not large enough to contain the code on the original SIMM. If the SIMM does not copy or the ERROR WRITING TO FLASH message appears, replace the blank SIMM. 3. Power on the printer. From the Boot Diagnostics menu, select and run MISC. TOOLS MENU / COPY BOOT CODE. If the new SIMM does not copy, replace the controller board.

Table 5. General Symptom List

Symptom	Solution
Paper feeds poorly	<ol style="list-style-type: none"> 1. Check the forms thickness lever: if it is set too tightly paper feeding can be affected. Set the forms thickness lever to match the thickness of the paper being used. 2. Power off the printer. Remove paper. Inspect the paper feed path for obstructions that could snag paper. Clear paper feed path of any obstructions. 3. Inspect the tractors and tractor door springs for damage, excessive wear, and equal door closing tension. If either tractor is worn, damaged, or exhibits uneven door closing tension, replace both tractor assemblies. 4. Check the condition and tension of the paper feed timing belt. Adjust the paper feed timing belt. Replace the belt if it is damaged. 5. Check the platen gap. Adjust the platen gap. 6. Check the dynamic paper tension. 7. Remove the shuttle frame assembly and check the following: <ol style="list-style-type: none"> a. Inspect the hammer bank cover assembly for ribbon debris, paper debris, or other foreign matter. Make sure the four foam spacers on the ribbon mask are properly seated. If the ribbon mask or hammer bank cover is damaged or deformed, replace it. b. Inspect the paper ironer for distortion or misalignment. Reposition or replace it if necessary. c. Make sure the paper guides are properly seated on the splined and support shafts. d. Make sure the paper entrance guide pivots freely with minimal down force. Reposition the springs or the guide if necessary. e. Check for correct position and function of the paper motion detector assembly. Reposition or replace if necessary. 8. Inspect the paper path from above (below the paper ironer), and from below (above the paper entrance guide), for debris, foreign matter, or anything that could inhibit paper motion. Correct as necessary. 9. Check the dynamic paper tension. 10. Remove the paper path. Make sure connector P107/PAPR M is fully seated in connector J107 on the controller board. Check for a good paper feed motor connection to J103 on the controller board.

Table 5. General Symptom List

Symptom	Solution
Paper feeds poorly (continued)	<ol style="list-style-type: none"> 11. Load paper. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper moves in both directions. Replace the paper feed motor if paper does not move in both directions. 12. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper moves in both directions. Replace the controller board if paper does not move in both directions.
Power on “hang” condition	<ol style="list-style-type: none"> 1. Remove the paper path or pedestal top cover. Reseat all cable connections to the controller board and the power supply board. 2. Power on the printer. If the printer “hangs,” replace the controller board. 3. Power on the printer. If the printer “hangs,” replace the power supply board.
Printer does not print from the host	<ol style="list-style-type: none"> 1. Check the host data cable connection at the rear of the printer. Attach the data cable to the printer interface. 2. Make a configuration printout. Verify that the printer matches host interface settings. Set printer interface parameters to match those of the host. 3. Power on the printer. Send a print job from the host. If printer does not print and the interface is RS-232, interchange the wires to pins 2 and 3. (This is the most common cause of an inoperative RS-232 cable.) Verify that the host and printer have the same baud rate, number of data bits, number of stop bits, and parity. Configure the host for XON/XOFF if possible, since this requires the least complex cable. 4. Power on the printer. Send a print job from the host. If the printer does not print from the host, replace the data and interface cable assemblies. 5. Remove the paper path or pedestal top cover. Check all cable connections on the controller board. Reseat all cable connectors on the controller board. 6. Power on the printer. Send a print job from the host. If the printer still does not print from the host, replace the controller board.

Table 5. General Symptom List

Symptom	Solution
Printer does not print self tests	<ol style="list-style-type: none"> 1. Power off the printer. Remove the paper path or pedestal top cover. Disconnect the control panel cable from connector J110 on the controller board. Disconnect the control panel cable from the control panel. Check continuity of the control panel cable assembly. Replace the control panel cable assembly if it fails continuity test. 2. Connect the control panel cable assembly to J110 on the controller board and to the control panel. Load paper. Power on the printer. Run a self test. If the self test does not run, replace the control panel assembly. 3. Power on the printer. Run a self test. If the self test does not run, replace the controller board.
Reverse paper feed: platen does not open	<ol style="list-style-type: none"> 1. Raise the forms thickness lever and check that the platen opens. If the platen opens with difficulty, inspect for and remove jams or obstructions. 2. Check the condition and tension of the platen open belt. Adjust the platen open belt. Replace the belt if it is damaged. 3. Check the platen gap. Adjust the platen gap. 4. Power off the printer. Remove the paper guide assembly. Disconnect connector P106 from the controller board. Check the resistance of connector P106/PLAT M. (Refer to the Main Wire Harness Test Tables in Appendix A.) Replace the platen open motor if it fails the resistance test. 5. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper moves in both directions. Replace the controller board if the platen does not open during paper reverse.

Table 5. General Symptom List

Symptom	Solution
TOF is lost repeatedly	<ol style="list-style-type: none">1. Check that the customer is setting the forms length to match the size paper used. Set the forms length to match the length of paper being used.2. If the customer is using multi-part forms, check that the forms thickness lever is not being set too tightly. Set the forms thickness lever to match the thickness of paper and provide satisfactory print quality, but not too tightly.3. Check the condition and tension of the paper feed timing belt. Adjust the paper feed timing belt. Replace the belt if it is damaged.4. Check the dynamic paper tension.5. Remove the paper path or pedestal top cover. Make sure connector P107/PAPR M is fully seated in connector J107 on the controller board. Connect P107/PAPR M to J107 on the controller board.6. Power on the printer. Load paper and set TOF. Press PAPER ADVANCE and VIEW several times and check that paper returns to TOF. Replace the paper feed motor if paper does not return to TOF.7. Power on the printer. Press PAPER ADVANCE and VIEW several times and check that paper returns to TOF. Replace the controller board if paper does not return to TOF.

Table 5. General Symptom List

Symptom	Solution
Shuttle	
Shuttle does not move	<ol style="list-style-type: none"> 1. Power down the printer. Remove the shuttle cover. Check the MPU gap. Adjust the gap between the MPU assembly and the flywheel to 0.010 ± 0.001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 inch-pounds (2.03 N•m). 2. Check that the MPU cable is connected to J03 on the mechanism base. Check that the shuttle motor cable is connected to J02 on the mechanism base. Connect the MPU and the shuttle motor cables. 3. Remove the paper path or pedestal top cover. Check that the shuttle motor drive cable is connected to J116 on the controller board. 4. Check the platen gap. Adjust the platen gap. 5. Inspect the ribbon mask for bends or deformation that snag and interfere with shuttle movement. Make sure the hammer bank cover assembly is correctly installed on its mounting pegs. Reinstall the hammer bank cover assembly. Replace a damaged or deformed hammer bank cover assembly. 6. Check continuity of the shuttle motor drive cable assembly. Replace shuttle motor drive cable assembly if it fails continuity test. 7. Power on the printer. Run a Shuttle Slow or Shuttle Fast test. If the shuttle does not move, replace the shuttle frame assembly. 8. Power on the printer. Run a Shuttle Slow or Shuttle Fast test. If the shuttle does not move, replace the power supply board. 9. Power on the printer. Run a Shuttle Slow or Shuttle Fast test. If the shuttle does not move, replace the controller board.

Table 5. General Symptom List

Symptom	Solution
Shuttle is noisy	<ol style="list-style-type: none">1. Check the bolts securing the mechanism base to the base pan. Tighten the mechanism base mounting bolts if they are loose enough to permit movement of the mechanism base.2. Remove the shuttle cover. Check the shuttle frame assembly mounting/clamp screws for looseness. Torque the 5/32 inch socket head clamp screws to 30 inch-pounds (3.39 N•m). Torque the center captive 5/32 inch socket head screw to 30 inch-pounds (3.39 N•m).3. Inspect the shuttle area for loose hardware. Tighten loose hardware.4. Check that the hammer bank cover assembly is correctly installed, that it has not slipped off the mounting pegs. Check that the ribbon mask has not partially separated from the hammer bank cover. Check for debris trapped between the ribbon mask, hammer bank cover, and hammer bank. Clean the shuttle frame assembly and hammer bank cover assembly if you find debris. Replace the hammer bank cover assembly if you find any damage to the ribbon mask or hammer bank cover.5. Power on the printer. Run a shuttle test. Replace the shuttle frame assembly if it is noisy or rattles.

Communications Failures

Many host-printer communications problems are complex. With the exception of a defective interface cable, most communications problems are not a result of a hardware failure. They usually result from an incompatible configuration of the host computer system, network (LAN, print server, controller, multiplexer, etc.), or the printer. Sometimes the print application program itself is at fault.

If you have limited communications experience, and the cause of the problem is not readily apparent, do the following:

1. Print out the printer configuration, including the E-Net Test Page if the customer is using the ethernet interface.
2. Obtain a copy of the Device Host Configuration if possible.
3. Call your support group for assistance in problem analysis.

If you cannot obtain support, or you have experience solving host-printer communications problems, the following additional information is provided.

You can quickly check the ASCII portion of the printer logic by sending a plain text file from a PC to the printer via the parallel or serial port. For a description of each of the ASCII interfaces, refer to the *User's Manual*.

Table 6. Communications Problems

Problem	Interface	Possible Causes & Solutions
Fails to print from host -or- Prints incorrect characters -or- Prints extra characters -or- Drops characters	Parallel	<ul style="list-style-type: none"> • Interface cable defective • Host/Network configuration • Printer logic • Terminating Resistors
	Serial	<ul style="list-style-type: none"> • Host/Printer interface cable pinouts incompatible • Host/Printer/Network configuration • Set DTR and RTS both True • Interface cable defective • Printer logic
	Twinax	<ul style="list-style-type: none"> • Interface cable defective • Host-Printer definition • Controller/Network configuration • Printer logic
	Coax	<ul style="list-style-type: none"> • Interface cable defective • Controller/Network configuration • Printer logic

Table 6. Communications Problems

	Ethernet	<ul style="list-style-type: none"> • Interface cable defective • Host/Printer/Network configuration • Printer logic
Ethernet PCBA responds to “ping” and “telnet” utilities, and can print from “ftp”, but card cannot be accessed by a browser.	Ethernet	<ol style="list-style-type: none"> 1. Open a telnet session using the IP address of the ethernet card. 2. Enter these commands: <pre>config http on save reset</pre> 3. Wait up to two minutes for the ethernet card to complete a reset cycle. 4. Close the telnet session. <p>You should be able to access the ethernet card now through a browser by using the IP address as a URL, as for example <code>http://xxx.xxx.xxx.xxx</code></p> <p>NOTE: If the ethernet card cannot be accessed by the Printer Manager, do the steps listed under “TCP Port Busy” on page 112.</p>
Ethernet PCBA responds to “ping,” “telnet,” and “ftp” utilities, but will not communicate from the host computer.	Ethernet	<ol style="list-style-type: none"> 1. Open a telnet session using the IP address of the ethernet card. 2. Enter these commands: <pre>start fox prn stop prn</pre> 3. If the fox test prints, the host computer is not configured properly.

Diagnostic Printer Tests






A set of printer tests is included in the DIAGNOSTICS configuration menu for use as diagnostic tools. Use these tests to check the print quality and basic operation of the printer. You will also use some of the tests in some adjustment procedures. The diagnostic tests are summarized below:













- **Shift Recycle** — A “sliding” alphanumeric pattern useful for identifying missing or malformed characters, improper vertical alignment, or vertical compression.
- **All E's** — A pattern of all uppercase letter E's useful for identifying missing characters, misplaced dots, smeared characters, improper phasing, or light/dark character variations.
- **E's + TOF** — A pattern of all E's repeated for ten lines and followed by a form feed to the top of the next page. This test is useful for identifying paper motion or paper feed problems.
- **All H's** — A pattern of all uppercase letter H's useful for detecting missing characters or dots, smeared characters, or improper phasing.
- **All Underlines** — An underline pattern useful for identifying hammer bank misalignment.
- **Shuttle Slow** — Exercises the shuttle and ribbon mechanisms at low speed. You can also use this test to check ribbon tracking and reversing.
- **Shuttle Fast** — Exercises the shuttle and ribbon mechanisms at high speed. You can also use this test to check ribbon tracking and reversing.
- **Shuttle Only** — Runs the shuttle mechanism with no ribbon movement.
- **Phase Printer** — A hammer timing test that permits you to adjust the hammer phase value. The hammer phase value is a timing parameter that controls the vertical alignment of dots in character printing. The numerical units are relative, they do not represent a physical measurement or value. There is no “correct” value or range. The factory prints the initial phase value on the casting of the shuttle assembly, next to the motor housing. Use this value as your starting point when adjusting hammer phasing.
- **Paperout Adj.** — Prints a vertical comb pattern. You use this pattern when you do the end of forms (paper out) adjustment procedure. The comb pattern lets you measure the number of dot rows from the completion of a paper out fault to the end of the paper.
- **Burnin Test** — Do not use. This test is used by the printer manufacturer to burn in the printer prior to shipment and has no value as a maintenance tool.
- **Print Error Log** — Prints the current log of errors. Most non-routine faults (ribbon stall, voltage faults) are stored in the error log.
- **Clear Error Log** — Clears all entries from the error log.
- **Adapter Test** — Prints the ethernet adapter statistics stored in the ethernet adapter (if present).




- **Ethernet Test** — Prints the ethernet statistics stored on the ethernet interface (if present). See page 145.
- **Acoustics** — A test used by the manufacturer to measure acoustic properties of the printer. This test has no value as a maintenance tool.
- **Demo** — Prints representative lines of the various CPI available and some sample bar codes.
- **Dice 5** — Prints all dot positions, creating a solid black band across the page. Used to detect dark and light hammer springs.
- **Print Ribbon Log** — Prints a list of the ribbons that have been used in the printer.

Selecting And Running Diagnostic Printer Tests

NOTE: You must set TOF after running any diagnostic test.











Step	Press	LCD Result	Notes
1.	Make sure the printer is on. Raise the printer cover.		
2.	Load paper.		
3.	Set TOF. (Refer to the <i>User's Manual</i> .)		
4.	ON LINE/CLEAR 	OFFLINE QUICK SETUP	The printer must be offline to run a print test.
5.	 + 	ENTER SWITCH UNLOCKED	
		OFFLINE QUICK SETUP	Unlocks ENTER key and control panel.
6.	 UNTIL	OFFLINE DIAGNOSTICS	
7.		DIAGNOSTICS Printer Tests	

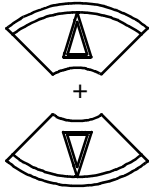

Step	Press	LCD Result	Notes
8.	 UNTIL	DIAGNOSTICS Test Width	Cycle through choices. X = Full Width or X = 80 columns.
9.		Test Width Full Width*	
10.	 OR 	Test Width X	
11.	ENTER 	Test Width X*	
12.		DIAGNOSTICS Test Width	
13.	 UNTIL	DIAGNOSTICS Printer Tests	
14.		Printer Tests Shift Recycle*	
15.	 OR 	Printer Tests All E's	
16.	ENTER 	Printer Tests All E's*	
17.	ENTER 	Printer Tests All E's*	Stops test.

Step	Press	LCD Result	Notes
18.	 + 	ENTER SWITCH LOCKED	Locks the ENTER key and control panel.
19.	ON LINE/CLEAR 	ONLINE LinePrinter+	Places the printer in online mode.
20.	Examine print quality. Characters should be fully formed and of uniform density.		
21.	Set TOF. (Refer to the <i>User's Manual</i> .)		

Printing The Ethernet Test

NOTE: You must set TOF after printing the Ethernet Test.

Step	Press	LCD Result	Notes
1.	Make sure the printer is on. Raise the printer cover.		
2.	Load paper.		
3.	Set TOF. (Refer to the <i>User's Manual</i> .)		
4.	ON LINE/CLEAR 	OFFLINE QUICK SETUP	The printer must be offline to run a print test.
5.	 + 	ENTER SWITCH UNLOCKED	
		OFFLINE QUICK SETUP	
6.	 UNTIL	OFFLINE DIAGNOSTICS	
7.		DIAGNOSTICS Printer Tests	
8.		Printer Tests Shift Recycle	
9.	 OR 	Printer Tests Ethernet Test	
10.	ENTER 	Printer Tests Ethernet Test*	Starts printing.
11.	ENTER 	Printer Tests Ethernet Test	Stops printing.

Step	Press	LCD Result	Notes
12.		ENTER SWITCH LOCKED	Locks the ENTER key and control panel.
13.	ON LINE/CLEAR 	ONLINE LinePrinter+	Places the printer in online mode.
14.	Set TOF. (Refer to the <i>User's Manual</i> .)		

Boot Diagnostics Menu

Printer boot-up software contains a “Boot Diagnostics” menu that you can access by holding down two keys while powering on the printer. This menu is not intended for the end user, but provides useful information for manufacturing and maintenance personnel.

The boot diagnostics menu is a multi-level menu that operates the same way as the user menus. The menu structure is shown in Figure 8 on page 148.

Activating The Boot Diagnostics Menu

1. Set the printer power switch to O (off).
2. On the control panel, press and hold down ◀ + ▼.
3. While holding ◀ + ▼, set the printer power switch to 1 (on).
4. When “BOOT DIAGNOSTICS / PRESS ENTER” appears on the LCD, release the ◀ + ▼ keys and press the **ENTER** key. Menu options are shown in Figure 8.

Exiting The Boot Diagnostics Menu

Method 1: Use the exit option in the Boot Diagnostics Menu

1. Using the arrow keys, move to the DIAGNOSTICS MENU / EXIT DIAGNOSTICS menu option. (Refer to the menu map on page 148.)
2. Press the **ENTER** key. The printer goes into startup initialization. (B30: STATUS INITIALIZING...)

Method 2: Cycling power

1. Power off the printer.
2. Wait 15 seconds.
3. Power on the printer.

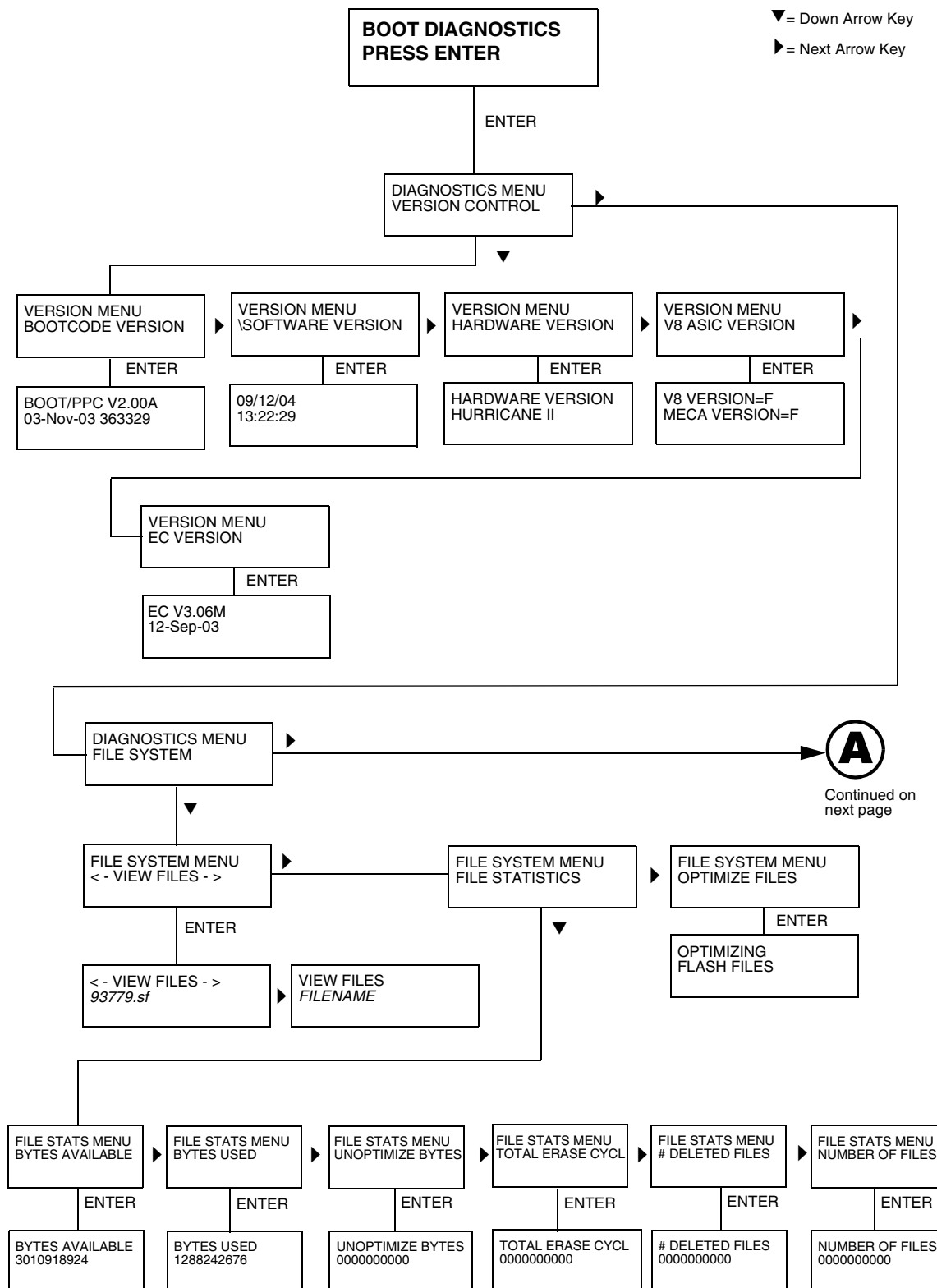


Figure 8. Boot Diagnostics Menu

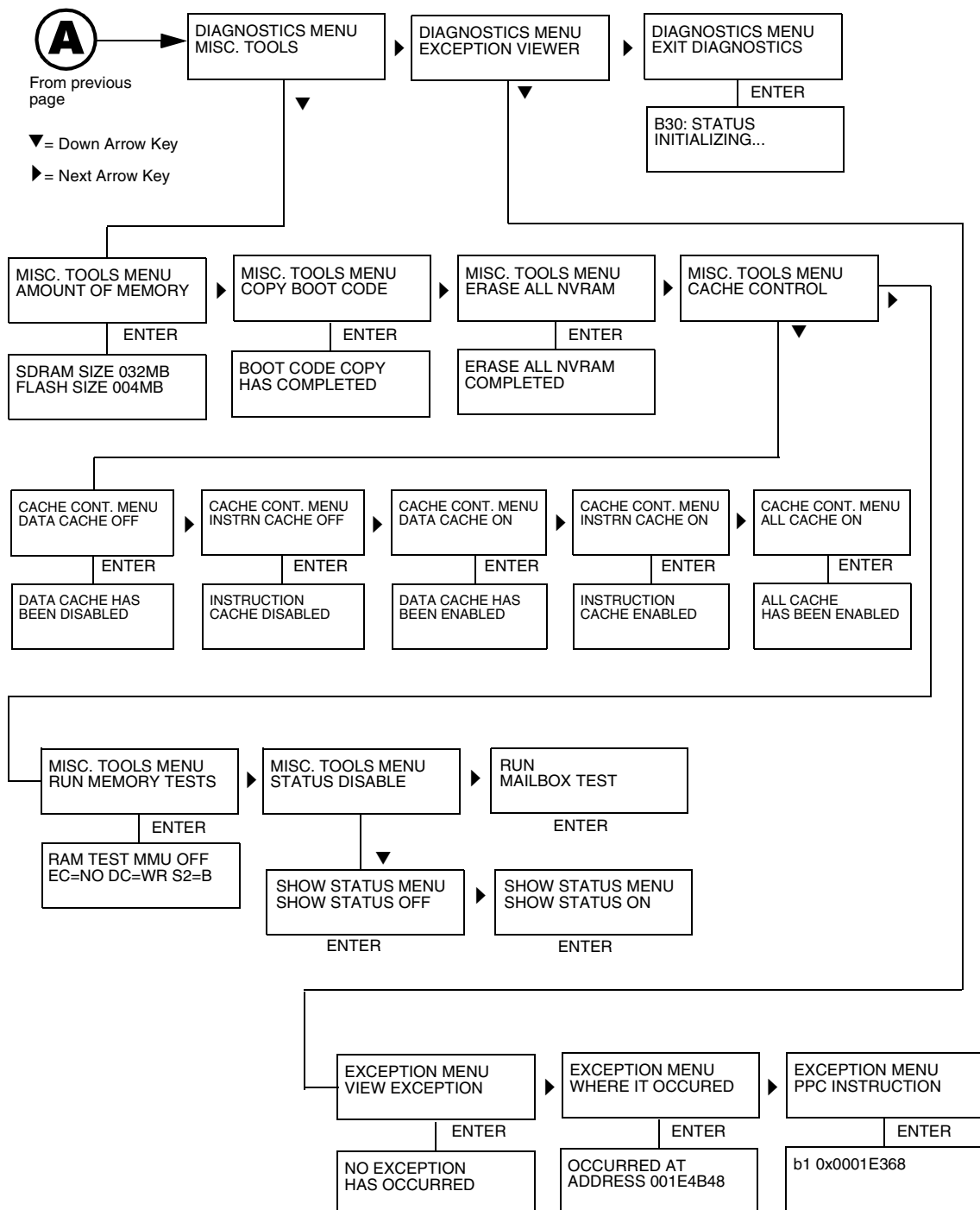


Figure 7. Boot Diagnostics Menu (continued)

Factory Menu

Printer software contains a Factory menu that you can access by holding down the four arrow keys when the printer is in the offline state. This menu is not intended for the end user, but is used by manufacturing and maintenance personnel to set or change certain operational parameters.

The factory menu is a multi-level menu that operates the same way as the user menus. The menu structure is shown in Figure 9 on page 151.

IMPORTANT If you do not know the purpose of a setting or value in the Factory Menu, **DO NOT** change it. Default menu values set at the factory are indicated by an asterisk (*) next to the value.

Entering The Factory Menu

1. Plug the AC power cord into the printer and the power source.
2. Power on the printer.
3. The printer must be offline to do this procedure. If the printer is online, press the **ON LINE** key. "OFFLINE / QUICK SETUP" will display.
4. On the control panel, press the **▲ + ▼** keys to unlock the **ENTER** key. "ENTER SWITCH UNLOCKED" briefly displays. (If "LOCKED" displays, simply press **▲ + ▼** again. This is the default key combination. The lock/unlock key combination can be programmed by the user. If **▲ + ▼** does not unlock the **ENTER** key, get the new key combination from the user.)
5. Press **▲ + ▼ + ► + ◄** to enter the factory menu. (Press all four keys at the same time.) "Factory / Set Coil Temp" appears on the display. Menu options are shown in Figure 9.
6. Before exiting the factory menu, press the **▲ + ▼** keys to lock the **ENTER** key.

Exiting The Factory Menu

Press **ON LINE** to exit the Factory menu.

▼ = Down Arrow Key

► = Next Arrow Key

Press **ENTER** to select or activate.

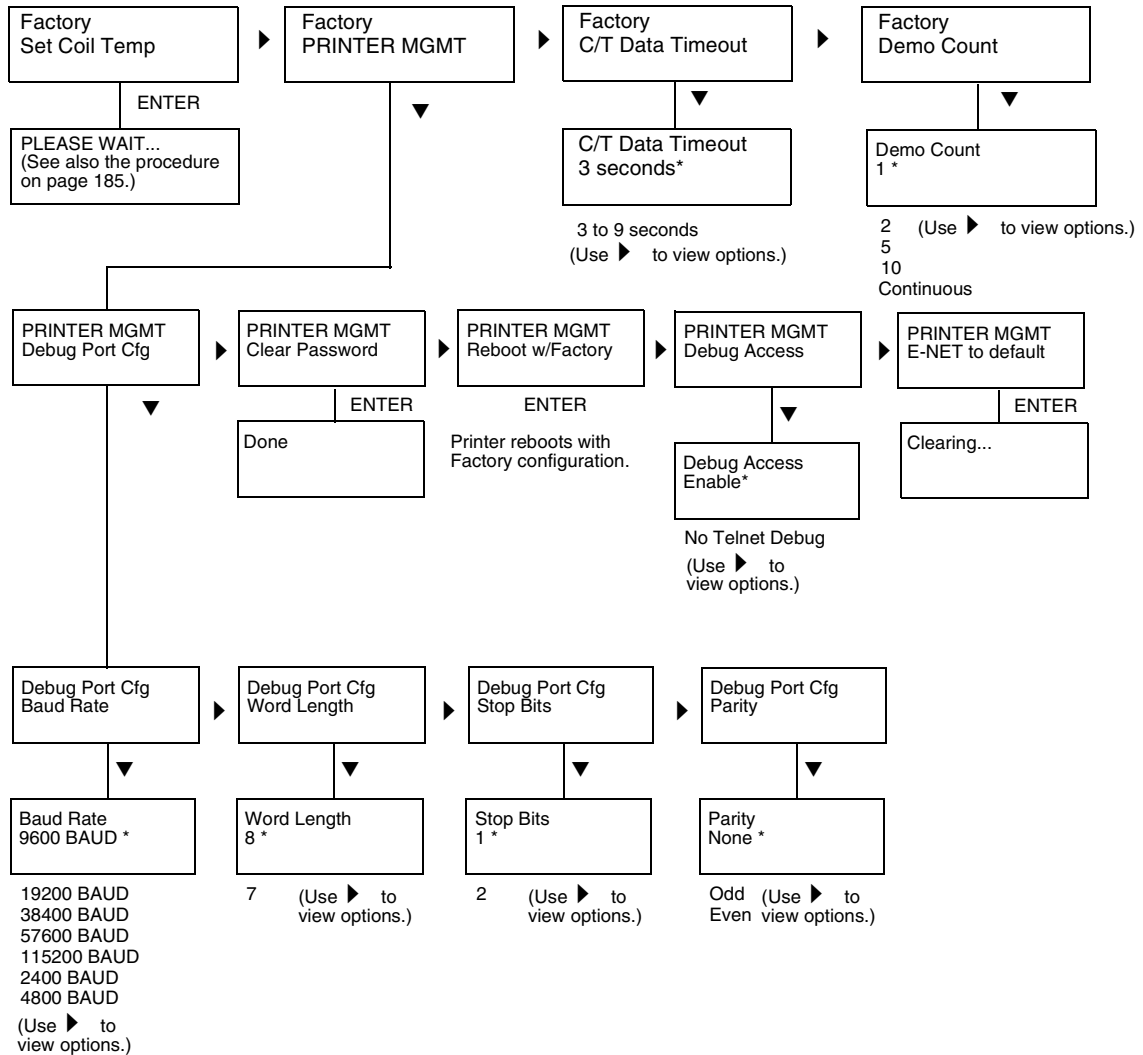


Figure 9. Factory Menu

Exception Menu

The exception menu is only accessible when certain faults occur. It provides additional troubleshooting information for some fault messages.

You will only use this menu when directed to by a troubleshooting procedure. When you come to this procedure, the printer will be powered on, with a specific fault message displayed which prevents further operation.

1. Press the ▲ (UP arrow) key seven (7) times. "Exception Menu / View Exception" will display.
2. Press the **ENTER** key. The cause of the fault will display. **Write down the cause of the fault.** (For example, "Machine Check Exception Error: Machine Check.")
3. Press the ► (RIGHT arrow) key **twice**. "Where it Occurred" will display.
4. Press the **ENTER** key. The address of the fault will display. **Write down the address of the fault.** (For example, "002BA160")
5. Press the ► (RIGHT arrow) key **twice**. "PPC Instruction" will display.
6. Press the **ENTER** key. The instruction that caused the fault will display. **Write down the instruction that caused the fault.** (For example, "r00,r09,0x0001 - > r0")
7. Power off the printer. Provide the messages you recorded to your next higher support facility.
8. Return to the troubleshooting procedure that sent you here.

Hex Code Printout

A hex code printout (or “hex dump”) prints every ASCII data character received from the host computer, and lists its corresponding two-character hexadecimal code. (See Figure 10 below.) You can use hex dumps as an aid in troubleshooting data reception problems.












In a hex dump every printable character is printed both as its assigned symbol and as its hex equivalent. Every unprintable (ASCII control) character is printed out as a period (.) and its hex equivalent. If the printer is using a parallel interface, the letter “p” before a hex code indicates an active Paper Instruction (PI) line, and a blank space before a hex code indicates an inactive PI line.


To convert an ASCII character to its corresponding hex code, or vice versa, refer to the ASCII code chart on page 156. To make a hex code printout, refer to the procedure on page 154.

!"#\$%&'()*+,-./	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
0123456789:;<=>?	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
@ABCDEFGHIJKLMNO	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
PQRSTUVWXYZ[\]^_	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
`abcdefghijklmnopqrstuvwxyz{~	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
!"#\$%&'()*+,-./0	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
123456789:;<=>?@	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
ABCDEFGHIJKLMN	90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
OPQRSTUVWXYZ[\]^_	AA	AB	AC	AD	AE	AF	B0	B1	B2	B3	B4	B5	B6	B7	B8	B9
`abcdefghijklmnopqrstuvwxyz{~	BA	BB	BC	BD	BE	BF	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9
!"#\$%&'()*+,-./0	CA	CB	CC	CD	CE	CF	DA	DB	DC	DD	DE	DF	E0	E1	E2	E3
123456789:;<=>?@	EA	EB	EC	ED	EE	EF	FA	FB	FC	FD	FE	FF				
ABCDEFGHIJKLMN																
OPQRSTUVWXYZ[\]^_																
`abcdefghijklmnopqrstuvwxyz{~																

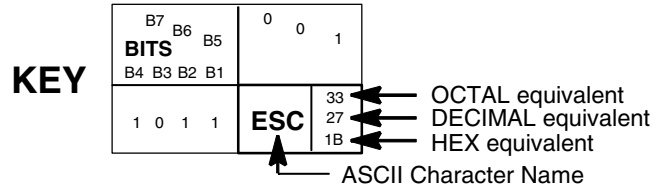
Figure 10. Sample Hex Dump

How To Print A Hex Dump

Step	Press	LCD Result	Notes
1.	Make sure the printer is on. Raise the printer cover.		
2.	ON LINE/CLEAR 	OFFLINE QUICK SETUP	Unlocks the ENTER key and control panel.
3.	 + 	ENTER SWITCH UNLOCKED	
		OFFLINE QUICK SETUP	
4.	 UNTIL	OFFLINE MAINT / MISC	Default
5.		MAINT / MISC Hex Dump Mode	
6.		Hex Dump Mode Disable*	
7.	 OR 	Hex Dump Mode Enable	Cycle through choices.
8.	ENTER 	Hex Dump Mode Enable*	Asterisk (*) indicates choice is active.
9.	 + 	ENTER SWITCH LOCKED	Locks the ENTER key and control panel.

Step	Press	LCD Result	Notes
10.	ON LINE/CLEAR 	ONLINE LinePrinter+	Places the printer in online mode.
11.	Send a file from the host computer. the printer outputs a hex dump. Refer to the ASCII chart on page 156.		
12.	When the hex dump is complete, take the printer offline and change the Hex Dump Mode back to Disable. Follow the steps outlined above and select Disable.		

ASCII Character Set



B7 B6 B5 BITS B4 B3 B2 B1	ROW	COLUMN								OCTAL equivalent	DECIMAL equivalent	HEX equivalent	ASCII Character Name
		0	1	2	3	4	5	6	7				
0 0 0 0	0	NUL	DLE	SP	0	@	P	\	p				
0 0 0 1	1	SOH	DC1 (XON)	!	1	A	Q	a	q				
0 0 1 0	2	STX	DC2	"	2	B	R	b	r				
0 0 1 1	3	ETX	DC3 (XOFF)	#	3	C	S	c	s				
0 1 0 0	4	EOT	DC4	\$	4	D	T	d	t				
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u				
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v				
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w				
1 0 0 0	8	BS	CAN	(	8	H	X	h	x				
1 0 0 1	9	HT	EM	)	9	I	Y	i	y				
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z				
1 0 1 1	11	VT	ESC	+	;	K	[	k	{				
1 1 0 0	12	FF	FS	,	<	L	\	l	|				
1 1 0 1	13	CR	GS	-	=	M	]	m	}				
1 1 1 0	14	SO	RS	.	>	N	^	n	~				
1 1 1 1	15	SI	US	/	?	O	_	o	DEL				

Soft vs. Hard Reset

Soft Reset

A soft(ware) reset clears printer memory then loads the power-up configuration set by the user. (If no power-up configuration has been set by the user, the factory default configuration is loaded.) It is called a soft reset because no hardware is tested. All diagnostic and initialization tests are bypassed and memory is simply refreshed with the power-up printer configuration.

The printer must be offline to do a soft reset:

1. Press the **ON LINE** key to put the printer in the offline state.
2. Press the ◀ + ▶ keys simultaneously.

The LCD will display “Standby / Soft Reset” while the printer loads the power-up configuration.

Hard Reset (“Cycle Power”)

A hard(ware) reset is a power shutdown and restart that runs all initialization and diagnostic routines. This is also called “cycling power.”

1. Set the printer power switch to O (off).
2. Wait 15 seconds.
3. Set the printer power switch to 1 (on).

NOTE: A hard printer reset causes the +48V power supply (fans, motors, etc.) to shut down in 1 to 5 seconds, depending on the amount of memory installed on the controller board.

4

Adjustments and Tests

Introduction

The printer is a durable, low-maintenance machine, but some components and systems require occasional adjustment and may need to be tested as part of a troubleshooting procedure.

You usually will be referred to this chapter by a troubleshooting procedure, or as part of a removal/installation procedure.

Adjustments and Tests

Preparing the Printer for Maintenance	page 160
Returning the Printer to Normal Operation.....	page 161
Belt, Paper Feed Timing, Adjustment	page 162
Belt, Platen Open, Adjustment	page 164
Paper Scale Alignment.....	page 166
Platen Gap Adjustment	page 168
Ribbon Guide Alignment	page 170
Paper Out Adjustment.....	page 172
Hammer Phasing Adjustment	page 175
Loading Flash Memory.....	page 177
Reprogramming the Security Key	page 183
Coil Temperature Adjustment	page 185
Dynamic Paper Tension Adjustment.....	page 186
Tractor Belt Tension Adjustment.....	page 188
Shuttle Electrical Short Check.....	page 189
Hammer Bank Power Cable Shorts Test	page 190
Cable Shorts Test	page 191
Main Wire Harness Test Diagnostic.....	page 193
Power Supply Operational Check	page 194

Preparing The Printer For Maintenance

WARNING Unplug the printer power cord from the printer or power outlet before you do any maintenance procedure. Failure to remove power could result in injury to you or damage to equipment. If you must apply power during maintenance, you will be instructed to do so in the maintenance procedure.

IMPORTANT Do not try to repair electronic components or assemblies in the field. Do not de-solder or re-solder any circuit board components. Replace a malfunctioning electronic assembly with an operational spare. Most electronic problems are corrected by replacing the printed circuit board assembly, sensor, or cable that causes the fault indication. This is also true of failures traced to the hammer bank—it is not field repairable and you must replace the entire shuttle frame assembly. Hammer spring assemblies are the only replaceable components of the shuttle frame assembly.

To prepare the printer for maintenance, do the following steps before you make any adjustments or perform any maintenance procedure:

1. Set the printer power switch to O (off).
2. Unplug the printer power cord from the printer or AC power source.
3. Disconnect the data (signal) cable(s) from the printer interface.
4. Unload paper.
5. Read the entire adjustment or maintenance procedure before you begin working on the printer.
6. Gather the necessary tools and parts before you begin working on the printer.

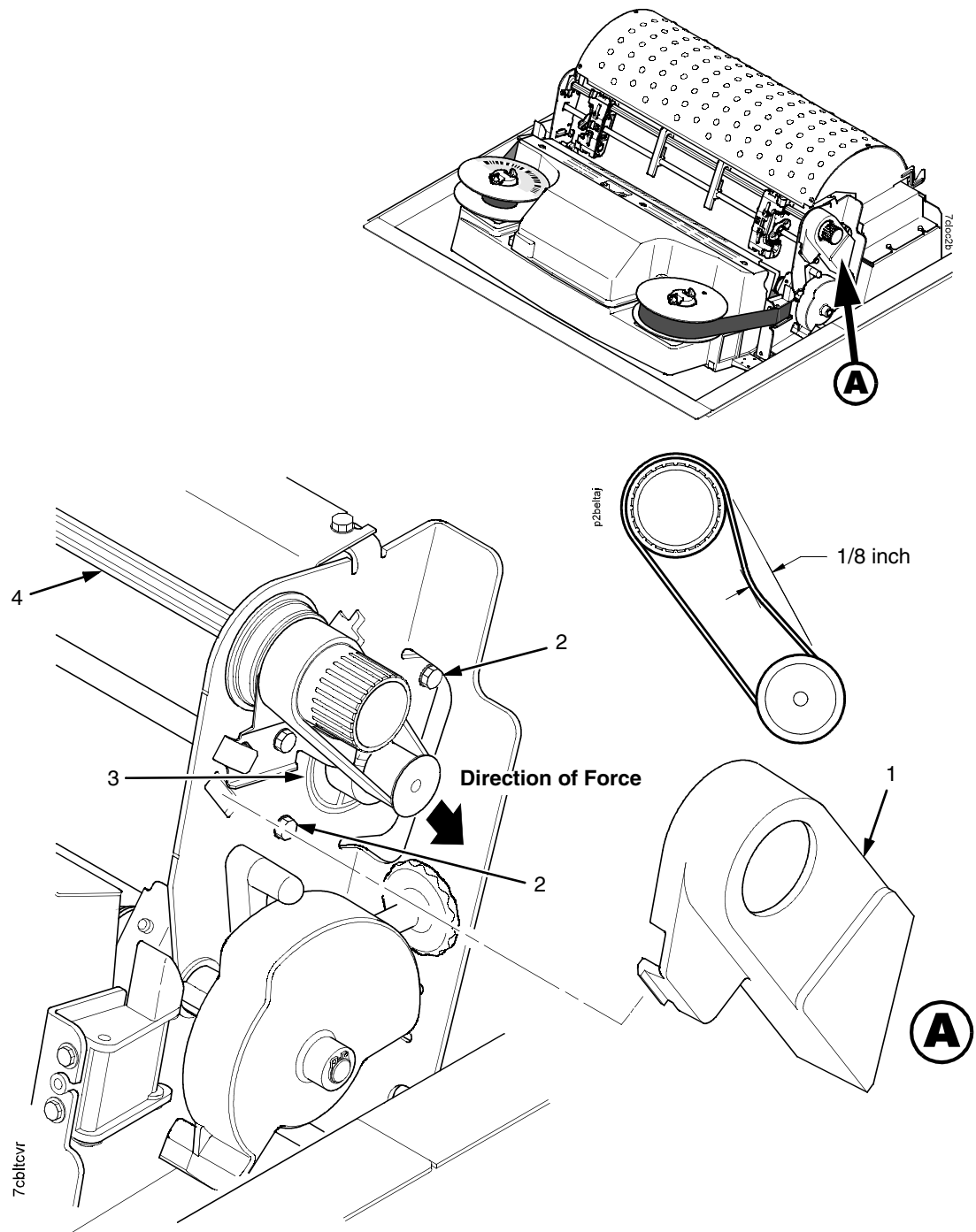
Returning The Printer To Normal Operation

When you have finished servicing the printer, return it to service by doing the following steps:

1. Load paper.
2. Connect the data (signal) cable(s) to the printer interface.
3. Plug the AC power cord into the printer and the power source.
4. Close the cabinet doors and the printer cover.
5. Set the printer power switch to I (on).
6. Test printer operation by selecting and running one of the operator print tests. (See page 141.)
7. Select the emulation. (Refer to the *User's Manual*.)
8. Set the top-of-form. (Refer to the *User's Manual*.)

Belt, Paper Feed Timing, Adjustment

1. Prepare the printer for maintenance (page 160).
 2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
 3. Remove the timing belt cover (1) by squeezing the front and back to release the plastic tabs from the slots in the side plate.
 4. Loosen (do not remove) the two 5/16 inch motor mount bolts (2).
 5. Using the straight end of a force gauge, apply 15 pounds (66.7 N) of pressure to the paper feed drive motor (3). Use the splined shaft (4) to steady the gauge.
 6. Reduce tension to 12 pounds (53.4 N) and torque the 5/16 inch paper feed motor mount bolts (2) to 18 inch-pounds (2.03 N•m).
- NOTE:** Belt tension is correct if the belt deflects 1/8 inch (3.175 mm) midway between the pulleys.
7. Snap the timing belt cover (1) into the slots in the side plate.
 8. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
 9. Return the printer to normal operation (page 161).



Legend:

- 1) Timing Belt Shield
- 2) Motor Mount Bolt (2)
- 3) Paper Feed Drive Motor
- 4) Splined Shaft

Figure 11. Paper Feed Timing Belt Adjustment

Belt, Platen Open, Adjustment

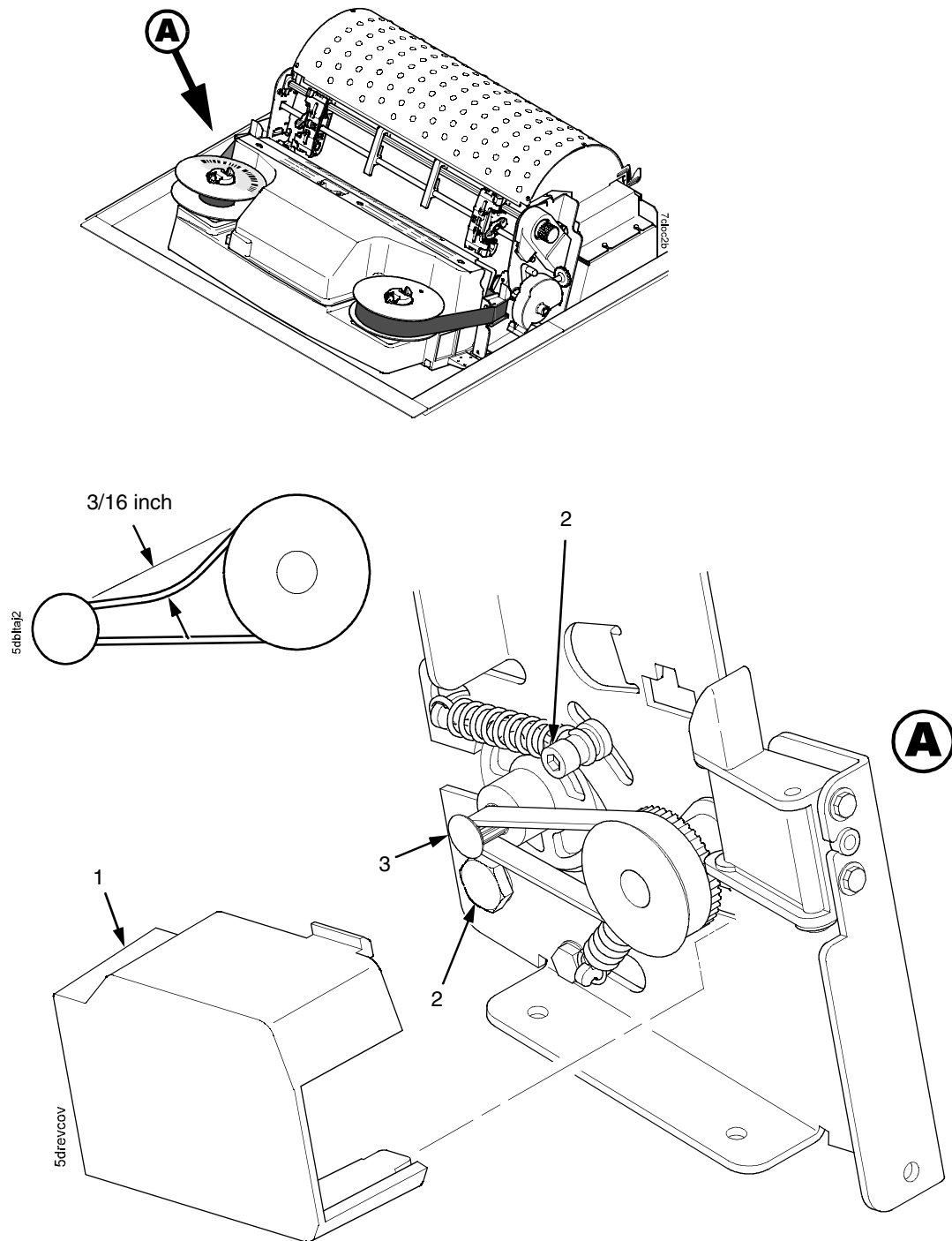
1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the platen open belt cover (1) by squeezing the top and bottom to release the plastic tabs from the slots in the side plate.
4. Using a 5/32 inch Allen wrench, *slowly* loosen the motor adjustment screw (2) just enough to permit movement of the platen open motor in the slotted side plate.
5. Close the forms thickness lever all the way.

CAUTION Too much tension on the platen open belt can cause the platen gap to change, which can lead to premature wear of the platen, damaged hammer tips, and poor print quality.

6. The spring will automatically tension the belt.
7. *Slowly* tighten the motor adjustment screw (2).

NOTE: Belt tension is correct if the belt deflects 3/16 inch (4.76 mm) midway between the pulleys. If deflection is more or less than 3/16 inch, repeat steps 4 through 7.

8. Snap the platen open belt cover (1) into the slots in the side plate.
9. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
10. Return the printer to normal operation (page 161).

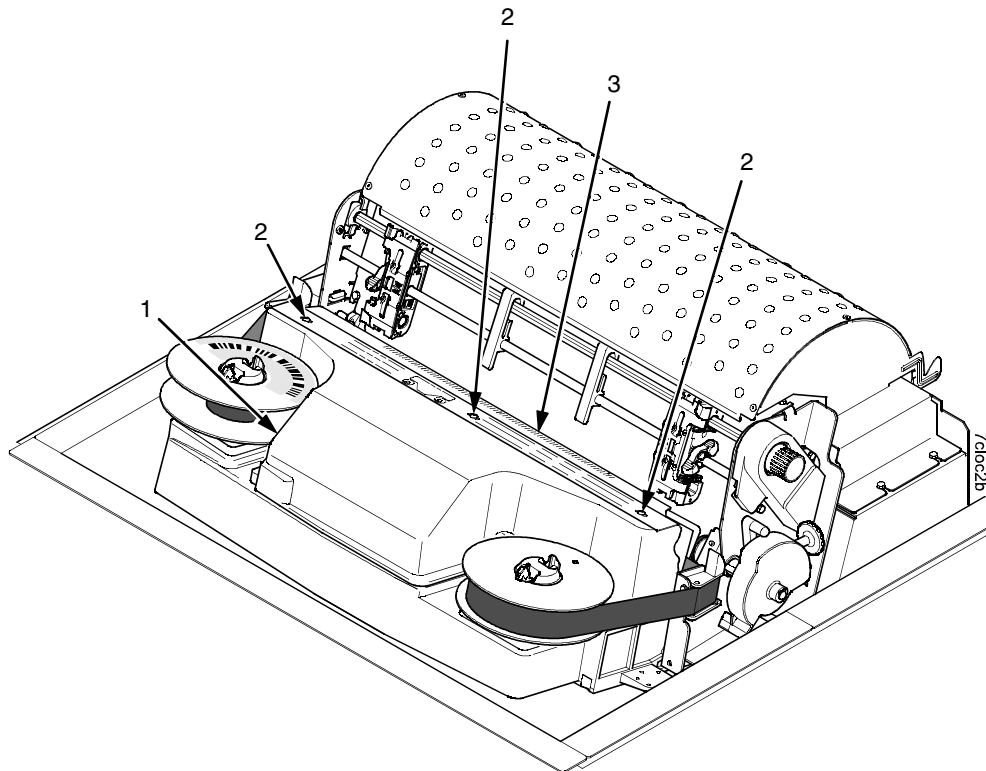
**Legend:**

- 1) Belt Cover
- 2) Motor Mount Screw (2)
- 3) Platen Open Motor Shaft

Figure 12. Platen Open Belt Adjustment

Paper Scale Alignment

1. Open the printer cover.
2. Load paper.
3. Connect the power cord to the AC power source.
4. Set the printer power switch to 1 (on).
5. Verify that the shuttle cover (1) is properly installed (page 210).
6. Print a full 136 column line by selecting and running one of the diagnostic self-tests. (See page 141.)
7. Check alignment of the scale to the print at column positions 1 and 136.
8. If adjustment is necessary, loosen the three 5/64 inch button-head hex screws (2).
9. Position the scale (3) so that column positions 1 and 136 line up with the first and last characters on the 136 character printout.
10. Tighten the 5/64 inch button-head hex screws (2).
11. Close the printer cover.

**Legend:**

- 1) Shuttle Cover
- 2) Screw, Button-Head, 5/64 inch hex (3)
- 3) Paper Scale

Figure 13. Paper Scale Alignment

Platen Gap Adjustment

IMPORTANT Only do this procedure if the original equipment shuttle frame assembly or platen was replaced by a new or refurbished unit, or if you were instructed to in a troubleshooting procedure.

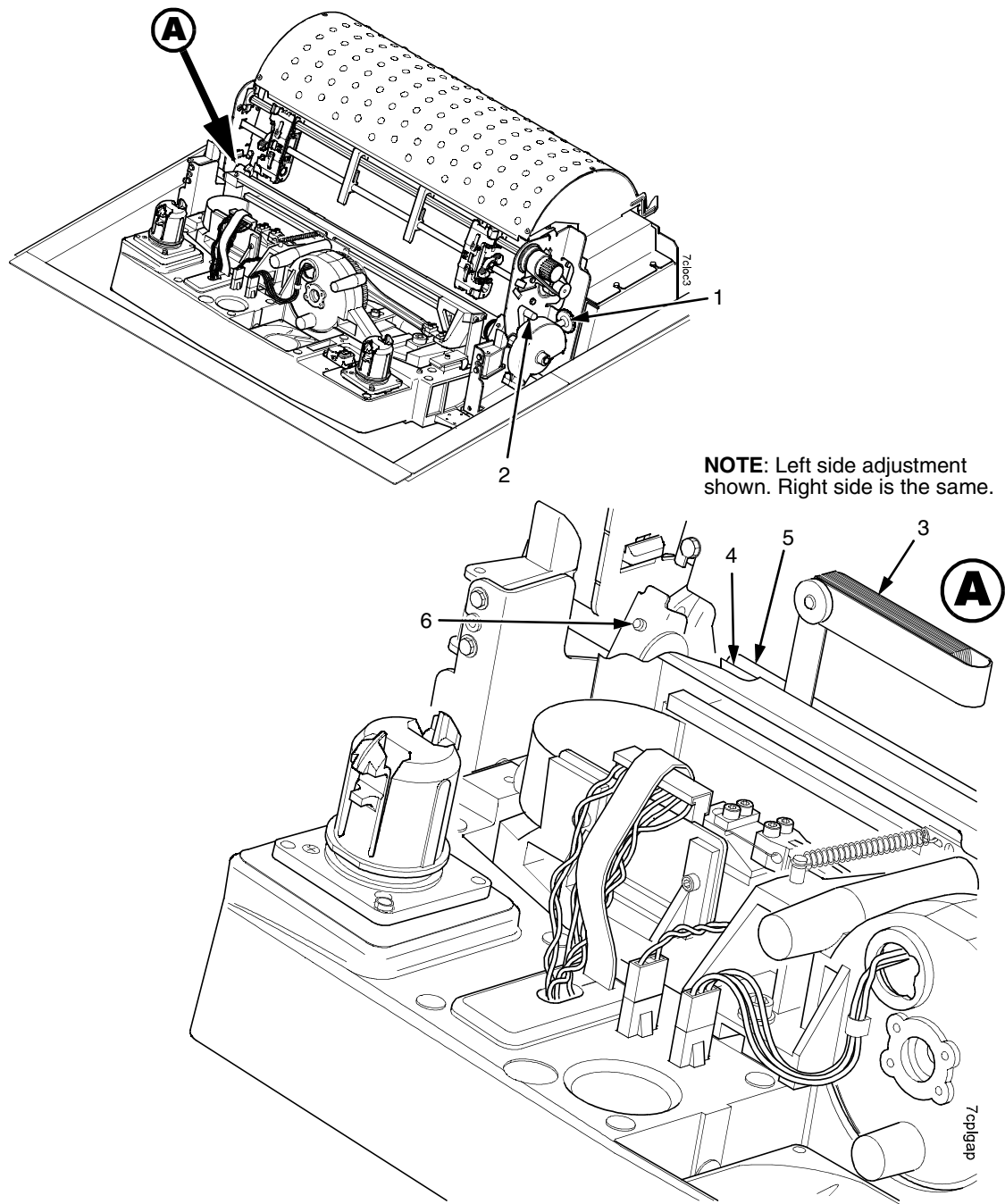
1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon and paper. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 210).
4. Loosen the platen open belt (page 164, steps 2, 3, and 4).
5. Rotate the platen stop knob (1) until the white pointer is aligned with "A" on the forms thickness label.
6. Raise the forms thickness lever (2) to the fully open position.

CAUTION Do not force the platen against the feeler gauge and do not move the feeler gauge laterally across the hammer bank. Damage to the hammer tips will result.

7. Insert the flat feeler gauge (3) straight down between the hammer bank cover plate (4) and ribbon mask (5), within four hammer positions of the left end of the hammer bank.

CAUTION Adjust the platen setscrews less than 1/4 turn on one side, then check the other side. Adjustment sensitivity is approximately 0.03 inch per revolution of the setscrew. Also, insert the feeler gauge no more than 2 inches down from the top of the ribbon mask.

8. Gently close the forms thickness lever (2) all the way. As the platen is closing, gently slide the feeler gauge up and down, keeping it between the hammer tip and ribbon mask. If the feel is too tight when the platen is being closed, adjust the 3/32 inch setscrew (6) at the end of the platen counterclockwise. If the feel is too loose, adjust the setscrew clockwise. With the forms thickness lever closed all the way, the feeler gauge should contact both the hammer tips and the ribbon mask and move with light friction. Shift the gauge slightly to verify.
9. Repeat steps 6 through 8 at the right end of the hammer bank.
10. After adjusting both sides, check the gap again at both ends. Readjust if necessary.
11. When the platen gap is correct at both ends of the platen, adjust the platen open belt (page 164).
12. Install the shuttle cover assembly (page 210).
13. Install the ribbon. (Refer to the *User's Manual*.)
14. Check the hammer phasing adjustment (page 175).
15. Return the printer to normal operation (page 161).

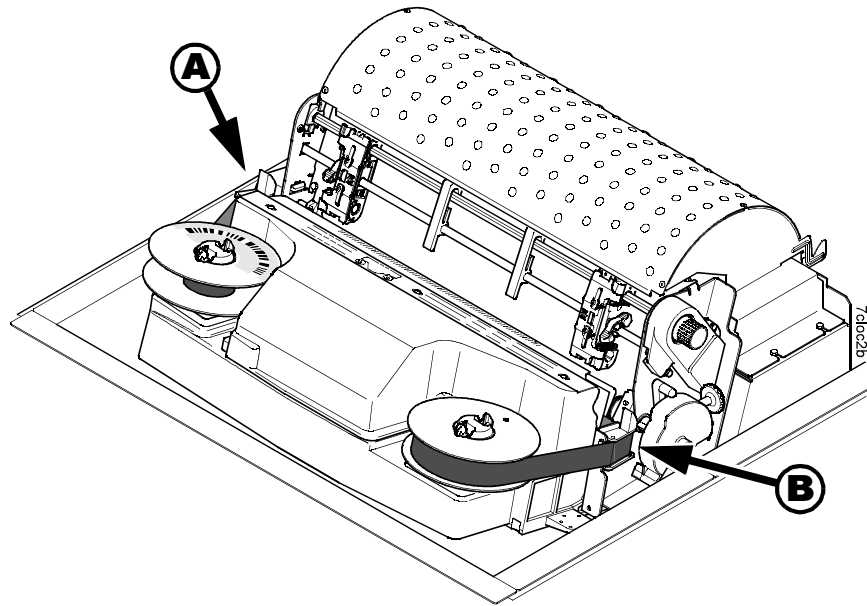
**Legend:**

- 1) Platen Stop Knob
- 2) Forms Thickness Lever
- 3) Feeler Gauge
- 4) Hammer Bank Cover
- 5) Ribbon Mask
- 6) Setscrew, 3/32 inch hex (2)

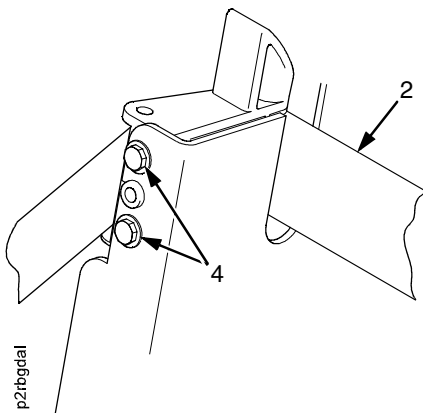
Figure 14. Platen Gap Adjustment

Ribbon Guide Alignment

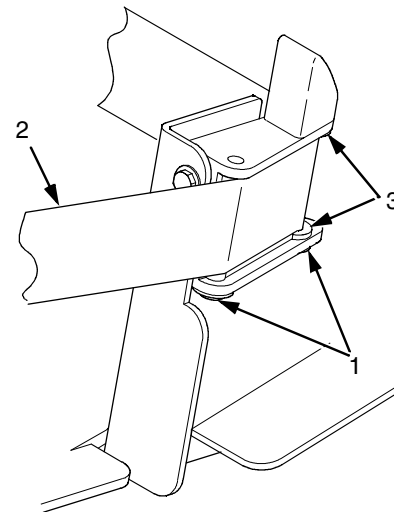
1. Open the printer cover.
2. Load paper.
3. Install the ribbon. (Refer to the *User's Manual*.)
4. Using the Shuttle Slow diagnostic printer test (page 141), wind the ribbon fully onto the ribbon spool on the side opposite the ribbon guide you want to adjust. For example, to align the right ribbon guide, wind the ribbon until the left ribbon spool is full. (You can reverse ribbon tracking by shorting across the ribbon guide skid screws (1) with a screwdriver or Allen wrench.)
5. Check ribbon tracking by running the Shuttle Slow diagnostic printer test. (See page 141.)
6. On the ribbon guide to be adjusted, momentarily short between the ribbon guide skid screws (1) to verify that the ribbon reverses.
7. Observe how the ribbon (2) passes around and across the ribbon guide. It should be centered and not folding against the top or bottom washers (3).
8. If the ribbon is not centered, stop the Shuttle Slow test. Use a small 7/32 inch box-end/open-wrench to loosen the retaining screws (4) just enough so that you can rotate the ribbon guide to new positions, but it will remain in place once moved.
9. Rotate the ribbon guide as required to center the ribbon (2).
10. Tighten the retaining screws (4).
11. Allow most of the ribbon to wind onto the ribbon spool on the side you adjusted, then repeat steps 5 through 10 for the other ribbon guide.



A Left Ribbon Guide



Right Ribbon Guide **B**



Legend:

- 1) Screw, Skid (2)
- 2) Ribbon
- 3) Steel Washer
- 4) Screw, Retaining (2)

Figure 15. Ribbon Guide Alignment

Paper Out Adjustment

This procedure tests and sets the distance from the page perforation at which a LOAD PAPER fault message is triggered. This adjustment prevents printing on the platen when the printer runs out of paper.

The measurement units are dot rows.

You will use the dot row patterns printed by the Paperout Adj. test to verify that this parameter is set correctly.

NOTE: Do this procedure only if a new paper detector switch assembly has been installed, the controller board has been replaced, or if you are sure the paper out adjustment is incorrect. A paper out triggering distance of 1 or 2 dot rows above the perforation is acceptable; 5 to 7 dot rows above or any dot rows below indicates adjustment is required. Also, although it is not required, it is advisable to test the paper out triggering distance with 6-part paper, in order to verify correct printing with multi-part forms.

The procedure below describes how to run the Paperout Adj. test and modify the paper out “Dots” value.

1. Open the printer cover.
2. On cabinet models, open the cabinet front door.
3. Load paper. Make sure the forms thickness lever is closed.
4. Power on the printer.
5. On the sheet of paper just below the paper entrance slot, cut or tear a four inch square on the left side, immediately below the perforation. (See Figure 16.) This creates a hole that will trigger a LOAD PAPER fault message, but allows printing to the right of the hole (which would occur on the platen in a true paper out condition).
6. Cut or tear a four inch square in the manner described above, on every third sheet, until you have made 3 or 4 holes.

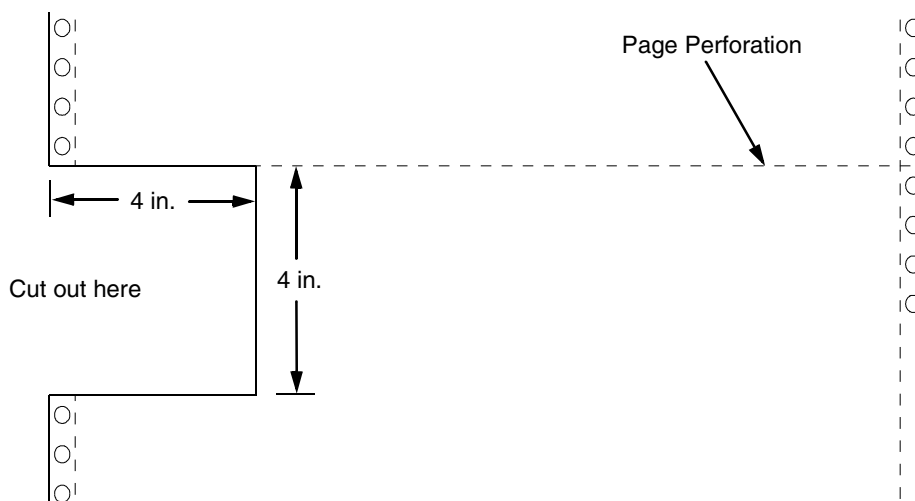
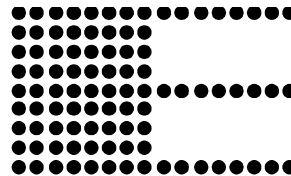


Figure 16. Paper Preparation for Paper Out Adjustment Test

7. If the printer is online, press the **ON LINE** key to place the printer offline. "OFFLINE / QUICK SETUP." displays.
8. On the control panel, press the **▲ + ▼** keys to unlock the **ENTER** key. "ENTER SWITCH UNLOCKED" briefly displays. (If "LOCKED" displays, simply press **▲** and **▼** again. This is the default key combination. The lock/unlock key combination can be programmed by the user. If **▲ + ▼** does not unlock **ENTER**, get the new key combination from the user.)
9. Press the **◀** key until "DIAGNOSTICS" displays.
10. Press **▼**. "DIAGNOSTICS / Printer Tests" displays.
11. Press **▼**. "SHIFT / RECYCLE" displays.
12. Press **▶** until "Paperout Adj." displays.

This test will print a vertical "comb" pattern at around column 70, each long bar separated by three shorter bars. An enlarged example of the comb pattern is shown below.



13. Press **ENTER** until the Paper Out Adjustment test starts. The comb pattern will print until the display shows "LOAD PAPER" and the audible alarm sounds.
 14. Open the platen and move the paper up with the vertical position knob and examine the area of the page perforation.

If a long bar just meets the perforation, the paper out adjustment distance is correct, skip to step 27. (1 or 2 dot rows above the perforation is OK; 5 to 7 dot rows above or any dots below the perforation mean adjustment of the Paper Out Dots value is required.)

If the comb pattern stopped short of the perforation or printed beyond the perforation, go to step 15.
 15. Measure how short or long the comb pattern printed by counting the number of dot rows needed to reach the perforation, or the number of dot rows that printed beyond the perforation.
- NOTE:** You can use the long bars to count the dot rows quickly. There are three dot rows between each long bar, so each long bar increases the number of dot rows by four. You can also tear off a small piece of the comb pattern from the beginning of the pattern and use it as a ruler to help you measure the dot rows required either to reach the perforation or back up to it.
16. Close the platen.
 17. Press **CLEAR** to remove the fault condition. "OFFLINE / QUICK SETUP" displays.
 18. Press the **◀** key until "DIAGNOSTICS" displays.
 19. Press **▼**. "DIAGNOSTICS / Printer Tests" displays.

20. Press **▶** until “Paper Out Dots” displays.
21. Press **▼**. The top line of the display will show “Paper Out Dots” and the bottom line will show the current setting for the number of dots.
22. Press **▼**. The number of dots will move up to the top line of the display with an asterisk (*) next to it.
23. Using the **▶** or **◀** key, adjust the XX DOTS value up or down by the number of dots you counted in step 15. (If the comb pattern stopped short of the perforation, increase the number of dots. If the comb pattern printed beyond the perforation, decrease the number of dots.)
24. Press **ENTER** to select the new number of dots as the active value. (The asterisk that appears tells you that it is now the active value.)
25. Press **CLEAR** to place the printer offline.
“OFFLINE / QUICK SETUP” displays.
26. Run the Paper Out Dots and the Paper Out Adjustment tests until the comb pattern prints at an acceptable distance from the page perforation. (Return to step 10.)
27. When the paper out triggering distance is acceptable, reload the paper, feed it past any remaining unused holes that you tore in it, and set the top of form.
28. Press **▲ + ▼** (or the key combination set by the user). “ENTER SWITCH LOCKED” briefly displays.
29. Close the printer cover.
30. Press the **ON LINE** key to place the printer online.

Hammer Phasing Adjustment

You must check and adjust hammer phasing if the controller board is replaced, the shuttle frame assembly is removed, or if the MPU is replaced.

The hammer phase value is a timing parameter that permits you to adjust the vertical alignment of dots in character printing. The phase value numerical units are relative; they do not represent a physical measurement or value. Thus there is no “correct” value or range. But, if the phasing value is far enough from the theoretical ideal value on a particular printer, errors can occur. If, for example, you are adjusting phasing and an error such as PAP FIFO UNDRFL* occurs, the phase value may be too high. Try a lower value.

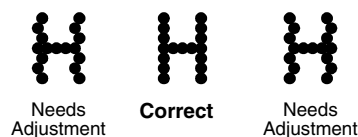
The factory prints the initial phase value on the shuttle assembly casting, next to the motor housing. Adjust the phasing to this value and recheck the vertical alignment. When vertical alignment is acceptable, write the new phasing value on the shuttle.

Phasing should be adjusted with the printer printing at full paper width.

IMPORTANT

The printer must be printing the Phase pattern of “H’s” when the Phasing Value is changed, or the New Phasing Value will not be written into memory. If the value is changed when not printing, the printer will return to its default phasing value when powered off then back on.

1. Load full width (136 column) paper and set the top of form.
2. Power on the printer.
3. If the printer is online, press the **ON LINE** key to place the printer offline. “OFFLINE / QUICK SETUP.” displays.
4. On the control panel, press the ▲ + ▼ keys to unlock the **ENTER** key. “ENTER SWITCH UNLOCKED” briefly displays. (If “LOCKED” displays, simply press ▲ and ▼ again. This is the default key combination. The lock/unlock key combination can be programmed by the user. If ▲ + ▼ does not unlock **ENTER**, get the new key combination from the user.)
5. Press the ◀ key. “OFFLINE / DIAGNOSTICS” displays.
6. Press ▼. “DIAGNOSTICS / Printer Tests” displays.
7. Press ▼. “Printer Tests / Shift Recycle” displays.
8. Press ▶ until “Printer Tests / Phase Printer” displays.
9. Press **ENTER**. The display shows “Printer Tests / Phase Printer” and the test begins. The current phasing value is printed on the left of the printed pattern of all H’s. As the pattern prints, compare the H’s to the figure below. If the phasing needs adjustment, go to step 10. If the phasing is OK, go to step 13.



10. Press ▼: The current phase index displays. Press ▼ again: An asterisk (*) appears next to the phase value.
11. Press ► to increase or ◀ to decrease the phasing index value, then press **ENTER** to activate the value as it prints. Continue to increase or decrease the phasing index until the pattern of H's is acceptable.
12. Press ▲ twice: "Printer Tests / Phase Printer" displays.
13. Press **ENTER** to stop the test.
14. Press **CLEAR**. "OFFLINE / QUICK SETUP" displays.
15. Press ▲ + ▼ (or the key combination set by the user). "ENTER SWITCH LOCKED" briefly displays.
16. Close the printer cover.
17. Press the **ON LINE** key to place the printer online.

NOTE: If you changed the phasing value, power down the printer, remove the ribbon and shuttle cover, and write the new phase value on the aluminum shuttle casting.

Loading Flash Memory

Flash memory is contained in a SIMM (single in-line memory module) located on the controller board. Printer control languages (the “emulations”) and printer operating system software are loaded into flash memory at the factory, but there are occasions when you may have to load this software:

- You have replaced the controller board
- You have replaced flash memory
- The customer needs to upgrade printer software
- The customer needs different emulation software
- The customer buys the PGL or VGL graphics language, the CT option, the IPDS option, or the ethernet NIC (Network Interface Card) option after the printer is installed

Emulation and operating system software are included as files on a CD-ROM that comes with the printer. You will copy the appropriate file from the CD-ROM to a computer’s hard disk, then download the file from the computer into printer memory.

IMPORTANT

When downloading emulation and operating system software to the printer, all other optional fonts, customer-supplied logos, setup files, feature files, and TIFF files will be erased. You will need to reload those files. Before starting a download, make sure you have all the necessary files on hand.

You can load software through the serial, parallel, or ethernet port of the printer, and you can do it three ways:

- If your computer can run Java™ programs, you can load software through any printer port by using the Firmware Download Utility included on the CD that comes with the printer. (See below.)
- You can use DOS commands to load software through the parallel port or serial port. (See page 179.)
- If the printer has the ethernet NIC (Network Interface Card) installed, you can load software through the ethernet port. (See page 182.)

Loading Software With The Firmware Download Utility

If your computer has the Java runtime environment installed, the Firmware Download Utility (FDU) allows you to load program files into the printer with an easy to use graphical interface. FDU is a utility program included on the CD that comes with the printer and can be used on computers with Windows®, UNIX®, and Linux® operating systems. With FDU, you can choose which printer port through which to load software (all are supported), choose the baud rate if you opt for serial, and launch the load process. FDU is a Java-based program, so you need Java runtime environment version J2re1.4.2 or higher installed on your computer. (The runtime environment can be downloaded free from <http://www.java.com/en/download>.)

1. Make a configuration printout of all saved configurations. (Refer to the *User’s Manual*.)

2. Set the printer power switch to O (Off).
3. Disconnect the data (signal) cable(s) from the I/O port(s) connectors on the printer interface.
4. Connect a printer data cable to the parallel, serial, or ethernet port of the computer you will use to download the software.
5. Connect the printer data cable to the appropriate I/O port of the printer.
6. On the printer control panel, press and hold down the **ON LINE** and **PAPER ADVANCE** keys. Without releasing the keys, power the printer on. When you see "B01 STATUS: 8245 SDRAM TEST 32MB" on the LCD, release the keys.
7. Wait until you see "PROGRAM DOWNLOAD" on the LCD before doing the next step. This can take a few seconds to appear, depending on the emulations and interfaces installed in the printer.
8. On your computer, create a directory named **download** at the root level of the hard drive. (For example, **C:\download** on a Windows computer.)
9. Insert the printer emulation software CD into your computer's CD-ROM drive.
10. Copy the **FDU.jar** file from the CD-ROM to your computer.
11. Open the **readme.txt** file on the CD-ROM. There are five emulation sets with corresponding part number files from which to choose:
 - CT / IPDS / IGP
 - ANSI / IGP
 - TN / IGP
 - PCL2 / IGP
 - LG / IGPAll emulations include the LP+ emulation. They are offered in two file formats: .exe and .prg. You can use either format with the FDU program.
12. Identify which emulation set you want to load into the printer and note the filename that corresponds to that emulation. The filename is a six digit number plus .exe or .prg. For example: 123456.exe or 123456.prg
This is the file you will download into the printer.
13. Copy the file to the **download** directory you created in step 8.
14. Double-click on the **FDU.jar** file you copied to your computer. It will launch its own window, then you can use it to select the emulation, the location of the file to be downloaded, the port into which to load it, and initiate the download.

IMPORTANT

Do not interrupt the downloading process once it has started. Interrupting a download will leave the flash memory on the controller board incompletely loaded, and the printer may not boot up.

15. When the new software has successfully loaded into flash memory and the printer has reset itself, set the printer power switch to O (off).
16. Remove the CD-ROM from your computer and store it with the printer.
17. If required, reconnect the data input cable(s) to the printer.
18. Set the printer power switch to I (on).

19. Using the configuration printout(s) you made in step 1, restore the printer configurations. (Refer to the printer *User's Manual*.)

Loading Through Parallel Port Using DOS

1. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
2. Set the printer power switch to O (Off).
3. Disconnect the data (signal) cable(s) from the printer interface connectors.
4. Connect a parallel data printer cable to the LPT1 port or a serial data printer cable to the COM1 port of an IBM-compatible computer running the PC-DOS, MS-DOS, or Windows (3.1x, 95, 98, Me, NT, 2000, or XP) operating system.

NOTE: Software loads at 9600 baud if you load through the serial port with a DOS command. This can take a long time. Software loads much faster through the parallel port.

5. Connect the data cable to the appropriate I/O port of the printer.
6. On the printer control panel, press and hold down the **ON LINE** and **PAPER ADVANCE** keys. Without releasing the keys, power the printer on. When you see "B01 STATUS: 8245 SDRAM TEST 32MB" on the LCD, release the keys.
7. Wait until you see "PROGRAM DOWNLOAD" on the LCD before doing the next step. This can take a few seconds to appear, depending on the emulations and interfaces installed in the printer.
8. Using Windows Explorer, create a directory named **download** at the root level of your C: hard drive. (C:\download)
9. Insert the printer emulation software CD-ROM into your computer's CD-ROM drive.
10. Open the readme.txt file on the CD-ROM. There are five emulation sets with corresponding part number files from which to choose:
CT / IPDS / IGP
ANSI / IGP
TN / IGP
PCL2 / IGP
LG / IGP
All emulations include the LP+ emulation. They are offered in two file formats: .exe and .prg. **Use .exe files to download through the parallel or serial port.**
11. Identify which emulation set you want to load into the printer and note the filename that corresponds to that emulation. The filename is a six digit number plus .exe. For example: 123456.exe
This is the file you will download into the printer.
12. Copy the file to the **download** directory you created in step 8.
13. Start a command prompt session. (The Start Menu icon is usually labeled **MS-DOS Prompt** or **Command Prompt**.)

14. At the command prompt type:
C :<Enter>
cd \download<Enter>
15. To load the file through the **LPT1 parallel port** on the computer, type the following at the command prompt on the computer:
`filename.exe -pb<Enter>`
where *filename.exe* is the file name you noted in step 11. This command decompresses the file on the hard drive and copies it as a binary file into the flash memory on the printer controller board.

IMPORTANT

Do not interrupt the downloading process once it has started. Interrupting a download will leave the flash memory on the controller board incompletely loaded, and the printer may not boot up.

While the file is copied into memory, the display screen on the printer control panel informs you of the load process and status.

16. When the new software has successfully loaded into flash memory and the printer has reset itself, set the printer power switch to O (off).
17. Remove the CD-ROM from the host computer and store it with the printer.
18. If required, reconnect the data input cable(s) to the printer.
19. Set the printer power switch to I (on).
20. Using the configuration printout(s) you made in step 1 on page 179, restore the printer configurations. (Refer to the printer *User's Manual*.)

Loading Software If Flash Contains Only Boot Code

If the flash memory contains only boot code (for example, if it is new), or if a download was interrupted (for example, by a power outage) you must download software through the printer's parallel port using the three-key initialization sequence covered in this section.

1. Make sure the printer's parallel port is available. In some configurations, you may have to re-install the Centronics® I/O cable and connector in order to load basic software into the printer.
2. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
3. Set the printer power switch to O (Off).
4. Disconnect the data (signal) cable(s) from the printer interface connectors.
5. Connect a parallel data printer cable to the LPT1 port of an IBM-compatible computer running the PC-DOS, MS-DOS, or Windows (3.1x, 95, 98, Me, NT, 2000, or XP) operating system.
6. Connect the data cable to the Centronics port of the printer.
7. On the printer control panel, press and hold down the **ON LINE + PAPER ADVANCE + VIEW / EJECT** keys. Without releasing the keys, power the printer on. When you see "B01 STATUS: 8245 SDRAM TEST 32MB" on the LCD, release the keys.

8. Wait until you see "B20: STATUS 00% / DOWNLOAD MODE" or "PROGRAM DOWNLOAD" on the LCD before doing the next step. This can take a few seconds to appear, depending on the emulations and interfaces installed in the printer.
9. Using Windows Explorer, create a directory named **download** at the root level of your C: hard drive. (**C:\download**)
10. Insert the printer emulation software CD-ROM into your computer's CD-ROM drive.
11. Open the readme.txt file on the CD-ROM. There are five emulation sets with corresponding part number files from which to choose:
CT / IPDS / IGP
ANSI / IGP
TN / IGP
PCL2 / IGP
LG / IGP
All emulations include the LP+ emulation. They are offered in two file formats: .exe and .prg. **Use .exe files to download through the parallel port.**
12. Identify which emulation set you want to load into the printer and note the filename that corresponds to that emulation. The filename is a six digit number plus .exe. For example: 123456.exe
This is the file you will download into the printer.
13. Copy the file to the **download** directory you created in step 8.
14. Start a command prompt session. (The Start Menu icon is usually labeled **MS-DOS Prompt** or **Command Prompt**.)
15. At the command prompt type:
C:><Enter>
cd \download<Enter>
16. At the command prompt on the computer:
filename.exe -pb<Enter>
where *filename.exe* is the file name you noted in step 11. This command decompresses the file on the hard drive and copies it as a binary file into the flash memory on the printer controller board.
17. When the software has successfully loaded into flash memory and the printer has reset itself, set the printer power switch to O (off).
18. Starting at step 6 of "Loading Through Parallel Port Using DOS" on page 179, load the software again through the parallel port. (In other words, use the two-key method to load software again. This ensures that all necessary code is loaded into printer memory.)

Loading Software Through The NIC

IMPORTANT

To load software through the ethernet NIC (Network Interface Card) you need the IP Address of the printer and the flash memory must contain basic printer code. If the flash memory was replaced, or if a download was interrupted (for example, by a power outage), you must load software through the parallel port. (Refer to “Loading Software If Flash Contains Only Boot Code” on page 180.)

1. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
2. Set the printer power switch to O (Off).
3. Connect the ethernet cable to the printer interface.
4. On the printer control panel, press and hold down the **ON LINE** and **PAPER ADVANCE** keys. Without releasing the keys, power the printer on. When you see “B01 STATUS: 8245 SDRAM TEST 32MB” on the LCD, release the keys.
5. Wait until you see “PROGRAM DOWNLOAD” on the LCD before doing the next step. This can take a few seconds to appear, depending on the emulations and interfaces installed in the printer.
6. Using Windows Explorer, create a directory named **download** at the root level of your C: hard drive. (C:\download)
7. Insert the printer emulation software CD-ROM into your computer's CD-ROM drive.
8. Open the readme.txt file on the CD-ROM. There are five emulation sets with corresponding part number files from which to choose:
CT / IPDS / IGP
ANSI / IGP
TN / IGP
PCL2 / IGP
LG / IGP
All emulations include the LP+ emulation. They are offered in two file formats: .exe and .prg. **Use .exe files to download through the NIC.**
9. Identify which emulation set you want to load into the printer and note the filename that corresponds to that emulation. The filename is a six digit number plus .exe. For example: 123456.exe
This is the file you will download into the NIC.
10. Copy the file to the **download** directory you created in step 6.
11. Start a command prompt session in Windows. (The Start Menu icon is usually labeled **MS-DOS Prompt** or **Command Prompt**.)
12. At the command prompt type:
c:<Enter>
cd \download<Enter>

13. Start the FTP (file transfer protocol) program by typing:

```
123456 -n xxx.xxx.xxx.xxx<Enter>
```

(where xxx.xxx.xxx.xxx is the IP Address of the printer.)

IMPORTANT

Do not interrupt the downloading process once it has started. Interrupting a download will leave the flash memory on the controller board and NIC incompletely loaded, and the printer may not boot up.

14. When the new software has successfully loaded into flash memory and the printer has reset itself, set the printer power switch to O (off).
15. Remove the CD-ROM from the host computer and store it with the printer.
16. If required, reconnect the data input cable(s) to the printer.
17. Set the printer power switch to I (on).
18. Using the configuration printout(s) you made in step 1 on page 182, restore the printer configurations. (Refer to the printer *User's Manual*.)

Reprogramming the Security Key

The security key on the PSA3 controller board can be reprogrammed with a Software Program Exchange (SPX) module. This allows the user or a service technician to enable features such as new emulations without having to remove covers and install a new security key on the controller board.

The SPX is an intelligent module that plugs into the debug port on the back of printers equipped with the PSA3 controller board. The SPX is used only once. It automatically overwrites itself after successfully reprogramming a security key.

The SPX is used at power-up only and is not left in the printer during normal operation. Because it is a single-use disposable item the user is not required to return it to the vendor or manufacturer.

How To Reprogram The Security Key

1. Power off the printer.
2. On cabinet models, open the rear door. On pedestal models, use the illustration below to locate the debug port at the rear of the printer.
3. Insert the SPX into the debug port, in as shown in Figure 17 on page 184.

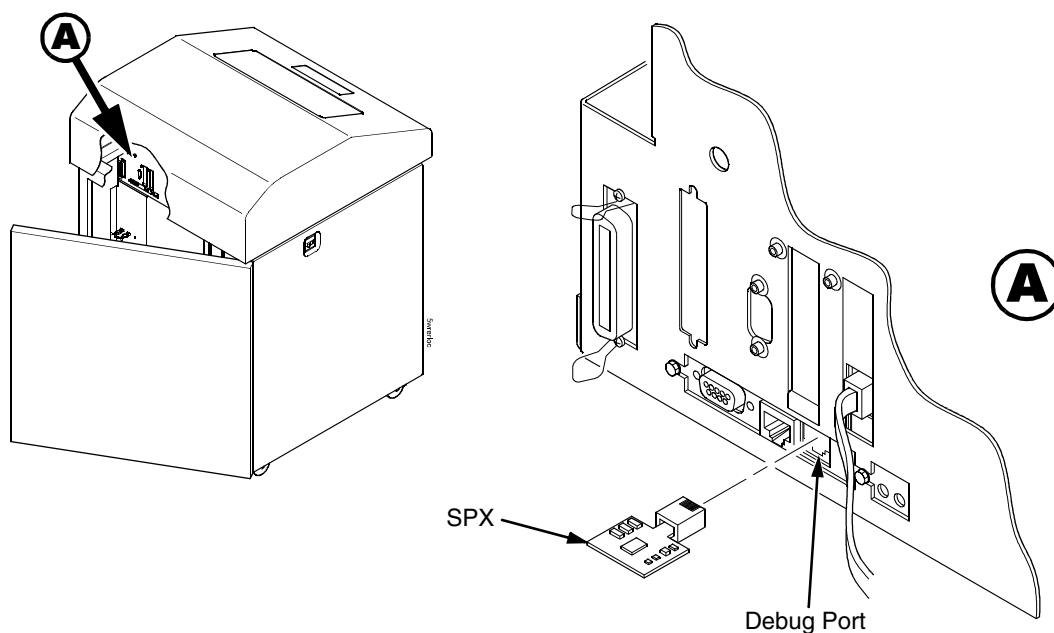


Figure 17. Inserting the SPX into the Debug Port

4. Power on the printer. The printer will begin its boot-up sequence.
5. When the printer detects a valid SPX, the control panel displays:
"NEW SPX DETECTED
PRESS ENTER"

NOTE: If an error message displays, find the message in the Message List in Chapter 3 and follow the troubleshooting instructions.

6. Press the **ENTER** key to activate the reprogramming sequence. The display will read:
"DO NOT POWER OFF
Upgrading..."
7. When the security key is reprogrammed, the display will read:
"REMOVE USED SPX
THEN PRESS ENTER"
8. Remove the SPX from the debug port at the rear of the printer.
9. Press the **ENTER** key. The printer will reboot itself and you may resume normal printing.
10. You may need to download the emulation if the emulation supported by the SPX is not in the current printer firmware.
11. You may need to set additional menu parameters for any new features that have been added or enabled. (Refer to the *User's Manual*.)

Coil Temperature Adjustment

IMPORTANT This procedure applies only to models P7000HD, P7X06H, P7X08H, P7X15, and P7220.

Do this procedure only when the original controller board or shuttle frame assembly have been replaced or you are instructed to do so in a maintenance or troubleshooting procedure. Do **not** do this procedure if the original controller board or shuttle frame assembly were removed and reinstalled as part of other maintenance tasks.

IMPORTANT The shuttle frame assembly must be at room temperature to do this procedure. Power off the printer and let it cool for at least one hour before doing this procedure.

1. Plug the AC power cord into the printer and the power source.
2. Power on the printer.
3. The printer must be offline to do this procedure. If the printer is online, press the **ON LINE** key. "OFFLINE / QUICK SETUP" will display.
4. On the control panel, press the **▲ + ▼** keys to unlock the **ENTER** key. "ENTER SWITCH UNLOCKED" briefly displays. (If "LOCKED" displays, simply press **▲** and **▼** again. This is the default key combination. The lock/unlock key combination can be programmed by the user. If **▲ + ▼** does not unlock **ENTER**, get the new key combination from the user.)
5. Press **▲ + ▼ + ► + ◄** to enter the factory menu. (Press all four keys at the same time.) "Factory / Set Coil Temp" appears on the display.
6. Press **ENTER**. The display tells you to "PLEASE WAIT" while the coil temperature is set by an automatic calibration sequence in printer software.
7. When the display again reads "Factory / Set Coil Temp" press **▲ + ▼** to lock the **ENTER** key.
8. Press the **ON LINE** key to exit the Factory menu.
9. Coil temperature is set. Return the printer to normal operation (page 161).

Dynamic Paper Tension Adjustment

This procedure helps you identify and eliminate conditions that contribute to paper jams, excessive tension on the paper feed motor, and vertical dot compression or expansion.

1. Open the printer cover.
2. Unload paper.
3. Unlock both tractors and move them outward to the sides as far as they will go.
4. Prepare a length of 14 inch wide paper consisting of three sheets that are still attached at the perforations. The paper must be single part, 18 lb. maximum weight, 0.0036 inch (0.09 mm) maximum thickness. Open the cabinet front door and feed the paper up through the print station until the first page clears the ribbon mask by about one inch. (Figure 18.)
5. Fold a two inch piece of plastic tape over the top sheet, midway between the sides, as shown in Figure 18 detail A.

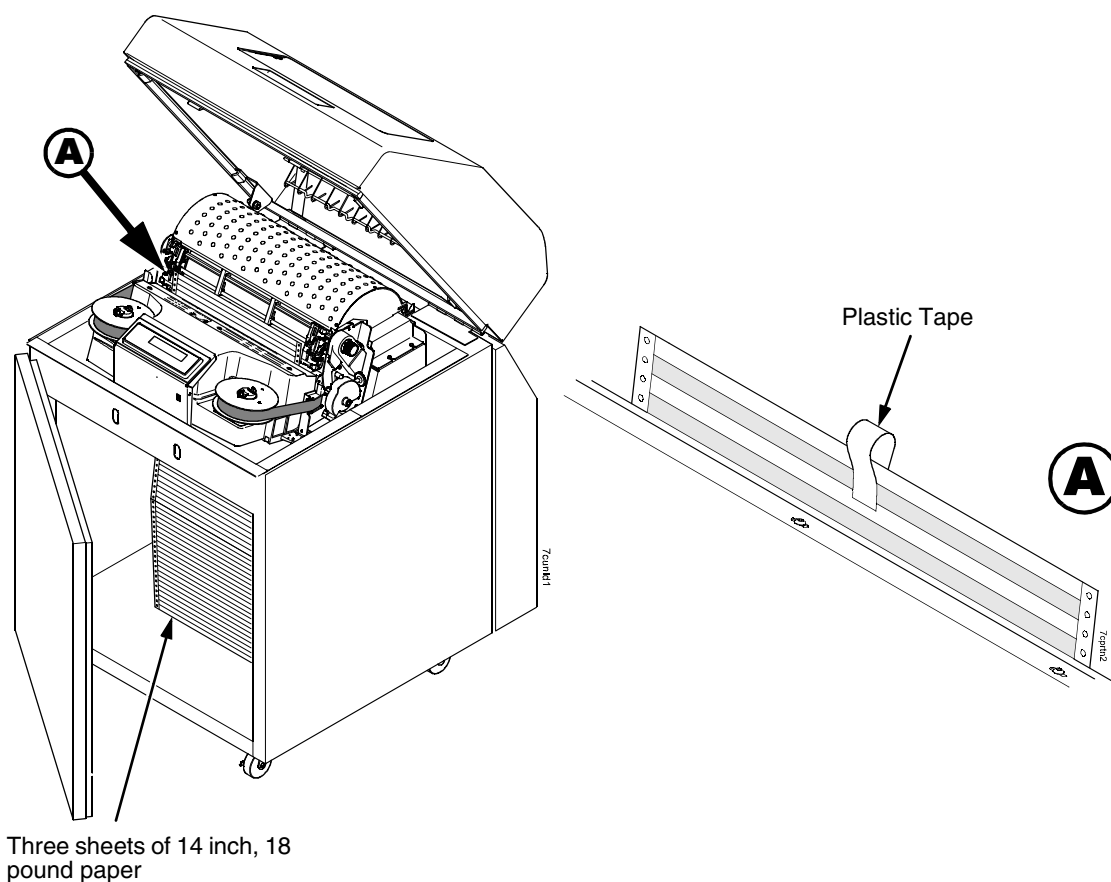


Figure 18. Preparing Paper for Tension Measurement

6. Close the forms thickness lever all the way (pointer at 'A').
7. Insert the hook of a "fish scale" force gauge through the tape you installed in step 5. (Figure 19.)

8. Use the scale to pull the paper slowly straight up through the print station for about six inches and note the maximum force exerted on the scale. Do not pull any page perforations through the print station. (Figure 19.)

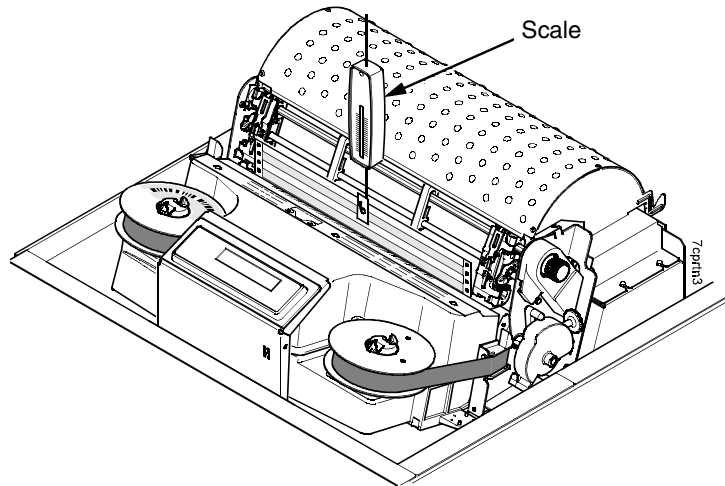


Figure 19. Measuring Paper Tension

9. Repeat steps 6 through 8 several times to get an average value of force on the gauge.
10. The average tension should be 6 to 12 ounces for printers with one paper ironer, and 9 to 15 ounces on printers with an additional auxiliary paper ironer. If the average value is greater than 13 (or 16) ounces, paper handling and print quality problems are likely.
11. If the average value is greater than 13 (or 16) ounces, check the platen gap (page 168), adjust if necessary, and recheck the dynamic paper tension.
12. If the platen gap is correct, remove the shuttle frame assembly (page 251) and check the following:
 - a. Inspect the hammer bank cover assembly for ribbon debris, paper debris, or other foreign matter. If the ribbon mask or hammer bank cover is damaged or deformed, replace it.
 - b. Inspect the paper ironer for distortion or misalignment. Reposition or replace it if necessary.
 - c. Make sure the paper guides are properly seated on the splined and support shafts.
 - d. Make sure the paper entrance guide pivots freely with minimal down force. Reposition the springs or the guide if necessary.
 - e. Check for correct position and function of the paper motion detector assembly. Reposition or replace if necessary.
 - f. Inspect the paper path from above (below the paper ironer), and from below (above the paper entrance guide), for debris, foreign matter, or anything that could inhibit paper motion. Correct as necessary.

Tractor Belt Tension Adjustment

First line print compression can be reduced by adjusting the tension of the tractor belts. The procedure below removes the slack that can occur in some tractors.

IMPORTANT Only do this procedure when the user reports that the first print line of forms is compressed and only after adjusting the dynamic paper tension (page 186). Always adjust both tractors.

1. Prepare the printer for maintenance (page 160).
2. Adjust the dynamic paper tension (page 186).
3. Carefully note the initial position of the adjustment screws. (Figure 20.)

CAUTION Adjust tractors only **ONE** detent at a time. Over-tightening a tractor belt can cause other paper feed problems and result in premature wear in the tractors.

4. On the inner side of the left tractor, use a Torx T-10 driver to rotate the adjustment screw one detent to increase tension. On the inner side of the right tractor, use a Torx T-10 driver to rotate the adjustment screw one detent to increase tension. (See Figure 20.)
5. Load paper, run a print test, and check for first line compression.
6. If compression still occurs, rotate the adjustment screws one more detent and test again.
7. If compression is not improved after adjusting the tension by two detents, return the adjustment screws to the initial positions you noted in step 3.
8. Return the printer to normal operation (page 161).

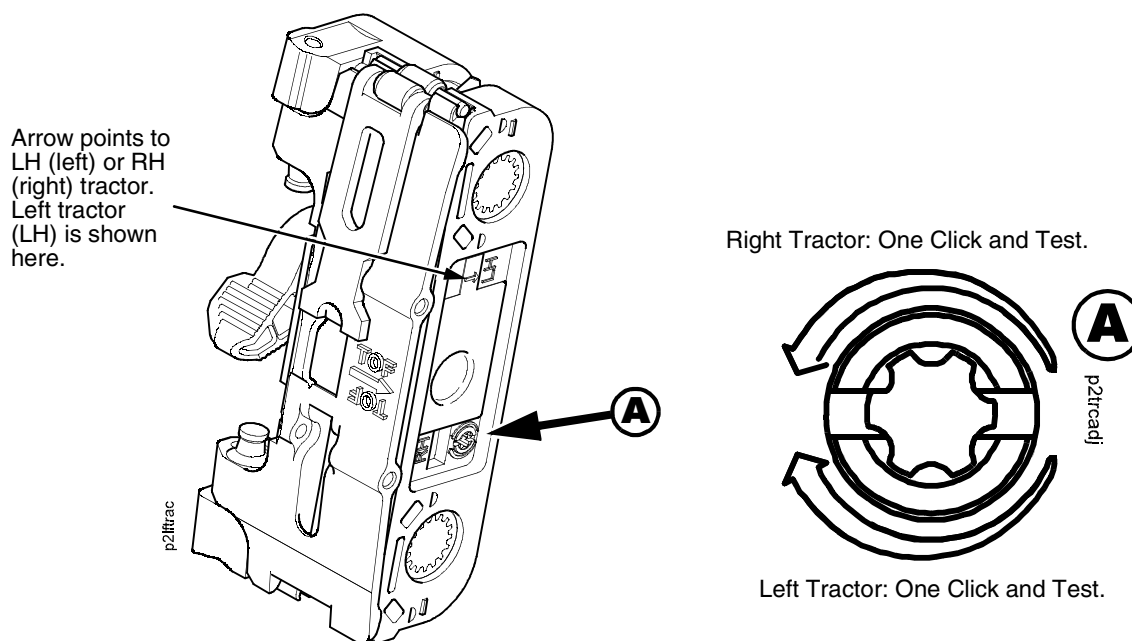


Figure 20. Tractor Belt Tension Adjustment

Shuttle Electrical Short Check

This procedure checks for metallic debris and checks for hammer coils shorting to the shuttle frame.

The hammer driver circuit board attached to the shuttle frame assembly can attract metal objects because of the magnets in the hammer bank. Such stray metal pieces can cause electrical shorting and damage to the shuttle assembly. (The hammer driver board does not have a protective cover because of concerns about component temperatures.)

IMPORTANT

Do this procedure

a) If you removed the shuttle cover during servicing and before you re-install the shuttle cover.

b) Before you replace the controller board with a new or refurbished board.

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 210).
4. Check the shuttle driver circuit board area for any foreign metal parts or objects (paper clips, staples, screws, chips of metal, broken shuttle spring fragments, etc.).
5. If you find any foreign metal parts or objects, carefully remove them.
6. Disconnect the hammer bank logic cable (P04) and the hammer bank power cable (P05) at the shuttle.
7. Set your Ohmmeter to the 10K Ohm scale or the scale closest to 10K Ohms.
8. Hold the two meter leads apart from each other (not touching anything) and note how your meter indicates an open circuit. For example, some meters read OL (Over Load), -1, flashing display, infinite resistance, etc.
9. Attach the common meter lead (usually black) to the shuttle frame.
10. Touch the positive meter lead (usually red) to another part of the shuttle frame and verify continuity. (Continuity is a low resistance reading of less than 1 Ohms.)
11. Attach the common meter lead to the shuttle frame, touch the positive lead to pins 1 through 10 of both hammer bank power plugs J05 and J06 located on the terminator board on the shuttle assembly. Pin 1 of each plug is the right-most pin as you face the printer. Hold the positive lead for a few seconds on each pin allowing the meter to stabilize, then read the resistance:
 - a. If the resistance of any pin is less than 1000 Ohms, replace the shuttle frame assembly (page 251).
 - b. If pin resistances are 1000 Ohms or greater (including an "open" reading as in step 7), the shuttle passes the test and is probably okay. Reconnect hammer bank logic cable (P04) and hammer bank power cable (P05) to the shuttle
12. Install the shuttle cover assembly (page 210).

13. Install the ribbon. (Refer to the *User's Manual*.)
14. Return the printer to normal operation (page 161).

Hammer Bank Power Cable Shorts Test

This test determines if the hammer bank power cable is shorted.

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Disconnect hammer bank power cable connector P105 from J105 on the controller board. (See Figure 47, page 272, item 10.)
4. Attach or hold the common lead (usually black) of an Ohmmeter to the shuttle frame.
5. At the hammer bank power cable plug (P05) on the shuttle terminator board, touch each of the 10 pins with the positive (usually red) meter lead and test for shorts to ground. If you find any shorts to ground, replace the hammer bank power cable.
6. Disconnect the common meter lead from the shuttle frame.
7. Check the hammer bank power cable for shorts by checking pin-to-pin: touch pin 1 with one meter lead and pin 2 with the other meter lead. If there is continuity, it means there is a short. (Continuity is defined as a reading of less than 1 Ohm; in other words, very low resistance.) Repeat this process until you have tested all the pins in the cable. If you find any shorts, replace the cable.
8. Connect hammer bank power cable connector P105 to J105 on the controller board. (See Figure 47, page 272, item 10.)
9. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
10. Return the printer to normal operation (page 161).

Cable Shorts Test

This test determines if a cable has a short to ground or a pin-to-pin short (also called a wire-to-wire short). Such shorts can be caused by cables resting on or moving across sharp edges. The edges over time can wear away the non-conductive shielding of the cable, exposing the conductor. A short occurs when the exposed conductor touches another metal surface or conductor.

This procedure tests only the cables listed below that can be disconnected at both ends:

- Intermediate cables of devices in the Main Wire Harness Test Tables:
 - Card Cage Fan
 - Left Ribbon Motor
 - Right Ribbon Motor
 - Exhaust Fan (in cabinet models)
 - Magnetic Pick-up Unit (MPU)
- Shuttle Motor Intermediate Cable
- Hammer Bank Power and Logic Intermediate Cables
- Control Panel Assembly Intermediate Cable
- Power Stack Logic and Power (Intermediate) Cables

The Procedure:

1. Prepare the printer for maintenance (page 160).
2. Disconnect the cable to be tested at both ends, but leave the cable routing as it was before you started this procedure.
3. Set your Ohmmeter to the 10K Ohm scale or the scale closest to 10K Ohms.
4. Hold the two meter leads apart from each other (not touching anything) and note how your meter indicates an open circuit. For example, some meters read OL (Over Load), -1, flashing display, infinite resistance, etc. Record this indication for later reference.

Check for shorts to ground:

5. Attach the common meter lead (usually black) to a bare metal ground point on the printer (e.g., a bolt head on the shuttle casting).
6. Touch the positive meter lead (usually red) to another bare metal ground point and verify continuity. (Continuity is a low resistance reading of less than 1 Ohm.)

IMPORTANT

When making continuity checks, touch the meter leads to the test points for at least 2 to 3 seconds so your meter has time to display correctly.

7. At one end of the cable, touch one of the pins with the positive (usually red) meter lead while the common lead (usually black) is still touching a ground point.

8. Check the pin for a short to ground, which is indicated by a meter reading of continuity (that is, a low resistance reading of less than 1 Ohm).
9. If you find a short to ground, replace the cable. If no short is detected, repeat steps 7 and 8 for the rest of the pins on the same end of the cable. If no shorts to ground are detected for any of the pins, proceed to the next section, which checks for pin-to-pin shorts.

Check for pin-to-pin shorts:

10. Disconnect the common (usually black) meter lead from the ground point.
11. Check for shorts within the cable by touching the common (usually black) meter lead to pin 1 at one end of the cable and touching the positive (usually red) meter lead to pin 2 at the same end of the cable.
12. Check for a pin-to-pin short, which is indicated by a meter reading of continuity (that is, a low resistance of less than 1 Ohm). **For a properly functioning cable that has no pin-to-pin short, you will see the “open circuit” meter reading you recorded in step 4.**
13. If you find a short, replace the cable. If no short is detected, check for pin-to-pin shorts on all the remaining pairs on the same end of the cable. If you find a short in any of the remaining pairs, replace the cable. If you find no shorts for any of the remaining pairs, the cable passes the shorts test; return to the procedure that referred you to this diagnostic procedure.

Main Wire Harness Test Diagnostic

This is a procedure for extended testing of various printer components.

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Disconnect cable connectors P106 and P107 from the controller board.
4. Refer to the Main Wire Harness Test Tables on page 328 as you do the following substeps:

- a. Measure the resistance of the device(s) specified in the procedure you are working.

NOTE: If you have a 60-pin expansion-CT adapter that was used on the old CMX and CFX controller boards, you can break it down into a two-row by 10 pin (i.e., a 20-pin) connector, which you can insert into P106 and P107 for easier electrical measurements.

- b. On motors, use the table to test for winding continuity and for no shorts between windings and motor frame. Rotate the motor by hand and test for shorts. If you find any shorts in a motor, replace the motor.
- c. Replace any defective devices.
5. Shuttle Motor test:
 - a. Remove the ribbon.
 - b. Remove the shuttle cover assembly (page 210).
 - c. Disconnect cable P02
 - d. At P02, check for approximately 0.7 Ohms per phase. Use this value to test for winding continuity and for no shorts between windings and the motor frame. Rotate the motor by hand and test for shorts.
 - e. Replace the shuttle frame assembly if you find any shorts.

NOTE: A number of “intermediate” cables in the printer can be disconnected at both ends and tested using the Cable Shorts Test (page 191):

- Intermediate cables of devices in the Main Wire Harness Test Tables:
 - Card Cage Fan
 - Left Ribbon Motor
 - Right Ribbon Motor
 - Exhaust Fan (in cabinet models)
 - Magnetic Pick-up Unit (MPU)
- Shuttle Motor Intermediate Cable
- Hammer Bank Power and Logic Intermediate Cables
- Control Panel Assembly Intermediate Cable
- Power Stacker Logic and Power (Intermediate) Cables

Power Supply Operational Check

This procedure shows you how to use the Power Supply Tester (Field Kit, Tester, Power Supplies, Generic, P/N 178083-001), to quickly and safely monitor the output voltages of the printer power supply from outside the card cage. You will be able to turn on and off the +48 volt and +8.5 volt outputs at the tester's remote Monitor Block.

To check the power supply you need a DC voltmeter with an input impedance greater than 20,000 ohms per volt and capable of measuring 55 volts DC. To measure +5 volt output, the voltmeter must have a low voltage range (10 volts).

CAUTION This tester is for intermittent monitoring of power supply voltages. Do not hold down the push button on the Monitor Block for more than five minutes at a time. To prevent overheating the Load Block, for each minute you hold down the push button on the Monitor Block, wait at least two minutes with the push button released. (There is no time limit to how long the Load Block can be attached to the power supply, just to how long you should hold down the push button.)

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).

CAUTION To prevent electrostatic damage to electronic components, wear a grounded static wrist strap when you work around the circuit boards.

3. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch the controller board or power supply board.
4. Disconnect power supply cable connector P101 from either the power stacker power cable or connector J101 on the controller board. (Figure 21.)
5. Plug power supply connector P101 into the 12-pin connector on the power supply tester Load Block, as shown in Figure 21. Note the position of Pin 1 relative to the Load Block.
6. Position the tester Monitor Block outside of the printer with the rubber feet resting on a flat surface. (If you are working on a cabinet model, you can close the top cover and use that as the flat surface.)

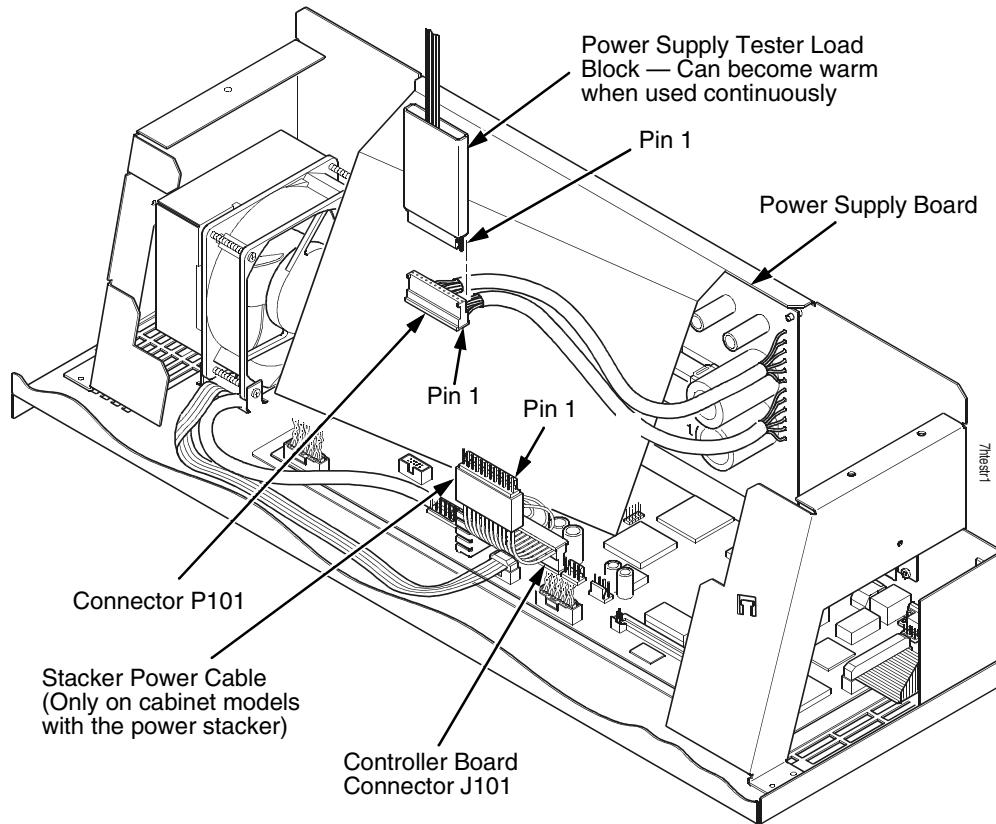


Figure 21. Connecting the Power Supply Tester

7. Plug the printer's power cord into the AC power outlet and the printer.
8. Insert the negative (-) lead of the voltmeter into the ground (GND) test jack on the Monitor Block. If the negative lead does not fit into the GND test jack, touch the negative lead to the ground (GND) pad. (Figure 22.)
9. Set the printer's power switch to 1 (on).
10. Touch the positive (+) lead of the voltmeter to the +5 V test point on the Monitor Block. The voltage should be 4.85 to 5.15 volts. (Figure 22.)
11. Measure the voltage at the NTEMPHI test point; it should be greater than 2.4 volts. (Figure 22.)
12. Measure the voltage at the +48 V test point; it should be less than 0.2 volts. (Figure 22.)
13. Measure the voltage at the +8.5 V test point; it should be less than 0.2 volts. (Figure 22.)
14. Press and HOLD IN the Push Button on the Monitor Block. (Figure 22.)
15. Measure the +5 V test point. It should be 4.85 to 5.15 volts.

16. Measure the +48 V test point. It should be 46.0 to 49.6 volts.
17. Measure the +8.5 V test point. It should be 8.1 to 9.4 volts.
18. Release the Push Button.
19. If you must measure voltages again, for each minute you held the Push Button down, wait at least two minutes with the Push Button released. This allows the Load Block to cool.
20. If any voltage reading is outside of the ranges listed above, replace the power supply. If all voltages are within range, return to the diagnostic procedure that caused you to use this tool.
21. Verify that the original problem has been corrected:
 - a. If the problem has been corrected, go to step 22.
 - b. If the problem has not been corrected, consider the following:
 This tester applies a small electrical load to the power supply. The tester load on the +5 volts is about 1.3 amps, so that a printer boot-up should be possible if the power supply tests OK. However, it is also possible that a power supply can test OK but still have an internal problem that prevents it from supporting a full print load. If the printer still does not print jobs correctly after the power supply has tested OK:
 - Consider replacing the controller board. If the problem persists, restore the original controller board, and
 - Consider again replacing the power supply.

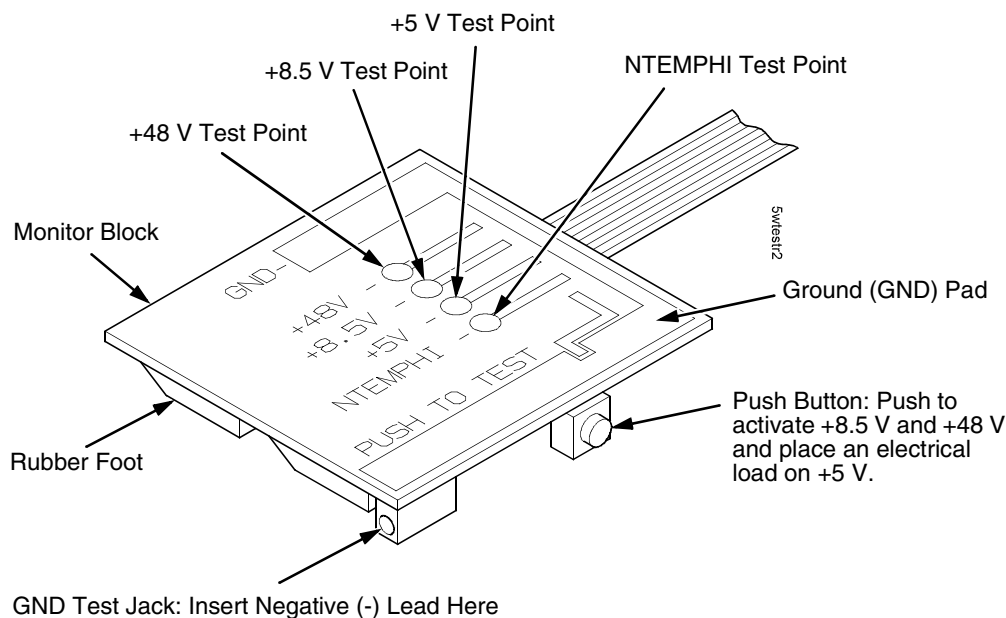


Figure 22. Testing the Power Supply

22. Set the printer's power switch to O (off).
23. Unplug power supply connector P101 from the 12-pin connector on the power supply tester Load Block. (Figure 21.)
24. Connect power supply cable connector P101 to either the power stacker power cable or connector J101 on the controller board. (Figure 21.)
25. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
26. Return the printer to normal operation (page 161).

5

Replacement Procedures

Organization Of This Chapter

This chapter contains written procedures for removing and installing components that are replaceable at the field service level of maintenance. The replacement procedures refer you to the illustrations in Chapter 6 on page 257.

Replacement Procedures

WARNING Unplug the printer power cord from the printer or power outlet before doing any maintenance procedure. Failure to remove power could result in injury to you or damage to equipment. Only apply power during maintenance if you are instructed to do so in a maintenance procedure.

IMPORTANT The components specified in this chapter are field replaceable units (FRUs). FRUs must be repaired at the factory. Do not try to repair these items in the field. Also do not attempt field repairs of electronic components or assemblies. Do not de-solder any circuit board components. Replace a malfunctioning electronic assembly with an operational spare. Most electronic problems are corrected by replacing the printed circuit board assembly, sensor, or cable that causes the fault indication. The same is true of failures traced to the hammer bank: it is not field repairable so you must replace the entire shuttle assembly. Hammer spring assemblies, the hammer bank cover, and the ribbon mask are the only replaceable components of the shuttle frame assembly.

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Belt, Paper Feed Timing

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the timing belt cover by squeezing the front and back to release the plastic tabs from the slots in the side plate. (See page 163, item 1.)
4. Loosen (do not remove) the two 5/16 inch paper feed motor mount screws. (See page 163, item 2.)
5. Roll the paper feed timing belt off the paper feed motor pulley and splined shaft pulley.

Installation

1. Roll the paper feed timing belt onto the splined shaft pulley and the motor pulley.
2. Using the straight end of a force gauge, apply 15 pounds (66.7 N) of pressure to the paper feed drive motor. Use the splined shaft to steady the gauge. (See page 163, item 2.)

NOTE: Belt tension is correct if the belt deflects 1/8 inch (3.175 mm) midway between the pulleys.

3. Reduce tension to 12 pounds (53.4 N) and torque the 5/16 inch paper feed motor mount screws to 18 inch-pounds (2.03 N•m).
4. Snap the timing belt cover into the slots in the side plate. (See page 163, item 1.)
5. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
6. Return the printer to normal operation (page 161).

Belt, Platen Open

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the platen open belt cover by squeezing the top and bottom to release the plastic tabs from the slots in the side plate. (See page 165, item 1.)
4. Using a 5/32 inch Allen wrench, *slowly* loosen the motor adjustment screw just enough to permit movement of the platen open motor in the slotted side plate. (See page 165, item 2.)
5. Push the platen open motor shaft toward the front of the printer to loosen the platen open belt. (See page 165, item 3.)
6. Roll the platen open belt off the motor pulley and platen open pulley.

Installation

1. Push the platen motor toward the front of the printer and install the platen open belt over the platen open pulley and the motor pulley. (See page 165, item 3.)
2. Release the platen open motor; the spring will automatically tension the belt.
3. *Slowly* tighten the motor adjustment screw. (See page 165, item 2.)

NOTE: Belt tension is correct if the belt deflects 3/16 inch (4.76 mm) midway between the pulleys. If deflection is more or less than 3/16 inch (4.76 mm), slowly loosen the motor adjustment screw and repeat steps 2 and 3.

4. Snap the platen open belt cover into the slots in the side plate. (See page 165, item 1.)
5. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
6. Return the printer to normal operation (page 161).

Circuit Breaker

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the card cage fan (page 215).
3. Disconnect the four circuit breaker electrical leads.
(Cabinet Models: See page 286.
Pedestal Models: See page 270.)
4. Press in on the spring clips and remove the circuit breaker from the printer.

Installation

1. Press the circuit breaker into the cutout until the spring clips snap into place.
(Cabinet models: See page 286.
Pedestal models: See page 270.)

CAUTION **To prevent severe damage to the printer, the circuit breaker electrical leads must be connected correctly.**

2. Connect the four circuit breaker electrical leads.
(Cabinet Models: See page 286.
Pedestal Models: See page 270.)
3. Install the card cage fan (page 215).
4. Return the printer to normal operation (page 161).

Connector Coupling Shrouds

Some of the cable connectors in the printer are grouped inside connector coupling shrouds designated P106 and P107. This procedure explains how to remove and install cable assemblies from these coupling shrouds.

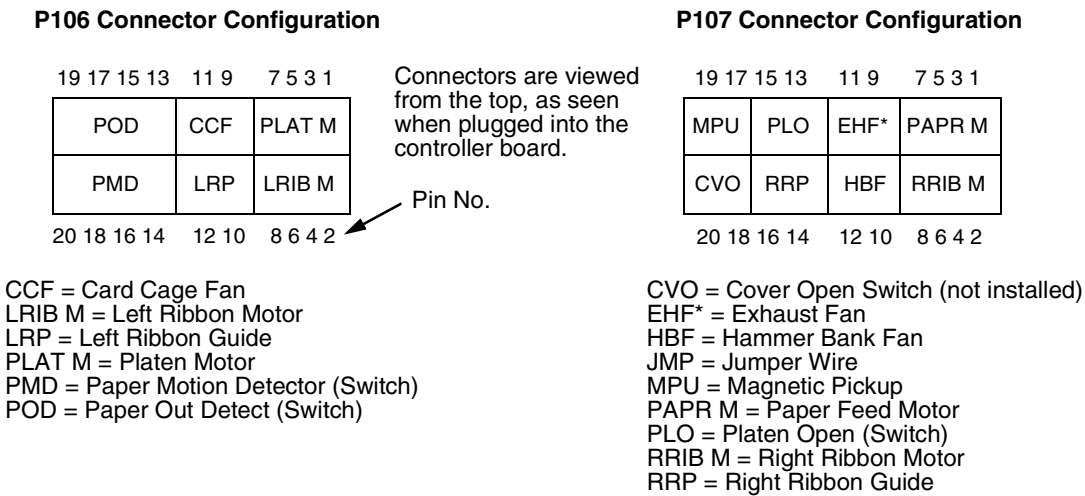
NOTE: There is also a diagram of the P106 / P107 connector coupling shrouds on the plastic protective barrier over the power supply.

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Disconnect the connector coupling shroud containing the cable assembly that you will replace.
4. Pull the side of the coupling shroud outward and gently pull the cable connector upward. (See Figure 23.) Notice that in a coupling shroud two-wire connectors are grouped across from two-wire connectors and four-wire connectors are grouped across from four-wire connectors.
5. Disengage the key tab(s) on the cable connector from the slots in the side of the coupling shroud.
6. Remove the cable connector from the coupling shroud. (Remove only the cable connector for the cable you are replacing; leave the other cable connectors in the coupling shroud.)

Installation

1. Position the cable connector in the connector coupling shroud. Two-wire connectors are always grouped across from two-wire connectors in a coupling shroud. Four-wire connectors are always grouped across from four-wire connectors in a coupling shroud. (See Figure 23.)
2. Pull the side of the coupling shroud outward and gently push the cable connector down into the coupling shroud.
3. Engage the key tab(s) on the cable connector in the slots in the side of the coupling shroud. Press the sides of the coupling shroud inward to make sure all cable connector key tabs are engaged in the coupling slots.
4. Connect the connector coupling shroud to its printer connection.
5. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
6. Return the printer to normal operation (page 161).



CCF = Card Cage Fan
LRIB M = Left Ribbon Motor
LRP = Left Ribbon Guide
PLAT M = Platen Motor
PMD = Paper Motion Detector (Switch)
POD = Paper Out Detect (Switch)

* JMP on pedestal models, used as a spacer

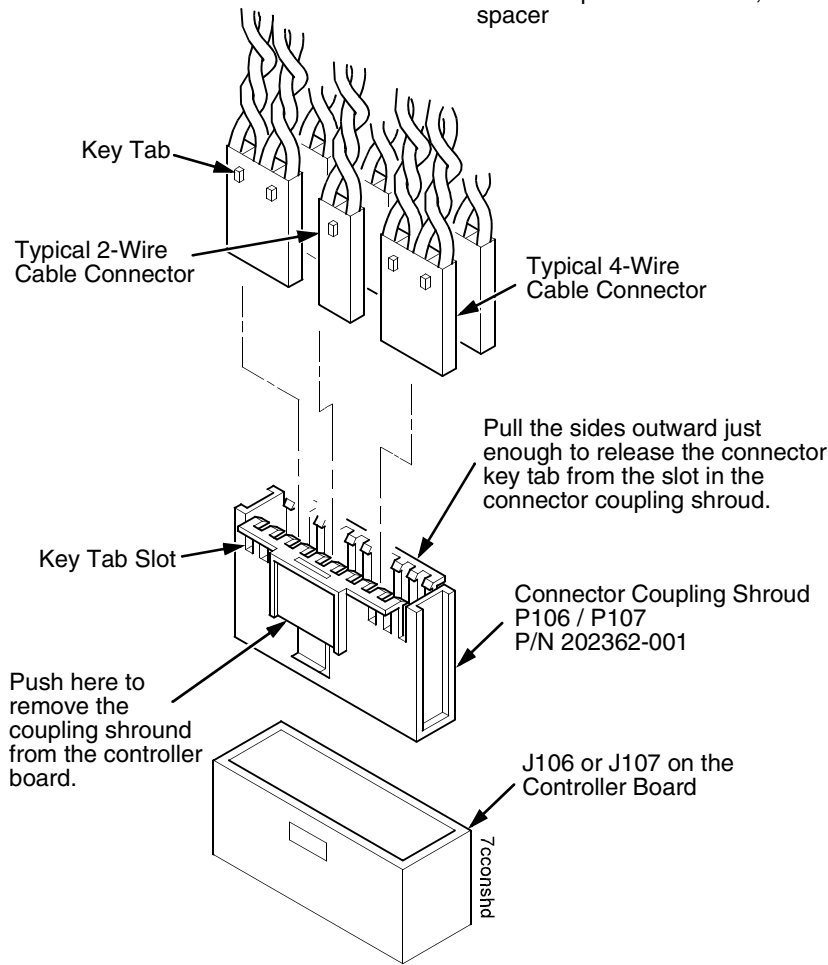


Figure 23. Connector Coupling Shrouds, Disassembly/Assembly

Control Panel Assembly

NOTE: The procedure for removing and installing the control panel is the same for cabinet and pedestal model printers.

Removal

1. Prepare the printer for maintenance (page 160).
2. Open the printer cover.
3. Disconnect the RJ-11 connector P310 from J2 on the back of the control panel. (See page 262, item 2.)
4. Remove the two screws securing the control panel to the panel bracket. (See page 262, items 1 and 11.)
5. Remove the control panel assembly from the panel bracket.

Installation

1. Engage the slot on the bottom of the control panel on the bottom edge of the panel bracket cutout. (See page 262, items 1 and 11.)
2. Align the holes on the top rear of the control panel with the holes in the upper edge of the panel bracket, and install the two mounting screws.
3. Connect RJ-11 connector P310 to connector J2 on the rear of the control panel.
4. Return the printer to normal operation (page 161).

Controller Board

Removal

- IMPORTANT** There are two types of controller board, V5 and V6. They are not interchangeable. If you remove a V5 controller board, install a V5 controller board. If you remove a V6 controller board, install a V6 controller board.
- CAUTION** To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.
1. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
- NOTE:** The MAC address for the onboard ethernet interface on the V6 controller board will be printed on the printer's configuration printout after completing this replacement procedure.
2. Prepare the printer for maintenance (page 160).
 3. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
 4. Remove the CT board, if it is installed (page 212).
 5. V5 controller board only: Remove the ethernet interface assembly, if it is installed (page 229). (The ethernet interface is built onto the V6 controller board.)
 6. Disconnect all cable connectors from the controller board.
(See page 270.)
 7. Loosen but do not remove the two screws securing the metal controller shield near serial cable connector J201.
 8. Loosen but do not remove the screw securing the metal shield to the bottom of the card cage, on the left side near the card cage fan.
- CAUTION** Do not separate the controller board from the metal shield. The shield serves as a stiffener and ground plane, and is an integral part of the controller board assembly.
9. Slide the controller board assembly to the left until the keyway clears the screw securing the controller board to the bottom of the card cage. Lift the controller board out of the printer.
 10. If you are removing the controller board for reasons other than replacement (i.e., you will re-install the original controller board at some point), you do not need to remove the flash memory or security key. But if you are replacing the controller board, remove the flash SIMM and security key (page 227), and install them on the replacement controller board. The security key must be installed on the replacement controller board to ensure the printer functions correctly.

Installation

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. If this is a replacement controller board, install the flash SIMM and security key on the new controller (page 227).
2. Position the controller board in the card cage, metal shield side down, component side uppermost. Engage the screw on the bottom of the card cage in the keyway in the metal controller shield. Slide the board to the right until the serial cable connector J201 on the controller board lines up with the cutout in the card cage. (See page 272.)
3. Tighten the two screws securing the metal shield near serial cable connector J201.
4. Tighten the screw securing the metal shield to the bottom of the card cage.
5. Connect all cable connectors to the controller board, using the Interconnection Diagram in Appendix A as your guide.
6. Install the CT board, if necessary (page 212).
7. V5 controller board only: Install the NIC, if necessary (page 229).
8. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).

IMPORTANT If the original board was replaced, you must download the emulation software again. Installing flash memory from the old board onto the new board does not transfer all operating system software.

9. Load flash memory (page 177).
10. Adjust the hammer phasing (page 175).
11. Adjust the paper out distance (page 172).
12. V5 controller board: Using the configuration printout(s) you made in step 1 of the removal procedure, restore and save the printer configuration(s). (Refer to the *User's Manual*.)
V6 controller board: Make a configuration printout, the MAC address for the onboard ethernet interface is printed on the configuration printout.

Cover Assembly, Hammer Bank / Ribbon Mask

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the shuttle frame assembly (page 251).
3. Lift the thick plate of the hammer bank cover assembly at one end, and peel the cover away from hammer bank magnets. (See Figure 24.)

Installation

CAUTION The hammer bank contains a strong magnet. To prevent damage to the hammer tips, do not let the steel hammer bank cover assembly snap into place as the hammer bank magnet attracts it. Any impact of the cover against the hammer bank can break hammer tips.

1. With the thick plate facing the hammer bank, hold the hammer bank cover assembly at a slight angle and engage the bottom edge on the alignment pins. First engage the center (round) hole, then the left (oblong) hole, to ensure that the cover lies flat on the hammer bank. (See Figure 24.)
2. Gently lower the hammer bank cover assembly until it lies flush on the hammer bank.
3. Check that the hammer bank cover assembly is positioned over the alignment pins and the hammer tips.
4. Install the shuttle frame assembly (page 251).
5. Return the printer to normal operation (page 161).

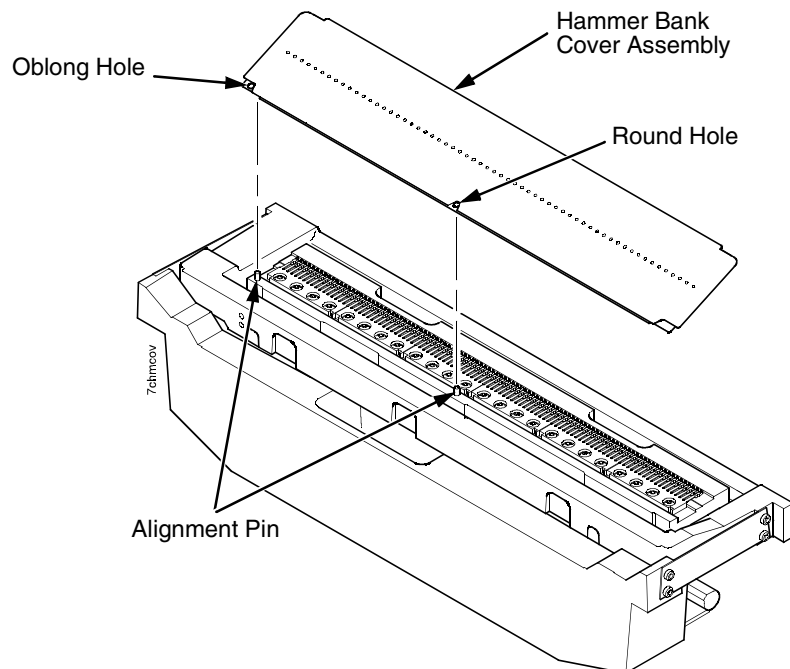


Figure 24. Hammer Bank Cover Assembly

Cover Assembly, Shuttle

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Loosen the shuttle cover screws (page 266, item 2).
4. Grasping the edges of the shuttle cover assembly, tilt the rear edge up and lift the shuttle cover assembly out of the printer.

Installation

1. Place the shuttle cover assembly in the printer. Tilt the forward edge of the cover down slightly and work the cover into position.

NOTE: Make sure the holes in the cover are over the locating pins on the base casting.

2. Tighten the shuttle cover screws (page 266, item 2).
3. Install the ribbon. (Refer to the *User's Manual*.)
4. Return the printer to normal operation (page 161).

Cover Assembly, Top, Pedestal Models

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the control panel assembly (page 206).
3. Loosen (do not remove) the two #2 Phillips hold-down screws on the rear of the printer. (See page 264, item 5.)
4. Remove the #2 Phillips screw in the lower left front corner of the top cover and the screw just to the right of the control panel bracket. (See page 264, item 3.)
5. Lift the top cover assembly off the printer base.

Installation

1. Reverse steps 3 through 5 of the removal procedure.
2. Return the printer to normal operation (page 161).

CT Board

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).

CAUTION To prevent electrostatic damage to electronic components, always wear a grounded static wrist strap when you handle circuit boards.

3. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch electronic components or the controller board.
4. Remove the screw securing the CT board connector plate to the rear of the card cage. (See page 288, item 4.)
5. Angle the CT board out of the card cage cutout as you lift the CT board out of the PCI slot on the controller board. (See page 288, item 1.)

Installation

1. Reverse steps 2 through 5 of the removal procedure.

IMPORTANT There are two expansion slots on the controller board. If the printer is a cabinet model with a power stacker installed, you must install the CT board in the outermost slot and leave the innermost slot empty.

2. Return the printer to normal operation (page 161).

Dashpot

CAUTION Two persons may be required to do this procedure. Prop or hold the printer cover securely while disengaging the dashpot.

NOTE: This procedure applies only to cabinet models.

Removal

1. Prepare the printer for maintenance (page 160).
2. Open the cabinet rear door.
3. Pry back the spring retaining clips. (See Figure 42, page 262.)
4. Remove the dashpot from the ball studs.

Installation

CAUTION Install the dashpot with the narrow rod uppermost.

Two persons may be required to do this procedure. Prop or hold the printer cover securely while installing the dashpot.

1. Position the dashpot against the ball studs on the upper and lower brackets with the narrow rod uppermost. (See Figure 42, page 262.)
2. Using external grip ring pliers to spread the retaining clips, push the dashpot onto the ball joints and slide the spring clips over the top (bottom) of the ball joint into the retaining grooves.
3. Close the printer cover.
4. Return the printer to normal operation (page 161).

Fan Assembly, Cabinet Exhaust

NOTE: This procedure applies only to cabinet models.

Removal

1. Prepare the printer for maintenance (page 160).
2. Open the front and rear cabinet doors and the printer cover.
3. Remove the paper fence/paper tray assembly. (See page 260.)
4. Remove the two 1/4 inch screws securing bottom of the air exhaust duct. (See page 262, item 4).
5. Remove the 1/4 inch screw directly below the forms thickness lever.
6. Disconnect the fan cable connector from connector P307 and remove the air exhaust duct.
7. Disconnect the fan cable connector from the side of the air exhaust duct.
8. Remove the two 1/4 inch fan mounting screws and the cabinet exhaust fan assembly.

Installation

CAUTION Air flow is **DOWN**. Install the cabinet exhaust fan so the label on the fan faces down.

1. Reverse steps 2 through 8 of the removal procedure.
2. Return the printer to normal operation (page 161).

Fan Assembly, Card Cage

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Disconnect the card cage fan cable connector. (See page 284.)
4. Cabinet Models: Remove the two fan mounting screws from the bottom of the fan. (See page 284, item 2.)
Pedestal Models: Remove the four fan mounting screws and nut. (See page 270, items 1 through 4.)
5. Remove the card cage fan assembly from the card cage.

Installation

CAUTION Air flow is INTO the card cage. Install the card cage fan so the label faces toward the inside of the printer and the cable faces the front of the printer.

1. Reverse steps 2 through 5 of the removal procedure.
2. Return the printer to normal operation (page 161).

Fan Assembly, Hammer Bank

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 210).
4. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
5. Trace the hammer bank fan cable assembly back to the controller board connector P107, releasing it from all cable constraints. (See the cable routing diagrams in Appendix A.)
6. Disconnect the fan connector from connector coupling shroud P107 on the controller board. (See page 204.)
7. Remove the two screws securing the fan to the base casting. Angle the hammer bank fan assembly up and out of the base casting and feed the motor wires and cable connector out from between the base casting and the base pan. (See page 284, items 21 and 22.)

Installation

CAUTION

Air flow is UP. Install the hammer bank fan so the label faces up.

1. Feed the hammer bank fan cable connector and motor wires between the fan well of the base casting and the base pan. Reach up under the base casting and route the fan cable to the right and angle the hammer bank fan assembly under the shuttle motor and down into the fan well. (See page 284.)
2. Route the fan motor wires (see cable routing diagrams, Appendix A) and connect the fan cable connector to J107 on the controller board. (See page 204.)
3. Install two screws in the locations shown in Figure 51 (page 284, item 21).
4. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
5. Install the shuttle cover assembly (page 210).
6. Install the ribbon. (Refer to the *User's Manual*.)
7. Return the printer to normal operation (page 161).

Hammer Spring Assembly, Version 1

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the shuttle frame assembly (page 251).
3. Carefully vacuum the shuttle frame assembly.
4. Remove the hammer bank cover assembly (page 209).

CAUTION

Hammer springs and hammer tips are fragile. Do not touch the hammer springs or tips. Handle hammer spring assemblies by the thick mounting base only. Apply pressure only to the mounting base.

5. Remove the mounting screws from the old hammer spring assembly. (See Figure 25.)
6. Handling the hammer spring assembly by the mounting base only, gently push up the mounting base and pry the old hammer spring assembly off its mounting pins. (See Figure 25.)
7. Inspect the hammer bank and the old hammer spring assembly:
 - a. If there is ink on the hammer bank mounting surface that was under the hammer spring, or if there is ink on the hammer spring assembly mounting surface that was against the hammer bank, or if there is ink on the hammer spring neck or tines, ink migration has occurred. Reinstall the old hammer spring assembly and replace the entire shuttle frame assembly (page 251).
 - b. If the old hammer spring assembly and the hammer bank are free of ink, install the new hammer spring assembly, as shown in the next section.

NOTE: A P7X06H/P7X15 lpm version 1 hammer bank is shown here. Removal, installation, and fastener torque values are the same for all version 1 hammer spring assemblies, even though hammer spring assemblies vary in number of hammers and number of mounting screws.

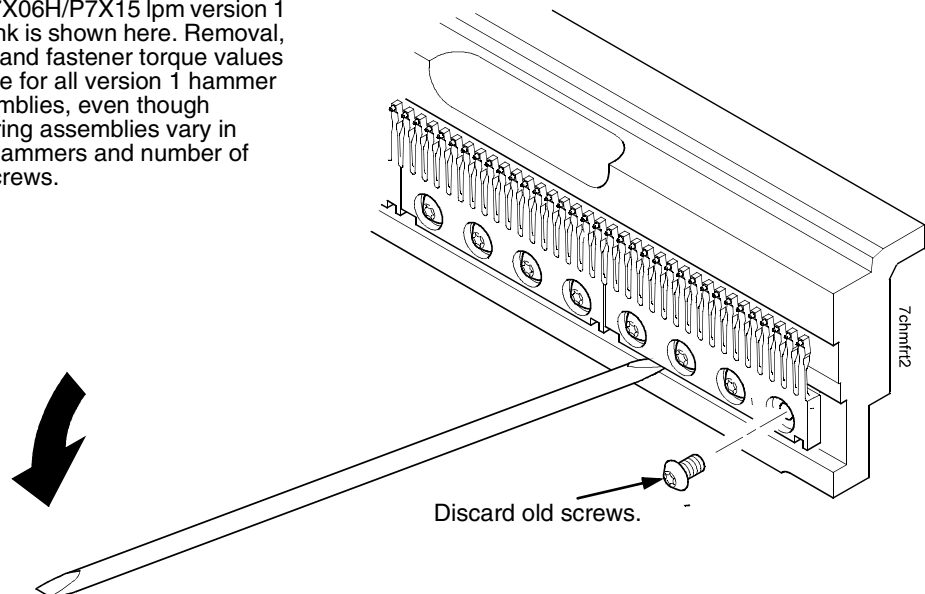


Figure 25. Hammer Spring Assembly, Removal

Installation

1. Using a clean dry cloth, wipe the hammer spring mounting surface on the hammer bank. Make sure the cloth does not leave lint on the hammer bank.

CAUTION Hammer springs and hammer tips are fragile. Do not touch the hammer springs or tips. Handle hammer springs by the thick mounting base only. Apply pressure only to the mounting base.

2. Handling the hammer spring assembly by the mounting base only, remove the new assembly and mounting screws from the box.
3. Handling the hammer spring assembly by the mounting base only, carefully position it on the hammer bank mounting pins. then gently press the mounting base down against the alignment pins. (See Figure 26, page 218.)
4. Continue pressing down on the mounting base of the new hammer spring assembly as you install the mounting screws from the replacement kit. Using a Torx T-10 bit adapter, and starting with the inner screws, torque each screw to 14 inch-pounds (1.58 N•m). (See Figure 26.)
5. Install the hammer bank cover assembly (page 209).
6. Install the shuttle frame assembly (page 251).
7. Install the ribbon and load paper.

CAUTION Do not attempt to adjust or “tweak” hammer springs.

8. Run a Diagnostic Printer Test and check print quality (page 141):
 - a. If print quality is acceptable, return the printer to normal operation (page 161).
 - b. If print quality is still degraded, replace the shuttle frame assembly (page 251).

NOTE: A P7X06H/P7X15 lpm version 1 hammer bank is shown here. Removal, installation, and fastener torque values are the same for all version 1 hammer spring assemblies, even though hammer spring assemblies vary in number of hammers and number of mounting screws.

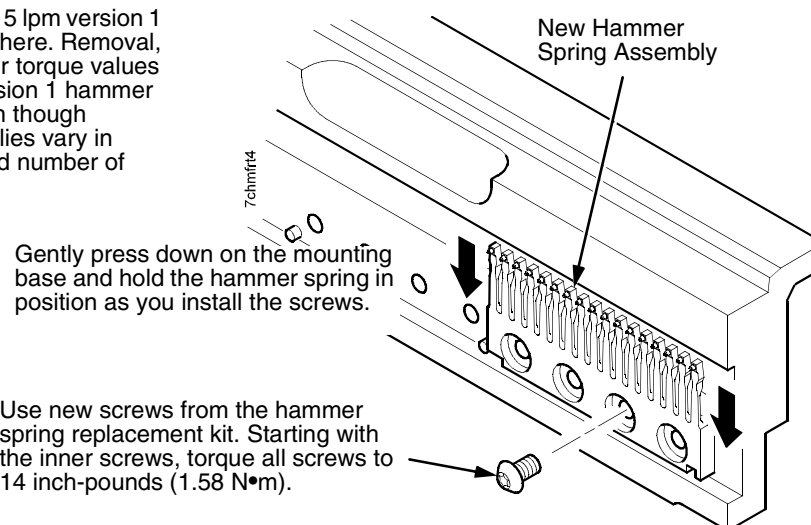


Figure 26. Hammer Spring Assembly, Installation

Hammer Spring Assembly, Version 2

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the shuttle frame assembly (page 251).
3. Carefully vacuum the shuttle frame assembly.
4. Remove the hammer bank cover assembly (page 209).

CAUTION

Hammer springs and hammer tips are fragile. Handle hammer spring assemblies by the thick mounting base only. Apply pressure only to the mounting base.

5. Remove the screws securing the old hammer spring. There will be three or four mounting screws, depending on the printer model. (Figure 27.)
6. Using the beveled end of the guide tool included in the kit, gently pry the old hammer upward and remove it.
7. Discard the old hammer spring assembly and the screws that secured it.
8. Inspect the hammer bank and the old hammer spring assembly:
 - a. If there is ink on the hammer bank mounting surface that was under the hammer spring, or if there is ink on the hammer spring assembly mounting surface that was against the hammer bank, or if there is ink on the hammer spring neck or tines, ink migration has occurred. Reinstall the old hammer spring assembly and replace the entire shuttle frame assembly (page 251).
 - b. If the old hammer spring assembly and the hammer bank are free of ink, install the new hammer spring assembly, as shown in the next section.

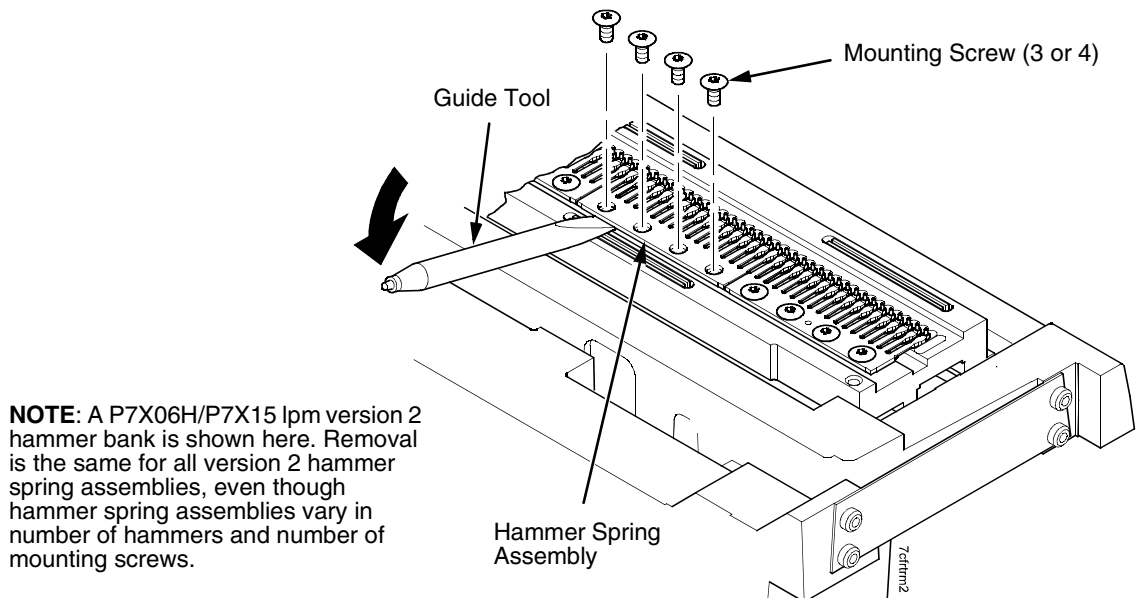


Figure 27. Version 2 Hammer Spring Assembly, Removal

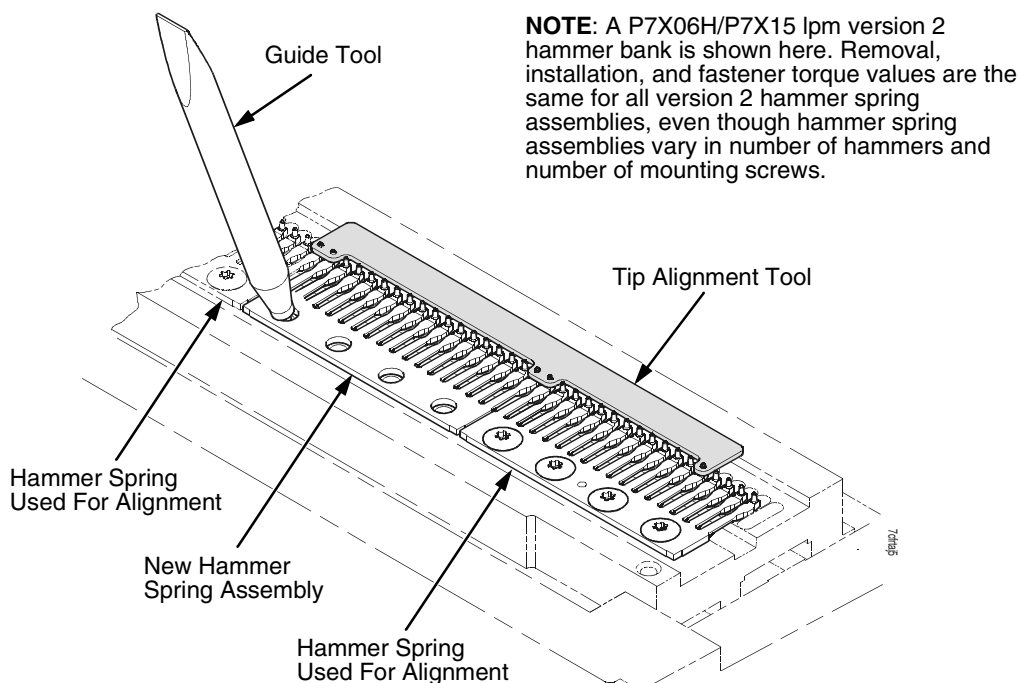
Installation Using The Short Tip Alignment Tool

This procedure is for installing one hammer spring assembly at a time, using short the tip alignment tool that comes with version 2 replacement hammer spring. To install more than one hammer spring assembly at a time, you must use the long tip alignment tool (page 222).

1. Using a clean dry cloth, wipe the hammer spring mounting surface on the hammer bank. Make sure the cloth does not leave lint on the hammer bank.

CAUTION Hammer springs and hammer tips are fragile. Do not touch the hammer springs or tips. Handle hammer springs by the thick mounting base only. Apply pressure only to the mounting base.

2. Handling the hammer spring assembly by the mounting base only, remove the new assembly and mounting screws from the box.
3. Handling the hammer spring assembly by the mounting base, position it on the hammer bank and center it over the mounting screw holes. (See Figure 28.)
4. Position the tip alignment tool over the end hammer tips of the new hammer spring and the end hammer tips of the adjacent hammer springs used for alignment. Use the guide tool to maneuver the hammer tips into the alignment tool. (See Figure 28.)



Models -05 and 02H: Tool 253258-001
 Models -10 and 03H: Tool 253257-001
 Models -15 and 06H: Tool 253256-001
 Models -20, 7000HD, and 08H: Tool 253255-001

Figure 28. Installing a Version 2 Hammer Spring Assembly Using the Short Alignment Tool

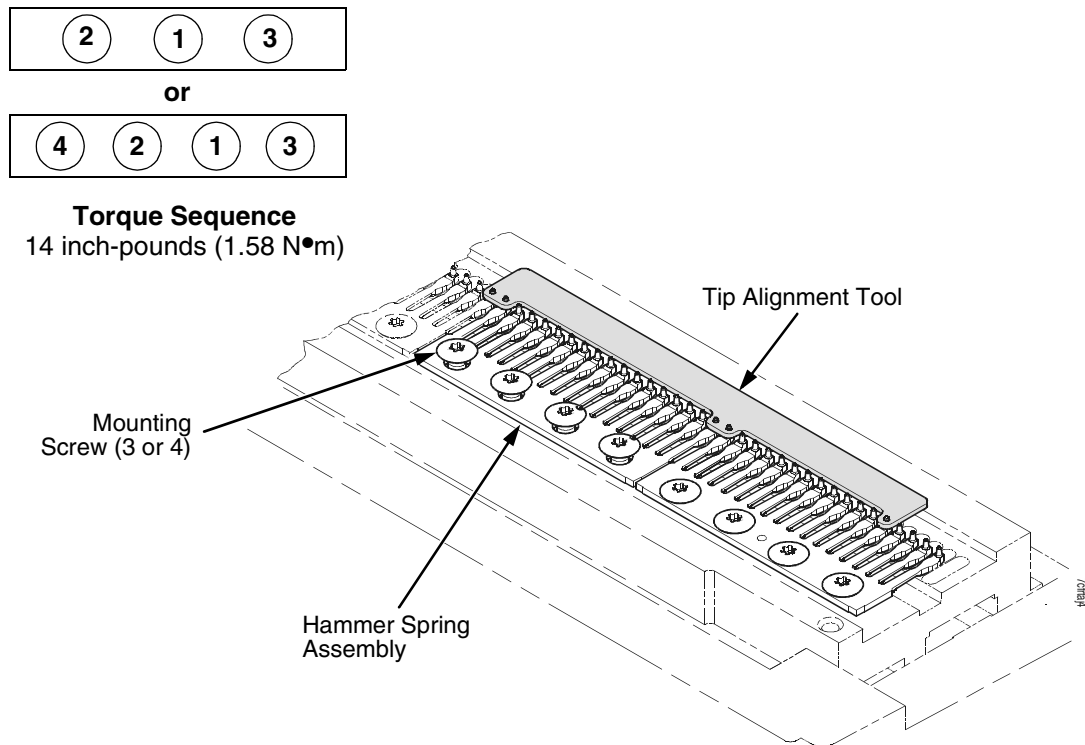


Figure 29. Installing the Mounting Screws in the Hammer Spring Assembly

5. Install the mounting screws in the hammer spring assembly. There will be three or four mounting screws, depending on the printer model. Torque the inner screw(s) to 14 in-lbs (1.58 N•m), then torque the outer screws to 14 in-lbs (1.58 N•m) in the sequence shown in Figure 29.
6. Lift the tip alignment tool off both hammer springs. Do not bend or re-use the tip alignment tool.
7. Install the hammer bank cover assembly (page 209).
8. Install the shuttle frame assembly (page 251).
9. Install the ribbon and load paper.

CAUTION Do not attempt to adjust or “tweak” hammer springs.

10. Run a Diagnostic Printer Test and check print quality (page 141):
 - a. If print quality is acceptable, return the printer to normal operation (page 161).
 - b. If print quality is still degraded, replace the shuttle frame assembly (page 251).

Installation Using The Long Tip Alignment Tool

This procedure is for installing more than one version 2 hammer spring assembly at a time, using the long tip alignment tool. To install one hammer spring assembly at a time, use the short tip alignment tool (page 220).

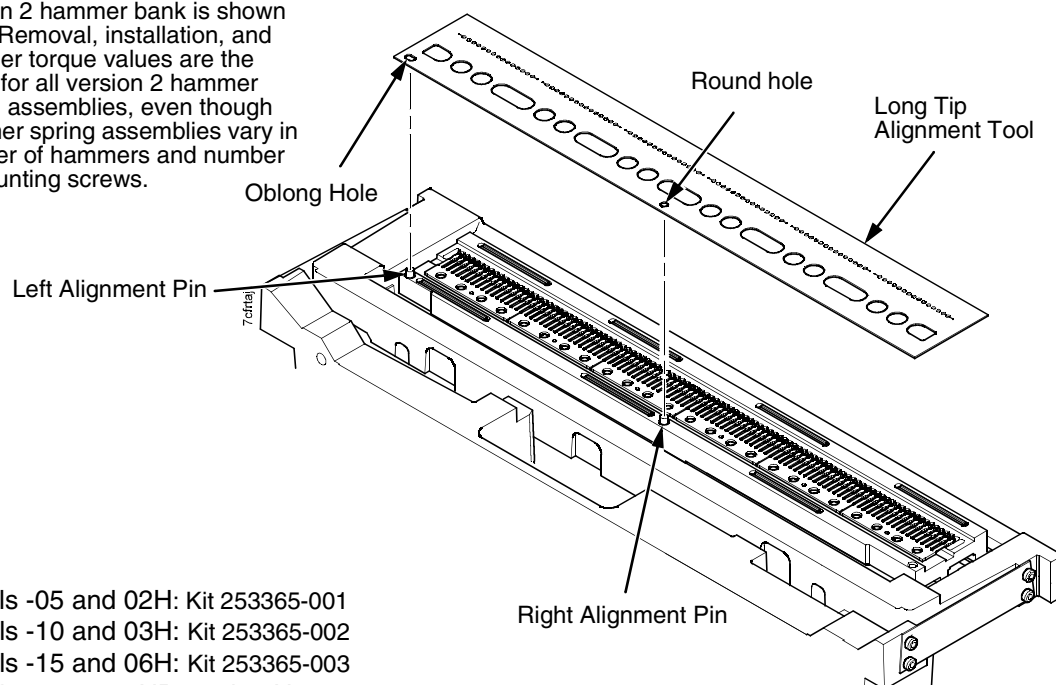
NOTE: If the hammer spring assemblies are being removed for cleaning, note their locations on the hammer bank and return them to the same locations when you reinstall them. This minimizes the impact to print quality when you reinstall the shuttle frame assembly.

1. Using a clean dry cloth, wipe the hammer spring mounting surface on the hammer bank. Make sure the cloth does not leave lint on the hammer bank.

CAUTION Hammer springs and hammer tips are fragile. Handle hammer springs by the thick mounting base only. Apply pressure only to the mounting base.

2. Handling the hammer spring assemblies by the mounting bases only, remove the new assemblies and mounting screws from the boxes.
3. Handling the hammer spring assemblies by the mounting base, position them on the hammer bank. Center the hammer spring assemblies as closely as possible over the mounting screw holes in the hammer bank.
4. Gently position the Long Tip Alignment Tool so the right alignment pin on the hammer bank is in the round hole in the tool, and the left alignment pin is in oblong hole. (See Figure 30.)

NOTE: A P7X06H/P7X15 lpm version 2 hammer bank is shown here. Removal, installation, and fastener torque values are the same for all version 2 hammer spring assemblies, even though hammer spring assemblies vary in number of hammers and number of mounting screws.



Models -05 and 02H: Kit 253365-001
 Models -10 and 03H: Kit 253365-002
 Models -15 and 06H: Kit 253365-003
 Models -20, 7000HD, and 08H: Kit 253365-004

Figure 30. Positioning the Long Alignment Tool

CAUTION In the next step, use **ONLY** the guide tool that comes with the alignment tool to align the version 2 hammer spring assemblies. To avoid damaging threads, never insert any metallic tool into the hammer spring mounting holes in the hammer bank.

5. Apply a gentle, continuous downward pressure to the alignment tool and gently swivel the guide tool in the hammer spring mounting holes to maneuver the hammer tips into the clearance and alignment holes in the alignment tool. You will feel and/or hear a small “click” when the hammer tips slip into the holes. (See Figure 31.)

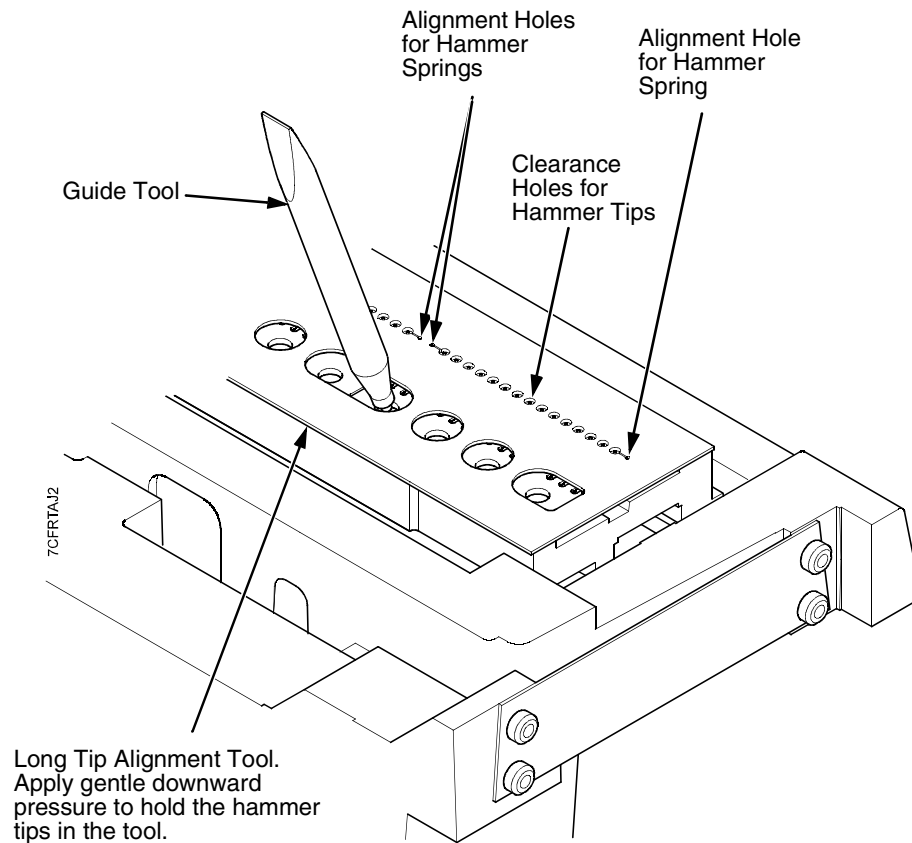


Figure 31. Using the guide tool to maneuver the hammer tips into the alignment tool holes.

6. Continue to apply a slight downward pressure on the tool and install the mounting screws in the hammer spring assemblies. Depending on the printer model, there will be three or four mounting screws per assembly. Torque the inner screw(s) to 14 in-lbs (1.58 N•m), then torque the outer screws to 14 in-lbs (1.58 N•m). (See Figure 32.)

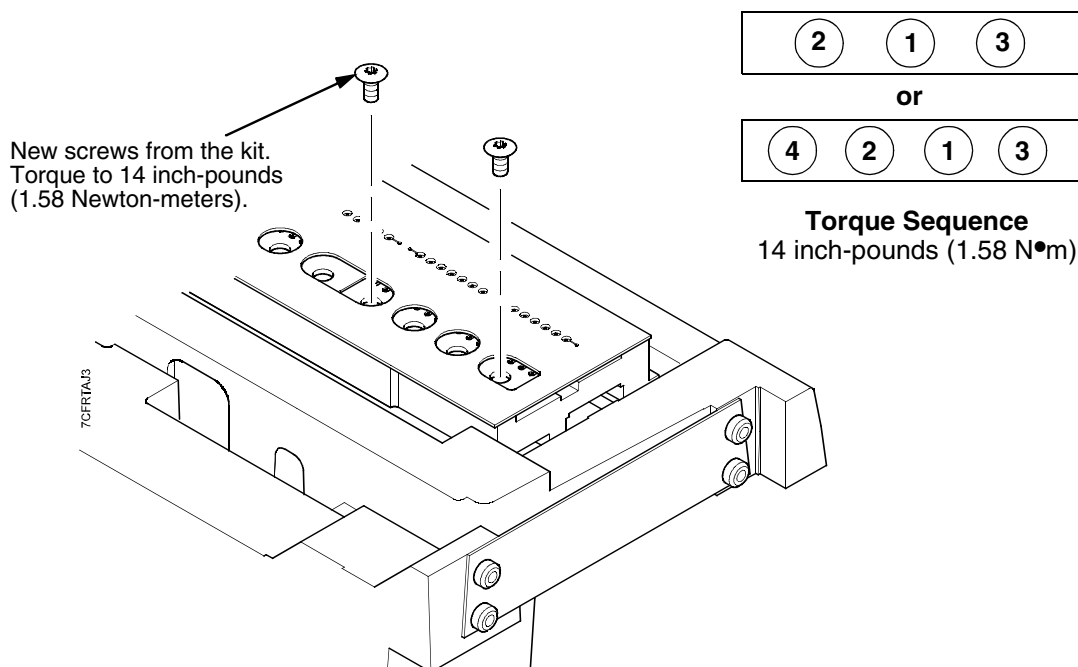


Figure 32. Installing the Torx T-10 Screws

7. When you have installed and torqued all hammer spring assemblies, gently lift the long tip alignment tool off both hammer springs.
8. Install the hammer bank cover assembly (page 209).
9. Install the shuttle frame assembly (page 251).
10. Install the ribbon and load paper.

CAUTION Do not attempt to adjust or “tweak” hammer springs.

11. Run a Diagnostic Printer Test and check print quality (page 141):
 - a. If print quality is acceptable, return the printer to normal operation (page 161).
 - b. If print quality is still degraded, replace the shuttle frame assembly (page 251).

Integrated Print Management Sensor

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the screw securing the Integrated Print Management sensor to the base casting. (See page 280, items 28 and 29.)
4. Trace the sensor cable back to the controller board, noting the cable routing and releasing the cable from restraints as necessary.
5. Disconnect the sensor cable connector from J122 on the controller board.
6. Lift the sensor and guide the sensor cable up and out of the base casting.

Installation

1. Reverse steps 2 through 6 of the removal procedure above.
2. Return the printer to normal operation (page 161).

Magnetic Pickup (MPU) Assembly

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover (page 210).
4. Disconnect the magnetic pickup (MPU) cable connector (page 276, item 5).
5. Loosen the 7/64 inch hex MPU clamp screw (page 276, item 3).
6. Unscrew the MPU assembly from the MPU bracket.

Installation

1. Install the MPU assembly by screwing it into the MPU bracket. (See Figure 48, page 276).
2. Using a feeler gauge, adjust the gap between the MPU assembly and the flywheel to $0.010 \pm .001$ inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 inch-pounds (2.03 N•m).
3. Check the gap between the MPU assembly and the flywheel with a feeler gauge:
 - a. If the gap is $0.010 \pm .001$ inch (0.254 ± 0.025 mm), go to step 4.
 - b. If the gap is not 0.010 ± 0.001 inch (0.254 ± 0.025 mm), loosen the MPU clamp screw and go back to step 2.
4. Route the MPU cable under the extension spring and connect the MPU cable connector (page 276, item 5). Make sure the MPU cable does not touch the extension spring after cable connection.
5. Install the shuttle cover (page 210).
6. Install the ribbon. (Refer to the *User's Manual*.)
7. Adjust the hammer phasing (page 175).
8. Return the printer to normal operation (page 161).

Memory and Security Key

CAUTION To prevent electrostatic damage to electronic components, always wear a grounded static wrist strap when you handle memory modules.

Removal

1. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
2. Prepare the printer for maintenance (page 160).
3. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
4. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch memory modules or the controller board.
5. To remove the flash SIMM or SDRAM DIMM (V5 controller only), gently open the side locks, angle the memory module upward, and remove it from the socket. (SDRAM is soldered on V6 controllers and cannot be removed.) (See Figure 33, page 228.)
6. If you need to remove the security key, gently lift the locking tab on the top side of controller board connector J9 enough to release the key, then lift and remove the security key. (See Figure 33, page 228.)

NOTE: The security key is a 3-pin semi-programmable EEPROM that enables the loading of microcode and emulation software. The printer will not operate correctly without a security key. If you need to replace the security key, contact Printronix for a replacement.

Installation

1. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch memory modules or the controller board.
2. If you removed the security key, position it on controller board connector J9 so that the lock indentation is on the same side as the locking tab on connector J9. Gently press the security key down onto the pins until the locking tab engages the lock indentation and locks the key in place. (See Figure 33.)

NOTE: Installing flash memory from one controller board to another does not transfer all operating system software, so you must download the emulation again.

3. Insert the memory module at a 45 degree angle into the correct socket (see Figure 33) on the controller board:
 - a. Insert the flash SIMM in socket J11 on the controller board at a 45 degree angle. Position the flash SIMM with the notched end toward the right side of the controller board. Press the SIMM gently into the socket until the edge connectors are seated, then press the SIMM downward until the side latches lock the SIMM in place. (See Figure 33, page 228.)

- b. V5 controller only: Position the SDRAM DIMM in socket J14 with the component side upward. Press the DIMM gently into the socket until the edge connectors are seated, then press the DIMM downward until the side latches lock it in place. (NOTE: SDRAM is soldered on the V6 controller board and cannot be removed.) (See Figure 33 below.)
4. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
5. Download the emulation (page 177).
6. If an SPX came with the flash memory, reprogram the security key (page 183).
7. Return the printer to normal operation (page 161).
8. Using the configuration printout(s) you made in step 1 of the removal procedure, reset and save the printer configuration(s). (Refer to the *User's Manual*.)

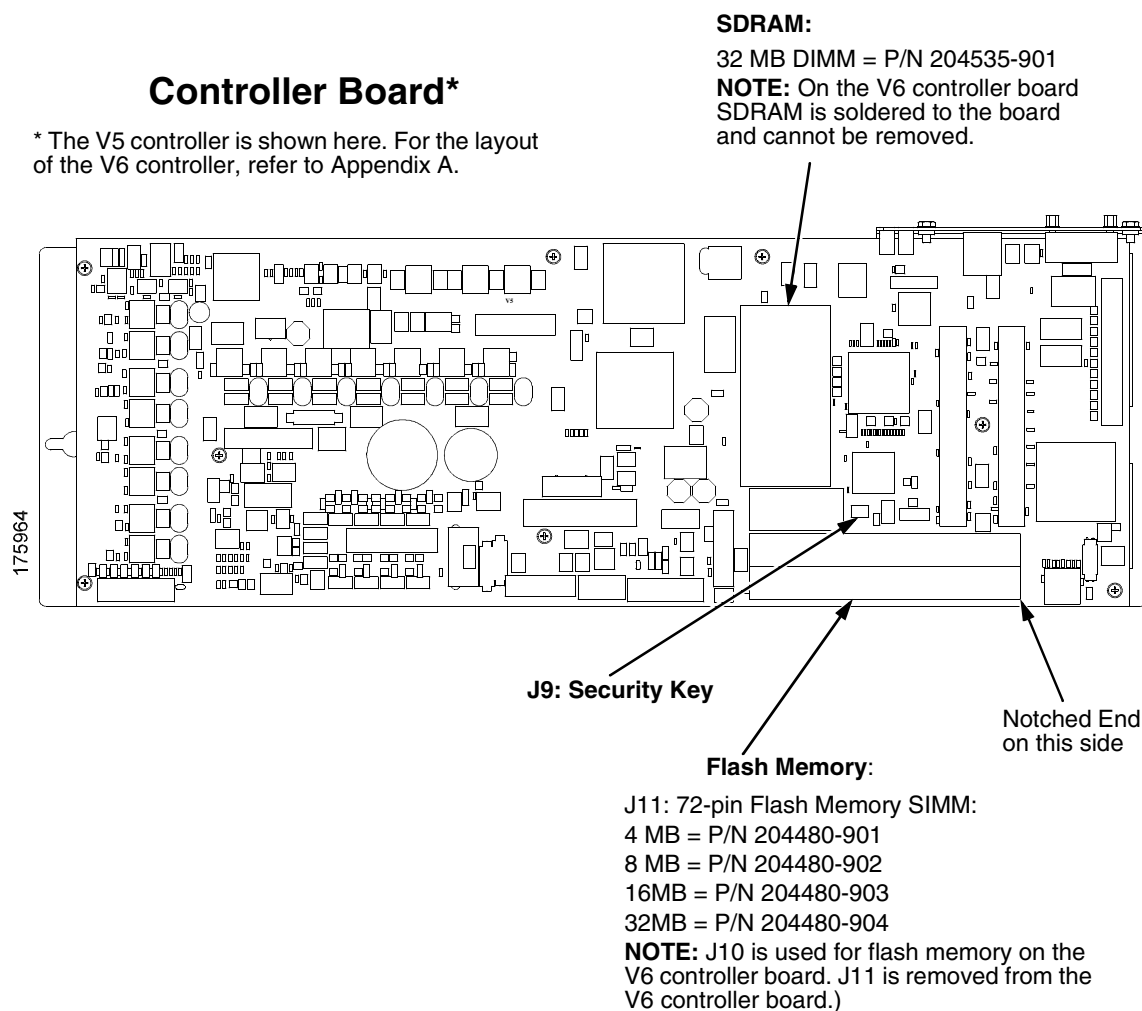


Figure 33. Memory Modules and Security Key

NIC (Network Interface Card) Assembly

NOTE: This procedure only applies to printer with the V5 controller board.
The ethernet interface is built onto the V6 controller board.

Removal

1. Make a configuration printout of all saved configurations. (Refer to the *User's Manual*.)
2. Prepare the printer for maintenance (page 160).
3. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).

CAUTION

To prevent electrostatic damage to electronic components, wear a grounded static wrist strap when you handle circuit boards.

4. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch electronic components or the controller board.
5. Remove the screw securing the NIC connector plate to the rear of the card cage. (See page 292, item 4.)

NOTE: For V5 controller board only. The NIC is onboard for the V6 controller.

6. Angle the NIC out of the card cage cutout as you lift the NIC off the expansion connector on the controller board. (See page 292, item 1.)

Installation

CAUTION

To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. Put on a static wrist strap and ground the lead to an unpainted part of the printer frame. Touch the printer frame with the hand wearing the wrist strap before you touch electronic components or the controller board.
2. Reverse steps 3 through 5 of the removal procedure.
3. Load printer software through the printer's parallel port using the three-key initialization sequence covered in "Loading Software If Flash Contains Only Boot Code" on page 180.
4. Set the printer power switch to O (off), wait five seconds, then set the printer power switch to 1 (on).
5. Return the printer to normal operation (page 161).

Testing NIC Operation

You can test the NIC by starting a telnet session (`telnet IP address`) and sending

```
start fox prn<Return>
stop prn<Return>
```

This command sequence sends consecutively numbered lines of text from the interface to the printer. The “fox” test is resident in the NIC and verifies that it can receive commands and can transfer data successfully to the printer.

NOTE: For the V6 controller board, reprogram the security key before using the NIC.

Paper Feed Motor

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the timing belt cover by squeezing the front and back to release the plastic tabs from the slots in the side plate (page 266, item 7).
4. Loosen, but do not remove, the two 5/16 inch paper feed motor mounting screws. (See page 284, item 6.)
5. Roll the paper feed timing belt off the paper feed motor pulley and splined shaft pulley.
6. Trace the paper feed motor cables back to the controller board, releasing it from tie wraps. (See the cable routing diagrams in Appendix A.)
7. Disconnect connector P107 from the controller board and remove the paper feed motor connector from connector P107. (See page 205.)

NOTE: Some paper feed motors are mounted with nuts and bolts; other motors have threaded flanges, eliminating the need for nuts.

8. Remove the motor mount screws (and nuts, if present).
9. Remove the paper feed motor assembly.

Installation

1. Position the paper feed motor assembly on the right side plate and install the motor mount bolts and nuts finger tight. (See page 284, items 6 and 18.)
2. Connect the paper feed motor cable connector to connector P107, then connect P107 to J107 on the controller board. (See page 205.)
3. Roll the paper feed timing belt onto the splined shaft pulley and the motor pulley
4. Using the straight end of a force gauge, apply 15 pounds (66.7 N) of pressure to the paper feed motor. Use the splined shaft to steady the force gauge.
5. Reduce pressure to 12 pounds (53.4 N) and torque the 5/16 inch motor mount screws to 18 inch-pounds (2.03 N•m).

NOTE: Belt tension is correct if the belt deflects 1/8 inch midway between the pulleys.

6. Snap the timing belt cover into the slots in the side plate.
7. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
8. Return the printer to normal operation (page 161).

Paper Ironer

WARNING Over time, the upper edge of the paper ironer can become sharp. To avoid cutting yourself, handle the paper ironer on the sides.

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the shuttle frame assembly (page 251).
3. Move the forms thickness lever to the open position.
4. Push the ends of the paper ironer toward the rear of the printer, disengage the tabs, then lift it up and out (page 280, item 3).
5. On models P7000HD, P7X06H, P7X08H, P7x15, and P7220, remove the auxiliary paper ironer, which is directly in front of the standard paper ironer.

Installation

NOTE: The black tape on the standard paper ironer faces toward the rear of the printer and toward the paper detector switch assembly.

1. Position the paper ironer so the black tape is on the side that faces the rear of the printer, towards the paper detector switch assembly. (See page 280, item 3.)
2. Push the paper ironer down into the slots until the tabs engage.
3. On models P7000HD, P7X06H, P7X08H, P7x15, and P7220, install the auxiliary paper ironer in front of the standard paper ironer. (See also the note on page 280, next to item 27.) Make sure the tabs on both paper ironers are firmly engaged.
4. Install the shuttle frame assembly (page 251).
5. Return the printer to normal operation (page 161).

Paper Path

NOTE: This procedure applies only to cabinet models.

Removal

1. Prepare the printer for maintenance (page 160).
2. Loosen—do not remove—the three screws that secure the paper path to the card cage. (See Figure 34.)
3. Slide the paper path to the left and lift it off the card cage.

Installation

1. Position the paper path offset slightly to the left on the card cage with the keyway cutouts over the three loosened screws. (See Figure 34.)
2. Slide the paper path to the right, engaging the three screws in the keyway slots. Slide the paper path to the right as far as it will go.
3. Tighten the screws securing the paper path to the card cage. (See Figure 34.)
4. Return the printer to normal operation (page 161).

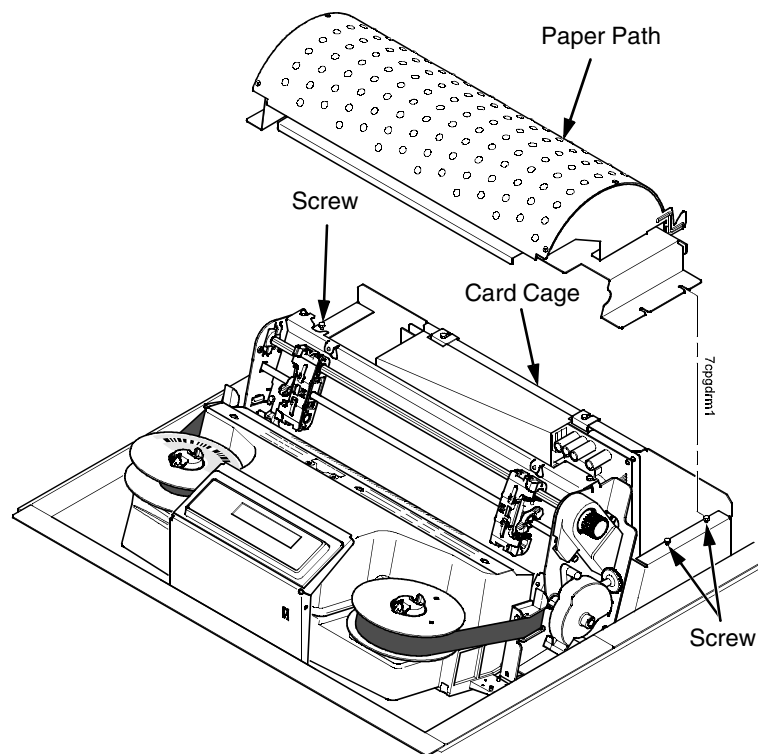


Figure 34. The Paper Path

Platen

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the shuttle frame assembly (page 251).
3. Remove the paper ironer (page 232).
4. Remove the three 1/4 inch screws securing the paper ironer bracket assembly and remove the assembly. (See page 280, items 4, 5, and 6.)
5. Remove the platen open belt (page 202).
6. Remove the platen pulley (page 280, item 21), as follows:
 - a. Loosen the 7/64 inch collar clamp screw.
 - b. Pull the platen pulley off the platen shaft.
7. Pull the spring link and white plastic bushing off the platen shaft and remove the spring link, bushing, and spring. (See page 280, items 16, 17, and 18.)
8. Remove the platen stop assembly by loosening the 7/64 inch clamp screw and pulling the assembly off the platen shaft. (See page 280, item 15.)
9. Remove the right side platen support spring by repeating step 7 on the right side of the platen.
10. Remove the Phillips #1 screw and washer securing the interlock switch bracket from the inside of the right side bracket. (See page 280, items 9 and 10.)
11. Pull the bracket, with the interlock switch assembly attached, off the platen shaft.
12. Remove the two 7/32 inch screws and washers securing the right ribbon guide assembly to the side plate. (See page 284, items 7, 8, and 9.)
13. Slide the ribbon guide assembly out of the side plate.
14. Pull the right side of the platen toward the front of the printer and move the platen to the right and out of the left side plate. (Hold the black metal washer on the left side of the shaft as you remove the platen. Make sure the wear saddles in the platen seat of the mechanism base stay in place.)

Installation

IMPORTANT

Install the platen with the longer shaft on the right hand side of the printer. The dowel pins protruding from the ends of the platen are the platen shafts. The platen shafts are not of equal length.

1. Wipe the platen shafts clean of grease and debris.
2. Install two washers on the longer (right) platen shaft.
(See Figure 35 below.)
3. Apply bearing lubricant to both platen shafts.

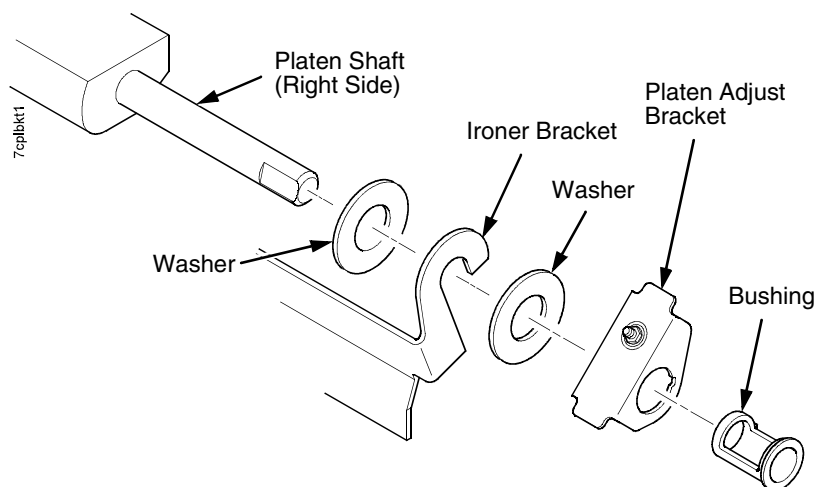


Figure 35. Installing the Platen Adjust Bracket

4. Make sure the two wear saddles are set flush into the corners of the mechanism base platen seat. (See Figure 36 below.)
5. Apply a layer of bearing lubricant 1/4 inch high to the seat of each wear saddle, making the layer as wide as the saddle and touching the rear angled surface.
6. Install one platen adjust bracket and bushing onto the longer platen shaft, with the screw at the top of the bracket. (See Figure 35.)
7. Place the other bracket and bushing onto the left side mechanism base platen seat so that the mechanism base platen seat is between the flanges of the bracket.
8. Insert the shorter platen shaft through the left platen adjust bracket and through the opening in the left side plate. Rotate the longer shaft into the opening in the right side plate and position the platen adjust brackets as shown in Figure 36.

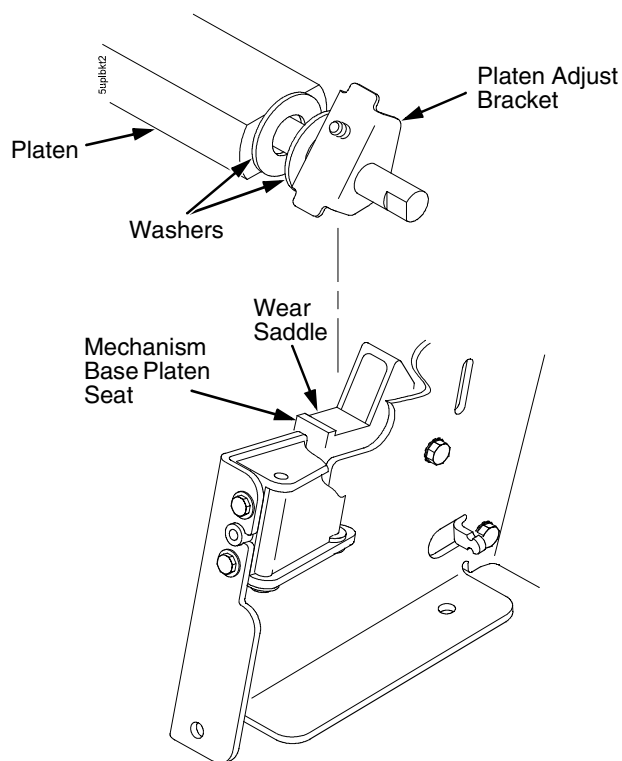


Figure 36. Positioning the Platen Adjust Brackets

9. Slide the right ribbon guide assembly into the side plate and install the two 7/32 inch screws and washers. (See Figure 51 on page 284, items 7, 8, and 9.)
10. Install the interlock switch bracket:
 - a. Slide the bracket, with the interlock switch assembly attached, onto the platen shaft and up against the right side plate.
 - b. Install the Phillips #1 screw and washer securing the switch and bracket.
11. Install the black metal washer onto the left side of the platen shaft. (See page 280, item 26.)
12. Apply bearing lubricant to the nylon bearings in the two spring links, slide the spring links onto the platen shafts, and connect the springs to the spring hooks in the side plates. (See page 280, items 16, 17, and 18.)
13. Apply bearing lubricant to the platen shafts on both sides, between the ends of the platen and the platen adjust brackets.

14. Install the paper ironer bracket. (See Figure 35.)
 - a. With the flat part of the bracket facing the front of the printer, place the two hooks of the upper part of the paper ironer over the platen shafts.

The left hook of the paper ironer bracket goes between the left platen adjustment bracket and the platen.

On the right side of the platen, a washer goes on both sides of the paper ironer bracket hook and the hook goes to the left of the right platen adjustment bracket. (See Figure 35.)
 - b. Install and torque three screws to 20 inch-pounds (2.26 N•m).
15. Push the platen to the left.
16. Install the platen stop assembly on the right hand platen shaft, pressing the interlock switch out of the way as the lever slides past it. Torque the 7/64 inch clamp screw to 18 inch-pounds (2.03 N•m). (See page 280.)

Open and close the forms thickness lever to make sure the clamp screw does not touch the right ribbon guide.
17. Install the platen shaft pulley with the 7/64 inch setscrew facing up and tighten the setscrew (page 280, items 21 and 22). Open and close the forms thickness lever and check that the platen pulley setscrew does not hit the left ribbon guide.
18. Install, but do not adjust, the platen open belt (page 280, item 23).
19. Install the paper ironer with the black tape towards the rear of the printer (page 280, item 3).
20. Install the shuttle frame assembly (page 251).
21. Adjust the platen gap (page 168).
22. Adjust the platen open belt (page 164).
23. Check ribbon guide alignment (page 170).
24. Check the hammer phasing (page 175).
25. Return the printer to normal operation (page 161).

Platen Open Motor

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Cabinet Models: Remove the card cage fan (page 215).
4. Remove the platen open belt cover by squeezing the top and bottom to release the plastic tabs from the slots in the side plate (page 280, item 24).
5. Using a 5/32 inch Allen wrench, loosen the platen motor adjustment screw (page 284, item 10).
6. Remove the platen open belt (page 280, item 23).
7. Trace the platen open motor cables back to connector P106 on the controller board, releasing the cables from all tie-wraps. (See cable routing diagrams in Appendix A.)
8. Remove the platen open cable connector from connector P106. (See page 205.)
9. Remove the 5/32 inch platen motor adjustment screw, platen spring post, and platen belt spring (page 284, items 10, 20, and 21).
10. Remove the 5/16 inch motor lower mount screw.
11. Remove the platen open motor assembly.

Installation

1. Position the platen open motor assembly with the wires toward the rear (page 284, item 5).
2. Install the 5/16 inch lower motor mount screw and torque it to 30 inch-pounds (3.39 N•m).
3. Install the 5/32 inch upper motor mount screw, platen spring post, and platen belt spring such that the screw is just loose enough to permit movement of the motor in the slotted side plate. (See page 284, items 10, 20, and 21.)
4. Rotate the motor all the way forward and install the platen open belt.
5. Connect the platen motor cable connector to connector coupling shroud P106.
6. Connect coupling shroud connector P106 to the controller board and install tie-wraps to secure the motor cable. (See the wire routing diagrams in Appendix A.)
7. Close the forms thickness lever all the way.

CAUTION

Too much tension on the platen open belt can cause the platen gap to change, which can lead to premature wear of the platen, damaged hammer tips, and poor print quality.

8. The spring automatically tensions the belt.
9. *Slowly* tighten the motor adjustment screw.

NOTE: Belt tension is correct if the belt deflects 3/16 inch midway between the pulleys. If deflection is more or less than 3/16 inch, repeat steps 7 through 9.

10. Snap the platen open belt cover into the slots in the side plate.
11. Cabinet Models: Install the card cage fan (page 215).
12. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
13. Return the printer to normal operation (page 161).

Platen Stop Assembly

NOTE: The forms thickness lever is part of the platen stop assembly.

Removal

1. Prepare the printer for maintenance (page 160).
2. Loosen—do not remove—the 7/64 inch clamp screw and pull the platen stop assembly off the platen shaft. (See page 280, items 12 through 15.)

Installation

1. Install the platen stop assembly on the right hand platen shaft, pressing the interlock switch out of the way as the lever slides past it. Torque the 7/64 inch clamp screw to 18 inch-pounds (2.03 N•m). (See page 280.) Open and close the forms thickness lever to make sure the clamp screw does not touch the right ribbon guide.
2. Return the printer to normal operation (page 161).

Power Supply Board

WARNING

To prevent injury from electric shock, wait at least one minute after shutting off power before removing the power supply board. Do not touch components on the board during removal or installation. Lift and handle the board only by the loops provided for this purpose.

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Mark then disconnect all cable assemblies going to and from the power supply board. (See page 272, item 3.)
4. Loosen—do not remove—the two screws securing the power supply board to top rear wall of the card cage. (See page 272, item 15.)
5. Grasp the power supply by the handling loops, tilt it forward, and lift it out of the printer.

Installation

1. Holding the power supply by the handling loops, tilt the bottom of the power supply toward the rear of the card cage and insert the tabs on the the power supply base in the channels on the lower rear card cage wall.
2. Rotate the top of the power supply board toward the rear of the card cage until the slots on the upper brackets bottom out on the screws on the top rear wall of the card cage.
3. Tighten the two screws securing the power supply board to top rear wall of the card cage. (See page 272, item 15.)
4. On models P7000HD, P7X06H, P7X08H, P7X15, and P7220 adjust the coil temperature if the original power supply was replaced by a new or refurbished power supply (page 159).
5. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
6. Return the printer to normal operation (page 161).

Resistors, Terminating, V5 Controller Board

For parallel interface configurations, the printer is equipped with 470 Ohm pull-up terminating resistors and 1K Ohm pull-down terminating resistors on the controller board. These are suitable for most applications. (See Figure 37, page 243.)

If the standard terminating resistor pack is not compatible with the particular interface driver requirements of the host computer, other values of pull-up and pull-down resistors may be required. 220 Ohm pull-up and 330 Ohm pull-down alternate terminating resistors are provided with the printer. If you install the 220 Ohm pull-up resistor, you must also install the 330 Ohm pull-down resistor. Possible terminating resistor combinations are shown below.

Configuration	RP1 (Pull-Down)	RP2 (Pull-Up)
Factory Default	1K Ohm	470 Ohm
Alternate 1	330 Ohm	220 Ohm
Alternate 2	None	1K Ohm

Removal

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Locate the terminating resistor packs. (See Figure 37, page 243.)
4. Using a chip puller, remove the resistor packs.

Installation

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. Using a chip installation tool, install the resistor packs in the correct socket. (See Figure 37, page 243.)
2. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
3. Return the printer to normal operation (page 161).

V5 Controller Board

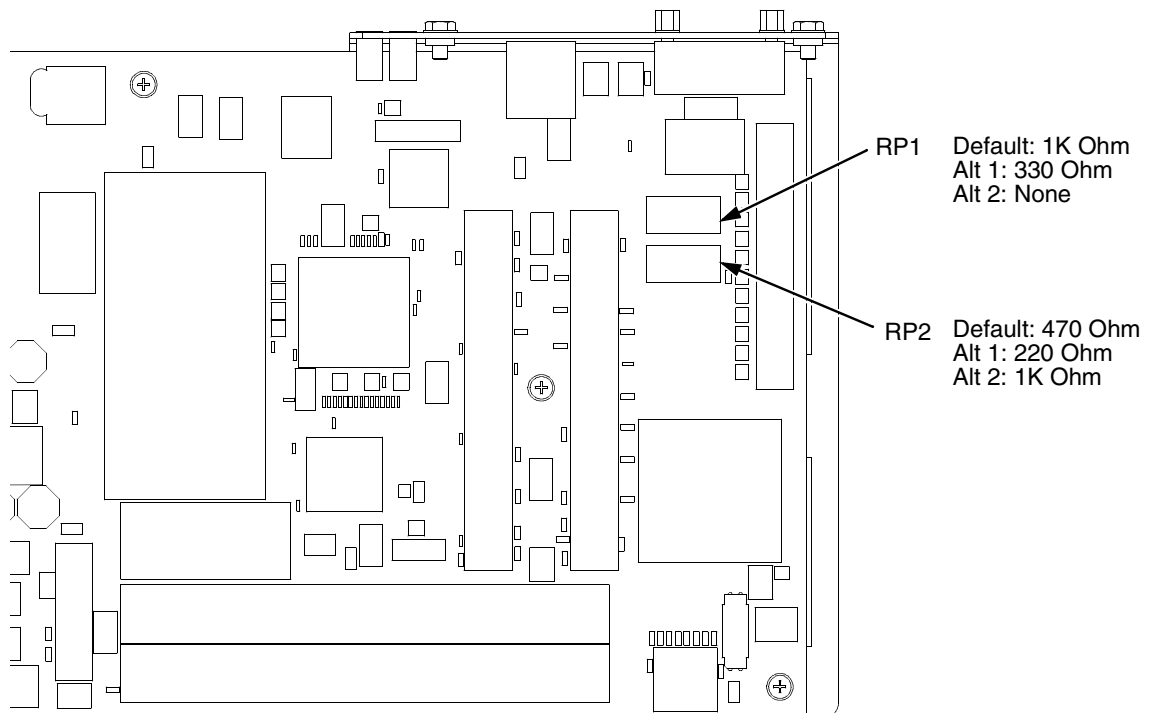


Figure 37. Terminating Resistors, V5 Controller Board, Removal/Installation

Resistors, Terminating, V6 Controller Board

For parallel interface configurations, the printer is equipped with 470 Ohm and 1K Ohm terminating resistors on the controller board. These are suitable for most applications. (See Figure 38, page 245.)

If the standard terminating resistor pack is not compatible with the particular interface driver requirements of the host computer, other RP1 and RP2 values may be required. 220 Ohm and 330 Ohm alternate terminating resistors are provided with the printer. If you install the 220 Ohm resistor, you must also install the 330 Ohm resistor. Possible terminating resistor combinations are shown below.

Configuration	RP1	RP2
Factory Default	470 Ohm	1K Ohm
Alternate	220 Ohm	330 Ohm

Removal

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Locate the terminating resistor packs. (See Figure 37, page 243.)
4. Using a chip puller, remove the resistor packs.

Installation

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle circuit boards.

1. Using a chip installation tool, install the resistor packs in the correct socket. (See Figure 37, page 243.)
2. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
3. Return the printer to normal operation (page 161).

V6 Controller Board

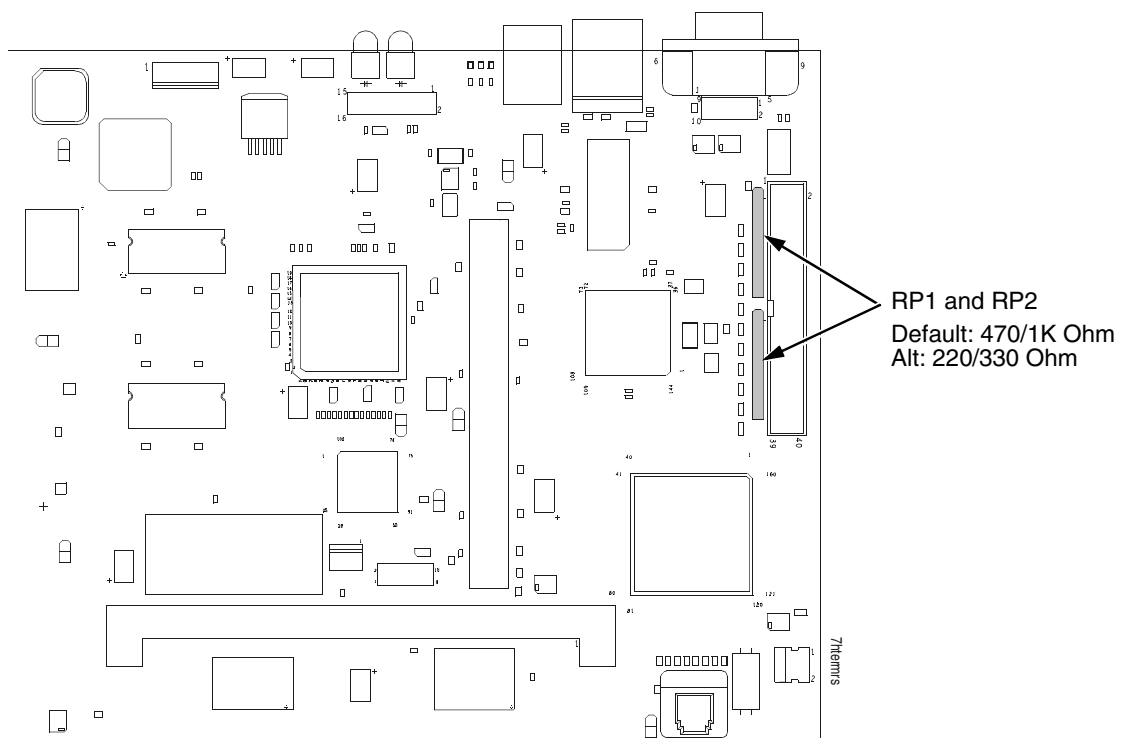


Figure 38. Terminating Resistors, V6 Controller Board, Removal/Installation

Ribbon Drive Motor

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the screws and washers that secure the ribbon drive motor to the base casting at the lower right and upper left corners of the motor. (See page 284, items 13 and 14.)
4. Lift and rotate the ribbon drive motor until the motor cable is aligned with the slot on the base casting.
5. Disconnect the ribbon drive motor cable connector.
6. Lift the motor up and out of the base casting.

Installation

1. Reverse steps 2 through 6 of the removal procedure above.

NOTE: Install the the ribbon drive motor mounting screws at the right front and left rear corners.

2. Install the ribbon. (Refer to the *User's Manual*.)
3. Return the printer to normal operation (page 161).

Ribbon Guide Assembly (L/R)

NOTE: The right ribbon guide is shown exploded in Figure 51 on page 284. The removal procedure is the same for both ribbon guides.

Removal

1. Prepare the printer for maintenance (page 160).
2. Cut and remove the tie-wrap from the tie wrap hole to free the ribbon guide cable. (See page 284, item 7.)
3. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
4. Trace the ribbon guide cable back to the controller board, releasing it from the cable restraints. (See the cable routing diagrams in Appendix A.)
5. For the left ribbon guide, disconnect connector coupling shroud P106 from the controller board. For the right ribbon cable, disconnect connector coupling shroud P107 from the controller board.
6. Trace the ribbon guide wires to the connector coupling shroud, and remove the cable connector from the shroud (page 205).
7. Remove the two 7/32 inch screws and washers securing the ribbon guide assembly to the side plate. To remove the screws from the right ribbon guide when the ribbon is still in place, use a small 7/32 inch box-end/open-end wrench. (See page 284, items 8 and 9.)
8. Slide the ribbon guide assembly out of the side plate.

Installation

1. Reverse steps 2 through 8 of the removal procedure above.
2. Align the ribbon guides (page 170).
3. Return the printer to normal operation (page 161).

Shaft, Splined

IMPORTANT

In order to preserve correct alignment of the side plates, the barrier panel must remain installed and fastened during this procedure.

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the paper supports from the splined shaft and support shaft. (See page 278, item 4.)
3. Remove the paper feed timing belt (page 201).
4. Unlock the left and right tractors and slide them to the center of the shaft.
5. Remove the screw securing the right tractor shaft plate and remove the plate (page 278, items 7 and 8).
6. Slide the splined shaft out of the sealed ball bearing in the left tractor shaft plate and remove the tolerance ring from the left end of the splined shaft (page 278, items 3, 5, and 6).
7. Hold the tractors so they do not fall, grasp the vertical adjustment knob, and slide the splined shaft to the right, out of the tractors and side plate.

Installation

1. Open the doors on the left and right tractors. Position the tractor belts so the alignment marks are at the top on both tractors. (See Figure 39.)
2. Slide the splined shaft through the right side plate and tractors. Make sure the same spline passes the marked groove on each tractor. (See Figure 39.)
3. Install the tolerance ring on the left end of the splined shaft (page 278, item 5).
4. Insert the tolerance ring lead-in portion into the sealed ball bearing in the left tractor shaft plate (page 278, items 3, 5, and 6) while sliding the ball bearing into the right side plate. Push the splined shaft to the left until the flange on the ball bearing is in solid contact with the right side plate. The splined shaft will protrude about 1/16 inch (1.6mm) from the ball bearing.
5. Install the right tractor shaft plate and screw (page 278, items 7 and 8) by first sliding the upper “fingers” up and against the flange on the ball bearing, then sliding the rectangular cutout over the support shaft end, then snapping the U-shaped “spring” behind the tab on the right side plate.
6. Install the paper feed timing belt (page 201).
7. Set the paper feed timing belt tension (page 162).
8. Install the paper supports on the splined and support shafts. (See page 278, item 4.)
9. Return the printer to normal operation (page 161).

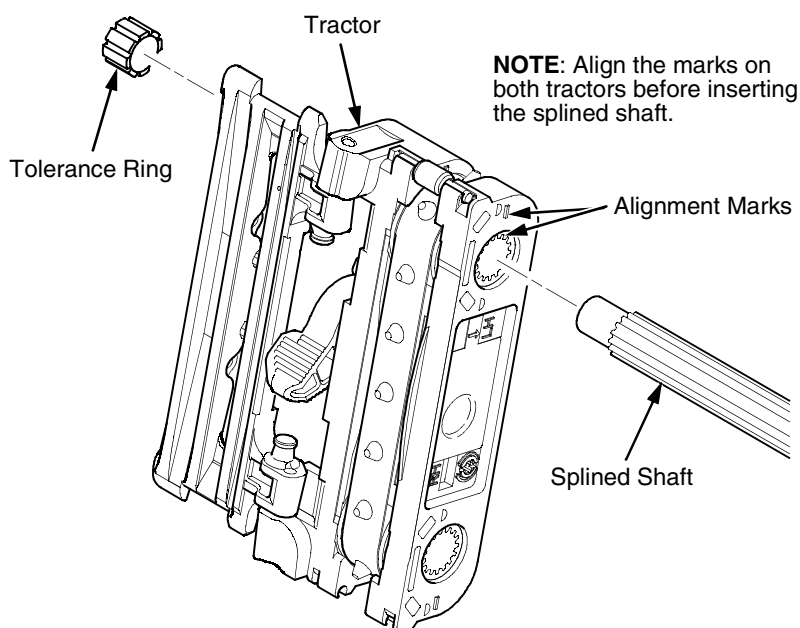


Figure 39. Splined Shaft and Tractor Installation

Shaft, Support

IMPORTANT

In order to preserve correct alignment of the side plates, make sure the barrier panel remains installed and fastened during this procedure.

Removal

1. Prepare the printer for maintenance (page 160).
2. Unlock the tractors and slide them to the far right.
3. Remove the paper supports from the splined shaft and support shaft. (See page 278, item 4.)
4. Remove the screw securing the right tractor shaft plate and remove the plate. (See page 278, items 7 and 8.)

NOTE: Hold the tractors while removing the support shaft.

5. Slide the support shaft to the right, out of the tractors and the right side plate. (See page 278, items 9, 10, and 11.)

Installation

1. Slide the support shaft into the right side plate and through the lower holes in the tractors. (See page 278, items 9, 10, and 11.)
2. Slide the support shaft through the left side plate until it bottoms in the left tractor shaft plate. (See page 278, items 2 and 9.)
3. Install the right tractor shaft plate and screw (page 278, items 7 and 8) by first sliding the upper “fingers” up and against the flange on the ball bearing, then sliding the rectangular cutout over the support shaft end, then snapping the U-shaped “spring” behind the tab on the right side plate.
4. Install the paper supports to the splined shaft and support shaft. (See page 278, item 4.)
5. Return the printer to normal operation (page 161).

Shuttle Frame Assembly

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 210).
4. Disconnect the MPU cable connector P03 and shuttle motor cable connector P02 (page 276, items 5 and 6).

CAUTION To prevent electrostatic damage to electronic components, always wear a properly grounded static wrist strap when you handle the shuttle frame assembly.

5. Disconnect the hammer drive and hammer logic cable connectors from the terminator board on the shuttle frame assembly. (See page 272.)
6. Loosen the side 5/32 inch socket head clamp screws on each end of the shuttle and pull the clamps back and off the guide shaft. Do not remove the clamps. Hand tighten the clamp screws to hold the clamps back.
7. Loosen the center 5/32 inch socket head screw enough to release the shuttle frame assembly from the base casting.
8. Unlock and slide the tractors outward as far as they will go on the tractor support shaft.
9. Open the forms thickness lever all the way.
10. Grasp the support legs cast on both sides of the shuttle motor and lift the shuttle frame assembly out of the base casting. Lift it slowly and carefully: the shuttle frame assembly is heavy.

Installation

1. Install the hammer bank / ribbon mask cover assembly if it was removed (page 209).

CAUTION

To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when you handle the shuttle frame assembly.

DO NOT remove the grease from the shaft of the replacement shuttle frame assembly. The shuttle shaft is aluminum, and the clamped ends of the shaft must be greased to prevent galling.

2. Open the forms thickness lever and move the tractors as far left and right as possible.
3. Holding the shuttle frame assembly by the support legs located on both sides of the shuttle motor and set it into the base casting (page 272).
Use both hands: the shuttle frame assembly is heavy.
4. Align the center 5/32 inch socket head screw in the base casting and hand turn the screw until only two or three threads have started.
5. Pull the shuttle frame assembly toward the front of the printer and hold it in this position while you do step 6.

CAUTION

Do not over-tighten the shuttle frame assembly clamp screws.

6. Slide each side clamp over the guide shaft and torque the 5/32 inch socket head clamp screw to 20 inch-pounds (2.26 N•m).
7. Torque the center captive 5/32 inch socket head screw to 20 inch-pounds (2.26 N•m).
8. Connect the hammer drive and hammer logic cable connectors to the terminator board on the shuttle frame assembly.
9. Connect the shuttle motor cable connector. (See page 276, item 6.)
10. Route the MPU cable under the extension spring and connect the MPU cable connector. (See page 276, item 5.) After the MPU cable is connected make sure that it does not touch the extension spring.

IMPORTANT

In the next step you must loosen the platen motor so the belt or pulley will not be over-stressed when the platen gap is adjusted after the shuttle is installed. (See page 164, steps 2, 3, and 4.)

11. If the shuttle assembly is a new or refurbished unit, adjust the platen gap (page 168); otherwise, skip to step 12.
12. Install the shuttle cover assembly (page 210).
13. Install the ribbon. (Refer to the *User's Manual*.)
14. Adjust the hammer phasing (page 175).
15. Return the printer to normal operation (page 161).

Spring, Extension, Hammer Bank

CAUTION Do not let the hammer bank rotate toward the platen during spring replacement.

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 210).
4. Model P7220 only: Remove the anti-rotation spring constraint from the extension spring. (See page 276, item 6.)
5. Unhook the extension spring from the spring lugs on the hammer bank and shuttle frame. (See page 276, item 4.)

Installation

1. Apply a dab of bearing lubricant to both spring lugs.

CAUTION Do not let the hammer bank rotate toward the platen during spring replacement. Make sure the extension spring does not touch the MPU cable after installation.

2. Hook the extension spring over the spring lugs. (See page 276, item 4.)
3. Model P7220 only: Install the anti-rotation spring constraint over the extension spring. (See page 276, item 6.)
4. Install the shuttle cover assembly (page 210).
5. Install the ribbon. (Refer to the *User's Manual*.)
6. Return the printer to normal operation (page 161).

Switch Assembly, Paper Detector

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Remove the two 1/4 inch screws securing the paper detector switch assembly. (See page 284, items 3 and 4.)
4. Trace the paper detector switch cables back to controller board connector P106, removing all tie wraps. (See the cable routing diagrams in Appendix A.)
5. Disconnect connector coupling shroud P106 from the controller board (page 205).
6. Trace the paper detector switch cables to the connector coupling shroud, and remove the PMD and POD cable connector from the shroud (page 204).
7. Remove the paper detector switch assembly.

Installation

1. Holding the slotted wheel against the PMD sensor, position the paper detector switch assembly and install the two 1/4 inch screws securing it to the printer base. (See page 284, items 3 and 4.)
2. Check PMD sensor arm range: make sure it travels freely and completely back into the sensing cavity.
3. Route the switch cables back to the controller board connector P106. (See the cable routing diagrams in Appendix A.)
4. Connect switch cables PMD and POD to the connector coupling shroud (page 205), then connect P106 to controller board connector J106.
5. Cabinet Models: Install the paper path (page 233).
Pedestal Models: Install the top cover assembly (page 211).
6. Check the paper out adjustment (page 172).
7. Return the printer to normal operation (page 161).

Switch Assembly, Platen Interlock

Removal

1. Prepare the printer for maintenance (page 160).
2. Cabinet Models: Remove the paper path (page 233).
Pedestal Models: Remove the top cover assembly (page 211).
3. Fully close the forms thickness lever (position 'A').
4. Trace the platen interlock switch cable back to the controller board.
Remove tie-wraps as necessary to free the cable. (See cable routing diagrams in Appendix A.)
5. Disconnect connector coupling shroud P107 from the controller board.
6. Remove the platen interlock cable connector from the connector coupling shroud (page 205).
7. Remove two Phillips #1 screws securing the platen interlock switch assembly. (See page 280, item 11.)
8. Remove the platen interlock switch assembly from the switch bracket.
9. Remove the switch cable from the cutout in the right side plate.

Installation

1. Reverse steps 2 through 9 of the removal procedure, and do the following when you have installed the switch on its bracket:
 - a. Install the two Phillips #1 screws finger tight.
 - b. Fully close the forms thickness lever (position A).
 - c. Insert a 0.011 inch (0.028 cm) feeler gauge between the bottom of the interlock switch assembly and the shaft of the forms thickness lever, gently push down on the interlock switch, and tighten the mounting screws. Remove the feeler gauge.
2. Return the printer to normal operation (page 161).

Tractor (L/R)

Removal

1. Prepare the printer for maintenance (page 160).
2. Remove the support shaft (page 250).
3. Remove the splined shaft (page 248).

Installation

1. Using the replacement tractors, install the support shaft (page 250).
2. Install the splined shaft (page 248).
3. Return the printer to normal operation (page 161).

6

Illustrated Parts Breakdown

Organization Of This Chapter

This chapter contains drawings of all electrical and mechanical assemblies in the printer. The table following each illustration lists the illustrated parts and their part numbers. Items marked “Ref” in the illustrations refer to parts that are not spared or are part of another assembly.

NOTE: Part numbers listed in the column labeled **Europe, Mideast, and Africa (EMEA)** are **RoHS compliant**. These parts conform to requirements specified in DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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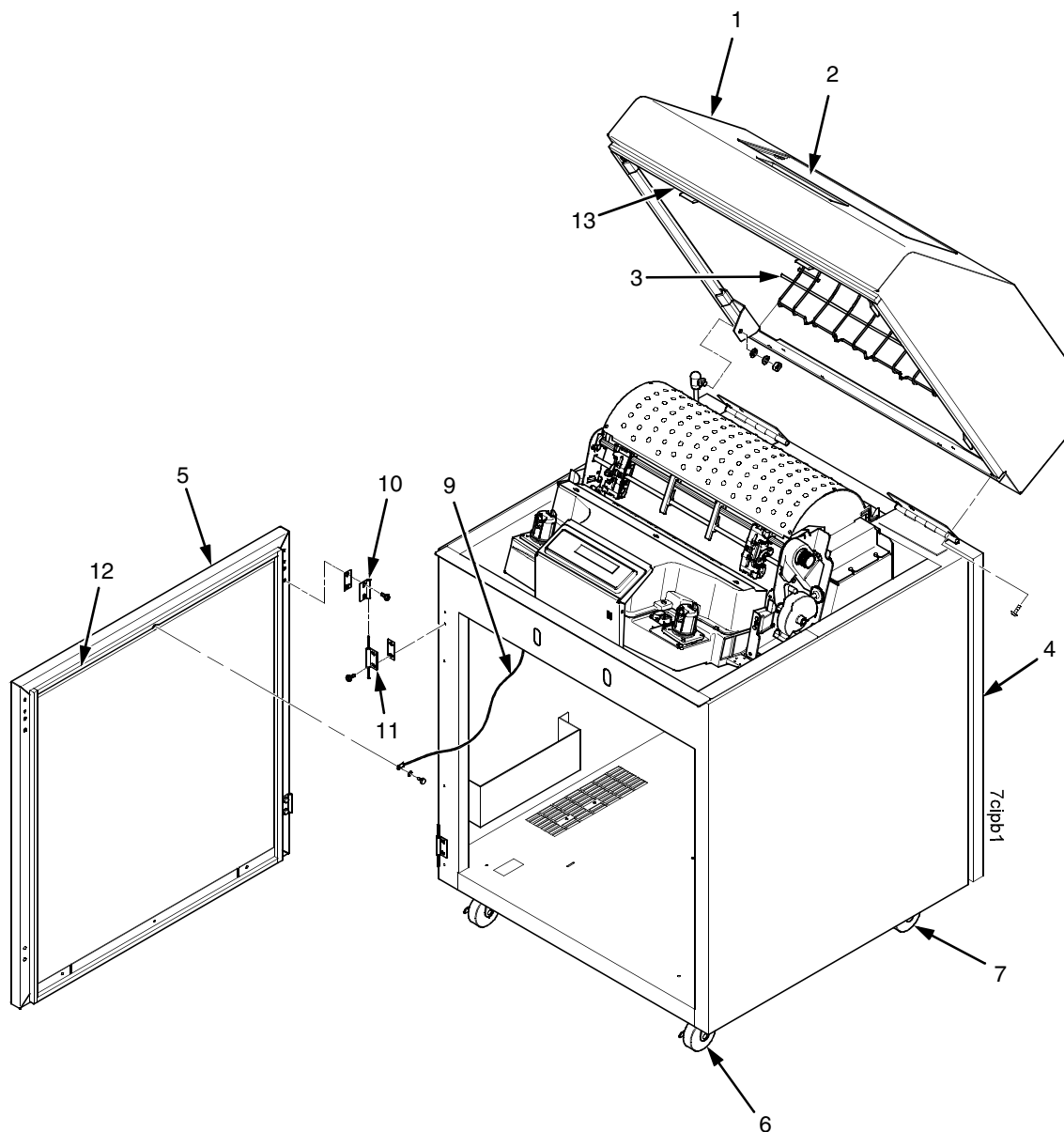


Figure 40. Top Cover, Doors, and Casters

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	177505-901 179781-901	177505-901 179781-901	Top Cover Assembly, Stealth Black Top Cover Assembly, Lt Gray	Includes items 2 and 3 Includes items 2 and 3
2	131803-901	131803-901	Window, Cabinet	
3	175680-001	175680-001	Wireform Paper Path, Standard	
4	177541-901 179785-901	177541-901 179785-901	Rear Door Assembly, Stealth Black Rear Door Assembly, Lt Gray	For printers without power stacker; includes items 9, 10, 11, 12, and 13
	177489-901 179792-901	177489-901 179792-901	Extended Door Assy, Stealth Black Extended Door Assy, Lt Gray	For use with power stacker For use with power stacker
5	177502-901 179779-901	177502-901 179779-901	Front Door Assembly, Stealth Black Front Door Assembly, Lt Gray	Includes items 9, 10, 11, 12, and 13
6	141278-901	141278-901	Caster, with Brake	Two at front
7	141278-902	141278-902	Caster, without Brake	Two at rear
9	101607-003	101607-003	Wire Rope, Front and Rear	One on each door (rear not shown)
10	131829-001	131829-001	Door Hinge, Top	
11	112367-001	112367-001	Door Hinge, Bottom	
12	157332-901	157332-901	Door Seal Kit	
13	156030-001	156030-001	Top Cover Seal Kit	

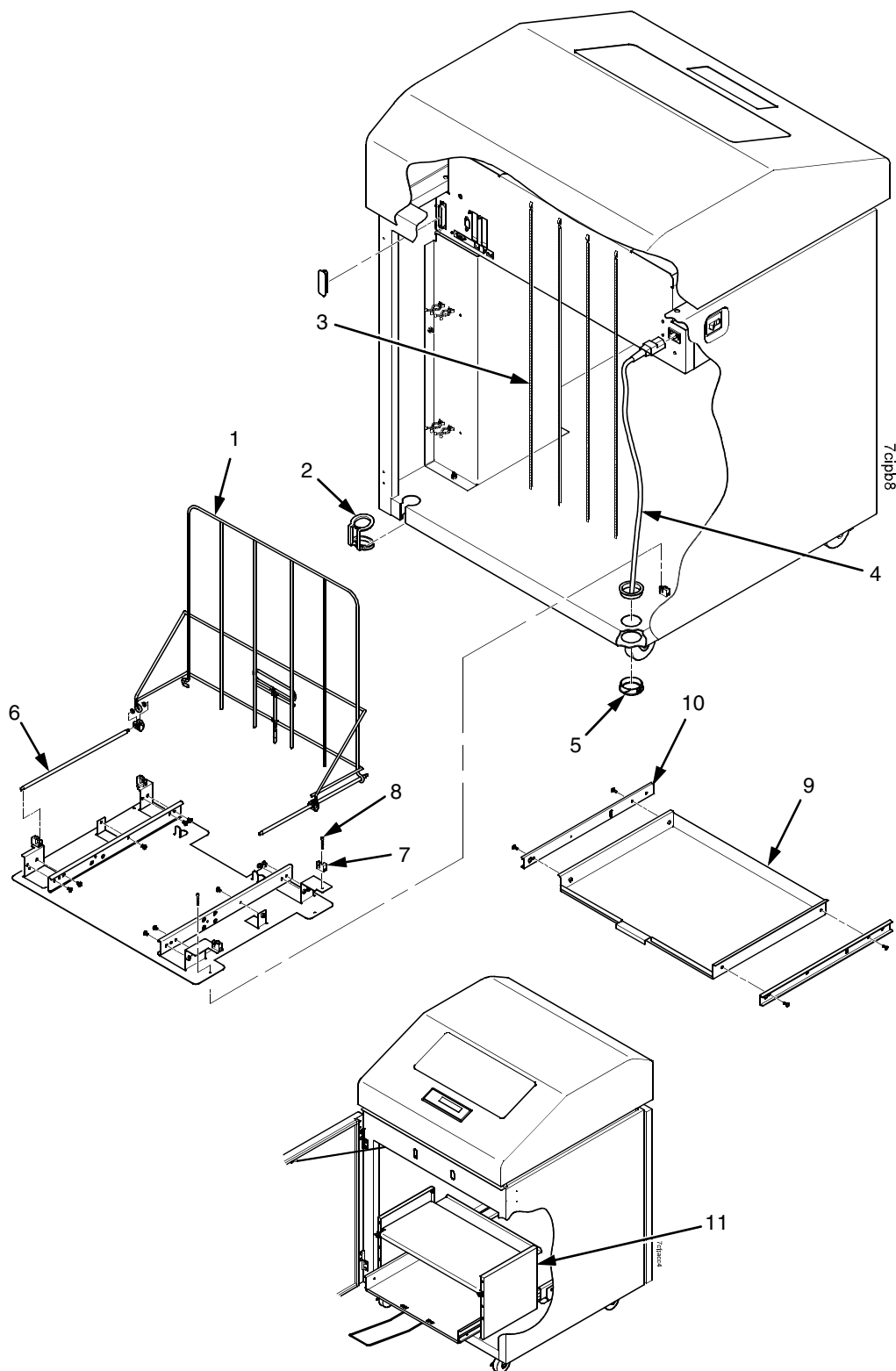


Figure 41. Paper Fence, Paper Chains, and Front Access Stacker

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	158179-901	158179-901	Passive Stacker Assembly	Not used on printers with the power stacker; includes items 6, 7, and 8
2	153503-001	153503-001	Grommet Kit, Cabinet	
3	153778-001	153778-001	Chain Assembly Kit	
4	Ref	Ref	AC Power Cord	
5	Ref	Ref	Grommet, Power Cord (2)	Included in item 2
6	151910-001	151910-001	Guide Rail, Stacker	Part of item 1
7	151831-001	151831-001	Clip, Rail, Stacker	
8	Ref	Ref	Screw (4)	
9	178913-001	178913-001	Field Kit, Tray, Cab, Rear, Black	Includes items 1, 6, 7, 8, 9, 10, and paper tent 173864-001
	179799-001	179799-001	Tray, Power Stacker, Pull-Out, Gray	
10	174392-901	174392-901	Slide Set, Ball Bearing	
11	250085-001	250085-001	Field Kit, Front Access Stacker, Cab	Optional on all cabinet models

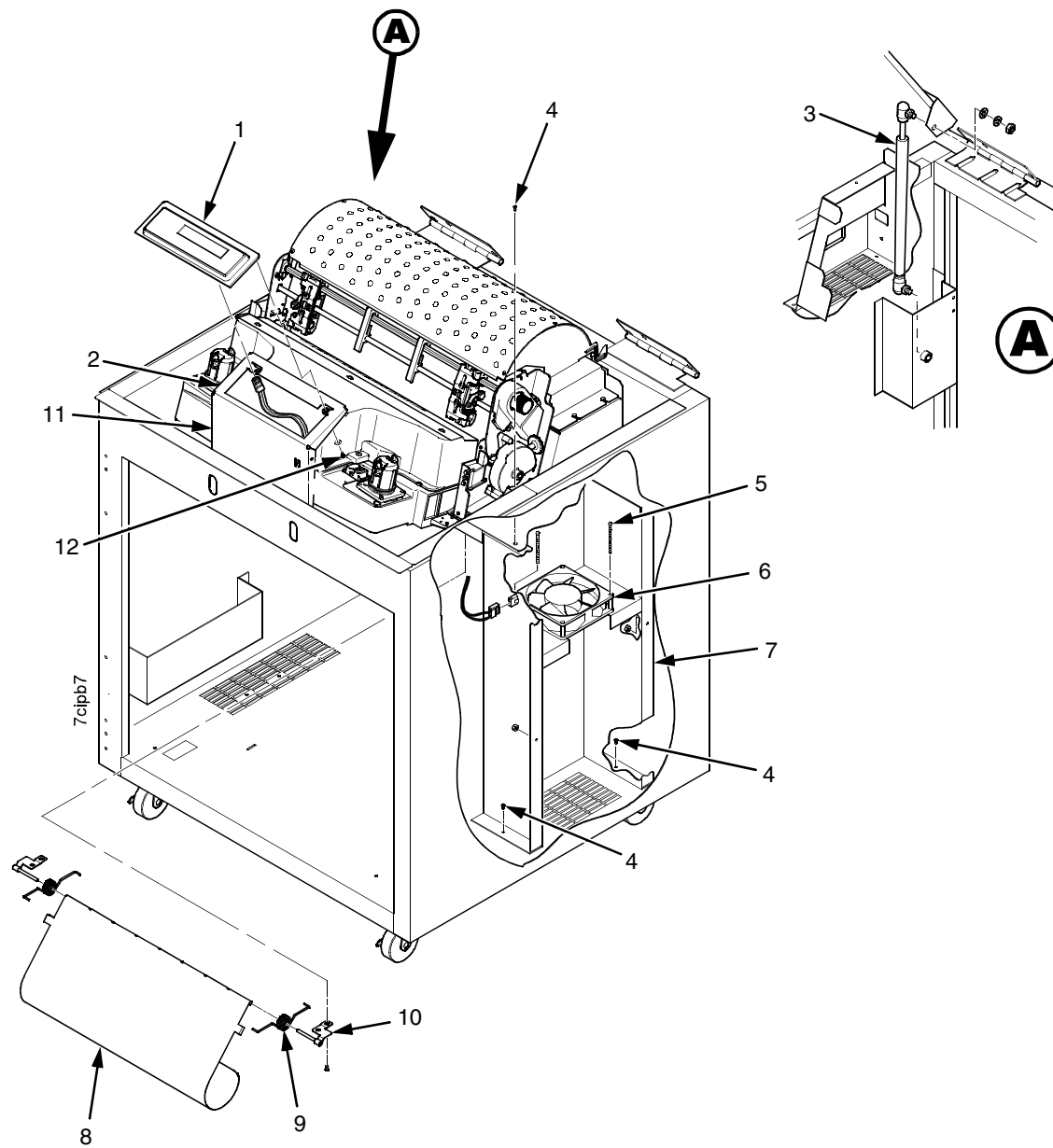


Figure 42. Control Panel and Cabinet Details

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	177530-901	250483-001	Control Panel Assembly, Cab	
2	152440-901	152440-901	Cable Assembly, Control Panel	
3	107961-905	107961-905	Dashpot Kit	Includes ball studs, spring clips, and mounting hardware
4	Ref	Ref	Screw, w/Lock Washer (3)	6-32x.375
5	Ref	Ref	Screw, w/Lock Washer (3)	6-32x2.00
6	150261-901	150261-901	Fan Assembly	Includes mounting hardware
7	Ref	Ref	Duct, Air Exhaust	
8	177296-001	177296-001	Paper Entrance Guide, V2	P7220 only
9	173428-001	173428-001	Spring, Paper Entrance Guide (2)	P7220 only
10	173351-001 173352-001	173351-001 173352-001	Bracket, Paper Entrance Guide, Right Bracket, Paper Entrance Guide, Left	P7220 only P7220 only
11	Ref	Ref	Control Panel Bracket	
12	Ref	Ref	Screw, Hex w/Lock Washer (2)	6-32x.375

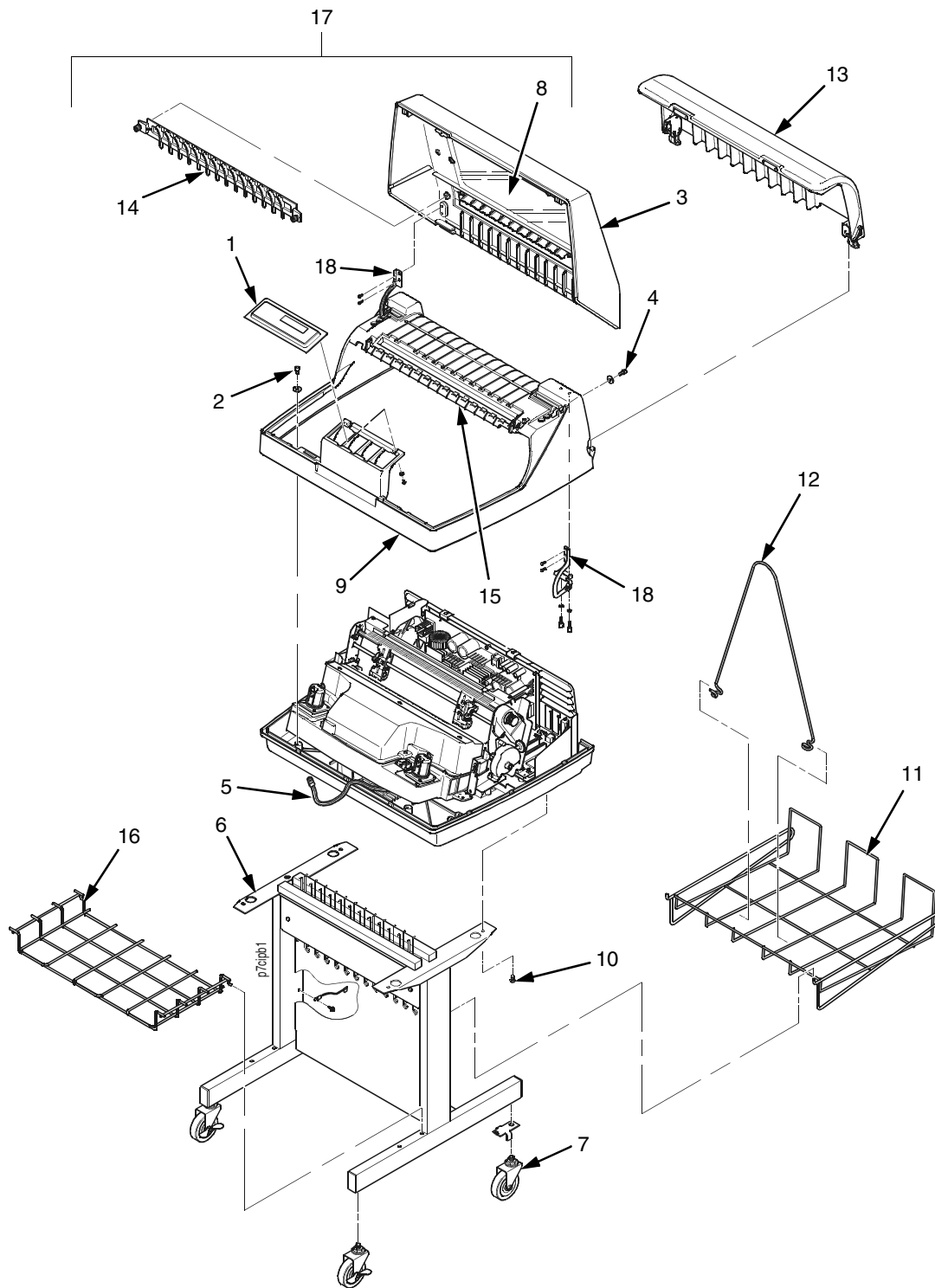


Figure 43. Pedestal Details

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	177530-902	250483-002	Control Panel Assembly, Ped	
2	Ref	Ref	Screw, Captive (2)	
3	179163-001 179845-001	179163-001 179845-001	Field Kit, Lid Assembly, Ped, Blk Field Kit, Lid Assembly, Ped, Gray	Both kits also contain items 8, 14, and 17
4	Ref	Ref	Screw (2)	
5	152440-901	152440-901	Cable Assembly, Control Panel	
6	179081-001 179776-001	179081-001 179776-001	Packaged Ped Kit, Stealth Black Packaged Ped Kit, Lt Gray	
7	179162-001	179162-001	Field Kit, Caster Kit, Ped	
8	178692-901	178692-901	Window, Top Cover	
9	179193-901	179193-901	Top Cover, Ped, Base Assy, Stealth Black, P7	
10	Ref	Ref	Screw (4)	10-32x.625
11	110718-001	110718-001	Paper Tray	
12	157070-901	157070-901	Paper Fence, Rear, Ped	
13	250083-001	250083-001	Field Kit, Acoustic Shroud, Ped, P7000	Optional on all pedestal models
14	178259-901 179765-901	178259-901 179765-901	Panel, Lid, Quick Access, Black Panel, Lid, Quick Access, Gray	
15	178241-901 179766-901	178241-901 179766-901	Panel, Quick Access, Flip Up, Black Panel, Quick Access, Flip Up, Gray	
16	156033-901	156033-901	Paper Tray, Front, Ped	
17	179193-901 179770-901	179193-901 179770-901	Top Cover, Ped, Base Assy, Stealth Black Top Cover, Ped, Base Assy, Lt Gray	
18	253272-001	253272-001	Spares Kit, Hinges,LT/RT,P7000 Pedestal	

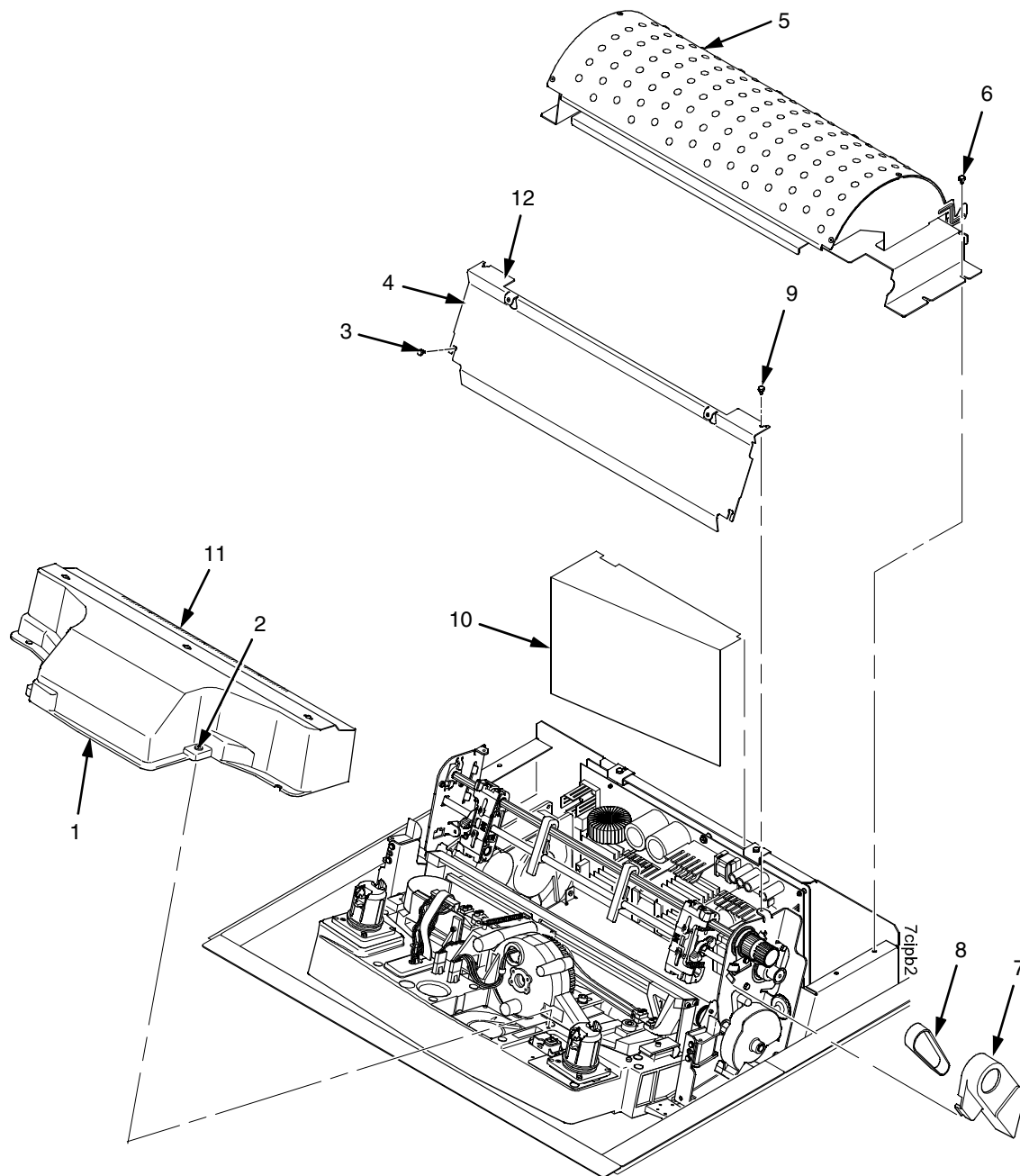


Figure 44. Inside Covers, Cabinet Models

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179128-901	179128-901	Shuttle Cover	Air Shroud Assembly
2	Ref	Ref	Screw, Captive (2)	10-24x.62 with O-ring, .125x.250x.06
3	Ref	Ref	Screw, Thread-forming (2)	6-32x.25 and #6 flat washer
4	Ref	Ref	Barrier Shield	
5	175188-901	175188-901	Paper Path, V3	
6	Ref	Ref	Screw, w/Lock Washer (3)	6-32.25 and #6 flat washer
7	153488-001	153488-001	Field Kit, Covers	Paper Feed Belt Cover shown
8	108664-903	108664-903	Belt, Timing, .080 Pitch, 100 Teeth, .500 Wide	Paper Feed Belt
9	Ref	Ref	Screw, Thread-forming (2)	6-32x.25
10	179276-001	179276-001	Power Supply Insulator	Taped to the upper edge of the card cage
11	153528-901	153528-901	Paper Scale	
12	152284-901	152284-901	Anti-static Brush Kit	Mounts to top of item 4

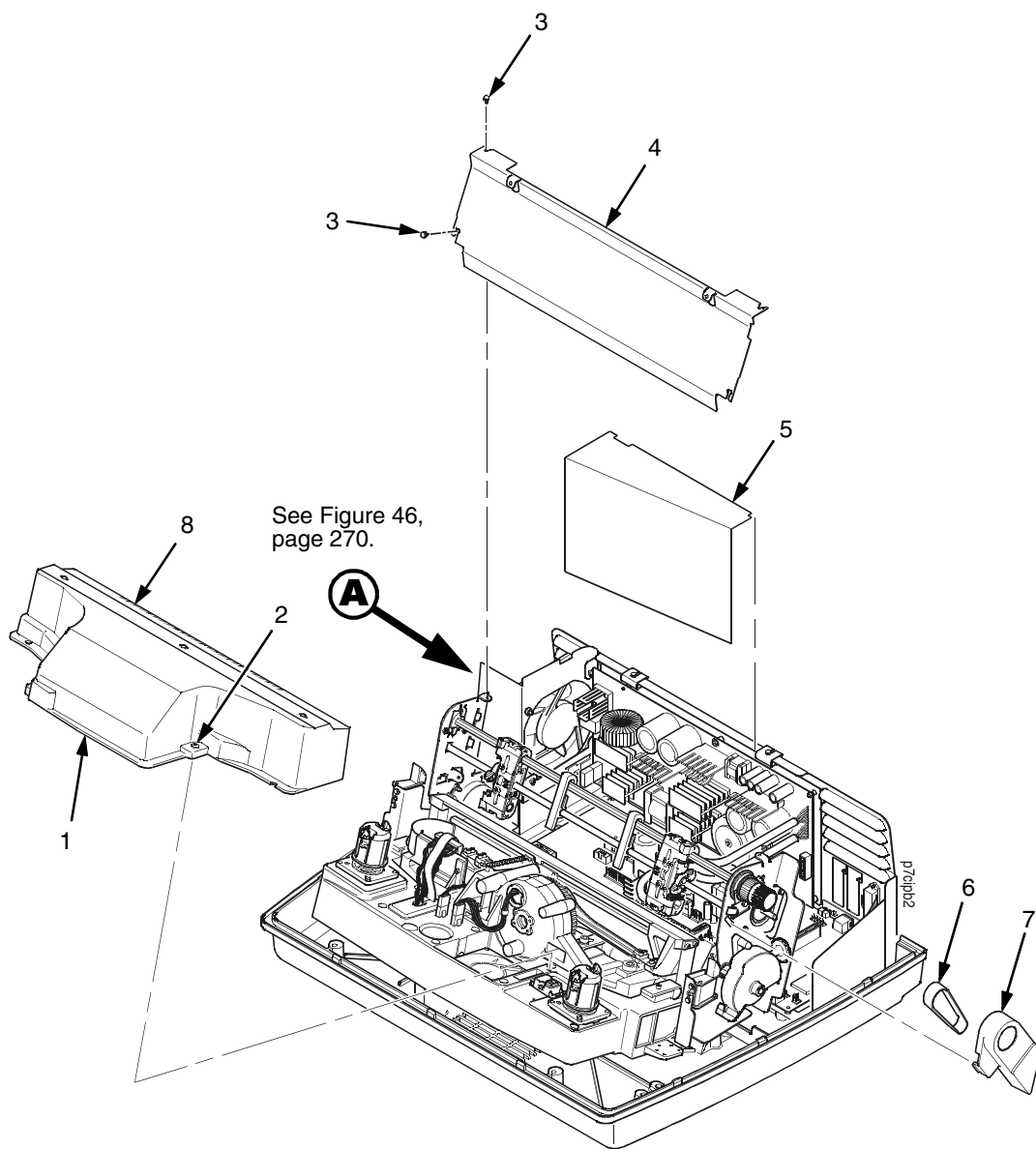


Figure 45. Inside Covers and Card Cage, Pedestal Models

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179128-901	179128-901	Shuttle Cover	Air Shroud Assembly
2	Ref	Ref	Screw, Captive (2)	10-24x.62 with O-ring, .125x.250x.06
3	Ref	Ref	Screw, Thread-forming (2)	6-32x.25 and #6 flat washer
4	Ref	Ref	Barrier Shield	
5	179276-001	179276-001	Power Supply Insulator	Taped to card cage along upper edge
6	108664-903	108664-903	Belt, Timing, .080 Pitch, 100 Teeth, .500 Wide	Paper Feed Belt
7	153488-001	153488-001	Field Kit, Covers	Paper Feed Belt Cover shown
8	153528-901	153528-901	Paper Scale	

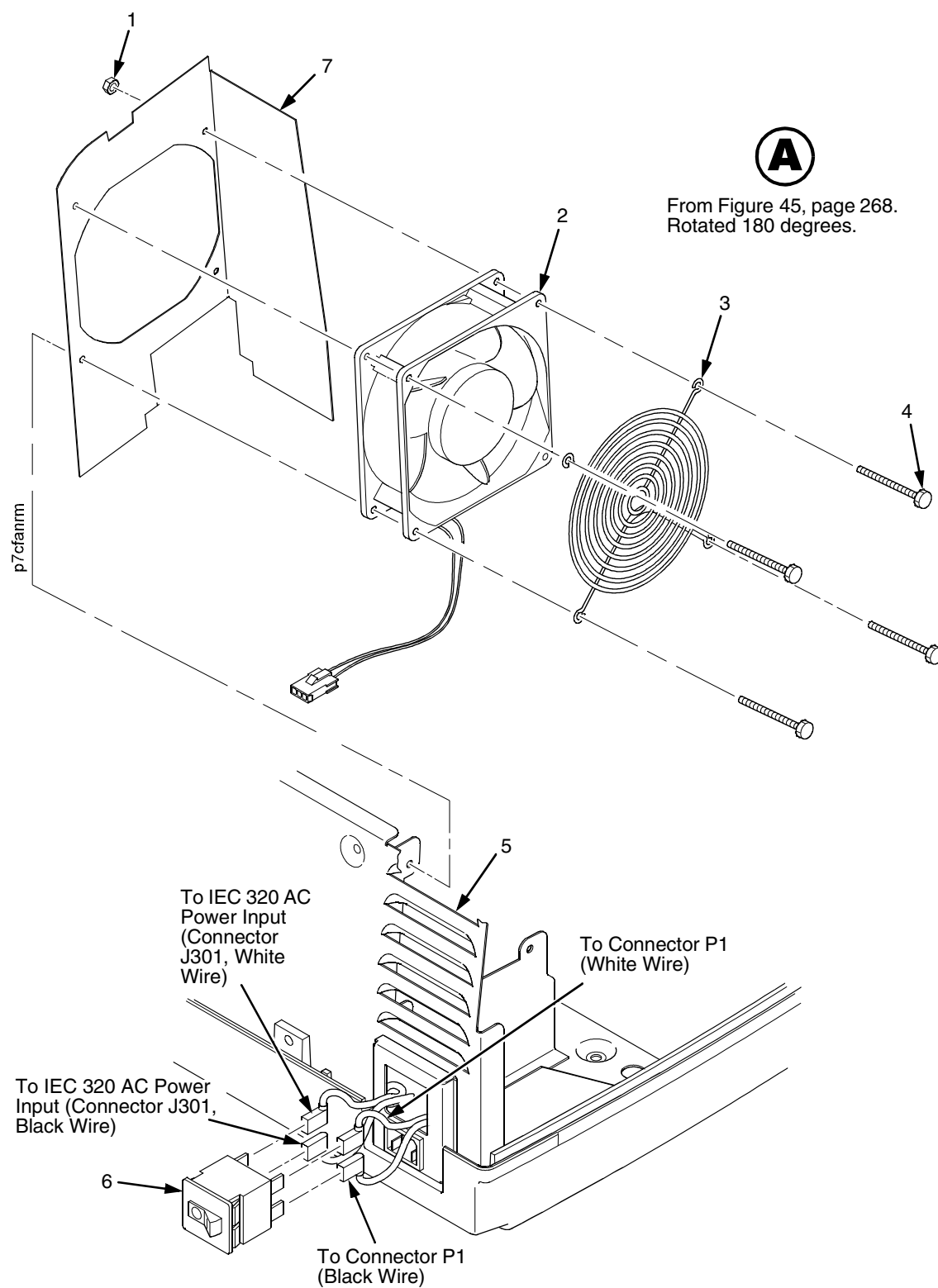


Figure 46. Card Cage Detail, Pedestal Models

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	Ref	Ref	Nut, 6-32 (1)	Upper right fan corner only
2	150261-901	150261-901	Card Cage Fan Assembly	Air flow is into card cage
3	Ref	Ref	Fan Guard	
4	Ref	Ref	Screw, w/Lock Washer (4)	6-32x1.75
5	Ref	Ref	Card Cage, Pedestal	
6	142013-901	142013-901	Circuit Breaker	
7	Ref	Ref	Baffle, Power Supply, Ped, P7000	

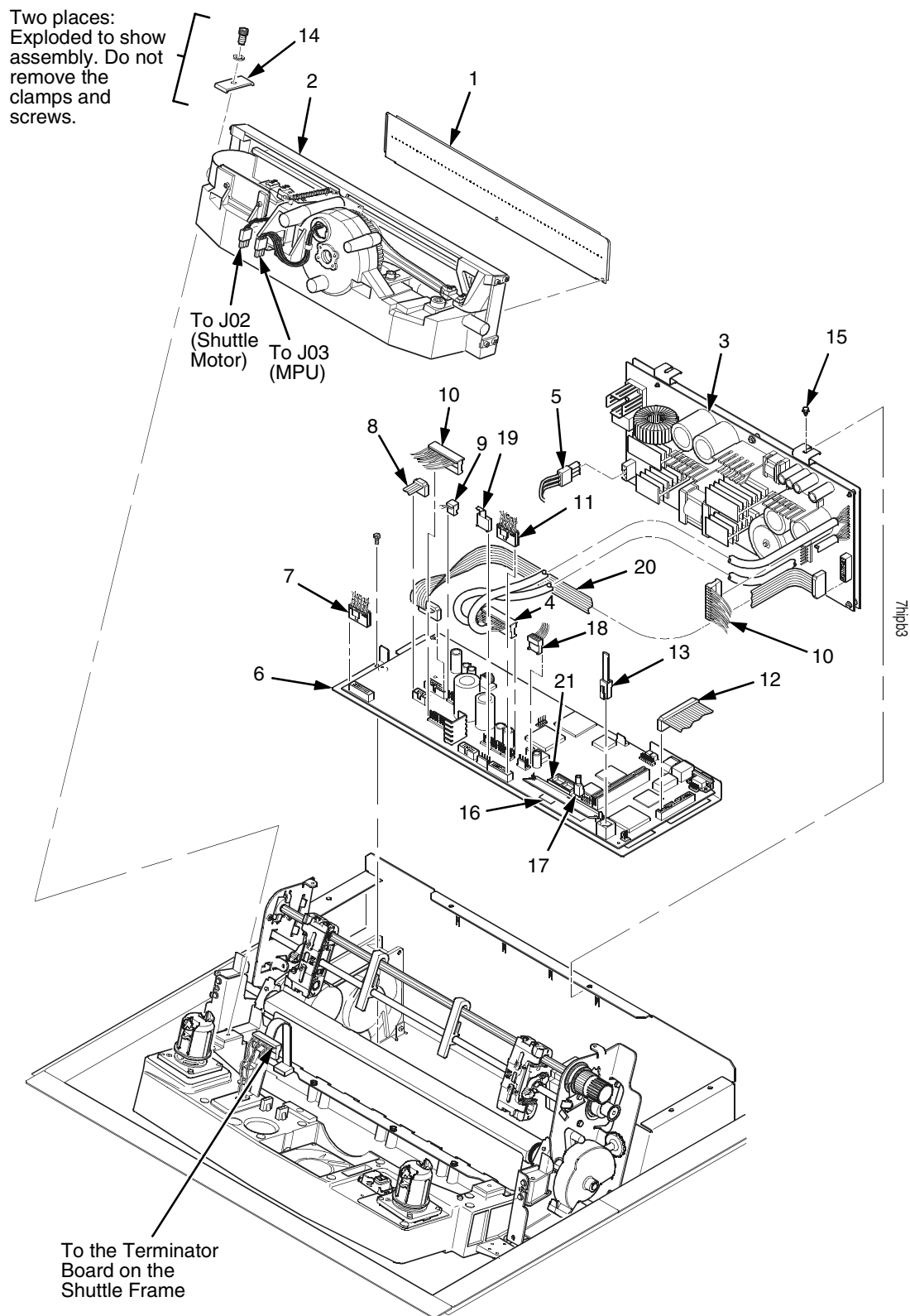


Figure 47. Print Mechanism and Circuit Boards

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	178311-901	178311-901	Ribbon Mask/HB Cover Assy	P7X05, P7X02H
	178310-901	178310-901	Ribbon Mask/HB Cover Assy	P7X10, P7X03H
	178309-901	178309-901	Ribbon Mask/HB Cover Assy	P7X15, P7X06H
	251665-901	178308-901	Ribbon Mask/HB Cover Assy	P7220, P7X08H, P7HD
2	252746-901	252746-901	Shuttle Assembly, 05, Version 2	P7X05
	178895-991	250762-991	Shuttle Assembly, 05, Adv Exch	P7X05
	252749-901	252749-901	Shuttle Assembly, 10, Version 2	P7X10
	178894-991	250761-991	Shuttle Assembly, 10, Adv Exch	P7X10
	252751-901	252751-901	Shuttle Assembly, 15, Version 2	P7X15
	253368-901	253368-901	Shuttle Assembly, 15, Version 2	P7X15
	(Non-RoHS compliant)			
	178893-991	250760-991	Shuttle Assembly, 15, Adv Exch	P7X15
	252753-901	252753-901	Shuttle Assembly, 20, Version 2	P7220
	253370-901	253370-901	Shuttle Assembly, 20, Version 2	P7220
	(Non-RoHS compliant)			
	178892-991	252753-901	Shuttle Assembly, 20, Adv Exch	P7220
	251407-901	250759-991	Shuttle Assembly, 02H	P7X02H
	252748-901	251466-901	Shuttle Assembly, 02H, Version 2	P7X02H
	179718-901	252748-901	Shuttle Assembly, 03H	P7X03H
	252750-901	250765-901	Shuttle Assembly, 03H, Version 2	P7X03H
	179719-901	252750-901	Shuttle Assembly, 06H	P7X06H
	252752-901	250764-901	Shuttle Assembly, 06H, Version 2	P7X06H
	179720-901	252752-901	Shuttle Assembly, 08H	P7X08H
	252754-901	250763-901	Shuttle Assembly, 08H, Version 2	P7X08H
	251425-901	252754-901	Shuttle Assembly, P7000HD	P7000HD
	174965-901	251446-901	Hammer Spring Assembly, 05	P7X05
	252700-901	174965-901	Hammer Spring Assembly, 05, Version 2	P7X05
	174966-901	252700-901	Hammer Spring Assembly, 10	P7X10
	252715-901	174966-901	Hammer Spring Assembly, 10, Version 2	P7X10
	174967-901	252715-901	Hammer Spring Assembly, 15	P7X15
	252723-901	174967-901	Hammer Spring Assembly, 15, Version 2	P7X15
	174514-901	252723-901	Hammer Spring Assembly, 20S	P7220
	252735-901	174514-901	Hammer Spring Assembly, 20S, Version 2	P7220
	251086-901	252735-901	Hammer Spring Assembly, 02H	P7X02H
	252743-901	251086-901	Hammer Spring Assembly, 02H, Version 2	P7X02H
	175609-901	252743-901	Hammer Spring Assembly, 03H	P7X03H
	252719-901	175609-901	Hammer Spring Assembly, 03H, Version 2	P7X03H
	175613-901	252719-901	Hammer Spring Assembly, 06H	P7X06H
	252727-901	175613-901	Hammer Spring Assembly, 06H, Version 2	P7X06H
	175991-901	252727-901	Hammer Spring Assembly, 08H	P7X08H
	252739-901	175991-901	Hammer Spring Assembly, 08H, Version 2	P7X08H
	251426-901	252739-901	Hammer Spring Assembly, HD	P7000HD
		251426-901		

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
3	179074-901 179074-991 179075-901 179075-991 179076-901 179076-991	250297-901 250297-991 250251-901 250251-991 250410-901 250410-991	Power Supply, PFC, 5/10 Power Supply, PFC, 5/10, Adv Exch Power Supply, PFC, 15 Power Supply, PFC, 15, Adv Exch Power Supply, PFC, 20 Power Supply, PFC, 20, Adv Exch	P7X05, -10, -02H, -03H P7X05, -10, -02H, -03H P7X15, P7X06H P7X15, P7X06H P7220, P7X08H, P7HD P7220, P7X08H, P7HD
4	Ref	Ref	P101 Cable Connector	Part of item 3
5	Ref	Ref	Cable Assembly, AC-In, Power Supply	Part of Field Kit, AC Assy, 153502-901
6	179077-901 179077-991	250298-901 250298-991 253081-901 253081-991	Controller PCBA, V5 Controller PCBA, V5, Adv Exch Controller PCBA, V6 Controller PCBA, V6, Adv Exch	
7	202362-001	202362-001	Housing, Connector Kit	P106, Motor Sensor, Left
8	152421-901	152421-901	Hammer Bank Logic Cable Assembly	
9	152420-901	152420-901	Shuttle Motor Cable Assembly	
10	164805-901 173215-901	164805-901 173215-901	Hammer Bank Power Cable Assy Hammer Bank Power Cable Assy	Use on all except P7220 P7220 only
11	202362-001	202362-001	Housing, Connector Kit	P107, Motor Sensor, Right
12	152439-901	152439-901	Centronics I/O Cable Assembly	
13	152440-901	152440-901	Control Panel Cable Assembly	
14	150399-901	150399-901	Clamp, Shaft, Receiving	
15	Ref	Ref	Screw, Captive, Power Supply (2)	
16	204480-902 204480-903	250488-902 250488-903	SIMM, Flash Memory, 8 MB SIMM, Flash Memory, 16 MB	Install in J11 on V5 board; install in J10 on V6 board
17	Ref		Security Key	
18	177482-001 178046-001 178535-001	177482-001 178046-001 178535-001	Paper Feed Motor Paper Feed Motor Paper Feed Motor	P7220 P7X05/10/15 P7X05/10/15LG
19	179526-901	179526-901	Integrated Print Management System Bar Code Sensor Assy	
20	173164-901	173164-901	Cable Assembly, PS I/O, 2000	Used only in P7220. (See also page 356.)
21	204535-901	250489-901	SDRAM DIMM, MEM, 32 MB, PC100 (V5 controller board only)	SDRAM is permanently soldered to the V6 controller board

(Parts lists continue on the next page.)

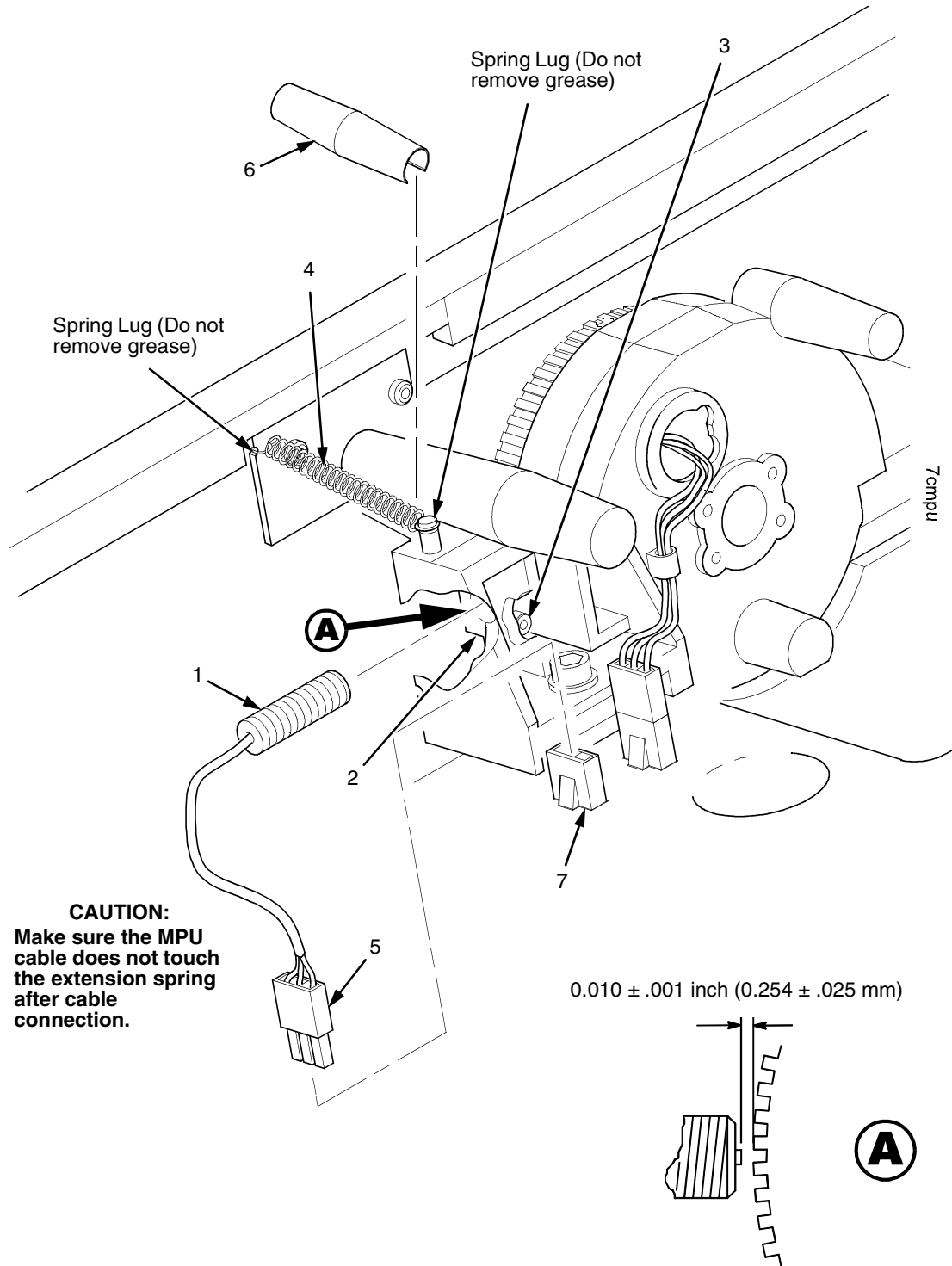


Figure 48. Magnetic Pickup (MPU) and Extension Spring

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	150281-901	150281-901	MPU Assembly	
2	Ref	Ref	Bracket, MPU	Part of item 1
3	Ref	Ref	Screw, Socket Cap	6-32x.38
4	153537-901	153537-901	Spring, Hammer Bank	
5	Ref	Ref	MPU Cable Connector (P03)	
6	176507-001	176507-001	Anti-Rotation Spring Constraint	P7220 only
7	152425-901	152425-901	MPU Cable Assembly	

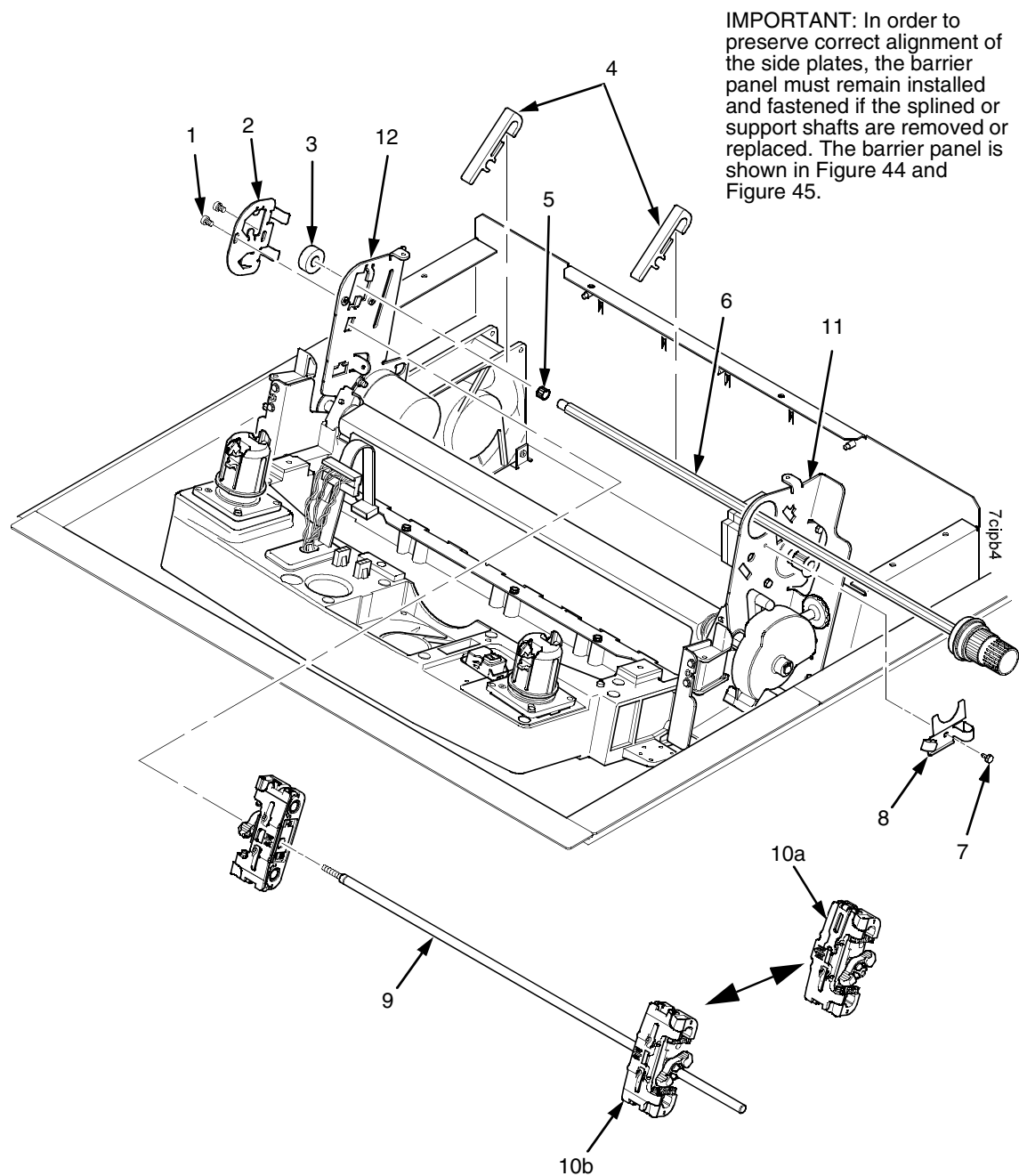


Figure 49. Tractor Shafts

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob (Self-Tapping) (2)	
2	173130-001	173130-001	Plate, Tractor Shaft, Left	
3	151944-001	151944-001	Bearing, Ball, Sealed	
4	178990-901	178990-901	Paper Support (2)	
5	204155-001	204155-001	Tolerance Ring,.37X.25,.006 THK,SS	
6	178988-901	178988-901	Splined Shaft Assembly (Blue Handle)	
7	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob (Self-Tapping)	
8	173217-001	173217-001	Plate, Tractor Shaft, Right	
9	173137-001	173137-001	Support Shaft	
10a	179061-901	179061-901	Tractor Set, 20 (Blue)	P7220 Installed at the factory on models with power stacker; comes standard on P7220
10b	179065-901	179065-901	Tractor Set, Non-Roller, 05/10/15 (Blue)	
11	Ref	Ref	Right Side Plate	
12	Ref	Ref	Left Side Plate	

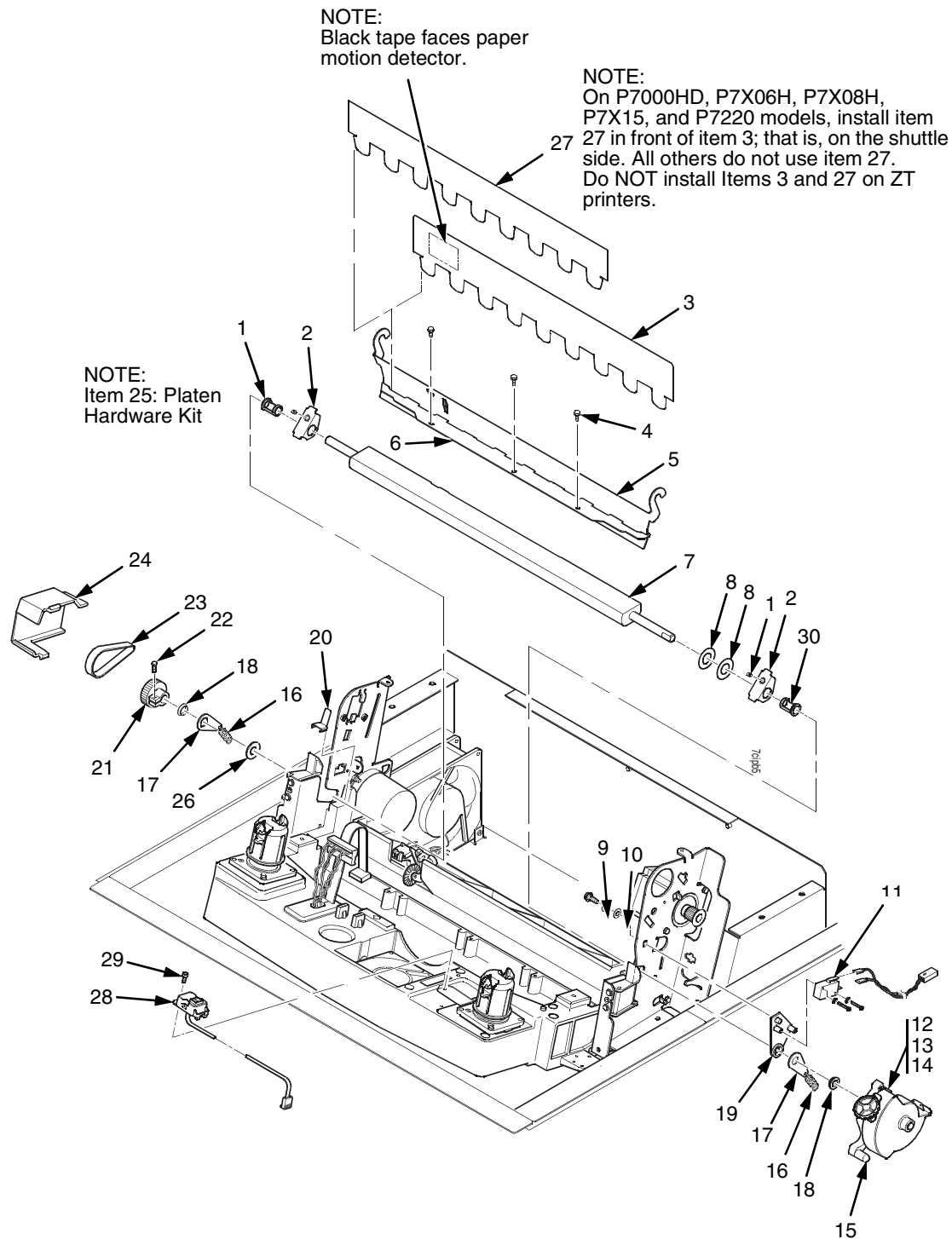


Figure 50. Platen

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	Ref	Ref	Setscrew (2)	Part of item 25
2	Ref	Ref	Bracket, Platen (2)	Part of item 25
3	150957-901	150957-901	Ironer Assembly, Reverse Paper Feed	All except ZT printers
4	Ref	Ref	Screw, Thread-forming (3)	6-32x.25
5	174968-001	174968-001	Ironer Bracket/Plate Field Kit	
6	Ref	Ref	Plate, Ironer	Part of item 5
7	112657-901	112657-901	Platen Assembly	
8	Ref	Ref	Washer, Flat (2)	Part of item 25
9	Ref	Ref	Screw (2)	Part of item 11
10	Ref	Ref	Washer, Flat #4 (2)	Part of item 11
11	179334-901	179334-901	Field Kit, Switch Assy, w/Bracket	Includes items 9, 10, 19
12	Ref	Ref	Screw, Socket Cap, 6-32x.75	Part of item 15
13	Ref	Ref	Washer	Part of item 15
14	Ref	Ref	Nut	Part of item 15
15	178705-901	178705-901	Platen Stop Lever Kit	Includes items 12, 13, 14
16	Ref	Ref	Spring, Extension 1.12L	Part of item 25
17	Ref	Ref	Link, Spring	Part of item 25
18	Ref	Ref	Bearing, Nylon .376	Part of item 25
19	Ref	Ref	Bracket, Switch Mount	Part of item 11
20	Ref	Ref	Wear Saddle, Platen (2)	Part of item 25
21	150703-902	150703-902	Platen Pulley, Drive	
22	Ref	Ref	Screw, Socket Cap, 6-32x.44	Part of item 21
23	141516-901	141516-901	Belt, Timing, .080 Pitch, .312 Wide	Platen Open Belt
24	153488-001	153488-001	Field Kit, Covers	Platen Open Belt Cover shown
25	177558-001	177558-001	Platen Hardware Kit	Includes items 1, 2, 8, 16, 17, 18, 20, 26, 30
26	Ref	Ref	Platen Washer	Part of item 25

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
27	176630-901	176630-901	Paper Ironer, Auxiliary	On P7X00HD, P7X06H, P7X08H, P7X15, and P7220 models install item 27 in front of item 3 (i.e., on the shuttle side). All other models do not use this item. Do NOT install this item on ZT printers.
28	179526-901	179526-901	Sensor Assembly, Integrated Print Management System/Barcode	
29	Ref	Ref	Screw	
30	173941-001	173941-001	Bushing	Part of item 25.

(Parts lists continue on the next page.)

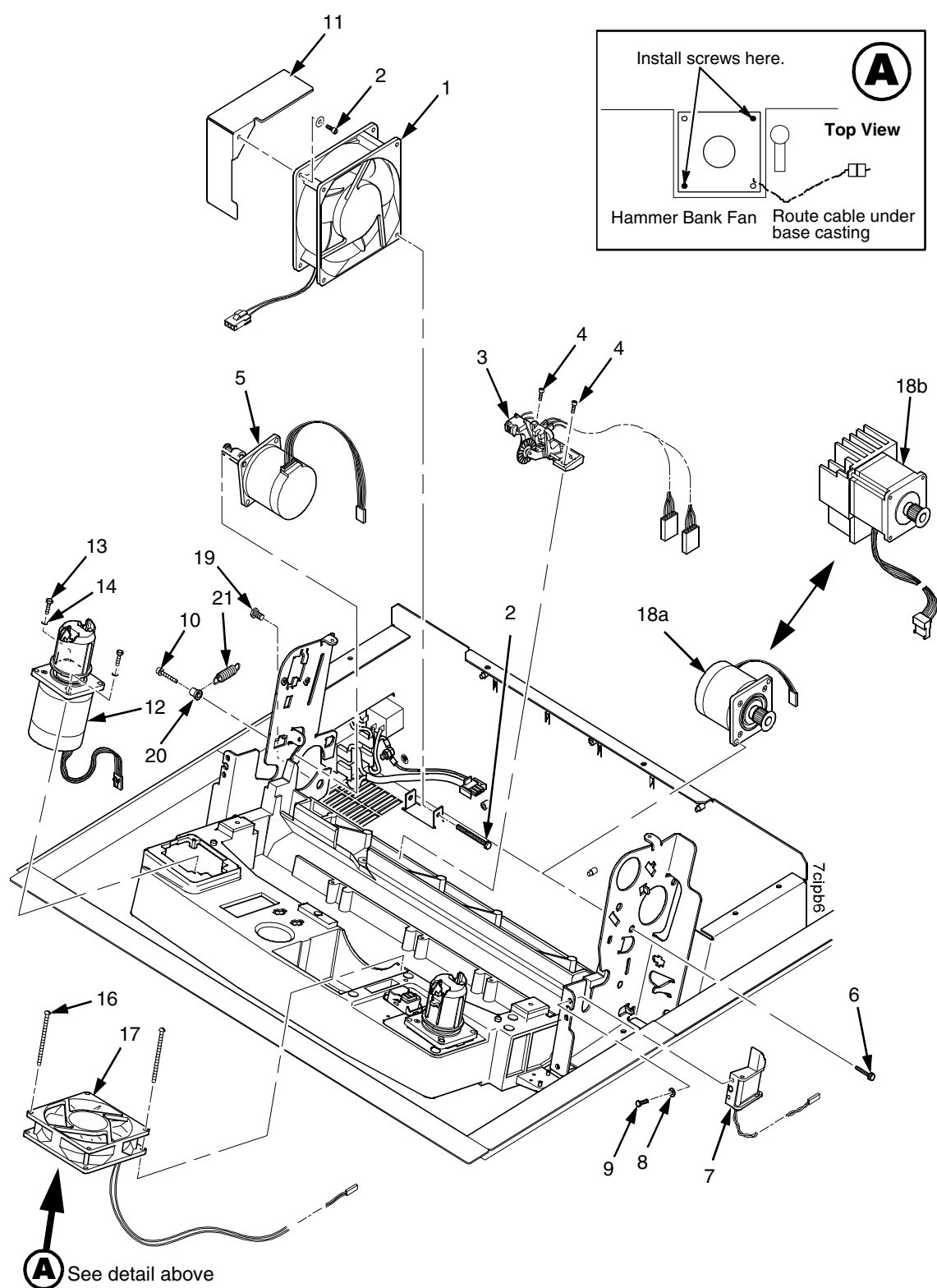


Figure 51. Motors, Fans, and Paper Detector Switch

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	150261-901	150261-901	Card Cage Fan Assembly	Air flow is into card cage
2	Ref	Ref	Screw, w/Lock Washer (3)	Two 6-32x1.75 on bottom, One 6-32x0.50 on top left
3	152415-901 170172-001	152415-901 170172-001	Switch Assembly, Paper Detector Field Kit, Slotted Black Back Form Switch	Optional switch used with black back forms
4	Ref	Ref	Screw, Thread-forming, 6-32x.375 (2)	Part of item 3
5	179638-001	179638-001	Motor Assembly, Platen	Includes pulley
6	Ref	Ref	Screw, Hex w/Lock Washer, 10-24x.50 (2)	Part of item 18
7	178992-902 178992-901 178995-001	178992-902 178992-901 178995-001	Ribbon Guide Cable Assembly, RH Ribbon Guide Cable Assembly, LH Field Kit, Ribbon Guide, LH/RH, P7000	
8	Ref	Ref	Washer, Flat #4	Part of item 7
9	Ref	Ref	Screw, w/Lock Washer, 4-40x.38	Part of item 7
10	Ref	Ref	Screw, w/Lock Washer, 10-32x.50 (2)	Part of item 5
11	Ref	Ref	Shield, Card Cage Fan	
12	179073-901	179073-901	Ribbon Motor Assembly, w/Hub	
13	Ref	Ref	Screw, Hex w/Lock Washer (2)	6-32x.50
14	Ref	Ref	Washer, Flat #6 (2)	
15	Deleted	Deleted	Deleted	
16	Ref	Ref	Screw, w/Lock Washer (2)	6-32x1.25
17	152416-901 173427-901	152416-901 173427-901	Hammer Bank Fan Assembly Hammer Bank Fan Assembly	All except P7220; air flow is up P7220; air flow is up
18a 18b	178046-001 177482-001	178046-001 177482-001	Field Kit, Paper Feed Motor, V3 Field Kit, Paper Feed Motor w/Heat Sink	All except P7220 P7220—Heat sink screws: 18 inch-pounds (2.03 N•m)
19	Ref	Ref	Screw, Hex w/Lock Washer (2)	10-32x.50
20	Ref	Ref	Post, Platen Belt Spring	
21	Ref	Ref	Spring, Platen Belt	

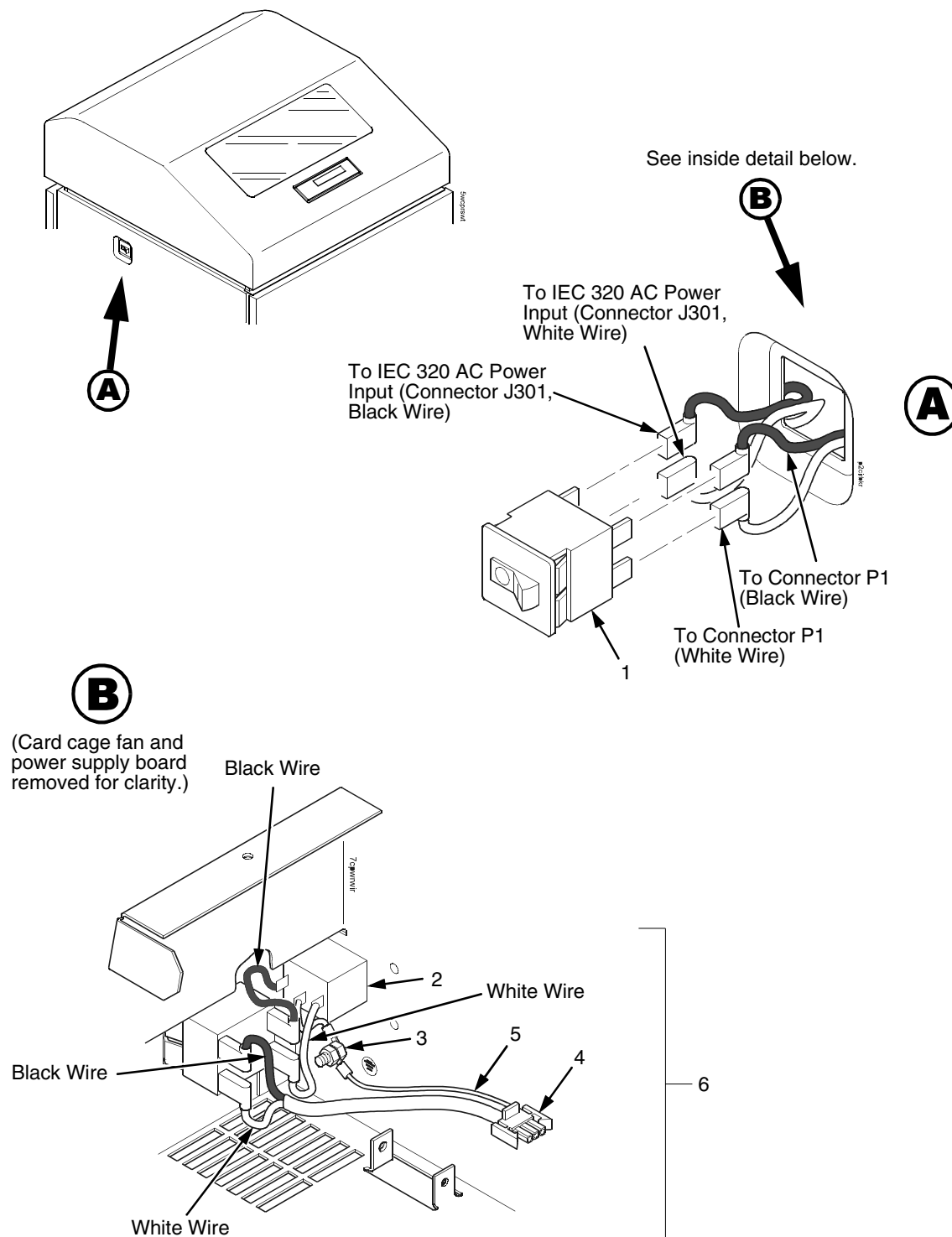


Figure 52. Circuit Breaker, Cabinet Models

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	142013-901	142013-901	Circuit Breaker	
2	Ref	Ref	IEC 320 AC Power Connector	Connector J301 Part of Field Kit, AC Assy 153502-001
3	Ref	Ref	Chassis Ground Stud	Part of Field Kit, AC Assy 153502-001
4	Ref	Ref	Connector P1	To power supply board connector J1 AC Part of Field Kit, AC Assy 153502-001
5	Ref	Ref	Cable Assembly, AC-In, Power Supply	Part of Field Kit, AC Assy 153502-001
6	153502-001	153502-001	Field Kit, AC Assy	

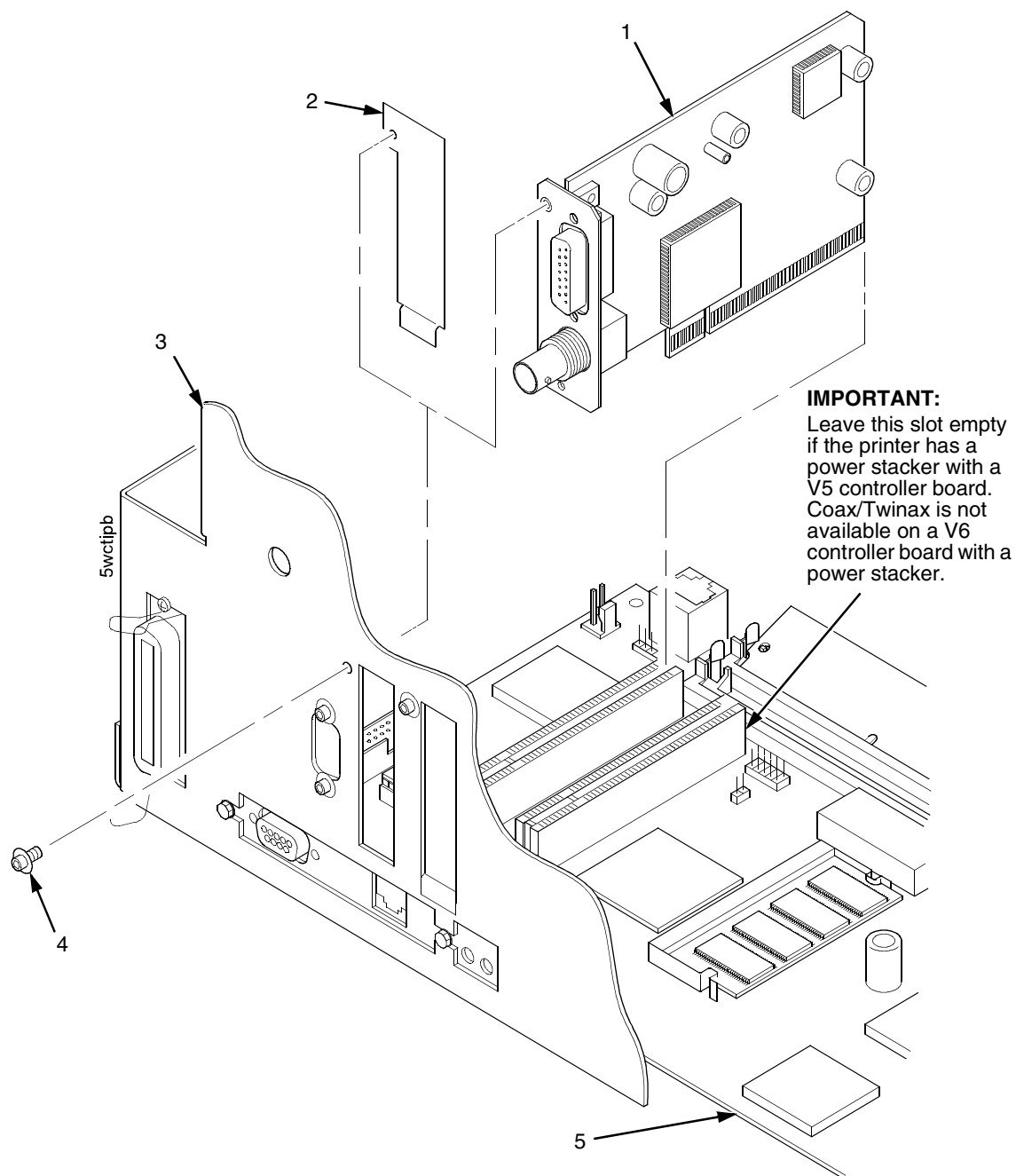
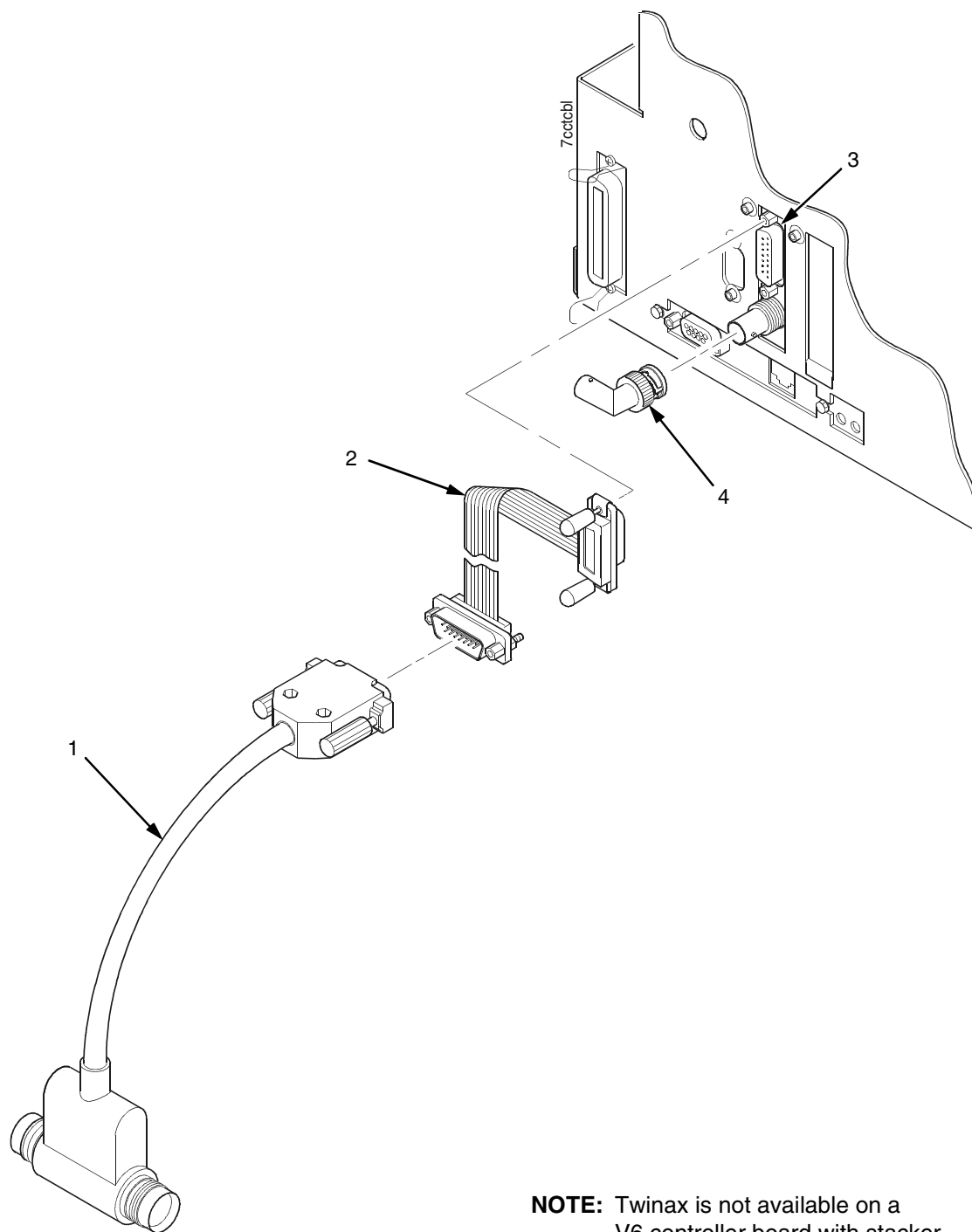


Figure 53. CT Board

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	177929-901 177929-991	179913-901 179913-991	Spare PCBA, PCI-CT, V3 Spare PCBA, PCI-CT, V3, Adv Exch	
2	176257-001	176257-001	Plate, PCI Cover	
3	Ref	Ref	Card Cage	
4	Ref	Ref	Screw	
5	Ref	Ref	V5 Controller Board	

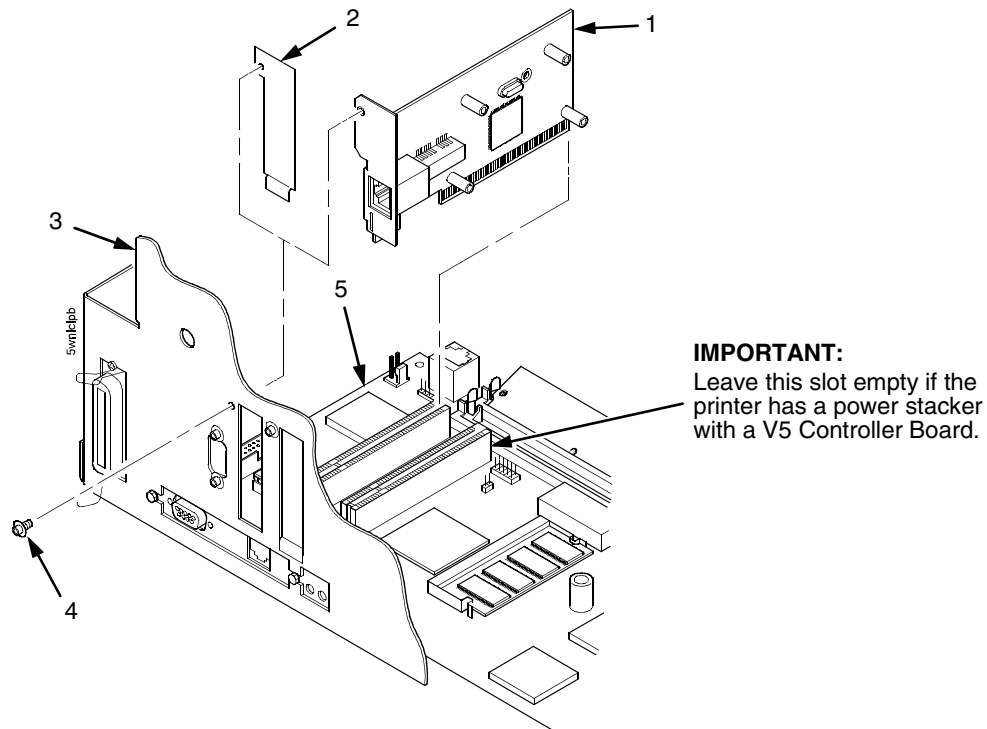


NOTE: Twinax is not available on a V6 controller board with stacker.

Figure 54. Twinax Extension Cable for Printers with PSA3 V5 Controller, Twinax I/O, and Power Stacker

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	140752-002	140752-002	Twinax Auto-Termination Cable ("Smart-T")	Required in printers with the power stacker so the twinax auto-termination cable will clear the stacker elevator. (See also page 352.)
2	204806-901	204806-901	Cable, Extension, Smart-T	
3	Ref	Ref	PCI-CT Twinax Connector	
4	Ref	Ref	PCI-CT Coax Connector	

V5 Controller Board



V6 Controller Board

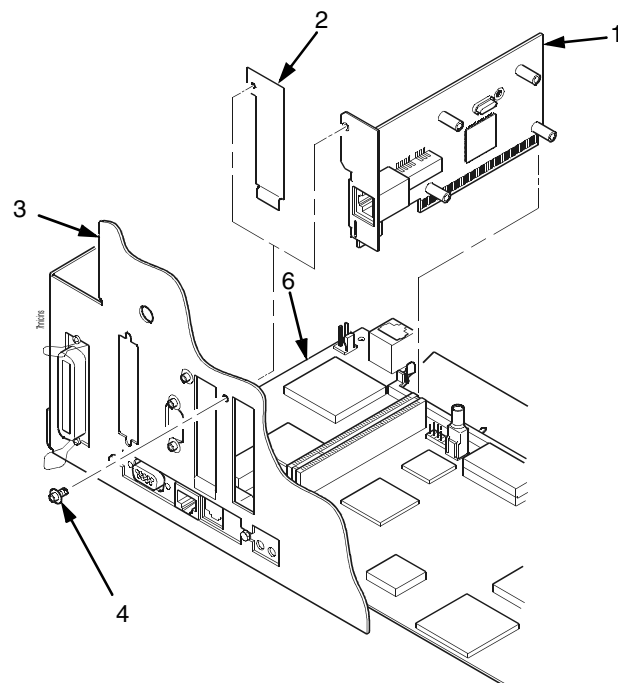


Figure 55. The NIC (Network Interface Card) on the V5 and V6 Controller Board

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179407-901 179407-991 177308-901	250678-901 250678-991 250675-901	Spare PCBA, PCI-Network Spare PCBA, PCI-Network, Adv Exch Spare PCBA, PCI Wireless	These are used on the V5 controller board. On the V6 controller board the NIC is part of the board.
2	176257-001	176257-001	Cover Plate, PCI	
3	Ref	Ref	Rear of Card Cage	
4	Ref	Ref	Screw	
5	Ref	Ref	V5 Controller Board	
6	Ref	Ref	V6 Controller Board	Ethernet hard wired on V6 controller board.

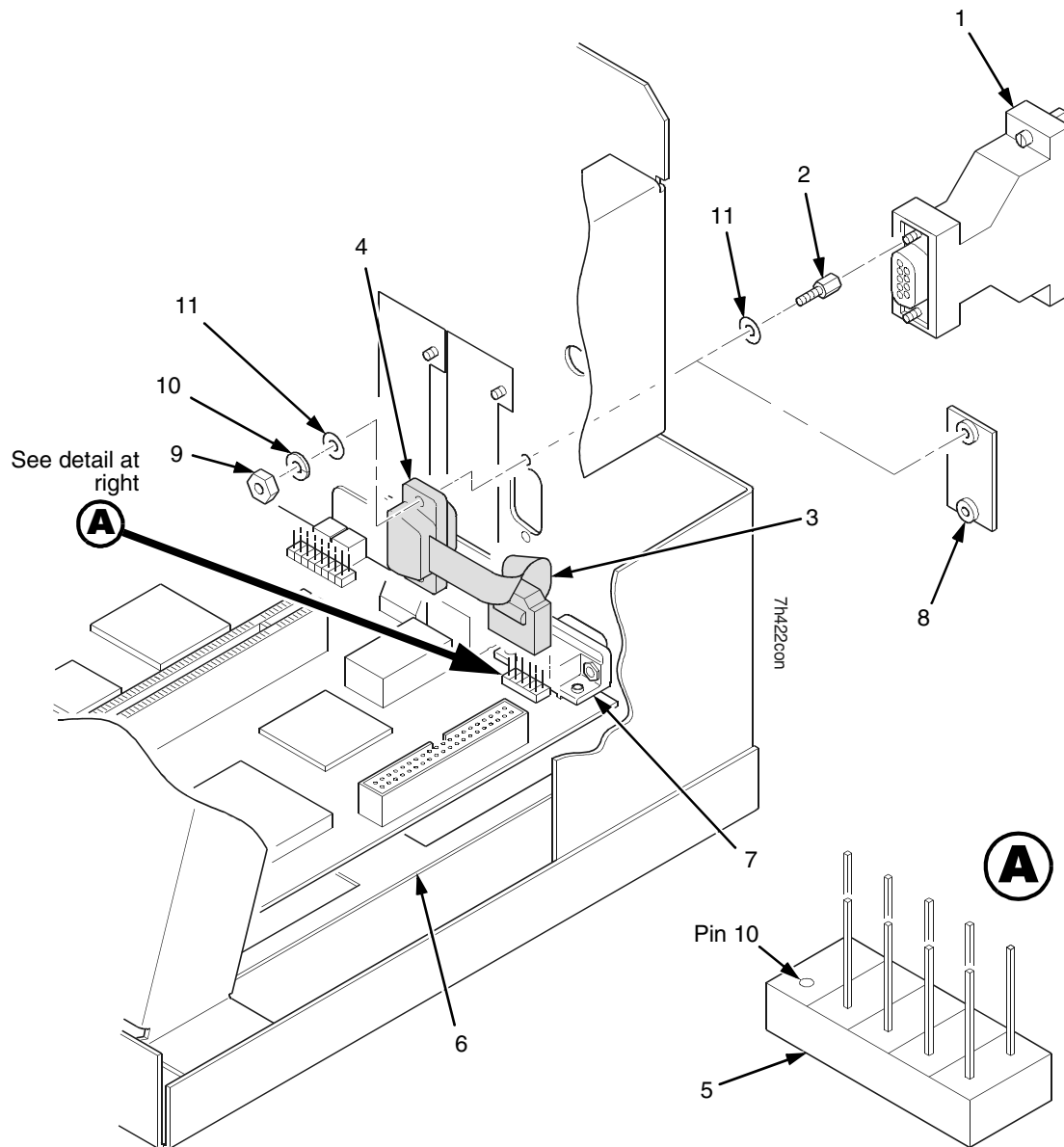
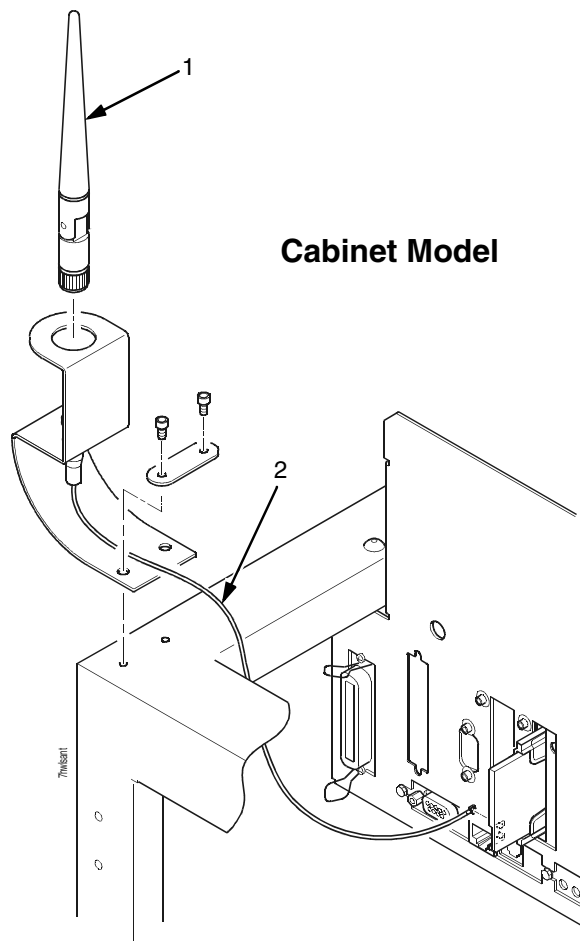


Figure 56. RS-422 Interface

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	176287-901	179134-901	PCBA, RS422 ADAPTER, DB9/DB25	Part of Field Kit 176425-001
2	102922-001	102922-001	Screwlock Kit, Female (2)	
3	176075-901	176075-901	Cable Assembly, RS-422, I/O	Part of Field Kit 176425-001
4	Ref	Ref	RS-422 Connector, 9-Pin	Part of item 3
5	Ref	Ref	Connector J15	Note that there is no Pin 10. If Pin 10 is present, remove it.
6	Ref	Ref	Controller Board	
7	Ref	Ref	Connector J201, RS-232, 9-Pin	
8	Ref	Ref	Cover Plate	
9	Ref	Ref	Nut (2)	Part of item 2
10	Ref	Ref	Lock Washer (2)	Part of item 2
11	Ref	Ref	Flat Washer (4)	Part of item 2



Cabinet Model

Pedestal Model

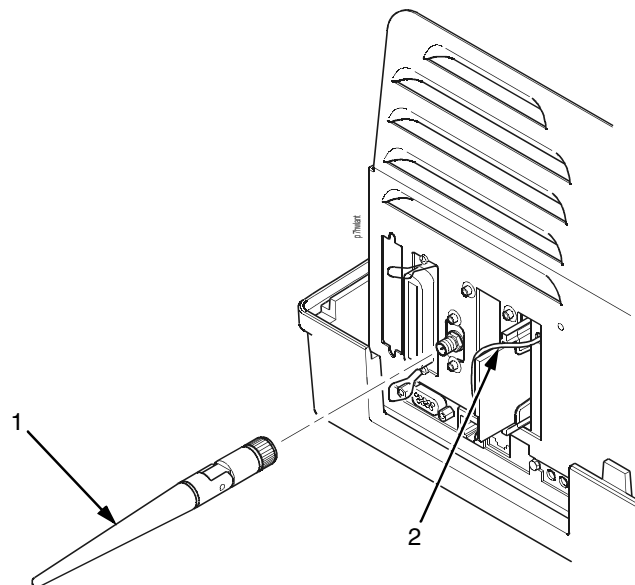


Figure 57. Dipole Antenna and Cable Used With the Optional Wireless NIC

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179228-001	179228-001	Field Kit, Antenna, Fixed Point, Dipole	
2	204479-001	204479-001	Cable, MMCX-BNC, 10 inch, S24	

7

Principles Of Operation

Line Matrix Printing

A line matrix printer creates characters and graphics by printing patterns of ink dots an entire line at a time.

Every text character is stored in printer memory as a pattern of dots on a logical grid called the dot matrix. (Figure 58.) The ink dots that appear on the paper are made by a row of hammer springs mounted on a shuttle that sweeps rapidly back and forth. Logic circuits on the controller board divide every line of incoming print data into horizontal dot rows. The hammers put dots at the required positions for the entire line by driving an inked ribbon onto the paper.

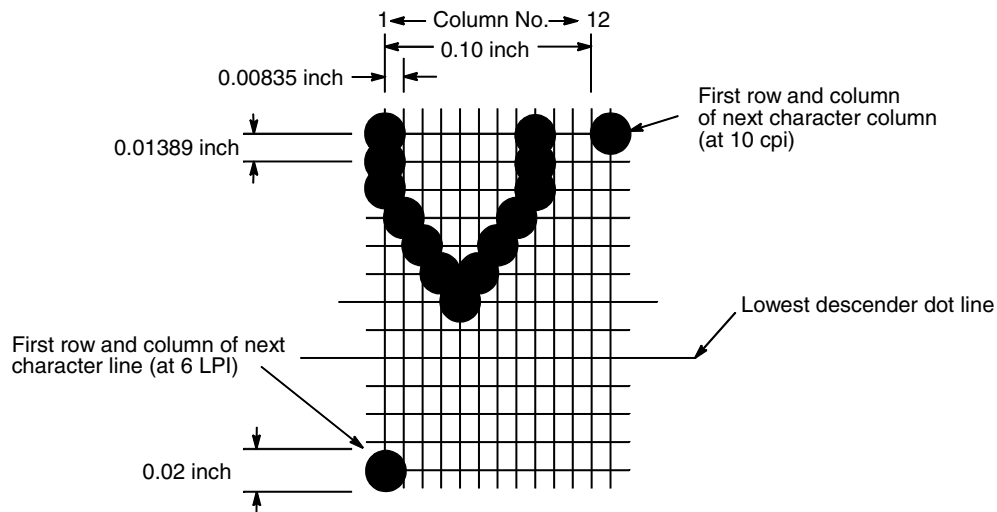


Figure 58. A Dot Matrix

When the shuttle reaches the end of a horizontal sweep, it reverses direction, the paper advances upward one dot row, and the hammer springs print the next row of dots as the shuttle moves in the opposite direction. When a line of text characters is completed, hammer action stops and the paper advances to the first dot row of the next print line. The number of dot rows used to separate print lines depends on the vertical line spacing selected by the user.

The dot matrix patterns of text characters vary according to the font the user selects. For example, in the data processing (DP) font at a line spacing of six lines per inch (lpi), a dot matrix contains 12 dot rows from the top of one character line to the top of the next. (Figure 58 and Figure 59.) At eight lpi there are nine dot rows per character line, at nine lpi there are eight dot rows per character line, and so on.

Each individual hammer spring can (and usually does) form more than one character as the shuttle moves horizontally. This principle is illustrated in Figure 60.

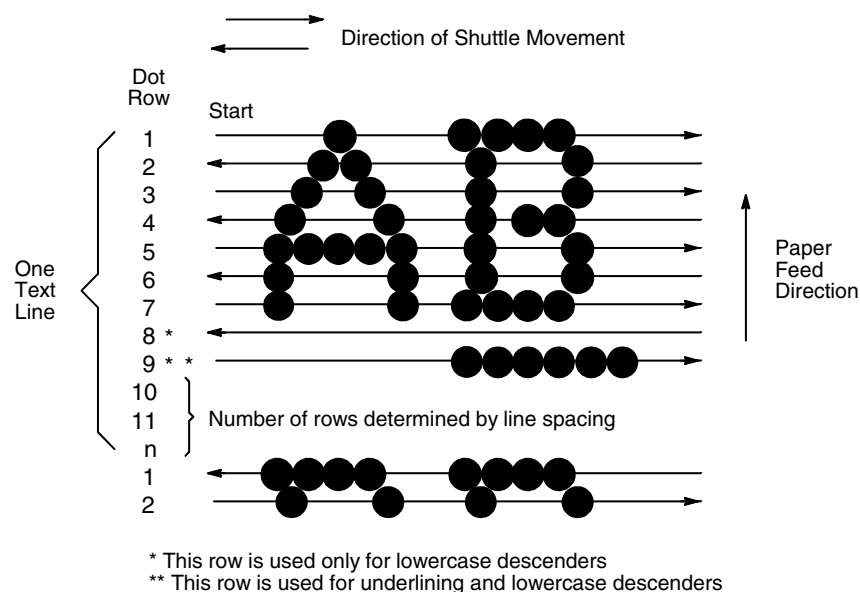


Figure 59. Standard Character Formation

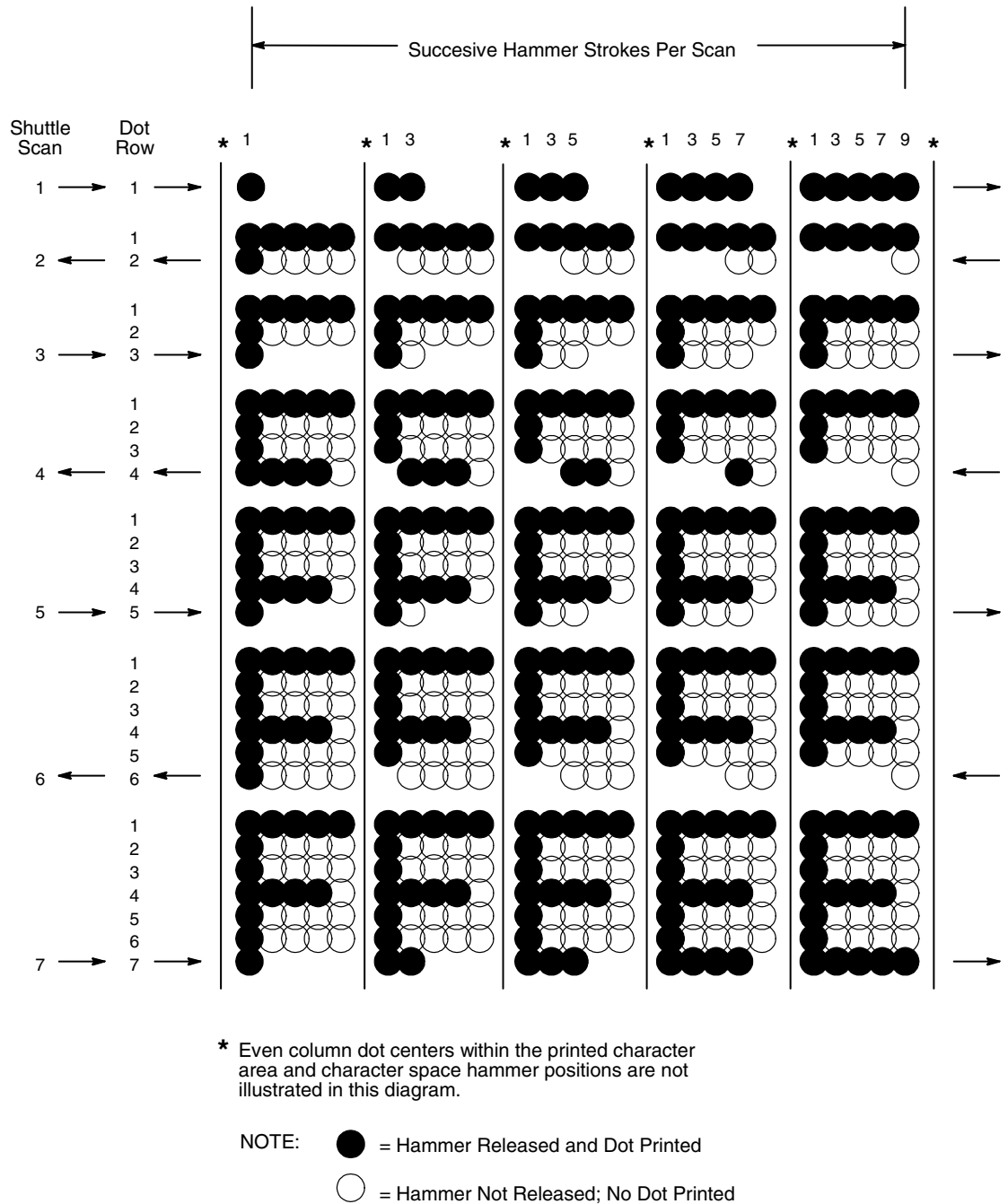


Figure 60. Typical Action of One Hammer Spring in Text Printing

Printing Rates

A line matrix printer prints entire lines sequentially, and measures the printing speed of text in lines per minute (lpm). This is faster than a moving-printhead printer, which prints single characters sequentially and measures its speed in characters per minute (cpm).

Many variables affect printing speed, the main ones being the font and the vertical dot density selected by the user. Lines containing such print attributes as bold or emphasized print, superscripts, subscripts, or elongated characters also reduce print speed, but the speed reduction is never less than half the rate of the same line printed without such attributes. The actual print rate of lines containing these attributes depends on the specific print job, but printer software maximizes the throughput by dynamically determining which dot rows contain adjacent dots and must be printed in two strokes.

The number of characters in a character set has no effect on printing speed.

The printing speed of graphics ("plot mode") is expressed in inches per minute (ipm).

The ability of the printer to feed paper both downward and upward allows the printing of multiple dot densities on a single line. This makes it possible to print forms and text simultaneously and to mix fonts on the same print line. The use of multiple dot densities and reverse paper feed affect printing rates the same way print attributes do.

Printing Mechanism

While the principles of line matrix printing are easy to state, the act of printing dots accurately from a rapidly oscillating shuttle onto a piece of paper that is moving vertically requires complex timing and coordination between printer logic and the printing mechanism.

The printing mechanism consists of three integrated subassemblies:

- Shuttle Frame Assembly
- Paper Transport System
- Ribbon Transport System

Shuttle Frame Assembly

The central element of the printing mechanism is the shuttle frame assembly, which houses the hammer bank assembly and the shuttle drive motor. (Figure 61.)

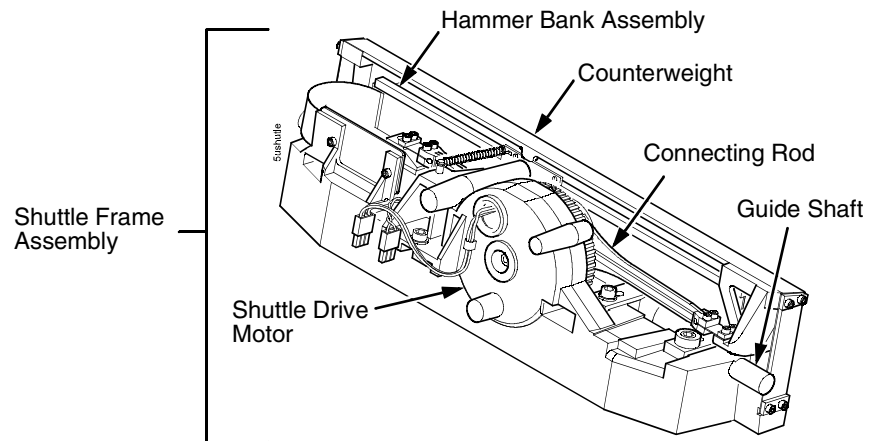


Figure 61. Shuttle Frame Assembly

Hammer Bank Assembly

A number of comb-like hammer spring assemblies are bolted to a solid hammer bank, forming the hammer bank assembly. The number of individual hammers on a hammer spring assembly and the number of hammer spring assemblies attached to the hammer bank vary by printer model:

- Models P7002H, P7002HZZT, P7202H, P7005, P7005ZZT, and P7205 have seven 4-hammer assemblies, for a total of 28 individual hammer springs.
- Models P7003H, P7003ZZT, P7203H, P7010, P7010ZZT, and P7210 have six 10-hammer assemblies, for a total of 60 individual hammer springs.
- Models P7006H, P7006HZZT, P7206H, P7015, P7015ZZT, and P7215 have six 17-hammer assemblies, for a total of 102 individual hammer springs.
- Models P7008H, P7208H, P7220, P7000HD, P7000HDZZT, and P7200HD have seven 18-hammer assemblies, for a total of 126 individual hammer springs.

Shuttle Drive Motor

The shuttle drive motor is built into the shuttle assembly casting and spins a crankshaft, to which are attached the big ends of two connecting rods. (Figure 61.) The small end of one connecting rod attaches to the hammer bank; the small end of the other connecting rod attaches to a counterweight frame surrounding the hammer bank. (The hammer bank and the counterweight constitute the shuttle assembly.) The shuttle drive motor, acting through the crankshaft and connecting rods, converts rotary motion to linear and opposing motion of the hammer bank and counterweight, in an arrangement similar to that of a horizontally-opposed gasoline engine. Mechanically, this design achieves the same benefits as that type of engine: perfect primary balance, low vibration, and durability.

Each hammer spring is a stiff leaf spring with a cylindrical tungsten carbide tip attached to the free end. (Figure 62.) A powerful permanent magnet is imbedded along the length of the hammer bank and acts on the hammer springs through individual pole pieces. The pole pieces magnetically attract and hold the free end of the hammer spring under tension. This is called the retracted state.

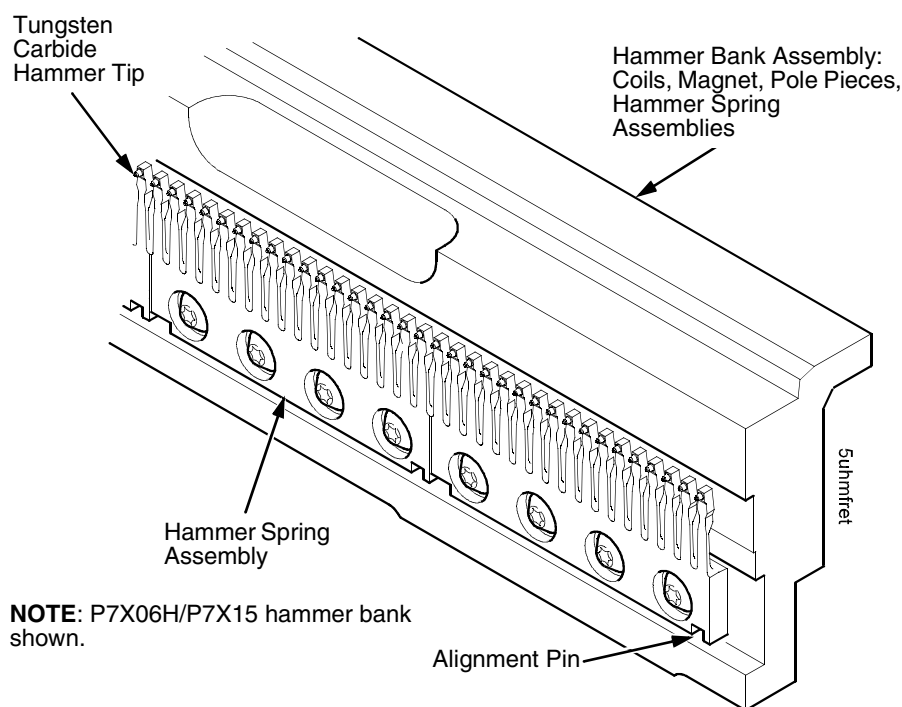


Figure 62. Hammer Springs and Hammer Bank (Detail)

Two electromagnetic coils are mounted behind each hammer and wound around each pole piece. The coils are normally de-energized. When hammer driver logic determines that a hammer must print a dot, a current pulse energizes the coils behind the hammer. The polarity of the resulting magnetic field opposes the field of the permanent magnet, canceling the magnetic attraction and releasing the hammer, which springs forward, striking the ribbon and paper and leaving an impression of its tip (a "dot") on the paper.

While the hammer is in flight the coils are de-energized and their magnetic field collapses, restoring the magnetic attraction of the permanent magnet in the hammer bank. After striking the ribbon and paper, the hammer rebounds and is recaptured by the permanent magnet. When the shuttle reaches the end of a sweep, it reverses direction, the paper is micro-stepped upwards one dot row, and the hammer springs print the next row of dots as the shuttle sweeps in the opposite direction. All this happens extremely rapidly: hammer re-firing in a 2000 lpm printer, for example, takes about 419 microseconds, with the vertical paper movement between dot rows occurring in 2.10 milliseconds.

Paper Transport System

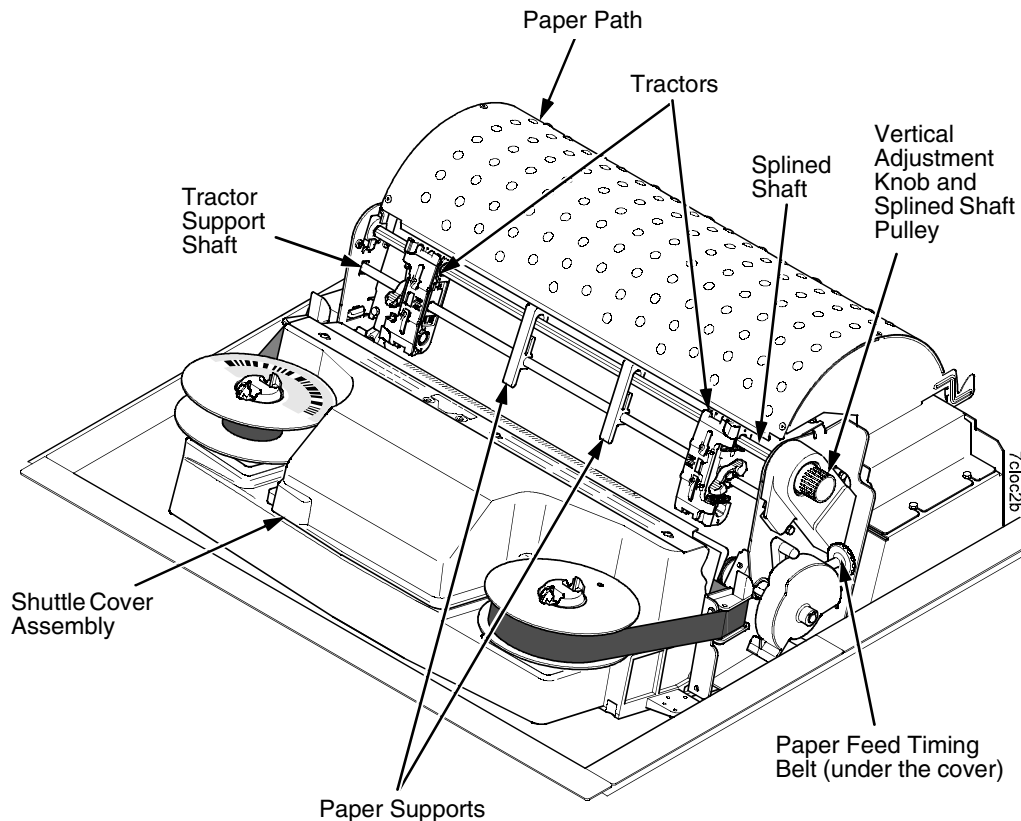


Figure 63. Paper Transport System

A two-phase DC stepper paper feed motor, directed by the engine controller (EC) on the controller board, drives two tractor sprockets by means of a toothed belt linked to a pulley on the splined shaft. The stepper motor permits extremely accurate vertical paper movement in 1/72 inch increments. This drive configuration is designed for continuous, fan-folded paper from 3 to 17 inches wide and 1 to 6 sheets thick. To reverse paper movement (that is, move it downward) a second motor opens and closes the platen by means of a toothed belt linked to a pulley on the platen shaft. Opening the platen prevents paper jams when paper direction is reversed after viewing the print area, setting top of form, or allowing applications to overprint forms.

Paper is positioned horizontally using the tractors. Each tractor is locked in position with a friction lock and engages the paper perforations with six sprocket pins.

The vertical adjustment knob is used to position paper vertically by hand.

Ribbon Transport System

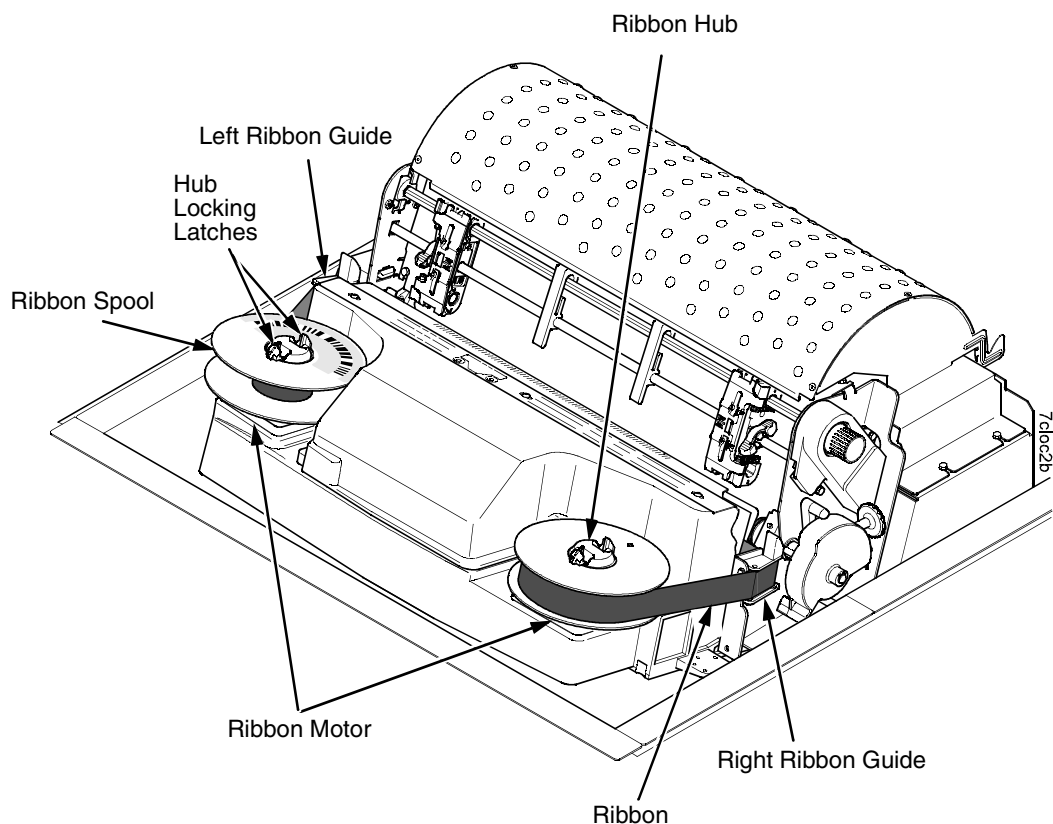


Figure 64. Ribbon Transport System

An inked ribbon made of a specially woven, highly durable fabric winds and unwinds continuously on a pair of spools latched to hubs driven by the ribbon motors. The large spools carry a longer ribbon, which contributes to greater ribbon life. A photo-reflective sensor mounted beneath the right-hand ribbon spool reads a bar coded label affixed to the ribbon spool and sends specialized data to the Integrated Print Management System software in printer memory. (Integrated Print Management is discussed in the next section.)

The hubs and spools are offset vertically to equalize ribbon wear and prolong ribbon life. The ribbon motors operate only when the shuttle assembly is moving. Ribbon motion reverses when a metal strip at either end of the ribbon crosses the left or right ribbon guide, completing a circuit that causes both motors to reverse direction.

Constant ribbon tension is maintained by controlling each motor with a drive and a drag circuit. While the shuttle assembly is in motion, one motor acts as a drive motor, pulling the ribbon against the resistance exerted by the other motor—the drag motor. This system maintains constant motor speed and ribbon tension.

Integrated Print Management System

The Integrated Print Management System monitors and communicates ribbon life. Using specially barcoded ribbon spools, the printer automatically detects when a new or used ribbon is loaded. A sophisticated software algorithm monitors all jobs printed and periodically updates the remaining ribbon life on the front panel display. The accurate presentation of available ribbon life allows for efficient planning of print jobs.

The Integrated Print Management System uses a bar coded label on special high-capacity ribbon spools and a photo-reflective sensor mounted beneath the right-hand ribbon spool. A bar coded label is affixed to each ribbon spool on opposite sides, so that the underside of the right-hand spool can always be read by the sensor. The bar code contains the following encoded information:

- Identifies the ribbon as Printronix (or authorized OEM)
- The thickness and length of the ribbon fabric to select the correct motor stepper tables
- The expected yield, which is used by Integrated Print Management software to set the ink depletion rate
- A unique identification sequence that is not duplicated on any other ribbon

To verify the authenticity of the ribbon, the bar coded label is scanned by the sensor as the spool rotates and the input data are decoded by the printer and interpreted by Integrated Print Management software.

Reading the information from the bar code, the system automatically sets up the parameters which dictate the ribbon life, based upon pre-determined depletion rates to a set dot density. The desired ribbon end point and alert actions can be adjusted to accommodate individual requirements.

Each ribbon spool label has a different identification sequence number. This permits the ribbon to be flipped over and re-used one time, while the system recognizes and tracks it as a new ribbon installation. In this manual, “new ribbon” means either a brand new ribbon or one that has been flipped once.

Operation

Ribbon ink consumption continuously displays as a percentage on the control panel display, the percentage decreasing as ink is consumed. At the default settings, when ribbon life reaches 2% the message changes to “RIBBON INK LOW / Install New RBN.” The control panel status lamp flashes, but the printer continues to accept new print jobs until ribbon life reaches 0%, at which time the alarm sounds, the indicator light flashes, the display updates, and printing pauses. If a new ribbon is loaded, the system automatically detects the change, clears the condition, and resets ribbon life to 100%. If it is not convenient to change the ribbon immediately, press the ONLINE / CLEAR key to resume printing for a few minutes on the worn ribbon. This procedure can be repeated indefinitely until the print job is done or until it is convenient to replace the ribbon.

The default settings for the Integrated Print Management System are enabled at the factory, and the system functions without intervention as long as genuine Printronix ribbons are used and the Integrated Print Management options have been set. The user can change settings, as discussed later in this section.

Control Panel Menus

Two Integrated Print Management System options are located in the QUICK SETUP, PRINTER CONTROL, and ADVANCED USER menus. (The *User's Manual* explains how to navigate the menu system and has complete menu maps.) From either the QUICK SETUP or the PRINTER CONTROL menu you can adjust the Ribbon End Point. From the ADVANCED USER menu you can set the Ribbon Action option. These options are discussed below.

Ribbon End Point

Factory default is Normal. This value corresponds to the life expectancy of an authorized ribbon. The Integrated Print Management System tracks ribbon life to the recommended end point before declaring RIBBON INK LOW or RIBBON INK OUT. Ribbon End Point is a global setting, which means it is in effect for all printer configurations and cannot be set for individual printer configurations.

By changing this setting, you specify a point lower or higher at which the “RIBBON INK LOW” or “RIBBON INK OUT” message will display. You can thus set ribbon life to match the required print density for a specific application. To change this setting, press the **LEFT** or **RIGHT ARROW** key to select either “Darker +1” through “Darker +6” (**LEFT ARROW**) or “Lighter -1” through “Lighter -10” (**RIGHT ARROW**). Each increment or decrement corresponds to a predetermined density value. Pressing **LEFT** or **RIGHT** changes the value by one increment per key press. The second line of the display changes to show the action taken. Press **ENTER** to select the desired level.

The changed setting will remain in effect until it is adjusted again. If a different type of ribbon is installed, the density setting will remain as selected, but the end of life value for the new ribbon type will be used.

For reference, the nominal starting density of a new black text ribbon is approximately 1.2, with a yield down to 0.5 density of approximately 16 million HS characters. Incrementing the Darker setting will raise the density end point, which decreases the ribbon yield. Each Darker increment will decrease the yield by a percentage from the expected 16 million. For example, Darker +1 would change the expected yield to 12.67 million characters. Darker +3 would decrease the yield to 6 million characters. Conversely, decrementing the Lighter setting decreases the print density, which increases the ribbon yield. Each Lighter decrement increases the yield by an additional percentage. For example, Lighter -2 would change the expected yield to 30 million characters. Lighter -5 would result in an approximate yield of 52 million characters.

Changes to Ribbon End Point setting can be made at any time during a ribbon's life, and the new end point will be calculated accordingly. However, once a depleted ribbon is removed and another ribbon installed, the depleted ribbon is added to the used ribbon log, and may not be re-introduced into the printer.

Ribbon Action

Factory default is Stop At RBN End. When the ribbon life reaches 0%, the message "RIBBON INK OUT / Install New RBN" displays on the control panel. The status lamp flashes, the alarm sounds (if enabled), printing stops, and the printer enters the fault state. Printing cannot resume until this condition is cleared. To complete a print job in progress, you can return the printer to ONLINE state by pressing **ONLINE / CLEAR**. This allows the printer to continue printing for approximately two minutes, at which point the printer will go into the fault state again. You can print for another two minutes by again pressing **ONLINE / CLEAR**. You can repeat this routine indefinitely, or until power to the printer is turned off. Once power is restored and a depleted ribbon is detected, "OLD RIBBON / Install New RBN" displays because the depleted ribbon was added to the Ribbon Log. A new ribbon must be installed to clear this condition.

When Ignore RBN End is selected, the ribbon life display remains on the control panel, and the Integrated Print Management System continues to monitor ink consumption to the appropriate value as set by the Ribbon End Point. When this end point is reached, the display will continuously show "RIBBON LIFE 0%" and the system will continue to run with no other warning indications. The printer can be taken OFFLINE or the power cycled and the Integrated Print Management System will permit the use of this ribbon. However, when the ribbon reaches the calculated absolute end of life, the printer stops printing, the status indicator flashes, the alarm sounds (if enabled), and the display switches to the "EXCESS RBN WEAR / Install New RBN" message. The ribbon serial number is added to the depleted ribbon log (described below). This fault cannot be cleared by pressing **ONLINE / CLEAR**. It can only be cleared by opening the platen or cycling power, at which time the ribbon will now be detected as a depleted ribbon. A new, recognized (authorized) ribbon must be installed to clear this fault.

Ribbon Installation And Detection

The Integrated Print Management System assumes that the full ribbon spool will be installed on the left-hand hub and the empty spool on the right-hand hub, but the full spool can be installed on the right ribbon hub as well. The ribbon detection routine will simply take a few seconds longer if the full spool is installed on the right-hand hub.

The new ribbon detection routine runs after printer power is restored, as part of the boot cycle, or whenever the platen is opened and closed. When done as part of the boot cycle, Shuttle Slow runs the ribbon motors to the left, the bar code is read off the bottom of the right ribbon spool, and the ribbon is confirmed. When the bar code is decoded, the Integrated Print Management System is reset using the new data, and the ribbon consumption display is updated. The ribbon motors and shuttle stop and the printer is brought to the selected power up configuration. This routine repeats any time the platen is closed and the printer is returned to ONLINE and no print data are in the buffer. If no print data are present, the ribbon motors and shuttle stop and the printer remains ONLINE. If the ribbon bar code cannot be decoded, is not authorized, or is not detected by the sensor, an error message is reported. If a data stream is detected during or after the ribbon detection routine, the print cycle begins without stopping the shuttle or ribbon motors. In this case the ribbon detection routine is done during the print cycle.

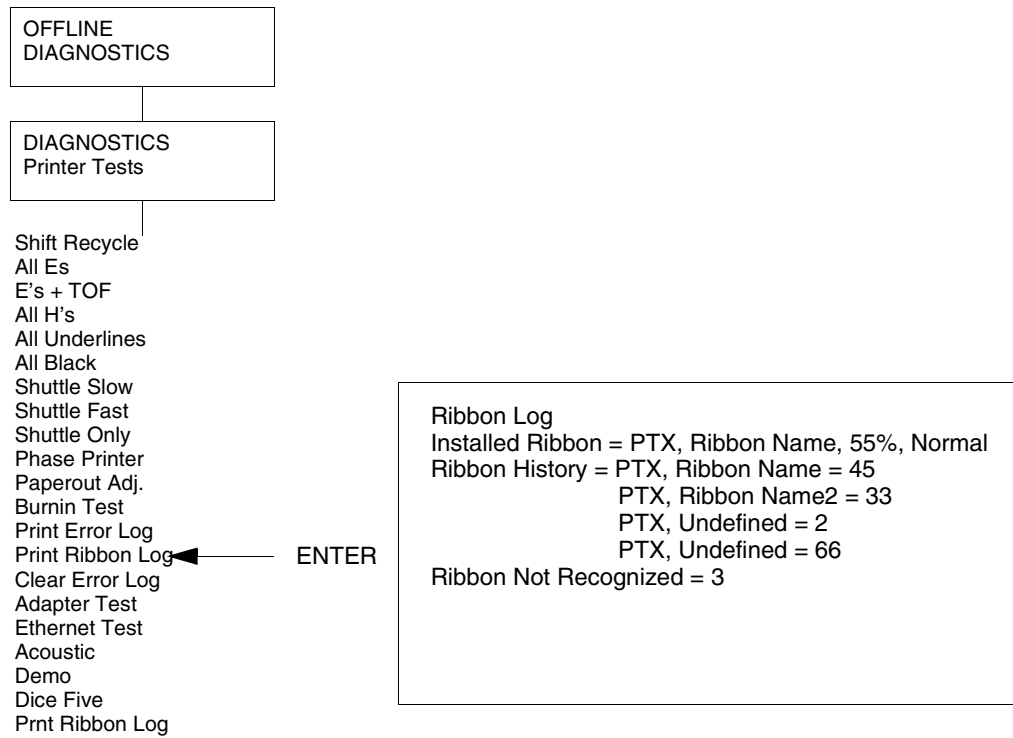
Previously used ribbons can be installed and used again to print, as long as they were not fully depleted and declared RIBBON INK OUT.

A ribbon can also be flipped over to print on the unused half. This situation occurs if printed images are narrow enough that only about half the ribbon is used at one time. When a ribbon is flipped it is treated as a new (different) ribbon, so if a ribbon is used across its full width and still flipped, it will report as new even though it is clearly used. It is the customer's responsibility to determine if the printing application can support ribbon flipping.

The Ribbon Log

The printer identifies each ribbon by maker (Printronix or authorized OEM), type, and an identification code unique to that specific ribbon. The Integrated Print Management System recognizes the currently installed ribbon and previously used (but not depleted) ribbons, and resumes tracking the life of the ribbon from the value it had when it was removed from the printer.

The printer keeps a log of depleted ribbons, identifying them if they are again installed on the printer. This information is not printed in detail, but a summary by type of all ribbons ever installed on a particular printer is listed in the log. The log also captures any attempts to run Unknown1 or Unknown2 ribbons. This information is recorded in the log as "Ribbon Not Recognized." The Ribbon Log is a permanent record; it cannot be cleared. The location and format of the Ribbon Log is shown below.



Logical Control Of The Printer

The printer consists of four subsystems: the control panel, the controller board, the power supply board, and the print mechanism, as illustrated in Figure 65.

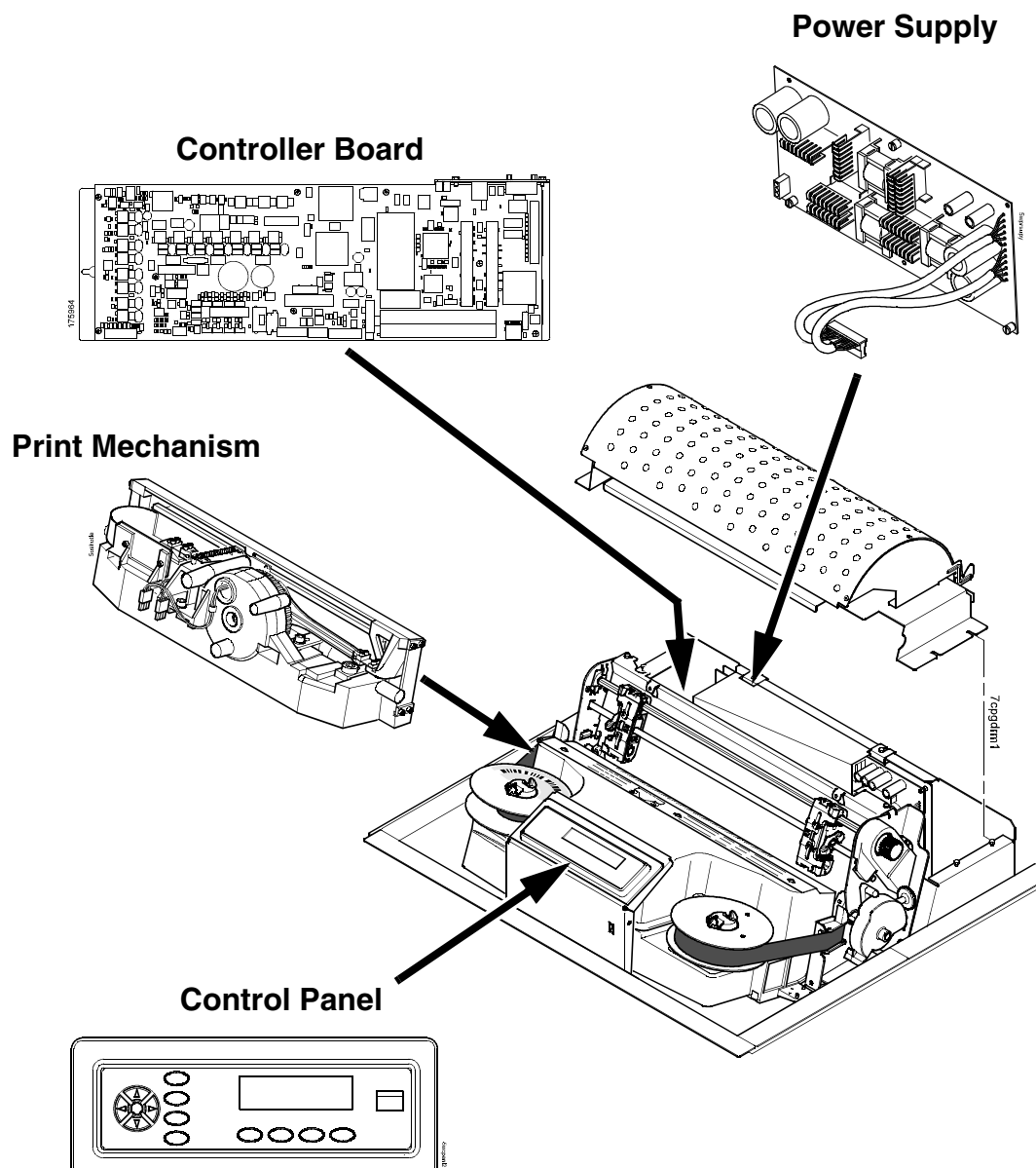


Figure 65. Functional Elements of the Printer

Control Panel

The user communicates with the printer by pressing keys on the control panel. The keys are momentary contact switches. The control panel processes and sends key closure information to the controller board and displays information from the controller on the LCD. A status indicator next to the LCD also conveys printer status information to the user.

The LCD, status indicator, and keys are mounted on a printed circuit board assembly enclosed in a protective housing. The functions of the keys and indicators are defined on page 26.

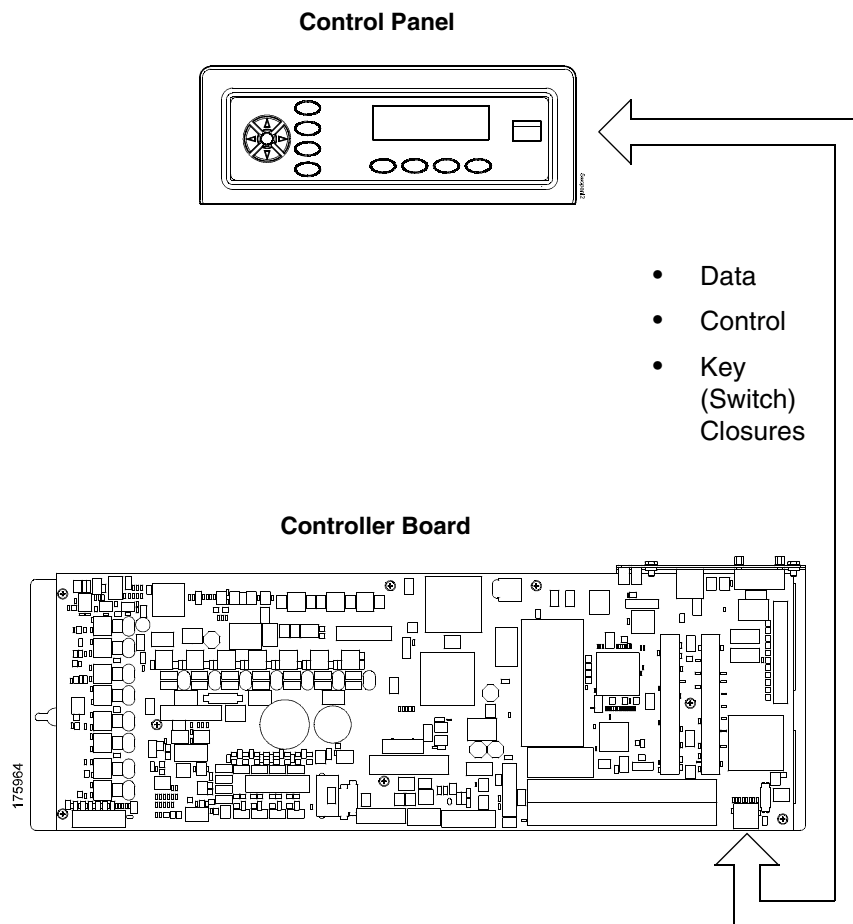


Figure 66. Control Panel Functional Overview

Controller Board

The heart of a P7000 printer is the “Hurricane” V5 or V6 controller board, which controls all printer functions and supports all P7000 models.

The controller board receives and processes all data from the host computer, builds the printable images, controls all motors, and drives the hammer springs. Except for the power supply, all logic and drive circuitry for the printer are contained on the controller board.

The controller board consists of two functional units: the DC (Data Controller) and the EC (Engine Controller).

The DC is responsible for:

- Host Input/Output (I/O)
- Operator I/O
- Security Interface
- Print Image Generation
- Overall High Level (Logical) Control

The EC is responsible for:

- Operating the print mechanism
- Monitoring the print mechanism for faults
- Power shutdown and power saving modes

The EC and DC communicate through semaphore registers. The DC receives input from the host and operator and returns dot images and LCD messages to buffers in memory. Image data are passed to the EC upon request, are processed, then sent to the hammer bank. The EC synchronizes paper, ribbon, platen, and shuttle motion as it feeds dot data to the hammer drivers. Figure 67 summarizes this architecture.

Data Controller

The data controller (DC) consists of the following elements:

- MPC8245 microprocessor
- A 72-pin flash SIMM socket that holds up to 32MB of program memory
- A 32MB SDRAM DIMM for data memory
- 8K x 8 Non-Volatile Battery-Backed Static RAM (NVRAM) for storage of configuration and system statistical data
- V8 ASIC (Application-Specific Integrated Circuit)
- Host I/O Drivers/Termination

MPC8245 Microprocessor

A Motorola MPC8245 microprocessor serves as the processor of the DC unit.

Flash Memory

The DC stores program and emulation code in flash memory. Flash memory is erasable, non-volatile, and much faster than a disk drive.

The DC uses AMD 5.0V-only flash memory, which does not require higher programming and erasing voltages on the board (it has an internal charge pump to make these voltages itself). This memory supports at least 100,000 write/erase cycles. The flash memory is 8 bits wide.

A 72-pin SIMM socket designated J11 is provided for flash memory. (Socket J10 is not used.) Up to 32MB of flash may be installed on the PSA3 controller board.

The programs that are stored in flash memory are downloaded through the parallel, serial, or optional ethernet port.

SDRAM

System SDRAM is used for program variables, image buffers, and input buffers. The SDRAM supports page mode operation and is addressable by individual byte. The SDRAM is a DIMM permanently mounted on the PSA3 controller board.

NVRAM

An 8K x 8 bit Non-Volatile battery-backed static RAM (NVRAM) device provides for the storage of configuration and system statistical data.

V8 ASIC

The V8 is a multi-function custom gate array ASIC containing all the logic for the DC that is not contained in the MPC8245 processor. The V8 provides the following services:

- Memory Access Controller
- SDRAM Controller
- Flash Controller
- Two DMA Channels
- Operator Panel Interface
- “Dot Plucking” and Adjacent Dot Checking
- Interface to the “Cajun” Bus
- Host I/O and Diagnostic Port

Memory Access Controller

All MPC8245 addresses go through the V8 ASIC. The V8 handles all address decoding, chip selects, DTACKs, and so on.

SDRAM Controller

The V8 supports up to four banks of page mode SDRAM.

Flash Controller

The V8 supports up to four banks of flash memory.

DMA Channels

The V8 provides two channels for direct memory access. These channels move data from the host interface or expansion bus to the SDRAM and vice versa. One address is an I/O address, the other is a memory address with auto-increment.

Control Panel Interface

The V8 control panel interface consists of five lines: serial clock, serial data, and three select lines. It is the V8 that handles all parallel-to-serial conversion (and vice versa) to and from the panel, as well as any special timing needed when toggling select lines, etc.

“Dot Plucking” And Adjacent Dot Checking

“Dot Plucking” is a specialized DMA function that removes dot data from a dot image buffer in SDRAM in a programmable manner, serializes it, and sends it to the hammer bank. This function is actually controlled by the EC (see page 318), which has access to the V8 through the “Cajun” Bus Interface.

“Cajun” Bus Interface

The “Cajun” bus connects the DC and the EC. The EC uses this bus to access DC resources, including the semaphore registers. (The semaphore registers are the primary communications path between the EC and DC.)

Ports

The V8 ASIC controls the following I/O functions:

- Interface to IEEE® 1284 Level 2 host
- Interface to RS-232-E serial host
- Interface to RS-422-B serial host

All the circuitry required for these types of hosts is provided on the controller board, except for the drivers themselves, ESD protection, and terminations.

Host I/O Drivers And Termination

Beyond the MPC8245 processor and V8 ASIC, additional support circuitry completes the serial and parallel interfaces. These circuits include:

- RS-232 drivers and receivers. These circuits use internal charge pumps to eliminate the need for $\pm 12V$ power.
- RS-422 differential drivers and receivers
- Parallel port pull-up and pull-down terminating resistors in DIP configuration for easy removal and installation.

All interface ICs and terminations have the following characteristics:

- Provide ESD protection to 15KV for all inputs.
- Less than 0.05V common mode ripple, measured at the power and ground of the interface ICs.
- Less than 0.02V common mode ripple, measured between chassis ground and the ground pins of the interface ICs.
- Greater than 200V/ μs slew rate for all outputs.

Engine Controller

The engine controller (EC) consists of four main elements:

- 80C167 Micro controller
- 128KB 5.0V-only FLASH program memory, organized as 64K x 16 bits. This memory is not expandable.
- MECA (Mechanism Engine Control ASIC)
- Analog drive circuitry

80C167 Microcontroller

The Siemens SAB 80C167 is a high-integration microcontroller with many features that suit it extremely well to real-time control applications. This controller and the MECA ASIC provide the functionality of three separate processors used in earlier controller board architectures. In this manual, the 80C167 is referred to as the EC.

Bus Configuration

The 80C167 bus is configured for 18-bit address, 16-bit data, non-multiplexed and segmented operation. The flash memory runs with zero wait states. An external PAL is used for address decoding.

Power Reduction

The 80C167 chip has two power reduction modes: idle and Energy Star. Idle mode is not used. In Energy Star mode, the +48V and all motors are de-energized, but the EC operates as normal.

EC Flash Memory

The EC stores all boot code, program code, and tables in its own local flash memory. This flash is organized as 64Kx16 bits and uses the same technology as the DC flash: it is +5.0V-only and is rated for a minimum of 100,000 write/erase cycles. EC memory is fixed; it is soldered to the controller board. Its contents can be updated through the DC. At run time, the EC also stores tables in shared SDRAM, which is accessed through the Cajun bus.

MECA ASIC

The 80C167 uses many counters, PWM generators, and FIFOs in the MECA to control printer motor functions. The MECA is a custom gate array, specifically designed to drive this system.

Analog Drive Circuitry

The analog drive circuits convert +48 volts and +8.5 volts into the power used to drive the motors and hammers in the printer. Sensors monitor the operation and status of critical components within the printer.

The printer has five electric motors: two ribbon drive, one paper feed, one platen open, and the shuttle motor. The shuttle motor is a brushless DC motor driven by current control. The MPU encoder is used as feedback for motor commutations, hammer fire timing, and motor stall detection. The paper feed motor is a DC stepping motor driven by current control. The paper feed motor may be driven in full, half, or 1/72 inch microsteps, depending on print requirements. The ribbon drive system uses two DC stepping motors that alternate drive and drag roles when the ribbon fabric reaches turnaround. The drive ribbon motor is microstepped in voltage mode, while the drag motor is loaded and monitored to maintain correct linear speed and tension. The platen motor is driven in current mode and can be full or half stepped. The overall current level may be reduced for standby modes.

The paper feed, ribbon drive, and shuttle motors are driven in control loops containing power MOSFETs, voltage and current sensors, the MECA ASIC, and the EC processor. The platen motor is driven by a stepping motor controller IC and the EC processor.

Control of the hammer drive is split between the controller board and the hammer bank. Common circuits are located on the controller board, while circuitry specific to the hammers is contained on the hammer bank. The EC uses the MECA ASIC on the controller board to set timing and upper drive profiles for hammer fire events. The controller also contains diagnostic circuitry for the hammer system. The hammer bank contains HBA ASICs that interpret fire commands and data from the MECA and V8 ASICs. The HBAs control lower drive MOSFETs on the hammer bank. These determine which hammers will participate in a fire event generated by the controller's upper drive.

Power Supply Board

The printer's power supply is on a printed circuit board mounted on the rear wall of the card cage. The power supply automatically senses and adjusts to any commercial electrical system that provides AC mains potential in 50 or 60 Hertz systems. This means the printer can operate anywhere in the world on local commercial power.

The power supply converts alternating current (AC) to direct current (DC) at three voltage levels and sends the DC voltages to the controller board. The controller board distributes all DC power to the logic and electromechanical circuits.

AC Power

The power supply operates on AC voltages ranging from 88 volts to 270 volts. It can tolerate variations in frequency of 47 to 63 Hz. The power supply is designed to withstand an AC input overvoltage of 300 VAC for one second with no degradation of DC output voltage or damage to printer circuits.

DC Power

The power supply board contains two DC power supply systems for the printer. The first is a +5 V bus for logic. The second consists of +48 V and +8.5 V buses for the hammer bank and motors.

The +5 V supply has an isolated return line that connects to the +48 V return at the printer load. Both returns are tied together in a one-point ground. The +5 V power supply has its own inverter, separate from the +48 V and +8.5 V outputs.

There is an opto-isolated input on the power supply that will shut down and latch off the +48 V and +8.5 V supplies unless it is pulled up to +5V with a 1K Ω resistor. This resistor is mounted on the controller board and may be pulled down or disconnected by software or internal cable interlocks. The +5 V output will remain stable for reporting and latching the fault condition. The return for this signal is the +5 V return. In addition, this shutdown circuit discharges and latches the +48 V down to a level lower than +15 V in less

than 200 milliseconds and requires recycling of the circuit breaker (On/Off switch) to reset the latch.

Loss of +48 V is seen by the EC and reported as a fault.

Printer Interface

The printer interface is the point where the data (signal) cable from the host computer plugs into the printer. The printer interface processes all signals and data to and from the host computer.

The printer supports a number of standard and optional interfaces to the host: computer:

- Centronics parallel (standard)
- IEEE 1284 parallel (standard)
- EIA®-232-E serial (standard)
- EIA-422-B serial (standard, but requires 9-pin/25-pin interface adapter kit)
- CT (Coaxial/Twinaxial) (optional)
- 10/100Base-T Ethernet Network Interface Card (NIC) (optional)

Selection of the interface is controlled by configuration menus accessed at the control panel. It is possible to physically connect more than one interface, but only one interface may be electrically active at any given time.

Graphics

The *VGL Advanced Graphics* programming language (a QMS graphics emulation) and the *PGL Advanced Graphics* programming language (a Printronix IGP emulation) are options that install in flash memory on the controller board.

These programming languages simplify the job of creating forms, bar codes, logos, expanded characters, and other graphics. The languages enable the printer to print sideways, upside down, and to make forms combining graphics, alphanumeric data, and bar codes—all in a single pass. Documents explaining configuration, operation, and programming are included with each option.

A

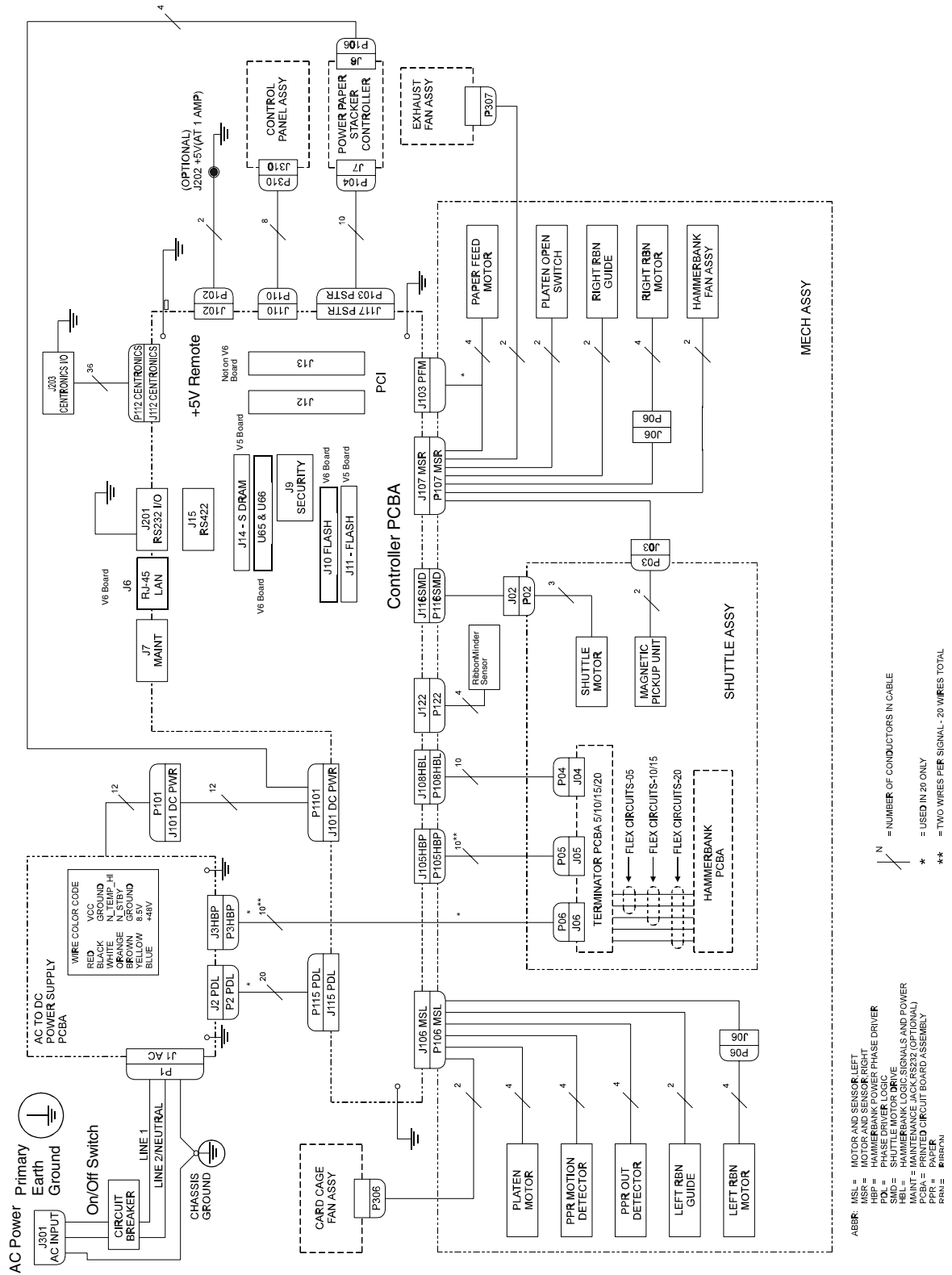
Wire Data

NOTE: Abbreviations, acronyms, and signal mnemonics are defined in Appendix B (page 377).

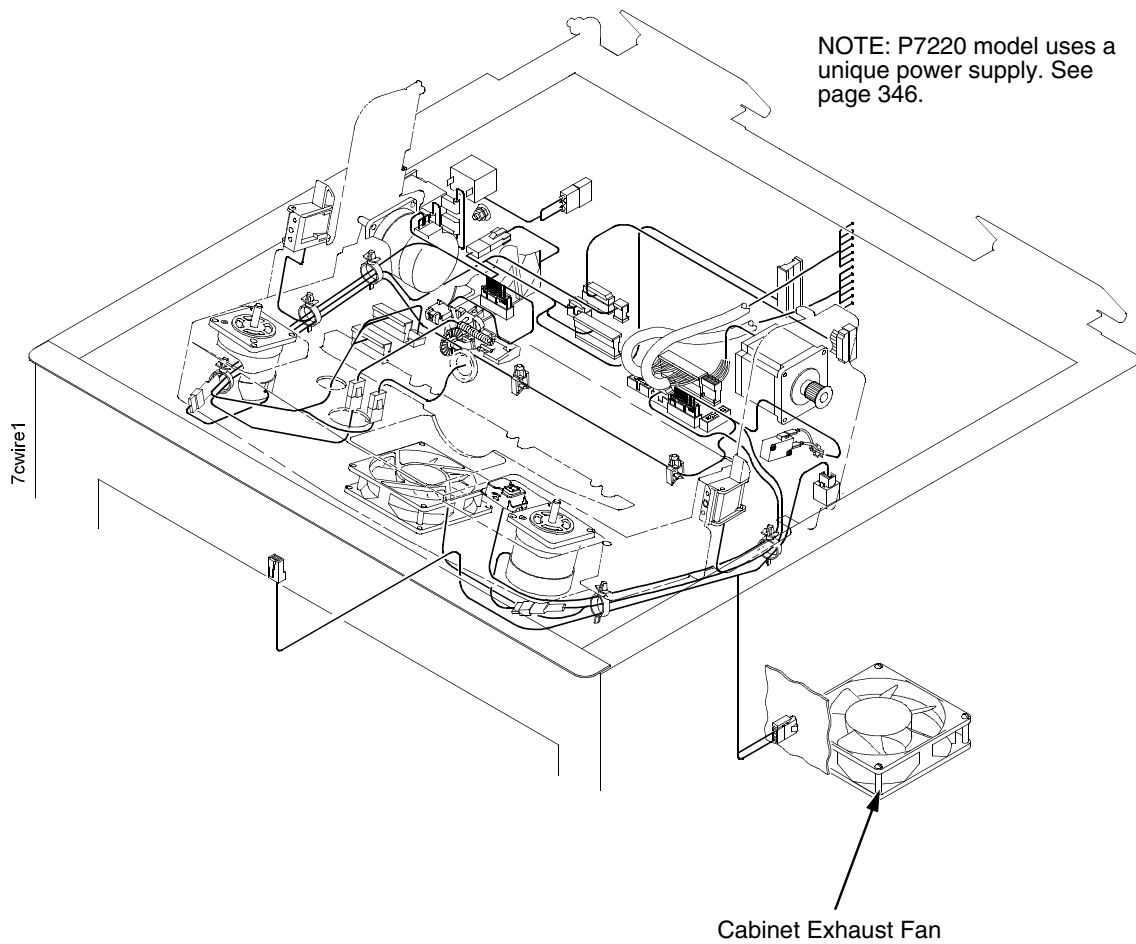
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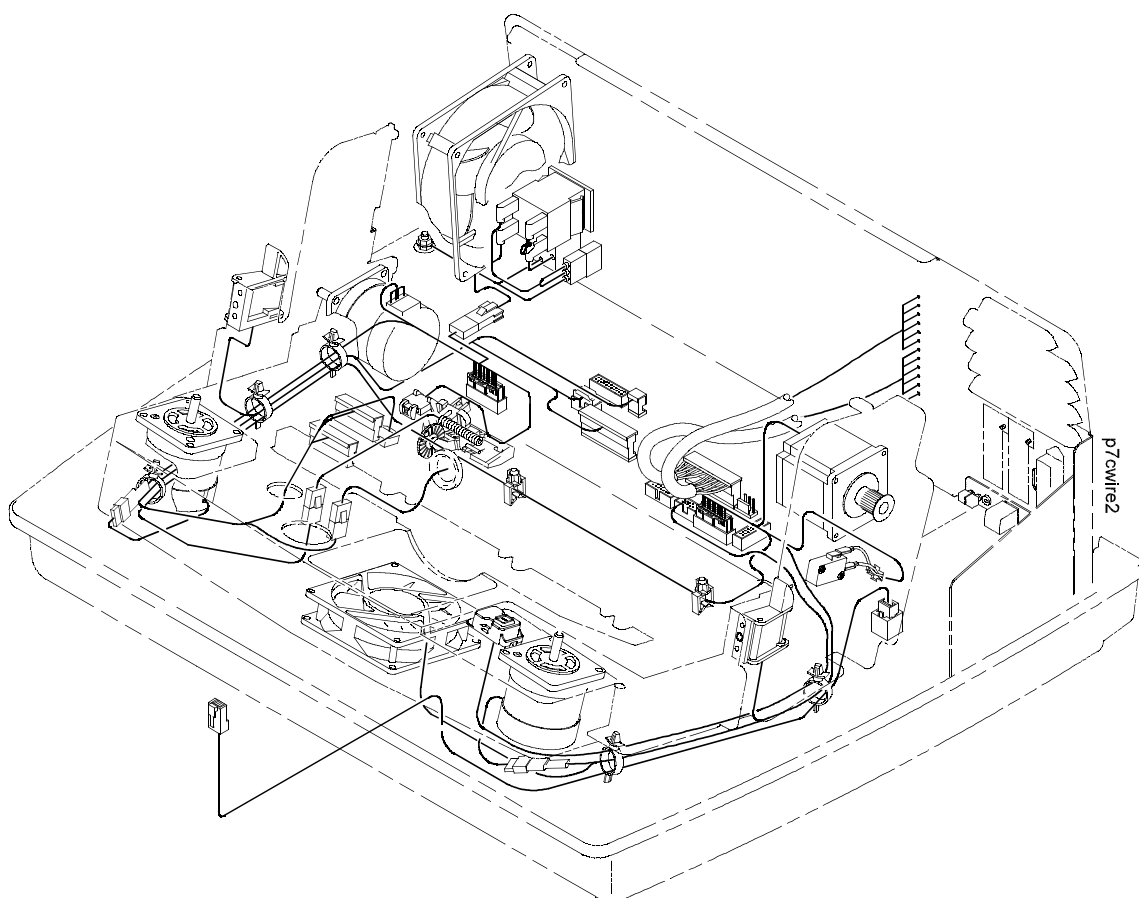
Interconnection Diagram



Cable Routing, Cabinet Model



Cable Routing, Pedestal Model



Main Wire Harness Test Tables

P106 Connector

19	17	15	13	11	9	7	5	3	1
POD				CCF					PLAT M
PMD				LRP					LRIB M

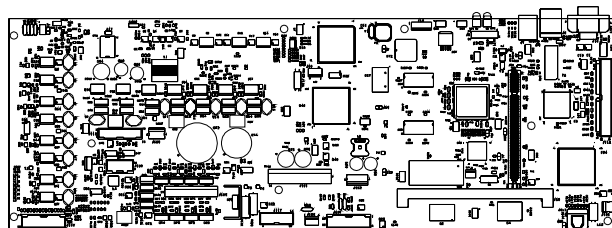
20 18 16 14 12 10 8 6 4 2

Resistance

Pin No.

Device	P106 Pins	Normal
LRIB M	2, 4 and 6,8	7.2 - 8.8 Ω
PLAT M	1, 3 and 5, 7	1.35 - 1.65 Ω
LRP	10, 12	Open across pins Short across post
CCF	9, 11	4.6 K Ω
PMD	14, 16 18, 20	8 Meg Ω Open
POD	13, 15 17, 19	8 Meg Ω Open

CCF = Card Cage Fan
 LRIB M = Left Ribbon Motor
 LRP = Left Ribbon Guide
 PLAT M = Platen Open Motor
 PMD = Paper Motion Detector (Switch)
 POD = Paper Out Detect (Switch)



J106

J107

MOTOR NOTES:

All Motors: Use the table values to test for winding continuity and for no shorts between winding and the motor frame. Rotate the motor by hand and test for shorts; replace the motor if you find any shorts.

Shuttle Motor = approx. 0.7 - 0.8 Ω per phase, except for the P20Q printer, which shows 0.42 Ω per phase. Use this value to test for winding continuity and for no shorts between windings and the motor frame. Rotate the motor by hand and test for shorts; replace the shuttle frame assembly if you find any shorts.

All fans have brushless DC motors powered by solid-state circuits and controlled by feedback from a fan rotor position Hall Effect sensor. Fans driven by +48V measure 4 - 5 K Ω . Fans driven by +24V measure 2 - 3 K Ω . A very low reading can mean one of the winding drive transistors is shorted. An open circuit could indicate defective fan electronics or an open cable. Fans will run whenever +48V is present; failure to run can mean a defective cable, connector, or current sense resistor on the controller board. An open circuit current sense resistor (on the controller board) will prevent the fan from running but will not allow software to detect the fault.

Connectors are viewed from the top, as seen when plugged into the controller board. For connector assembly and disassembly, see page 204.

P107 Connector

19	17	15	13	11	9	7	5	3	1
MPU				PLO					EHF*
CVO				RRP					HBF
									RRIB M

20 18 16 14 12 10 8 6 4 2

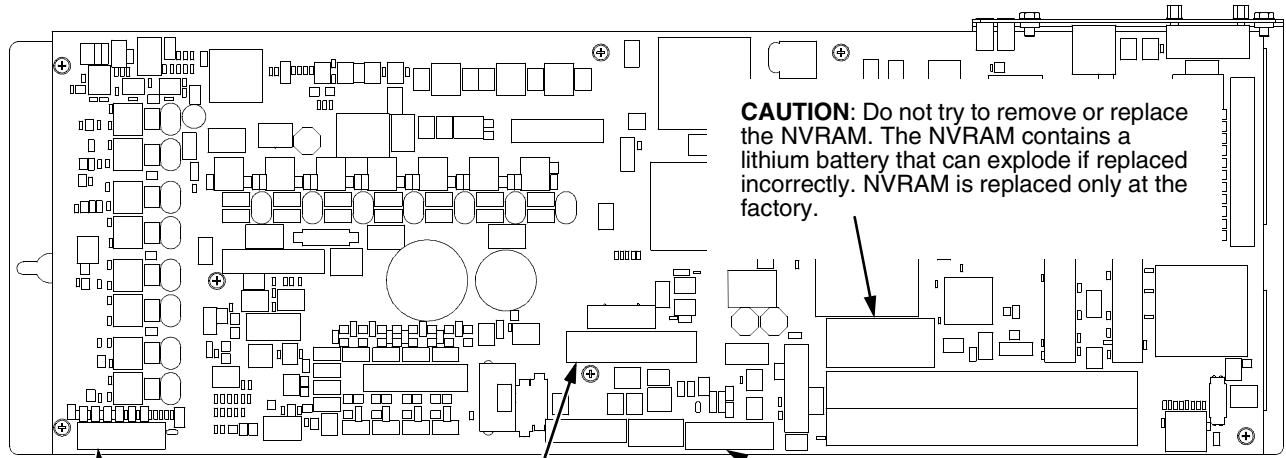
Resistance

Device	P107 Pins	Normal
RRIB M	2, 4 and 6,8	7.2 - 8.8 Ω
PAPR M	1, 3 and 5, 7	0.417 - 0.681 Ω
HBF	10, 12	2.7 K Ω
EHF	9, 11	4.6 K Ω
RRP	14, 16	Open across pins Short across post
PLO	13, 15	Continuity: switch closed Open: switch open
CVO	18, 20	Continuity: switch closed Open: switch open
MPU	17, 19	670 Ω

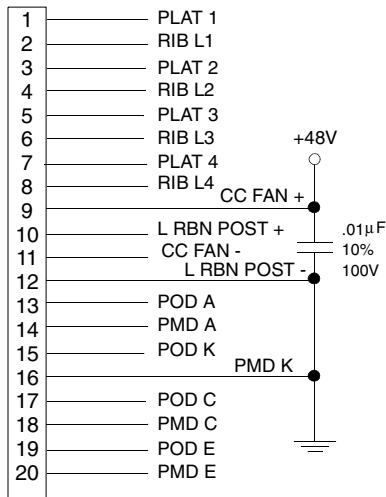
CVO = Cover Open Switch (not installed)
 EHF* = Exhaust Fan
 HBF = Hammer Bank Fan
 MPU = Magnetic Pickup
 PAPR M = Paper Feed Motor
 PLO = Platen Open (Switch)
 RRIB M = Right Ribbon Motor
 RRP = Right Ribbon Guide

* JMP on pedestal models, used as a spacer

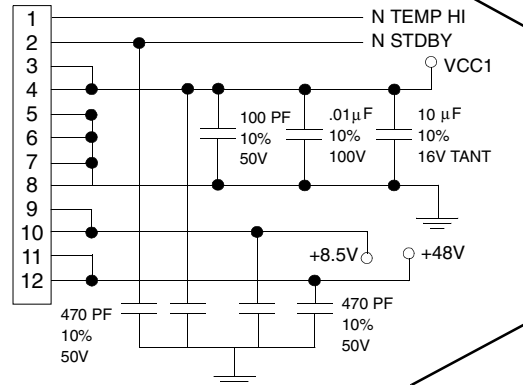
V5 Controller Board



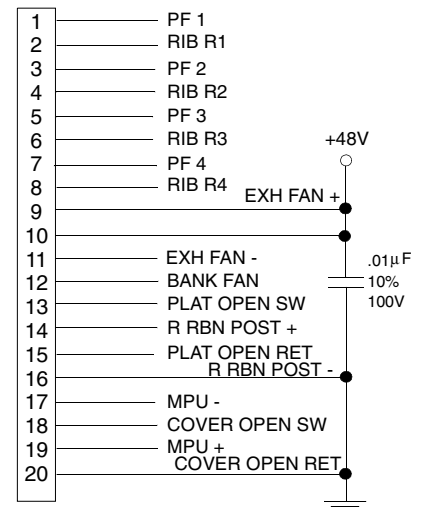
Motor Sensor Left
J106



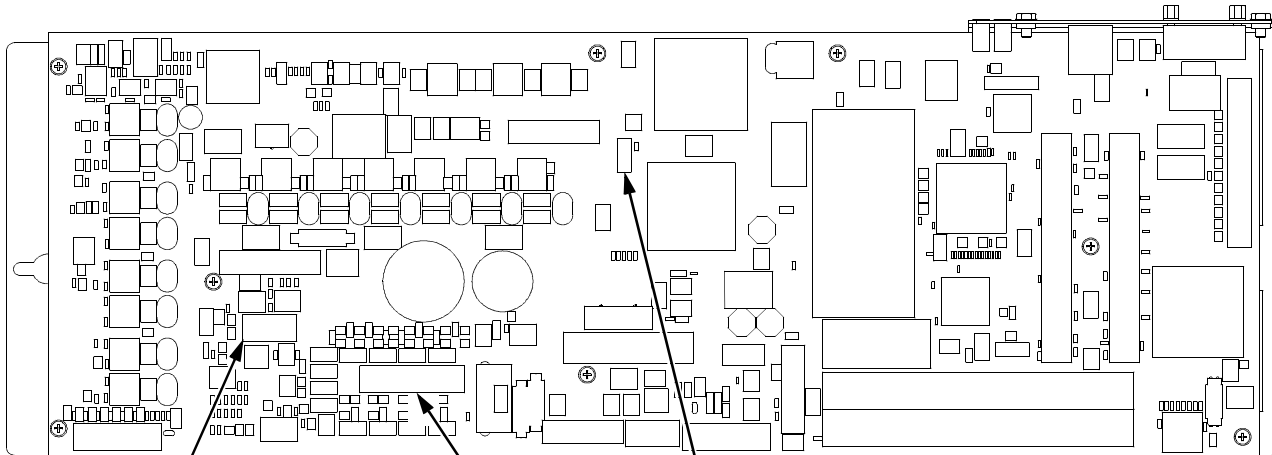
Power Supply
J101



Motor Sensor Right
J107

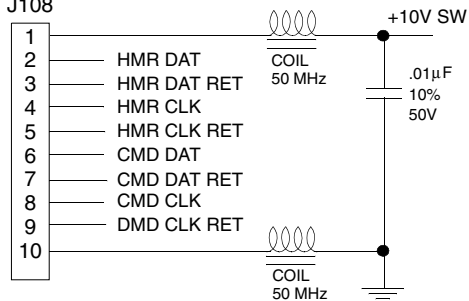


V5 Controller Board (continued)



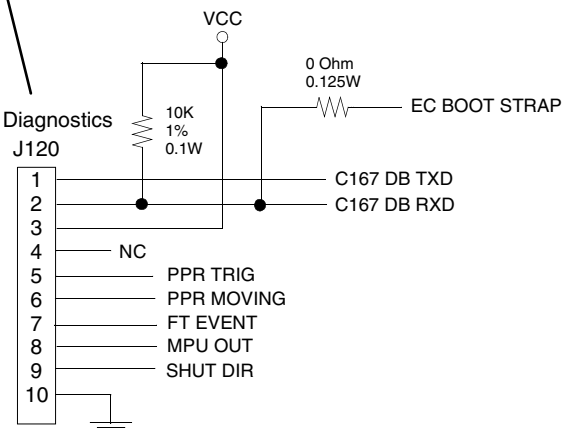
Hammer Bank Logic

J108



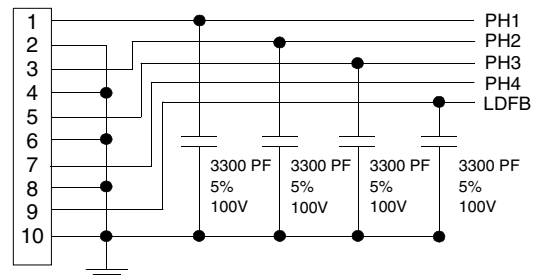
EC Diagnostics

J120

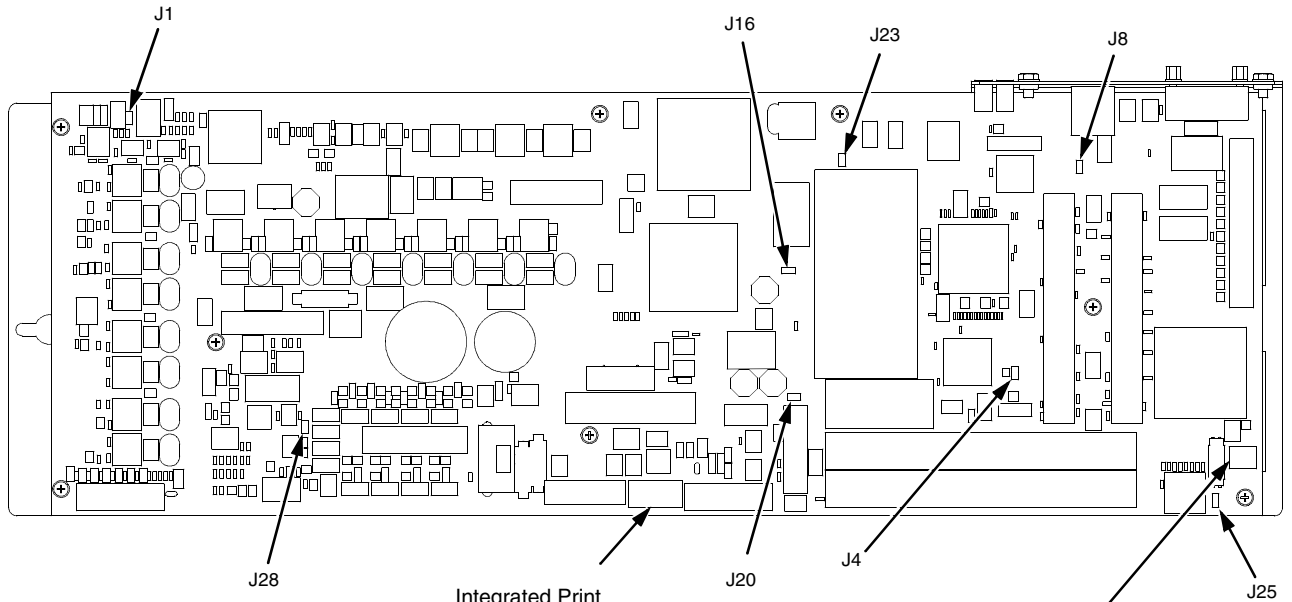


Hammer Bank Power

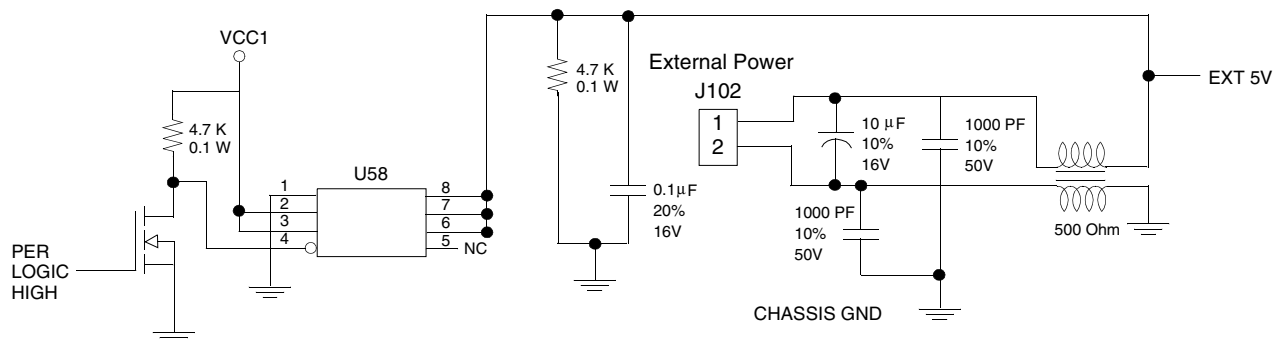
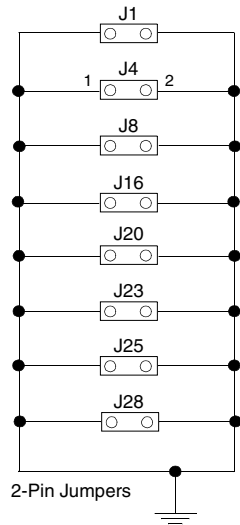
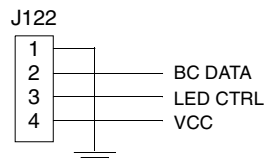
J105



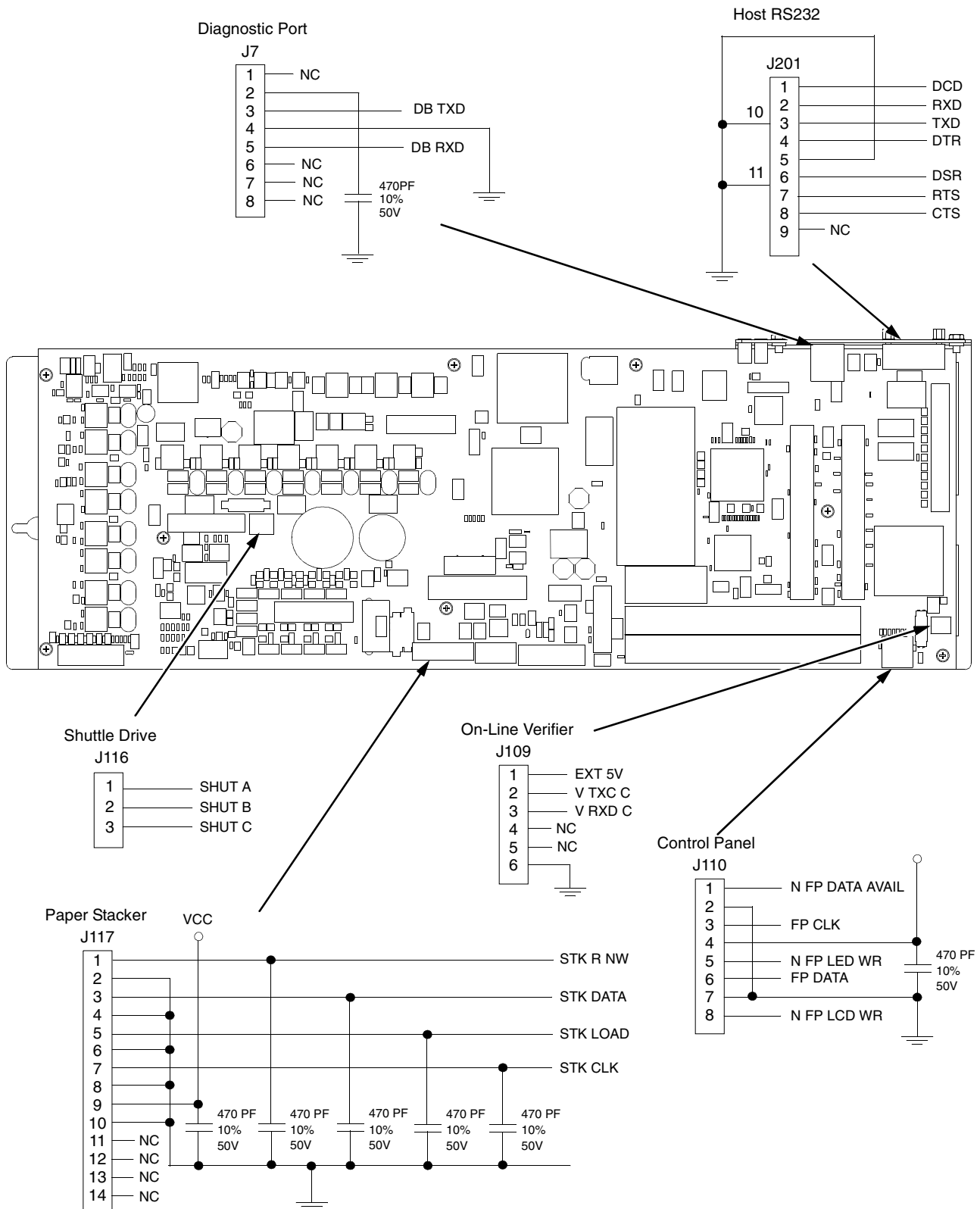
V5 Controller Board (continued)



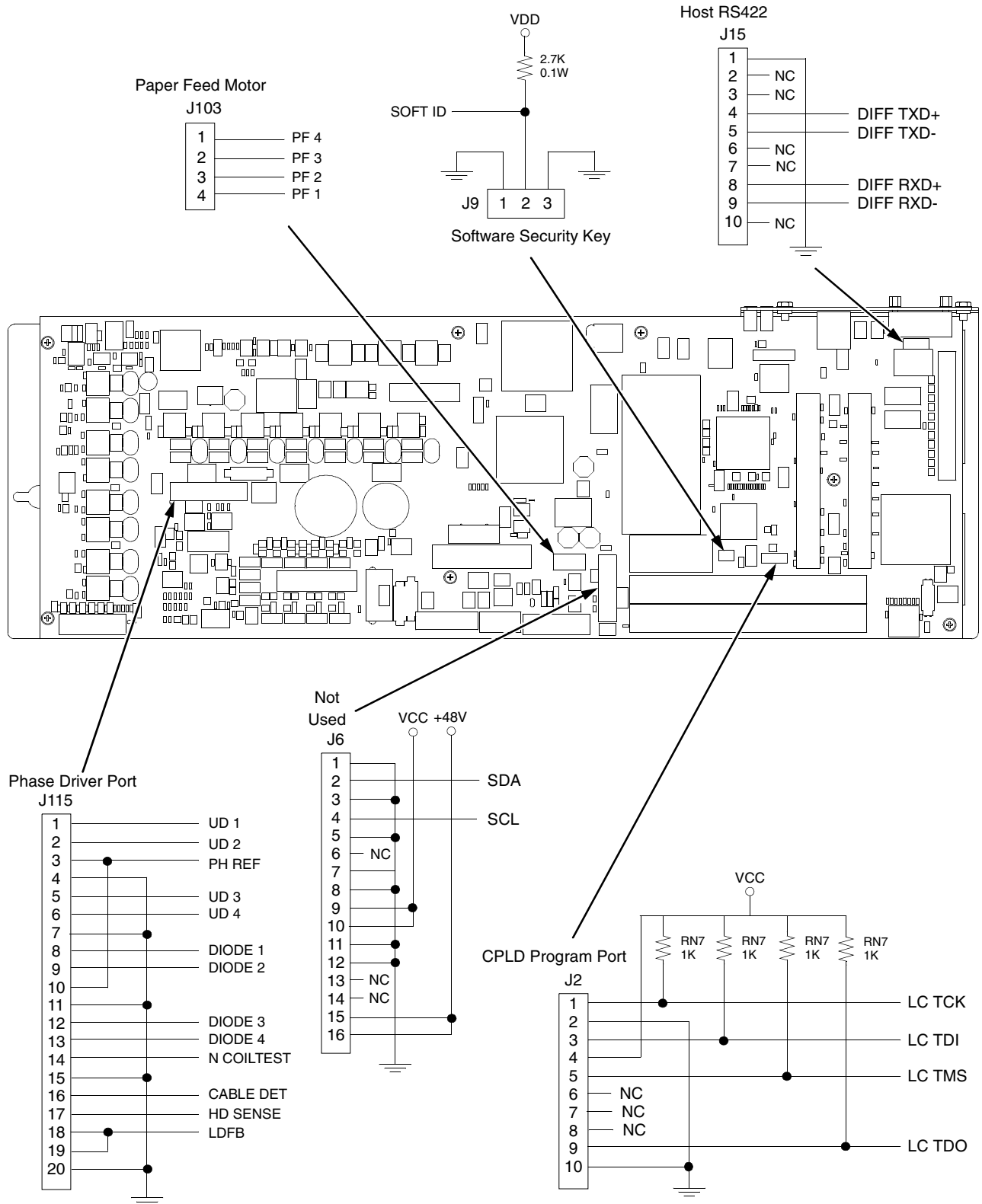
Integrated Print
Management System
Sensor



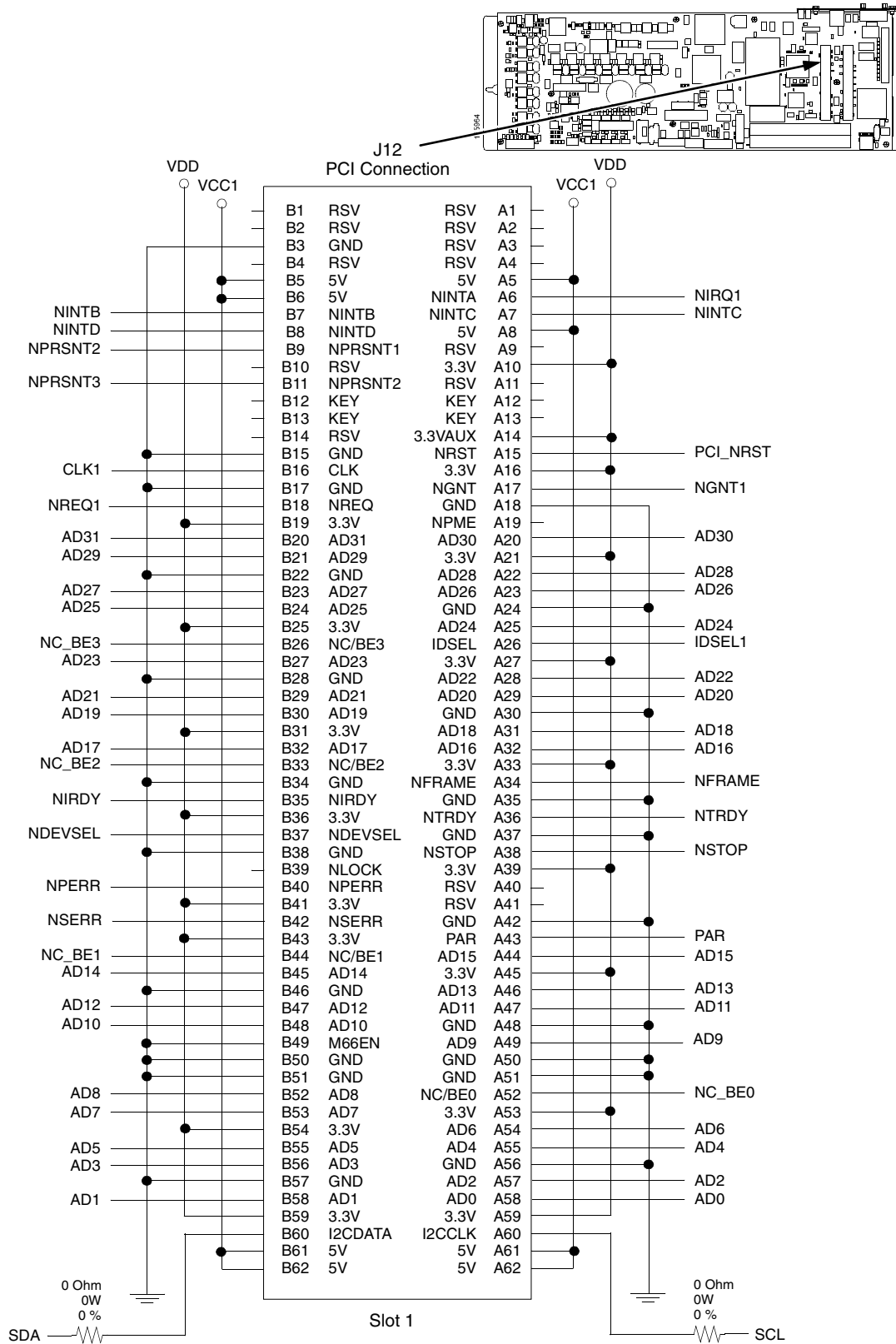
V5 Controller Board (continued)



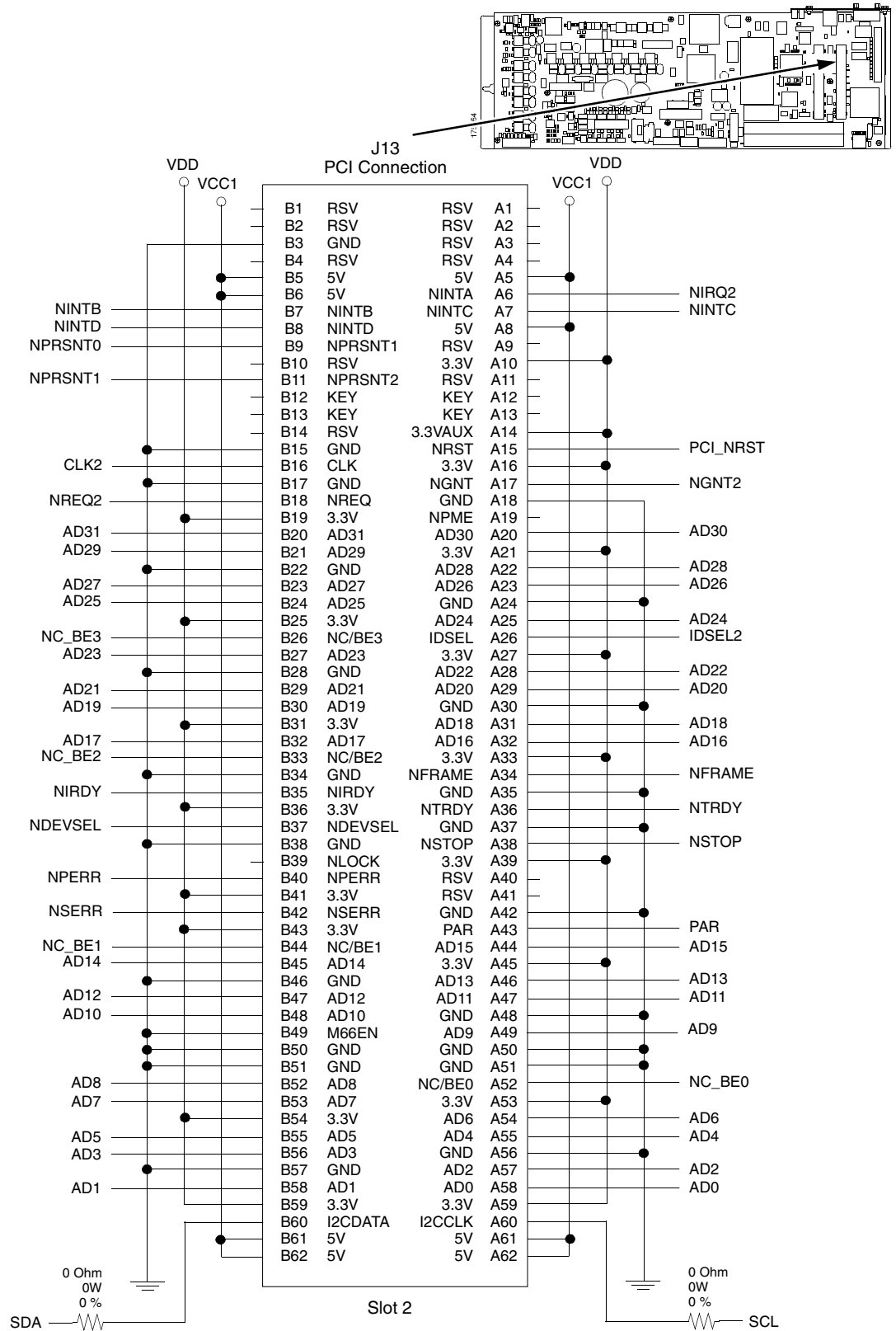
V5 Controller Board (continued)



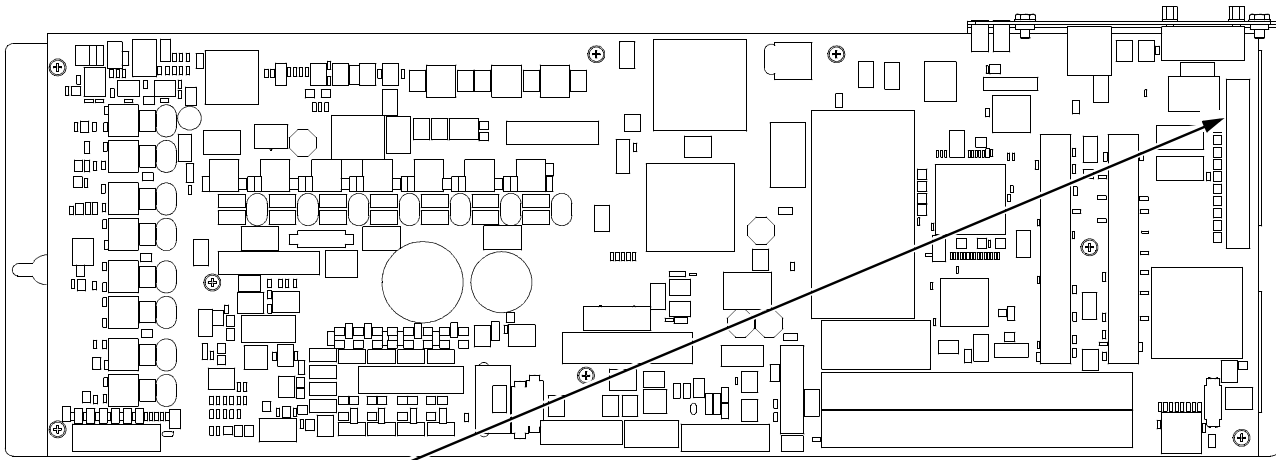
V5 Controller Board (continued)



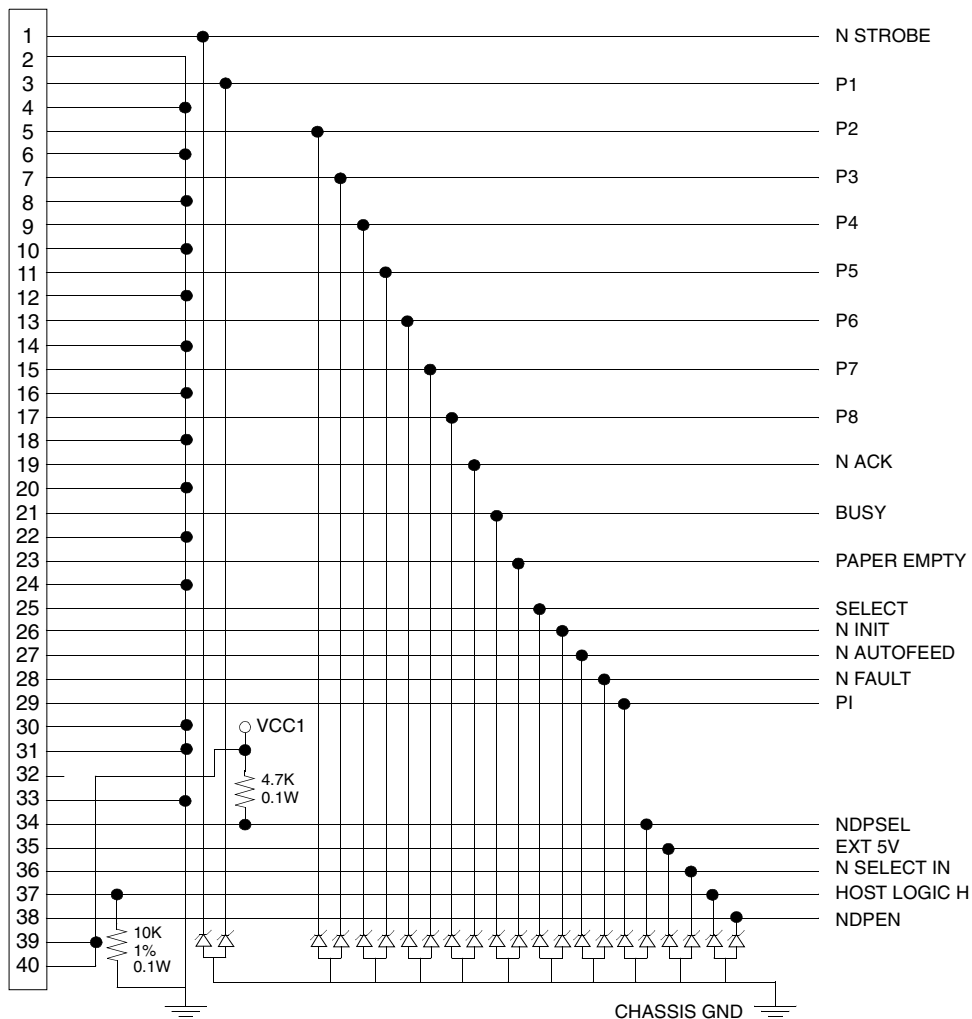
V5 Controller Board (continued)



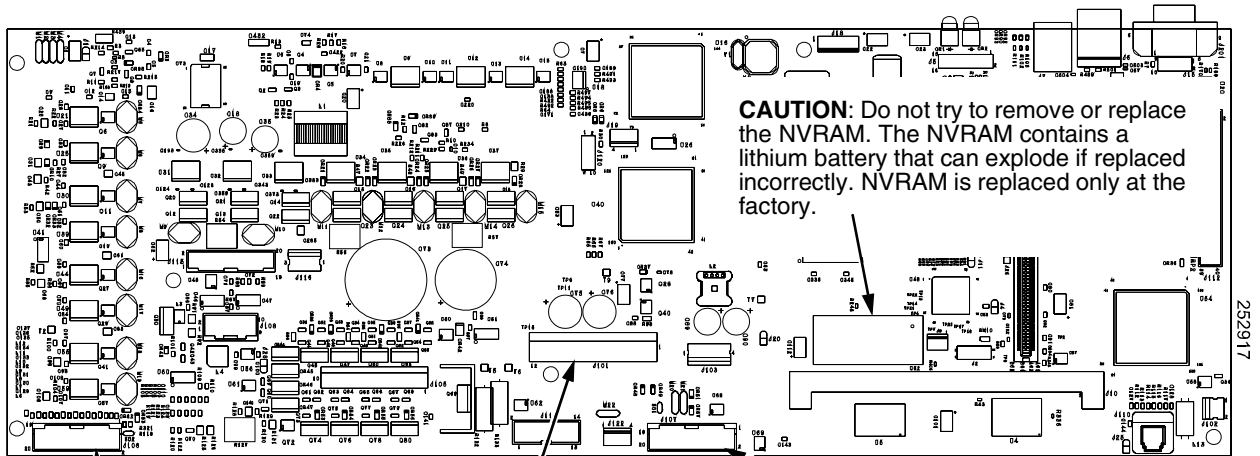
V5 Controller Board (continued)



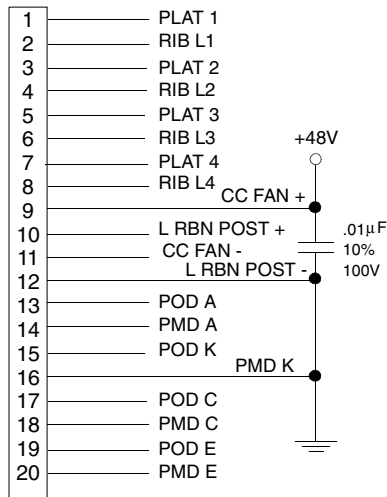
Centronics Connector
J112



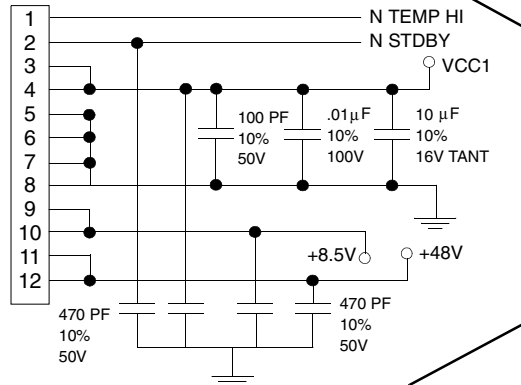
V6 Controller Board



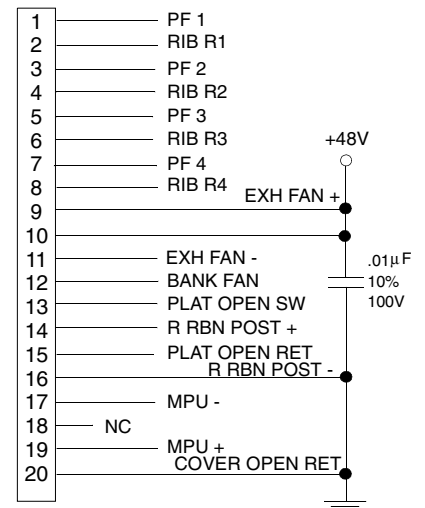
Motor Sensor Left
J106



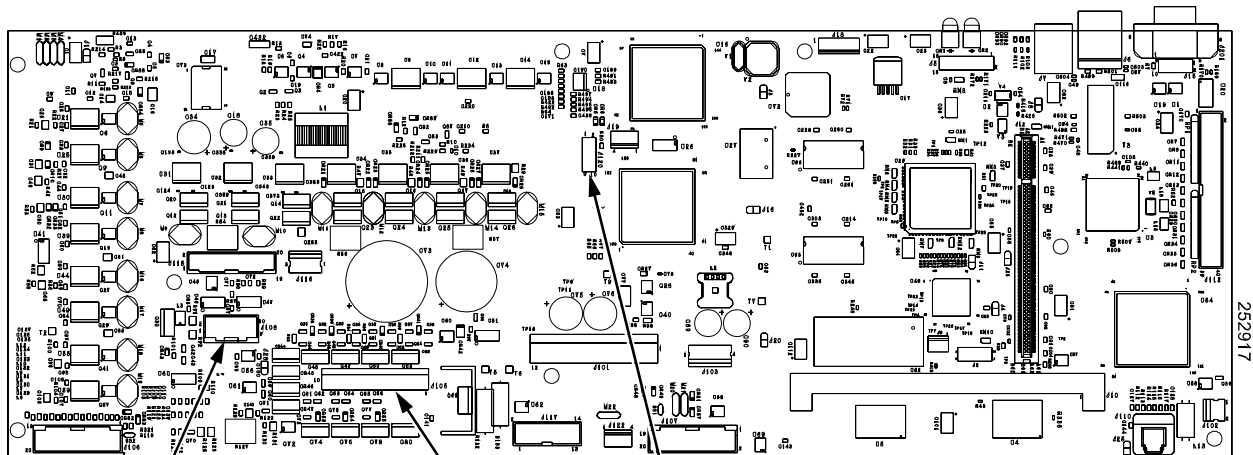
Power Supply
J101



Motor Sensor Right
J107

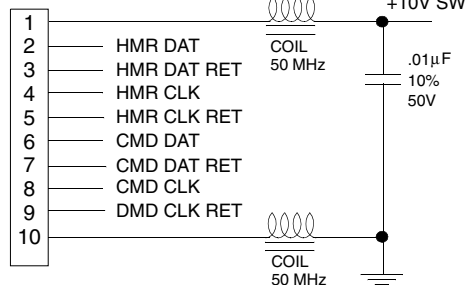


V6 Controller Board (continued)



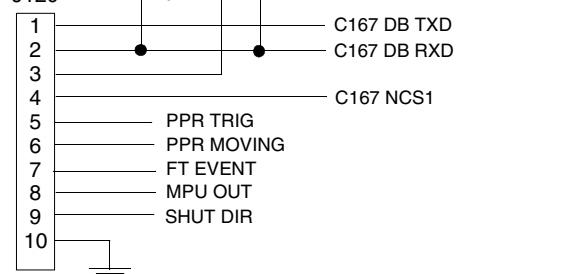
Hammer Bank Logic

J108



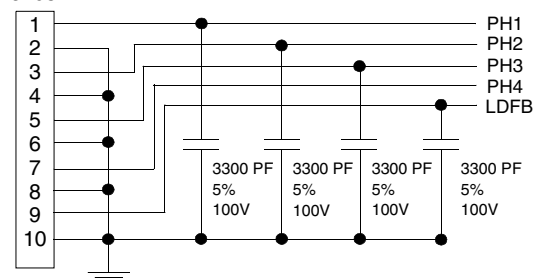
EC Diagnostics

J120

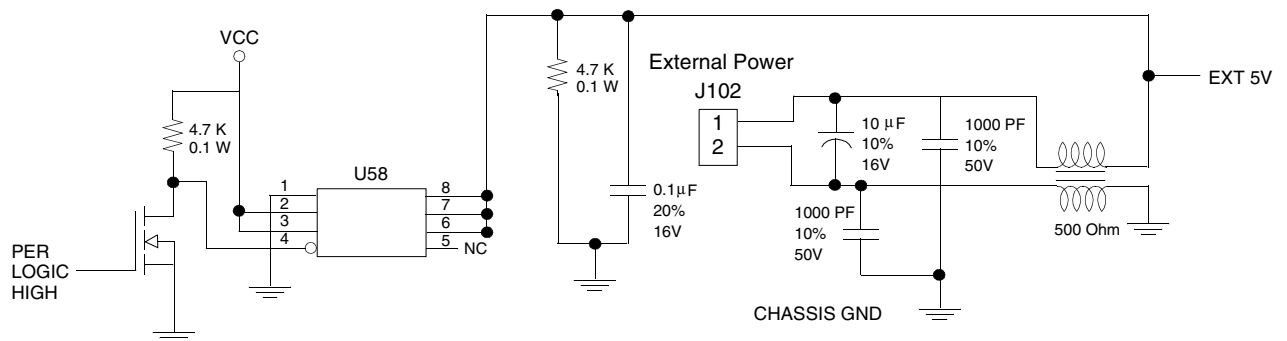
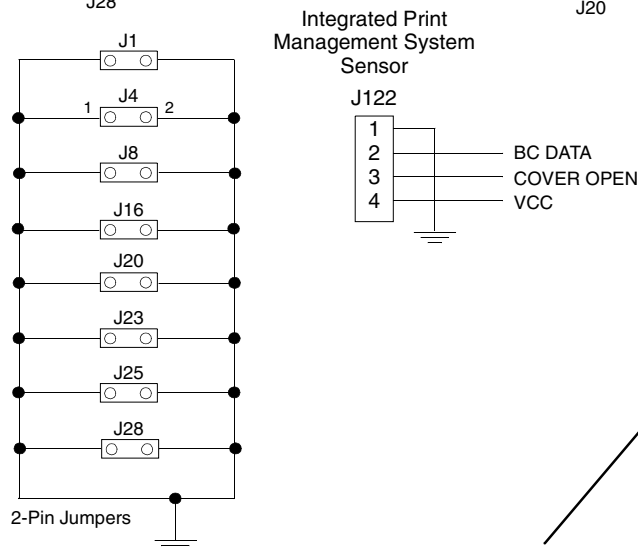
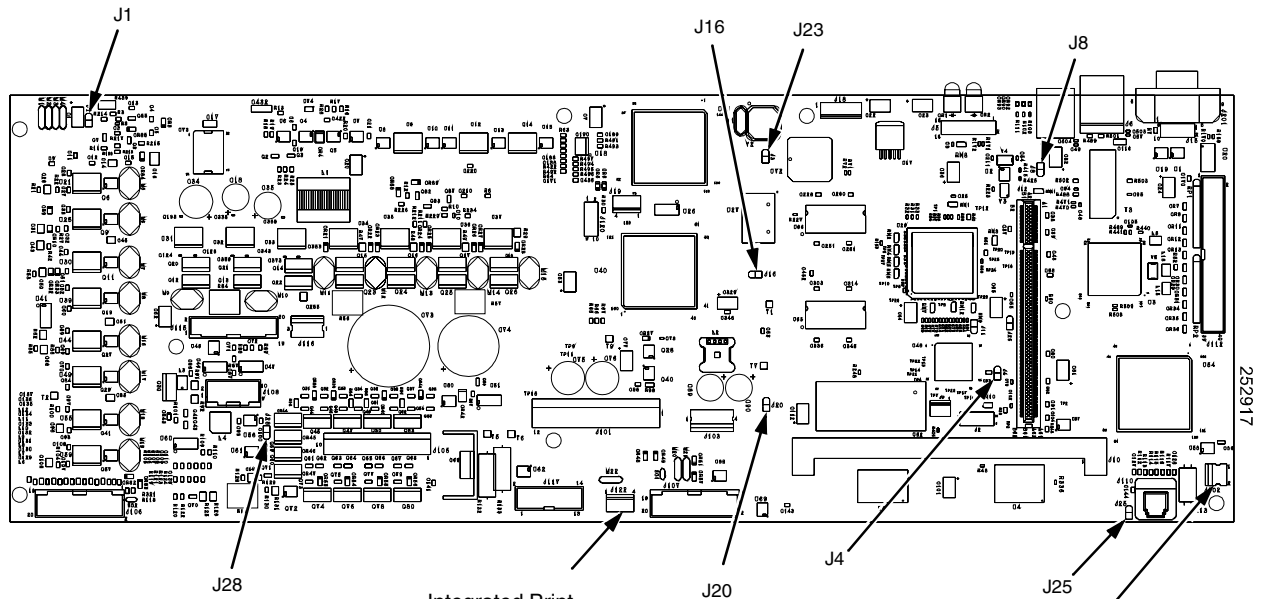


Hammer Bank Power

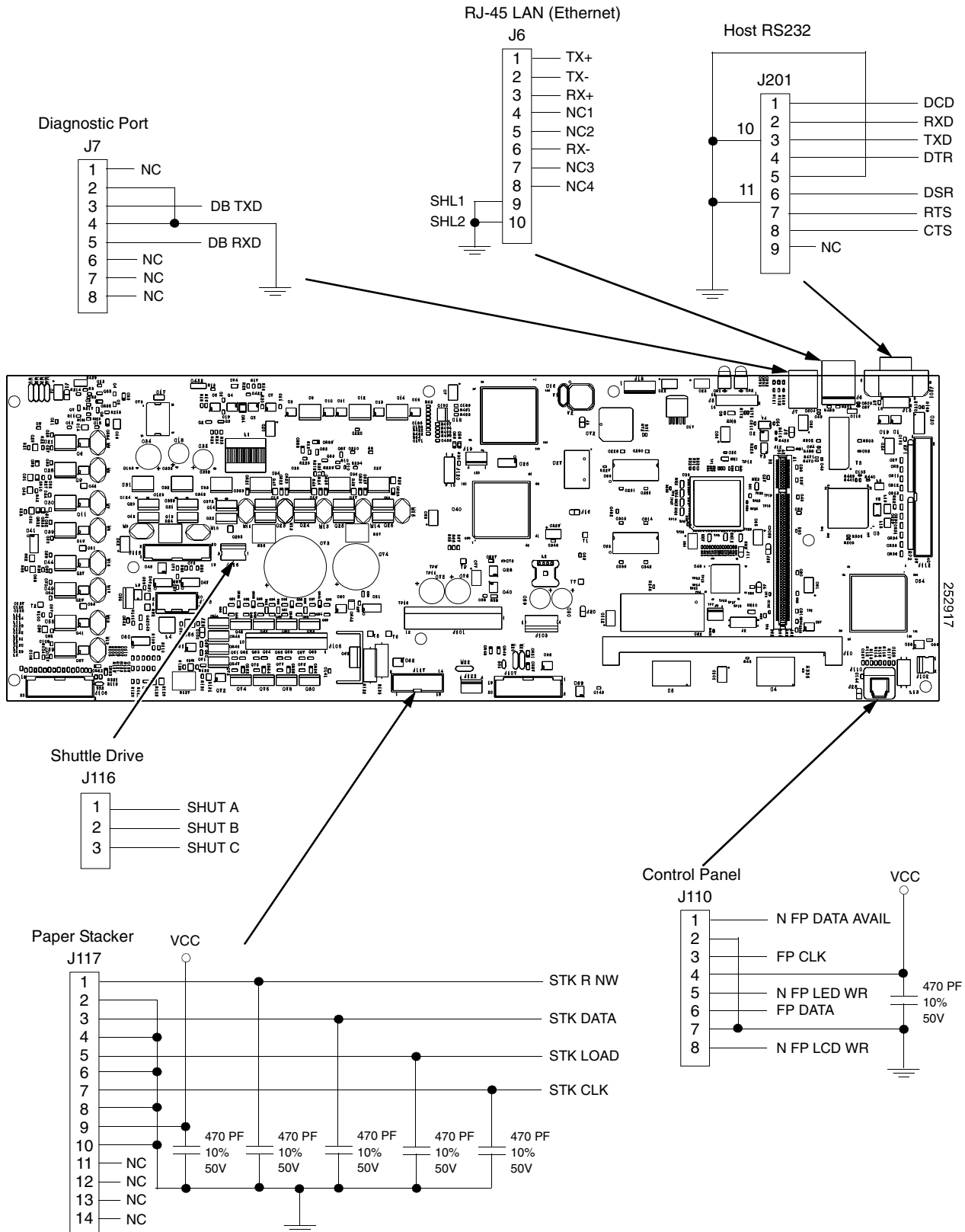
J105



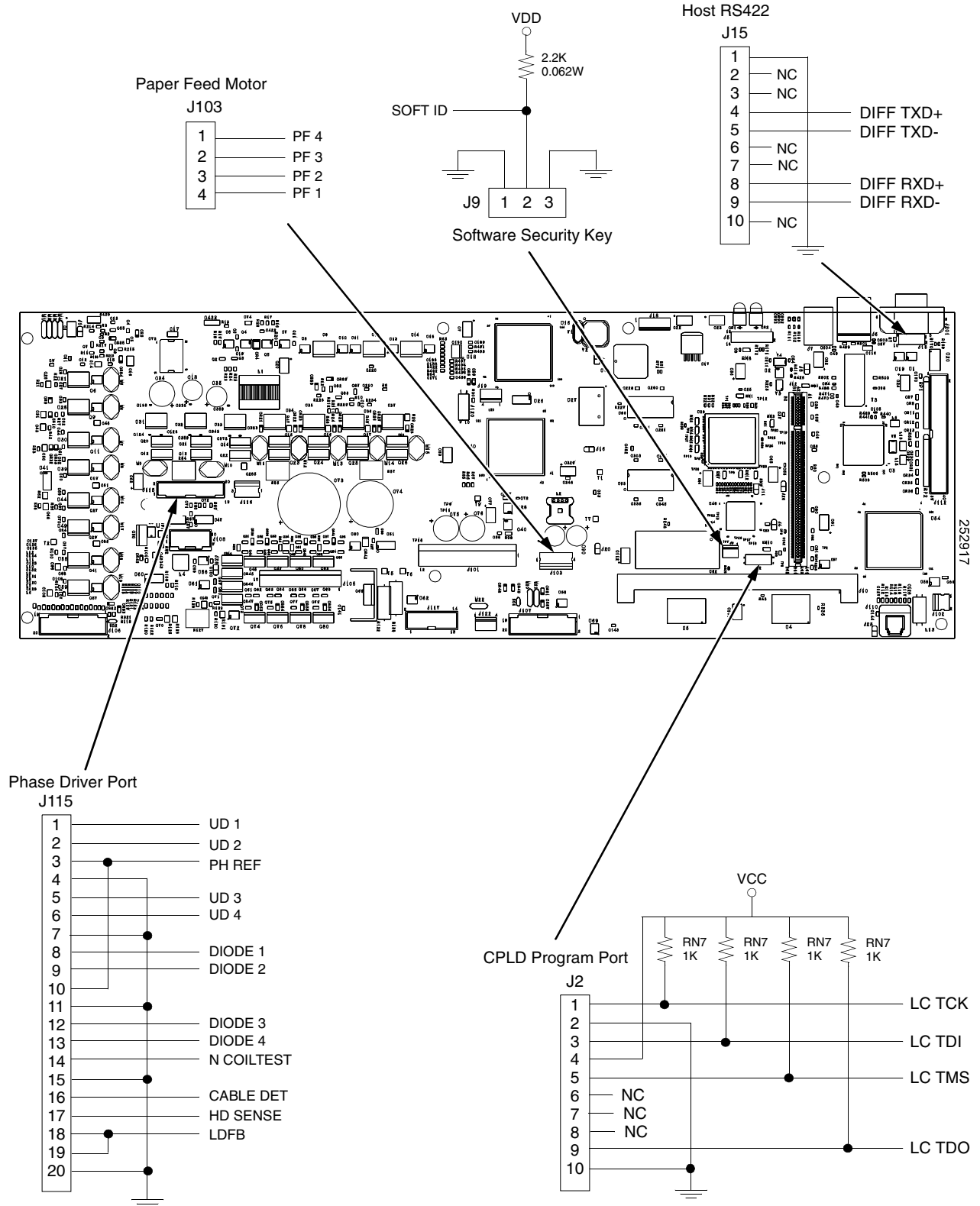
V6 Controller Board (continued)



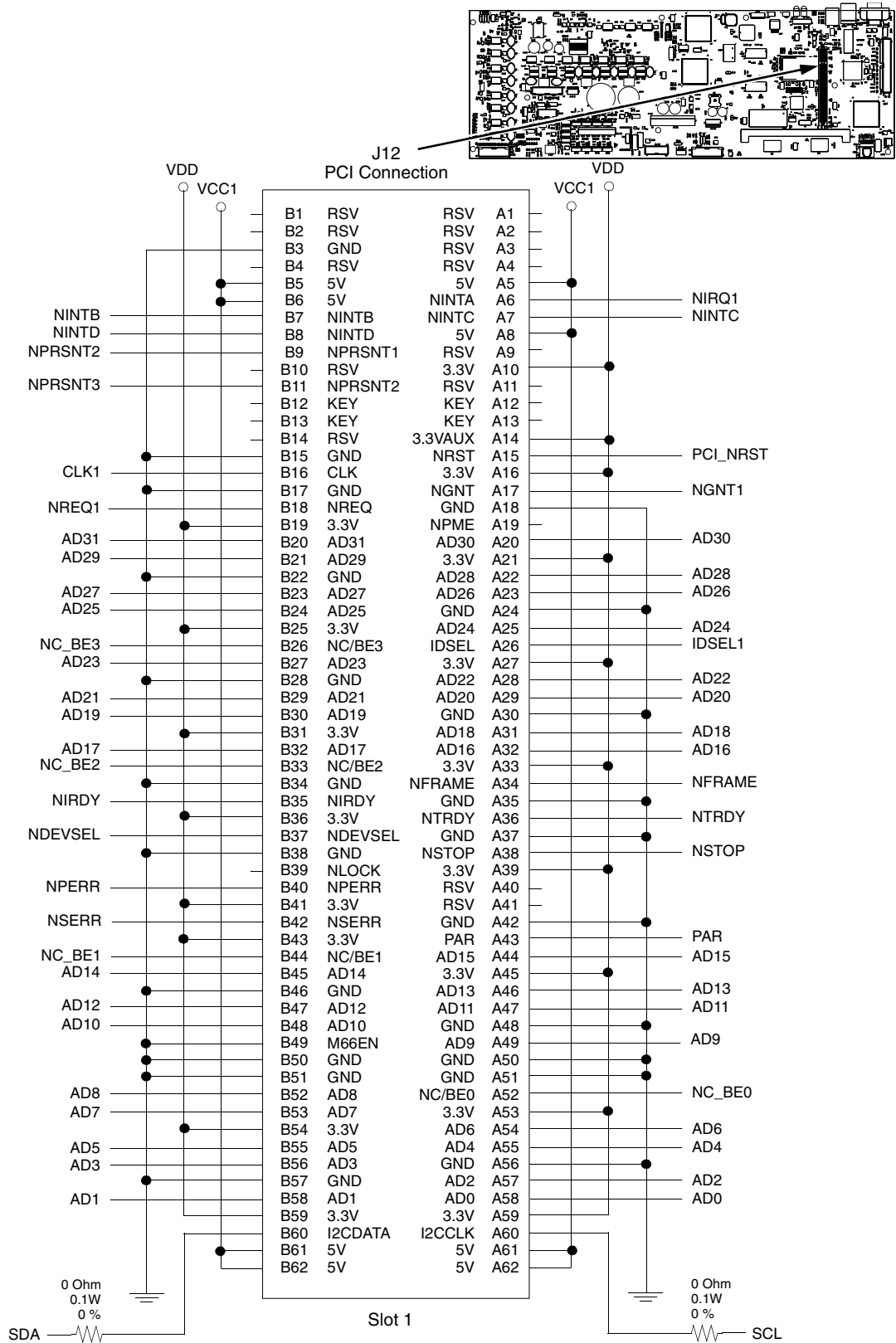
V6 Controller Board (continued)



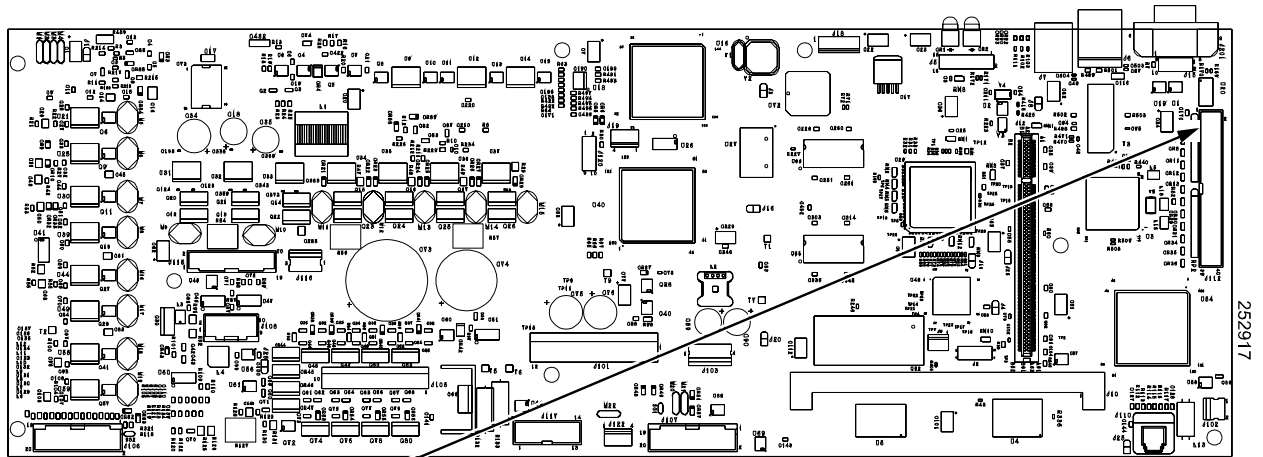
V6 Controller Board (continued)



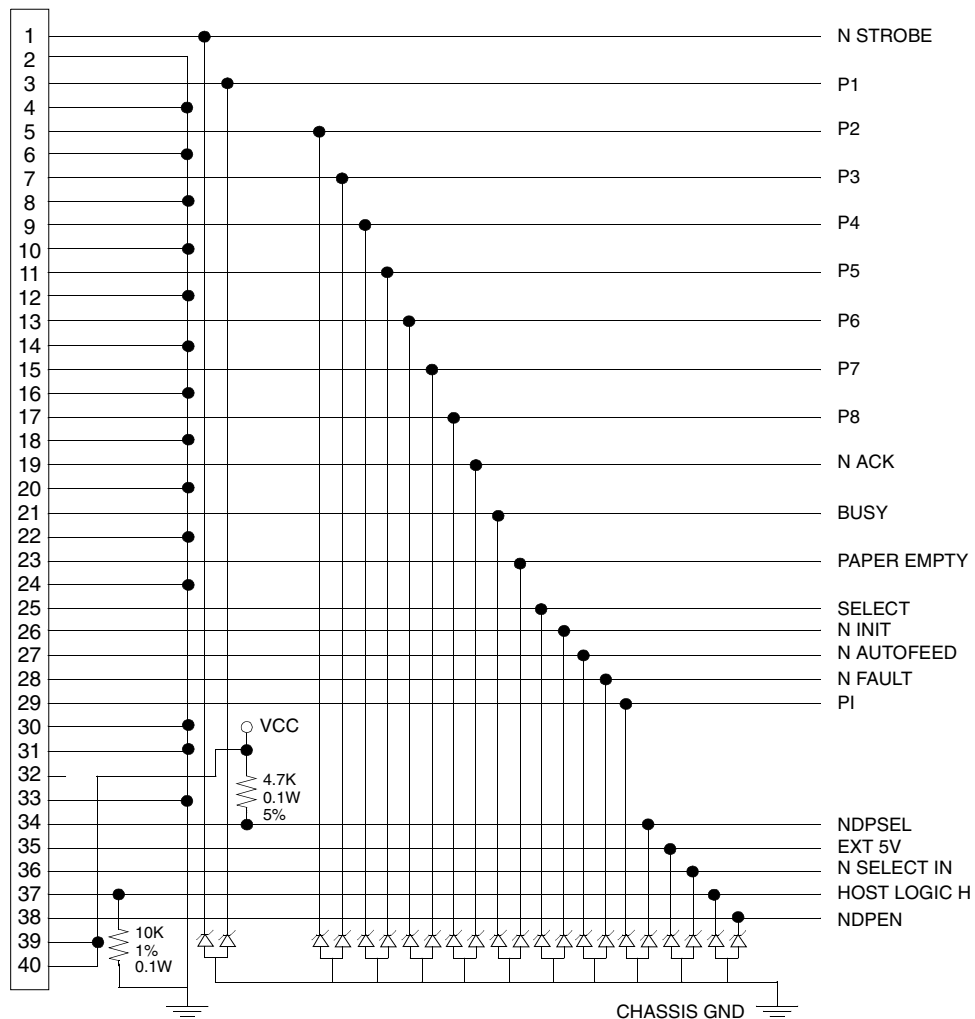
V6 Controller Board (continued)



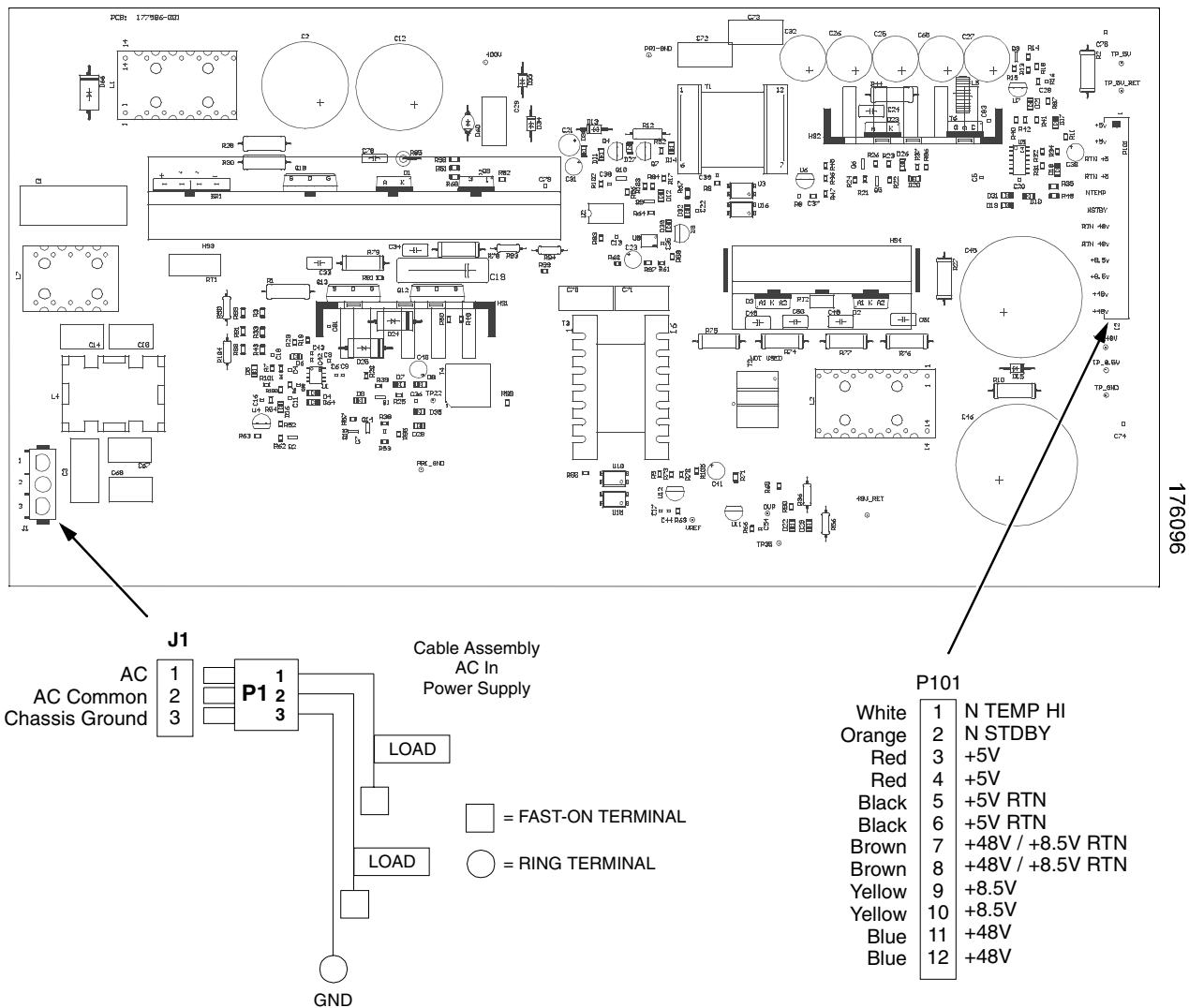
V6 Controller Board (continued)



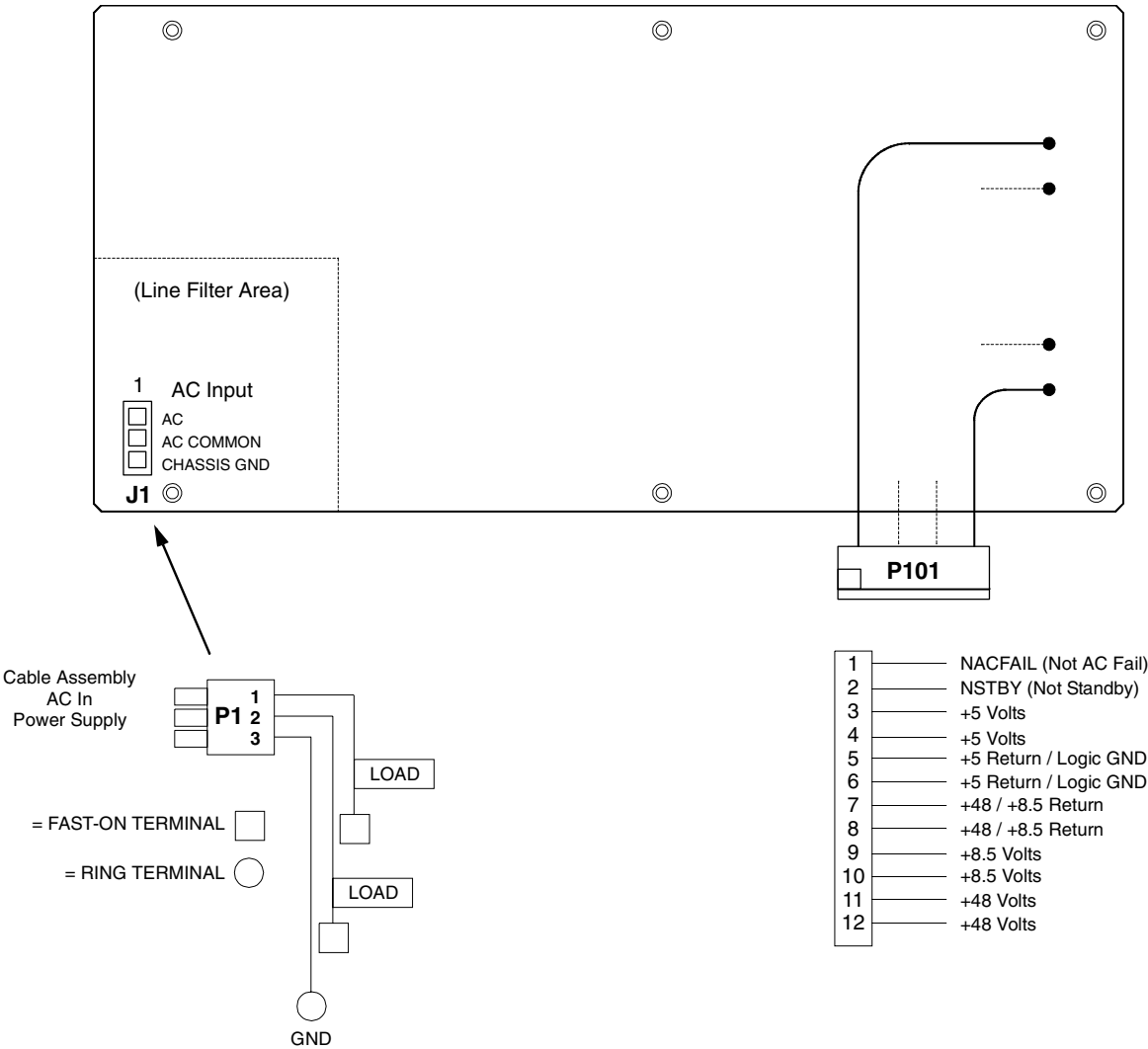
Centronics Connector
J112



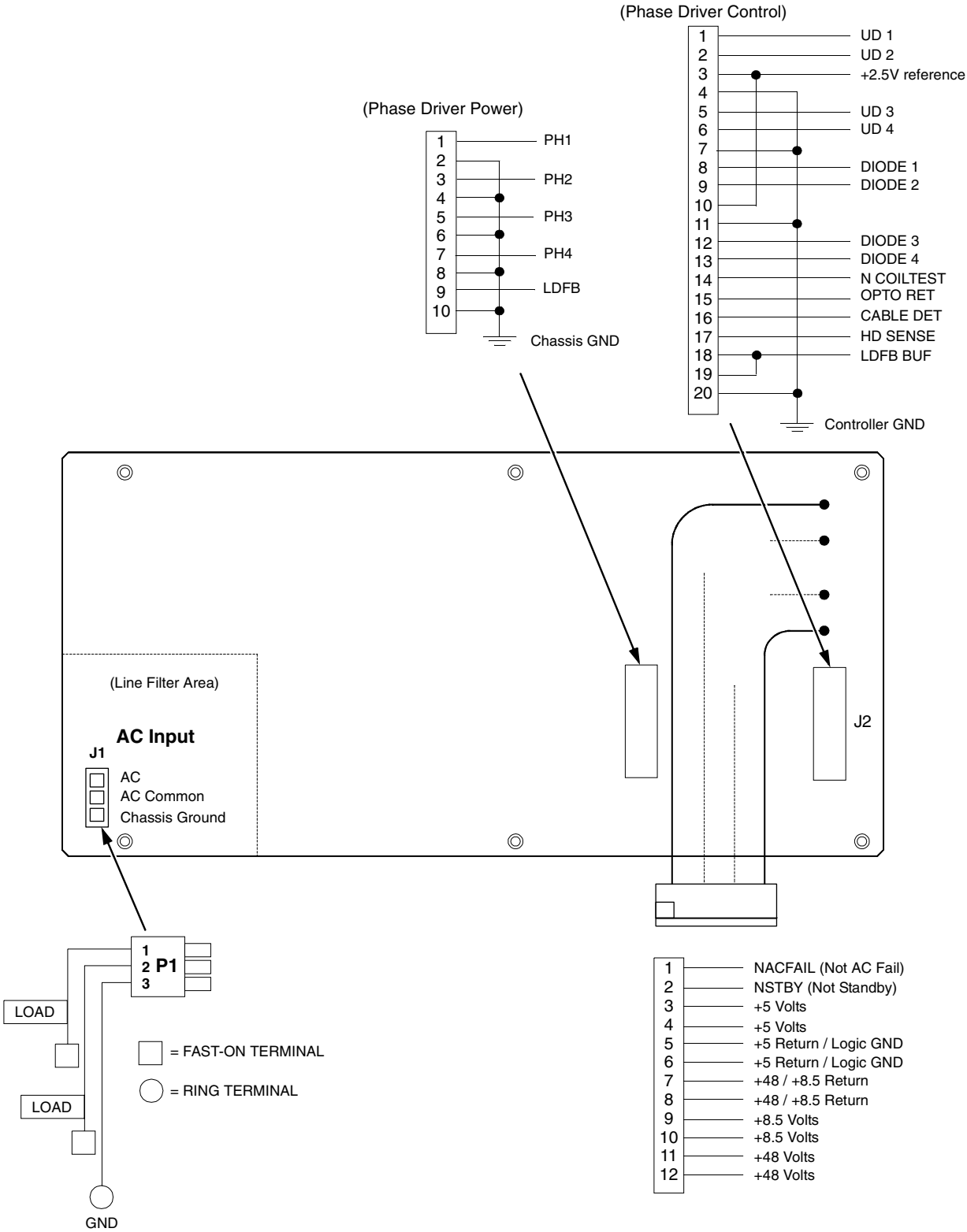
Power Supply: P7X05, P7X10, P7X02H, and P7X03H



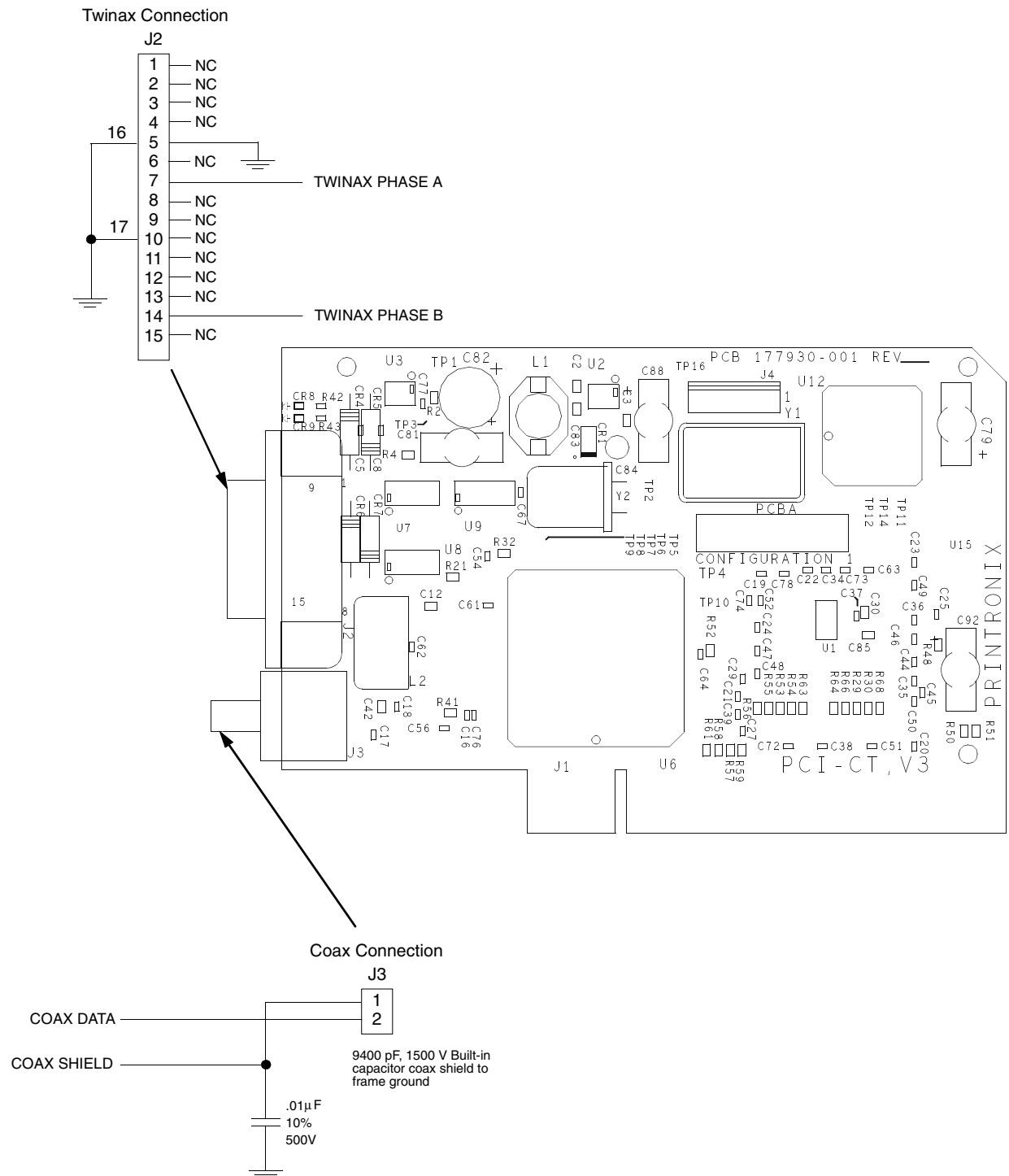
Power Supply: P7X06H and P7X15



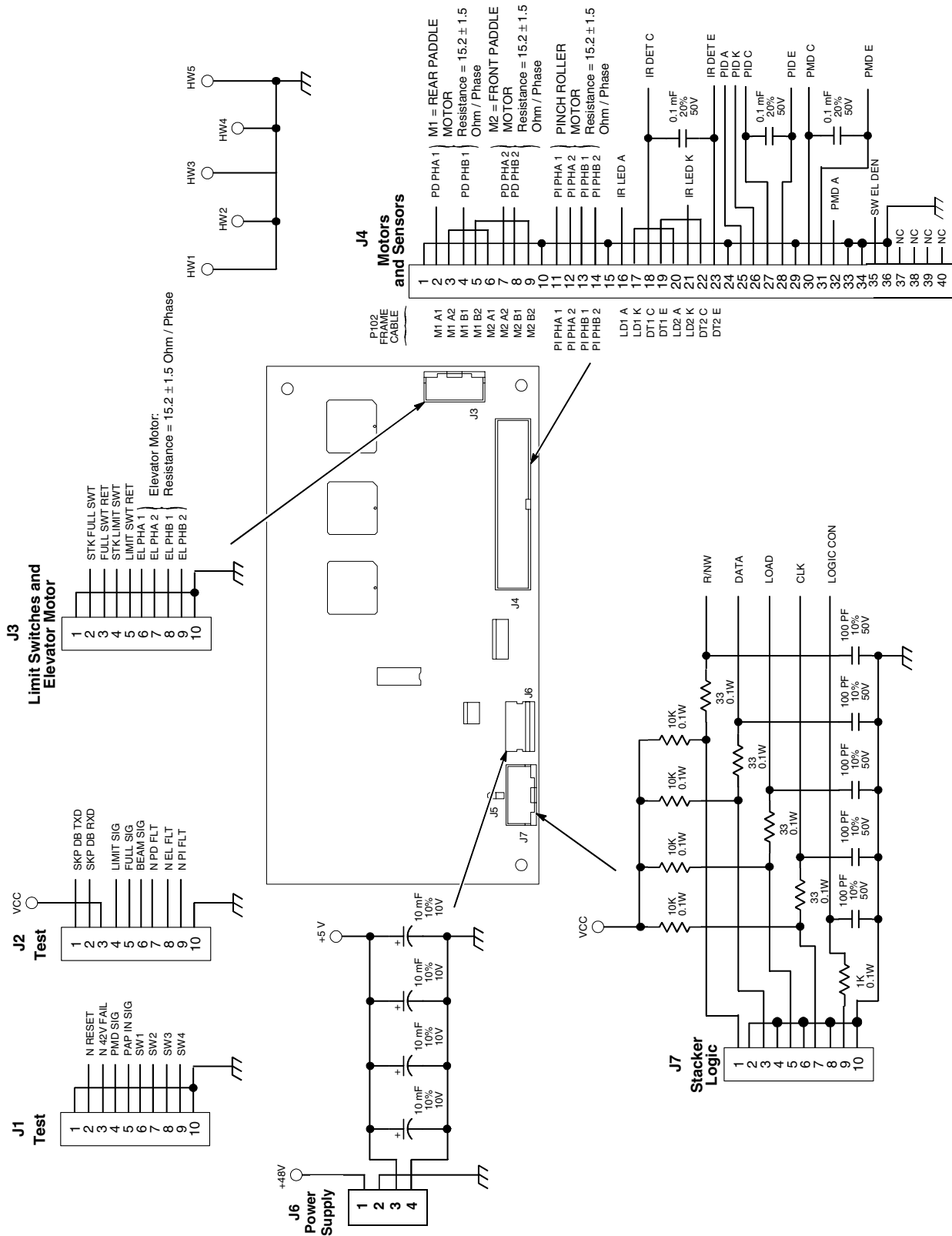
Power Supply: P7000HD, P7X08H, and P7220



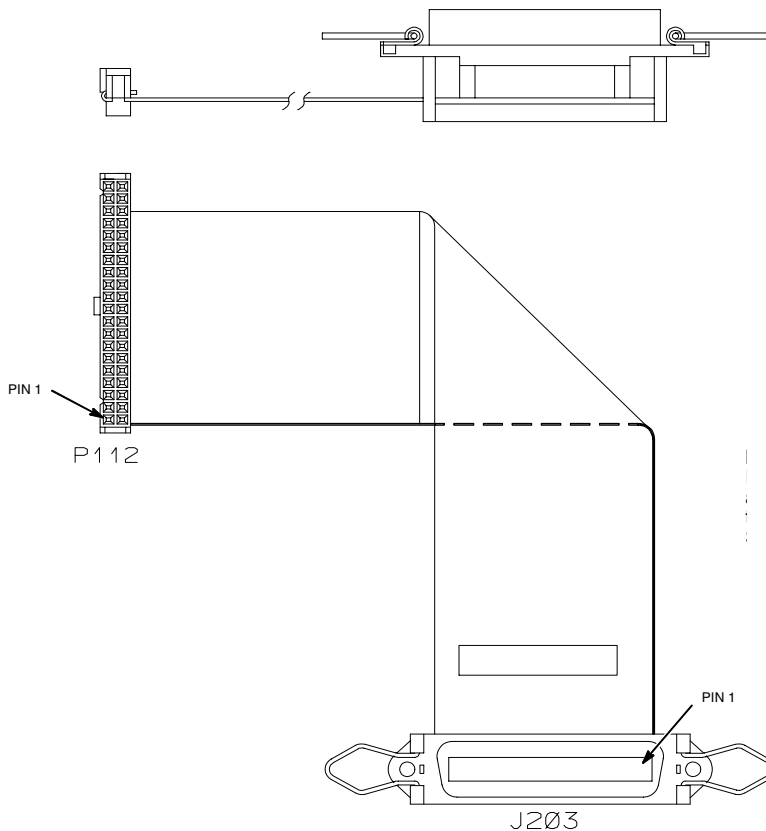
CT Board



SureStak Power Stacker PCBA



Cable Assembly, Centronics I/O (P/N 152439-901)



IMPORTANT

To comply with Electromagnetic Compatibility (EMC) regulatory requirements, all interface cables must be of a minimal quality level, be the correct length, and be properly installed.

RS-232 port and parallel port cables must meet the following specifications: 1) The cable design must be double shielded with a copper braid over an aluminum mylar foil and not just a conductive foil spiral wrapped around a drain wire. 2) The shield must terminate coaxially (360 degrees) to a metal connector housing and not be terminated by just a simple wire lead. 3) Cable length, including connectors, must be three meters or less. 4) The cable connector anchor screws must be securely seated in the printer receptor hardware.


For reference purposes only, two Centronics parallel port cables that have been tested and found to comply with these requirements are a Belkin® P/N F2A046-10 and a Primelogic P/N PLU 2823224. Other electrically equivalent cables are acceptable.

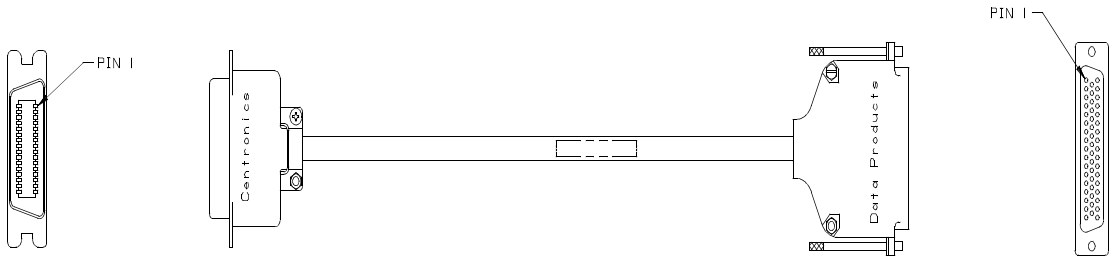
Cable Assembly, Centronics-to-Dataproducts Adapter
(P/N 154695-001)

154695

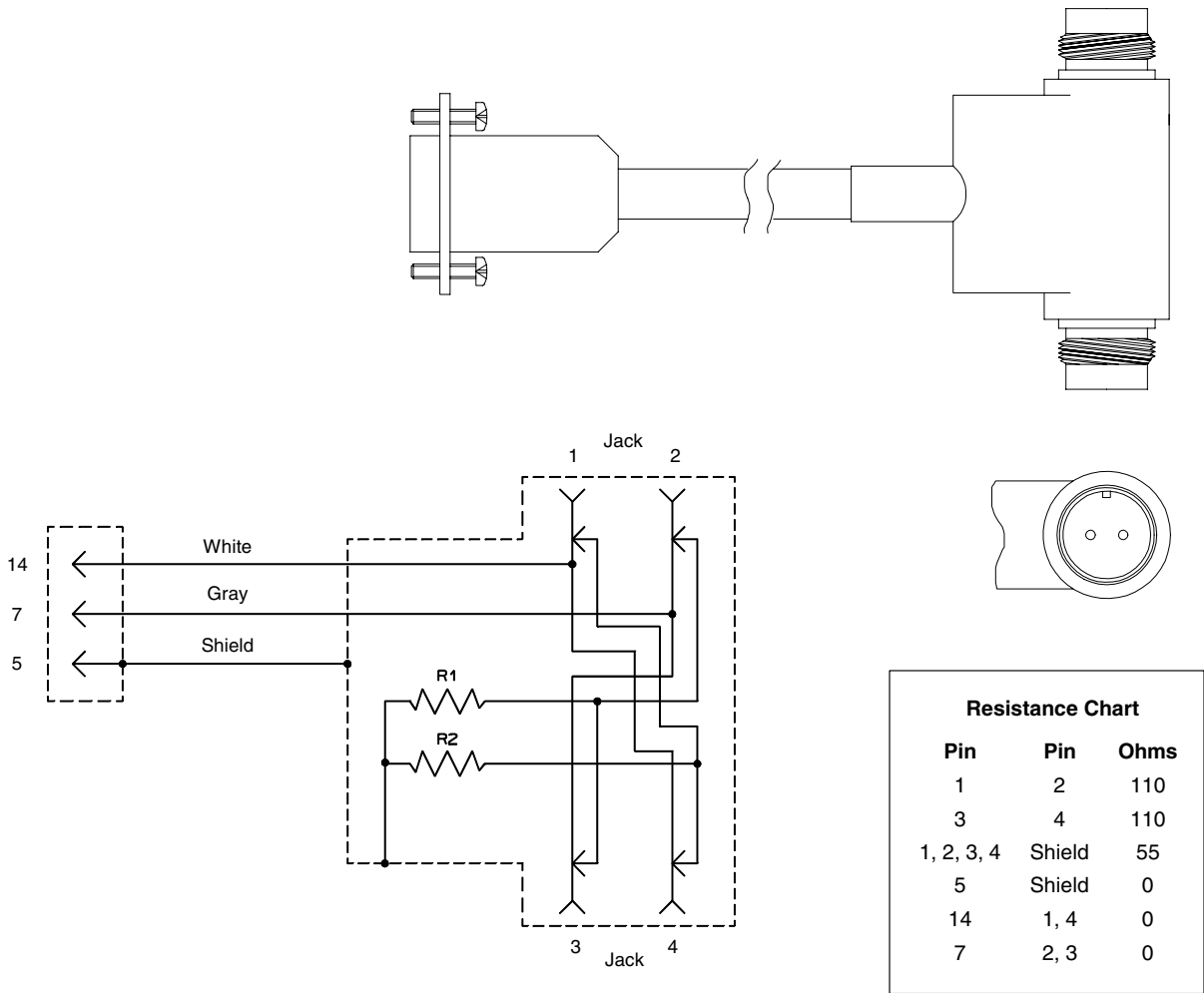
WIRING TABLE		
CENTRONICS	TWISTED PAIR	DATAPRODUCTS
PIN 1	#1	PIN 38
* PIN 19		* PIN 37
PIN 2	#2	PIN 19
* PIN 20		* PIN 3
PIN 3	#3	PIN 20
* PIN 21		* PIN 4
PIN 4	#4	PIN 1
* PIN 22		* PIN 2
PIN 5	#5	PIN 41
* PIN 23		* PIN 40
PIN 6	#6	PIN 34
* PIN 24		* PIN 18
PIN 7	#7	PIN 43
* PIN 25		* PIN 42
PIN 8	#8	PIN 36
* PIN 26		* PIN 35
PIN 9	#9	PIN 28
* PIN 27		* PIN 44
PIN 10	#10	PIN 23
* PIN 28		* PIN 7
PIN 12	#11	PIN 22
* PIN 30		* PIN 6
PIN 13	#12	PIN 21
* PIN 29		* PIN 5
PIN 15	#13	PIN 30
* PIN 33		* PIN 14
PIN 31	#14	PIN 31
* PIN 16		* PIN 15
* PIN 16,35	#15	* PIN 11,27
* PIN 17		* PIN 39
		PIN 45
		* PIN 46

* GROUND

JUMPER WIRE



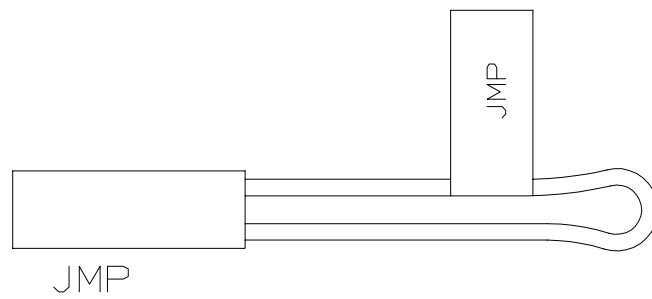
Cable Assembly, Twinax Auto-Termination (P/N 140752-002)



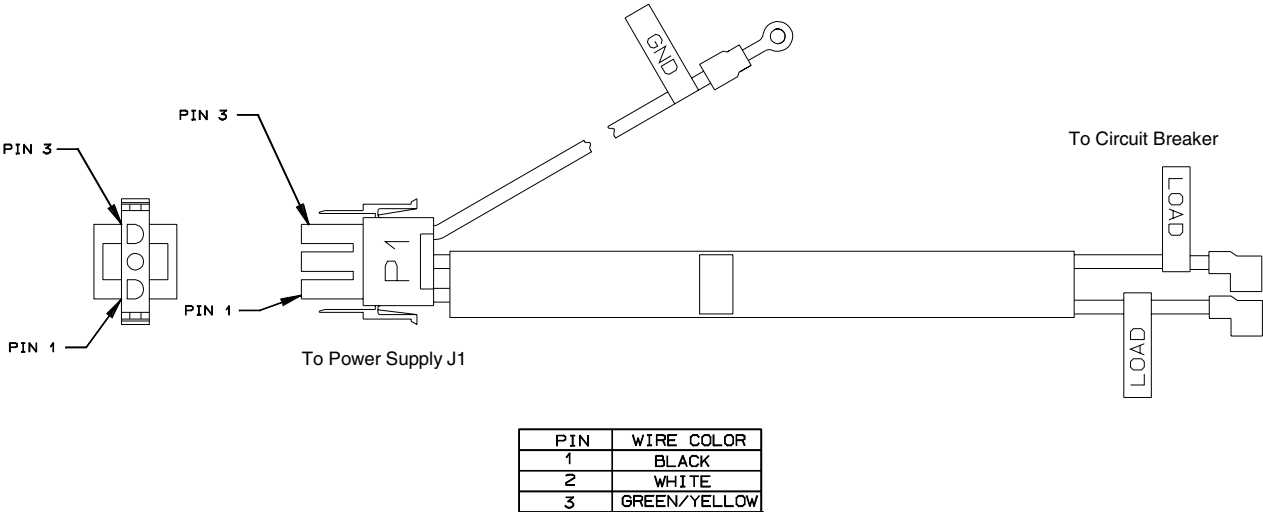
Cable Extension, Smart-T (P/N 204806-901)



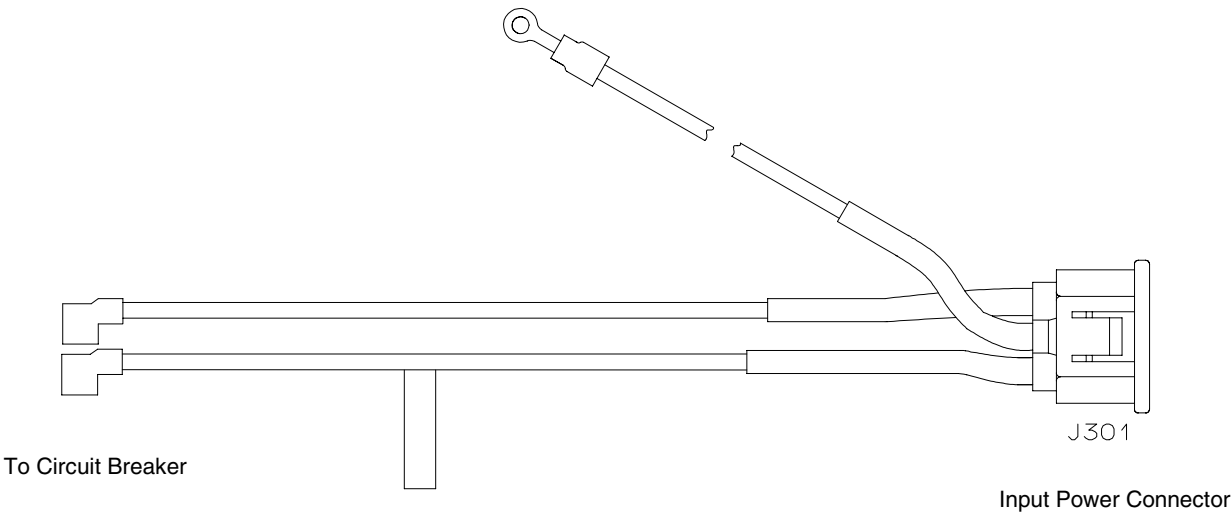
Cable Assembly, 2-Pin Jumper, 0.1 Ctr (P/N 154470-901)



Cable Assembly, AC In, Power Supply
(AC Kit P/N 153502-901)

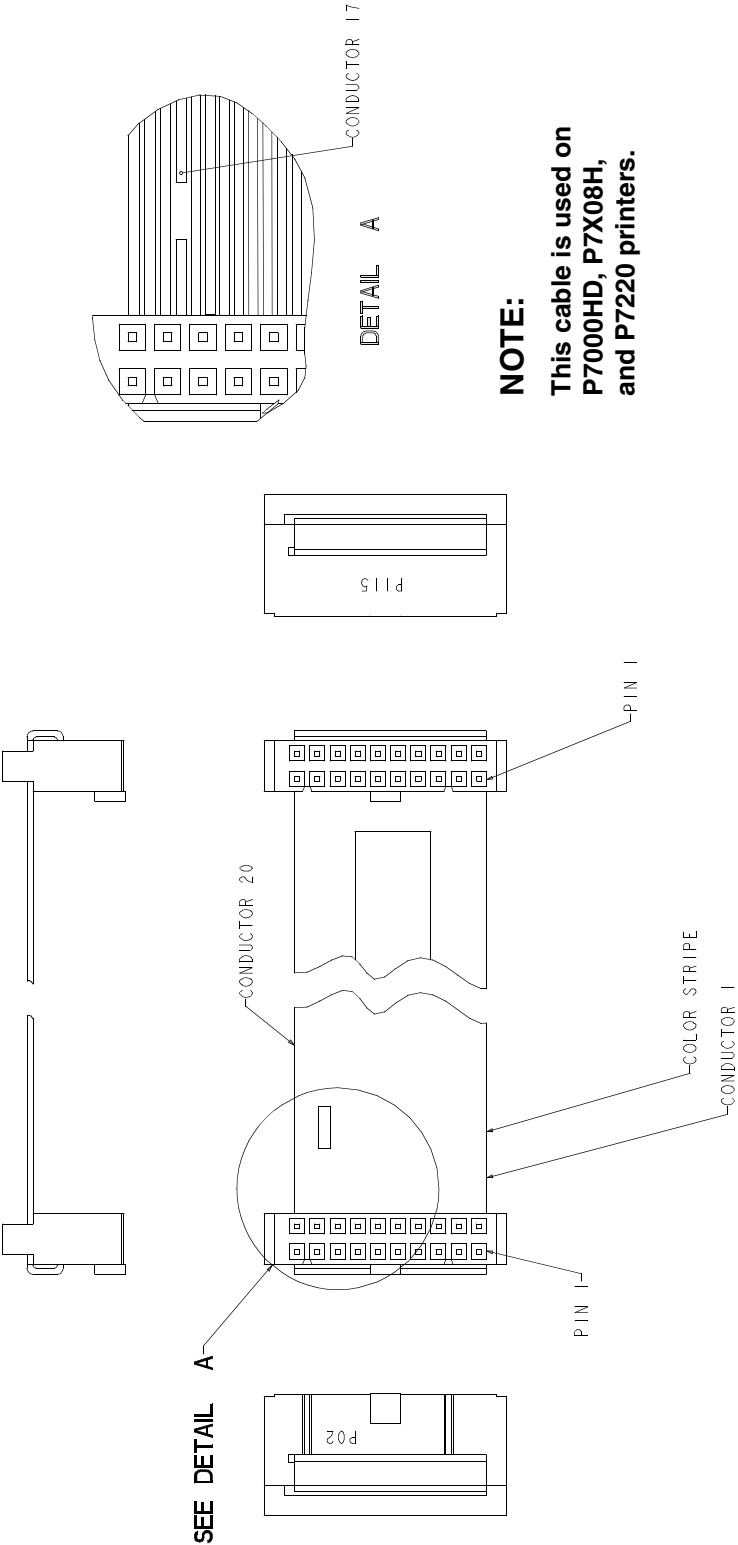


Cable Assembly, AC Power Input (AC Kit P/N 153502-901)



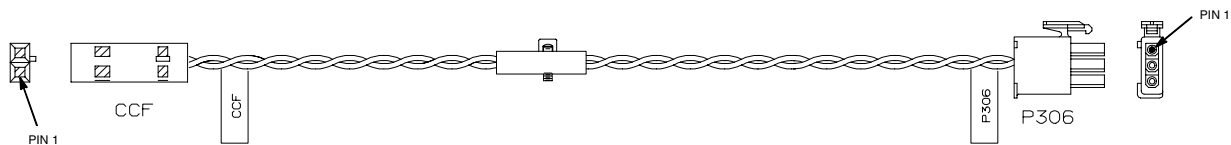
PIN	WIRE COLOR
LINE	BLACK
NEUTRAL	WHITE
GROUND	GREEN/YELLOW

Cable Assy, PS I/O (P/N 176601-901)



NOTE:
This cable is used on
P7000HD, P7X08H,
and P7220 printers.

Cable Assembly, Card Cage Fan (P/N 152422-901)

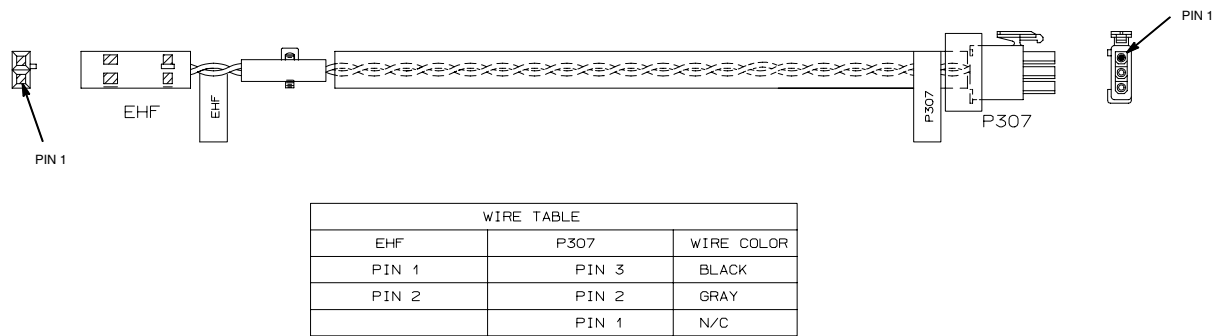


WIRE TABLE		
CCF	P306	WIRE COLOR
PIN 1	PIN 3	BLACK
PIN 2	PIN 2	GRAY
	PIN 1	N/C

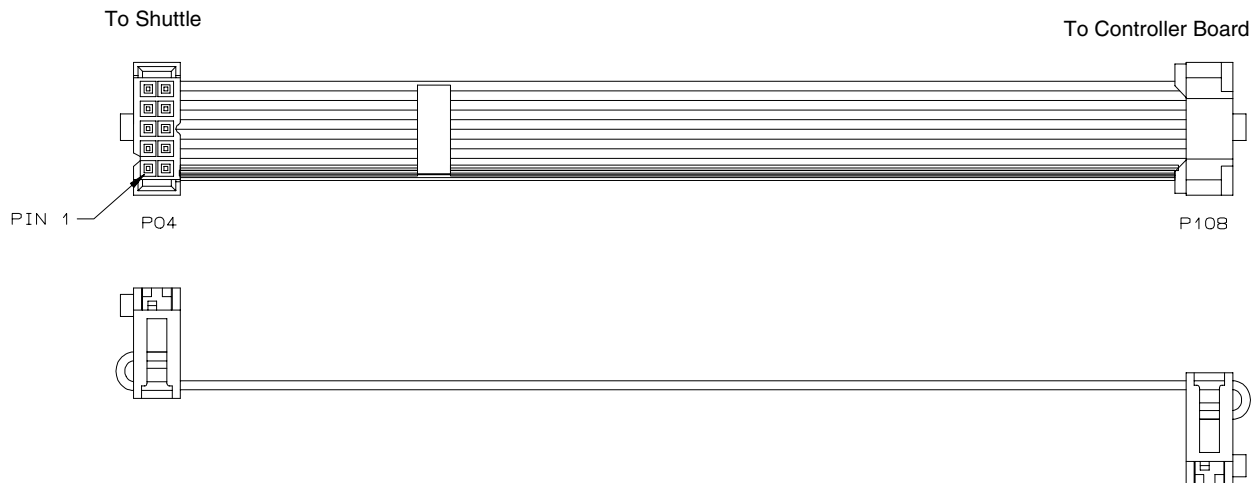
Cable Assembly, Control Panel (P/N 152440-901)



Cable Assembly, Exhaust Fan (P/N 152424-901)



Cable Assembly, Hammer Bank Logic (P/N 152421-901)



Cable Assy, Hammer Bank Power (P/N 164805-901)

IMPORTANT:

Use this cable on any P7000 printer except the P7000HD, P7X08H, and P7220. On the P7000HD, P7X08H, and P7220 use P/N 173215-901, shown on the next page.

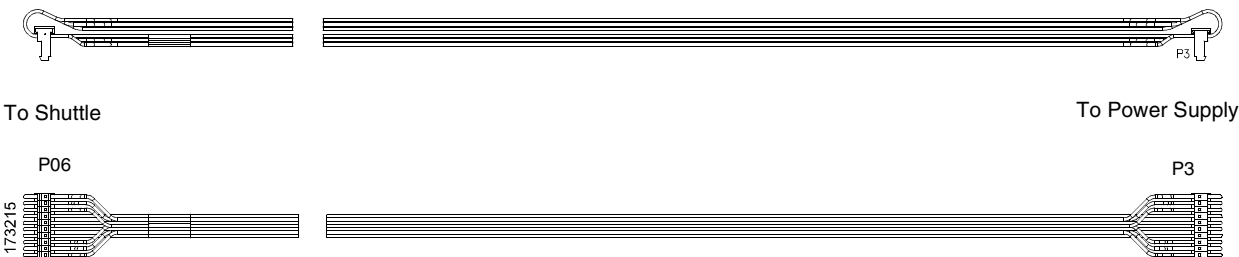


Wire Table	
P05	P105
2	1
1	2
4	3
3	4
6	5
5	6
8	7
7	8
10	9
9	10

Cable Assy, Dual Hammer Bank Power (P/N 173215-901)

IMPORTANT:

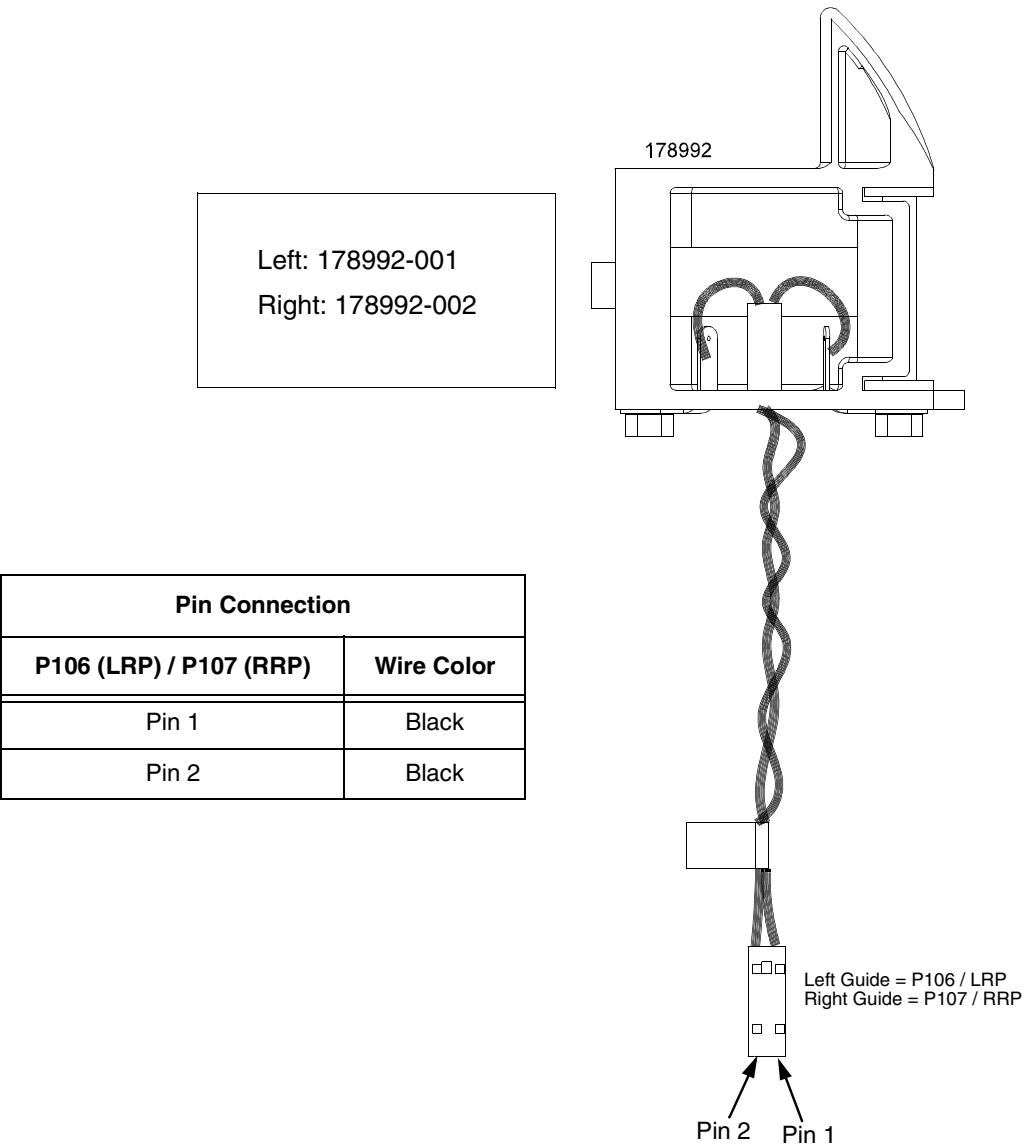
Use this cable on the P7000HD, P7X08H, and P7220 printer. On any other P7000 printer use P/N 164805-901, shown on the previous page.



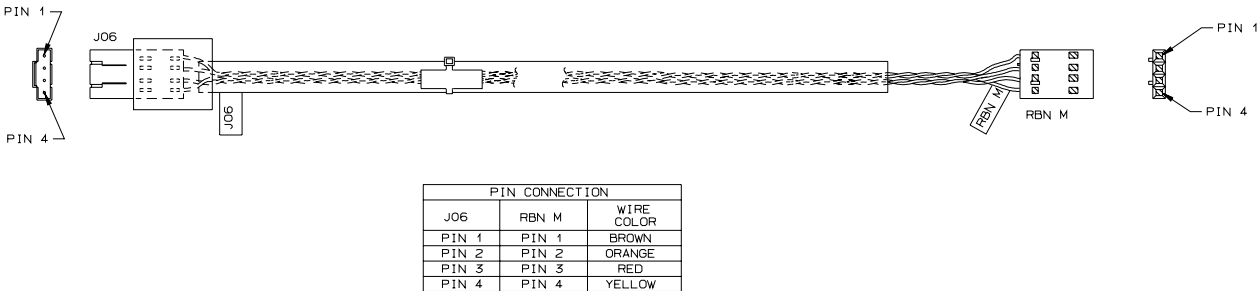
Wire Table	
P06	P3
2	1
1	2
4	3
3	4
6	5
5	6
8	7
7	8
10	9
9	10

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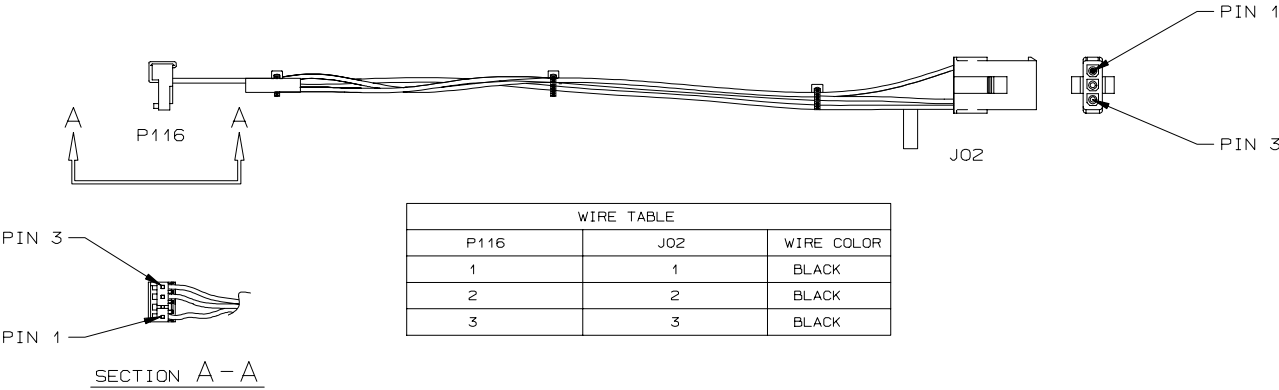
Cable Assembly, Ribbon Guide, P7000



Cable Assembly, Ribbon Motor, Extension (P/N 154067-901)

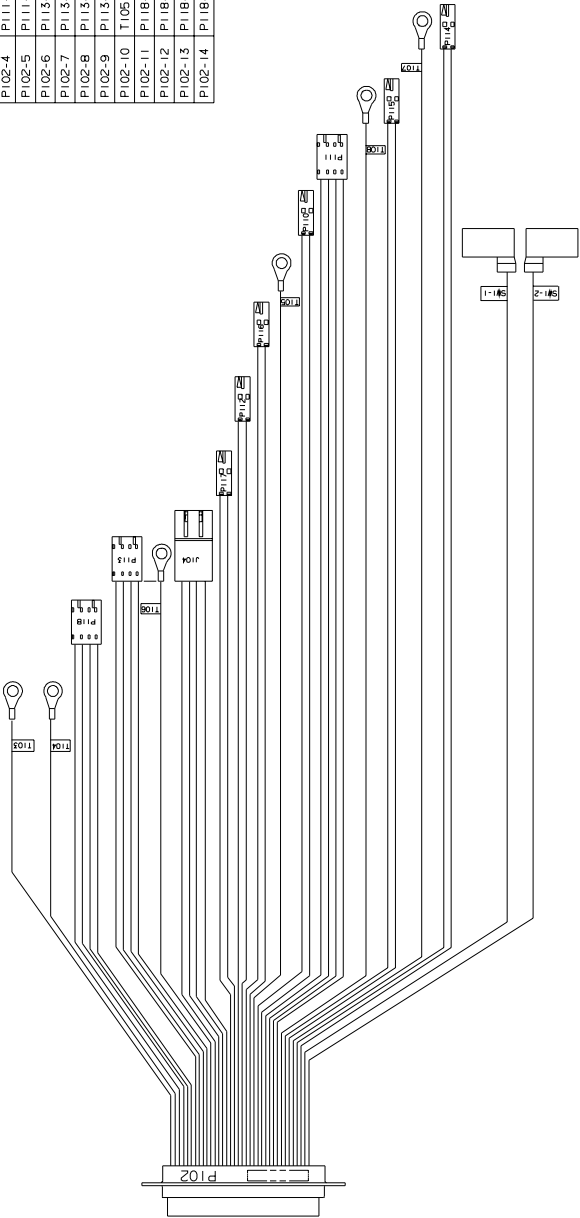


Cable Assembly, Shuttle Motor Drive (P/N 152420-001)



Frame Cable, Power Stacker (P/N 173824-001)

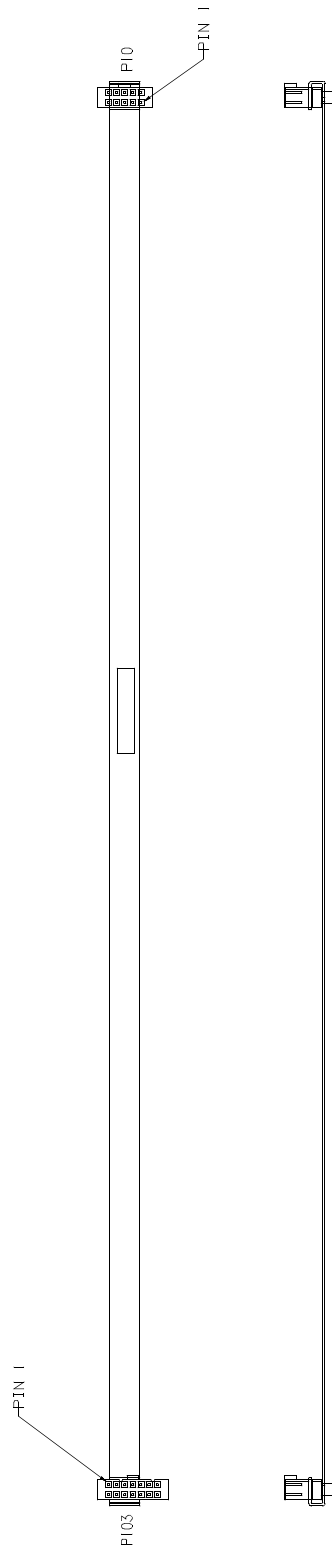
REF. DES		ITEM NO.	WIRE LG. (XX±.25) (REF.)	REF. DES		ITEM NO.	WIRE LG. (XX±.25) (REF.)
FROM	TO			FROM	TO		
P102-1	T104	11	6.00	P102-15	T106	11	11.50
P102-2	P111-1			P102-16	P110-2	3	22.50
P103-3	P111-2	6	23.00	P102-17	P110-1		
P102-4	P111-3			P102-18	P114-2	3	43.00
P102-5	P111-4			P102-19	P114-1		
P102-6	P113-1			P102-20	P112-2	3	12.50
P102-7	P113-2	6	11.50	P102-21	P112-1		
P102-8	P113-3			P102-22	P115-2	3	36.00
P102-9	P113-4			P102-23	P115-1		
P102-10	T105	11	21.50	P102-24	T107	11	43.00
P102-11	P118-2			P102-25	P117-2	3	12.00
P102-12	P118-1	6	7.00	P102-26	P117-1		
P102-13	P118-3			P102-27	P116-2	3	15.00
P102-14	P118-4			P102-28	P116-1		
				P102-29	T108	11	36.00
				P102-30	J104-3		
				P102-31	J104-4	7	11.50
				P102-32	J104-1		
				P102-33	J104-2		
				P102-34	T103	11	6.00
				P102-35	SW1-1	9	22.00
				P102-36	SW1-2		



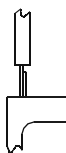
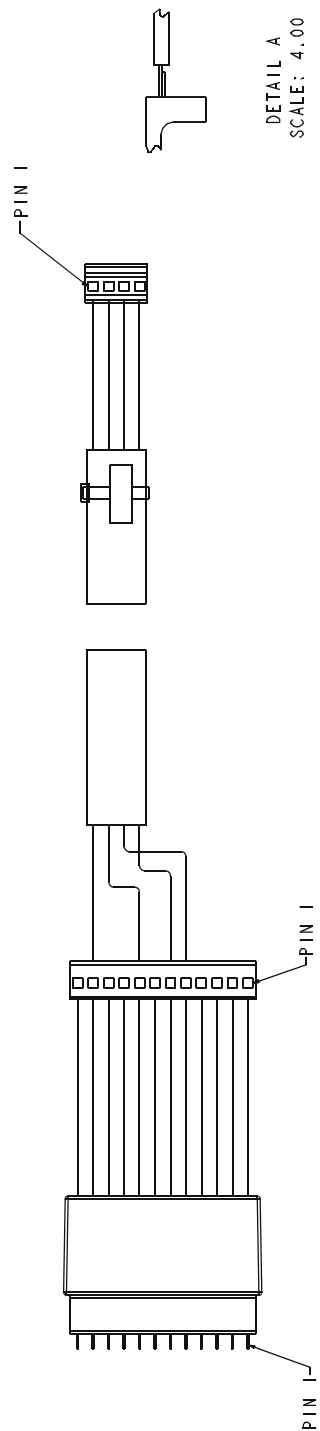
TWIST WIRE TABLE	
TWIST GROUPS	WIRES
1	P102-2 THRU P102-5
2	P102-6 THRU P102-9
3	P102-10, P102-16, P102-17
4	P102-11 THRU P102-14
5	P102-15, P102-20, P102-21
6	P10-18, P102-19, P102-24
7	P102-22, P102-23, P102-28
8	P102-25, P102-26
9	P102-27, P102-28
10	P102-30 THRU P102-33
11	P102-35, P102-36

173824

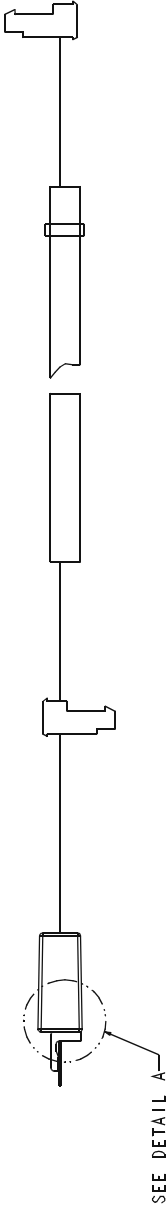
Logic Cable, Power Stacker (P/N 176029-001)



Power Cable, Power Stacker (P/N 174414-001)



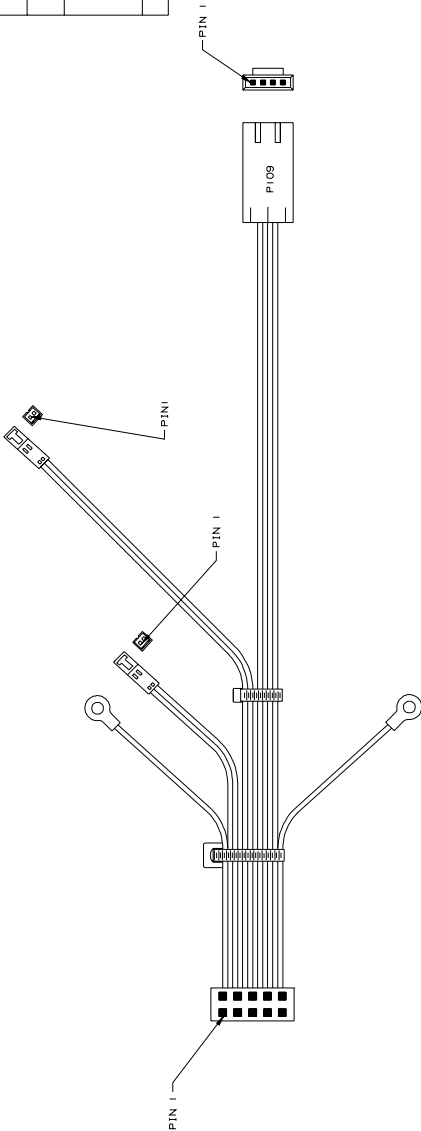
CONNECTION TABLE					
J101	P1101	P1101	P106		
PIN 1	PIN 1	PIN 11	PIN 1		
PIN 2	PIN 2	PIN 8	PIN 2		
*	*	PIN 4	PIN 3		
*	*	PIN 5	PIN 4		
*	*				
PIN 11	PIN 11				
PIN 12	PIN 12				



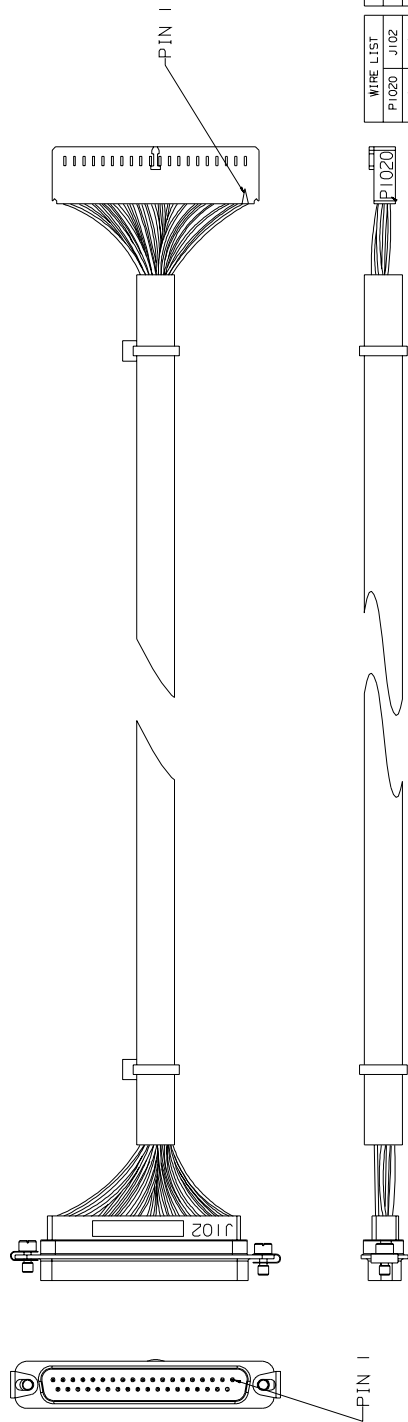
Rail Cable, Power Stacker (P/N 173823-001)

CONNECTION TABLE			
FROM	TO	COMPONENTS	WIRE LENGTH [1/2" - 25"]
P108-1	T102	202746-001	10.00"
P108-2	J18A - PIN 1	203499-001	8.00"
P108-3	J18A - PIN 2	203499-001	8.00"
P108-4	J18B - PIN 1	203499-001	19.80"
P108-5	J18B - PIN 2	203499-001	19.80"
P108-6	P109 - PIN 1	202748-001	24.00"
P108-7	P109 - PIN 2	202748-001	24.00"
P108-8	P109 - PIN 3	202361-001	24.00"
P108-9	P109 - PIN 4	202361-001	24.00"
P108-10	T101	202746-001	10.00"

TWIST WIRE TABLE	
TWIST GROUP	WIRES
A	P108-1,P108-10
B	P108-2,P108-3
C	P108-4,P108-5
D	P108-6,P108-7, P108-8,P108-9
E	P18-1,P18-2



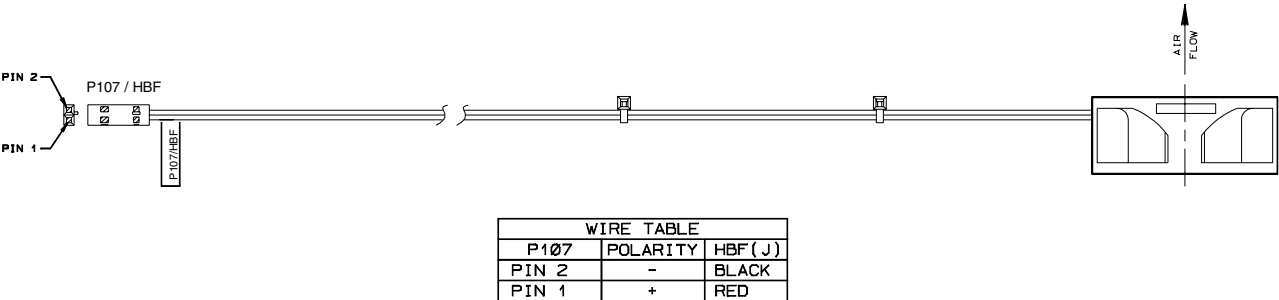
Elevator I/O Cable, Power Stacker (P/N 174759-001)



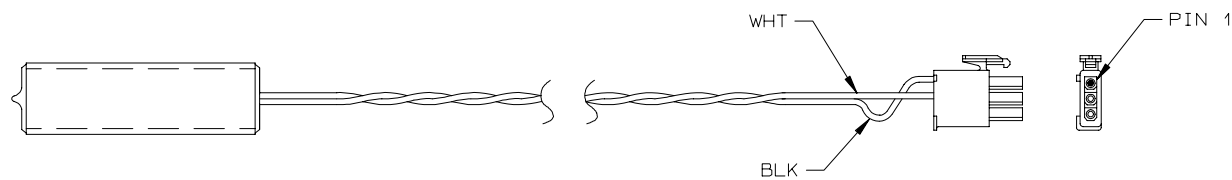
WIRE LIST		WIRE LIST	
P1020	J102	P1020	J102
1	1	21	21
2	2	22	22
3	3	23	23
4	4	24	24
5	5	25	25
6	6	26	26
7	7	27	27
8	8	28	28
9	9	29	29
10	10	30	30
11	11	31	31
12	12	32	32
13	13	33	33
14	14	34	34
15	15	35	35
16	16	36	36
17	17	37	37
18	18	38	38
19	19	39	39
20	20	40	40

TWIST WIRE TABLE	
P1020 CONN	
1 AND 34	
2 THRU 5	
6 THRU 9	
10, 16 AND 17	
11 THRU 14	
15, 20 AND 21	
18, 19 AND 24	
22, 23 AND 29	
16	
25 AND 26	
27 AND 28	
30 THRU 33	
35 AND 36	

Fan Assembly, Hammer Bank (P/N 152416-901)

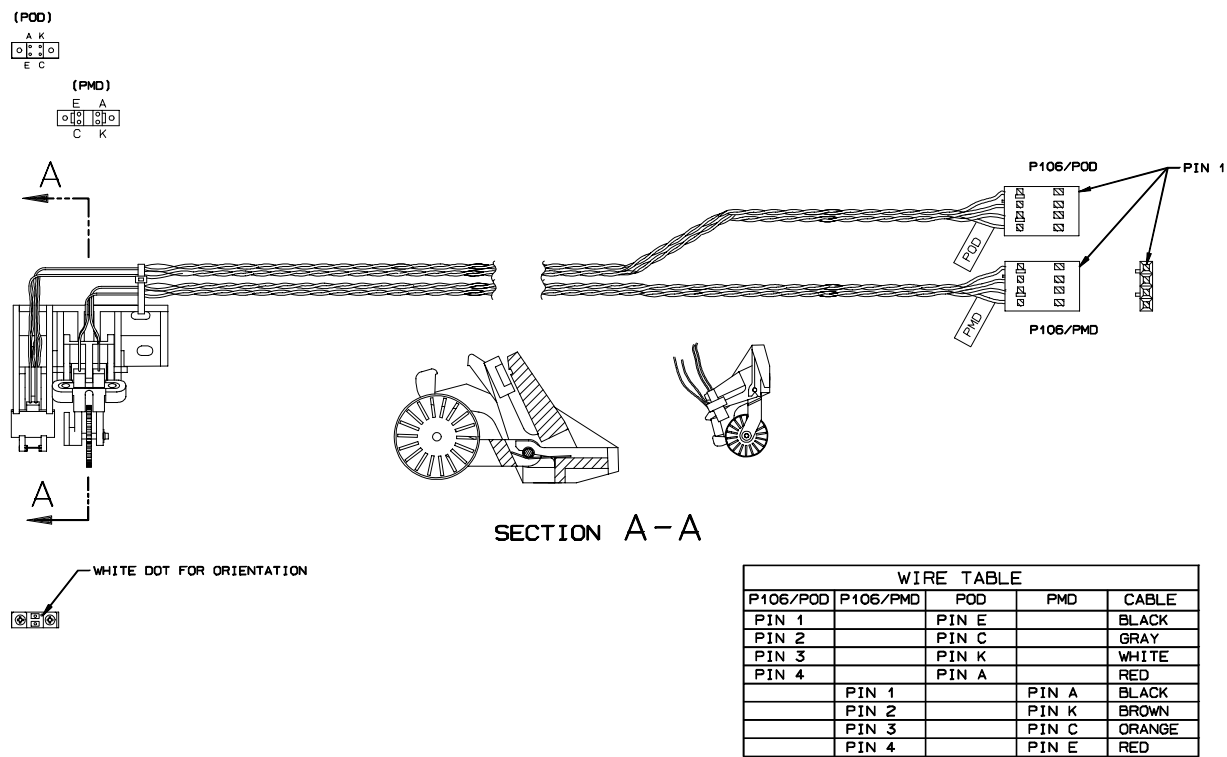


Magnetic Pickup (MPU) Assembly (P/N 150281-901)

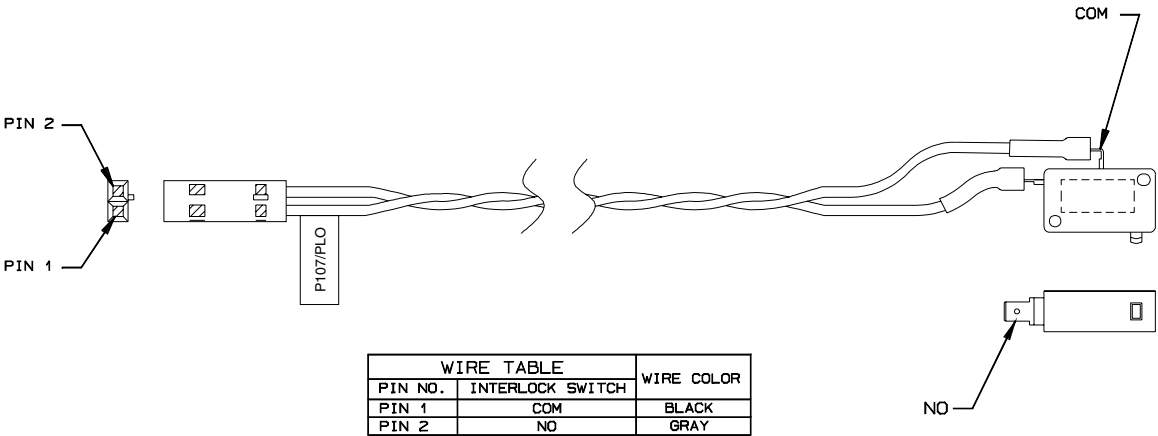


WIRE TABLE	
CONN PIN NO.	WIRE COLOR
1	BLACK
2	WHITE
3	N/C

Switch Assembly, Paper Detector (P/N 152415-901)



Switch Assembly, Platen Interlock (P/N 152417-901)



B

Abbreviations

NOTE: Signal abbreviations with first letter “N” are negative true.

Abbreviation	Definition
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K Ω	1,000 Ohms
Meg Ω	1,000,000 Ohms
μ F	microfarad (10^{-6} farad)
μ s	microsecond (10^{-6} second)
μ sec	microsecond (10^{-6} second)
A0, A1, etc.	Address 0, Address 1, etc.
AC	Alternating Current
ACC	Access
ACK	Acknowledge
AMP	Amplitude; Ampere
AMPL	Amplitude
AN	Anode
ASIC	Application-Specific Integrated Circuit
ATTN	Attention
B	Buffered
BANK FAN	Hammer Bank Fan
BCOM	Buffered Communication
BCP	Bi-phase Communications Processor
BHSC	Buffered Hammer Shift Clock
BN	Buffered, Low True
BNLD	Buffered, Low True, Lower Driver
BPS	Bits Per Second
BSY	Busy
BTU	British Thermal Unit
BUD	Buffered Upper Driver

CA	Cathode
CC	Card Cage
CCF	Card Cage Fan
CHNG	Change
CIR	Circuit
CLK	Clock
CO	Cover Open
COLL	Collector
COMM	Communication
CONTLR	Controller
CMD	Command
CNC	Connector, Connection
CPI	Characters Per Inch
CPLD	Complex Programmable Logic Device
CR	Carriage Return
CT	Coaxial/Twinaxial ("Coax/Twinax")
CTL	Control
CTS	Clear to Send
CU	Control Unit
CUR	Current
D0, D1, etc.	Data Bit 0, Data Bit 1, etc.
DAT	Data
DBCS	Double Byte Character Set
DC	Direct Current, Data Controller (a functional unit of the controller board)
DCD	Data Carrier Detect
DIAG	Diagnostic
DIFF	Differential
DIMM	Dual Inline Memory Module
DMA	Direct Memory Access
DP	Data Processing, Dataproducts
DPEN	Dataproducts Enable
DPMC	Dot Plucker Memory Controller
DPU	Data Processing Unit
DRAM	Dynamic Random Access Memory
DRV	Drive or Driver
DRVR	Driver

DSR	Data Set Ready
DTR	Data Terminal Ready
EC	Engine Controller (a functional unit of the controller board)
EEPROM	Electrically Erasable/Programmable Read-Only Memory
EHF	Exhaust Fan
EL	Elevator motor (power stacker)
EMEA	Europe, Mideast, and Africa
EMI	ElectroMagnetic Interference
EMIT	Emitter
EPROM	Electrically Programmable Read-Only Memory
ERR	Error
ESD	Electrostatic Discharge
EX	Exhaust, Extra
EXH	Exhaust
EXF	Exhaust Fan
EXP	Expansion
EXPND	Expand
FD	Feed
FF	Form Feed
FIFO	First In, First Out
FLT	Fault
FLTR	Filter
FP	Front Panel (Control Panel)
FRU	Field Replaceable Unit
FTIC	Fire Timer Integrated Circuit
GND	Ground
HB	Hammer Bank
HBA	Hammer Bank ASIC
HBF	Hammer Bank Fan
HL	Hammer Bank, Left
HBP	Hammer Bank Power
HBR	Hammer Bank, Right

HD	Hammer Driver, High Definition
HDIC	Hammer Driver Integrated Circuit
HDPH	Hammer Driver Phase
HLP	Hammer Bank Logic, Signals, and Power
HW	Hardware
IC	Integrated Circuit
ID	Identification
IGP	Intelligent Graphics Printing
INST	Instruction
INT	Interrupt
I/O	Input/Output
IPB	Illustrated Parts Breakdown
IPM	Inches Per Minute
IRQ	Interrupt Request
(J)	Jack connector
JEDEC	Joint Electron Device Engineering Council. An organization that sets standards for electronic devices and components.
L	Left
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
LF	Line Feed
LO	Low
LPI	Lines Per Inch
LPM	Lines Per Minute
LRIB	Left Ribbon
LRP	Left Ribbon Guide
M	Motor
m	meter (metric unit of length)
MAIN	Maintenance Jack, RS-232 (Optional)
MECA	Mechanism Engine Control ASIC
MECH	Mechanism
MF	microfarad (10^{-6} farad)
MH	Mounting Hole, Main Harness

MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MOT	Motor
MPU	Magnetic Pick-Up (Unit)
ms	millisecond (10^{-3} second)
MSL	Motor and Sensors, Left
MSR	Motor and Sensors, Right
N	Negative True; Newton (metric unit of force)
NIC	Network Interface Card (ethernet interface)
N/C	Not Connected
NC	Not Connected
NLQ	Near Letter Quality
No.	Number
NOVRAM	Nonvolatile Random Access Memory
ns	nanosecond (10^{-9} second)
NT	Not
NVRAM	Nonvolatile Random Access Memory
OEM	Original Equipment Manufacturer
OLV	On Line Verify
OP	Operand
P5	+ 5 VDC
(P)	Pin connector
P(1), P(2), etc.	Parallel data 1, data 2, etc.
PAL	Programmable Array Logic
PAP	Paper
PAPR	Paper
PARM	Parameter
PCBA	Printed Circuit Board Assembly
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PD	Paper Detect(or)
PE	Printer Error, Paper Empty
PER	Peripheral Device
PF	Paper Feed, picofarad (10^{-12} farad)

PFC	Paper Feed Controller, Power Factor Corrected (a power supply used on 500 lpm and 1000 lpm printers)
PFM	Paper Feed Motor
PGL	Printronix Graphics Language
PHA	Phase A
PHB	Phase B
PI	Paper Instruction
PLAT	Platen
PLM	Platen Motor
PLO	Platen Open Switch
PMD	Paper Motion Detect
PN	Pin or Plug
P/N	Part Number
PO	Paper Out
POD	Paper Out Detector Switch
PPR	Paper
PROM	Programmable Read-Only Memory
PS	Power Supply
PS5	Power Supply + 5 Volt
PSA3	Printronix System Architecture, Third Generation
PTR	Pointer, Printer
PWM	Pulse Width Modulation
PWR	Power
R	Right
RBN	Ribbon
RD	Read
RDY	Ready
RET	Return
RIB	Ribbon
RG	Ribbon Guide
RGL	Ribbon Guide, Left
RGR	Ribbon Guide, Right
RM	Ribbon Motor
RML	Ribbon Motor, Left
RMR	Ribbon Motor, Right

RoHS	Restriction of Hazardous Substances: In the illustrated parts sections part numbers listed in the column labeled Europe, Mideast, and Africa (EMEA) conform to requirements specified in DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
RQ	Request
RRIB	Right Ribbon
RRP	Right Ribbon Guide
RSP	Ribbon and Shuttle Processor
RST	Reset
RTS	Request to Send
RXD	Receive Data
SCS	SNA Character Stream
SDRAM	Synchronous Dynamic Random Access Memory
SEC	Security (Key)
SEL	Select
SEN	Sense, Sensor
SF	Structured Field
SG	Signal Ground
SHH	Shuttle Hall (Effect)
SHM	Shuttle Motor
SHUT	Shuttle
SHUTL	Shuttle
SIMM	Single Inline Memory Module
SLCT	Select (Online)
Slew	Rapid vertical paper movement
SMD	Shuttle Motor Drive
SNA	Systems Network Architecture
SOFT	Software
SPU	Shuttle Processor Unit
SPX	Software Program Exchange module
SRAM	Static Random Access Memory
STAT	Status or State
STBY	Standby
STK	Stacker
SW	Switch, Software

SYNC	Synchronize
TCB	Task Control Block
TEMP	Temperature; Temporary
TOF	Top Of Form (first print line)
TP	Test Point
TTL	Transistor-Transistor Logic
TXD	Transmit Data
UART	Universal Asynchronous Receiver/Transmitter
UDPH	Upper Drive Phase
UNDEF	Undefined
USART	Universal Synchronous/Asynchronous Receiver/Transmitter
V	Volts
VAC	Volts, Alternating Current
VDC	Volts, Direct Current
V _{CC}	Voltage at Collector
V _{DD}	Voltage at Drain
VGL	Code V™ Graphics Language
V _{SS}	Voltage at Source
V8	A special ASIC on the controller board containing circuits that help the data controller (DC) operate.
WR	Write
w/	With
w/o	Without
XMT	Transmit
ZT	Zero Tear (printer)
ZTP	Zero Tear Printer

C

Metric Conversion Tables

Length

Multiply	By	To Obtain
foot	0.3048*	meter (m)
foot	30.48*	centimeter (cm)
foot	304.8*	millimeter (mm)
inch	0.0254*	meter (m)
inch	2.54*	centimeter (cm)
inch	25.4*	millimeter (mm)
meter	3.280840	foot
centimeter	0.03280840	foot
millimeter	0.003280840	foot
meter	39.37008	inch
centimeter	0.3937008	inch
millimeter	0.03937008	inch

* Figure is exact.

Torque and Force

Multiply	By	To Obtain
pound-inch	0.11298	Newton-meter (N•M)
pound-foot	1.3558	Newton-meter (N•M)
Newton-meter (N•M)	8.8511	pound-inch
Newton-meter (N•M)	0.7376	pound-foot
pound	4.4482	Newton (N)
Newton (N)	0.22481	pound

Mass and Density

Multiply	By	To Obtain
pound*	0.4535924	kilogram (kg)
ounce*	28.34952	gram (g)
kilogram	2.204622	pound*
gram	0.03527393	ounce*

* avoirdupois

Temperature

To Convert	To	Use Formula
temperature Celsius (t_c)	temperature Fahrenheit (t_f)	$t_f = 1.8 t_c + 32$
temperature Fahrenheit (t_f)	temperature Celsius (t_c)	$t_c = (t_f - 32) / 1.8$

Power

Multiply	By	To Obtain
Btu (International Table) per hour	0.2930711	watt (W)
watt (W)	3.412141	Btu (International Table) per hour
watt (W)	0.001359621	horsepower (metric)
horsepower (metric)	735.499	watt (W)

D

SureStak™ Power Stacker

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Introduction

The SureStak Power Stacker is a factory-installed option that augments the paper feed system of cabinet model printers. It is designed to work with forms 5 to 12 inches long (12.7 to 30.5 cm) and up to 16 inches (41 cm) wide without the paper tent installed or up to 15.5 inches (39.5 cm) wide with the paper tent installed. (See Figure 68.) Using longer or shorter paper can cause error messages and unpredictable operation of the stacker.

Because most of the stacker assembly is inside the cabinet, you must remove the stacker from the printer to service it or replace most of its components.

This appendix has three parts:

- An overview of stacker operation.
- Removal/installation instructions for the entire power stacker assembly and for components that require the most frequent replacement.
- An illustrated parts breakdown (IPB) showing how the power stacker is assembled and listing the part numbers for replaceable parts.

NOTE: Only replaceable parts have part numbers in the IPB. If you need to replace a part for which no part number is shown, replace the entire stacker assembly.

Stacker Operation

The power stacker mechanically directs the paper from the printer to the paper stack. It is mounted in the rear of the cabinet and has its own control panel. Its main components are shown in Figure 68.

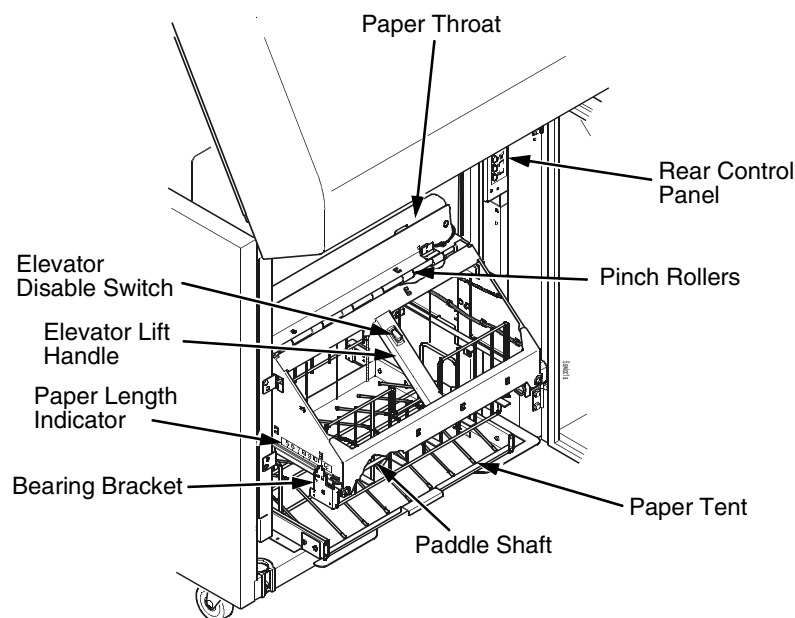


Figure 68. Power Stacker Component Locations

Setting Up The Power Stacker

1. Set the printer power switch to I (On).
2. On the rear control panel, press the **ON LINE** key to take the printer offline. (Figure 69.)
3. Press the **ELEVATOR UP** key and wait for the elevator assembly to reach the top of its travel. (Figure 69.)

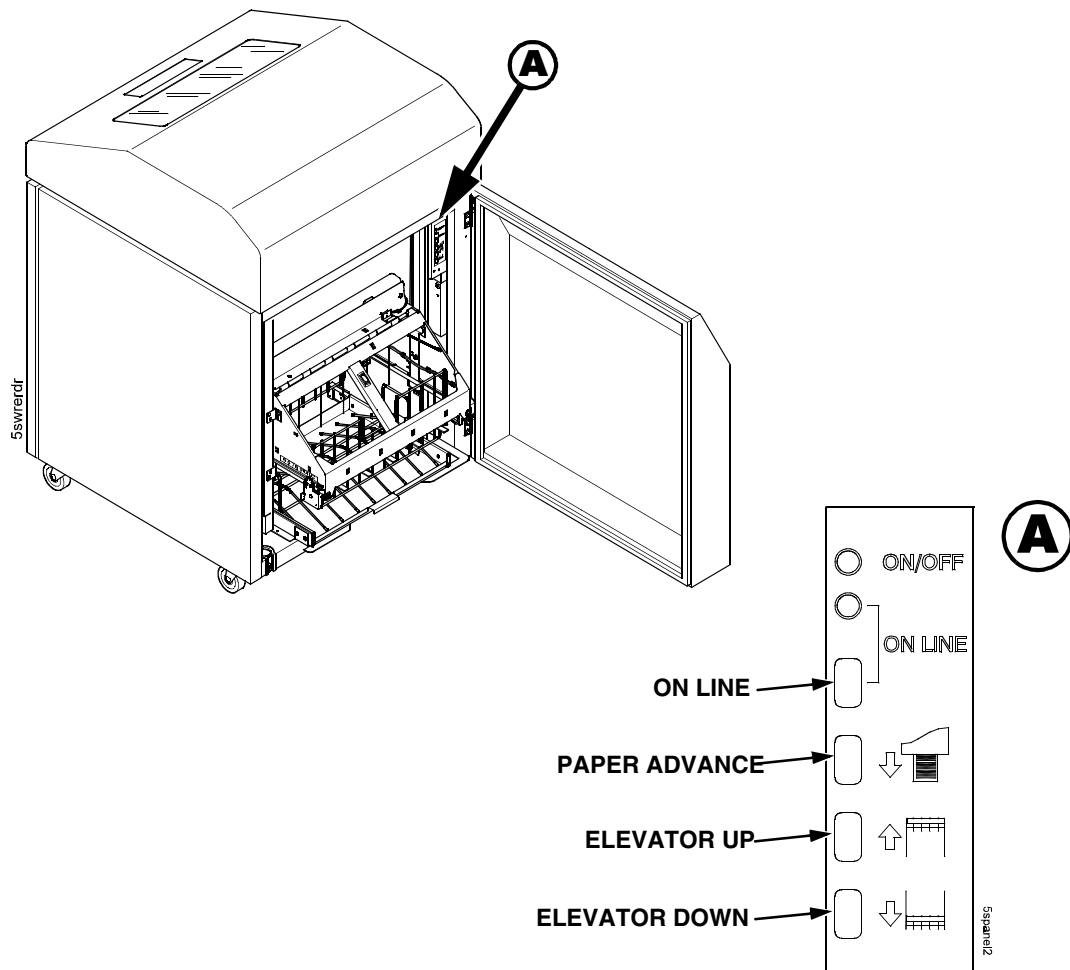


Figure 69. The Rear Control Panel

4. If the paper you will use is not wider than 15.5 inches (39.5 cm) pull out the paper tray and install the wireform paper tent. (Figure 70.) If the paper is wider than 15.5 inches (39.5 cm) leave the paper tent out of the printer.

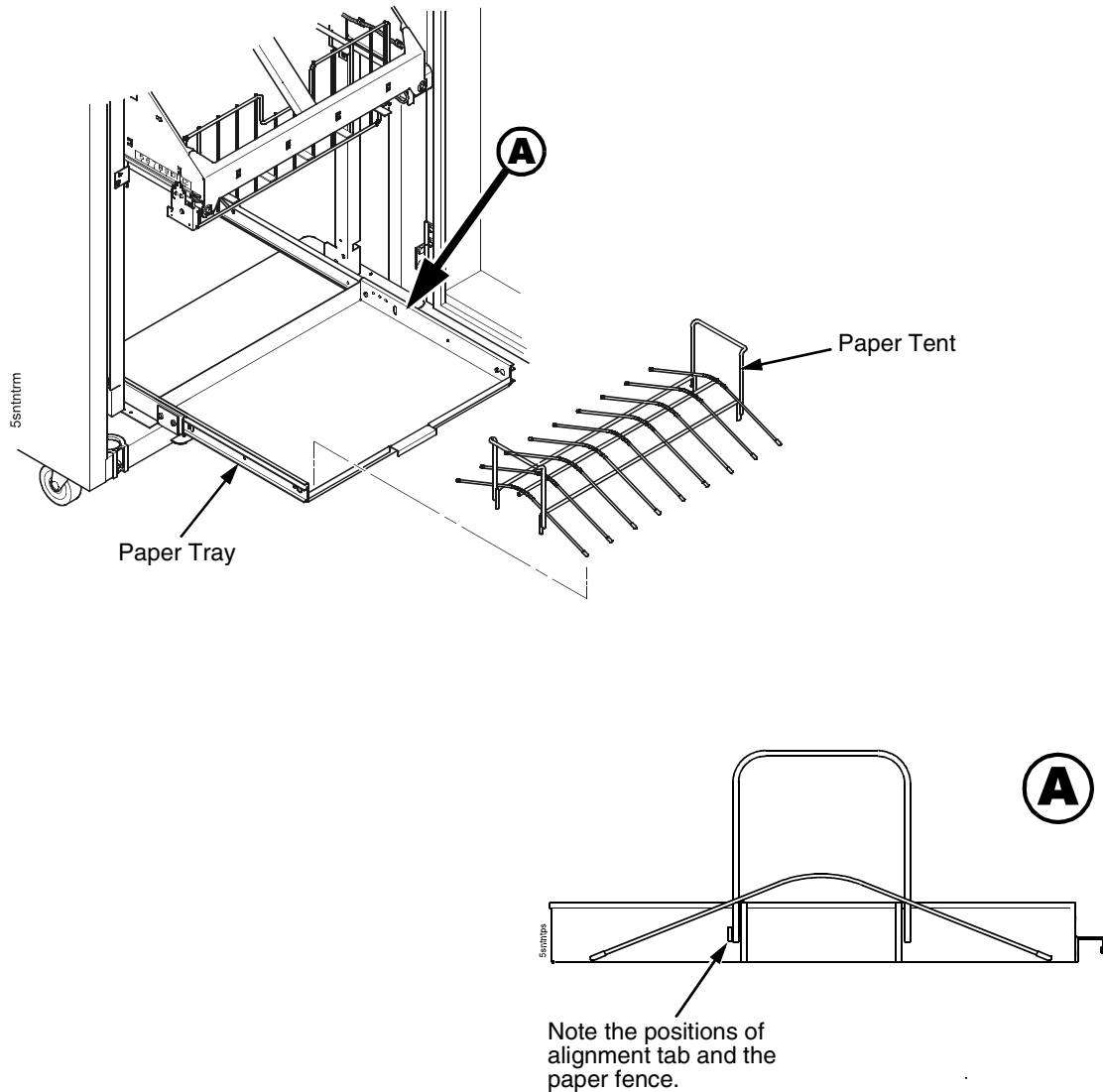


Figure 70. The Paper Tent

5. Push or pull the paddle shaft toward the front or the rear of the printer to set the desired paper length. Align the indicator notch on the bearing bracket with the paper length indicator. The power stacker can handle paper or forms from 5 to 12 inches (12.7 to 30.5 cm) long. (Figure 71.)

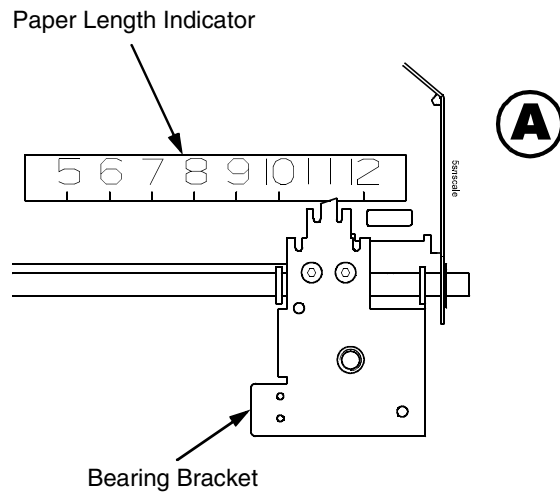
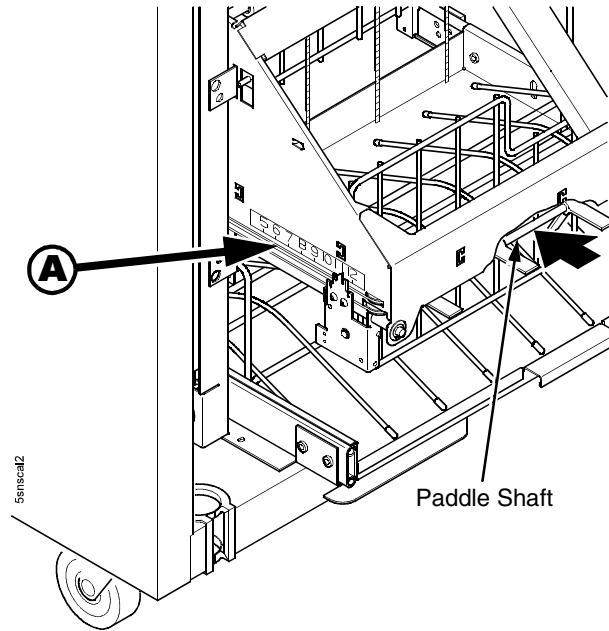


Figure 71. The Paper Length Indicator

Loading And Starting The Power Stacker

1. Press the **PAPER ADVANCE** key and hand feed the paper down into the paper throat of the stacker. Continue to advance the paper until it reaches the paper tent (if installed) and feed three to five extra sheets into the stacker. Make sure the paper passes through the paper throat of the stacker. (Figure 72.)
2. Stack the extra pages on top of the wire paper tent (if installed), making sure the paper bends with the natural fold. (Figure 72.)
3. Press the **ON LINE** key to put the printer in the online state. The stacker elevator will return to the correct position for printing.
4. Check that the paper is still centered between the sides of the paper tent (if installed).
5. Close the cabinet rear door.
6. If necessary, set Top Of Form. (Refer to the *User's Manual*.)

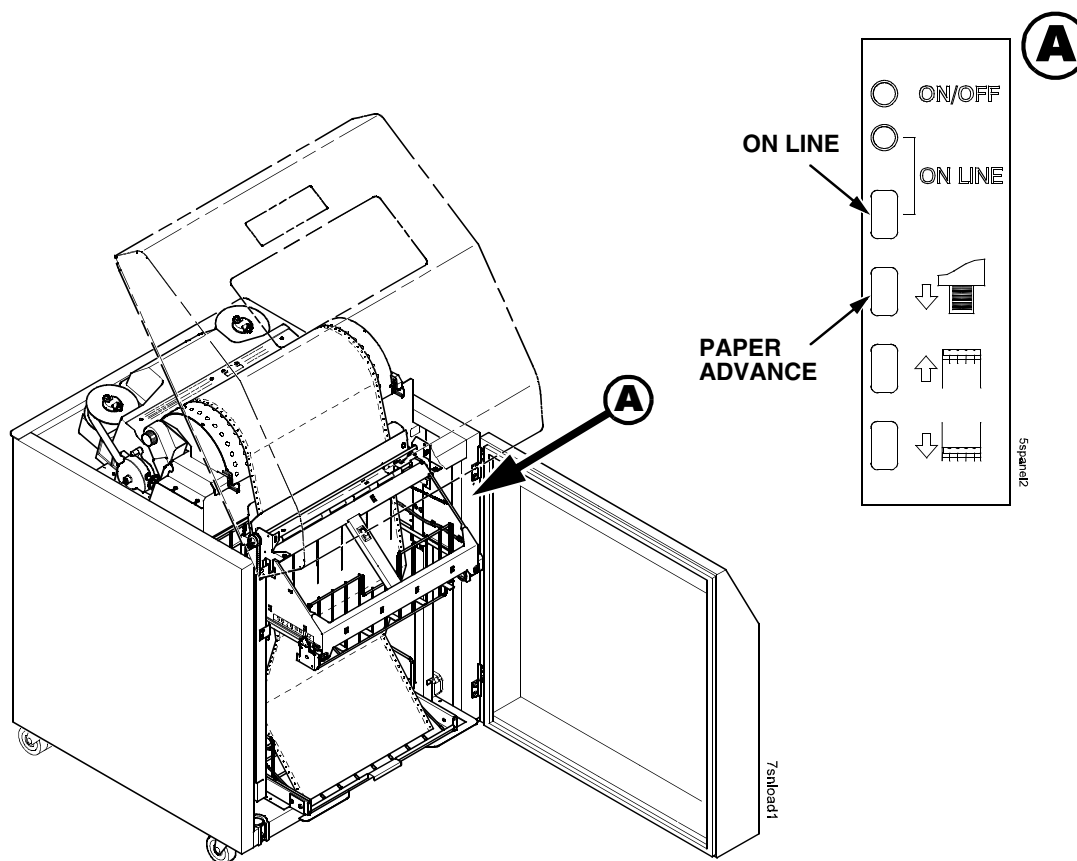


Figure 72. Stacking Paper on the Wire Paper Tent

Stacker Problems

The power stacker augments the paper feed system of the printer. The most frequently occurring problems in the paper feed system are paper jams. Other problems that can occur are worn or poor electrical connections and cabling, worn or defective feed motors, worn or damaged mechanical components, or incorrect installation of the stacker assembly. Table 7 shows some of the problems that can occur with the power stacker and the page where you can find the troubleshooting procedure.

Stacker First Inspection

NOTE: Do this inspection before doing any other troubleshooting or repair work on the power stacker.

1. Verify that the elevator seats all the way down on its left and right hand stops without having to force it down or hold it in position.
 - a. If necessary, correct improper seating by moving the elevator all the way down to the bottom of its travel and loosen the drive belt pulley on the side(s) that does not seat properly.
 - b. While holding the elevator in the fully down position, tighten the pulley setscrews.
 - c. Verify that the elevator seats against both stops.

ATTENTION

While doing the next step, make sure the idler rollers do not interfere with the drive rollers as they move along the drive shaft.

2. Verify that the friction washers do not bind on the driver shaft.
 - a. Manually retract and hold the idler roller shaft so the paper throat is open. While the throat is open, slide the drive roller on one end toward the center of the shaft.
 - b. Wipe a finger across the shaft and check for lubricant.
 - c. Release the drive roller and allow it to spring back into position along the drive shaft.
 - d. Repeat substeps a, b, and c on the other end of the driver shaft.
 - e. Verify that there was no oil on the shafts.
 - f. If the drive rollers returned to position without hanging up on the shaft, they are not binding and are OK.
 - g. If there was oil on the shafts or the drive rollers hung up on the shaft, replace the roller drive shaft (page 421).
3. Power on the printer and move the stacker elevator up and down using the ELEVATOR UP and ELEVATOR DOWN keys on the rear operator panel.
 - a. Check the stacker limit switches (page 126).
 - b. Move the elevator up and down using the ELEVATOR UP and ELEVATOR DOWN keys on the rear operator panel. While the elevator is moving, press the ELEVATOR UP or ELEVATOR DOWN key. Elevator motion should stop.

- c. With the elevator at its lowest position, run the Shuttle Slow test (page 141) from the front operator panel. While the test runs, interrupt both IR beams, one at a time, and verify that the elevator rises.
- d. With the Shuttle Slow test running, verify that:
 - Both paddle shafts rotate downwards towards the paper stack;
 - While holding each of the idler rollers one at a time, the rest of the idler assembly continues to rotate freely;
 - That the pinch rollers are rotating downwards at the pinch point;
 - With the elevator at its lowest position, create a stack of four continuous forms. Press the FORM FEED key on rear operator panel. All of the forms should pass through the pinch rollers and stack normally.

Stacker Confidence Check

- 1. Verify that all cables are properly connected at the back of the rear control panel.
- 2. From the rear control panel, do and observe the following:
 - a. Power on the printer and make sure it goes the READY state.
 - b. The green LED should be on.
 - c. Press the ON LINE key and observe the yellow LED. The yellow LED should come on when the printer is online.
 - d. The yellow LED should be off when the printer is offline.
 - e. Press the PAPER ADVANCE (down arrow) key. The printer should do a form feed every time you press this key.
 - f. Press and release the ELEVATOR UP key. The elevator should go up.
 - g. Press and release the ELEVATOR DOWN key. The elevator should go down.
- 3. Disable the power stacker from the configuration menu using the front operator panel. With the printer in the offline state, press the ELEVATOR UP key on the rear control panel. The elevator should move upward and automatically stop when it reaches its highest position. (Do NOT force it up.)
- 4. Using the heaviest form available, slide the form over the paper path and into the stacker throat. It should be able to go through the stacker throat without having to force it. If the form cannot go through the stacker throat, do the STACKER JAM troubleshooting procedure on page 111.
- 5. With the power stacker still at its highest position, enable the power stacker using the configuration menu at the front operator panel. Put the printer in READY state. The stacker elevator should automatically go to the lowest position possible, depending on how much paper is in the stacker tray.

6. Using the rear operator panel, press the PAPER ADVANCE (down arrow) key until three or four pages feed through the stacker throat.
 - a. Check the LCD on the front operator panel for faults. If there is a fault, the paper out detector is failing and needs to be checked and cleaned.
 - b. If there are no faults on the LCD, load the forms in the printer and through the stacker throat. Feed enough forms into the stacker so that they fold properly in the tray or stacker base.
7. Run a Ripple Print or All H's print test (page 141), and make sure that both rows of rubber paddles are rotating inward and the pinch rollers are rotating downward.
8. Run the All E's + FF test (page 141) for ten pages. The stacker should stack and fold the paper without errors.
9. Move the elevator up approximately one inch and cover the emitter with opaque or black tape. From your laptop or the host computer, run a multiple page print job. The elevator should start to move upward about 1/2 inch every three seconds until it reaches its topmost position. The LCD should display STACKER FULL when the elevator reaches the top of its travel.
10. Lower the elevator by pressing ELEVATOR DOWN key. The elevator should stop at its bottom position without motor noise. If you hear motor noise, do the "Stacker 'chatters' at upper or lower limit" procedure on page 124.
11. Set the elevator at the lowest position permitted by the amount of paper stacked in the tray. Run an operator print test and induce a paper jam before the paper throat of the power stacker. STACKER JAM should display on the front operator panel.
12. If the stacker has not failed any test up to this point, the stacker checks out OK. If errors occurred during these checks refer to Table 4 on page 42 and troubleshoot the appropriate symptom. When the stacker is operational, clear the error log and place the printer online.

Stacker Motor Check

1. Power off the printer.
2. Open the rear cabinet door.
3. Unfasten the cable clamp holding the stacker control panel cables.
4. Disconnect stacker rail cable connector P107 from J3 on the back of the stacker operator panel.
5. Disconnect stacker frame cable connector P102 from connector J4 on the back of the stacker operator panel.
6. Find pin 1 of connectors P107 and P102.
7. Check both cables for damaged pins, continuity, and shorts.

8. Check all four stacker motors for 15.2 ± 1.5 Ohms resistance per phase.
 All four motors are the same:
 Measure pin 1 to pin 2 for Phase A
 Measure pin 3 to pin 4 for Phase B
 pin 1 = red
 pin 2 = yellow
 pin 3 = orange
 pin 4 = brown
 - a. Elevator motor assembly connector J3, pins 6, 7, 8, and 9
 - b. Rear paddle motor assembly (M1) connector J4 pins 2, 3, 4, and 5
 - c. Front paddle motor assembly (M2) connector J4 pins 6, 7, 8, and 9
 - d. Pinch roller motor assembly connector J4 pins 11, 12, 13, and 14
9. Replace any cable that is damaged or fails continuity/shorts check.
10. Replace any motor that fails the resistance check.

Table 7. Power Stacker Problems

Symptom	Origin of Symptom	Explanation	Solution
Printer does not detect presence of power stacker	Reported by user.	Various causes possible.	page 123
STACKER FAULT	Message on control panel LCD.	This message is triggered when the elevator cannot reach the top or bottom limit switch before timing out.	page 109
STACKER FULL	Message on control panel LCD.	Status message: the power paper stacker is full.	page 110
STACKER JAM	Message on control panel LCD.	Paper is bunching above the elevator or the paper motion detector is not working properly.	page 111
Stacker “chatters” at upper or lower limit	Reported by user.	Various causes possible.	page 124
Stacker does not stack properly	Reported by user.	Various causes possible.	page 125
Stacker elevator does not move	Reported by user.	Various causes possible.	page 125
Stacker elevator moves by itself	Reported by user.	Various causes possible.	page 125

Table 7. Power Stacker Problems

Symptom	Origin of Symptom	Explanation	Solution
Stacker limit switch check	Other troubleshooting procedures.	A procedure that tests the motion limit switch at the top and bottom of the right vertical rail. You will usually be referred to this procedure from other troubleshooting procedures. When you have completed this procedure, return to the procedure that sent you there.	page 126
Stacker motor check	Other troubleshooting procedures.	A procedure that tests the four stacker motors and their cables. You will usually be referred to this procedure from other troubleshooting procedures. When you have completed the procedure, return to the procedure that sent you there.	page 127
Stacker not operating	Reported by user.	Same symptom as “Printer does not detect presence of power stacker”	page 123

Removing The Power Stacker

1. Set the printer power switch to O (off).
2. Unplug the power cord.
3. Unload paper from the stacker area. (Refer to the *User's Manual*.)
4. Remove the paper tent (if present). (Figure 73.)

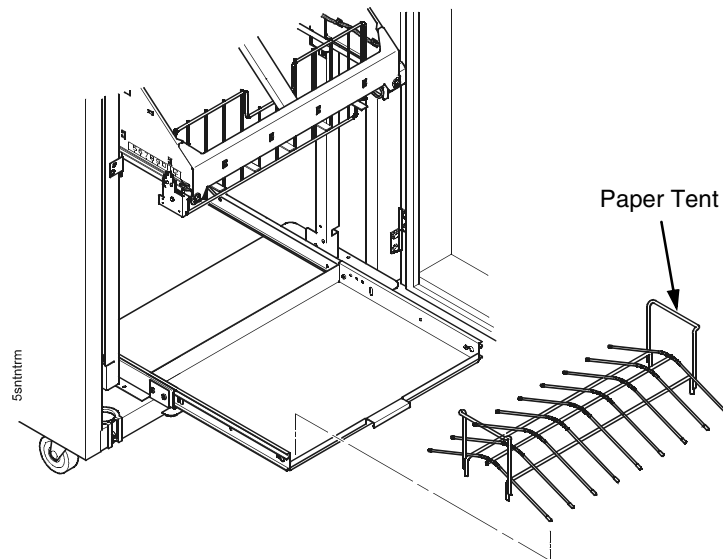


Figure 73. Removing the Paper Tent

5. Cut the tie wrap (if present) and remove the paper fence. (Figure 74.)

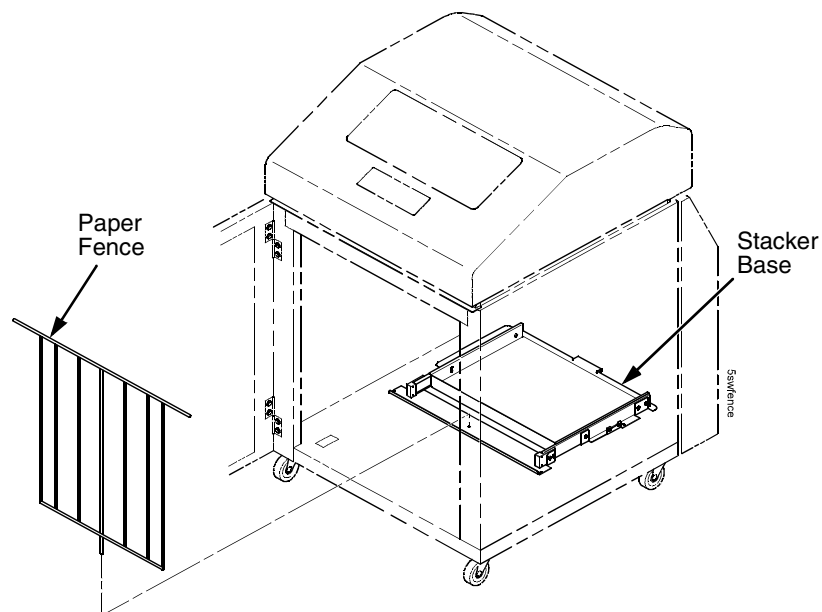


Figure 74. Removing the Paper Fence

6. Remove the two 10-32 x 5/32 inch buttonhead screws and washers securing the vertical rails to the upper frame cross-member at the rear of the cabinet. (Figure 75.)
7. Remove the two Torx T-10 screws securing the stacker base to the cabinet floor. (Figure 75.)
8. Remove the two Torx T-10 screws that secure the rail bracket to the cabinet floor. (Figure 75.)

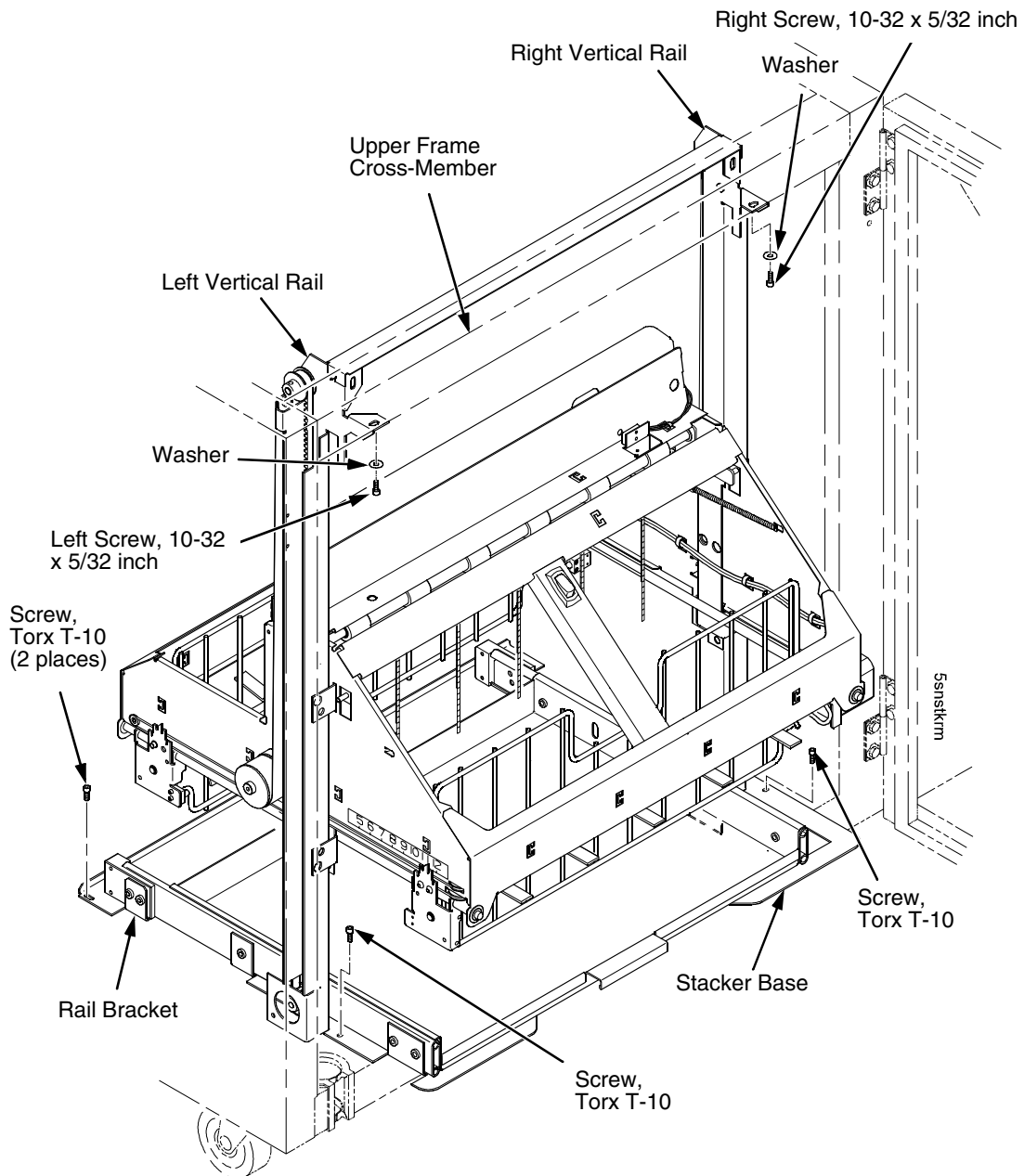


Figure 75. Preparing the Stacker for Removal

9. Pull the paper tray out until the holes in the rails permit access to the M3 buttonhead screws. (Figure 76.)
10. Loosen one turn (do not remove) the M3x6 screws securing the vertical rails to the stacker base. Each rail is secured by two screws. (Figure 76.)

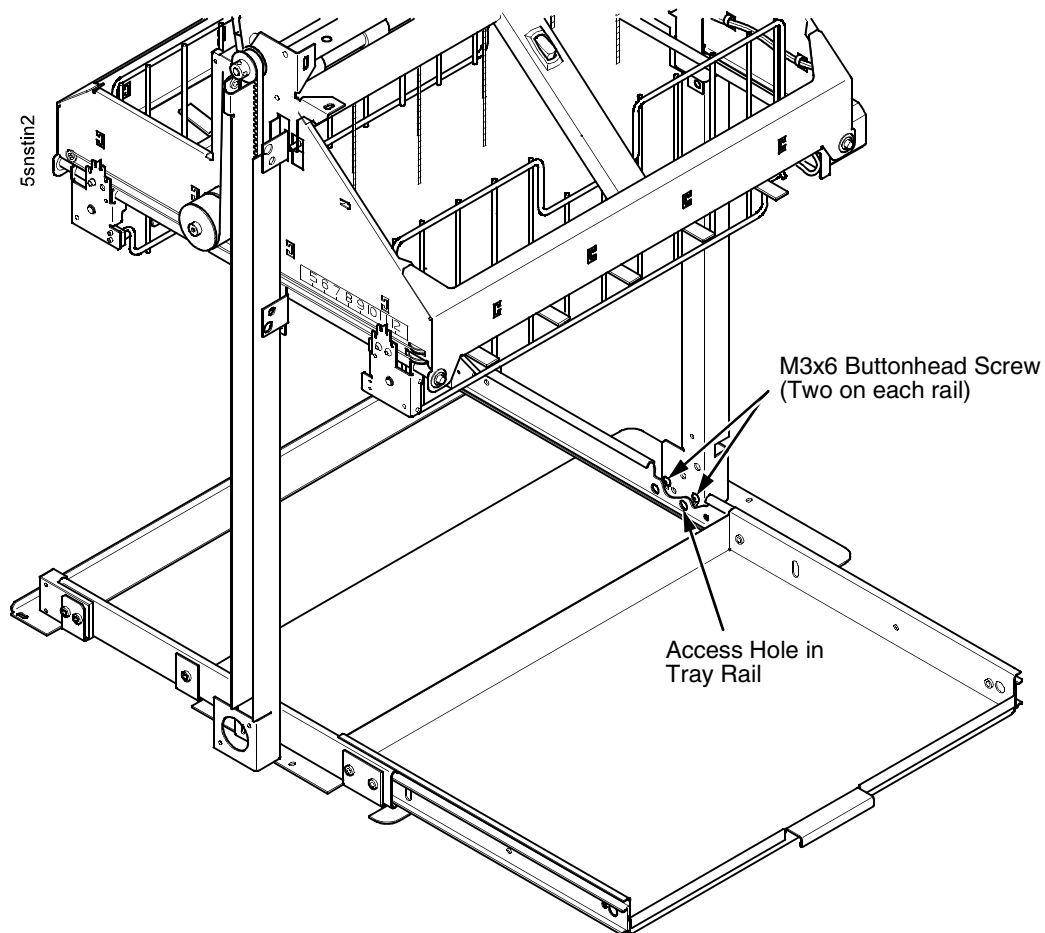


Figure 76. The Lower Screws in the Vertical Rails

11. Lower the elevator assembly to its lowest position. Tilt the vertical rails towards the front of the printer to make room for removing the control panel.
12. Remove the two 4-40 x 1/4 inch screws securing the elevator I/O cable to the elevator assembly and disconnect the stacker I/O cable. (Figure 77.)

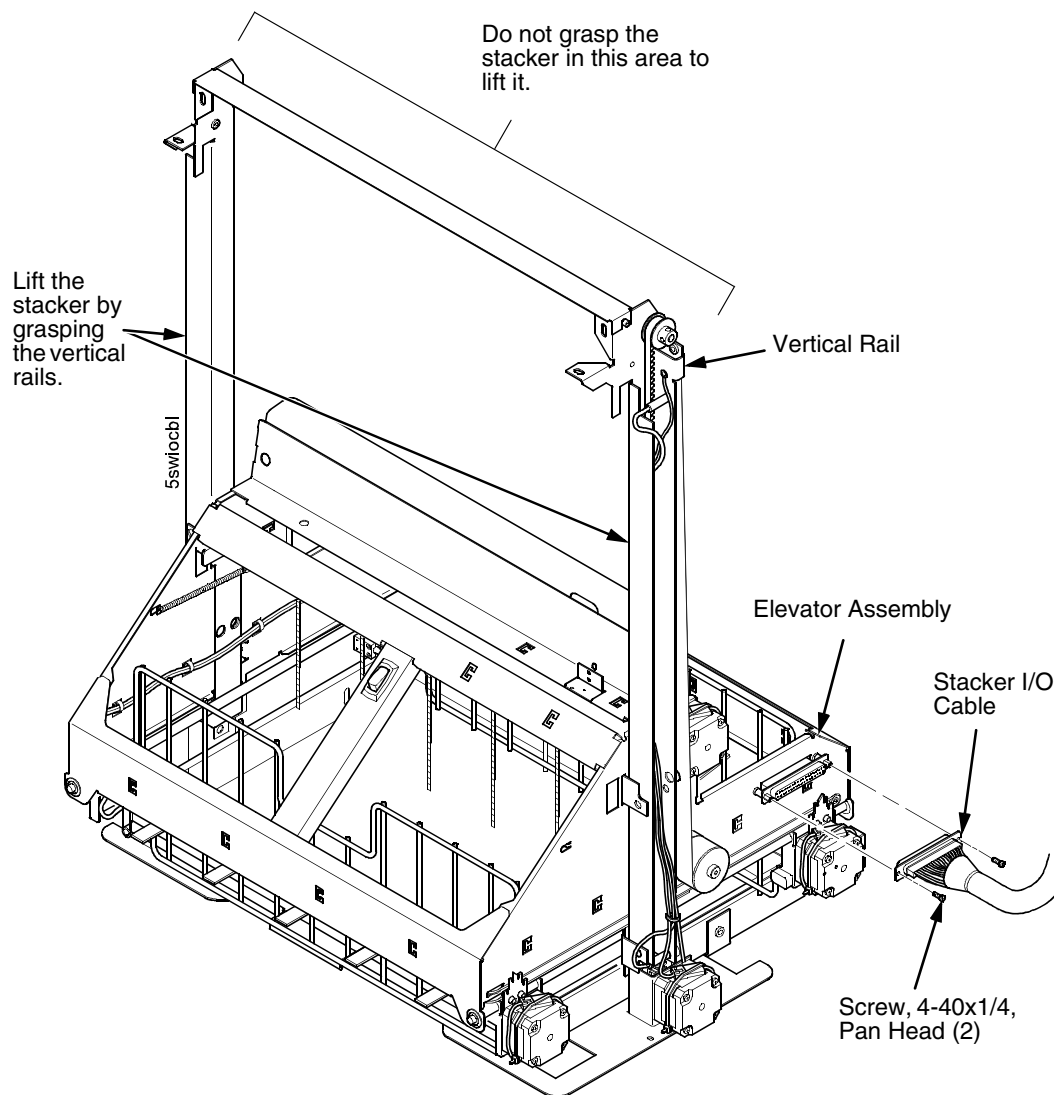


Figure 77. Disconnecting the Stacker I/O Cable

13. Remove two screws, washers, and the standoff from the stacker control panel. (Figure 78.)

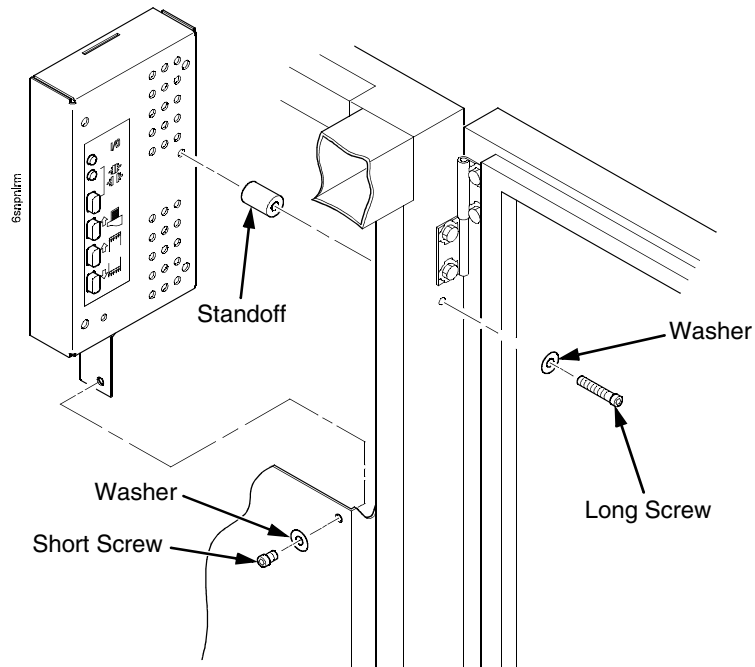


Figure 78. Removing the Stacker Control Panel

14. Remove four cables from the stacker control panel, and remove the stacker control panel. (Figure 79.)

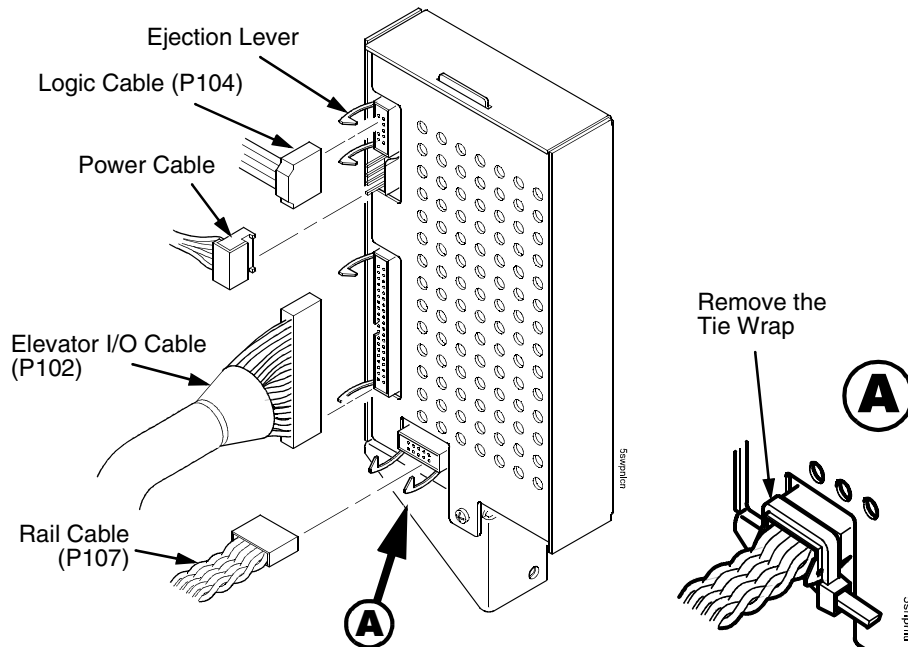


Figure 79. Removing Cables from the Stacker Control Panel

NOTE: It may be easier to wear gloves for the next step.

15. Slide the stacker assembly slightly to the right to clear the air exhaust duct. Tilt the vertical rails toward the front of the printer until they clear the upper frame cross-member. Grasping the stacker assembly by the vertical rails, lift and slide it to the rear and angle it out of the cabinet, as shown in Figure 80.

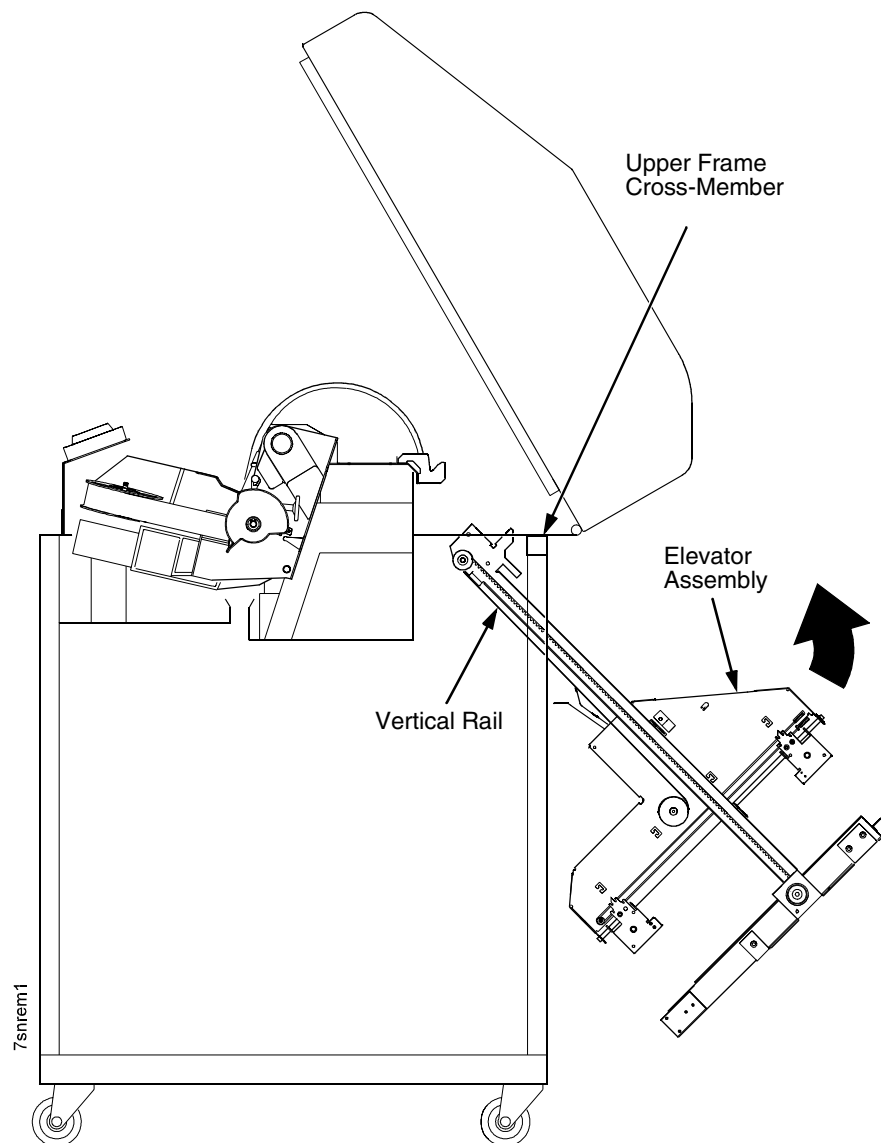


Figure 80. Removing the Stacker Assembly

Installing The Power Stacker

NOTE: This section shows installation of the power stacker assembly, the stacker cable assemblies, and the stacker control panel.

1. Set the printer power switch to O (off).
2. Unplug the power cord.
3. Remove paper.
4. Loosen—do not remove—the three paper path hold-down screws. Slide the paper path to the left and lift it off the card cage. (Figure 81.)

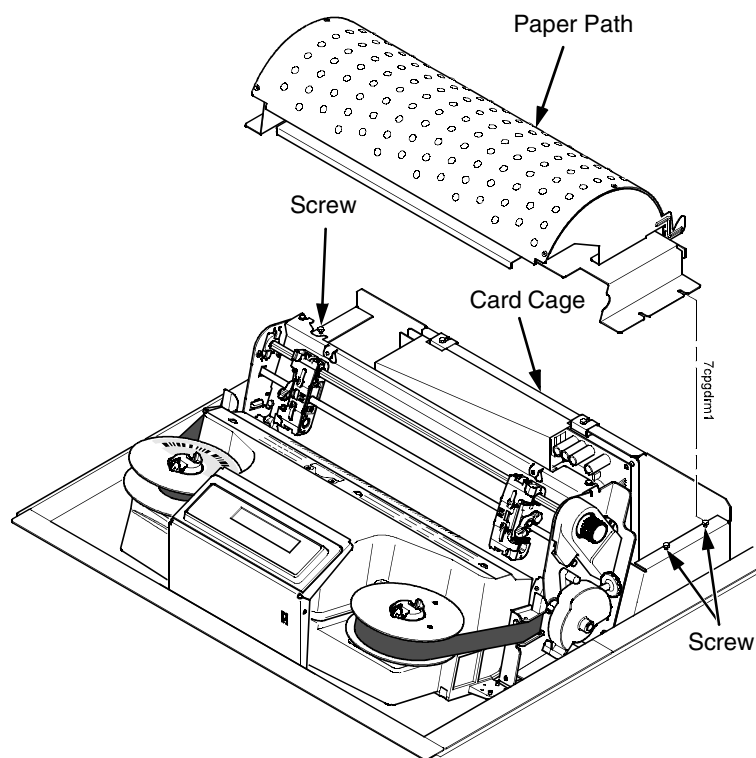


Figure 81. Remove the Paper Path

5. Connect the power stacker logic cable P103 to connector J117 on the controller board. (Figure 82.)
6. Disconnect the power supply cable from connector J101 on the controller board. (Figure 82.)
7. Connect power supply cable connector P101 to the stacker power cable, then connect the stacker power cable to connector J101 on the controller board. (Figure 82.)
8. Route the stacker power cable in front of the controller board and down through the cutout under the card cage fan. (Figure 82.)
9. Route the stacker logic cable in front of the controller board and down through the cutout under the card cage fan. (Figure 82.)

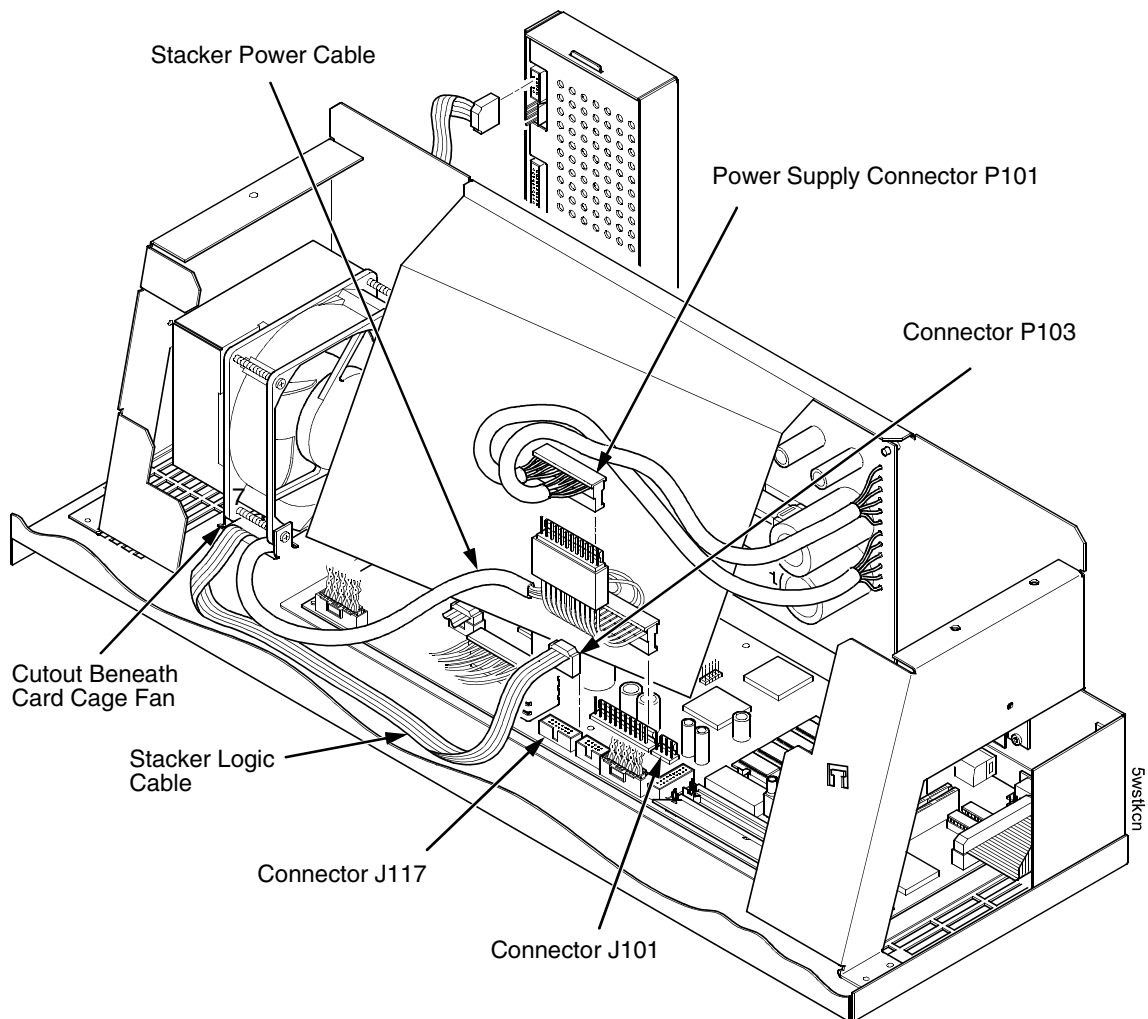


Figure 82. Power Stacker Connections on the PSA3 Controller Board

10. Pull the paper tray out until the holes in the rails permit access to the M3 buttonhead screws. (Figure 83.)
11. Loosen one turn—do not remove—the M3 screws securing the vertical rails to the stacker base. Each rail is secured by two screws. (Figure 83.)

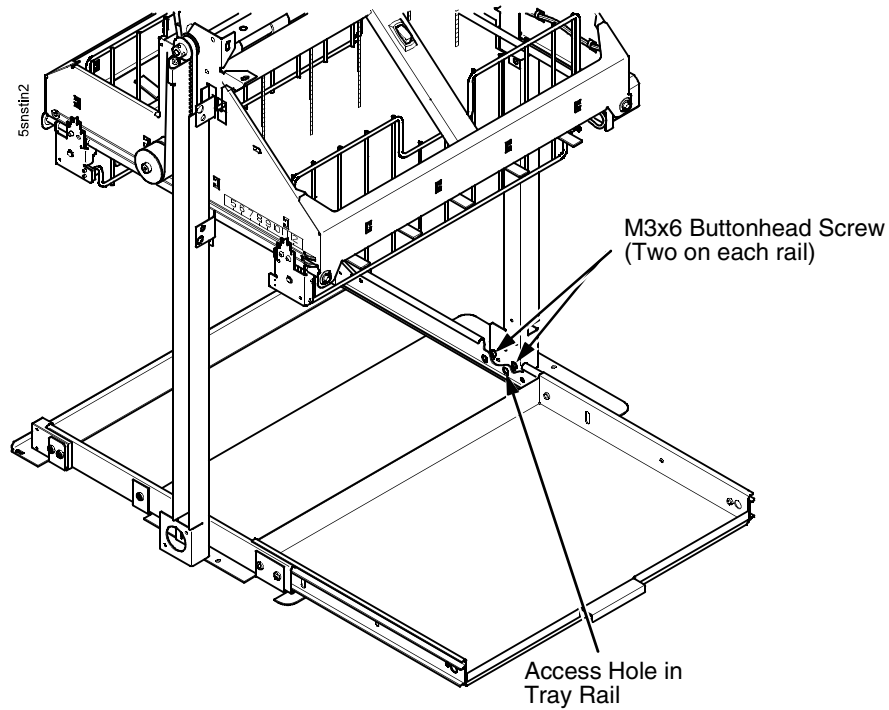


Figure 83. The Lower Screws in the Vertical Rails

12. Position the elevator assembly at the bottom of the vertical rails.
(Figure 84.)
13. Connect the elevator I/O cable to the elevator assembly and install the two 4-40 x 1/4 inch screws, as shown in Figure 84.

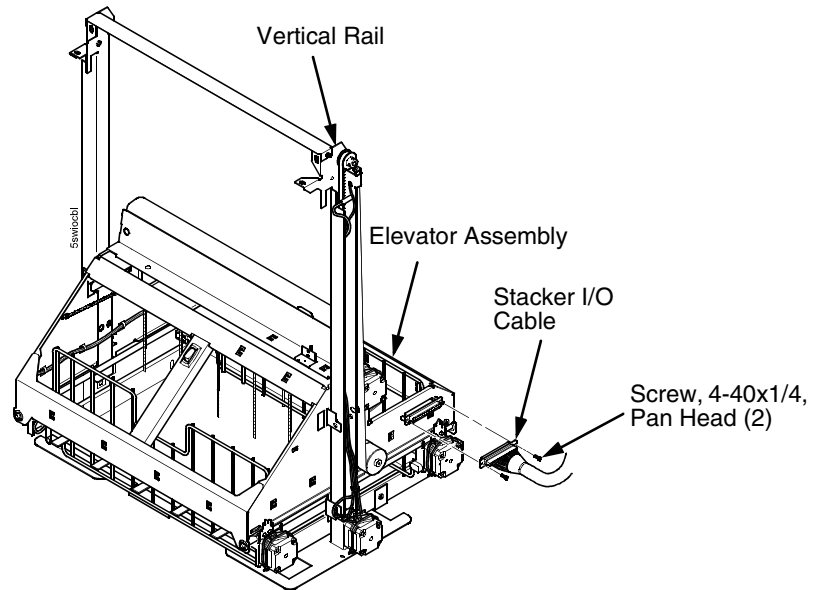


Figure 84. The Elevator I/O Cable

CAUTION The paper stacker assembly mounts to the rear upper frame cross-member and the cabinet floor. It is a snug fit. During installation, grasp the stacker by the vertical rails and take care to avoid scratching painted surfaces or damaging the stacker.

NOTE: It may be easier to wear gloves for the next step.

14. Position the stacker assembly slightly to the right in order to clear the air exhaust duct, insert the vertical rails inside and under the upper frame cross-member, then slowly swing the base of the stacker assembly into the cabinet. (Figure 85a.)
15. Work the stacker base rearward and engage the upper brackets of the vertical rails under the upper frame cross-member. (Figure 85b.)
16. Align the holes in the vertical rail brackets with the holes in the upper frame cross-member. (Figure 85c and Figure 86.)

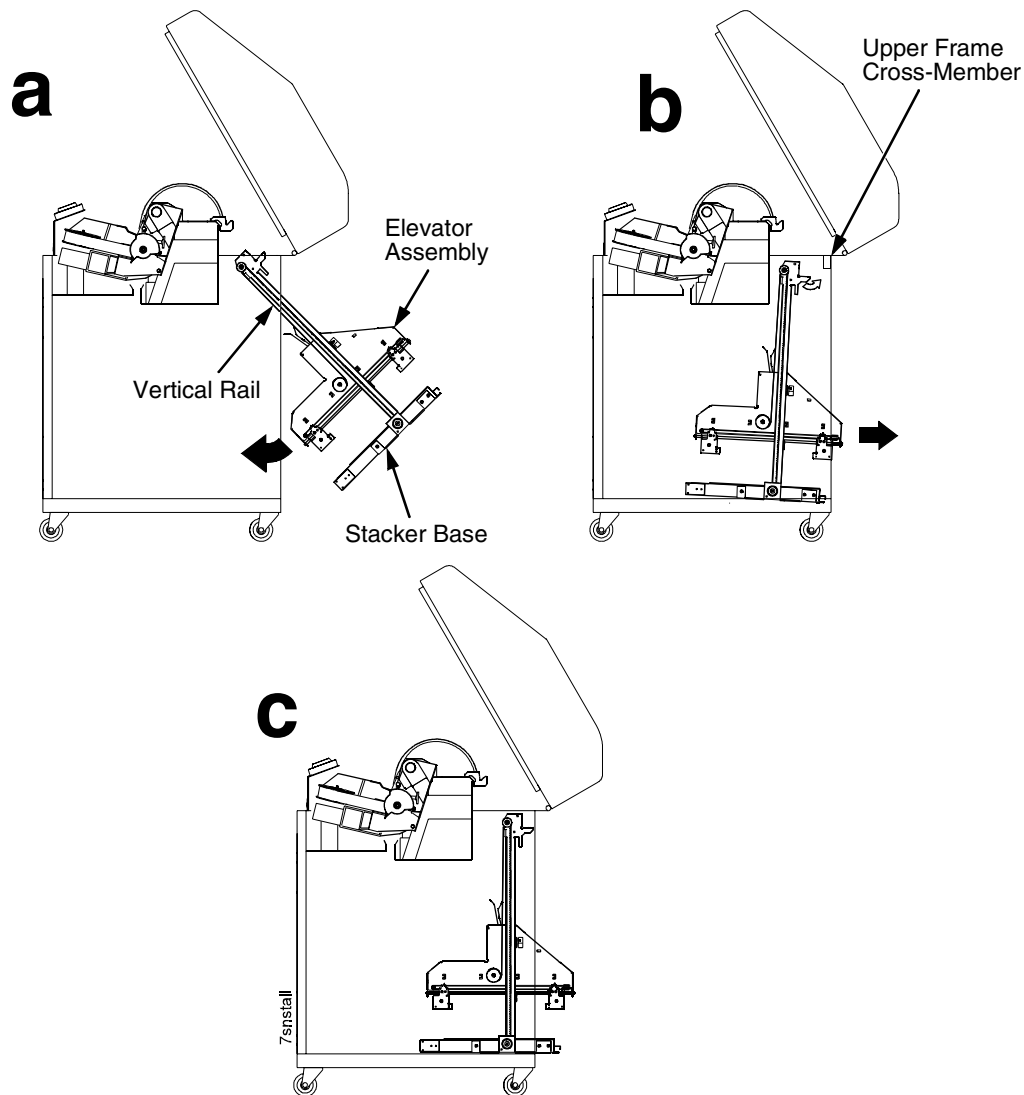


Figure 85. Stacker Installation

17. Align the holes in the stacker base with the holes in the cabinet floor.
(Figure 85c and Figure 86)
18. Install finger tight the 10-32 x 5/32 inch buttonhead screw and washer securing the left vertical rail to the upper frame cross-member. (Do not install the right hand screw yet.) (Figure 86.)
19. Install and tighten the two Torx T-10 screws securing the stacker base to the cabinet floor. (Figure 86.)
20. Install and tighten the two Torx T-10 screws that secure the rail bracket to the cabinet floor. (Figure 86.)

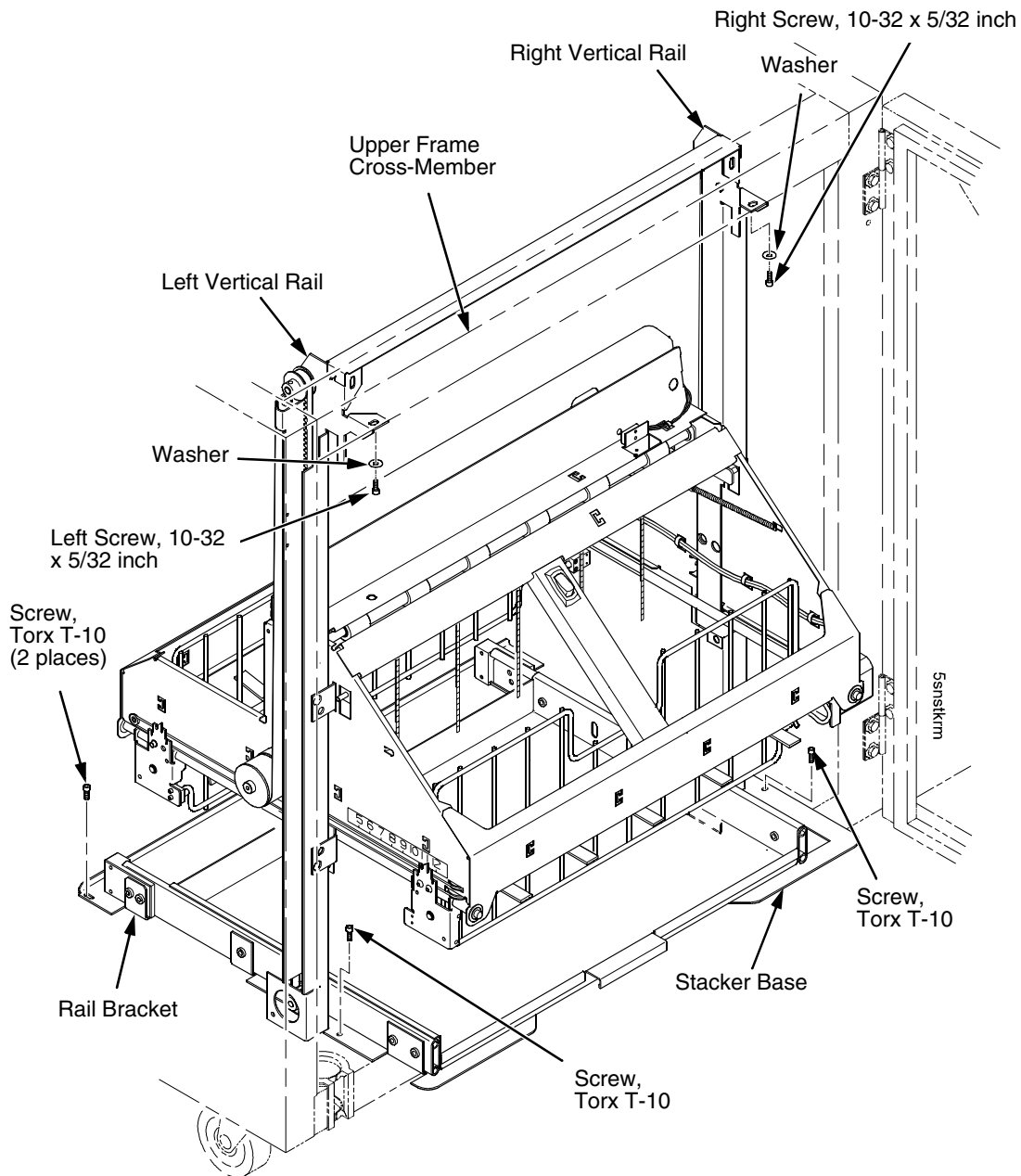


Figure 86. Stacker Fasteners

21. Gather the stacker rail cable, elevator I/O cable, logic cable, and power cable. Route the cables outboard of the elevator assembly. (Figure 87.)

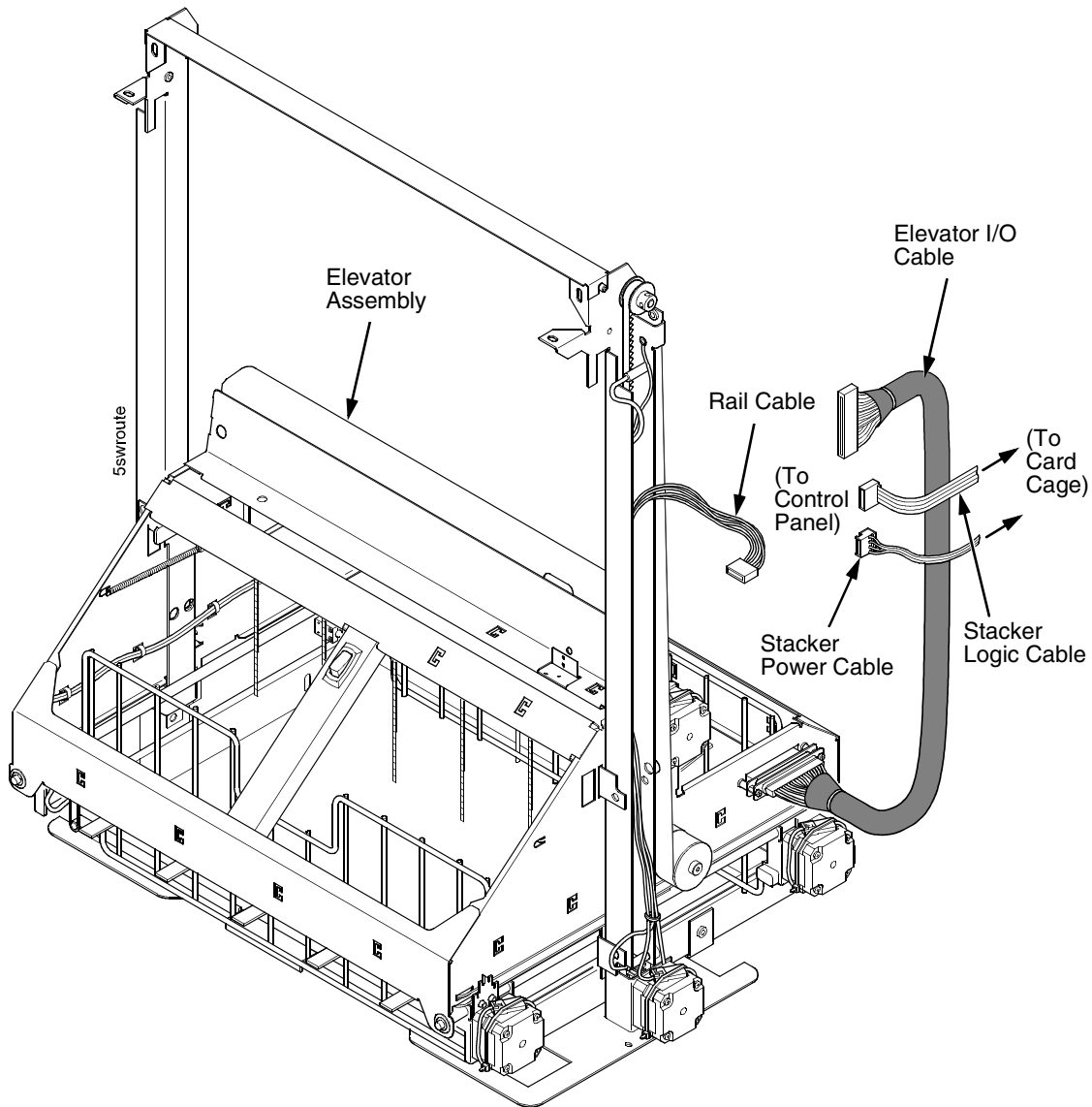


Figure 87. Stacker Cable Routing

22. Connect the stacker cables to the rear of the stacker control panel assembly and make sure the ejector levers close over the connectors. (Figure 88.)
23. Press rail cable connector P107 into the control panel until the ejectors close, then tie wrap the ejectors to the connector. (Figure 88, detail A.)

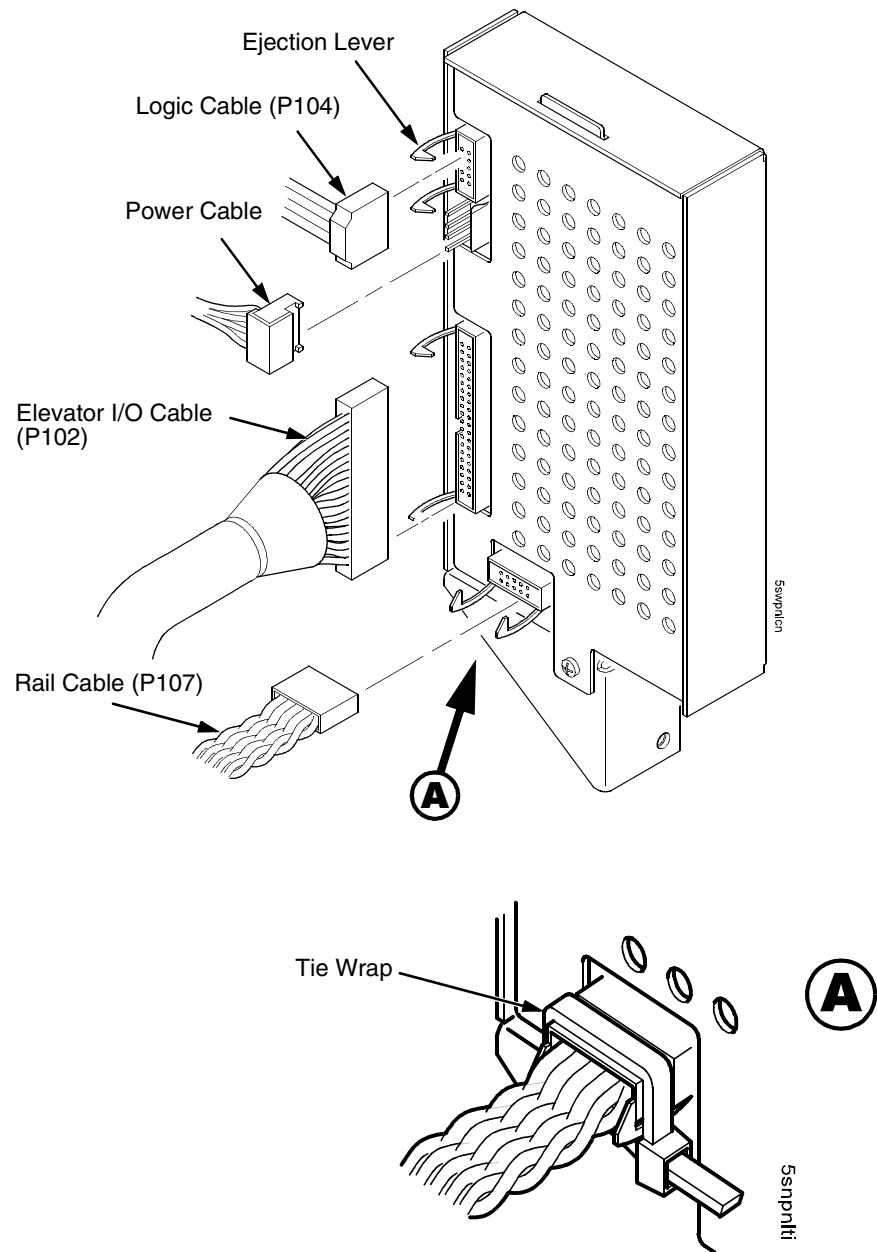


Figure 88. Stacker Control Panel Cables

24. Apply the double-sided tape to one end of the control panel standoff. Remove the paper backing and hold the standoff inside the cabinet while you insert the upper mounting screw and washer through the hole in the frame. Use the screw as a guide to align the standoff with the hole, then press the standoff against the inside wall and push the upper screw in as far as it will go. Now maneuver the control panel into position and install the upper mounting screw finger tight in the control panel. (Figure 89.)
25. Inspect the distance between the control panel lower bracket and the inner panel of the cabinet.
 - a. If the control panel lower bracket is flush with the cabinet inner panel, proceed to step 26.
 - b. If there is a gap between the control panel lower bracket and the cabinet inner panel, do the following:
 - 1) Peel the backing off the spacer adhesive. (Figure 89.)
 - 2) Align the spacer with the holes in the lower bracket and inner panel. (Figure 89.)
 - 3) Press the spacer adhesive against the inner panel. (Figure 89.)
26. Install the lower mounting screw and washer. Tighten the upper mounting screw. (Figure 89.)

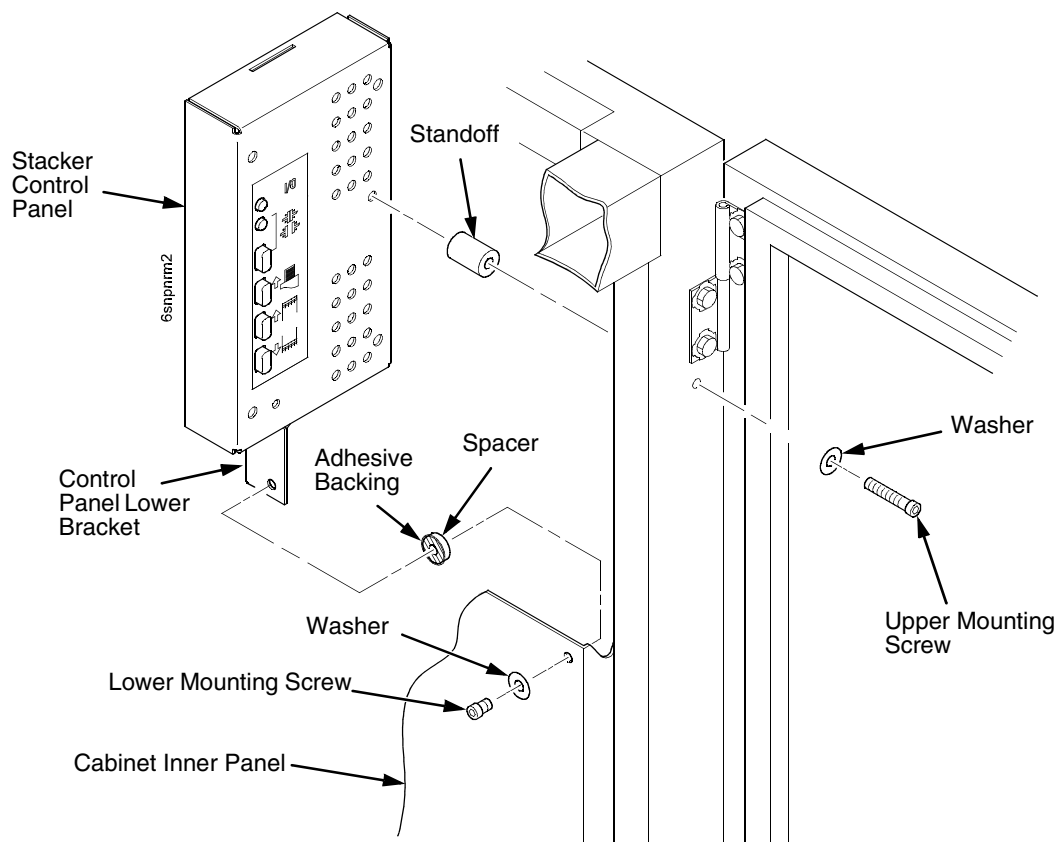


Figure 89. Installing the Stacker Control Panel

27. Install finger tight the 10-32 x 5/32 inch buttonhead screw and washer securing the right vertical rail to the upper frame cross-member. (Figure 86.)
28. Move the elevator assembly up and down on the vertical rails until it travels smoothly with no binding.
29. Tighten the two 10-32 x 5/32 inch buttonhead screws securing the vertical rails to the upper frame cross-member.
30. Pull the paper tray out until the holes in the rails permit access to the M3x6 screws. Tighten the M3 screws securing the vertical rails to the stacker base. Each rail is secured by two screws. (Figure 83.)
31. Move the elevator assembly up and down and make sure it travels smoothly with no binding. If the elevator binds or catches anywhere along its path of travel, slightly loosen the upper rail screws and repeat steps 28 and 29 until the elevator moves smoothly.
32. Bundle the stacker control panel cables in the wire saddles located under the card cage. Tie wrap the cables so they do not catch in the stacker mechanism as it moves up and down. Route the stacker rail and frame cables so they move without snagging as the elevator assembly moves up and down. (Figure 90.)

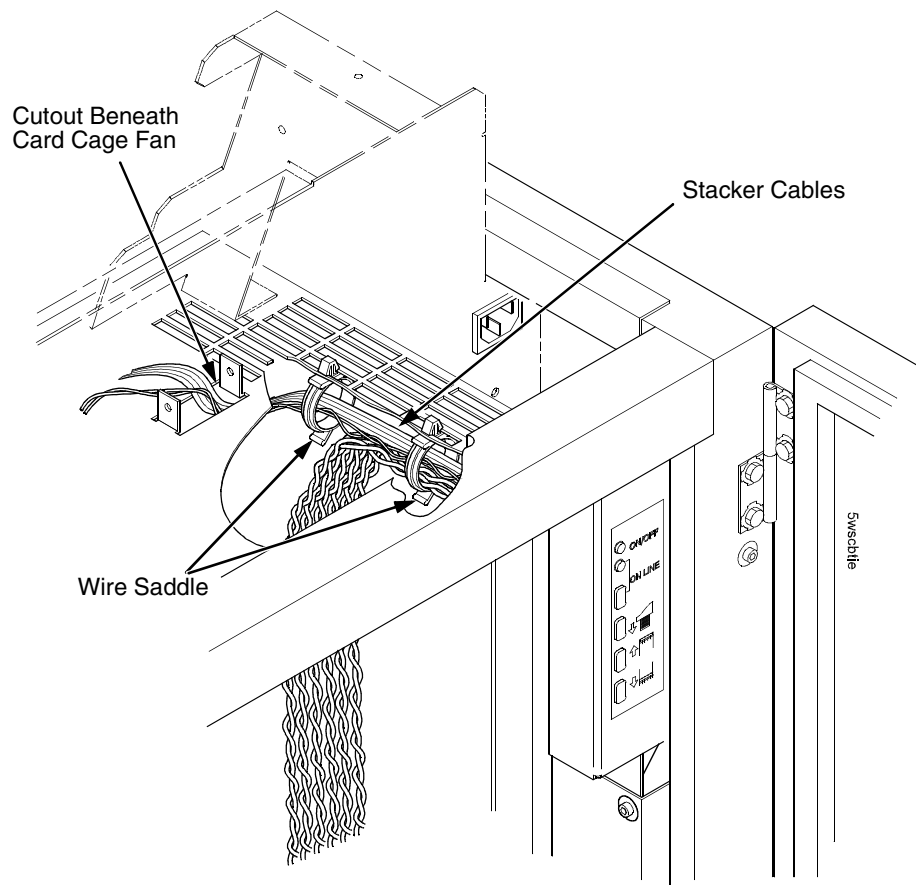


Figure 90. Securing Stacker Cables

33. Install the paper fence. (Figure 91.)

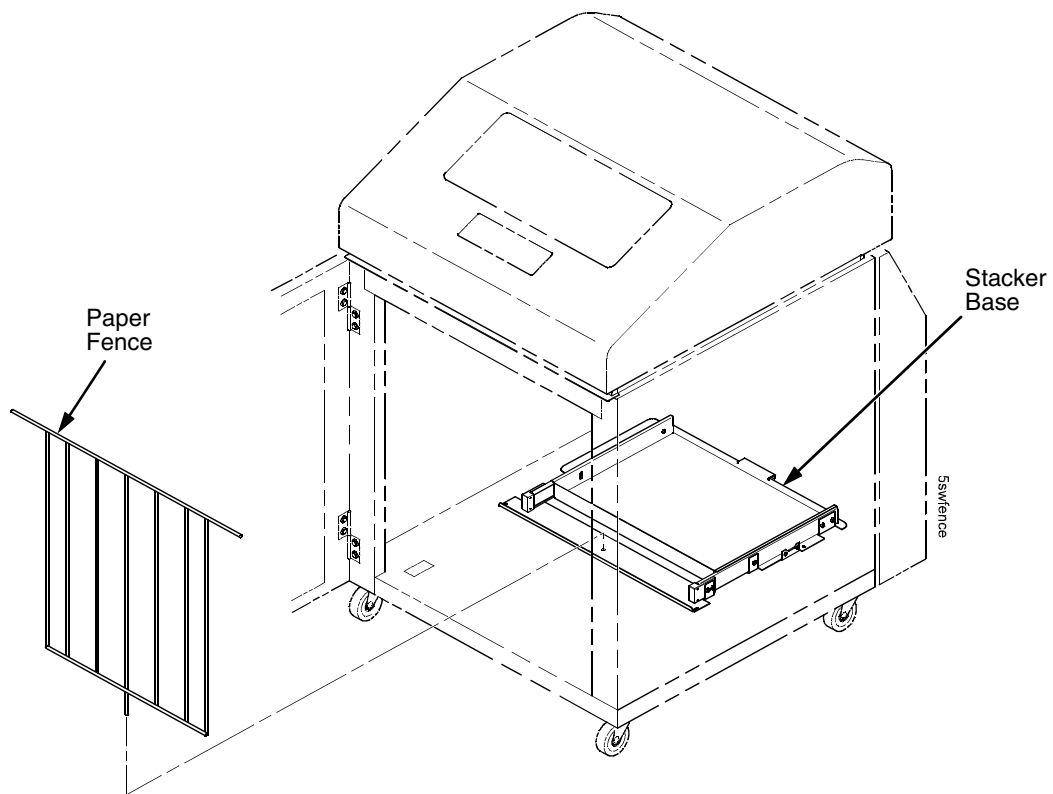


Figure 91. Paper Fence

34. If the paper you will use is not wider than 15.5 inches (39.5 cm), pull out the paper tray and install the paper tent. (Figure 92.) If the paper is wider than 15.5 inches (39.5 cm) leave the paper tent out of the printer

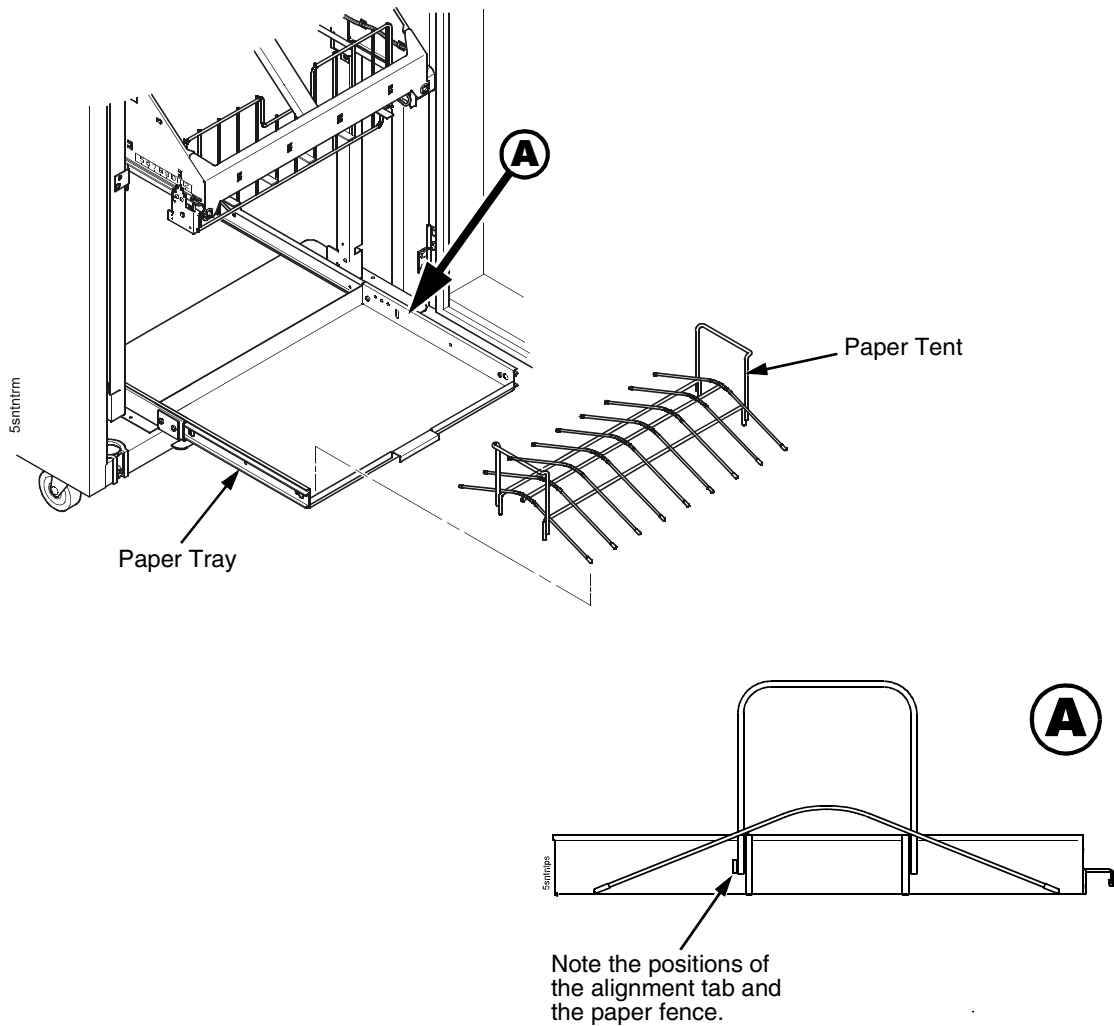


Figure 92. Paper Tent

35. Install the paper path that you removed in step 4.
36. Install paper and test stacker operation. (Refer to the *User's Manual*.)

Replacing The Constant Force Spring

1. Remove the stacker assembly from the printer. (See page 398.)
2. Raise the elevator assembly to within about 1/4 inch of its highest position and secure it to the vertical rails using tie wraps or string. Do not over-tighten the tie wraps or string; tighten them just enough to hold the elevator up. (Figure 93.)

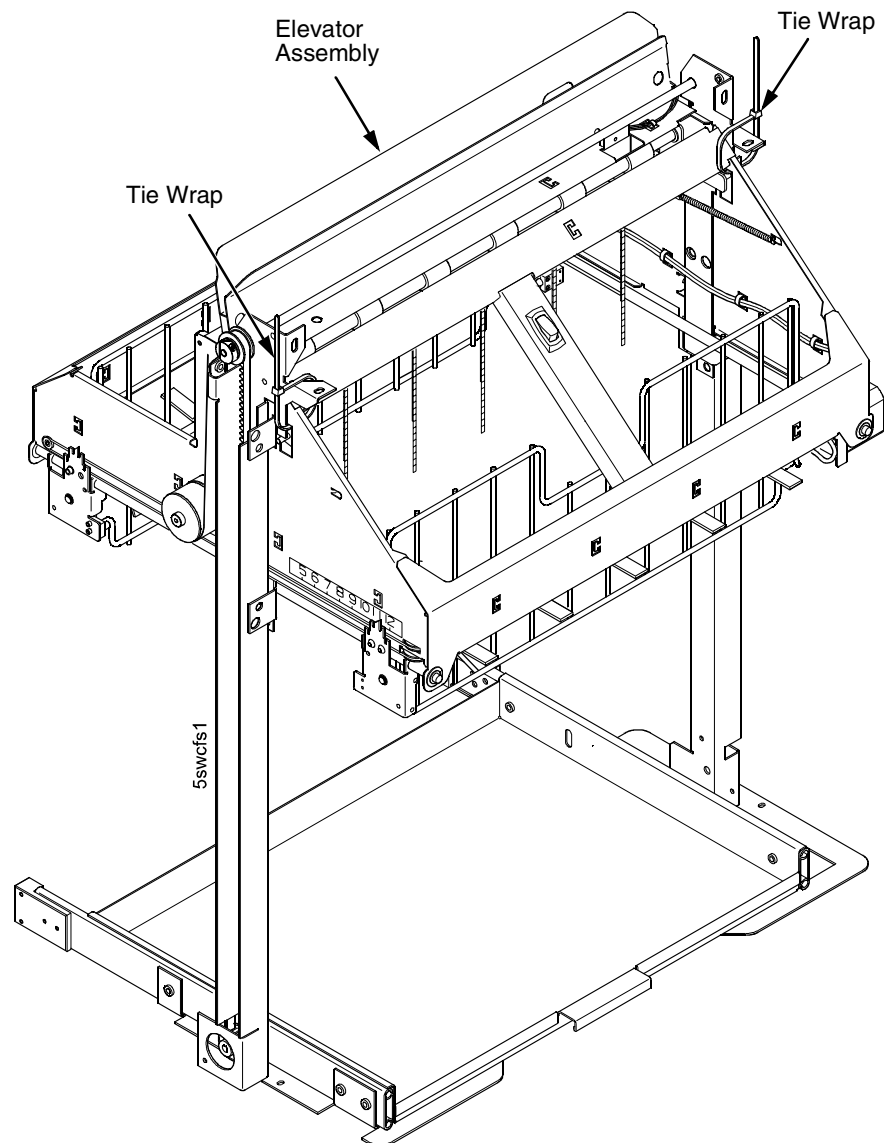


Figure 93. Securing the Elevator Assembly

WARNING The constant force spring is powerful and under high tension. Protect your hands with gloves. To avoid pinching or cutting your fingers, grip the spring and drum firmly in the next two steps. Coil the spring slowly and carefully. Do not let the spring twist or crimp.

3. Remove the shoulder screw, large washer, spacer, and small washer from the constant force spring and drum. Let the spring coil itself up until it reaches the top of its travel on the vertical rail. (Figure 94.)
4. Firmly gripping the spring and drum, remove the rail screw and washer securing the spring to the vertical rail. (Figure 94.)
5. Position a new constant force spring on the vertical rail and install the rail screw and washer. (Figure 94.)
6. Install the shoulder screw, large washer, spacer, and small washer as shown in Figure 94.

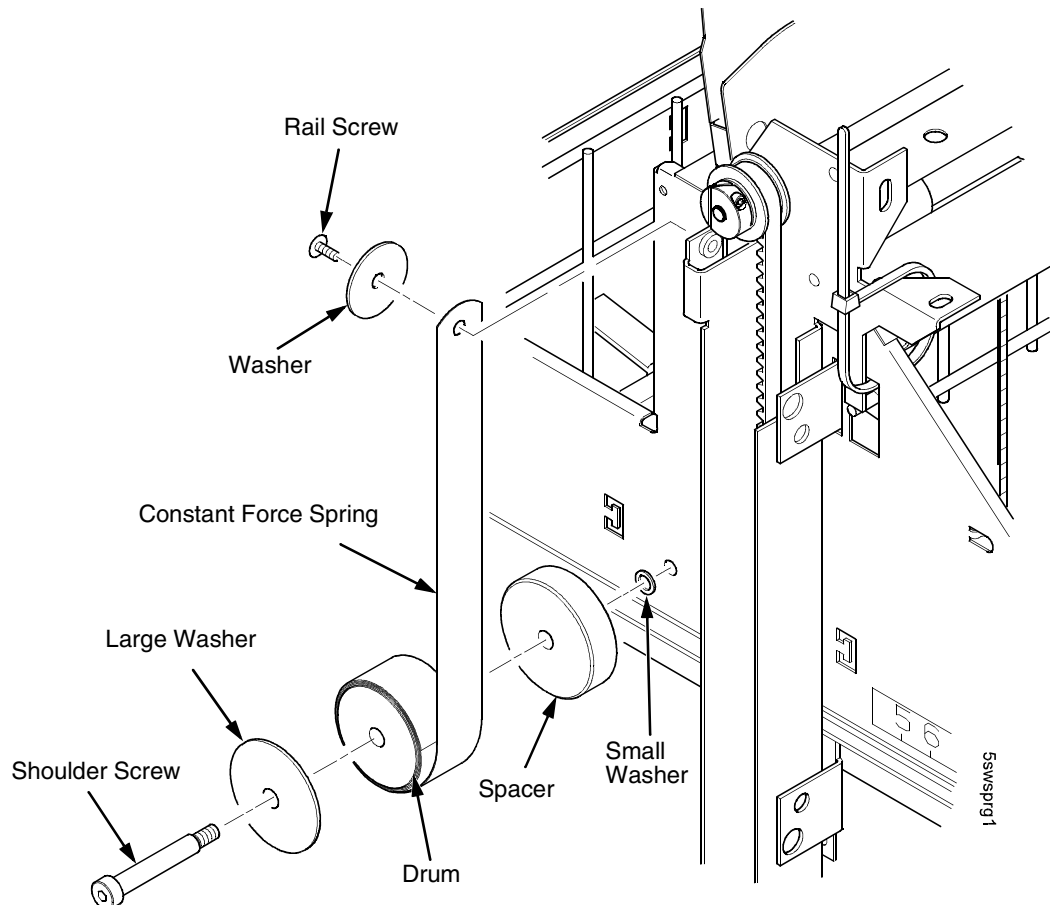


Figure 94. Removing and Installing the Constant Force Spring

Replacing The Timing Belts

1. Remove the stacker assembly from the printer (page 398).
2. Raise the elevator assembly to its highest position and secure it to the vertical rails using tie wraps or string. Do not over-tighten the tie wraps or string; tighten them just enough to hold the elevator up. (Figure 93, page 416.)
3. If you are removing the left timing belt, remove the screw and washer from the pulley at the bottom of the left vertical rail, and remove the pulley. (Figure 95.) Go to step 6.
4. If you are removing the right timing belt, remove the two metric Allen screws that secure the timing belt motor to the right vertical rail. (Figure 95.) Go to step 5.

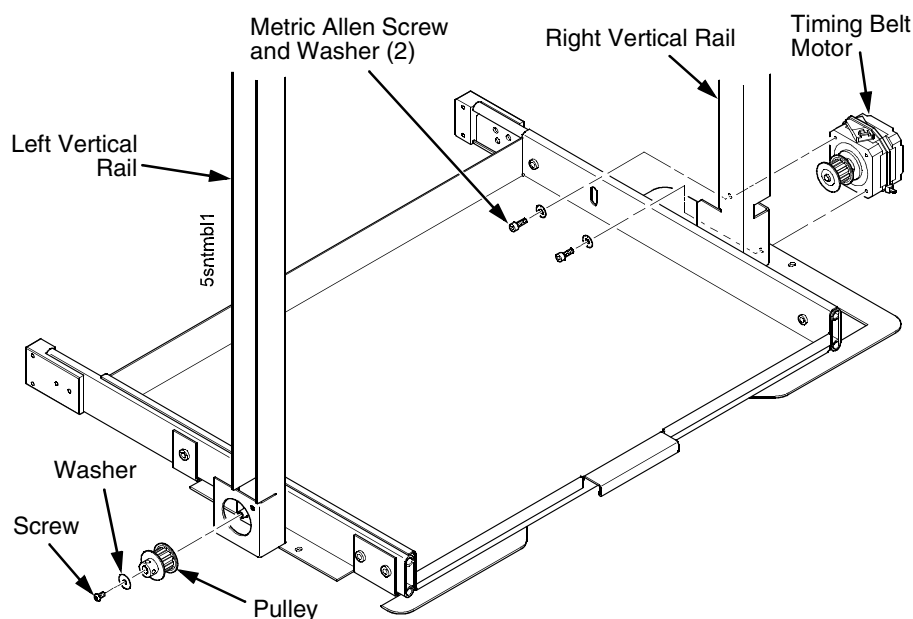


Figure 95. Removing the Timing Belt Pulley and Motor

5. Loosen the two setscrews on the motor pulley and remove the pulley. Unplug the motor cable, if necessary. (Figure 96.) Go to step 6.

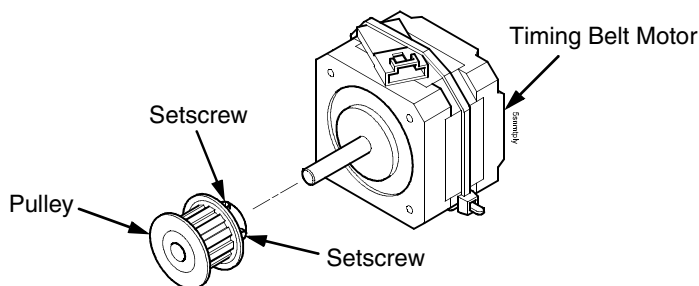


Figure 96. Removing the Timing Belt Motor Pulley

6. Remove the shoulder screw and large washer that secure the constant force spring to the vertical rail. (Figure 97.)

NOTE: Left is shown.
Right is the same.

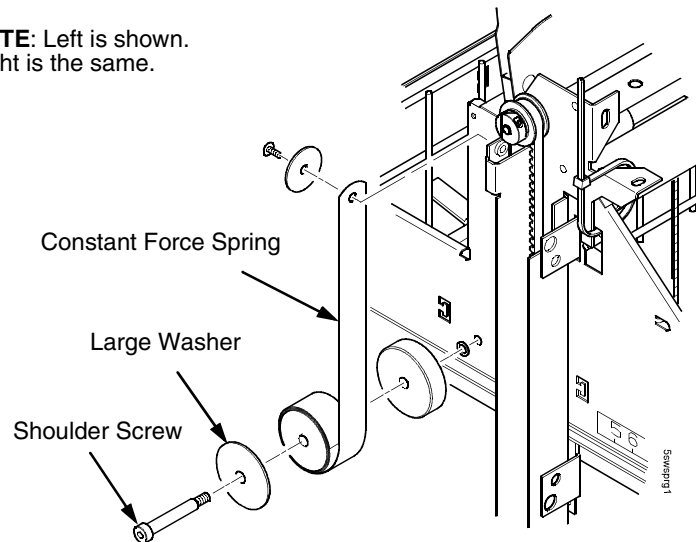


Figure 97. Releasing the Constant Force Spring

7. Remove two Allen screws from the belt clamp that secures the timing belt to the stacker frame. (Figure 98.)

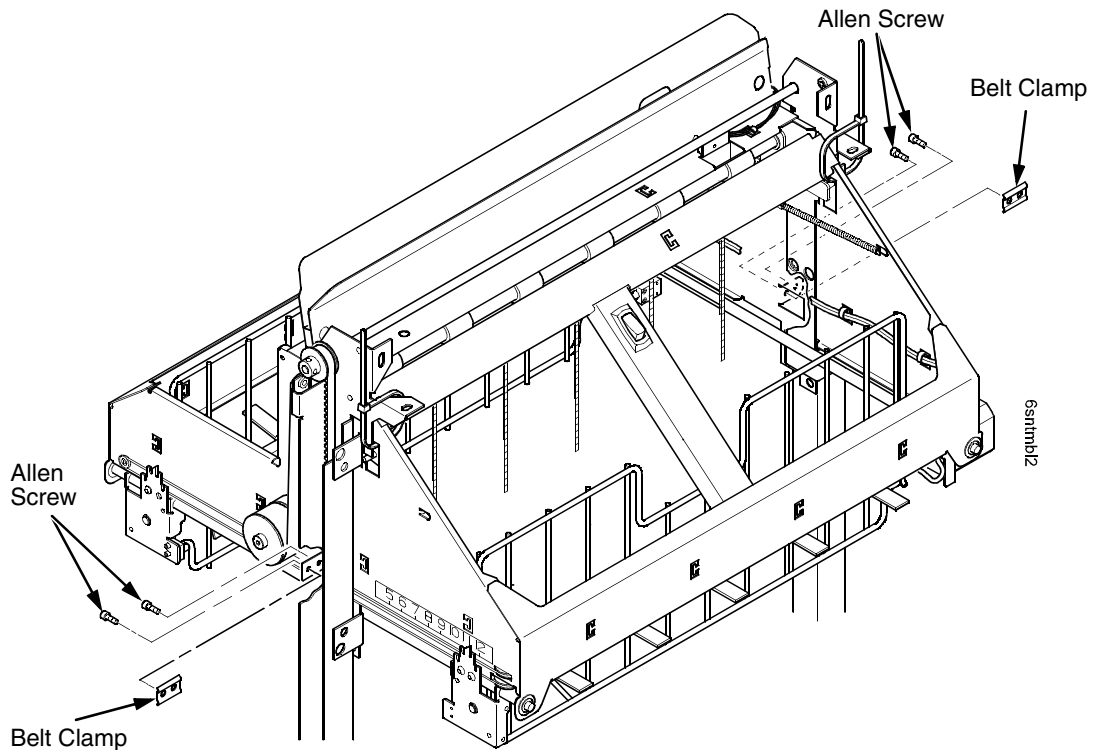


Figure 98. Removing the Belt Clamps

8. Remove the timing belt by working it around the vertical rail and constant force spring. (Figure 99.)
9. To install a timing belt, reverse the steps of this procedure.

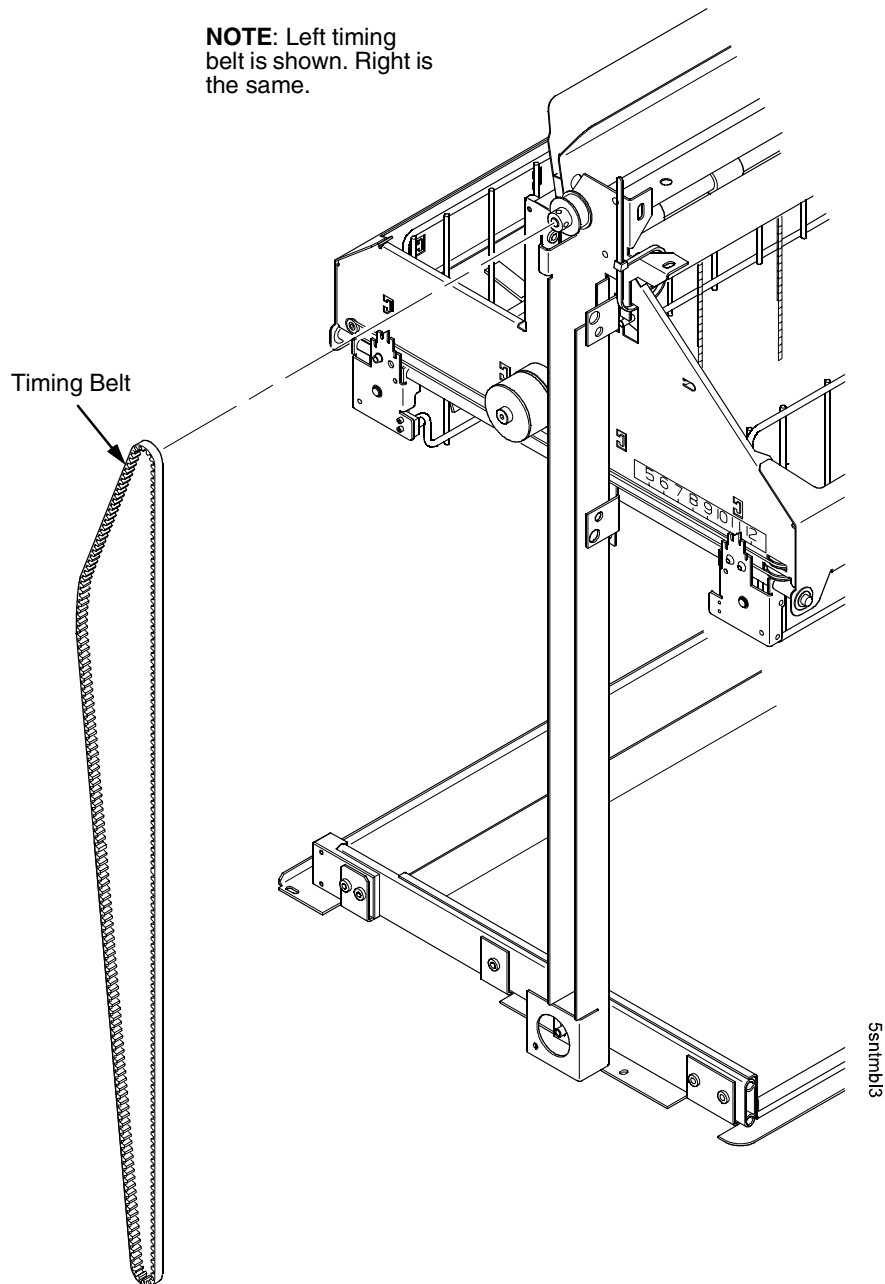


Figure 99. Removing the Timing Belt

Replacing The Roller Drive Shaft

1. Remove the stacker assembly from the printer (page 398).
2. Unhook the right bearing pivot plate's extension spring from the tab on the elevator. (Figure 100.)
3. Using an M-2 Allen wrench, remove the screw securing the right bearing pivot plate to the elevator. (Figure 100.)

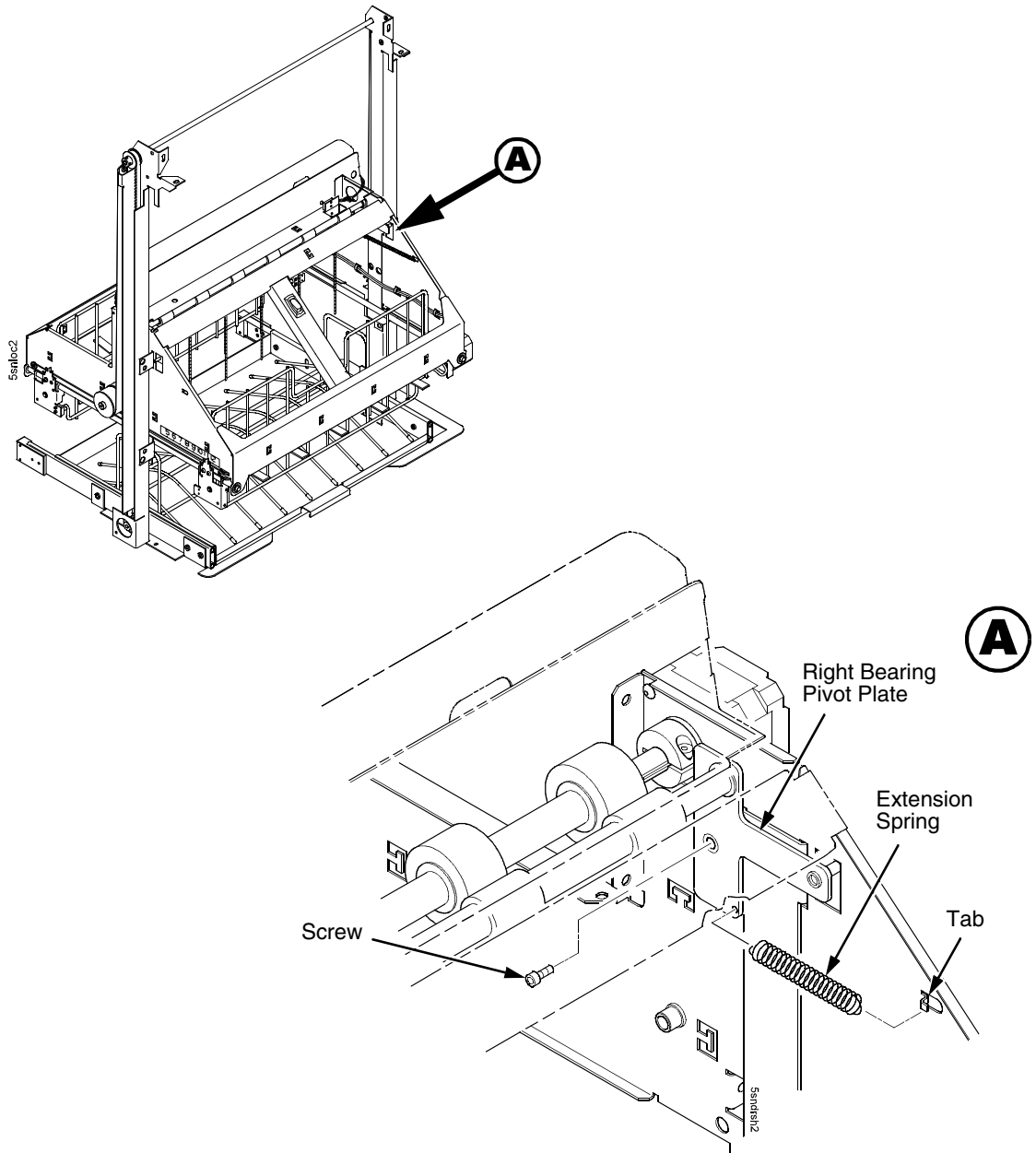


Figure 100. Right Bearing Pivot Plate and Extension Spring

4. Move the idler shaft enough to expose the lower mount screw of the power stacker stepper motor. (Figure 101.)
5. Cut and remove the upper tie wrap securing the stepper motor wires to the elevator. (Be careful not to cut a motor wire.)
6. Using an M-2 Allen wrench, remove the two screws securing the power stacker stepper motor to the elevator. (Figure 101.)
7. Using a 9/64 inch Allen wrench, loosen (do not remove) the collar screw securing the collar to the roller drive shaft. (Figure 101.)
8. Support the roller drive shaft with one hand and pull the stepper motor shaft out of the roller drive shaft. Let the stepper motor hang from its cables.

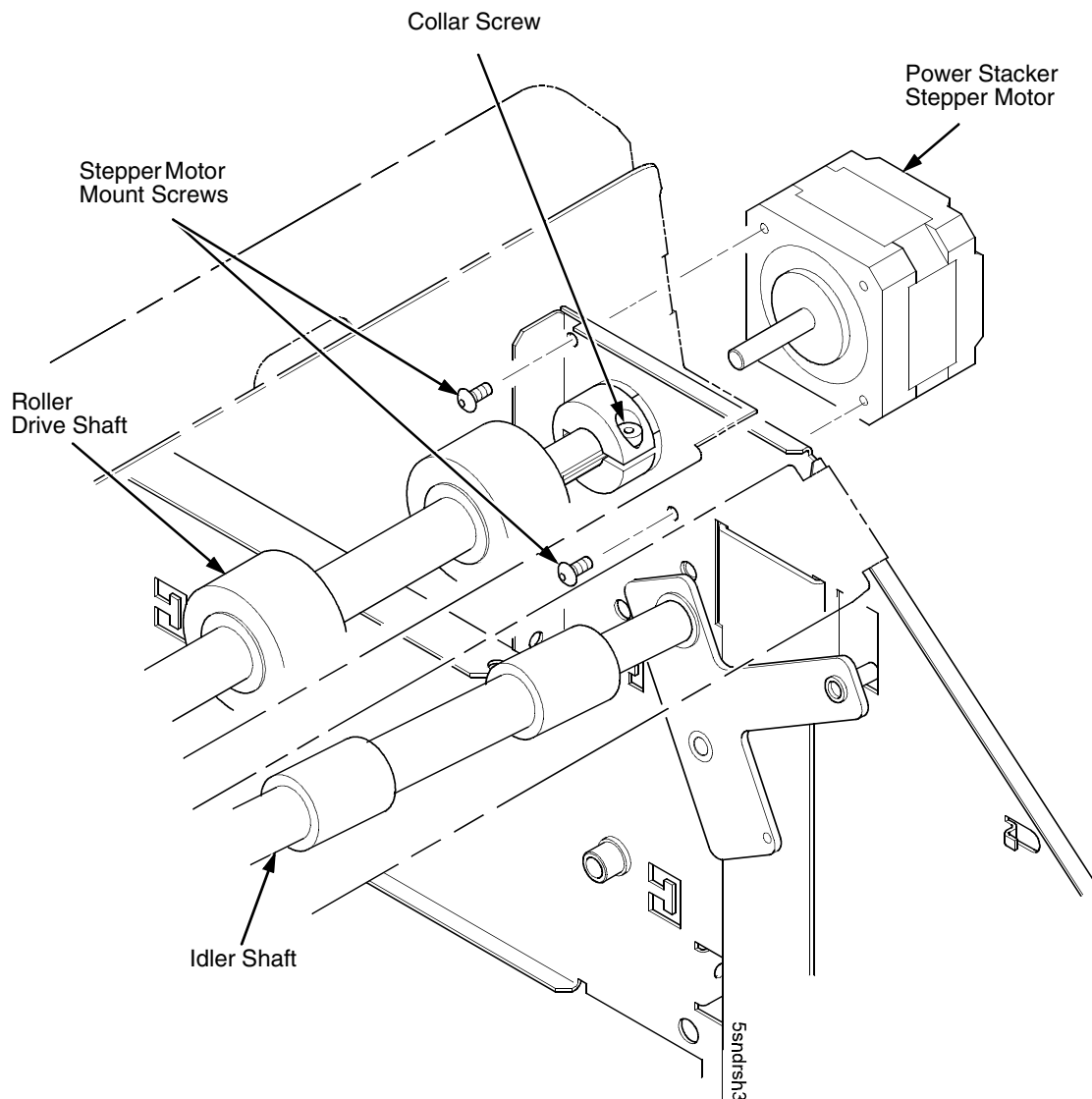


Figure 101. Power Stacker Stepper Motor

9. Remove the roller drive shaft, taking care to retain the bearing at the left end of the shaft and the collar at the right end of the shaft. (Figure 102.)
10. Remove the bearing and collar from the old roller drive shaft and retain these items for installation on the new roller drive shaft. (Figure 102.)
11. Using an M-2 Allen wrench, remove the screw securing the grounding clip to the left side of the elevator. Discard the old grounding clip, but retain the screw so you can install a new grounding clip when you install the new roller driver shaft. (Figure 102.)
12. Remove the new roller drive shaft, grounding clip, and bearing lubricant from the packaging.
13. Inspect the new roller drive shaft for oil and grease; wipe off any oil or grease from the roller drive shaft and rollers. The roller drive shaft must be dry and clean.
14. Apply a small dab of bearing lubricant to the dimple in the new grounding clip. Make sure this is the only area containing lubricant. (Figure 102.)
15. Reverse the steps of the removal procedure, making sure to to install the new grounding clip to the side of the elevator and the bearing and collar onto the new roller drive shaft.

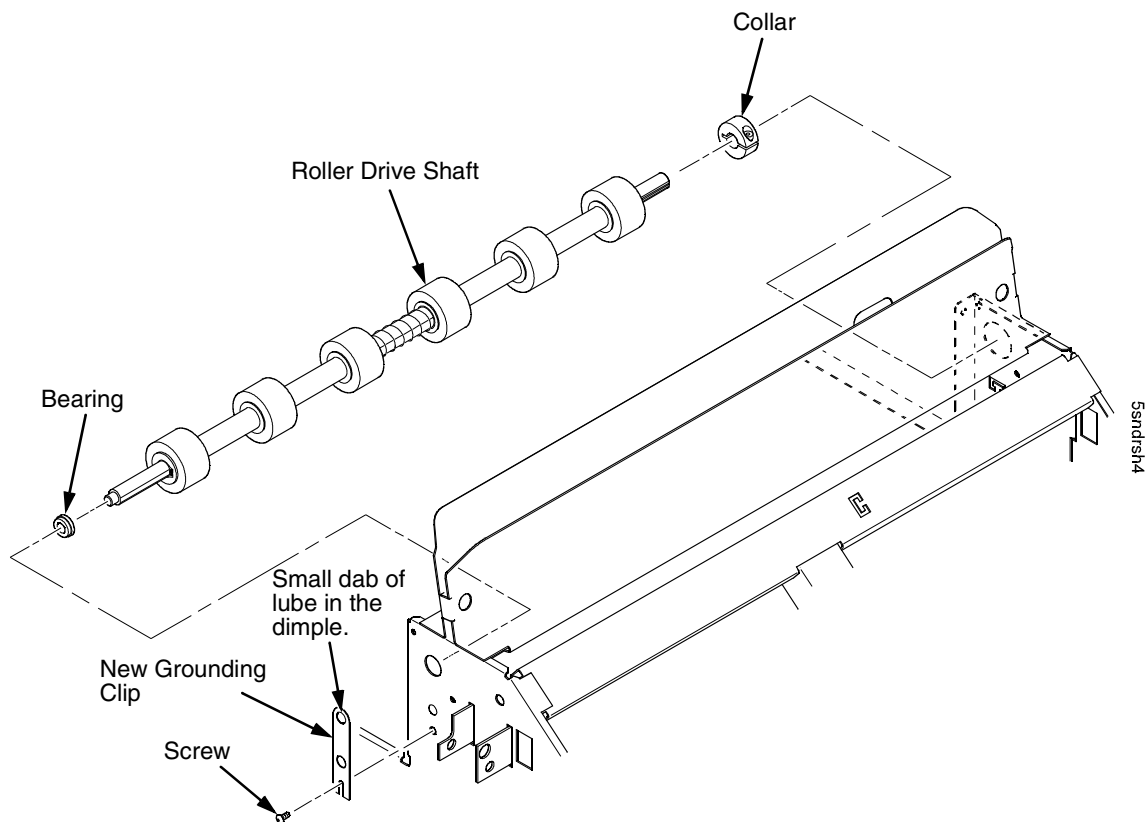


Figure 102. Roller Drive Shaft

Illustrated Parts Breakdown

The Illustrated Parts Breakdown (IPB) consists of exploded drawings of the power stacker assembly and subassemblies. Parts are listed next to each drawing.

IMPORTANT **The Phase III (newest) power stacker is illustrated in this section. If the stacker you are working on does NOT look like the one illustrated here, order the part designated Phase II if the part has both a Phase II and Phase III listing. If a part is not listed as both Phase II and Phase III, you can use that part on any stacker.**

Only replaceable parts are assigned part numbers. If a part or assembly is damaged but does not have a part number, replace the entire power stacker assembly.

NOTE: Part numbers listed in the column labeled **Europe, Mideast, and Africa (EMEA)** are **RoHS compliant**. These parts conform to requirements specified in DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The IPB starts on the next page.

List of Illustrations

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Figure 104. Elevator Detail: Motors, Rollers, and Paddles page 428

Figure 105. Stacker Detail: Motor Bracket page 430

Figure 106. Stacker Detail: Elevator Bracket page 432

Figure 107. Stacker Detail: Paper Motion Detector..... page 434

Parts Not Illustrated In This Section:

- Extended Door Assembly, Stealth Black:177489-001
Extended Door Assembly, Lt Gray: 179792-001
- Reed Limit Switch Assembly: 204234-001
- Control Panel Assy, Pwr Stkr, Black, Americas and Asia/Pacific:
178911-901; EMEA (RoHS): :250676-901) (See Figure 89, page 412)
Cont. Pnl Assy, Pwr Stkr, Blk, Adv Exch, Americas and Asia/
Pacific:178911-991; EMEA (RoHS):250676-991
Control Panel Assy, Pwr Stkr, Gray: 179798-001
- Stacker Hardware Kit: 173830-001
- Rail Cable, Power Stacker: 173823-001 (See page 370)
- Power Cable, Power Stacker: 174414-001 (See page 369)
- Logic Cable, Power Stacker: 176029-001 (See page 368)
- Frame Cable, Power Stacker: 173824-001 (See page 367)
- Elevator I/O Cable, Power Stacker: 174759-001 (See page 371)

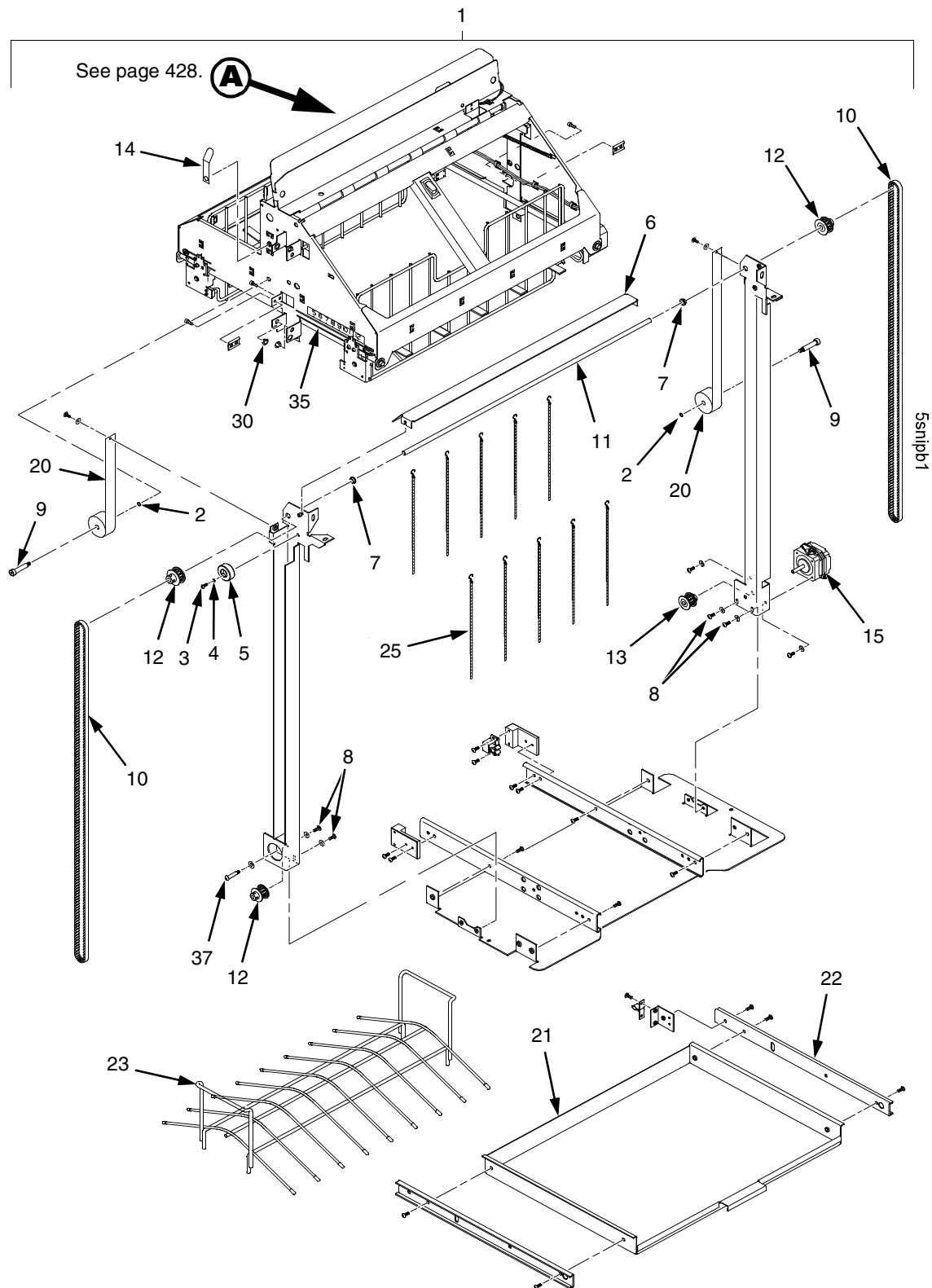


Figure 103. Stacker Assembly

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	178908-001 179804-001	178908-001 179804-001	Stacker Assembly, Power, Black Stacker Assembly, Power, Gray	
2	204956-001	204956-001	Washer, 5/16 X .200 X .030, Stainless Steel	Part of item 36
3	203251-001	203251-001	Screw, Hex Skt Btn Hd, Zinc M3X8mm	
4	204458-001	204458-001	Washer, Shim, .125 ID X .010 inch Thick	
5	173818-001	173818-001	Timing Belt Tensioner Assy, Pwr Stkr	
6	178899-001 179802-001	178899-001 179802-001	Deflector, Power Stacker, Black Deflector, Power Stacker, Gray	
7	202721-901	202721-901	Clip-On Bearing	Part of item 36
8	Ref	Ref	Screw, Torx, 6-32 x .25	Part of item 36
9	Ref	Ref	Screw, Shoulder, 10-32	Part of item 36
10	202716-001	202716-001	Timing Belt	
11	173726-001	173726-001	Shaft, Lift, Phase III	
12	178058-001	178058-001	Pulley, Timing, Fairloc, 12T	
13	159398-001	159398-001	Pulley, Motor	
14	175726-901	175726-901	Clip, Ground, Dimpled, Pwr Stkr	Part of item 47
15	158446-001	158446-001	Motor Assembly, Power Stacker	Elevator motor and paddle motor
16	173530-001	173530-001	Motor, Stepper, Power Stacker	Paper puller motor
20	178918-001	178918-001	Spring, Conforce, with Spool Assy	
21	178913-001	178913-001	Field Kit, Tray, Cab, Rear, Black	
22	174392-001	174392-001	Slide, Ball Bearing, Rear Tray	
23	173864-001	173864-001	Tent, Paper, Power Stacker	
25	151527-905	151527-905	Chain	Mount outboard of shafts
30	202705-901	202705-901	Nylon Plug	
35	202720-901	202720-901	Cable	
36	173830-001	173830-001	Stacker Hardware Kit	Kit not illustrated
37	Ref	Ref	Screw, Shoulder, 8-32	Part of item 36

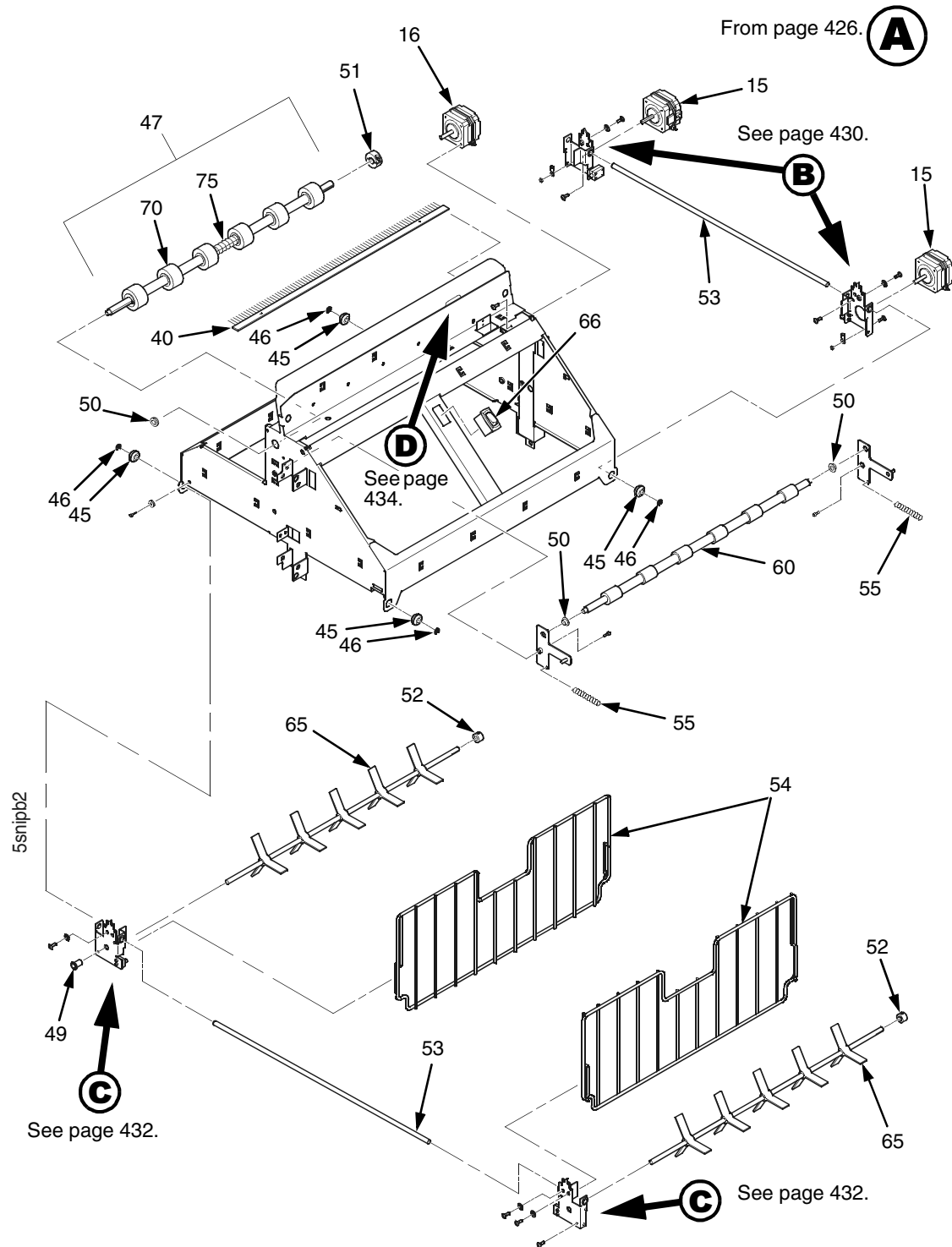


Figure 104. Elevator Detail: Motors, Rollers, and Paddles

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
40	158313-001	158313-001	Anti-Static Brush	
45	Ref	Ref	Shear Grommet	Part of item 36
46	Ref	Ref	Cap Nut	Part of item 36
47	158736-901	158736-901	Drive Shaft Assy (Roller Drive Shaft)	Includes items 14, 70, and 75
48	156393-001	156393-001	Spacer, Drive Roller	Part of item 47
49	202789-901	202789-901	Bearing, Flanged	Part of item 36
50	202824-901	202824-901	Bearing	Part of item 36
51	202708-901	202708-901	Collar Clamp	
52	Ref	Ref	Collar, Setscrew	Part of item 36
53	156390-001	156390-001	Support Shaft	
54	174570-001	174570-001	Fence, Wireform, Phase III	
55	203032-001	203032-001	Extension Spring	
60	157275-001	157275-001	Idler Roller	
65	157054-001	157054-001	Paddle, Power Stack	
66	204235-001	204235-001	Switch, Assy, Rocker	Elevator Disable Switch
70	157960-001	157960-001	Drive Roller	Part of item 47
75	176781-001	176781-001	Compression Spring	Part of item 47
76	204234-001	204234-001	Switch Assy, Reed Limit (2)	Not illustrated; attach to item 77
77	250235-001	250235-001	Reed Switch Mounting Plate (2)	Not illustrated; attach to top and bottom of right vertical rail

From page 428.

B

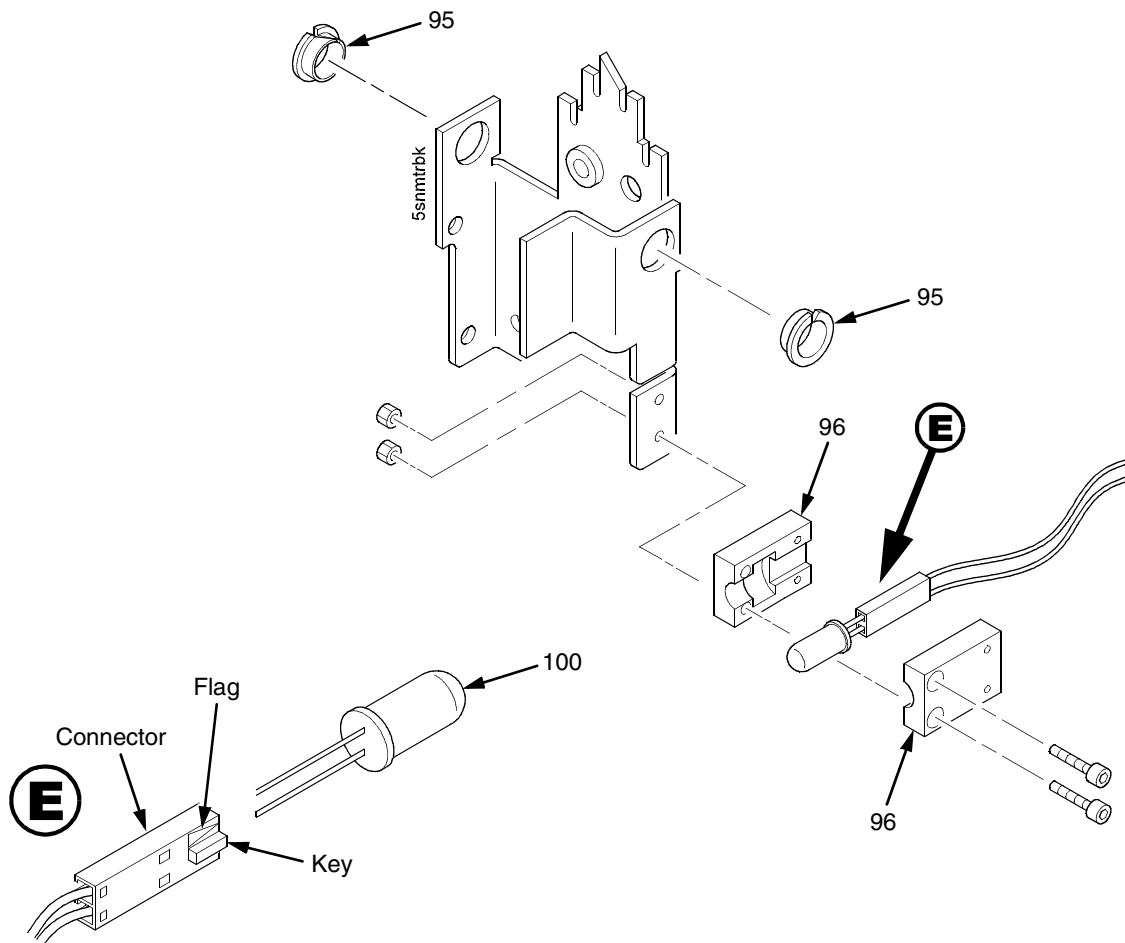


Figure 105. Stacker Detail: Motor Bracket

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
95	Ref	Ref	Clip-On Bearing	Part of item 36
96	158288-001	158288-001	Holder, LED, Round	
100	Ref	Ref	LED, IR, T-1, 3/4	

C

From page 428.

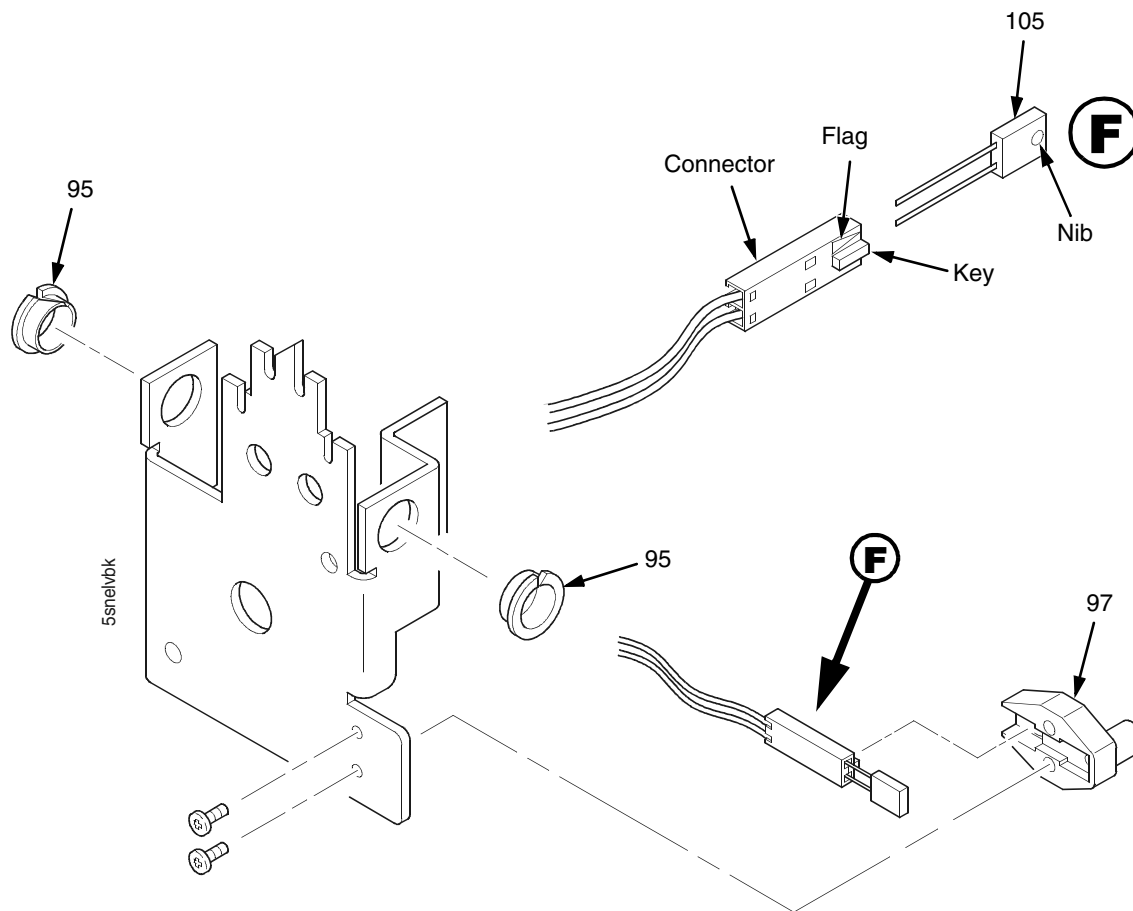


Figure 106. Stacker Detail: Elevator Bracket

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
95	Ref	Ref	Clip-On Bearing	Part of item 36
97	158290-001	158290-001	Holder, LED, Flat	
105	Ref	Ref	Photodarlington, NPN, Rectifier	

From page 428.



Rotated 180 Degrees

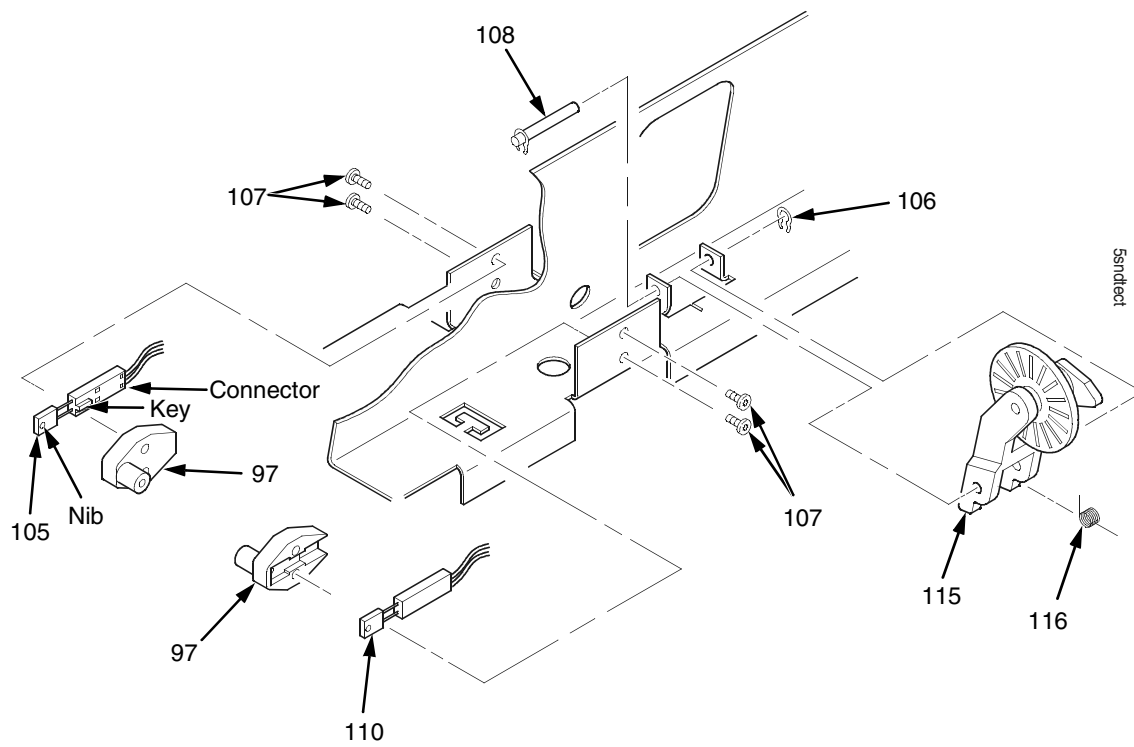


Figure 107. Stacker Detail: Paper Motion Detector

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
97	158290-001	158290-001	Holder, LED, Flat	
105	Ref	Ref	Photodarlington, NPN, Rectifier	
106	Ref	Ref	Retaining Ring, External, 0.093 inch	Part of item 115
107	Ref	Ref	Screw, Panhead, Type B, 2 x 3/16	Part of item 36
108	Ref	Ref	Shaft, Paper Detector Switch, Long	Part of item 115
110	Ref	Ref	LED, IR, Rectangular	
115	170289-001	170289-001	Field Kit, Power Stacker, PMD	Paper Motion Detector
116	Ref	Ref	Spring, Torsion	Part of item 115

E

Zero Tear (ZT) Printers

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Overview

Zero Tear (ZT) printers are pedestal models equipped with hardware and software which permit them to print without losing a sheet of paper between print jobs. The ZT printer automatically presents the current print line to the tear bar when it finishes printing and no data are being sent to the printer. When it receives more data from the host computer, the ZT printer pulls the form down to the print station and resumes printing.

The ZT printer is available as a 500, 1000, or 1500 LPM ASCII printer, as a 200, 300, 600, or 800 LPM H-Series (DBCS) printer, and as a 133 IPM HD (High Definition) printer.

Performance Limitations

Forms Type

The paper feed tractors on a ZT printer push the paper up through the print station instead of pulling paper down through it, as in the standard pedestal printer. This limits the kinds of forms the ZT printer can use. If the forms do not fall within the limits specified in Table 8, the printer may lose top-of-form, the frequency of paper jams may increase, dot compression and line separation could occur, or printing may not even be possible. The user should match the media to the application to ensure acceptable print quality. Also, because the paper is pushed from below the print station, the last form in the paper supply may not print fully or may not be presented to the printer exit for retrieval.

All paper used in the ZT printer must have the standard tractor feed holes, spaced one half inch apart. The ZT printer does not support cut sheet and continuous friction fed paper. Also, the forms specified in Table 8 can have no more than one form per page horizontally.

Table 8. Forms Type

Description	Length	Width (edge to edge)
One to three part, continuous, with carbon, fan-folded, edge-perforated paper forms	3 to 12 inches	7 to 16½ inches
One to four part, continuous, with carbon, fan-folded, edge-perforated paper forms	3 to 12 inches	7 to 12 inches
One to four part, continuous, carbonless, fan-folded, edge-perforated paper forms	3 to 12 inches	7 to 16.5 inches
One to six part, continuous, carbonless, fan-folded, edge-perforated paper forms	3 to 12 inches	7 to 12 inches
Forms with a paper weight of 20 to 100 pounds and a maximum thickness of 0.025 inches	3 to 12 inches	7 to 16½ inches
Forms with a paper weight of 18 to 100 pounds and a maximum thickness of 0.025 inches	3 to 12 inches	7 to 12 inches
Forms with all approved types of interleaf edge attachment except those using metallic or other hard devices		

Paper Jams

Paper jams can occur if you tear off a form incorrectly. If you experience two or more paper jams per box of forms, follow these guidelines to help reduce jams:

- Position the lower paper guides properly
- Adjust the paper web tightness properly
- Position the form perforation against the tear bar
- Do not tear off a form while the paper is moving
- Direct the tear force toward yourself and across the tear bar, not upward

User Environment

Printed forms exit the printer from the top of the pedestal lid, which makes a ZT printer a little noisier than a standard pedestal printer.

Control Panel Menus

The ZTP SETTINGS menu includes the ability to enable or disable the features unique to the ZT printer (ZTP), set the tear bar distance, set the auto present data time, and set the auto present wait time. This section defines these options. (For more information about configuration menus, refer to the *User's Manual*.)

ZTP Function

This option enables or disables all the functions unique to the ZTP. The default is Enable.

ZTP Tear Distance

This option sets the tear off distance from the current print position to the tear bar. Adjustable values in increments of 1/144th inch range from 200 to 2880. The up and down arrows adjust the display value. When you press the **Enter** key, the selected value is stored and a scale is printed to indicate the current tear off position. The default value is 1060.

ZTP Data Time

This option sets the pause time in the data stream that the ZTP requires before moving the form to the tear bar once a print job is completed. The values range from .5 to 5 seconds. The default is .5 seconds.

ZTP Wait Time

This option sets the minimum amount of time that the form stays at the tear bar. This allows you time to remove the form before the form is retracted to print the next form. The adjustable values range from 1 to 10 seconds in increments of 1 second. The default value is 2 seconds.

ZTP Platen Open

This option allows the user to have the platen open whenever forms are reversed. Enabled is the default, used for most papers and labels. The feature can be disabled as required by some multi-part forms.

Operation

Adjust The Paper Guides

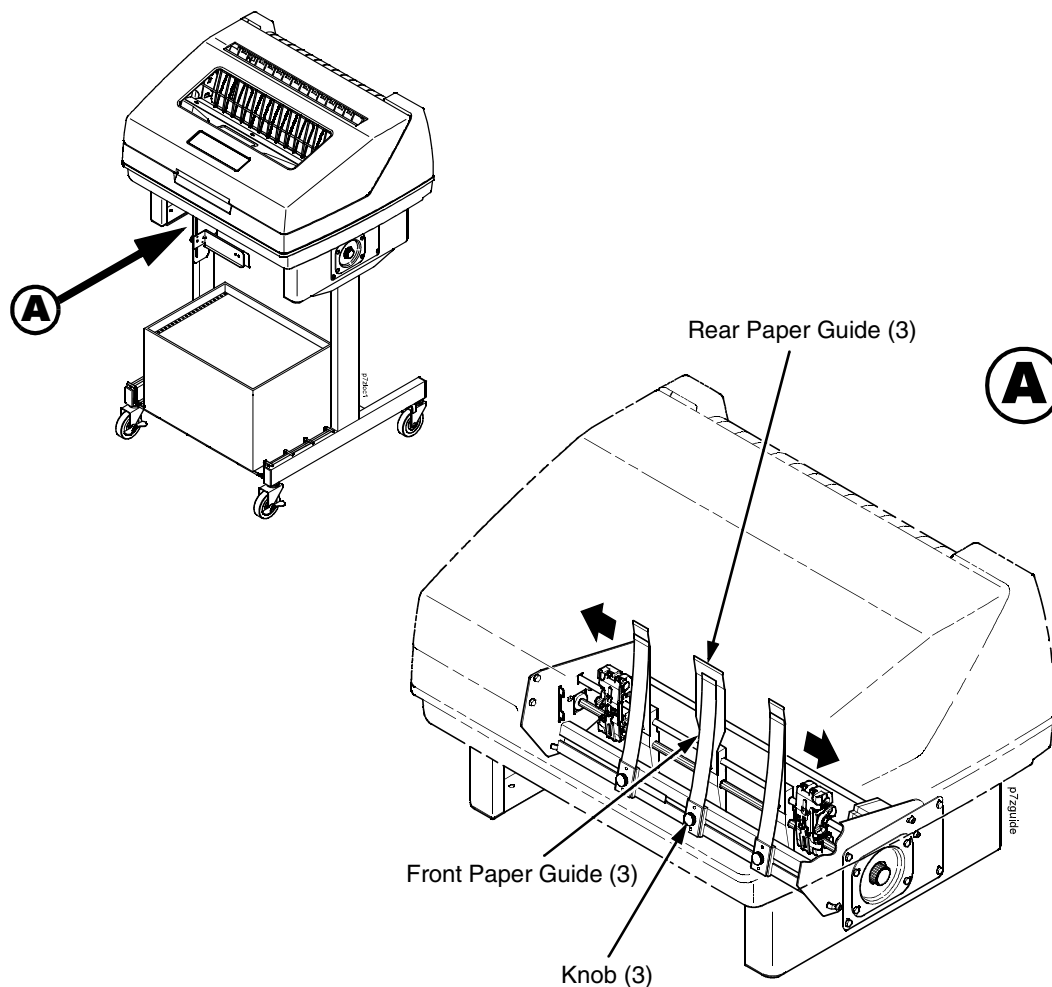


Figure 108. Adjusting The Paper Guides

1. Turn the knob on the front left paper guide counterclockwise to loosen the guide.
2. Slide both the front and rear left paper guides as close to the left tractor as possible.
3. Turn the knob on the front left paper guide clockwise to tighten the guide.

4. Similarly, position the right paper guides as close to the right tractor as possible.
5. Position the middle paper guides in the center.

Load Paper

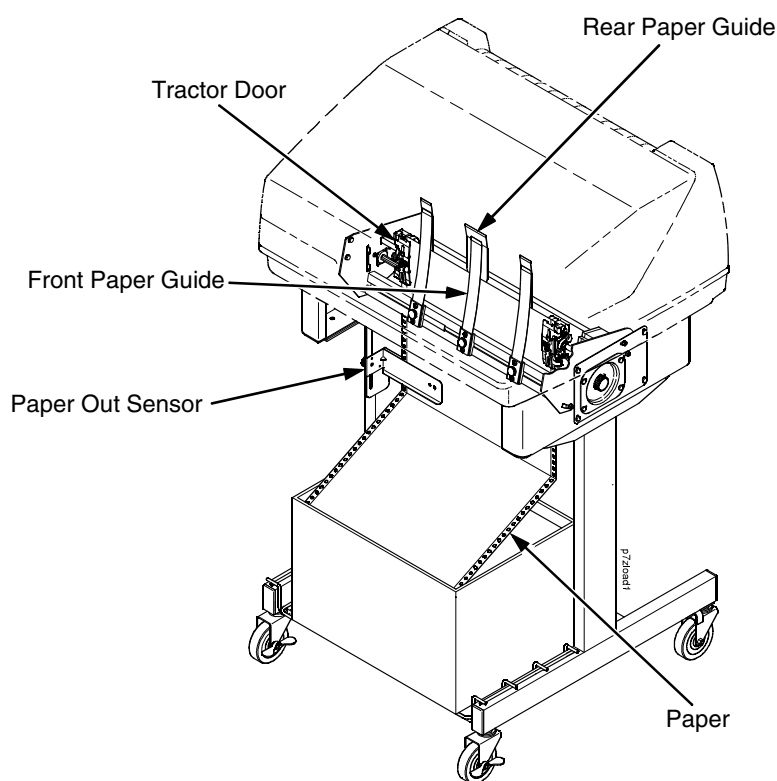


Figure 109. Loading Paper

1. Open both tractor doors.
2. Slide the paper up through the paper out sensor slot on the left side, and up between the front and rear paper guides.
3. Unlock the left tractor and load the paper on the left tractor sprockets.
4. Close the left tractor door.
5. Unlock the right tractor and load the paper onto the right tractor sprockets.
6. Close the right tractor door.
7. Adjust the paper web tightness by sliding the right tractor to remove slack or to adjust for various paper widths.
8. Lock both tractors in position by pressing down on the tractor locks.

Set The Tear Bar Distance

To set the tear bar distance, do the following steps:

1. Power the printer on.
2. Make sure the printer is offline.
3. Press the right arrow ► until "OFFLINE/ZTP SETTINGS" displays.
4. Press the down arrow ▼. "ZTP DataTime" displays.
5. Press the right arrow ► until "ZTP TearDist" displays.
6. Press the down arrow ▼. "ZTP TearDist/xx/144 Inch" displays.
7. Press the **Enter** key. A scale prints to indicate the tear bar distance in relation to the tear bar.
8. Press the left arrow ◀ or right arrow ► to decrease or increase the tear bar distance in increments of 1/144th inch.
9. Press **Enter** to select the desired value. An asterisk appears next the selected value.
10. Press **Enter** again to print a new scale. For correct tear bar distance, the zero should align with the tear bar. (See Figure 110.)

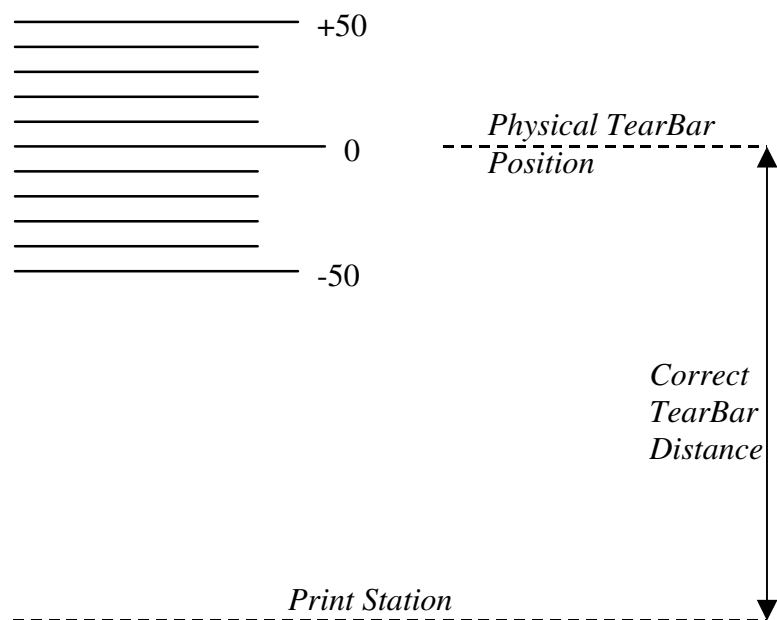


Figure 110. Correct Tear Bar Distance

11. Reset the top of form, using the procedure on page 443.

Set The Top Of Form

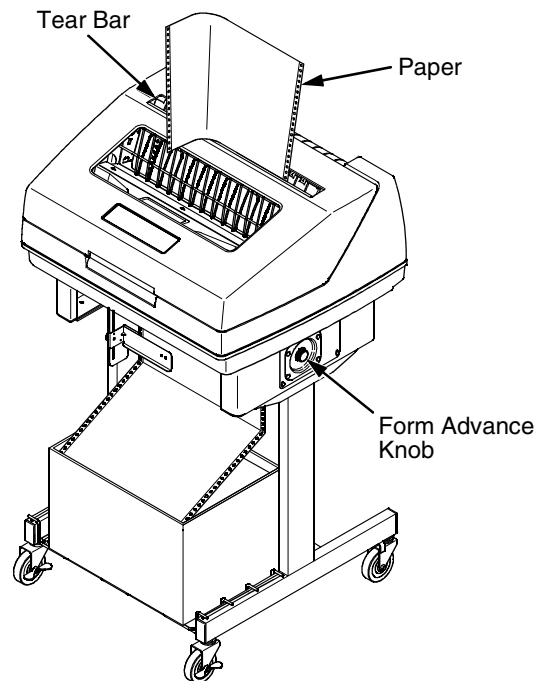


Figure 111. Setting The Tear Off Position

The ZT printer uses the tear bar as the reference point for setting the tear off position. To set the position of the forms perforation to the tear off bar, use the **SET TOF** key as follows:

1. Make sure the paper guides are adjusted correctly and the paper is properly loaded.
2. Press the **SET TOF** key on the control panel. The printer display will read "Align at TearBar/Then Press TOF".
3. Use the form advance knob to move the top of the form to the tear off bar.
4. Position the perforation so it aligns with the tear off bar. This is easily done by advancing one complete sheet above the tear off bar and folding it over at the perforation.
5. Position the fold exactly at the tear off bar.
6. Tear the sheet off to ensure proper positioning and a clean tear off.

NOTE: If you do not want to lose a form, position the top of the form at the tear off bar. Run a finger along the back of the form along the tear off bar to ensure the perforation is presented at the tear off point.

7. Press the **SET TOF** key again. The printer display will read "Top Of Form Set/Press ONLINE". The printer will then be brought OFFLINE and the top of form will be set.
8. Press the **ONLINE/CLEAR** key to bring the printer online.

Position The Paper Out Sensor

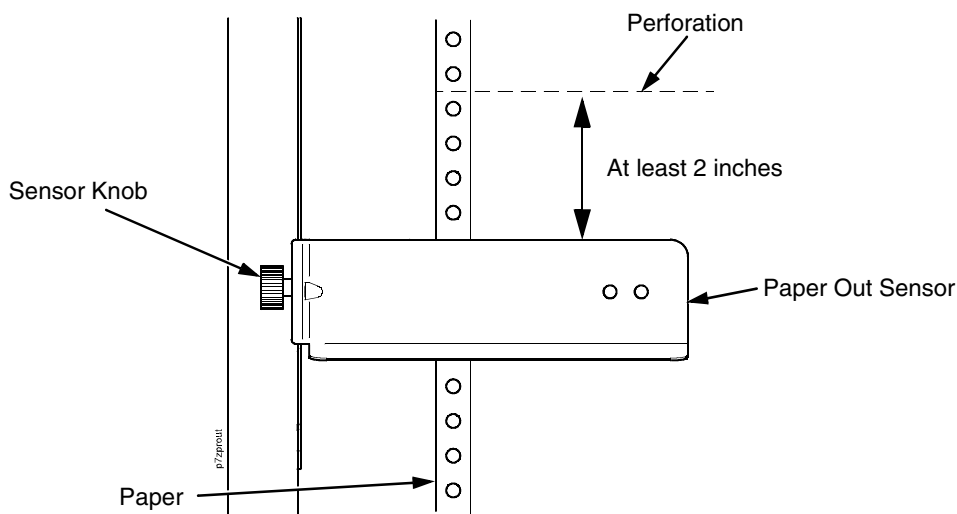


Figure 112. The Paper Out Sensor

The paper out sensor indicates when the printer runs out of paper. (The sensor does not work with black-backed forms.) Unlike the standard pedestal printer, on a ZT printer you must load the paper through the paper out sensor slot (Figure 109 and Figure 112). Correct positioning of the paper out sensor ensures that the last form the printer prints will be properly presented to the tear bar. To position the paper out sensor, do the following:

1. Position the paper properly at the tear bar (page 443).
2. Loosen the paper out sensor by turning the sensor knob counterclockwise.
3. Position the paper out sensor so that there are at least two inches between a perforation and the top of the paper out sensor. (Figure 112.)
4. Tighten the paper out sensor by turning the sensor knob clockwise.
5. Press **ONLINE/CLEAR**. When the first print job is sent to the printer, the paper is drawn into the printer, the top of form aligns with the print station, and the print job begins.

Illustrated Parts Lists

Only replaceable parts are given part numbers in the illustrated parts lists.
Part numbers are not listed for common fasteners and attachment hardware.
Items marked “Ref” in the illustrations refer to parts that are not spared or are part of another assembly.

NOTE: Part numbers listed in the column labeled **Europe, Mideast, and Africa (EMEA)** are **RoHS compliant**. These parts conform to requirements specified in DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Illustrations of ZT Components

Figure 113. ZT Details..... page 446

Figure 114. ZT Inside Covers, Barrier Shield, and Shuttle Assy page 448

Figure 115. ZT Circuit Boards and Paper Feed Assembly..... page 450

Figure 116. ZT Tractor Shafts and Paper Feed Motor page 452

Figure 117. ZT Platen and Integrated Print Mgmt Sensor Assy..... page 454

Figure 118. ZT Hammer Bank Fan, Motors, and Ribbon Guides.... page 456

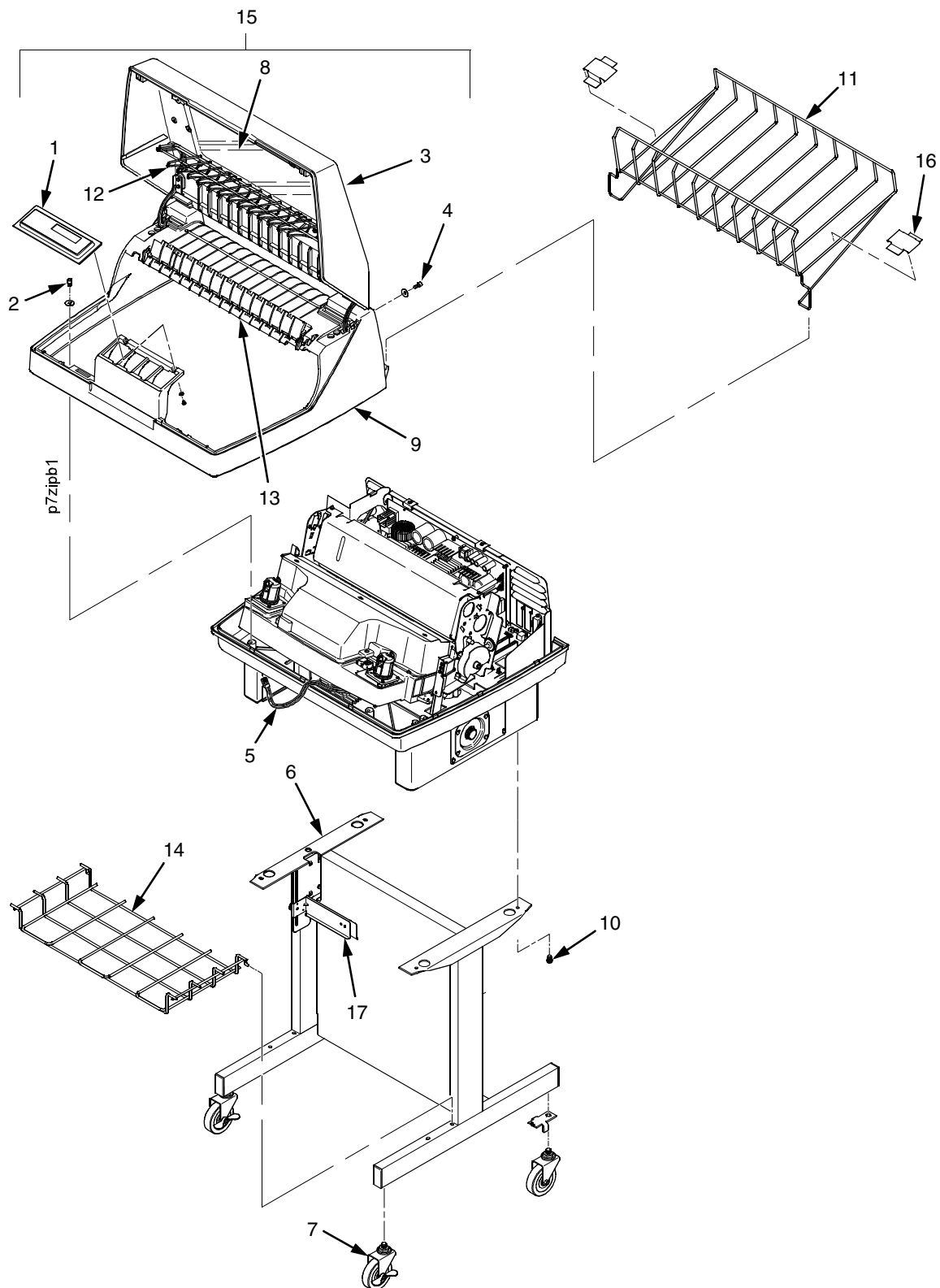


Figure 113. ZT Details

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	177530-902	250483-002	Control Panel Assembly, Ped	
2	Ref	Ref	Screw, Captive (2)	
3	250086-001 250087-001	250086-001 250087-001	Top Cover Assembly, Ped, Blk Top Cover Assembly, Ped, Gray	
4	Ref	Ref	Screw (2)	
5	152440-901	152440-901	Cable Assembly, Control Panel	
6	179081-001 179776-001	179081-001 179776-001	Packaged Ped Kit, Stealth Black Packaged Ped Kit, Lt Gray	
7	179162-001	179162-001	Field Kit, Caster Kit, Ped	
8	178692-901	178692-901	Window, Top Cover	
9	Ref	Ref	Housing, Pedestal, V3	
10	Ref	Ref	Screw (4)	10-32x.625
11	250081-001	250081-001	Field Kit, Short Stack, Ped, P7000	Contains items 16
12	179395-001	179395-001	Wireform, Upper, ZTP, Ped, P7000	
13	178241-901 179766-901	178241-901 179766-901	Panel, Quick Access, Flip Up, Black Panel, Quick Access, Flip Up, Gray	
14	156033-901	156033-901	Paper Tray, Front, Ped	
15	179972-901 177119-901	179972-901 177119-901	Top Cover, Full Assy, P7000, ZTP, Black Top Cover, Full Assy, P7000, ZTP, Gray	Does not include control panel (item 1) Does not include control panel (item 1)
16	250014-001	250014-001	Slide, Output Basket, Pedestal	Part of item 11
17	179093-901	179093-901	Paperout Assembly, ZTP	

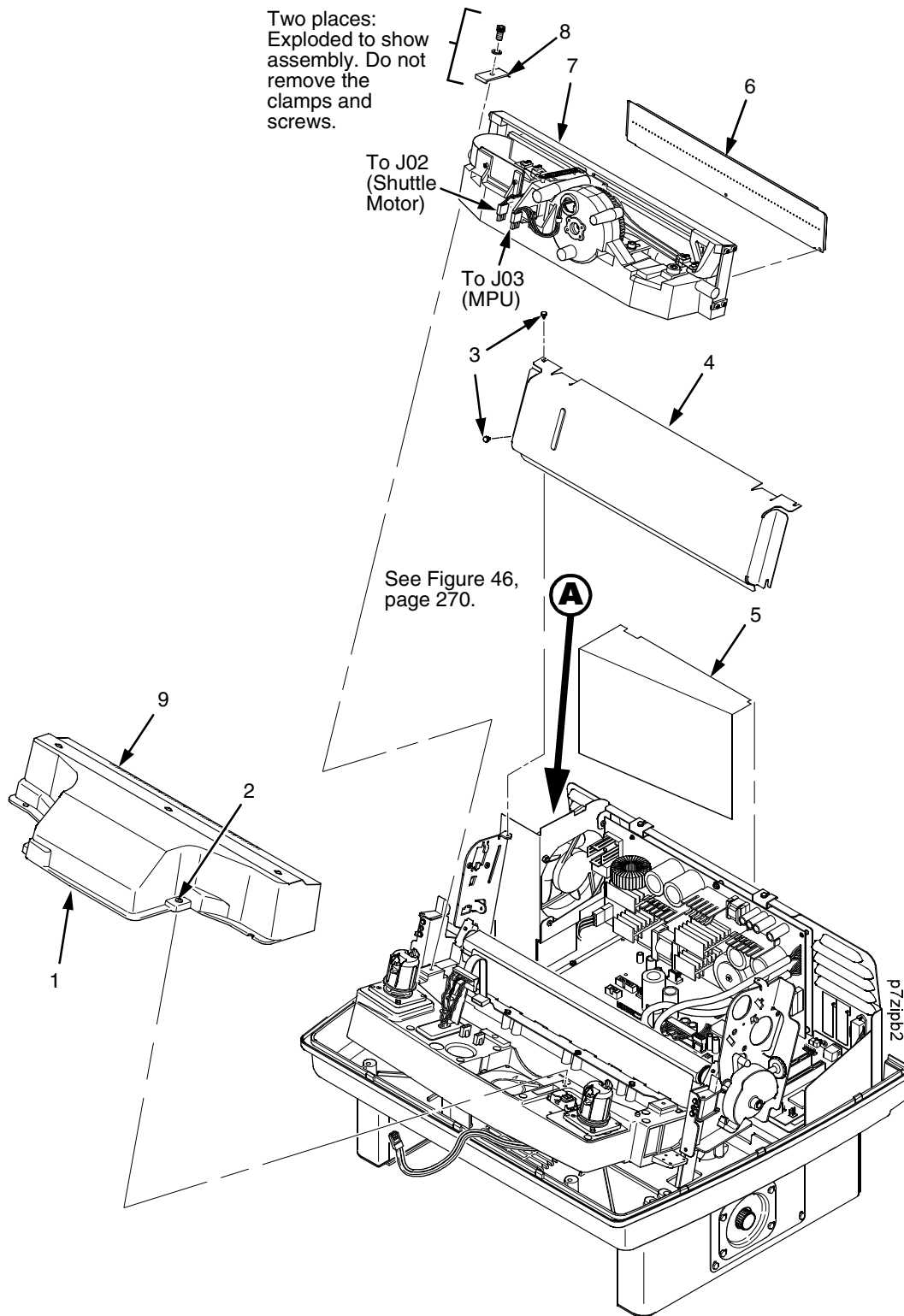


Figure 114. ZT Inside Covers, Barrier Shield, and Shuttle Assembly

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179128-901		Shuttle Cover	Air Shroud Assembly
2	Ref	Ref	Screw, Captive (2)	10-24x.62 with O-ring, .125x.250x.06
3	Ref	Ref	Screw, Thread-forming (2)	6-32x.25 and #6 flat washer
4	Ref	Ref	Barrier Shield	
5	179276-001	179276-001	Power Supply Insulator	Taped to card cage along upper edge
6	178311-901 178310-901 178309-901 178308-901	178311-901 178310-901 178309-901 178308-901	Ribbon Mask/HB Cover Assy Ribbon Mask/HB Cover Assy Ribbon Mask/HB Cover Assy Ribbon Mask/HB Cover Assy	P7005, P7002H P7010, P7003H P7015, P7006H P7008H, P7000HD
7	178895-901 178895-991 178894-901 178894-991 178893-901 178893-991 251407-901 179718-901 179719-901 179720-901 251425-901 174965-901 174966-901 174967-901 251086-901 175609-901 175613-901 175991-901 251426-901	250762-901 250762-991 250761-901 250761-991 250760-901 250760-991 251466-901 250765-901 250764-901 250763-901 251446-901 174965-901 174966-901 174967-901 251086-901 175609-901 175613-901 175991-901 251426-901	Shuttle Assembly, 05 Shuttle Assembly, 05, Adv Exch Shuttle Assembly, 10 Shuttle Assembly, 10, Adv Exch Shuttle Assembly, 15 Shuttle Assembly, 15, Adv Exch Shuttle Assembly, 02H Shuttle Assembly, 03H Shuttle Assembly, 06H Shuttle Assembly, 08H Shuttle Assembly, P7000HD Hammer Spring Assembly, 05 Hammer Spring Assembly, 10 Hammer Spring Assembly, 15 Hammer Spring Assembly, 02H Hammer Spring Assembly, 03H Hammer Spring Assembly, 06H Hammer Spring Assembly, 08H Hammer Spring Assembly, HD	P7005 P7005 P7010 P7010 P7015 P7015 P7X02H P7X03H P7X06H P7X08H P7000HD P7005 P7010 P7015 P7X02H P7X03H P7X06H P7X08H P7000HD
8	150399-901	150399-901	Clamp, Shaft, Receiving	
9	153528-901	153528-901	Paper Scale	

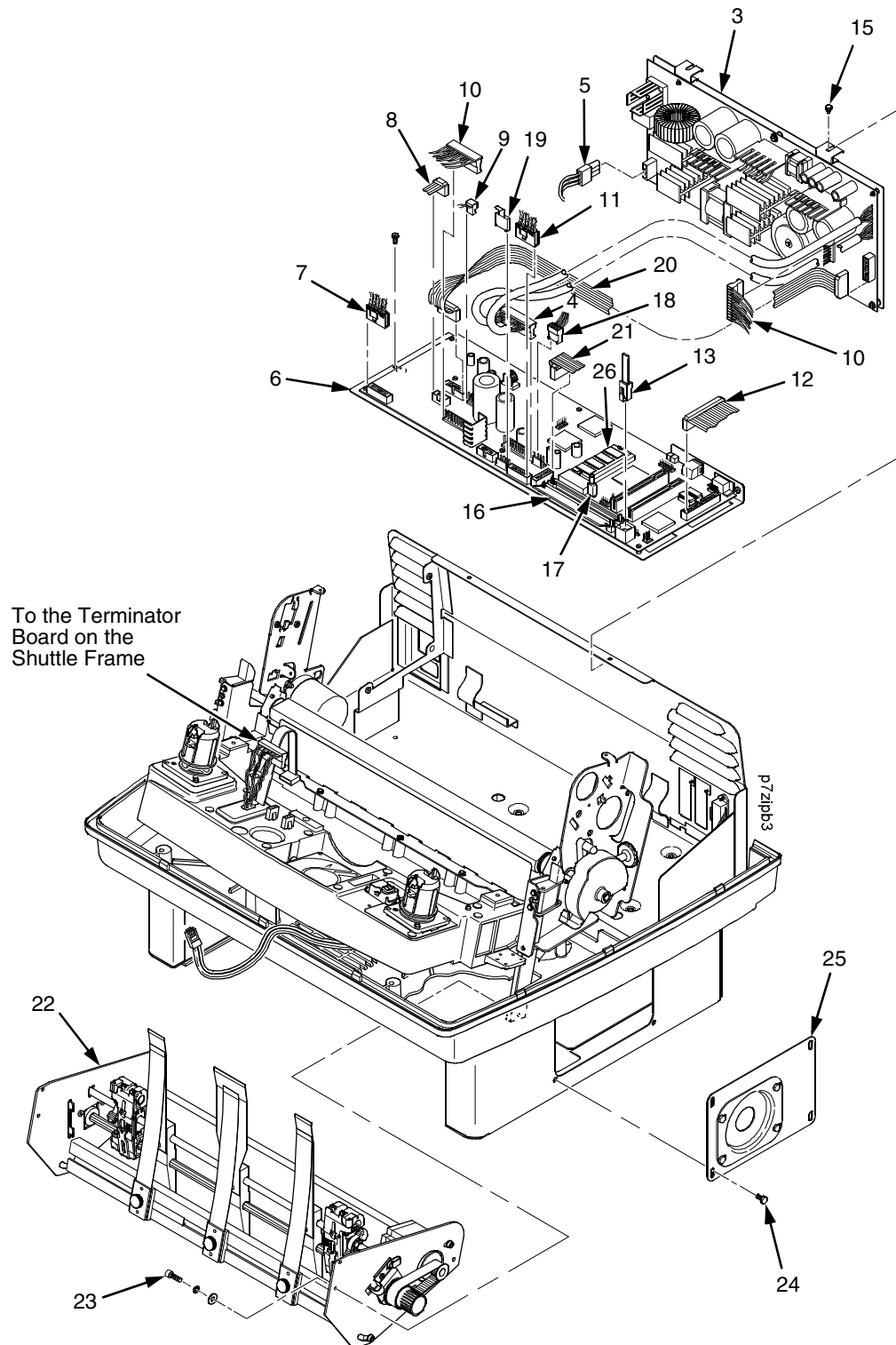


Figure 115. ZT Circuit Boards and Paper Feed Assembly

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
3	179074-901 179074-991 179075-901 179075-991 179076-901 179076-991	250297-901 250297-991 250251-901 250251-991 250410-901 250410-991	Power Supply, PFC, 5/10 Power Supply, PFC, 5/10, Adv Exch Power Supply, PFC, 15 Power Supply, PFC, 15, Adv Exch Power Supply, PFC, 20 Power Supply, PFC, 20, Adv Exch	P7005, -10, -02H, -03H P7005, -10, -02H, -03H P7015, P7X06H P7015, P7X06H P7008H, P7000HD P7008H, P7000HD
4	Ref	Ref	P101 Cable Connector	Part of item 3
5	Ref	Ref	Cable Assembly, AC-In, Power Supply	Part of Field Kit, AC Assy, 153502-901
6	179077-901 179077-991	250298-901 250298-991	Controller PCBA, (V5) Controller PCBA, (V5) Adv Exch	
7	202362-001	202362-001	Housing, Connector Kit	P106, Motor Sensor, Left
8	152421-901	152421-901	Hammer Bank Logic Cable Assembly	
9	152420-901	152420-901	Shuttle Motor Cable Assembly	
10	164805-901	164805-901	Hammer Bank Power Cable Assembly	Used on all except P7220
11	202362-001	202362-001	Housing, Connector Kit	P107, Motor Sensor, Right
12	152439-901	152439-901	Centronics I/O Cable Assembly	
15	Ref	Ref	Screw, Captive, Power Supply (2)	
16	204480-902 204480-903	250488-902 250488-903	SIMM, Flash Memory, 8 MB SIMM, Flash Memory, 16 MB	Install in slot J11. J10 is not used.
17	Ref	Ref	Security Key	
18	178046-001 178535-001	178046-001 178535-001	Paper Feed Motor Paper Feed Motor	P7X05/10/15 P7X05/10/15LG
19	Ref	Ref	Integrated Print Management System Bar Code Sensor (179526-901) Cable	
20	Ref	Ref	Not Used	
21	Ref	Ref	Not Used	
22	179990-001	179990-001	Paper Feed Assembly, ZTP	Not spared as an assembly
23	Ref	Ref	Screw w/Locwasher and Flat Washer	
24	Ref	Ref	Screw, Hex w/Lockwasher, 8X.38	
25	Ref	Ref	Cover Plate, Right Extension	
26	204535-901	250489-901	SDRAM DIMM, MEM, 32 MB, PC100	

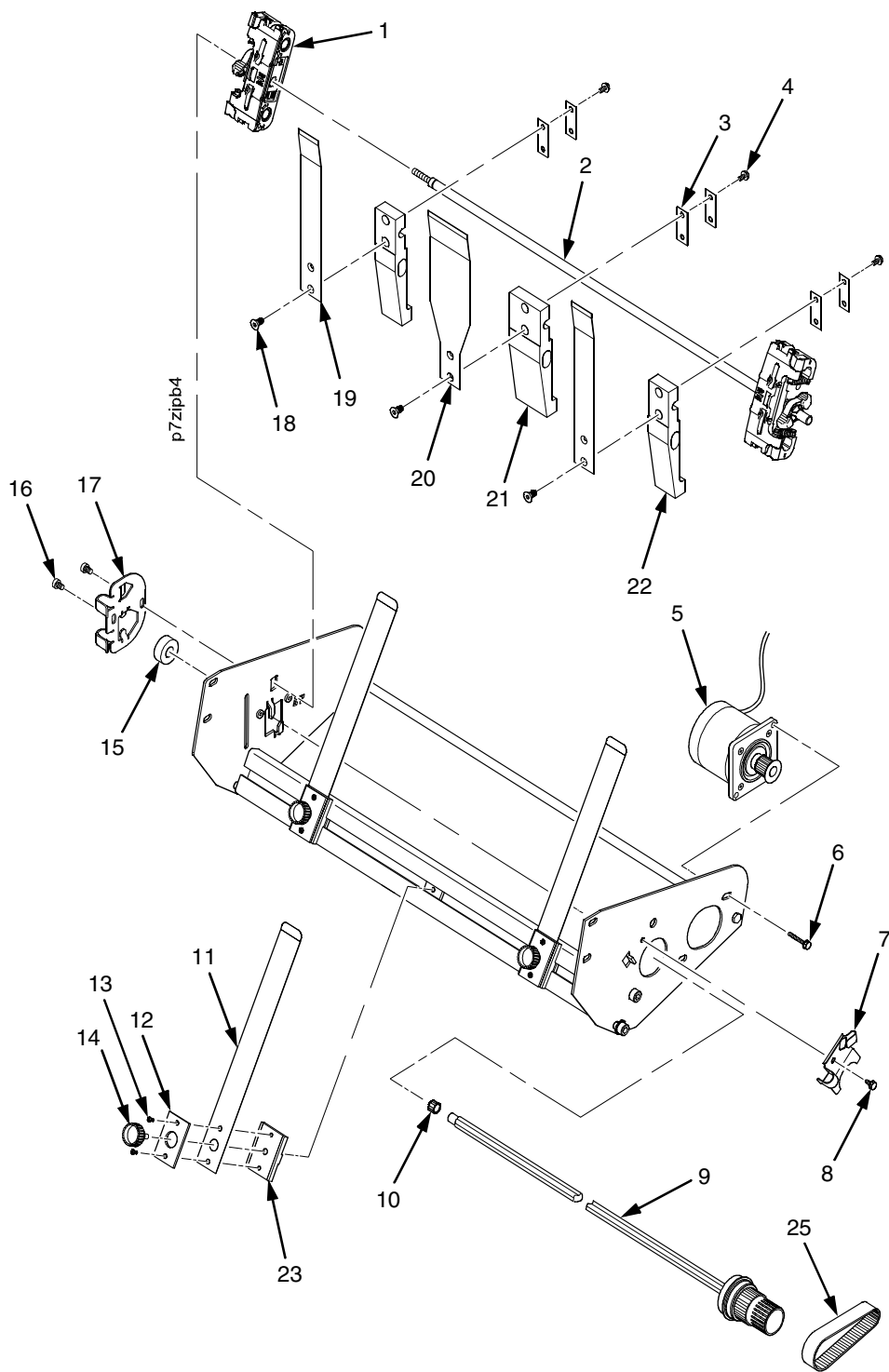


Figure 116. ZT Tractor Shafts, Paper Guides, and Paper Feed Motor

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	179065-901	179065-901	Tractor Set, Non-Roller, 05/10/15 (Blue)	
2	Ref	Ref	Shaft, Spacer, Tractor, ZTP	Part of item 24
3	Ref	Ref	Pad, Nylon, Mount Block, ZTP	Part of item 24
4	Ref	Ref	Screw, Button Head (3)	
5	178046-001	178046-001	Field Kit, Paper Feed Motor, V3	
6	Ref	Ref	Screw, Hex w/Lock Washer, 10-24x.50 (2)	Part of item 5
7	173217-001	173217-001	Plate, Tractor Shaft, Right	
8	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob, Self-Tapping	
9	178988-901	178988-901	Splined Shaft Assembly (Blue Handle)	
10	204155-001	204155-001	Tolerance Ring,.37X.25,.006 THK,SS	
11	250088-001	250088-001	Field Kit, Leaf, Paper Guide, P7000, ZTP	Contains three front leaf guide assemblies
12	177812-001	177812-001	Plate, Clamping, Paper Guide, ZTP (3)	Part of item 11
13	Ref	Ref	Screw, 6-32x.25, ¼ Hex Hd, Washer (6)	Part of item 11
14	Ref	Ref	Screw, M5X16X.8, SHCS-Thumb, SS, ASTM F837M	Part of item 24
15	Ref	Ref	Bearing, Ball, Sealed	
16	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob (Self-Tapping) (2)	
17	173130-001	173130-001	Plate, Tractor Shaft, Left	
18	Ref	Ref	Screw, Flat HD, Metric, M3x6mm (3)	
19	Ref	Ref	Leaf, Guide, Paper, Outer, ZTP (2)	
20	Ref	Ref	Leaf, Guide, Paper, Center, ZTP	
21	Ref	Ref	Block, Mount, Ctr Paper Guide, ZTP	
22	Ref	Ref	Block, Mounting, Outboard, Paper Guide, ZTP (2)	
23	177814-001	177814-001	Extrusion, Paper Guide, ZTP (3)	Part of item 11
24	178717-001	178717-001	Field Kit, Hardware, ZTP	
25	108664-903	108664-903	Belt, Timing, .080 Pitch, 100 Teeth, .500 Wide	Paper Feed Belt

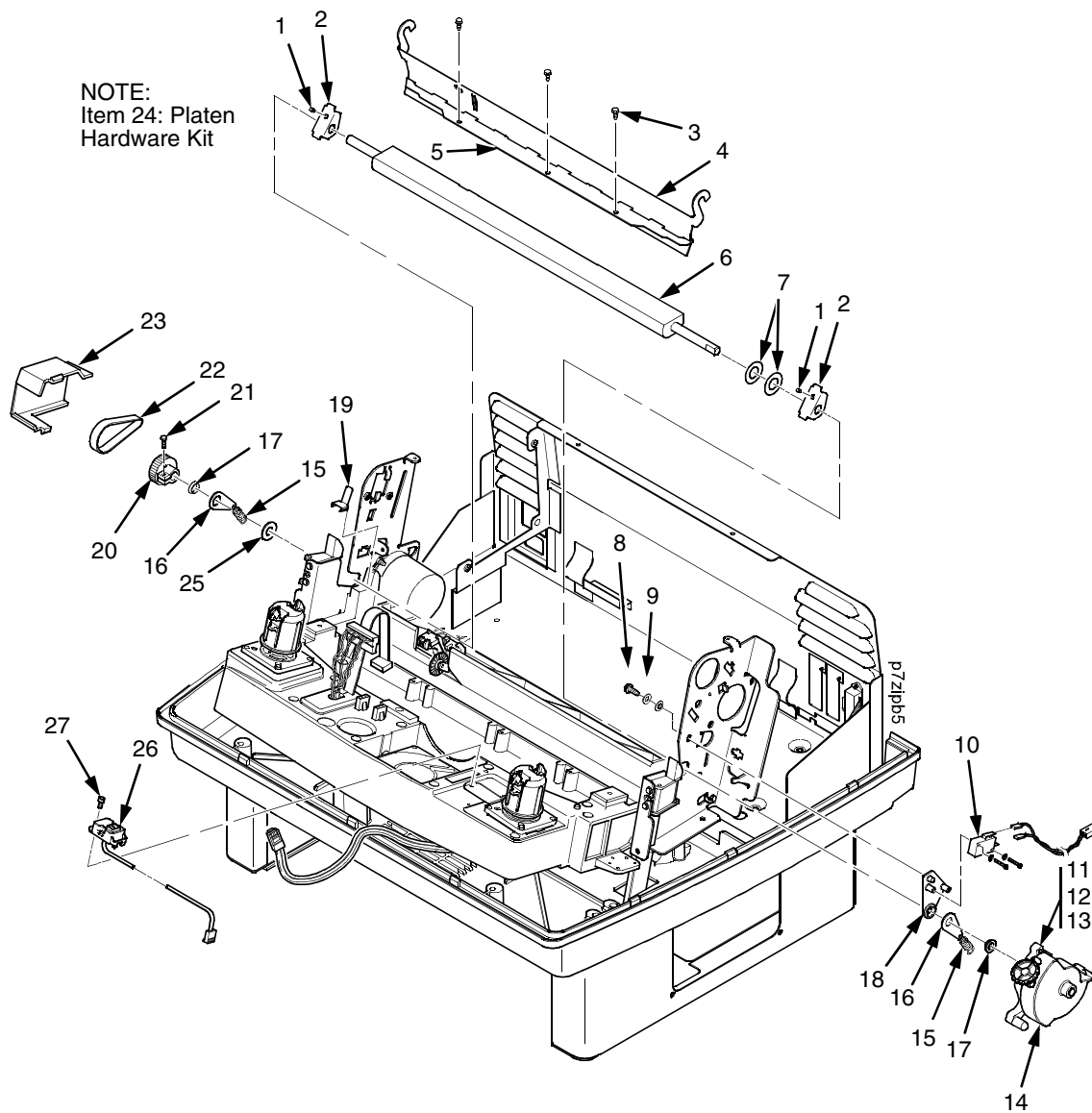


Figure 117. ZT Platen and Integrated Print Management Sensor Assembly

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	Ref	Ref	Setscrew (2)	Part of item 24
2	Ref	Ref	Bracket, Platen (2)	Part of item 24
3	Ref	Ref	Screw, Thread-forming (3)	6-32x.25
4	174968-001	174968-001	Ironer Bracket/Plate Field Kit	
5	Ref	Ref	Plate, Ironer	Part of item 4
6	112657-901	112657-901	Platen Assembly	
7	Ref	Ref	Washer, Flat (2)	Part of item 24
8	Ref	Ref	Screw (2)	Part of item 10
9	Ref	Ref	Washer, Flat #4 (2)	Part of item 10
10	179334-901	179334-901	Field Kit, Switch Assy, w/Bracket	Includes items 8, 9, 18
11	Ref	Ref	Screw, Socket Cap, 6-32x.75	Part of item 14
12	Ref	Ref	Washer	Part of item 14
13	Ref	Ref	Nut	Part of item 14
14	178705-901	178705-901	Platen Stop Lever Kit	Includes items 11, 12, 13
15	Ref	Ref	Spring, Extension 1.12L	Part of item 24
16	Ref	Ref	Link, Spring	Part of item 24
17	Ref	Ref	Bearing, Nylon .376	Part of item 24
18	Ref	Ref	Bracket, Switch Mount	Part of item 10
19	Ref	Ref	Wear Saddle, Platen (2)	Part of item 24
20	150703-902	150703-902	Platen Pulley, Drive	
21	Ref	Ref	Screw, Socket Cap, 6-32x.44	Part of item 20
22	141516-901	141516-901	Belt, Timing, .080 Pitch, .312 Wide	Platen Open Belt
23	153488-001	153488-001	Field Kit, Covers	Platen Open Belt Cover shown
24	177558-001	177558-001	Platen Hardware Kit	Includes items 1, 2, 7, 15, 16, 17, 19, 25
25	Ref	Ref	Platen Washer	Part of item 24
26	179526-901	179526-901	Sensor Assembly, Integrated Print Management System/Barcode	
27	Ref	Ref	Screw	

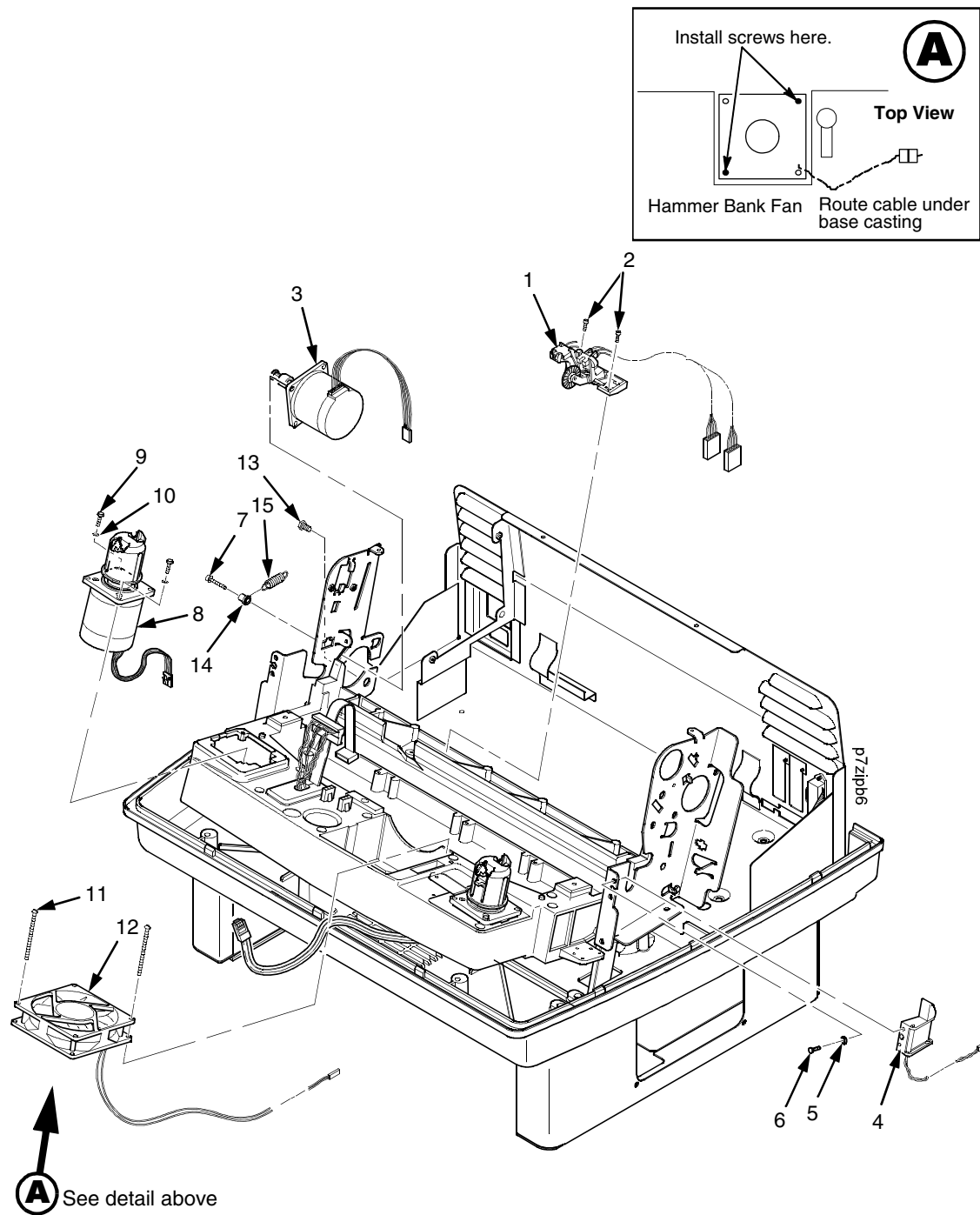


Figure 118. ZT Hammer Bank Fan, Motors, and Ribbon Guides

Item No.	Americas and Asia/ Pacific Part No.	Europe, Mideast, and Africa (EMEA) Part No. (RoHS Compliant)	Description	Notes
1	152415-901 170172-001	152415-901 170172-001	Switch Assembly, Paper Detector Field Kit, Slotted Black Back Form Switch	Optional switch used with black back forms
2	Ref	Ref	Screw, Thread-forming, 6-32x.375 (2)	Part of item 1
3	179638-001	179638-001	Motor Assembly, Platen	Includes pulley
4	178992-902 178992-901 178995-001	178992-902 178992-901 178995-001	Ribbon Guide Cable Assembly, RH Ribbon Guide Cable Assembly, LH Field Kit, Ribbon Guide, LH/RH, P7000	
5	Ref	Ref	Washer, Flat #4	Part of item4
6	Ref	Ref	Screw, w/Lock Washer, 4-40x.38	Part of item 4
7	Ref	Ref	Screw, w/Lock Washer, 10-32x.50 (2)	Part of item 3
8	179073-901	179073-901	Ribbon Motor Assembly, w/Hub	
9	Ref	Ref	Screw, Hex w/Lock Washer (2)	6-32x.50
10	Ref	Ref	Washer, Flat #6 (2)	
11	Ref	Ref	Screw, w/Lock Washer (2)	6-32x1.25
12	152416-901 173427-901	152416-901 173427-901	Hammer Bank Fan Assembly Hammer Bank Fan Assembly	All except P7220; air flow is up P7220; air flow is up
13	Ref	Ref	Screw, Hex w/Lock Washer (2)	10-32x.50
14	Ref	Ref	Post, Platen Belt Spring	
15	Ref	Ref	Spring, Platen Belt	

F

Paper Specifications And Forms Design

Introduction

This appendix is divided into two sections.

The first section lists general specifications for continuous form paper used in this printer. (Specific brands of paper are not recommended.)

The second section goes into more detail, providing definitions, guidelines, and a checklist you can use to design forms that will run smoothly through the printer.

Adherence to these specifications will ensure the best print quality and reliable operation of the printer.

General Paper Specifications

This section describes the minimum paper specifications that must be met to ensure the best printer performance.

Always test paper and forms before buying large quantities. Make all measurements at 20° to 26° Celsius (68° to 78° Fahrenheit) and 45% to 55% relative humidity. Printronix printers perform well with forms that meet the specifications listed in Table 9 and Table 10 below.

NOTE: Printronix conforms to ANSI® Standard X3.96-1983, “American National Forms Information Systems for Continuous Business Forms,” and ISO Recommendation No. 2784, which cover common form widths and depths, standards for sprocket feed holes and margins, and other basic tolerances.

Table 9. Paper Sizes

Maximum Form Width	17.0 inches (43.18 cm) edge to edge
Minimum Form Width	3.0 inches (7.62 cm) edge to edge
Maximum Printing Width	13.6 inches (34.54 cm)
Maximum Right Margin	1 to 13.6 inches (2.54 to 34.54 cm)
Maximum Left Margin	0 to 13.5 inches (0 to 34.29 cm)
Maximum Form Length	16 inches (40.64 cm)
Minimum Form Length	2 inches (5.08 cm)

Table 10. Paper Weights

Single-Part Forms	
Standard	15 to 100 pound (57 to 380 gm/meter ²)
Best Print Quality	18 to 60 pound (68 to 227 gm/meter ²)
Multipart Forms	
Carbon Paper	12 pounds (46 gm/meter ²) up to 6 total pages
Carbons	8 pounds (30 gm/meter ²) up to 6 total pages
Pack Thickness	Maximum 0.025 inch (0.635 mm) total
Carbonless	Up to 4-part forms

Test the paper first if it will be used in environments with greater than 80% or less than 20% humidity. Test paper that will be used at high humidity for satisfactory feeding and handling. Test paper that will be used at low humidity to determine if static buildup must be eliminated for proper paper stacking.

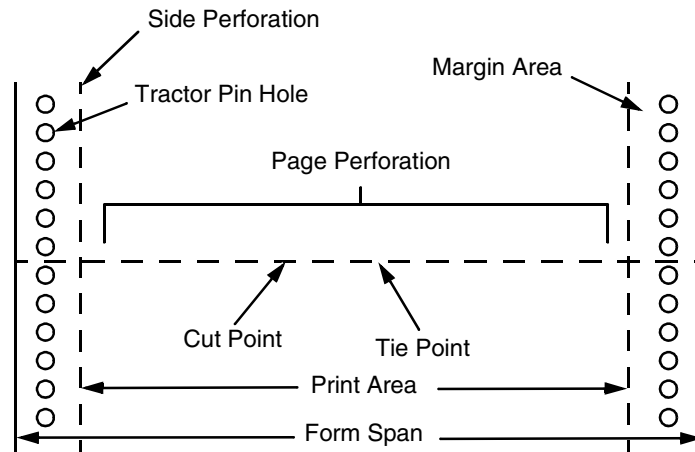
Paper Guidelines

The terms below are used to describe and discuss continuous form paper.

Terms And Definitions

Chaff	Bits of paper not completely removed after the punch process that creates tractor pin holes, major and minor perforations, etc.
Cut Point	The area along a perforation where a cut has been made that extends through the entire form. (Compare Tie Point.)
Cut-to-Tie Ratio	The ratio of cut points to tie points occurring along a perforation.
Evenness	The amount of variation between the thickest and thinnest points measured across the print area (i.e., between the side perforations).
Form Thickness	Thickness measured at the thickest point of the entire form. This includes glue lines, compressed staples, perforations, etc., and is not limited to the printed region of the form.
Margin	The region outside the print area of the form. The margin is typically bounded by the outermost vertical perforations (i.e., where the tractor holes are located) and the edge of the form.
Print Area	The region where printing occurs, and which is always between the side perforations.
Print Station	The area in the printer where occur the actual impacts that constitute printing.
Staple	A punch-cut fastening stitch located along the vertical edge and within the side perforation region of a multipart form. (Note that this is <i>not</i> a metal staple.)
Tenting	The measured thickness between the print area of the form and the peak thickness of a major perforation. Tenting is typically caused by overly stiff perforations or incorrect registration of the inner parts of multipart forms.
Tie Point	The area along a perforation between the cut points. (Compare Cut Point.)

The figure below illustrates the terms used in this appendix.



Side View of Form

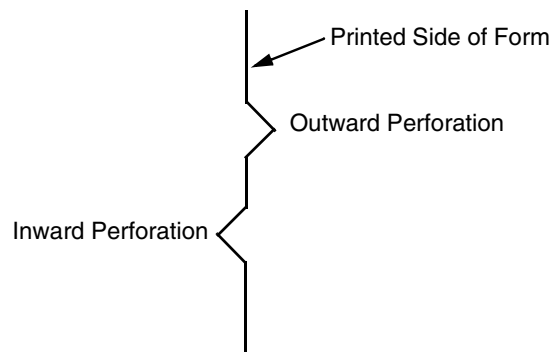


Figure 119. Forms Terminology

Environmental Considerations

Before they are used, forms should be stored for at least 24 hours — preferably 48 hours — in the environment in which they will be used. This stabilizes the moisture content of the paper, resulting in better feeding and stacking. But forms should never be stored in environments that result in damage such as delamination of glues, creasing, folding, etc.

Form Types

Three kinds of continuous form paper are specified for use with the printer:

- Edge-perforated, fanfolded, single-part forms
- 2- to 6-part multipart carbon forms
- 2- to 4-part multipart carbonless forms

For all forms, the width range is 3 to 17 inches, the length range is 2 to 12 inches.

Form Weight

Use 15 to 100 pound (6.80 to 45.36 kg) stock. Light weight and recycled forms must be strong enough to assure that tractor holes and perforations do not tear or detach during form feed, skipping, and ejecting operations.

Form Thickness

Forms must be no thicker than 0.025 inches (0.0635 cm) at the thickest part of the form — including glue lines, staples, perforations, etc. — and is not restricted to just the print area.

Form Evenness

The evenness of forms must not exceed 0.003 inches (0.00762 cm) across the print area (between the side perforations).

Tenting caused by buildup of perforation thickness must be minimized. A perforation thickness measured at the major perforation that exceeds 1.25 times the forms thickness measured in the print area will result in an unpredictable and unreliable form. The perforation thickness must never exceed the maximum forms thickness of 0.025 inches (0.0635 cm).

Tractor Pin Engagement

The printer uses tractors with 6-pin engagement. Detailed engagement specifications are given in ISO-2784, but are summarized in the table below.

Specification	Inches	Millimeters
Hole centerline (CL) to edge of form	0.236 ± 0.028	6.0 ± 0.10
Hole Diameter (Serrations or any occlusion due to incorrect registration of multipart forms cannot exceed this dimension.)	0.156 ± 0.004	4.0 ± 0.10
Distance between centers of two consecutive holes	0.500 ± 0.002	12.7 ± 0.05
Maximum deviation of holes from their centerline	0.004	0.10
Maximum deviation of lefthand hole to adjacent righthand hole (CL to CL)	0.006	0.15
Maximum parallel deviation of lefthand hole CL to righthand hole CL	0.006	0.15

Methods Of Forms Attachment

Any method of attachment (staples, crimps, gluing, etc.) must be designed in a way that does not permit air to be trapped between copies of a form. Hard or wire brads and staples must not be used.

Any attachment must not coincide with the major perforation or any horizontal perforation.

Gluing

Gluing must be controlled and uniform, since it is a major contributor to the maximum form thickness. A form that meets the maximum forms thickness requirement in the print area but which exceeds the maximum thickness at a glue line is considered an unreliable and unpredictable form.

Staples

Staples must be used only in the margin area of the form and must not be in line with the path of the tractor holes. Ideally, staples are placed in the margins so that they coincide with areas of the form where printing does not occur.

Figure 120 below shows preferred and unacceptable ways of fabricating staples.

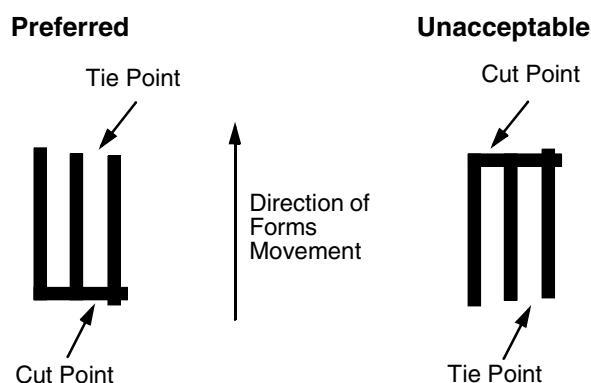


Figure 120. Preferred vs. Unacceptable Form Staples

Cut-To-Tie Ratio

A common cut-to-tie ratio for bond forms is 4:1 (that is, 80% cut to 20% ties). This value is dictated chiefly by the application program that the form runs under. Lower cut-to-tie ratios will yield better form handling, but stacking may suffer due to increased stiffness of the perforations. Some level of experimentation is required to determine the best cut-to-tie ratio. But remember that a cut-to-tie ratio that causes a thickness buildup greater than 0.025 inch (0.635 mm) or that creates an evenness variation greater than 0.003 inch (0.0762 mm) will result in an unreliable and unpredictable form.

Perforation Intersections

Whenever a horizontal line of perforations intersects with a vertical line of perforations, the point of intersection must be a tie point. Cut points at such intersections make the form unacceptable.

Chaff Content

Tractors holes should be clear of chaff. As much as possible, there should not be loose chaff in the box in which the paper is packed.

Form Design Checklist

Use this checklist to help you remember key areas of consideration when designing and ordering forms and paper stocks.

Environment

_____ Before they are used, forms are given at least 24 hours of condensing time in the environment in which they will be used.

_____ Forms are not stored in environments that result in such damage as delamination of glue lines, creasing, folding, etc.

Type Of Form

Form Type (Check One)					
1 Part	2 Part	3 Part	4 Part	5 Part	6 Part

<----- Carbonless Range ----->

<----- Carbon Range ----->

Recycled Paper? Yes _____ No _____ If yes, assure adequate form strength to prevent tractor holes and perforations from tearing or detaching during form feeds and page ejects.

Security Form? Yes _____ No _____ If yes, the last page of the form should have a minimum 50% reflectance and, if possible, the stippled page faces inward to the form.

Form Weight

Form weight = _____
(Minimum = 15 lb. / 6.8 kg ; Maximum = 100 lb / 45.36 kg)

Form Thickness

Form thickness = _____
(0.025 inches / 0.0635 cm maximum measured at the thickest point of the form, which includes perforations, compressed staples, glue lines, etc.)

Form Evenness

The evenness of the form = _____
(Not to exceed 0.003 in. / 0.00762 cm)

Tenting due to buildup of perforation thickness must be minimized. A perforation thickness measured at the major perforation that exceeds 1.25 times the forms thickness measured in the print area will result in an unreliable and unpredictable form. Perforation thickness must not exceed the maximum form thickness of 0.025 in. / 0.0635 cm.

Tractor Pin Holes

The holes which engage the tractor pins must conform to the following specifications:

Specification	Inches	Millimeters
Hole centerline (CL) to edge of form	0.236 ± 0.028	6.0 ± 0.1
Hole Diameter (Serrations or any occlusion due to incorrect registration of multipart forms cannot exceed this dimension.)	0.156 ± 0.004	4.0 ± 0.1
Distance between centers of two consecutive holes	0.500 ± 0.002	12.7 ± 0.05
Maximum deviation of holes from their centerline	0.004	0.1
Maximum deviation of lefthand hole to adjacent righthand hole (CL to CL)	0.006	0.15
Maximum parallel deviation of lefthand hole CL to righthand hole CL	0.006	0.15

Methods Of Forms Attachment

- _____ Must not allow air entrapment between copies of the form
- _____ Must not use hard brads or staples
- _____ Must not coincide with major perforation or any horizontal perforation
- _____ Gluing lines must not result in a form that exceeds 0.025 in. / 0.0635 cm thickness
- _____ Staples must be used only in margin area of form
- _____ Staple cuts must not be in the direction of form movement through the tractors
- _____ Staples must not occur in-line with the path of the tractor holes

_____ Staples should be placed in the margins so that they coincide with areas of the form where printing will not occur

Cut-To-Tie Ratio

_____:_____ (Typical ratio is 4:1, or 80% cut to 20% tie)

Thickness Buildup = _____ in. / cm

NOTE: A cut-to-tie ratio that causes a thickness buildup greater than 0.025 in. / 0.0635 cm, or that creates an evenness variation greater than 0.003 in. / 0.00762 cm, will result in an unreliable and unpredictable form.

Perforation Intersections

_____ Horizontal-vertical perforations are tie points. Cut points at such intersections are unacceptable.

Chaff Content

_____ Tractor holes are clear of chaff.

_____ There is no loose chaff in the box the paper is packed in.

Summary

Because it is impossible to test all possible forms available for use in the printer, Printronix recommends that paper conform to the specifications outlined in this appendix for the best printer performance.

But the guidelines in this appendix are not a substitute for actual testing. Always test forms—including special single-part paper, multipart forms, forms with glue strips, carbonless forms, card stock, and labels—for satisfactory feeding, registration, and print quality prior to purchase. For best results in selecting standard or specialty forms, consult a forms vendor who can ensure conformance to the guidelines in this appendix and who can recommend cost-effective purchases.

Storage And Handling

The performance of the printer depends to a large degree on the condition of the paper used; therefore, the following principles for packaging, handling, and storage are highly recommended.

Packaging

To avoid damage during handling, use top and bottom fillers in continuous form cartons to hold the paper stack firmly in place. Proper packaging ensures that the paper remains flat and is not damaged along the edges.

Storage

Do not store cartons directly on the floor, and do not stack them more than six high. Set each carton upright and squarely on the one underneath. Do not place anything else on the stack of paper, as this can damage the paper.

Preconditioning Forms

Protect paper from temperature and humidity extremes. Store paper in the same environment as the printer for 24 to 48 hours before using the paper. This allows the moisture content of the paper to stabilize.

P7000 printers are used at temperatures from 5° to 40° C (41° to 104° F) up to 1524 meters (5000 feet), from 5° to 32° C (41° to 90° F) up to 2438 meters (8000 feet), with a non-condensing relative humidity of 10% to 90%. This is the full operating range; for the best results store the printer paper at 18° to 24° C (65° to 75° F), with a relative humidity of 40% to 50%.

If the printer is in an environment subject to extremes of temperature or humidity, store the printer paper in a better environment and move it to the printer as needed.

G

Maintenance Manuals For P5000 Printers

This manual covers only P7000 printers. Information about Printronix P5000 line matrix printers is contained in the maintenance manuals summarized below.

Printer Model	Type of Controller Board	Type of Hammer Bank	Maintenance Manual
P5000 - Early	CMX, CFX	Single	164253-001 (See Table 11)
P5B / 10 / 15	CMX, CFX	Single	175455-001 (See Table 12)
P5000 - Recent	PSA3	Single	176475-001 (See Table 13)
P5220D, P5224D	CFX, PSA3	Dual	173843-001 (See Table 14)

Table 11. Early P5000 Single Hammer Bank Printers: Maintenance Manual 164253-001

Model	Max Print Speed	Enclosure	Single Hammer Bank	Controller Board ¹
P50KA™	585 lpm	Pedestal	91 Hammers Kanji / Hanzi	25 MHz CMX
P500™	900 lpm	Pedestal	49 Hammers	25 MHz CMX
P5003H™	N/A	Pedestal	60 Hammers	40 MHz CFX
P5005™	475 lpm	Pedestal	28 Hammers	25 MHz CMX
P5005-QA™	475 lpm	Pedestal w/ Quick-Access Cover	28 Hammers	25 MHz CMX
P5005-12™	475 lpm	Pedestal	28 Hammers, 12 MIL tips	25 MHz CMX

Table 11. Early P5000 Single Hammer Bank Printers: Maintenance Manual 164253-001

Model	Max Print Speed	Enclosure	Single Hammer Bank	Controller Board ¹
P5005-12-QA™	475 lpm	Pedestal w/ Quick-Access Cover	28 Hammers, 12 MIL tips	25 MHz CMX
P5005A™	500 lpm	Pedestal	28 Hammers	25 MHz CMX
P5005A-QA™	500 lpm	Pedestal w/ Quick-Access Cover	28 Hammers	25 MHz CMX
P5005A-12™	500 lpm	Pedestal	28 Hammers, 12 MIL tips	25 MHz CMX
P5005A-12-QA™	500 lpm	Pedestal w/ Quick-Access Cover	28 Hammers, 12 MIL tips	25 MHz CMX
P5005B™	500 lpm	Pedestal	28 Hammers	40 MHz CMX
P5005B-QA™	500 lpm	Pedestal w/ Quick-Access Cover	28 Hammers	40 MHz CMX
P5005B-12™	500 lpm	Pedestal	28 Hammers, 12 MIL tips	40 MHz CMX
P5005B-12-QA™	500 lpm	Pedestal w/ Quick-Access Cover	28 Hammers, 12 MIL tips	40 MHz CMX
P5006H™	N/A	Pedestal	102 Hammers	40 MH CFX
P5008™	800 lpm	Pedestal	49 Hammers	25 MHz CMX
P5008-QA™	800 lpm	Pedestal w/ Quick-Access Cover	49 Hammers	25 MHz CMX
P5009-QA™	900 lpm	Pedestal w/ Quick-Access Cover	49 Hammers	25 MHz CMX
P5010™	1000 lpm	Pedestal	60 Hammers	40 MHz CMX
P5010-QA™	1000 lpm	Pedestal w/ Quick-Access Cover	60 Hammers	40 MHz CMX
P5015™	1500 lpm	Pedestal	102 Hammers	40 MHz CMX

Table 11. Early P5000 Single Hammer Bank Printers: Maintenance Manual 164253-001

Model	Max Print Speed	Enclosure	Single Hammer Bank	Controller Board¹
P5015-QA™	1500 lpm	Pedestal w/ Quick-Access Cover	102 Hammers	40 MHz CMX
P51KA™	585 lpm	Table Top	91 Hammers Kanji / Hanzi	25 MHz CMX
P52KA™	585 lpm	Cabinet	91 Hammers Kanji / Hanzi	40 MHz CMX
P5203H™	N/A	Cabinet	60 Hammers	40 MHz CFX
P5205™	475 lpm	Cabinet	28 Hammers	25 MHz CMX
P5205-12™	475 lpm	Cabinet	28 Hammers, 12 MIL tips	25 MHz CMX
P5205A™	500 lpm	Cabinet	28 Hammers	25 MHz CMX
P5205A-12™	500 lpm	Cabinet	28 Hammers, 12 MIL tips	25 MHz CMX
P5205B™	500 lpm	Cabinet	28 Hammers	40 MHz CMX
P5205B-12™	500 lpm	Cabinet	49 Hammers, 12 MIL tips	40 MHz CMX
P5206H™	N/A	Cabinet	102 Hammers	40 MHz CFX
P5208™	800 lpm	Cabinet	49 Hammers	25 MHz CMX
P5209™	900 lpm	Cabinet	49 Hammers	25 MHz CMX
P5210™	1000 lpm	Cabinet	60 Hammers	40 MHz CMX
P5212™	1200 lpm	Cabinet	91 Hammers	25 MHz CMX
P5214™	1400 lpm	Cabinet	91 Hammers	40 MHz CMX
P5214-SS™	1400 lpm	Cabinet w/SureStak Paper Stacker	91 Hammers	40 MHz CMX
P5215™	1500 lpm	Cabinet	102 Hammers	40 MHz CMX
P5215-SS™	1500 lpm	Cabinet w/SureStak Paper Stacker	102 Hammers	40 MHz CMX

¹ The 40 MHz CMX controller board is also compatible with earlier models that used the 25 MHz CMX board and should be used if the CMX board is replaced in one of these older models. The CFX, V1, controller board was used only in early models P5003H, P5203H, P5006H, and P5206H.

**Table 12. Later P5000 Single Hammer Bank Printers (The “P5B/10/15” Line):
Maintenance Manual 175455-001**

Model	Maximum Print Speed	Enclosure	Hammer Bank	Controller Board¹
P5003H™	N/A	Pedestal	60 Hammers	40 MHz CFX
P5005B™	500 lpm	Pedestal	28 Hammers	40 MHz CMX
P5005B-QA™	500 lpm	Pedestal w/Quick- Access Cover	28 Hammers	40 MHz CMX
P5005B-12™	500 lpm	Pedestal	28 Hammers, 12 MIL tips	40 MHz CMX
P5005B-12-QA™	500 lpm	Pedestal w/Quick- Access Cover	28 Hammers, 12 MIL tips	40 MHz CMX
P5006H™	N/A	Pedestal	102 Hammers	40 MH CFX
P5010™	1000 lpm	Pedestal	60 Hammers	40 MHz CMX
P5010-QA™	1000 lpm	Pedestal w/Quick- Access Cover	60 Hammers	40 MHz CMX
P5015™	1500 lpm	Pedestal	102 Hammers	40 MHz CMX
P5015-QA™	1500 lpm	Pedestal w/Quick- Access Cover	102 Hammers	40 MHz CMX
P5203H™	N/A	Cabinet	60 Hammers	40 MHz CFX
P5205B™	500 lpm	Cabinet	28 Hammers	40 MHz CMX
P5205B-12™	500 lpm	Cabinet	49 Hammers, 12 MIL tips	40 MHz CMX
P5206H™	N/A	Cabinet	102 Hammers	40 MHz CFX
P5210™	1000 lpm	Cabinet	60 Hammers	40 MHz CMX
P5215™	1500 lpm	Cabinet	102 Hammers	40 MHz CMX
P5215-SS™	1500 lpm	Cabinet w/SureStak Paper Stacker	102 Hammers	40 MHz CMX

¹ The 40 MHz CMX controller board is compatible with all PSA P5XXX printers except the P5220S and H-Series (which use the CFX controller board) and printers that use the PSA3 controller board. The 40 MHz CFX, V3, controller board was used in PSA models P5003H, P5203H, P5006H, and P5206H until the H-Series line expanded and upgraded to the PSA3 controller board.

Table 13. P5000 PSA3 Single Hammer Bank Printers: Maintenance Manual 176475-001

Model	Maximum Print Speed	Printer Enclosure	Hammer Bank	Controller Board¹
P5003H™	340 lpm	Pedestal	60 Hammers	PSA3
P5203H™	340 lpm	Cabinet	60 Hammers	PSA3
P5006H™	600 lpm	Pedestal	102 Hammers	PSA3
P5206H™	600 lpm	Cabinet	102 Hammers	PSA3
P5008H™	750 lpm	Pedestal	126 Hammers	PSA3
P5208H™	750 lpm	Cabinet	126 Hammers	PSA3
P5220S™	2000 lpm	Cabinet	126 Hammers	PSA3
P5220S-SS™	2000 lpm	Cabinet w/SureStak Paper Stacker	126 Hammers	PSA3
¹ The PSA3 controller board is the only controller board that can be used in these printers. Printers that use the PSA3 board cannot use the CMX or CFX controller boards.				

Table 14. P5220D and P5224D Dual Hammer Bank Printers: Maintenance Manual 173843-001

Model	Maximum Print Speed	Printer Enclosure	Hammer Bank	Controller Board¹
P5220D™	2000 lpm	Cabinet	156 Hammers	CFX
P5220D-SS™	2000 lpm	Cabinet w/SureStak Paper Stacker	156 Hammers	CFX
P5224D™	2400 lpm	Cabinet	156 Hammers	PSA3
P5224D-SS™	2400 lpm	Cabinet w/SureStak Paper Stacker	156 Hammers	PSA3
¹ The controller boards are not interchangeable in these printers. The PSA3 and CFX controller boards and their respective card cages differ in physical dimensions and design.				

H

Customer Support

Printronix Customer Support Center

IMPORTANT

Please have the following information available prior to calling the Printronix Customer Support Center:

- Model number
- Serial number (located on the back of the printer)
- Installed options (i.e., interface and host type if applicable to the problem)
- Configuration printout:

Line Matrix Printer

Press PRT CONFIG on the control panel, then press Enter.

- Is the problem with a new install or an existing printer?
- Description of the problem (be specific)
- Good and bad samples that clearly show the problem (faxing of these samples may be required)

Americas (714) 368-2686

Europe, Middle East, and Africa (31) 24 6489 311

Asia Pacific (65) 6548 4114

<http://www.primtronix.com/support.aspx>

Printronix Supplies Department

Contact the Printronix Supplies Department for genuine Printronix supplies.

Americas (800) 733-1900

Europe, Middle East, and Africa (33) 1 46 25 1900

Asia Pacific (65) 6548 4116
or (65) 6548 4182

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