Infoprint 6500 Line Matrix Printers

Form No. G544-5978-01

Models 6500-v05, -v5P, -v10, -v1P, -v15, and -v20

Models 6500-D3C, -D3P, -D6C, and -D8C

Maintenance Information Manual

Note!

Before using this information and the product it supports, read the information in “Notices” on page 10.

Second Edition (May 2006)

This edition applies to the IBM Infoprint 6500 Line Matrix Printer.

Internet

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All models of the printer meet the requirements of IEC 950, First Edition, Amendments 1 and 2.

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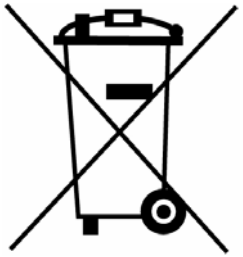
This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at: http://www.ibm.com/ibm/environment/products/prp.shtml.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

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All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Product Recycling and Disposal

This unit may have lead-containing materials – such as circuit boards and connectors – that require special handling. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. This book contains specific information on batteries and refrigerant where applicable.

This product may contain a sealed, lead-acid battery; lithium battery; nickel-metal-hydride battery; or nickel-cadium battery. Batteries of these types must be recycled or disposed of properly. Recycling facilities may not be available in your area.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used batteries and batter packs from IBM equipment. For information on proper disposal of the batteries in this product, please contact IBM at 1-800-426-4333.

For information on disposal of batteries outside the United States, contact your local waste disposal facility.

Communication Statements

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Fules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union (EU) Conformity Statement

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication devices.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A conform á la norme NMB-003 du Canada.

Statement of CISPR 22 Edition 2 Compliance

Attention: This is a Class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japanese VCCI Class A

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Japanese JEITA Statement

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Taiwan

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廢電池請回收

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Australia/New Zealand

Attention: This is a Class A Product. In a domestic enviroment this product may cause radio interference in which case the user may be required to take adequate measures.

Korea

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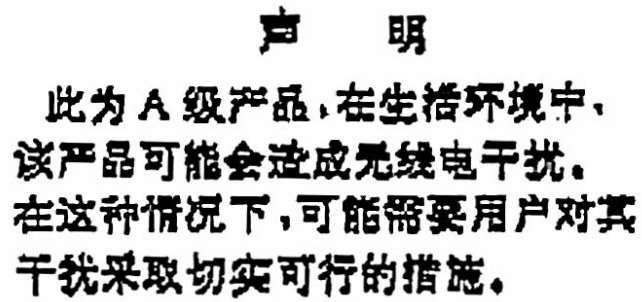
China

Declaration: This is a Case A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take practical actions.



German Conformity Statement

Handbuchtexte: FCC class A entspricht: EMVG Klasse A

Text für alle in Deutschland vertriebenen EN 55022 Klasse A Geräte:

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichket von Geräten (EMVG) vom

18. September 1998 (bzw. der EMC EG Richtlinie 89/336):

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die IBM Deutschland Informationssysteme GmbH, 70548 Stuttgart.

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

Das Gerät erfüllt die Schutzanforderungen nach EN 55022 Klasse A und EN 50024.

EN 55022 Klasse A Gerdte müssen mit folgendem Warnhinweis versehen werden: Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen öerursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

EN 55024 Hinweis:
Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 55024 festgelegt), dann kann es dabei eventuell gestört werden. In solch einem Fall ist der Abstand bzw. die Abschirmung zu der industriellen Störquelle zu öergrvßern.

Anmerkung:
Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

European Union (EC) Electromagnetic Compatibility Directives

This product conforms to the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu furhren.

Properly shielded and grounded cables and connectors must be used to reduce the potential for causing interference to radio and TV communication and to other electrical or electronic equipment. IBM cannot be responsible for any interference caused by using other than recommended cables and connectors.

This product has been tested and found to comply with limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesminesters für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

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

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

Electrical Safety

The printers are inspected and listed by recognized national testing laboratories: Underwriters Laboratories, Inc. (UL**) in the U.S.A., Canadian Standards Association (CSA**) in Canada, and TUV Rheinland. Listing of a product by a national testing laboratory indicates that the product is designed and manufactured in accordance with national requirements intended to minimize safety hazards. Remember, however, that this product operates under conditions of high electrical potentials and heat generation, both of which are functionally necessary.

Lightning Safety

To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.

Safety And Notices

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

DANGER

<#>	**This symbol indicates the presence of a hazard that could cause death or serious injury. Danger and Caution notices are numbered to help you find the translated versions in the *IBM 6500 Safety Notices* booklet.**

CAUTION

<#> **This symbol indicates the presence of a hazard that could cause moderate or minor injury.**

CAUTION

<#> **This symbol indicates a heavy assembly that requires two or more persons to lift or hold.**

CAUTION

<#> **This symbol indicates a part or assembly that is hot enough to burn you.**

CAUTION

<#> **This symbol indicates a part or assembly that is sharp enough to cut you.**

ATTENTION **Attention indicates the possibility of damage to a device, program, system, or data.**

IMPORTANT **Important indicates information vital to proper operation of the printer.**

NOTE: A note gives you helpful information and tips about printer operation and maintenance.

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IBM

Infoprint

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IPDS

PC-DOS

RISC System/6000

SCS

Token-Ring

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Centronics	Genicom Corporation
Code V	Quality Micro Systems
CSA	Canadian Standards Association
Dataproducts	Dataproducts Corporation
ECOS	ECOS Electronics Corp., Inc., Oak Park, Ill.
EIA	Electronic Industries Association
Energy Star	United States Environmental Protection Agency
Fluke	John Fluke Manufacturing Co., Inc.
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IGP	Printronix, Inc.

LinePrinter Plus, LP+	Printronix, Inc.
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MTOS	Industrial Programming, Inc.
PGL	Printronix, Inc.
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Torx	Camcar/Textron Inc.
UL	Underwriter’s Laboratories, Inc.
Windows 3.1x, 95, 98, Me, NT, 2000, and XP	Microsoft Corporation

Safety Inspection

Safety devices to protect operators and service personnel from injury are installed in all IBM printers. Use this inspection guide as an aid in identifying possible unsafe conditions in an Infoprint* 6500 printer.

Do the inspection steps outlined in this section before the normal inspection for Maintenance Agreement Qualification, or any time you are instructed to make a safety inspection.

If you find any unsafe conditions, determine the severity of the hazard and whether or not you can continue the inspection without first correcting the problem.

IMPORTANT **The correction of any unsafe condition is the customer's responsibility.**

Preparation

You must have completed the "CE Basic Electricity" training course (self-study course number BOPS08XS or current level) to do this Safety Inspection.

Have the following items available:

- *Electrical Safety for IBM Customer Engineers*, Order No. S229-8124.
- A Fluke** meter (P/N 8496278) or similar device for measuring electrical resistance and voltage.
- An ECOS** Electrical Safety Tester (P/N 6339695) in the United States or a similar safety tester in other countries.

For each safety check on the following pages, do the steps in the order presented. Do not omit any steps.

Prepare The Printer For Inspection

To prepare the printer for a safety inspection, read the safety notices below, then do all the steps that follow.

DANGER

<3> **Hazardous voltages are present in the printer with the power cord connected to the power source. Switch off printer power and unplug the printer power cord before proceeding.**

<4> **Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.**

<5> **Power off the printer and disconnect the power cord *before* connecting or disconnecting a communication port, teleport, or attachment cable connector.**

1. Put the printer in the NOT READY state.
2. Power off the printer.
3. Unplug the printer power cord from the customer's power outlet.

Inspect Mechanical Parts

Top Cover And Cabinet Doors

1. Inspect the top cover:
   a. Open the top cover. On cabinet models, make sure the dashpot holds the cover up in the open position.
   b. Make sure the window is not cracked or broken.
   c. Make sure the seal around the top cover is not cracked or broken.
   d. Make sure there are no exposed sharp edges.
   e. Make sure the wireform paper guide assembly is undamaged.
   f. Make sure the electrostatic discharge (ESD) fingers are not loose or damaged. Make sure they touch the contact strips on the frame when the cover is closed.
   g. Close the top cover. Make sure the operator panel is centered in the opening of the cover.
2. On cabinet models, inspect the front and rear cabinet doors:
   a. Make sure the seals and magnetic strips are not loose or damaged.
   b. Make sure the restraining cable is attached and unbroken.
   c. Make sure there are no exposed sharp edges.
   d. Open the rear cabinet door and inspect the lower rear paper path for the following:

      Make sure the paper stacker tray assembly or optional power stacker is in place and undamaged.

Print Mechanism

1. Open the printer top cover.
2. Make sure the shuttle cover is correctly installed and undamaged. (See page 343.)
3. Make sure the paper guide assembly is correctly installed and undamaged. (See page 366.)

Inspect Electrical Parts

Safety Ground Path

1. Make sure the printer power cord is unplugged.
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Make sure the ground cable from the circuit breaker power leads is undamaged and firmly attached to the ground lug on the wall of the card cage, as shown in Figure 1.

NOTE: Ground paths for the printer are summarized in and Figure 2.

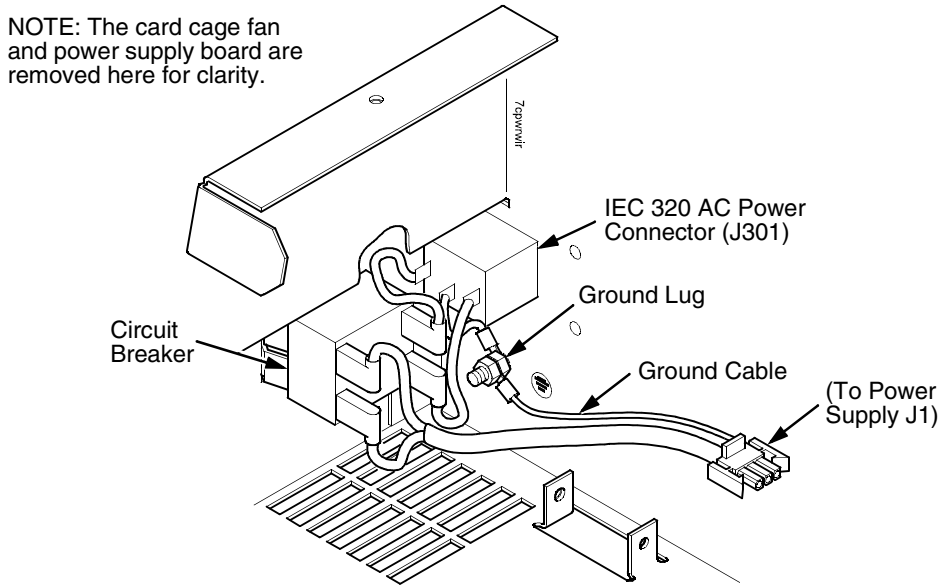


Figure 1. This figure is a detail drawing showing the ground lug for the circuit breaker of cabinet models.

4. Set a Fluke meter (P/N 8496278) or similar device to the lowest resistance scale. Measure the resistance between the power cable ground pin and the printer frame: safety ground circuits should measure 0.1 Ohm or less.
5. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).

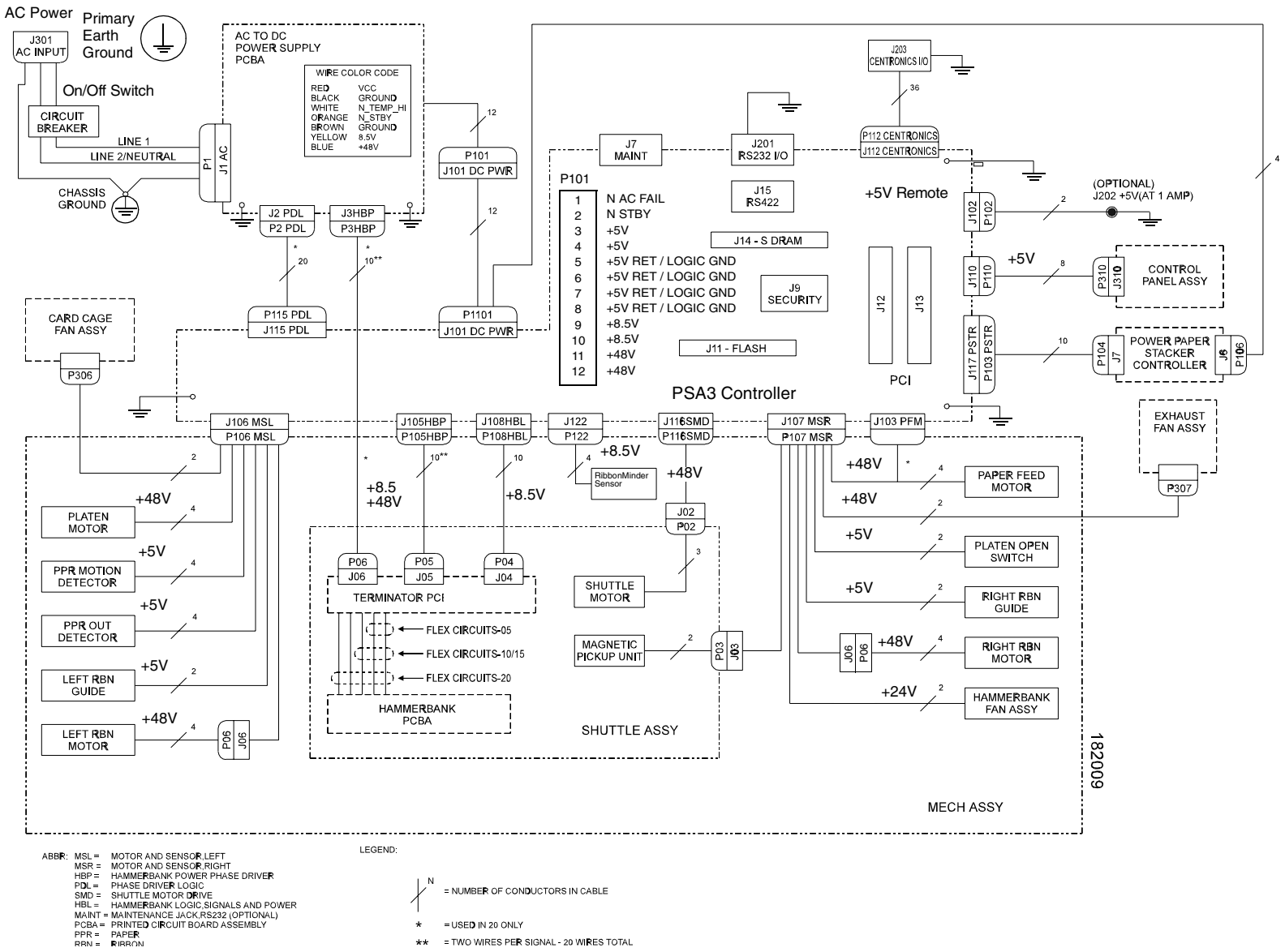


Figure 2. This figure shows the ground path diagram for the Infoprint 6500 printer.

Customer Power Source Service Check

Use an ECOS Electrical Safety Tester (P/N 6339695) in the United States or a similar safety tester in other countries.

NOTE: The ECOS tester will trip ground fault detector protected outlets. This is a good test of the ground fault detector. Reset the outlet as needed.

Plug the ECOS meter into the customer's outlet. Follow the instructions supplied with the meter to test for the following:

- Wiring errors
- Low voltage
- Neutral to ground short
- Ground path impedance
- Neutral impedance

NOTE: The customer is responsible for correcting problems with the power source.

Each branch circuit must be grounded for safety and correct operation of the printer. This ground must be connected either to the electrical service ground or to a suitable building ground. The printer power cable has a green or green/yellow insulated grounding conductor. This is a ground line, *not* a neutral line.

Power Cable

1. Make sure the power cable is not damaged.
2. Make sure the power plug is the correct type.

Power On / Off Verification

1. Make sure all covers are installed.
2. Plug the power cable into the customer's power outlet.
3. Power on the printer and watch the LCD.
4. Verify that the power-on diagnostic tests and initialization routines are successful.
5. After successful initialization, the printer should cycle automatically to either the READY or NOT READY mode, depending on which power on state was selected when the printer was configured.
6. Power off the printer. Verify that the LCD goes completely blank and all fans stop.

Print Interlock Service Check

1. Power on the printer.
2. Open the printer top cover.
3. Open the forms thickness lever. The LCD should display “057 CLOSE PLATEN.”
4. Close the forms thickness lever. The fault message should clear.

Preface

This publication explains how to maintain and repair IBM Infoprint 6500 line matrix printers.

THIS MANUAL IS INTENDED FOR USE BY TRAINED SERVICE PERSONNEL ONLY.

About This Manual

This is a field service maintenance manual for IBM Infoprint 6500 line matrix printers. Refer to the Table of Contents or the Index to locate the maintenance information you need.

How To Replace Parts

1. Go to Removals and Adjustments on page 328.
2. Find the removal procedure for the part you want to replace.
3. Read the entire procedure *before* you do the procedure. This is important for two reasons:
   - Notes and notices provide important information. (Notices are defined on page 18.)
   - There are different models in the Infoprint 6500 family; procedures and parts can differ depending on the model.
4. Gather the tools you will need.
5. Do the procedure.

How To Order Parts

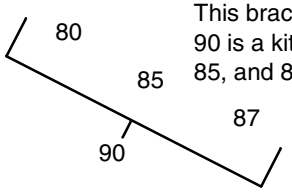
Go to the Parts Catalog on page 408, which contains drawings of all printer assemblies. Locate the part you need. Following each illustration is a list of the parts shown and their part numbers.

When locating parts, note the following:

- If a part number is listed you can order that part or assembly. If a component is part of a field kit, order the kit.
- Parts marked “Ref” (reference) are not spared or are part of another assembly.
- Part numbers are not listed for common fasteners.
- Look for the following features in the illustrations:

This kind of arrow points to an area that is ...

Enlarged where you see the larger letter.



This bracket indicates that item 90 is a kit containing parts 80, 85, and 87.

Printing Conventions In This Manual

Operator panel keys and LCD messages are set off from regular text in this manual:

- Operator panel keys and indicators are printed **boldface** and **UPPERCASE**.
  Example: Press the **CANCEL** key, then press the **START** key.
- Liquid Crystal Dislay (LCD) messages are printed in capital letters inside quotation marks (“ ”).
  Example: Press the **STOP** key. “NOT READY” appears on the LCD.
- Key combinations are denoted by the **+** (plus) symbol.
  Example: Press **SCROLL** ↑ **+ SCROLL** ↓
  means *Press the SCROLL* ↑ *key and the SCROLL* ↓ *key at the same time.*

Related Documents

This manual does not explain how to configure and operate the printer, or how to program application software for operation with the printer. That information is in the following manuals:

Manual	Form Number
IBM Infoprint 6500 Line Matrix Printer: User's Manual, English	S544-5957
IBM Infoprint 6500 Line Matrix Printer: Quick Start Guide, English	S544-5968
IBM Infoprint 6500 Line Matrix Printer: ANSI Programmer's Reference	G544-5983
IBM Infoprint 6500 Line Matrix Printer: ASCII Programmer's Reference	G544-5979
IBM Infoprint 6500 Line Matrix Printer: CTA Programmer's Reference	G544-5982
IBM Infoprint 6500 Line Matrix Printer: IPDS Programmer's Reference	S544-5984
IBM Infoprint 6500 Line Matrix Printer: Code V Programmer's Reference Manual	G544-5981
IBM Infoprint 6500 Line Matrix Printer: IGP Programmer's Reference Manual	G544-5980
IBM Infoprint 6500 Line Matrix Printer: Ethernet Interface User's Manual	G550-0440
IBM Infoprint 6500 Line Matrix Printer: Warranty Manual, Non-Americas	G550-0424
IBM Infoprint 6500 Line Matrix Printer: Safety Manual, Worldwide	G550-0418
IBM Infoprint 6500 Line Matrix Printer: Softcopy SOLW and User Documentation, Worldwide	GK3T-9926
Printing Systems SOLW Customer Notice, Worldwide	G550-0423

About The Printer

The entire system architecture of an IBM Infoprint 6500 line matrix printer is contained on a single controller board. The use of permanent SDRAM, replaceable flash memory, and PCI expansion slots on the controller board permits rapid access to stored printer emulations and fast processing of print data. A variable-speed shuttle and precise paper control enable the printer to print a wide variety of high-volume jobs with minimum maintenance and maximum reliability.

IGP** and Code V** Printronix** emulations are simple but versatile graphics programming languages that load into flash memory. These printers are therefore excellent bar code and graphics printers.

Although technologically advanced, an Infoprint 6500 printer is easy to use. The operator can select every printer function at the operator panel or by sending printer control codes in the data stream from the host computer.

The IBM Infoprint 6500 Printer Family

The Infoprint 6500 line matrix printer family consists of pedestal mount and floor cabinet models that print at the speeds shown in Table 1 on page 31. The print speeds listed in Table 1 are the maximum attainable under controlled test conditions. The print speed of real print jobs is determined by the interaction of many variables and is rarely a single, unchanging speed.

Infoprint 6500 printers have quiet and efficient black cabinets and pedestals, a new operator panel, and feature the PSA3** controller board. The PSA3 controller board has faster memory, streamlined architecture, and two PCI expansion slots.

Table 1 shows that there are " D " model and " v " model printers. The letter D designates the "D-Series" of printers uniquely designed to print Asian DBCS (Double Byte Character Set) ideograms, like Hanzi and Hangul characters. These printers are designed specially for the Asian market. The letter " v " designates models that print alphabetic characters used worldwide.

NOTE: Infoprint 6500 printers have a redesigned card cage and input/output ports, making the PSA3 controller board and associated electronic components incompatible with IBM 6400 or 6400-i printers.

IMPORTANT **When replacing components, be careful to order the correct spares for the model you are servicing. The shuttle and hammer spring assemblies for each model cannot be used on other models.**

Table 1. The Infoprint 6500 Printer Family

Model Number	Print Speed of Draft Mode Text	Enclosure	Hammer Bank
6500-D3C	336 LPM*	Floor Cabinet	60 Hammers
6500-D3P	336 LPM	Pedestal	60 Hammers
6500-D6C	604 LPM	Floor Cabinet	102 Hammers
6500-D8C	800 LPM	Floor Cabinet	126 Hammers
6500-v05	500 LPM	Floor Cabinet	28 Hammers
6500-v5P	500 LPM	Pedestal	28 Hammers
6500-v10	1000 LPM	Floor Cabinet	60 Hammers
6500-v1P	1000 LPM	Pedestal	60 Hammers
6500-v15	1500 LPM	Floor Cabinet	102 Hammers
6500-v20	2000 LPM	Floor Cabinet	126 Hammers
* Lines Per Minute			

How To Identify The Printer

The model number of the printer indicates the printer family, rated maximum print speed, and type of enclosure. (See Figure 3.)

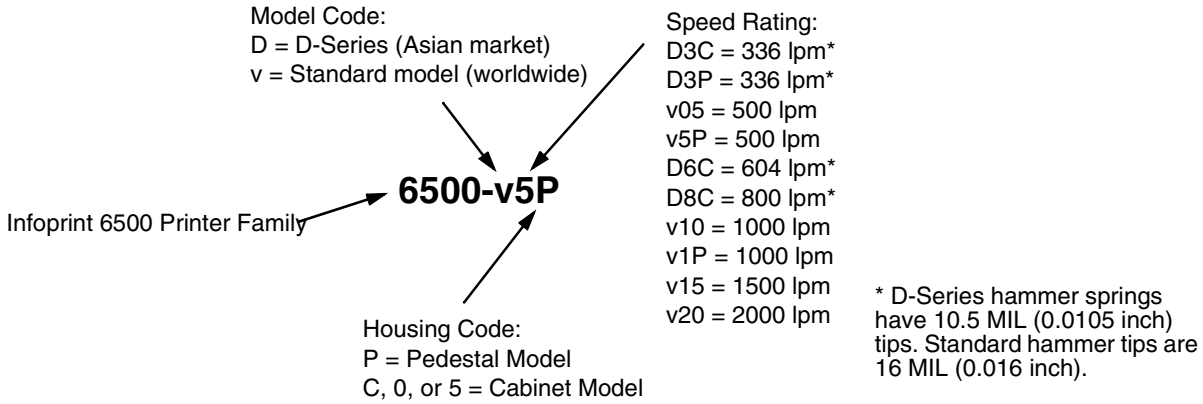


Figure 3. This figure shows how to interpret printer model numbers.

Printer Configuration Code

Every Infoprint printer has a configuration code which specifies the type of cabinet, the controller board revision level, the V8 ASIC revision level, and the MECA ASIC revision level. The configuration is included in the configuration printout. Figure 4 shows how to interpret the printer's configuration code.

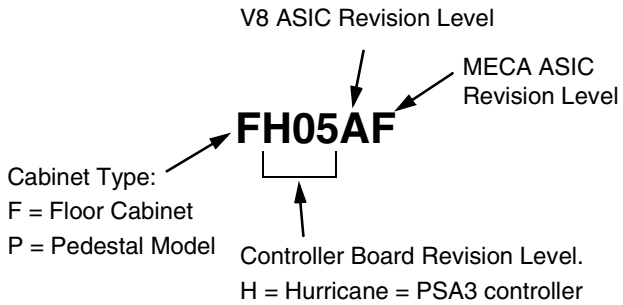


Figure 4. This figure show how to interpret the printer's configuration code.

Forms Handling

Pedestal models provide access to printed forms either from the tear-at-perforation edge on the top cover or the cover can be adjusted so the forms exit from the rear of the printer. Pedestal models also have a wireform paper tray attached to the front of the pedestal and a wireform catch basket attached to the rear of the pedestal.

Cabinet models can be equipped with three types of paper stacking device. The simplest is a fixed paper fence used in combination with the paper guide chains that come on all cabinet models. The paper fence is a wireform divider that separates the source paper stack from the printed output stack. For improved performance at higher throughputs, the guide chains are used with a moveable fence called the “passive stacker,” which can be adjusted to match the form’s length. For more demanding applications, an optional power stacker is available for the 1500 and 2000 lpm cabinet models. This information is summarized in Table 2. For more information about the power stacker, refer to Appendix E on page 469.

Table 2. The Paper Stackers on Cabinet Models

Printer Type	Fixed Paper Fence and Passive Paper Stacker	Power Paper Stacker
6500-D3C	Standard	Not Available
6500-D6C	Standard	Not Available
6500-D8C	Standard	Not Available
6500-v05	Standard	Not Available
6500-v10	Standard	Not Available
6500-v15	Standard	Option
6500-v20	Standard	Option

Important Maintenance Notes

To ensure the best performance of the printer, remember these important maintenance principles when you service it:

ATTENTION **Failure to observe these guidelines can result in damage to the equipment.**

- Do not adjust the platen gap unless the original shuttle assembly or platen has been replaced with a new or rebuilt unit, or unless you are instructed to do so in a troubleshooting procedure.
- Never bend or “tweak” hammer springs.
- Always handle the hammer springs by the thick mounting base. The hammer springs are precisely aligned and the hammer tips are delicate.
- Never close the forms thickness lever too tightly. This can lead to smearing, degraded print quality, paper jams, and damage to the platen and shuttle assembly.

Controls And Indicators

Electrical Controls: Figure 5

Key or Indicator	Function
MENU	If the printer is in NOT READY mode, this key puts the printer into PROGRAM mode. If the configuration menus are locked, the LCD indicates the operator panel is locked.
CONFIG	Prints the current configuration.
RETURN	Returns to the next higher level of a configuration menu.
MICRO ↑	In NOT READY mode, moves the paper upward 1/72 inch (“micro-step” function).
MICRO ↓	In NOT READY mode, moves the paper downward 1/72 inch (“micro-step” function).
SCROLL ↑	In PROGRAM mode, moves to the next menu (“Scroll” function).
SCROLL ↓	In PROGRAM mode, moves to the previous menu (“Scroll” function).
ENTER	Selects the option displayed on the LCD. This action either sets a value, moves to the next lower level of configuration, or starts a self-test.
LINE FEED	Moves paper up one line, as determined by current line spacing.
VIEW	Press to move the current print position up to the tractor area for viewing. Press again to return paper to original print position.
FORM FEED	Advances paper to next Top-Of-Form, as defined by the current page length.
SET TOP OF FORM	Sets Top-Of-Form and moves paper downward from the tractor alignment notches to the print position.
CANCEL	Cancels a print job.
EJECT	Moves paper for viewing or tear-off. This key is configurable: refer to the *User’s Manual.*
STOP	Puts the printer in NOT READY mode. This key also stops a Printer Test, and restores after an eject.

Key or Indicator	Function
START	Puts the printer in READY mode. This key also clears fault conditions, exits PROGRAM mode menus, moves paper back to the print position after **VIEW** is pressed, and restores the print position after a form is ejected.
STOP + ENTER	Soft reset: loads the power on configuration into memory. The printer must be in NOT READY mode to do a soft reset.
RETURN + ENTER	Toggles the lock on the configuration menus.
Status Lamp	Lit when the printer is in READY mode and the printer is ready to process data. Off when the printer is in NOT READY mode. Flashes when an error occurs.
LCD	The LCD (Liquid Crystal Display) displays printer status messages.
Power Switch	Applies AC power to the printer: (1 = on, 0 = off.) This switch is also a circuit breaker.

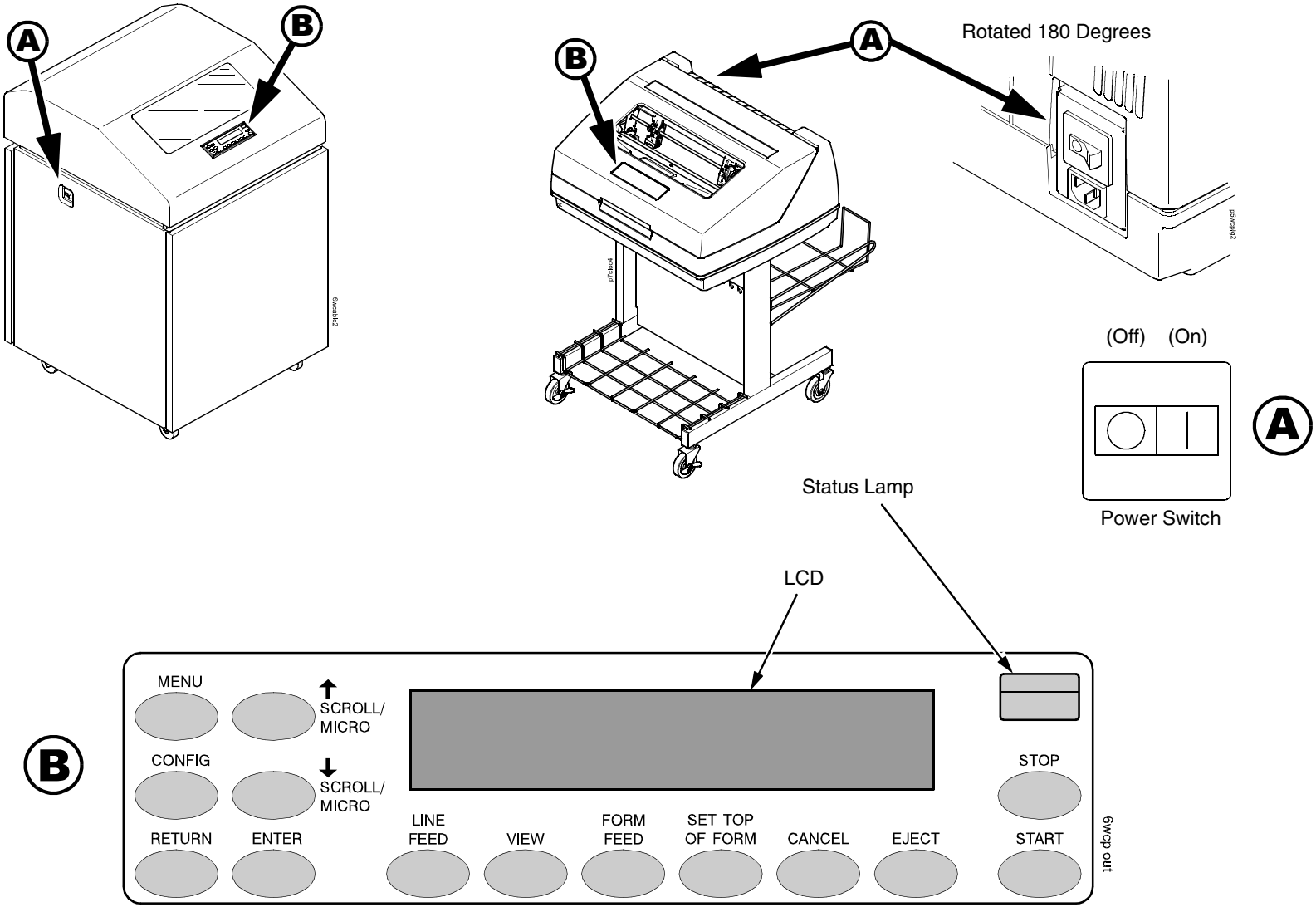
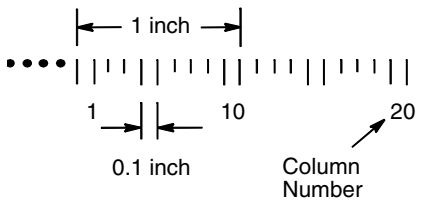


Figure 5. This figure shows the locations of the electrical controls on floor cabinet and pedestal model printers.

Mechanical Controls: Figure 6

Control or Indicator	Function
Paper Supports	Help prevent paper jams by supporting the paper between the tractors. The supports 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 or unload paper.
Forms Thickness Pointer and Scale	Indicates relative thickness of forms and paper. Set this lever at A for thin (single-part) forms, B for thicker forms, and so on.
Forms Thickness Lever and Platen Stop	The forms thickness lever closes the platen to the relative thickness of the paper. The platen stop returns the platen to the lever adjustment set by the user.
Tractors (2)	Hold and feed paper. Used to set side margin and position paper horizontally.
Tractor Locks (2)	Lock tractors in position.
Vertical Position Knob	Used to set top of form or first line to be printed. Rotating this knob moves paper vertically. Works when forms thickness lever is open.
Ribbon Loading Path Diagram	Instructions showing how to load the ribbon correctly.
Paper Scale	A horizontal scale graduated in tenths of an inch, useful for setting paper margins counting text columns. (See below.)



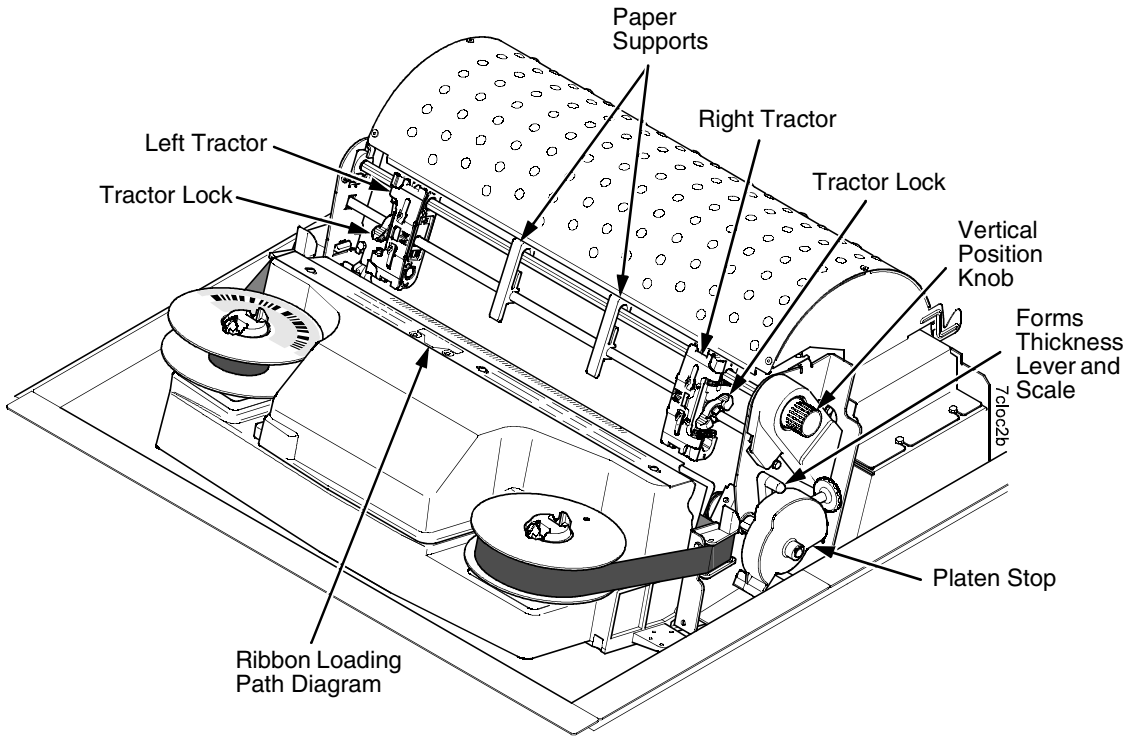


Figure 6. This figure shows the locations of the mechanical controls on on floor cabinet and pedestal model printers.

1 *Diagnosing Problems*

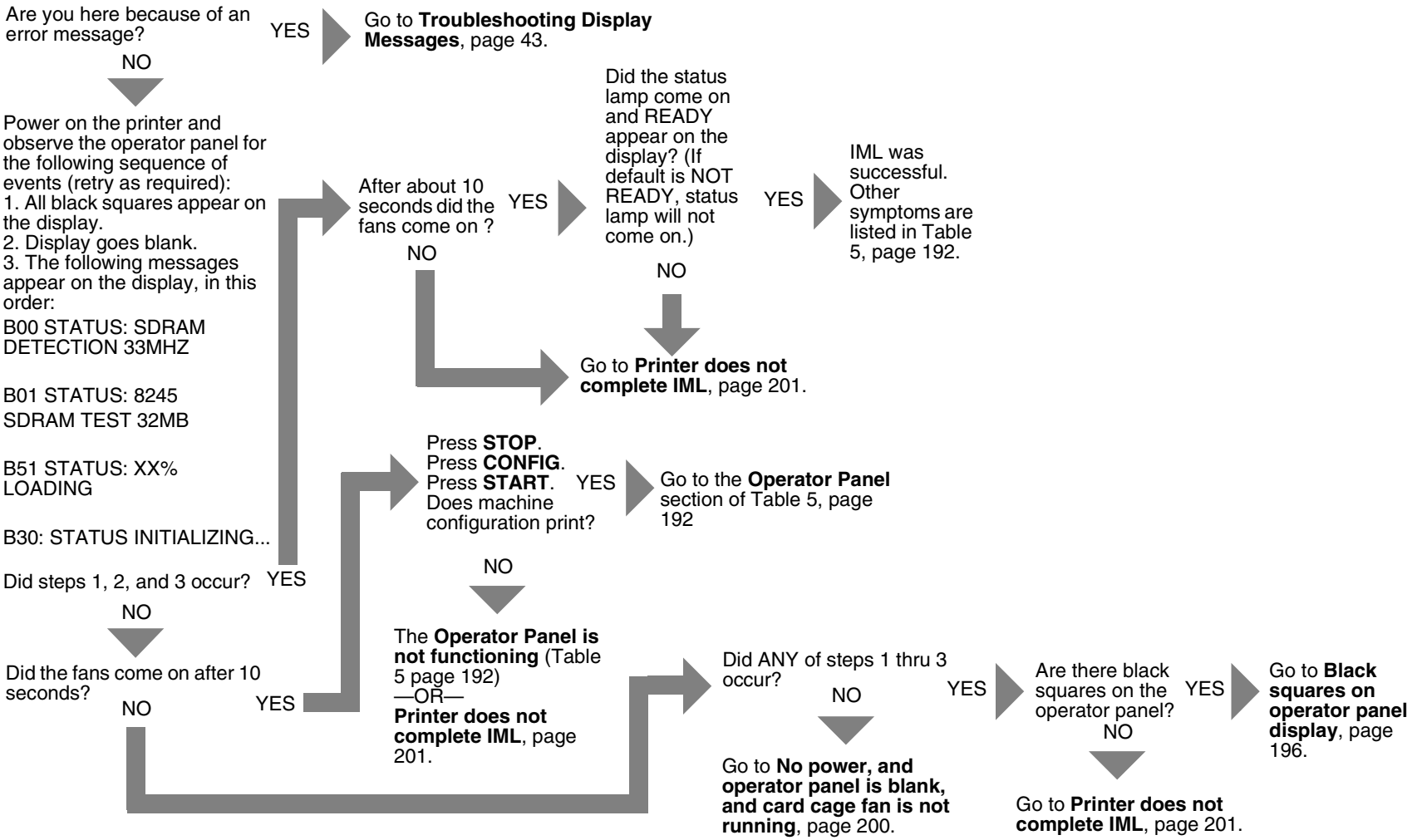
Introduction

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

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

Troubleshooting At A Glance ...

Start Of Call



How To Troubleshoot

DANGER

<3> Hazardous voltages are present in the printer with the power cord connected to the power source. Switch off printer power and unplug the printer power cord before proceeding.

<4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.

<5> Power off the printer and disconnect the power cord *before* connecting or disconnecting a communication port, teleport, or attachment cable connector.

You will be more successful in troubleshooting printer problems if you use standard fault isolation techniques. 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 matching message or symptom in Table 3 on page 44 or Table 5 on page 192. If you find a match, follow the troubleshooting instructions in the table.
4. If you do not find the symptom in either troubleshooting table, 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 system at a time, until the final half is a field-replaceable part or assembly.

IMPORTANT **Do not attempt field repairs of electronic components or assemblies. 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: replace the entire shuttle assembly. It is not field repairable.**

5. Replace the defective part or assembly.
6. Test printer operation immediately after every corrective action.
7. Install 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.

Troubleshooting Display Messages

If a fault condition occurs in the printer, three things happen:

- The status indicator on the operator panel flashes on and off.
- A message describing the fault condition appears on the LCD.
- Certain *Unit Check* conditions (see below) are automatically recorded in the error log. The error log is a buffer in non-volatile memory (NVRAM) that stores up to 50 messages as a list. The most recent message is stored at the top of the list, the oldest message at the bottom of the list. The list can never contain more than 50 error messages, so the bottom message drops away if the count reaches more than 50 error messages before the log is cleared. You can both print the error log and clear it. (See page 229.)

The LCD displays two kinds of printer conditions:

- An *Attention* condition halts printing until the operator replenishes supplies, clears paper jams, corrects a problem of communication between the printer and host computer, etc.
- A *Unit Check* condition is a failure detected by self-test and fault circuitry. Unit check conditions are either *recoverable* or *unrecoverable*.

  Recoverable unit check conditions are errors detected in the electromechanical print mechanism that may be temporary and correctable by cycling power. The printer tries a number of times to correct the condition before posting the message to the operator panel. The first thing to do in such cases is to power the printer off, wait 15 seconds, then power the printer back on. If the message reappears, classify the unit check condition unrecoverable.

  Unrecoverable unit check conditions are “hard” failures such as overcurrent, component failure, or microcode failures that prevent printing until the conditions are corrected. Unrecoverable conditions require that the printer be powered off and the condition corrected before powering the printer back on.

Display Messages

Find the message in the **Message List** below and follow the suggested procedure. After correcting an error, press the **START** key to clear the message.

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 3. Message List

Operator Panel Message	Explanation	Corrective Action
001 END OF FORMS LOAD FORMS	Attention message: the printer is out of paper.	1. Load paper. Press **STOP**. If message does not clear, go to the next step. 2. Check forms for dark backs or holes/perforations large enough to cause false END OF FORMS messages. Consider ordering the black back paper detector switch assembly. 3. Check for black or colored back on 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 media with a white or light back. If media with white/light back works and black/dark media does not, replace the paper detector switch with the optional black back forms switch assembly. 4. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Remove the barrier shield (cabinet model) or the barrier shield and paper guide (pedestal model). Make sure the sensors are securely snapped into the bracket, the mounting screws hold the paper detector switch assembly securely, and clean the sensors if they are dirty. 5. Check that connector P106/PMD is fully seated in connector J106 on the controller board. 6. Plug in the printer and power it on. Load paper. Replace the paper detector switch assembly if the message appears. 7. Plug in the printer and power it on. Load paper. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
001 END OF FORMS LOAD FORMS (continued)		11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
002 FORM JAMMED CLEAR AND RELOAD FORM	Attention message: the printer cannot detect paper motion. Inspect the paper path for jams.	1. Clear jams. Load paper. 2. Press **FORM FEED** 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 218. If forms feed, go to the next step. 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 221. 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. 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. 7. Check and adjust the platen open belt. Replace the belt if it is damaged. 8. 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. 9. Check and adjust the paper feed belt. Replace the belt if it is damaged. 10. Check and adjust the platen gap.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
002 FORM JAMMED CLEAR AND RELOAD FORM (continued)		11. Clean the paper motion detector with a cotton swab and alcohol. At the operator 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 problem reappears, the controller board or microcode is suspect. Do the following: 12. Save the printer configuration values. (Refer to the *User's Manual*.) 13. Clear NVRAM (page 253). 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). 18. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 19. If the problem reappears, replace the paper detector switch assembly and set the paper motion detector (PMD) to ENABLE.
003 FORMS EJECTED PRESS EJECT	Non-error status message.	Press the **EJECT** key to return the paper to the print position.
004 VIEW FORMS PRESS VIEW KEY	Non-error status message.	Press the **VIEW** key to return the paper to the print position.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
006 HOST SYSTEM REQUEST ATTENTION	Host attention message: the host computer or printer controller requires attention.	Not a printer problem.
007 FM HEADER ERROR	Applications software has violated header format parameters.	Not a printer problem. Have the system administrator correct applications data or configuration.
008 HOLD PRINT TIMEOUT PRESS START	Status message: the printer was offline more than 10 minutes and the "Intervention Required" parameter is set to "Send to Host."	Press **START** to put the printer in the READY state.
009 INVALID KEY PRESS	Attention message informing the operator that the wrong key was pressed.	No action required.
010 PARAMETER ERROR	The printer received an illegal parameter value in the command code.	1. Press **STOP** to clear the fault. Press **START** to go to the READY state. 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 227.
011 SCS COMMAND ERROR	The printer received an undefined control character (hex 40) through the coax/twinax interface.	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 227.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
012 STRUCTURED FLD ERROR	Application software has violated structured data field parameters.	Not a printer problem. Have the system administrator correct applications data or configuration.
013 ACTIVATE LOST	The printer detects a twinax protocol communication error and reports the error.	1. Power off and unplug the printer. Check the twinax host data cable and twinax I/O cable connection at the CT board. 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 on page 303. If resistances are not correct, replace the twinax auto-termination cable. 3. Plug in the printer and power it on. 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 227.
014 INVALID ACTIVATE	The printer detects a twinax protocol communications error and reports the error.	1. Power off and unplug the printer. Check the twinax host data cable and twinax I/O cable connection at the CT board. 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 on page 284. If the resistances are not correct, replace the twinax auto-termination cable. 3. Plug in the printer and power it on. 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 227.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
015 COMMUNICATION CHECK CHECK CABLE	The line is not active on a twinax interface.	1. Power off and unplug the printer. Check the twinax host data cable connection and twinax I/O cable connection at the CT board. 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 on page 303. If resistances are not correct, replace the twinax auto-termination cable. 3. Plug in the printer and power it on. 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.) 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 coax/twinax expansion board. Record the message and return it with the defective board.
016 INVALID COMMAND	The printer detects a twinax protocol communications error and reports the error.	1. Power off and unplug the printer. Check the twinax host data cable and twinax I/O cable connection at the CT board. 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 on page 284. If resistances are not correct, replace the twinax auto-termination cable. 3. Plug in the printer and power it on. 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 227.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
017 STACKER JAM CHECK STACKER	This message is triggered if there is paper inside the throat of the stacker elevator, but the elevator is not moving.	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: 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 and unplug the printer. Remove the paper guide assembly. Disconnect stacker cables from the controller board, stacker assembly, and stacker operator panel. Check cables for cuts, breaks, or damaged pins. Check continuity of cables. Replace any cable that is damaged or fails continuity test.
018 STACKER FULL CHECK STACKER	Status message: the power paper stacker is full.	1. Unload the stacker. 2. Check the stacker limit switches. (See page 207.) If the limit switches are OK, go to the next step. 3. Power off and unplug the printer. Remove the paper guide assembly. Disconnect stacker cables from the controller board, stacker assembly, and the stacker operator panel. Check cables for cuts, breaks, or damaged pins. Check continuity of cables. Replace any cable that is damaged or fails continuity test. Reconnect all stacker cables to the controller board, stacker, and stacker operator panel.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
019 STACKER FAULT CHECK STACKER	Two situations can trigger this message: 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 operator 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.	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: 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 207.) If the limit switches are OK, go to the next step. 5. Power off and unplug the printer. Remove the paper guide assembly. Disconnect stacker cables from the controller board, stacker assembly, and the stacker operator panel. Check cables for cuts, breaks, or damaged pins. Check continuity of cables. Replace any cable that is damaged or fails continuity test. 6. Plug in the printer and power it on. Disable the power stacker unit under the Printer Control menu. (Refer to the *User's Manual.)* If the problem reappears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
019 STACKER FAULT CHECK STACKER (continued)		a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 14. If the problem reappears, replace the stacker motors.
021 BUFFER OVERRUN VERIFY CONFIGURATION	The print buffer has overflowed on a serial interface. The printed output may contain random * (asterisk) characters.	1. Make a configuration printout. 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. 2. Set printer serial interface parameters to match those of the host. 3. Send a print job to the printer. If the message appears, go to **Communications Failures**, page 227.
022 UNIT ADDRESS INVALID CHECK PRINTER ADDRESS	Poll timeout on the twinax interface indicating the unit address is not recognized by the printer.	Have the system administrator make sure the printer address is correct.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
024 SERIAL PARITY ERROR	The printed output may contain random ? (question mark) characters.	1. Make a configuration printout. 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. Set printer serial interface parameters to match those of the host. 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 227. 4. If the printer is in a twinax environment, check the error log for 024 errors 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 coax/twinax multi-platform interface. (Refer to the *Coax/ Twinax Multi-Platform Interface Feature Installation and Operation Guide*, Form Number S246-0149.)
025 FRAMING ERROR VERIFY CONFIGURATION	The printed output may contain random ! (exclamation point) characters.	1. Make a configuration printout. Verify that the printer matches host 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 227.
026 HEX DUMP MODE	Printer attach status message.	No action required.
027 COMMUNICATIONS CHECK CALL SYSTEM OPERATOR	Enable poll timeout. The printer was not enabled for one minute over a coax interface	Power off and unplug the printer. Check data cable connection and host system. (Refer to line problem determination procedures, as recommended by the host system.)

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
028 COMMUNICATIONS CHECK CALL SYSTEM OPERATOR	Poll timeout error. The printer was not polled for one minute over a coax interface.	Power off and unplug the printer Check data cable connection and host system. (Refer to line problem determination procedures, as recommended by the host system.)
029 8344 DIAGNOSTIC FAILED	Link-level code test detects a hardware failure on the coax/ twinax expansion board. This message can also occur if the software in flash memory is corrupted.	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 coax/twinax expansion board. Record the message and return it with the defective board.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
031 END OF FORMS TMEOUT LOAD FORMS	On a coax interface, a timeout message is sent to the host if paper is not loaded within 10 minutes after **STOP** was pressed to clear an end of forms fault.	1. Load paper. Press **STOP**. If message does not clear, go to the next step. 2. Check for black or colored back on 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 media with a white or light back. If media with white/light back works and black/dark media does not, suggest to the customer that they order the black-back forms RPQ, which will replace the paper detector switch with a black-back forms switch assembly. 3. Power off and unplug the printer. Remove the paper guide assembly 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. Plug in the printer and power it on. Load paper. Replace the paper detector switch assembly if the message appears. 6. Plug in the printer and power it on. Load paper. If the problem reappears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
031 END OF FORMS TMEOUT LOAD FORMS (continued)		b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
032 FORMS JAMMED TIMEOUT CLEAR AND RELOAD FORMS	On a coax interface, a timeout message is sent to the host if paper motion has not occurred for 10 minutes after **STOP** was pressed to clear a paper jam fault.	1. Clear the paper jam. Press **STOP**. 2. Press **FORM FEED** 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 218. 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 221. 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. 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. 7. Check and adjust the platen open belt. Replace the belt if it is damaged. 8. 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. 9. Adjust the paper feed belt. Replace the belt if it is damaged. 10. Check and adjust the platen gap.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
032 FORMS JAMMED TIMEOUT CLEAR AND RELOAD FORMS (continued)		11. Clean the paper motion detector with a cotton swab and alcohol. At the operator 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 problem reappears, the controller board or microcode is suspect. Do the following: 12. Save the printer configuration values. (Refer to the *User's Manual*.) 13. Clear NVRAM (page 253). 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). 18. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 19. Power on the printer in download mode and load flash memory (page 254). 20. If the message does not appear, replace the paper detector switch assembly and set the paper motion detector (PMD) to ENABLE.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
041 BUFFER OVERFLOW	The print buffer has overflowed on a serial interface. The printed output may contain random * (asterisk) characters.	1. Make a configuration printout. 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 227**.**
042 NO CUSTOM SET AVAIL	Printer configuration: the custom configuration set does not exist.	Save the custom configuration set.
043 CUSTOM SET EXISTS	Printer configuration: custom set is write-protected.	Delete the existing custom configuration set, then save the new set.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
045 FIRMWARE ERROR * SEE USERS MANUAL	Application software tried to perform an illegal printer function or damaged memory is detected on the controller board. If this message appears at power-up, replace the controller board. Record the message and return it with the defective board. After replacing the controller board, DO NOT make the printer READY, but immediately download the latest code from IBM First (page 247), then power on in download mode and load the flash memory (page 254).	1. Cycle power. Run the print job. If the message appears, download the emulation software again. 2. Cycle power. Run the print job again. If the message appears, replace the flash memory with blank flash with boot code and then download code. 3. Plug in the printer and power it on. Run the print job again.If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, there is an application software error. Reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
046 EC STOPPED AT STATE <state>	Where <state> is a number from 0000 to 0010. The Engine Controller processor 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 (page 336). Record the message and return it with the defective board. After replacing the controller board, DO NOT make the printer READY, but immediately download the latest code from IBM First (page 247), then power on in download mode and load the flash memory (page 254).	1. Power off and unplug the printer. Remove the flash memory SIMM and SDRAM DIMM. Inspect the flash and SDRAM memory module sockets on the controller board. If any socket pins are bent or damaged, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 2. Download the latest code from IBM First (page 247). 3. Power on the printer in download mode and load flash memory (page 254). If the message appears, replace the flash memory with blank flash containing boot code, then load flash memory (page 254). 4. If the message appears, replace the SDRAM DIMM, then load flash memory (page 254). 5. Plug in the printer and power it on. Load paper. If the message reappears, the controller board, or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on in download mode and load flash memory (page 254).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
046 EC STOPPED AT STATE <state> (continued)		12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
056 HAMMER COIL OPEN SEE USERS MANUAL	Electrical malfunction of one or more hammer coils.	1. Check the shuttle for electrical shorts (page 268). 2. Cycle power. If the message appears, replace the shuttle frame assembly. 3. Power on the printer. Run a print test. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
057 CLOSE PLATEN	The forms thickness lever is open.	1. Load paper. Close the forms thickness lever. If message does not clear, go to the next step. 2. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Disconnect connector P107 from the controller board. Check continuity of the platen interlock switch cable from P107/PLO to the switch. Replace the platen interlock switch assembly if it fails the continuity test. 3. Check that the platen interlock switch is not loose. 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. (Refer to the Main Wire Harness Test Tables in Chapter 3.) Replace the platen open motor if it fails the resistance test. 6. Plug in the printer and power it on. Run a print test. If the problem reappears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
057 CLOSE PLATEN (continued)		12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
058 SHUTL JAM SEE USERS MANUAL	The shuttle is not moving or is moving at the wrong speed.	1. Check the forms thickness lever: if it is set too tightly, it can slow the shuttle enough to trigger the fault message. Set the forms thickness lever to match the thickness of paper and provide satisfactory print quality, but not too tightly. 2. Check and adjust the platen gap. 3. Inspect the ribbon mask for bends or deformation that may snag and interfere with shuttle movement. Make sure the hammer bank cover assembly is correctly installed on its mounting pegs. 4. Run a print test. If the message appears, power off the printer, unplug the printer, and go to the next step. 5. Remove the shuttle cover. Remove the paper guide assembly 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 on page 282.) Remove obstructions and reseat all cables. Check the resistance of MPU in P107. (Refer to the Main Wire Harness Test Tables on page 284.) Replace the MPU if it fails the test. 6. Plug in the printer and power it on. 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 ± .001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 ± 1 inch-pounds (2.03 ± 0.11 N•m). If the shuttle does not move go to Shuttle Short Tests (page 268) and follow the steps exactly as listed. 7. Run a print test. If the message appears, replace the MPU intermediate cable assembly.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
058 SHUTL JAM SEE USERS MANUAL (continued)		8. Run a print test. If the problem reappears, the controller board or microcode is suspect. Do the following: 9. Save the printer configuration values. (Refer to the *User's Manual*.) 10. Clear NVRAM (page 253). 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). 15. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 16. Run a print test. If the message appears, remove the shuttle frame assembly and place it on a hard, flat surface. Rotate the flywheel by hand and check for any binding. The flywheel should spin more than one turn. If it fails this test, replace the shuttle frame assembly. 17. Run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, contact your DDS and Second Level Support.
059 CANCEL PRINT ACTIVE	Non-error status message.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
060 PRINTER HOT SEE USERS MANUAL	Controller board sensors report high temperatures on the board. This message indicates internal temperatures over 60° Celsius (140° Fahrenheit). Print jobs do 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 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.	1. Inspect printer environment for severity. Advise the user to move the printer to cooler, cleaner location. 2. Power off and unplug the printer. Remove the paper guide assembly 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. Remove the shuttle cover and Check the shuttle for electrical shorts (page 268). 5. Install the paper guide assembly or pedestal top cover. Plug in the printer and power it on. Load paper. Run the Plot Test for 1/4 page. If the problem reappears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
060 PRINTER HOT SEE USERS MANUAL (continued)		12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
062 MACHINE CHECK SEE USERS MANUAL	Sensors cannot detect current in the fan circuit.	1. Cycle power. If the message appears, press **STOP**. 2. If the message occurs on a pedestal model, check that the correct operator panel is installed. The operator panel for a pedestal model has resistors R18 and R19 next to the operator panel cable connector. 3. Check that the exhaust fan is connected to exhaust fan cable connector J307 and verify that the connector is not installed backwards. 4. Power off and unplug the printer. Remove the paper guide assembly. Disconnect connector P107 from the controller board. Test connector P107/EHF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Chapter 3.) Replace components that fail test. 5. Make sure connector P107/EHF has a good connection at J107 on the controller board. 6. Inspect for obstructions of airways and vents. Check for items beneath the printer blocking cabinet vents. Make sure cabinet exhaust fan vents are not blocked. 7. Plug in the printer and power it on. Check for fan operation. If the message appears or the fan doesn't work, replace the exhaust fan. 8. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 9. Save the printer configuration values. (Refer to the *User's Manual*.) 10. Clear NVRAM (page 253). 11. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
062 MACHINE CHECK SEE USERS MANUAL (continued)		12. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). 15. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
065 HAMMER FAN CHECK SEE USERS MANUAL	Hammer Bank Fan Fault. Sensors cannot detect current in the fan circuit.	1. Cycle power. If the message appears, press **STOP**. 2. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Verify that the connector is not installed backwards. 3. Disconnect connector P107 from the controller board. Test connector P107/HBF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Chapter 3 and the Main Wire Harness Test Diagnostic in Chapter 2.) Replace components that fail test. 4. Make sure P107/HBF has a good connection at J107 on the controller board. 5. Inspect airways and vents for obstructions. 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
069 DATA CLEARED	This message appears when data are cleared out of printer after the **CANCEL** key has been pressed.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
080 POWER SUPPLY HOT	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 **START** key resumes the print task. Check the operating environment. A severe environment is one with an ambient temperature at or above 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.	1. Inspect printer environment for severity. Advise the user to move the printer to cooler, cleaner location. 2. Run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 3. 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. 4. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check that the power supply guard/air deflector is correctly positioned over the power supply board.  **CAUTION: DO NOT TOUCH THE POWER SUPPLY**, but hold your hand close enough to it to check for heat radiating off the power supply board. If the power supply is noticeably hot, replace it. 5. Check that all fan cables are connected. 6. Inspect vents and fan airways for obstructions. Look underneath cabinet models for items blocking the cabinet exhaust vents. 7. Replace the power supply if you did not do so earlier. 8. Install paper guide assembly or pedestal top cover. Plug in the printer and power it on. Load paper. Run the “All E’s” print test for 5 to 10 minutes. If the problem reappears, the controller board or microcode is suspect. Do the following: 9. Save the printer configuration values. (Refer to the *User’s Manual*.) 10. Clear NVRAM (page 253). 11. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
080 POWER SUPPLY HOT (continued)		12. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). 15. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
081 POWER VOLT CHECK SEE USERS MANUAL	The power supply has failed.	1. Run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
082 POWER 8.5 CHECK SEE USERS MANUAL	8.5 Volt Power Failed. Internal power failure.	1. Cycle power. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 11. Power on the printer. If the message appears, replace the shuttle frame assembly.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
083 INTAKE FAN CHECK * SEE USERS MANUAL	Sensors cannot detect current in the card cage fan circuit.	1. Cycle power. If the message appears, press **STOP**. 2. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Verify that connector p106/CCF is not installed backwards. The side of the connector with the locking tab MUST point toward the shell (i.e., outward) when it is plugged into P106. If it is backwards, the fan will not run and the 083 error will appear. 3. Disconnect connector P106 from the controller board. Test connector P106/CCF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Chapter 3.) Replace components that fail test. 4. Make sure P106/CCF has a good connection at J106 on the controller board. 5. Inspect for obstructions of airways and vents. 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
083 INTAKE FAN CHECK * SEE USERS MANUAL (continued)		13. Power on the printer in download mode and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
084 POWER 48V CHECK * SEE USERS MANUAL	48 Volt Power Failed. Internal power failure. **NOTE:** Before going to the customer account, obtain a power supply, a PSA3 controller board, and hammer bank power and logic cables for the printer model you will be working on. If the customer account is a long distance away, also obtain a shutlle assembly. You will return for credit any component that is not used.	1. Run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, continue with this procedure but skip the steps concerning the power supply. 2. If the printer is operational, print the Error Log. Check the error log for 065 HAMMER BANK FAN FAULT or other errors that occurred before the 084 error. Investigate these errors as appropriate, because they may be the cause of the 084 error. 3. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Before handling circuit boards, put on a static wrist strap. 4. Remove the power supply (PS) and inspect it for any burn marks. Replace the PS if you find any signs of burning or overheating. 5. Reinstall the PS. Check that PS connector P101 is correctly and fully seated in connector J101 on the controller board. Verify that pin 1 on P101 goes into pin 1 on the controller board. If P101 is ever plugged in backwards with the power on, the controller board will probably be damaged. 6. Check the shuttle for shorts by conducting the Shuttle Electrical Shorts Test on page 268. This is IMPORTANT! Replace the shuttle if it is defective. If it passes the shorts test, remove the shuttle frame assembly and place it on a hard, flat surface. Spin the flywheel by hand. The flywheel should spin more than one turn and there should be no binding anywhere in its spin. If it fails this test, replace the shuttle frame assembly. 7. Replace the hammer bank power and logic cables. (Refer to 086 CONTROL 15V CHECK / SEE USERS MANUAL, steps 4 through 7.) Plug in the printer and power it on.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
084 POWER 48V CHECK * SEE USERS MANUAL (continued)		a. If the printer comes to READY, go to step 13. b. If the 084 message appears, power off , unplug the printer, and go to step 8. 8. In the normal power-on sequence, the card cage fan (CCF) will turn on after “TESTING HARDWARE, PLEASE WAIT” displays on the operator panel. If the CCF turns on, this means the power supply (PS) +48 volts is OK. In the following substeps, you will determine if +48V works by removing most external cables and components from the controller and PS boards. a. Disconnect all connections to the controller board except the P101 power connector and P110 op panel connector. b. Remove the two-pin CCF connector from the P106 shell and plug it onto J106 pins 9 and 11 on the controller board. c. Power on the printer. If the operator panel lights up, this indicates PS +5V is working. If the CCF runs momentarily (about 2 seconds), the PS +48V is working and you can go to step 9. d. The CCF did not come on in step 8c. Do CCF resistance and wiring checks. Replace the CCF or any wiring found defective. e. Power on the printer. If the operator panel lights up, the PS +5V is working. If the CCF runs momentarily (about 2 seconds), the PS +48V is working and you can go to step 9. f. If the CCF did not come in step 8e, the controller or PS board is defective. It is easier to swap out the PS first. Power down and unplug the printer. Replace the PS. g. Power on the printer. If the operator panel lights up, the PS +5V is working. If the CCF runs momentarily (about 2 seconds), the PS +48V is working. Go to step 9. h. If the CCF did not come on in step 8f after replacing the PS, power down and replace the controller (page 336).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
084 POWER 48V CHECK * SEE USERS MANUAL (continued)		i. Plug in the printer and power it on. If the operator panel lights up, the PS +5V is working. If the CCF runs momentarily (about 2 seconds), the PS +48V is working. j. If, after replacing the power supply and controller in steps 8f and 8g, the CCF did not come on, contact DDS and Boulder support. Exit this procedure. **IMPORTANT:** Be sure to install the original power supply and controller board back into the printer if the new part is NOT required. k. Replacing the PS and controller fixed the initial errors. To make sure that the PS was also defective, do the following 1) Replace the original PS. 2) Retest. 3) If OK, return the new PS that is not required. Go to step 9. 4) If not OK, reinstall the new PS. If OK after installing the new PS, go to step 9. If not OK, contact DDS and Boulder support. Exit this procedure. 9. In step 8, you determined that the PS +48V is working; therefore, an external cable or component connecting to the controller board or the PS is pulling down the PS +48V. Reconnect all cables to the controller board and PS. Verify that the 084 message still occurs when you power on the printer. In the table steps below, you are trying to determine which external cable or component is defective. Disconnect one cable at a time in accordance with the following table. If the 084 error still occurs with the cable disconnected, the defective component is on another cable. If the 084 error does *not* occur with the cable disconnected, then the 084 error *is* associated with that cable — perform diagnostics on the cable and its connecting components. Always reconnect the cable before disconnecting the next cable in the table. When connecting hammer bank power P105, make sure pin 1 on P105 connects to pin 1 on the controller board.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
084 POWER 48V CHECK * SEE USERS MANUAL(continued)	 **DANGER**	**<3>** **Hazardous voltages are present in the printer with the power cord connected to the power source. Switch off printer power and unplug the the printer power cord before proceeding.** **Before unplugging or plugging in any cable, power off and unplug the printer. Do NOT put your hands or tools inside the printer when it is plugged in.**

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
084 POWER 48V CHECK * SEE USERS MANUAL (continued)		

Disconnect Plug under test. All others are connected.	Expected Fan result if +48 V is OK	Expected Operator Panel Result	Comments
P105	CCF (Card Cage Fan) momentarily on (2 seconds) CCF on (D8C/v20 models)	TABLE MISMATCH READY (D8C/v20 models)	+48 V is OK. Do hammer bank logic cable and shuttle checks.
P106	Shuttle fan comes on	083 INTAKE FAN FAULT	+48 V is OK. Do P106 wire harness, platen motor, and other component checks.
P107	CCF comes on	090 SHUTTLE OPEN	+48 V is OK. Do P107 wire harness, hammer bank fan, and other component checks.
P108	CCF momentarily on (2 seconds)	TABLE MISMATCH	+48 V is OK. Do P108 cable harness, hammer bank logic, and shuttle checks.
P103 (Stacker Logic Cable)	CCF comes on	READY	+48 V is OK. Do stacker logic cable and stacker checks
P105 (Stacker Power Cable) Keep P101 plugged into the controller.	CCF comes on	READY	+48 V is OK. Do stacker power cable and stacker checks.
P105 and P103	CCF comes on	READY	+48 V is OK. Do stacker check.
P116	CCF comes on	READY	+48 V is OK. Do P116 cable harness and shuttle motor check.

Table 3. Message List

<table>
<tr><th>Operator Panel Message</th><th>Explanation</th><th>Corrective Action</th></tr>
<tr><td>084 POWER 48V CHECK *
SEE USERS MANUAL (continued)</td><td colspan="2">
<table>
<tr><th>Disconnect Plug under test. All others are connected.</th><th>Expected Fan result if +48 V is OK</th><th>Expected Operator Panel Result</th><th>Comments</th></tr>
<tr><td>P122 for model -D8C/-v20</td><td>CCF comes on</td><td>READY or
TABLE MISMATCH</td><td>Do hammer bank and shuttle checks.</td></tr>
<tr><td>P02 on PS, ribbon cable for model -D8C/-v20</td><td>CCF on momentarily (1 second)</td><td>TABLE MISMATCH
DOWNLOAD AGAIN</td><td>+48 V is OK. Do P02 cable checks.</td></tr>
<tr><td>P03 on PS for model -D8C/-v20</td><td>CCF comes on</td><td>HAMMER BANK NOT INSTALLED message (momentarily). TABLE MISMATCH / DOWNLOAD AGAIN</td><td>+48 V is OK. Do P03 cable and shuttle checks.</td></tr>
</table>
10. The 084 message still occurred when each of the above cables were individually unplugged during step 9.
11. Power off and unplug the printer. Reconnect all cables to the controller board and PS.
12. Plug in the printer and power it on. If the 084 message appears, contact DDS and Boulder support. Exit this procedure.
13. The printer comes on READY. If the controller was not replaced during the above procedure, print the error log. Look for the the last errors that are not the 084 message. Investigate the other reported errors by following the appropriate procedure in this manual.
14. Go to “OPERATOR PRINT TESTS” in the configuration menu and print a full 136 character width test pattern of All H’s. If there is any print quality issue, go to the appropriate procedure in this manual.
</td></tr>
</table>

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
085 CONTROL VOLT CHECK SEE USERS MANUAL	Controller voltage failure.	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 flash memory with blank flash with boot code and download code. 3. Check the shuttle for electrical shorts (page 268). 4. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 12. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
086 CONTROL 15V CHECK SEE USERS MANUAL	Controller voltage failure.	1. Make a configuration printout and note the customer's code load (if possible). 2. Power down and unplug the printer. 3. Replace the hammer bank logic cable. There may be damage you cannot see. 4. Power on the printer. If the problem persists, do the cable shorts test (page 270) on the hammer bank (HB) power cable. Replace the cable if necessary. **NOTE:** When reconnecting the HB power cable, make sure pin 1 on the cable connector matches pin 1 on the PCBA connector. Plugging the HB power cable in backwards can result in a "Table Mismatch" error. 5. Make sure the cables are properly tie-wrapped away from the reciprocating shuttle. Spin the shuttle motor by hand to check that the cables are clear of the shuttle as it moves. 6. You can easily verify that when the shuttle cover is installed, the hammer bank logic cable is clear of the shuttle by removing the paper scale on the shuttle cover, as follows: a. Remove the paper scale BEFORE installing the cover to reduce the chance of losing a screw in the machine. Mark a location reference line with a pencil across the paper scale and cover. Remove the three screws holding the paper scale. b. Install the shuttle cover and fasten it in place. Look in past the shuttle cover to verify the position of the hammer bank logic cable. If it is near the shuttle, remove the cover and push or tie the cable back. c. When the cable position is OK, install the paper scale, being careful not to drop any of the three screws. Erase the pencil line.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
086 CONTROL 15V CHECK SEE USERS MANUAL (continued)		7. Power on the printer. If the problem persists, refer to the Main Wire Harness Test Diagnostic (page 272) to complete the following substeps: a. Power down and unplug the printer. b. Measure the resistance of the following motors: left and right ribbon motors, platen motor, paper feed motor. Compare the readings with the values in the two tables mentioned in the test diagnostic. Replace any defective motors. c. Inspect all cables going from the above motors to the controller board. Replace any damaged cables. d. If no problems are found, do a cable shorts test (page 270) on the intermediate cables of the ribbon motors and shuttle motor. Replace any damaged cables. 8. Power on the printer. If the problem persists, check the shuttle for electrical shorts (page 268). Replace the shuttle if it is defective. 9. Power on the printer. If the problem persists, refer to the Main Wire Harness Test Diagnostic (page 272) and check the shuttle motor. Replace the shuttle assembly if the motor is out of spec. 10. Power on the printer. If the problem persists, inspect the controller board for burned components. If any are found, contact Level 2 support for possible isolation of an additional failing component (e.g., a motor) that may be damaging the board. Also inspect the SDRAM DIMM socket for bent/damaged pins. **NOTE:** If Level 2 directs you to replace the controller board remember that you must power up in download mode, obtain the latest code from IBM First (page 247), then load flash memory (page 254). 11. Power on the printer. If the problem persists, replace the shuttle frame assembly.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
086 CONTROL 15V CHECK SEE USERS MANUAL (continued)		12. Run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, Contact your DDS and Second Level Support.
087 PLATEN OPEN TIMEOUT CLOSE PLATEN	On a coax interface, the forms thickness lever has been open for at least one minute. Load paper.	1. Close the forms thickness lever. Press **STOP**. 2. Run a print test. If a platen open or close platen message appears, Power off and unplug the printer. Remove the paper guide assembly 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. Check that the platen interlock switch is not loose. 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. (Refer to the Main Wire Harness Test Tables in Chapter 3.) Replace the platen open motor if it fails the resistance test. 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. Run a print test. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
087 PLATEN OPEN TIMEOUT CLOSE PLATEN (continued)		11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
088 CONTROL 23.5V CHECK SEE USERS MANUAL	Controller Voltage Failure.	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 flash memory with blank flash with boot code. 3. Download the latest code from IBM First (page 247). 4. Power on the printer in download mode and load flash memory (page 254). 5. Check the shuttle for electrical shorts (page 268). 6. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board. 13. Power on the printer and run a print test. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
088 CONTROL 23.5V CHECK SEE USERS MANUAL (continued)		14. Power on the printer. If the message appears, replace the shuttle frame assembly.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
089 RIBBON STALL	This message occurs when the ribbon fails to move while printing.	1. The lower flange of the ribbon hub may be interferring with the shuttle cover. Check that the shuttle cover is properly installed on both locating pins. If possible, bias the cover toward the rear of the machine to clear the ribbon hub. If this does not work, try filing material out of the cover locating hole to bias the cover enough to clear the ribbon hub. 2. Check the forms thickness lever: if it is set too tightly it can inhibit ribbon movement. Set the forms thickness lever to match the thickness of the paper being used, but not too tightly. 3. Inspect the ribbon motor intermediate cables. Make sure they are seated correctly in the controller board and at the ribbon motor cable. 4. Inspect the ribbon guides for ink buildup, which can inhibit ribbon movement. Clean the printer. 5. Inspect the hammer bank cover/ribbon mask for bending or damage, which can inhibit ribbon movement. Replace the hammer bank cover assembly if it is bent or damaged. 6. Check the platen gap. If the gap is too small, it can inhibit ribbon movement. Adjust the platen gap. 7. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check the resistance of connectors P106/LRIB M and P107/RRIB M. (Refer to the Main Wire Harness Test Tables in Chapter 4 and the Main Wire Harness Test diagnostic in Chapter 2.) If ribbon motor resistance is not correct, replace the motor and/or the intermediate cable, if installed. 8. Check the shuttle for electrical shorts (page 268). 9. Plug in the printer and power it on. Run an Operator Print Test. (See page 229.) If the 089 RIBBON STALL message appears, the controller board or microcode is suspect. Do the following:

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
089 RIBBON STALL (continued)		10. Save the printer configuration values. (Refer to the *Setup Guide*.) 11. Clear NVRAM (page 253). 12. Download and install the latest code from IBM First (page 252). 13. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 14. Download and install the latest code from IBM First (page 252). 15. Power on the printer in download mode and load flash memory (page 254). 16. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
101 UPPER DRIVER SHORT* SEE USERS MANUAL	Hammer driver circuits on the controller board are shorted to ground.	1. If this message flashes just before “084 POWER 48V CHECK* SEE USERS MANUAL” appears, the controller board or microcode is suspect. Do the following: 2. Save the printer configuration values. (Refer to the *User’s Manual*.) 3. Clear NVRAM (page 253). 4. Download and install the latest code from IBM First (page 247). 5. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). 8. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 9. Cycle power. If the message appears, press **STOP**. If the message does not clear, replace the hammer bank logic cable and the hammer bank power cable assemblies. 10. Check the shuttle for electrical shorts (page 268).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
101 UPPER DRIVER SHORT* SEE USERS MANUAL (continued)		11. Power on the printer. If the problem appears and you have not previously replaced the controller board, the controller board or microcode is suspect. Do the following: 12. Save the printer configuration values. (Refer to the *User's Manual*.) 13. Clear NVRAM (page 253). 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). 18. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and have them contact Second Level Support. Second Level will then conference PE in with CE on site and DDS.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
102 LOWER DRIVER SHORT * SEE USERS MANUAL	Circuit(s) on the hammer bank or in the hammer bank power cable are shorted to ground.	1. Cycle power. If the message appears, press **STOP**. If the message does not clear, replace the hammer bank logic cable and the hammer bank power cable. 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the message appears, replace the shuttle frame assembly. 4. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
110 STACK OVERFLOW * SEE USERS MANUAL	System stack has run out of room and overflowed into other memory.	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 problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
111 STACK UNDERFLOW * SEE USERS MANUAL	Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
112 UNDEFINED OPCODE * SEE USERS MANUAL	Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
113 INSTRUCTION SET SEE USERS MANUAL	Protected Instruction. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
114 ILLGL OPR ACCESS * SEE USERS MANUAL	Illegal Operand Accessed. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
115 ILLGL INSTR ACCESS SEE USERS MANUAL	Illegal Instruction Accessed. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM. (page 253) 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
116 ILLGL BUS ACCESS SEE USERS MANUAL	Illegal External Bus Accessed. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
117 A TO D OVERRUN * SEE USERS MANUAL	Analog to Digital overrun. The analog-to-digital converter on the controller board has overflowed.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
118 UNDEFINED INTERRUPT SEE USERS MANUAL	Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
119 TCB CORRUPTED * SEE USERS MANUAL	Task Control Block on the controller board has been corrupted.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
120 ACCESS NULL POINTER * SEE USERS MANUAL	The processor tried to access a pointer that contains nothing (null).	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
121 PAP NOT AT SPEED * SEE USERS MANUAL	Paper not at speed. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
122 PAP NOT SCHEDULED * SEE USERS MANUAL	Paper not scheduled. The paper feed process is not scheduling on the controller board, and the printer cannot advance paper.	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. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
123 PAP BUSY TOO LONG * SEE USERS MANUAL	Paper busy too long. Firmware error on the controller board.	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 and unplug the printer. Remove the paper guide assembly or pedestal top cover. Make sure connectors P106 and P107 are fully seated on the controller board. 3. Plug in the printer and power it on. Run the print job again. If the message appears, power off and unplug the printer. 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. (See the Cable Shorts Test on page 270.) 4. Check the shuttle for electrical shorts (page 268). 5. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode, and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
124 PAP FIFO OVERFLOW * SEE USERS MANUAL	Paper First In First Out Overflow. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
125 PAP FIFO UNDERFLOW * SEE USERS MANUAL	Paper First In First Out Underflow. Firmware error on the controller board.	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 and unplug the printer. Remove the paper guide assembly or pedestal top cover. Make sure connectors P106 and P107 are fully seated on the controller board. Plug in the printer. 3. Check hammer phasing (page 399). Try using a lower phasing value; sometimes this message indicates too high a hammer phase value. 4. Run the print job again. If the message appears, power off and unplug the printer. Make sure the MPU cable, the hammer bank logic cable, and the hammer bank power cable are undamaged and have good connections. Replace as needed. (Refer to the Cable Shorts Test on page 270.) 5. Check the shuttle for shorts (page 268). 6. Plug in the printer and power it on. Run the print job again. If the message appears, replace the shuttle frame assembly. 7. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
125 PAP FIFO UNDERFLOW * SEE USERS MANUAL (continued)		12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode, and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 15. Power on the printer. Run the print job again. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, contact your DDS and Second Level Support

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
126 PAP FEED BAD TABLE * SEE USERS MANUAL	Paper feed bad table. The paper feed process on the controller board has a corrupted table. If this message appears during a software download, do the download again. If the message appears on the second try, replace the controller board. Record the message and return it with the defective board. After replacing the controller board, DO NOT make the printer READY, but immediately download the latest code from IBM First (page 247), then power up in download mode and load the flash memory (page 254).	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
127 ILLEGAL STATE * SEE USERS MANUAL	Paper feed illegal state. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
128 INVALID COMMAND * SEE USERS MANUAL	Paper Invalid Command. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
129 INVALID PARAMETER * SEE USERS MANUAL	Paper Invalid Parameter. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
130 PAP FEED INCOMPLETE SEE USERS MANUAL	Paper Incomplete. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
131 UNEXPECTED INTERRUPT SEE USERS MANUAL	Unexpected interrupt in the paper feed process on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
134 INVALID COMMAND * SEE USERS MANUAL	Platen invalid command. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears,, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
135 INVALID STATE * SEE USERS MANUAL	Platen invalid state. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
136 INVALID PARAMETER * SEE USERS MANUAL	Platen invalid parameter. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode, and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
137 SHUTL INVALID CMD * SEE USERS MANUAL	Shuttle invalid command. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
138 SHUTL INVALID PARM * SEE USERS MANUAL	Shuttle invalid parameter. Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
139 OVERSPEED CHECK * SEE USERS MANUAL	Firmware error on the controller board.	1. Cycle power. Run the print job again. If the message appears, download the emulation software again. 2. Remove the shuttle cover. Remove the paper guide assembly or the pedestal top cover. Make sure the MPU cable (P/N 14H5329) is not pinched. Check both the section of MPU cable coming from the sensor and the intermediate cable extension that runs to the controller board. (Refer to the Interconnection Diagram in Chapter 3.) Check the resistance of the MPU at connector P107. (Refer to the Main Wire Harness Test Tables in Chapter 3.) Replace the MPU if it fails the test. Adjust the gap between the MPU and the shuttle motor flywheel to 0.010 inch (0.254 mm). 3. Check the shuttle for electrical shorts (page 268). 4. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode, and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
140 48 VOLTS FAILED * SEE USERS MANUAL	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.	1. Power off and unplug the printer. Remove the paper guide assembly or top cover to gain access to the card cage. 2. Make sure the power supply board is correctly connected to the controller board. 3. Plug in the printer and power it on. If the message appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, the controller board or the code is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear the NVRAM. 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
142 PAP FEED DRIVE FAIL * SEE USERS MANUAL	Paper feed drive failed. The paper feed driver circuit on the controller board is drawing too much current.	1. Power off and unplug the printer. Refer to the Main Wire Harness Test Diagnostic (page 272) to complete the following substeps: a. Measure the resistance of the paper feed motor. Compare the readings with the values in the two tables mentioned in the test diagnostic. Replace any defective motors. b. Inspect the cable going from the paper feed motor to the controller board. Replace the cable if you find any damage. 2. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *Setup Guide*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
143 SHUTL DRIVER FAILED * SEE USERS MANUAL	Shuttle driver failed. The shuttle driver circuit on the controller board is drawing too much current.	1. Power off and unplug the printer. Remove the paper guide assembly 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. Check the shuttle for electrical shorts (page 268). 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 11. Power on the printer. If the message appears, replace the shuttle frame assembly.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
144 SHUTTLE FAN FAILURE SEE USERS MANUAL	Sensors cannot detect current in the hammer bank fan circuit.	1. Cycle power. If the message appears, press **STOP**. 2. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Verify that the connector is not installed backwards. 3. Disconnect connector P107 from the controller board. Test connector P107/HBF for shorts or opens. (Refer to the Main Wire Harness Test Tables in Chapter 3 and the Main Wire Harness Test Diagnostic in Chapter 2.) Replace components that fail test. 4. Make sure P107/HBF has a good connection at J107 on the controller board. 5. Inspect airways and vents for obstructions. 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
146 RIBBON INK OUT CHANGE RIBBON	RibbonMinder** software has determined that the ribbon is out of ink.	Install a new IBM ribbon.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
147 H/B CONTROL MODE SEE USERS MANUAL	H/B = Hammer Bank. The printer has sensor circuits that continually sample the operating temperature of key components of the print mechanism. When higher than normal temperatures are sensed in one or more coils, print speed is automatically reduced by 50% and the H/B CONTROL MODE message is sent to the LCD to inform the operator. When the coil(s) cool down, print speed automatically returns to 100% and the message clears from the LCD. This message is normal for extremely dense print jobs, such as the Plot Test. If the printer often prints at half speed, it may be operating in a severe environment. A severe environment is one with an ambient temperature at or above 40° Celsius (104° Fahrenheit) or that 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, or reduce the size and duration of the print jobs.	1. If the printer is a 1500 or 2000 lpm model set the coil temperature (page 401). 2. Inspect the printer environment for severity. Advise the user to move the printer to cooler, cleaner location. 3. 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. 4. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check all fan cable connections. 5. Plug in the printer and power it on. Verify that all fans operate. Replace any fan that does not operate. 6. 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. 7. Check the shuttle for electrical shorts (page 268). 8. Install the paper guide assembly 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. If the printer is a 1500 or 2000 lpm model set the coil temperature (page 401). 9. Run the “All E’s” print test for 5 to 10 minutes. If the problem reappears, the controller board or microcode is suspect. Do the following: 10. Save the printer configuration values. (Refer to the *User’s Manual*.) 11. Clear NVRAM (page 253). 12. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
147 H/B CONTROL MODE SEE USERS MANUAL (continued)		13. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). 16. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 17. If the printer is a 1500 or 2000 lpm model set the coil temperature (page 401).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
148 DRIVER CIRCUIT BAD SEE USERS MANUAL	The hammer coil count test failed.	1. Cycle power. If the message appears, press **STOP**. 2. Check the shuttle for electrical shorts (page 268). 3. Power off and unplug the printer. Remove the shuttle cover. At the shuttle frame assembly, disconnect the hammer bank logic and power cables. Plug in the printer and power it on. If “HB NOT INSTALLD” appears on the LCD, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User’s Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
148 HMR BANK NOT INSTALLED SEE USERS MANUAL	Self-test routines do not detect hammer coils at printer start-up.	1. Power off and unplug the printer. Verify that the shuttle frame assembly is installed. Install the shuttle frame assembly. 2. Remove the paper guide assembly 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. Plug in the printer and power it on. If the message appears, test the hammer bank logic cable for shorts (page 270). 4. Check the shuttle for electrical shorts (page 268). 5. Power on the printer. If the message appears, replace the hammer bank logic cable. 6. Plug in the printer and power it on. If the message appears, replace the shuttle frame assembly. 7. Plug in the printer and power it on. If the message appears again, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
160 ERROR: DC PROGRAM NOT VALID	The printer cannot find the data controller (DC) program or the validation checksum is corrupt.	1. Download the latest code from IBM First (page 247). 2. Power on the printer in download mode and load flash memory (page 254). 3. If the message appears, power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 4. Replace flash memory SIMM with a blank flash containing the boot code. 5. Plug in the printer and power it on. 6. Load flash memory (page 254). 7. If the message appears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode, and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
164 ERROR: SDRAM JEDEC MISSING	The JEDEC table in the SDRAM DIMM is missing, corrupted, or defective. The printer uses this table to identify the SDRAM.	Cycle power. If the message appears, replace the controller board.
167 ERROR: PROGRAM NEEDS MORE DRAM	The printer requires more SDRAM memory in order to run the downloaded program.	Use a smaller emulation program (page 247).
168 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 (page 247). **NOTE:** The printer must have at least 8MB of flash memory for the latest level of code to work correctly.
169 ERROR: PROGRAM NOT COMPATIBLE	The printer is not compatible with the downloaded program.	Use the correct emulation software option(s) for this model printer (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
172 ERROR: WRITING TO FLASH	Hardware or software fault in flash memory.	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 2. Replace flash memory with blank flash containing boot code. 3. Load flash memory (page 254). 4. If the message appears with new memory, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
173 ERROR: WRONG CHECKSUM	The printer received the complete program but the checksum did not match. The data may have been corrupted during download.	1. Power off the printer. Download the program again from the beginning. If the message appears, download the latest code from IBM First (page 247). If the message appears, replace the flash memory with blank flash containing boot code. 2. Load flash memory (page 254). 3. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
174 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 3. Message List

Operator Panel Message	Explanation	Corrective Action
175 ACCESS NULL POINTER* SEE USERS MANUAL	The processor tried to access a pointer that contains nothing (null).	1. Cycle power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). If the message appears, replace the flash memory with blank flash containing boot code. 2. Load flash memory (page 254). 3. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
180 ETHERNET ADDRESS ADAPTER NOT INSTALLED	The ethernet PCBA did not initialize correctly.	1. Verifty that there is a NIC installed. 2. If there is a NIC installed, power off the printer and remove the paper guide assembly or top cover assembly. 3. Reseat the NIC in its PCI slot and make sure it has a good connection. 4. Power on the printer. If the message appears again, replace the NIC.
181 ETHERNET ADAPTER BEING INITIALIZED	Status message that indicates that the Network Interface Card is processing the boot procedure.	No action required.
182 ETHERNET DETECTED	Status message that indicates that the internal Network Interface Card has established communication.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
191 SECURITY VIOLATION	Security code of the security key on the controller board does not match the code of the firmware on the controller board.	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 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 for the customer's emulations. If a key is present, replace it. 2. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
194 INCOMPAT. E-NET NIC REPLACE NIC	The ethernet NIC installed in the printer is not the correct part number for a 6500-v printer.	Remove the NIC and replace it with a NIC with the correct part number for this printer.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
195 INCOMPAT. WLAN NIC REPLACE NIC	The wireless NIC installed in the printer is not the correct part number for a 6500-v printer.	Remove the NIC and replace it with a NIC with the correct part number for this printer.
200 SOFTWARE ERROR* RECYCLE POWER	Application software tried to perform an illegal printer function or damaged logic circuits were detected on the controller board.	1. Cycle power. If the message appears, power off and unplug the printer. 2. Disconnect the input data line from the host computer. Plug in the printer and power it on. If the message appears, download the latest code from IBM First (page 247). 3. Cycle power. Run the print job again. If the message reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, there is an application software error. Reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
301 RIBBON INK LOW INSTALL NEW IBM RIBBON	Status message indicating the RibbonMinder feature is enabled and the ribbon ink level is 2%.	Install a new IBM ribbon.
302 EXCESSIVE RIBBON WEAR INSTALL NEW IBM RIBBON	Status message that displays when ribbon reaches the end of its service life, whether RibbonMinder is enabled or not.	Install a new IBM ribbon.
303 BARCODE NOT DETECTED INSTALL NEW IBM RIBBON	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.”)	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 **START** and run the print job again. If the message reappears, replace the ribbon. 3. Press **START** and run the print job again. If the message appears, replace the RibbonMinder sensor.
304 BARCODE DAMAGED REVERSE RIBBON SPOOLS	The sensor detects a bar code, but it is not fully decoded. This fault condition is entered into the Error Log (not the Ribbon Log).	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 **START** and run the print job again. If the message reappears, replace the ribbon. 4. Press **START** and run the print job again. If the message appears, replace the RibbonMinder sensor.
305 OLD RIBBON DETECTED INSTALL NEW IBM RIBBON	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 IBM ribbon.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
306 UNKNOWN RIBBON INSTALL NEW IBM RIBBON	The sensor detects a bar code, but the OEM ribbon model is not permitted on this printer.	Install a new IBM ribbon.
307 UNKNOWN RIBBON INSTALL NEW IBM RIBBON	The sensor detects a bar code, but the region code does not match the printer.	Install a new IBM ribbon.
308 RIBBON SENSOR ERROR SEE USERS MANUAL	A future enhancement not supported on this printer.	No action required.
990 MACHINE CHECK	Host status message.	No action required.
A97 GRAPHIC CHECK ERROR PRESS STOP THEN START	The printer received a non-printable character over a twinax interface.	Press **STOP** then **START**.
B00 STATUS: SDRAM DETECTION 33MHZ	Status message: the printer has begun its boot-up initialization 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.
B10 ERROR: NO DRAM DETECTED*	Boot-up routines did not detect the presence of the SDRAM DIMM.	1. Cycle power. If the message appears again, power down, unplug the printer, and check that there is an SDRAM DIMM installed on the controller board. If not, install the SDRAM. If so, reseat the SDRAM DIMM. 2. Plug in the printer and power it on. If the message appears, replace the SDRAM DIMM. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B11 ERROR: RAM TEST FAILED*	SDRAM failed the boot initialization test.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the SDRAM DIMM. 2. Plug in the printer and power it on. If the message appears, replace the SDRAM DIMM. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). 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.
B20: STATUS 00% DOWNLOAD MODE	Status message informing the operator that software is being downloaded. Percentage figure indicates 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.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B22 ERROR: DECOMPRESS SIZE*	Flash memory has not passed boot initialization tests.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the flash SIMM. 2. Plug in the printer and power it on. If the message appears, replace the flash SIMM. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B23 ERROR: DECOMPRESS CKSUM*	Flash memory has not passed boot initialization tests.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the flash SIMM. 2. Plug in the printer and power it on. If the message appears, replace the flash SIMM. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
B30: STATUS INITIALIZING...	Status message: the printer is running its initialiation routines afer startup and successful memory tests.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
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.	1. Cycle power. If the message appears, the controller board or microcode is suspect. Do the following: 2. Download and install the latest code from IBM First (page 247). 3. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 4. Download and install the latest code from IBM First (page 247). 5. Power on the printer in download mode, and load flash memory (page 254). 6. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B40 ERROR: SDRAM EEPROM CKSUM BAD*	Flash memory has not passed boot initialization tests.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the flash SIMM. 2. Plug in the printer and power it on. If the message appears, replace the flash SIMM. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B41 ERROR: DIMM MEMORY NOT SDRAM*	The DRAM DIMM installed on the controller board is not Synchronous DRAM (SDRAM).	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B42 ERROR: SDRAM ROWS NOT ALLOWED*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B43 ERROR: SDRAM TOO MANY BANKS*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B44 ERROR: SDRAM NOT 64 BITS WIDE*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B45 ERROR: SDRAM IS WRONG VOLTAGE*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.
B46 ERROR: SDRAM HAS MIXED SIZES*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.
B47 ERROR: SDRAM LARGER THAN 256M*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.
B49 ERROR: SDRAM # LOGICAL BANKS*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B50 ERROR: SDRAM LOGIC COMB BANKS*	Printer boot initialization tests detect incorrect SDRAM.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode, and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
B51 STATUS: XX% LOADING	Status message: printer boot-up routines are loading printer system software into flash memory and SDRAM.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
B53 ERROR: 12C NO ARBITRATION	There is a problem on the 12C bus which allows the SDRAM DIMM to communicate with the CT interface.	1. Cycle power. If the message appears again, replace the CT board. 2. Power on the printer. If the message appears, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 3. Download and install the latest code from IBM First (page 247). 4. Power on the printer in download mode, and load flash memory (page 254). 5. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
B54 ERROR: SDA LINE STUCK LOW	The serial data signal has shorted low on the controller board.	1. Cycle power. If the message appears, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 2. Download and install the latest code from IBM First (page 247). 3. Power on the printer in download mode, and load flash memory (page 254). 4. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
B55 SEND PROGRAM TO EC	Status message: the printer is loading the engine controller program into the engine controller.	No action required.
BOOT DIAGNOSTICS	Non-error status message.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
CLEARING PROGRAM FROM FLASH	Status message: emulation software successfully loaded into printer memory and the checksum matched. The old program is now being deleted from flash memory.	No action required.
DIAGNOSTIC PASSED	Status message: the printer passed its memory and hardware initialization tests.	No action required.
DO NOT POWER OFF DOWNLOADING XX%	Status message: the printer is downloading emulation software into printer memory. XX% indicates the percentage of program that has been loaded. Powering off the printer while software is loading can damage the flash memory.	No action required, but do not power the printer off while code is being loaded.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
DP FIFO BUSY SEE USERS MANUAL	There is a timing problem in the Engine Controller firmware.	1. Cycle power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Power on the printer in download mode and load flash memory (page 254). 3. If the message appears, replace flash memory SIMMs with a blank flash containing the boot code. 4. Load flash memory (page 254). 5. If the message appears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode, and load flash memory (page 254). 12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E00 EXE @ ADDR0 See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E01A TYPE 0x40 See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E01B TYPE 0x60 See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E02 MACHINE CHK See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03A DSI HASH L See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E03B DSI HASH S See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03C DSI BAT PL See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03D DSI BAT PS See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03E DSI CXIWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03F DSI CXOWX See User Manual	An illegal or unsupported instruction was attempted in the application programn.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E03G DSI ECXIWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E03H DSI ECXOWX See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E04A ISI NO TRA See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E04B ISI DIRECT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E04C ISI PROTEC See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E06 NOT ALIGNED See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E07 ILLEGAL INS See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E08 FLOATINGPNT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E12 SYSTEM CALL See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E13 TRACE INT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E16 ITRANS MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E17 DLOAD MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E18 DSTORE MISS See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E19 BREAKPOINT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E20 SYS MANAGE See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E30 DEBUGGER See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31A EVENT O BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31B EVENT 1 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31C EVENT 2 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31D EVENT 3 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E31E EVENT 4 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31F EVENT 5 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31G EVENT 6 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E31H EVENT 7 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32A CND 0 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E32B CND 1 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32C CND 2 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32D CND 3 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32E CND 4 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32F CND 5 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E32G CND 6 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E32H CND 7 BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E33 WRITE BP See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E34 TRACE CMPLT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
E99 UNKNOWN INT See User Manual	An illegal or unsupported instruction was attempted in the application program.	1. Cycle Power. Run the print job again. If the message appears, download the latest code from IBM First (page 247). 2. Cycle power. Run the print job again. If the message appears, record the message and contact your DDS and Second Level Support.
ENERGY SAVER MODE	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.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
E Net Test Unavailable	The Ethernet PCBA did not initialize correctly.	1. Cycle power. Wait for “E Net Ready” to display, then retry operation. If it still fails, power down, unplug the printer, and reseat the ethernet NIC in its PCI slot. 2. Print the Ethernet Test Page from the Operator Print Tests. 3. Verify that the IP address, subnet mask, and default gateway address are correct in the printout. 4. Verify that the IP address can be “pinged.” 5. If the message still appears, replace the ethernet NIC.
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.	1. Cycle power. If the message appears again, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 2. Download and install the latest code from IBM First (page 247). 3. Power on the printer in download mode and load flash memory (page 254). 4. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: DRAM AT ADDRESS XXXXXXXX	The printer found a defective memory location.	1. Cycle power. If the message appears again, power down, unplug the printer, and reseat the DRAM DIMM. 2. Plug in the printer and power it on. If the message appears, install a new SDRAM DIMM of the correct type and size. 3. Plug in the printer and power it on. If the message appears again, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: DRAM NOT DETECTED	SDRAM is defective or missing.	1. Cycle power. If the message appears again, power down, unplug the printer, and check the SDRAM on the controller board. If present, reseat SDRAM; if missing, install SDRAM. 2. Plug in the printer and power it on. If the message reappears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: EC PROGRAM NOT VALID	The printer cannot find the engine controller program or the validation checksum is corrupt.	1. Download the latest code from IBM First (page 247) and load flash memory (page 254). If the message occurs again, replace the flash memory SIMM with blank flash containing boot code. 2. Load flash memory (page 254). 3. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: FLASH DID NOT PROGRAM	The printer encountered an error trying to program flash memory.	1. Download the latest code from IBM First (page 247). 2. If the message occurs again, power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 3. Replace the flash memory with blank flash containing boot code. 4. Plug in the printer and power it on. 5. Download the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). 7. If the message appears, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: FLASH NOT DETECTED	The printer could not find flash memory.	1. Power off and unplug the printer. Check flash memory on the controller board. If present, reseat the flash SIMM; if missing, install a new flash SIMM. After replacing the memory, DO NOT make the printer READY, but go to the next step immediately. 2. Download the latest code from IBM First (page 247). 3. Plug in the printer and power it on in download mode and load flash memory (page 254). If the message appears again, replace the flash memory SIMM. 4. Load flash memory (page 254). 5. Power on the printer. If the message appears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode, and load flash memory (page 254). 12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: NO DRAM DETECTED*	Boot-up routines did not detect the presence of the SDRAM DIMM.	Cycle power. If the message appears, replace the controller board (page 336). Record the message and return it with the defective board.
ERROR: NVRAM FAILURE	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.	1. Clear NVRAM (page 253). 2. Make sure the printer has at least 8MB of flash memory. 3. Replace the coax/twinax board. 4. If the message appears at power-up, clear NVRAM (page 253), then replace the flash memory. After replacing the memory, DO NOT make the printer READY, but go immediately to the next step. 5. Download the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). 7. 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.) 8. If the message appears after replacing or increasing memory,replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode, and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: PROGRAM NOT VALID	The printer does not see a program in flash memory.	1. There is no program in printer memory. Download the latest code from IBM First (page 247). 2. Power on the printer in download mode and load flash memory (page 254). 3. If the message appears, power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 4. Replace the flash memory and reload code. 5. If the problem reappears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode, and load flash memory (page 254). 12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
ERROR: SHORT AT ADDRESS XXXX	Hardware failure in SDRAM or controller board circuitry.	1. Download the program again (page 247). 2. Check the shuttle for electrical shorts (page 268). 3. Power on the printer. If the message appears again, replace the SDRAM. If message occurs with new memory, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
FLASH TYPE IS NOT SUPPORTED	The printer boot code cannot write to the flash SIMM installed.	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 2. Install the correct blank flash SIMM with boot code (page 356). 3. Download the latest code from IBM First (page 247). 4. Power on the printer in download mode and load flash memory (page 254). 5. If the message appears again, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). 12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
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.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
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.	1. Cycle power. If the message appears, power down and reseat 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.	1. Cycle power. If the message appears, power down and reseat 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.	1. Cycle power. If the message appears, power down and reseat 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 3. Message List

Operator Panel Message	Explanation	Corrective Action
HAMMER COIL BAD #, #, #, #, ... etc.	Hammer coil(s) number #, #, etc. failed the current test at power-up. Check that the hammer bank cables are connected.	1. Check the shuttle for electrical shorts (page 268). 2. Cycle power. If the message appears, replace the shuttle frame assembly. Record the message and return it with the defective assembly. 3. Power on the printer. If the message appears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
INTERRUPT UNUSED VECTOR 00	This message is generated when the controller board gets an interrupt that it does not understand. This problem can be created by electrical noise, a software problem, or by a hardware problem.	1. Cycle power. If this message occurred once and never again, you can ignore it. 2. Check the shuttle for electrical shorts (page 268). 3. If the message reappears or appears consistantly check the grounding of the printer. If the machine is correctly grounded, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, suspect and application software error. Reinstall the original controller board and contact your DDS and Second Level Support.
LOADING PROGRAM FROM PORT XX%	The new emulation program is loading into printer RAM. XX% indicates how much of the program has loaded.	No action required.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
LOADING PROGRAM INTO FLASH	Status message: the printer has deleted the previous emulation program from flash memory and is loading the new program into flash memory.	No action required.
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.	1. Clear NVRAM (page 253). 2. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. 3. Make sure the printer has at least 8MB of flash memory. 4. Replace the coax/twinax board and adapter. 5. Plug in and power on the printer. If the message appears at power-up, clear NVRAM (page 253), then replace the flash memory. After replacing the memory, DO NOT make the printer READY, but go immediately to the next step. 6. Download the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). 8. 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.) 9. If the message appears after replacing or increasing memory,replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode, and load flash memory (page 254). If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
NOT READY	Printer state message: printer is offline, not in communication with host.	No action required.
ONLINE CU TIMED OUT	Poll time-out of the controller unit. 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.)
OPERATOR MENU <menu item>	Non-error status message.	No action required.
OPERATOR MENU LOCKED	Non-error status message.	No action required, unless you want to unlock the **ENTER** key.
OPERATOR MENU UNLOCKED	Non-error status message.	No action required, unless you want to lock the **ENTER** key.
PA1 SELECTED	Attach status message.	No action required.
PA2 SELECTED	Attach status message.	No action required.
P05 DIAGNOSTIC TEST PASSED	Non-error status message: the printer passed its memory and hardware initialization tests.	No action required, but if the printer “hangs” with this message displayed go to **Printer does not complete IML**, page 201.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
P60 ERROR: DRAM AT ADDRESS <hex>	The printer found a defective memory location.	1. Replace the SDRAM. 2. Power on the printer. If the message appears, the controller board or microcode is suspect. Do the following: 3. Save the printer configuration values. (Refer to the *User's Manual*.) 4. Clear NVRAM (page 253). 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
P69 ERROR: EC STOPPED AT STATE XXXX	Where XXXX is a number from 0000 to 0010. The Engine Controller hung at a process indicated by XXXX. (Refer to "The Power On Sequence" in Chapter 2 for descriptions of the different states.) If the state is 0000, replace the controller board. Record the message and return it with the defective board. After replacing the controller board, DO NOT make the printer READY, but immediately download the latest code from IBM First (page 247), then power up in download mode and load the flash memory (page 254).	1. Power off and unplug the printer. Remove the flash memory SIMM and SDRAM DIMM. Inspect the memory sockets on the controller board. If any socket pins are bent or damaged, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY—proceed to the next step 2. Download the latest code from IBM First (page 247). 3. Plug in the printer and power it on in download mode and load flash memory (page 254). 4. Install the flash memory SIMM and SDRAM DIMM, making sure they are correctly seated. Power on the printer. Load the flash memory. If the message appears, replace the flash memory with blank flash containing boot code. 5. Plug in the printer and power it on. Load the flash memory. If the message appears, replace the SDRAM DIMM. 6. Plug in the printer and power it on. Load the flash memory. If the message appears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board if it was not previously replaced (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247).

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
P69 ERROR: EC STOPPED AT STATE XXXX (continued)		12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
PLEASE WAIT... RESET IN PROGRESS	Status message: the printer finished loading the program into flash memory and is automatically resetting itself.	No action required.
RESETTING...PLEASE WAIT	Status message: the printer is resetting itself.	No action required.
RESTORING BOOT CODE	Status message when downloading boot code. Code is checked then saved in flash memory.	No action required.
SERVICE <service test>	Non-error status message.	No action required.
SHUTTLE TYPE NOT SUPPORTED*	The shuttle type was not detected at power-up.	1. Power off and unplug the printer. Remove the paper guide assembly 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. Plug in the printer and power it on. 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.
SPX FOUND, ERROR: KEY NOT DETECTED	The controller board does not have a security key.	1. Remove the SPX from the RJ-12 Debug Port. 2. Power down the printer. 3. Install the security key.

Table 3. Message List

Operator Panel Message	Explanation	Corrective Action
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.	1. Remove the SPX from the RJ-12 Debug Port. 2. Cycle printer power.
TESTING HARDWARE PLEASE WAIT	Status message when printer runs self-tests and initialization routines.	No action required, but if the printer “hangs” at this message, refer to “Printer does not complete IML,” page 201.
TOP OF FORM SET	Non-error status message.	No action required.
WAITING FOR ETHERNET ADAPTER	Status message that appears when printer is first powered on if the internal Network Interface Card 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, but if the printer “hangs” with this message displayed, refer to the ethernet reset procedures in the *Ethernet User’s Manual*.
WAITING FOR PROGRAM DOWNLOAD	Emulation download mode has been activated, but program download has not yet begun.	No action required.

Troubleshooting Other Symptoms

DANGER

<3> Hazardous voltages are present in the printer with the power cord connected to the power source. Switch off printer power and unplug the printer power cord before proceeding.

<4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.

<5> Power off the printer and disconnect the power cord before connecting or disconnecting any communication port, teleport, or attachment cable connector.

Use standard fault isolation techniques to troubleshoot malfunctions that are 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 conditions reported by the user.
3. Look for a match in the **General Symptom List** that begins on page 192. If you find a match, go to the troubleshooting procedure and follow the numbered instructions.
4. If you do not 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 system at a time, until the final half is a field-replaceable part or assembly.

IMPORTANT **Do not attempt field repairs of electronic components or assemblies. 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: replace the entire shuttle frame assembly. It is not field repairable.**

5. Replace the defective part or assembly.
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.

Communication Problems

Many host-printer communication 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 background experience, and the cause of the problem is not readily apparent, do the following:

1. Print out the printer configuration.
2. Verify that you have the latest level of code. If not, load the latest level of code.
3. Obtain a copy of the Device Host Configuration if possible.
4. Call your support group for assistance in problem analysis.

If you cannot obtain support, or you have previous 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 4. Common Communications Problems

Problem	Interface	Common Causes
Printer "hangs" during print job	Any	1. Reload the latest level of code (page 247). 2. Replace the platen open switch.
Fails to print from host -or- (go to the next page)	parallel	- Interface cable defective - Host/Network configuration - Printer logic - Terminating Resistors - Incorrect printer configuration. Refer customer to the *User's Manual*.

Table 4. Common Communications Problems

Problem	Interface	Common Causes
Prints incorrect characters -or-	serial	- Host/Printer interface cable pinouts incompatible - Host/Printer/Network configuration - Set DTR = READY BUFFER NOT FULL; RTS = TRUE - Interface cable defective - Printer logic - Incorrect printer configuration. Refer customer to the *User's Manual*.
Prints extra characters -or-	twinax	- Interface cable defective - Host-Printer definition - Controller/Network configuration - Printer logic - Incorrect printer configuration. Refer customer to the *User's Manual*.
Drops characters -or-	coax	- Interface cable defective - Controller/Network configuration - Printer logic - Incorrect printer configuration. Refer customer to the *User's Manual*.
Data loss -or- (go to the next page)	ethernet	- Interface cable defective - Host/Printer/Network configuration - Printer logic - Incorrect printer configuration. Refer the customer to the *User's Manual*. - Incorrect ethernet configuration. Refer customer to the *User's Manual*.

Table 4. Common Communications Problems

Problem	Interface	Common Causes
Cannot access the printer through PMU over an Ethernet Interface	ethernet	If the ethernet port is not enabled, the following message will occur when you try to connect to a printer: "The network address given in the printer properties was reached, but the printer port is busy. This may occur when another user is accessing the same printer, or when another logical printer is connected to the same address." To solve this problem, enable the ethernet option to allow the PMU to establish a connection with the ethernet interface: 1. Make sure a successful "ping" can be performed. 2. If the READY indicator is on, press the **STOP** key. The printer must be in the NOT READY state. 3. Press **MENU**. "OPERATOR MENU / QUICK SETUP" appears on the display. 4. Press **RETURN + ENTER** to unlock the **ENTER** key. 5. Press the **SCROLL↑** or **SCROLL↓** key until "OPERATOR MENU / PRINTER CONTROL" appears on the display. 6. Press **ENTER**. "PRINTER CONTROL / INTERFACE SELECTION" appears on the display. 7. Press **SCROLL↑** or **SCROLL↓** until "PRINTER CONTROL / PRINTER MANAGEMENT PORT" appears on the display. 8. Press **ENTER**. "PRINTER MANAGEMENT PORT / < current setting>" appears on the display. 9. Press **SCROLL↑** or **SCROLL↓** until "PRINTER MANAGEMENT PORT / ETHERNET" appears on the display 10. Press **ENTER**. An asterisk (*) appears next to ETHERNET, indicating it is now the active port. 11. Press **RETURN + ENTER** to lock the **ENTER** key.

Table 4. Common Communications Problems

Problem	Interface	Common Causes
Cannot access the printer through PMU over an Ethernet Interface (continued from previous page)	ethernet	12. Press **STOP** to exit the menu and put the printer in the NOT READY state. 13. Power off the printer, wait a few seconds, then power on the printer to activate the new diagnostic port. The PMU will now establish a connection with the Ethernet Interface.
Host cannot communicate with 6500 printer when hooked up to TCP/IP to AS/400 with the Ethernet NIC installed	ethernet	Refer to the appropriate Ethernet Interface User's Manual.

Device Handshaking

Handshaking is the exchange of signals between the host computer and the printer to indicate the status of the data being transferred. In serial data transfer, the printer uses both hardware and software handshaking and transmits both forms simultaneously when the input buffer is full.

The printer can be used with either serial or parallel host interfaces. Parallel interfaces are usually straightforward, with no special settings required. Serial interfaces, however, have a variety of possible communication parameter settings.

There are two methods of handshaking:

- **Hardware Handshaking**
  This is an electrical signal controlled by the logic state on pin 20 of the serial interface connector J2 at the back of the printer. The signal goes high when the printer is ready to receive data. The signal goes low when the printer is in the busy state, which indicates that the input buffer is full and can no longer receive data.
- **Software Handshaking**
  XON and XOFF are software signals that control serial data flow between the printer and the host system. When the printer input buffer is full, the printer transmits the XOFF (CTRL S) character, which signals the host to stop sending data. When space becomes available in the input buffer, the printer sends the XON (CTRL Q) character, which tells the host that the printer is ready to receive more data.

The Printer Interface

The printer will not function properly if an incorrectly wired interface cable or the wrong interface cable is installed.

When the printer is first turned on, it resets itself to the following default serial communication parameters:

PARAMETER	DEFAULT VALUE
Baud	9600
Data Bits	8
Parity	NONE
Stop Bits	1

Use the Serial Port configuration menu to change serial interface parameters. (Refer to the *User's Manual*.)

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 the previous page.

Table 5. General Symptom List

Symptom	Corrective Action
Jams	
CLEAR JAM message instead of LOAD FORMS when printer is out of paper	1. Power off and unplug the printer. Remove the paper guide assembly 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. 2. Check that connector P106/PMD is fully seated in connector J106 on the controller board. 3. Plug in the printer and power it on. Load paper. Replace the paper detector switch assembly if either message appears. 4. Check the shuttle for electrical shorts (page 268). 5. Plug in the printer and power it on. If either message appears, the controller board or microcode is suspect. Do the following: 6. Save the printer configuration values. (Refer to the *User's Manual*.) 7. Clear NVRAM (page 253). 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). 12. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
CLEAR JAM message will not clear and paper does not move	1. Power off and unplug the printer. 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. On -D8c and -v20 models, check connector J103 on the controller board. 2. If the platen gap is correct, remove the shuttle frame assembly and check the following: 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 and that their lower ends are seated in the groove on the upper forward edge of the platen. 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. 3. Check and adjust the paper feed timing belt. Replace the belt if it is damaged. 4. Power on the printer. Load paper. Press **FORM FEED** 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. Check for heavily tented horizontal perforations in the paper. If horizontal perforations are heavily tented, consider setting the “Set Platen at BOF” configuration option (in the Printer Control menu) to Open. (Refer to the *User’s Manual*.) 6. Check the shuttle for electrical shorts (page 268). 7. Power on the printer. Press **FORM FEED** and **VIEW** several times and check that paper moves correctly in both directions. If the message appears or the paper moves erratically, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User’s Manual*.)

Table 5. General Symptom List

Symptom	Corrective Action
CLEAR JAM message will not clear and paper does not move (continued)	9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). 14. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
CLEAR JAM message will not clear but paper moves	1. Power off and unplug the printer. Remove the paper guide assembly 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. 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. Plug in the printer and power it on. Load paper. Replace the paper detector switch assembly if the message appears. 6. Plug in the printer and power it on. If the problem reappears, the controller board or microcode is suspect. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.) 8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Operator Panel	
Black squares on operator panel display	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Disconnect the operator panel cable from the panel and from J110 on the controller board. Check continuity of the cable. Replace the operator panel cable if it fails continuity test. Connect the cable. 2. If the printer has the coax/twinax expansion board, check the adapter connection to the controller board. Make sure the 60-pin expansion adapter is correctly seated in the controller board connector J111 and the coax/twinax expansion board. 3. Make sure the flash memory is seated properly in J10 and J11. Regardless of memory configuration, J11 must be used. Reseat flash memory. 4. Plug in the printer and power it on. If black squares appear on the LCD, the flash memory could be blank. Replace the flash SIMM in J11 with a new flash SIMM and reload code (page 247). 5. Make sure the controller board has a security key installed. 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. If black squares appear on the LCD, replace the operator panel. 8. Plug in the printer and power it on. If black squares appear on the LCD, replace the controller board (page 336). After replacing the controller board, do NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Operator panel blank	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check all cable connections into the controller board; make sure the operator panel cable is seated in connector J110 on the controller board. 2. If the printer has the coax/twinax expansion board, check the adapter connection to the controller board. Make sure the 60-pin expansion adapter is correctly seated in the controller board and the coax/twinax expansion board. 3. Plug in the printer and power it on. Inspect the operator panel display and cooling fans. If the operator panel is blank and the cooling fans come on, replace the operator panel cable assembly and/or the operator panel, as required. 4. Check the shuttle for electrical shorts (page 268). 5. Plug in the printer and power it on. If the operator panel is blank and the fans do not come on, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 6. Cycle power. If the operator panel is blank, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Operator panel display shows garbled, broken characters	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check cable connections into the controller board. Make sure the operator panel cable is seated in connector J110 on the controller board. 2. Replace the flash memory. 3. Download the latest code from IBM First (page 247). 4. Power on the printer in download mode and load flash memory (page 254). 5. Reseat the SDRAM DIMM in socket J14 on the controller board. 6. Power on the printer. If the control panel shows broken characters, replace the SDRAM DIMM. 7. Power on the printer in download mode and load flash memory (page 254). 8. Do a cable shorts test on the operator panel cable (page 270). 9. If the problem reappears, replace the operator panel and operator panel cable assembly. 10. Power on the printer. If the problem reappears, the controller board or microcode is suspect. Do the following: 11. Save the printer configuration values. (Refer to the *User's Manual*.) 12. Clear NVRAM (page 253). 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 15. Download and install the latest code from IBM First (page 247). 16. Power on the printer in download mode and load flash memory (page 254). 17. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Operator panel keys do not work	1. Power on the printer. Check the operation of the operator panel keys. Replace the operator panel if keys do not work. 2. Power on the printer. Check the operation of the operator panel keys. Replace the operator panel cable assembly if keys do not work. 3. Power on the printer. Check the operation of the operator panel keys. If the keys do not work, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 4. Download and install the latest code from IBM First (page 247). 5. Power on the printer in download mode and load flash memory (page 254). 6. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Power / IML Failures	
No power, and the operator panel is blank, and the card cage fan is not running	1. Check that the AC power outlet has power. Restore AC power as required. 2.  **88 - 270 V** 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. 3. Remove the paper guide assembly 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. Connect the AC-in power supply cable and AC power input cables to the on/off switch-circuit breaker. Make sure all ground connections are clean and tight. 4. Plug the printer in and power it on. Do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 5. Check that AC-in power cable connector P1 is connected to J1 on the power supply board. 6. Check that power supply cable connector P101 is connected to J101 on the controller board. 7. Check all cable connections on the controller board. Reseat all cables, making sure that none of the cables are connected upside down. 8. Disconnect AC-in power supply cable connector P1. 9. Plug the AC power cord into the printer and power outlet. Set the circuit breaker to 1 (on). Measure AC voltage at pins 1 and 2 of connector P1. If there is no voltage, replace the circuit breaker. If there is voltage, contact your DDS and Second Level Support.
Printer loops IML	1. If the printer is using the Ethernet NIC, download the latest code from IBM First (page 247). 2. Go to “Printer does not complete IML” (page 201).

Table 5. General Symptom List

Symptom	Corrective Action
Printer does not complete IML	**NOTE:** Power-on initialization is explained on page 246. 1. Verify that the customer's power supply is within the specification of the printer. 2. Power off and unplug the printer. Remove the paper guide or pedestal top cover. Check that all cables are connected to the controller board. Reseat all cable connectors on the controller board, especially connectors P106 and P107. Also reseat the flash memory SIMM and SDRAM DIMM. 3. Plug in the printer and power it on. If the printer does not successfully complete IML, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and replace the shuttle frame assembly. 11. Plug in the printer and power it on. If the problem persists, replace the operator panel and cable. 12. Plug in the printer and power it on. If the problem persists, contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Printer Power On Resets (POR) by itself	1. Download the latest code from IBM First (page 247). Power on the printer in download mode and load flash memory (page 254). 2. Verify that the customer's power supply is within the specification of the printer. 3. Reseat the flash memory SIMM and SDRAM DIMM. 4. Power on the printer. If the problem persists, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Power Stacker	
Printer does not detect presence of power stacker -or- Stacker not working	1. Check that the power stacker is enabled under the Printer Control menu. (Refer to the *User's Manual.)* 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. a) Power off the printer. b) Unfasten the cable clamp holding the stacker operator panel cables. c) Disconnect the stacker power cable from the back of the stacker operator panel. (See Figure 65, page 486.) 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 operator panel. If the voltages are not correct, power off and unplug the printer, remove the paper guide assembly, and disconnect the stacker power cable from the controller board. (See Figure 71, page 492.) 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, go to the next step. 4. Power off and unplug the printer. Remove the paper guide assembly. Disconnect the stacker cables from the controller board, stacker assembly, and the stacker operator panel (see Figure 71, page 492). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. Replace any cable that is damaged or fails continuity test. Reconnect all stacker cables to the controller board, stacker, and stacker operator panel. 5. Plug in the printer and power it on. Check that the ON LINE indicator lights on the stacker operator panel. If the ON LINE indicator does not light, replace the stacker operator panel. 6. Power on the printer. Check that the ON LINE indicator lights on the stacker operator panel. If the ON LINE indicator does not light, suspect the controller board. Do the following: 7. Save the printer configuration values. (Refer to the *User's Manual*.)

Table 5. General Symptom List

Symptom	Corrective Action
Printer does not detect presence of power stacker -or- Stacker not working (continued)	8. Clear NVRAM (page 253). 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure that brought you to this procedure, replace the controller board if it was not replaced earlier in this procedure (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Stacker chatters at upper or lower limit	1. Power off and unplug the printer. Unload paper. 2. Open the rear cabinet door, press the elevator disable switch and manually move the elevator up and down, through its entire range of motion. Check that elevator motion is not blocked or hindered by the operator panel cable or other obstruction. The elevator mechanism is sensitive to binding and obstructions, so do all adjustments and servicing very carefully. Remove any obstructions or reroute the stacker operator panel cable as necessary. Check the following areas for possible binding: a) Cables adjacent to the elevator and vertical rails. b) Make sure the paper tent is positioned correctly. c) Make sure the paper fences in the elevator slide freely. d) Check for obstructions near the upper and lower limit switches. 3. Verify that the stacker rails are vertical and parallel. Adjust the stacker rails if necessary: they must be vertical and parallel. 4. Make sure the elevator is parallel to the printer. 5. Plug in the printer and power it on. Operate the power stacker. While the stacker is operating, check that: 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. 6. While the stacker is operating, observe if assisting the motion of the elevator helps prevent chattering. If so, binding is suspected. Inspect the vertical rails for foreign material (grease, dirt, adhesive residue, etc.) that might cause binding. Clean the rails if necessary. Check that the elevator pulleys (item 12, Figure 92) are not mounted so tightly to the vertical rails that they can cause binding. From 0.005 to 0.020 inches of clearance between the pulleys and the vertical rails is desirable.

Table 5. General Symptom List

Symptom	Corrective Action
Stacker does not stack properly -or- Stacker elevator does not move	1. Power off and unplug the printer. 2. Check for and remove any obstructions preventing elevator movement. 3. Check for misaligned stacker rails Adjust the stacker rails if they are not vertical and parallel. 4. Plug in the printer and power it on. Operate the power stacker. While the stacker is operating, check that: 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. 5. Check the stacker limit switches. (See page 207.) If the limit switches are OK, go to the next step. 6. Check the stacker motors. (See page 208.) If the stacker motors are OK, go to the next step. 7. Remove the paper guide assembly. Disconnect stacker cables from the controller board, stacker assembly, and the stacker operator panel (see Figure 71, page 492). Check cables for cuts, breaks, or damaged pins. Check continuity of cables. Replace any cable that is damaged or fails continuity test. Reconnect all stacker cables to the controller board, stacker, and stacker operator panel.
Stacker elevator moves by itself	1. Power off and unplug the printer. Inspect all stacker LEDs for dust, chaff, or dirt. Clean the stacker LEDs and the sight tubes on the LED mounts. 2. Plug in the printer and power it on. If the stacker elevator moves by itself, replace the stacker LEDs.

Table 5. General Symptom List

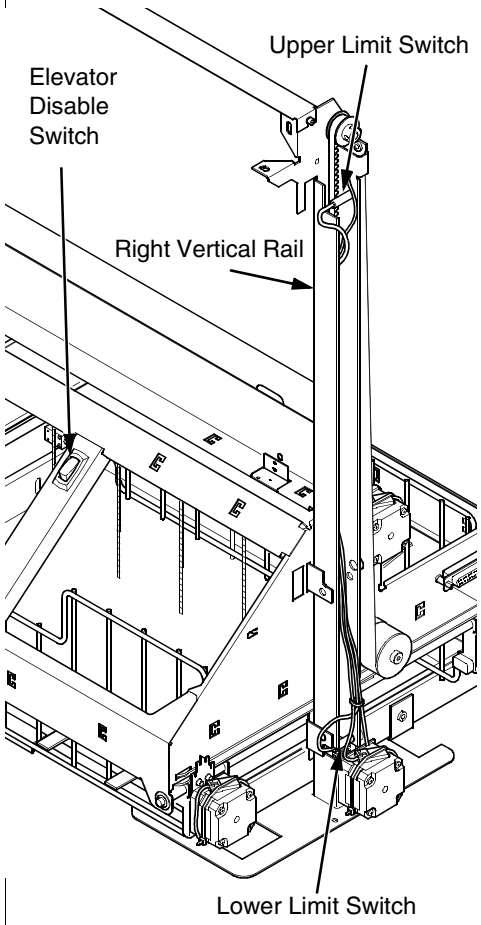
Symptom	Corrective Action
Stacker limit switch check  	**NOTE:** This procedure tests the upper and lower limit switches on the right vertical rail. These magnetic switches are normally closed. You can quickly check their functionality with a small, powerful magnet. You will usually be referred to this procedure from other troubleshooting procedures. When you have completed this check procedure, return to the procedure that sent you here. 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. a. With the magnet secured next to the lower limit switch press the ELEVATOR DOWN key on the stacker operator 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, powerfule 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. a. With the magnet secured next to the upper limit switch press the ELEVATOR UP key on the stacker operator 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	Corrective Action
Stacker motor check	**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. 1. Power off and unplug the printer. 2. Open the rear cabinet door. 3. Unfasten the cable clamp holding the stacker operator panel cables. 4. Disconnect stacker rail cable connector P107 from connector J3 on the back of the stacker operator panel. (See Figure 65, page 486.) 5. Disconnect stacker frame cable connector P102 from connector J4 on the rear of the stacker operator panel. (See Figure 65, page 486.) 6. Locate pin 1 of connector P102 and connector P107. (See page 319 and page 322.) 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 operator panel PCBA pinout drawing on page 297.) 9. Replace any cable that is damaged or fails continuity test. Replace any motor that fails the resistance test.

Table 5. General Symptom List

Symptom	Corrective Action
Print Quality	
Characters or dots are missing, smeared, too light, or too dark, or the output is missing entire dot rows	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. Verify that the customer's forms are within specifications. 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 an approved IBM 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 and unplug 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. Inspect the paper ironer. If the paper ironer has slipped up into the print line, reposition the paper ironer. 7. Check the shuttle for electrical shorts (page 268). 8. Check and adjust the platen gap.

Table 5. General Symptom List

Symptom	Corrective Action
Characters or dots are missing, smeared, too light, or too dark, or the output is missing entire dot rows (continued)	9. Remove the paper guide assembly or pedestal top cover. Make sure connectors P105 and P108 (and P115 and P122 on -D8C/-v20 models) have good connections at the shuttle frame assembly. Make sure all cable connectors have good connections on the power supply board. 10. Print out the printer's configuration (refer to the *User's Manual*). Call support to confirm the correct microcode levels, especially the EC and DC levels. If the code levels are incorrect, download the correct microcode (page 247). 11. Power on the printer. If the problem still occurs, check the hammer bank logic cable and the hammer bank power cable for shorts (page 270). 12. Plug in the printer and power it on. If the problem still occurs, replace the shuttle frame assembly. 13. Plug in the printer and power it on. If the problem still occurs, the controller board or microcode is suspect. Do the following: 14. Save the printer configuration values. (Refer to the *User's Manual*.) 15. Clear NVRAM (page 253). 16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 18. Download and install the latest code from IBM First (page 247). 19. Power on the printer in download mode and load flash memory (page 254). 20. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Horizontal misalignment of characters (Dots or characters move left or right from dot row to dot row or line to line)	1. Check and adjust hammer phasing. 2. Check the dynamic paper tension. 3. Remove the shuttle frame assembly and place it on a hard, flat surface. Spin the flywheel by hand and check for binding. The flywheel should spin more than one turn. If it fails this test, replace the shuttle frame assembly. If it passes this test, inspect the shuttle frame assembly area for ink residue, paper chaff, or debris and clean the area and components as necessary. 4. Check the shuttle for electrical shorts (page 268). 5. Check the MPU gap. Using a feeler gauge, adjust the gap between the MPU assembly and the flywheel to 0.010 ± .001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 ± 1 inch-pounds (2.03 ± 0.11 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 shuttle frame assembly. 8. Power on the printer. Run a print test. If the problem reappears, the controller board or microcode is suspect. Do the following: 9. Save the printer configuration values. (Refer to the *User's Manual*.) 10. Clear NVRAM (page 253). 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). 15. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Randomly misplaced dots	1. Power off and unplug the printer. Check and adjust the platen gap. 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 leads to the ground stud is tight. 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. Check the shuttle for electrical shorts (page 268). 6. Plug in the printer and power it on. Run a print test. If the problem occurs, replace the flash memory with blank flash with boot code. Replace the SDRAM DIMM. Download the code (page 247). 7. Plug in the printer and power it on. Run a print test. If the problem occurs, replace the security key. 8. Plug in the printer and power it on. Run a print test. If the problem occurs, the controller board or microcode is suspect. Do the following: 9. Save the printer configuration values. (Refer to the *User's Manual*.) 10. Clear NVRAM (page 253). 11. Download and install the latest code from IBM First (page 247). 12. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 13. Download and install the latest code from IBM First (page 247). 14. Power on the printer in download mode and load flash memory (page 254). 15. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 16. Plug in the printer and power it on. Run a print test. If the symptom appears, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step.

Table 5. General Symptom List

Symptom	Corrective Action
Randomly misplaced dots (continued)	17. Plug in the printer and power it on. Run a print test. If the problem occurs, replace the shuttle frame assembly.
Incorrect output	1. Check the printer configuration for the proper values of CPI, LPI, print quality, forms length, and width. 2. Refer to the reset command description in the *User's Manual*.

Table 5. General Symptom List

Symptom	Corrective Action
Vertical misalignment of characters: 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	1. Load paper. Press **FORM FEED** 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 and adjust the paper feed timing belt. Replace the belt if it is damaged. 3. Check and adjust the platen gap. 4. Check and adjust the dynamic paper tension (page 402). 5. Check and adjust the tractor belt tension (page 405). 6. Check for heavily tented horizontal perforations in the paper. If horizontal perforations are heavily tented, consider setting the “Set Platen at BOF” configuration option (in the Printer Control menu) to Open. (Refer to the *User’s Manual*.) 7. 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. 8. 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. 9. Power on the printer. Load paper. Run a print test. If the problem occurs, replace the paper feed motor. 10. Check the shuttle for electrical shorts (page 268). 11. Power on the printer. Run a print test. If the problem occurs, the controller board or microcode is suspect. Do the following: 12. Save the printer configuration values. (Refer to the *User’s Manual*.) 13. Clear NVRAM (page 253). 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step.

Table 5. General Symptom List

Symptom	Corrective Action
Vertical misalignment of characters: 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 (continued)	16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). 18. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support. 19. Run a print test. If the problem occurs, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, go to the next step. 20. Run a print test. If the problem occurs, replace the shuttle frame assembly.
Columns of blank spaces	**NOTE:** You may also be getting “Table Mismatch” errors. 1. Check the hammer bank logic cable for shorts (page 270). 2. Run the operator print test “All H’s.” If the print test shows horizontally compressed characters arranged in 12 columns with approximately 8 mm of blank space between columns, the flex cable to the shuttle driver card may have cold solder joints. 3. Replace shuttle frame assembly.

Table 5. General Symptom List

Symptom	Corrective Action
Printer Operation	
Downloads consistently fail	**NOTE:** Most download problems are detected by software during the dowload procedure and communicated by LCD messages. If downloads fail consistently with no messages or with erratic messages, suspect a hardware failure. 1. Power off and unplug the printer. Remove the paper guide assembly 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 SIMMs. Inspect the flash SIMM sockets on the controller board. If any socket pins are bent or damaged, replace the controller board. After replacing the controller board, DO NOT make the printer READY, but go to the next step immediately after replacing the controller board. 3. Download the latest code from IBM First (page 247). Plug in the printer and power it on in download mode and load flash memory (page 254). 4. Check that customer has the right size SIMMs for the emulation. Install SIMMs that support the emulation software. 5. Power on the printer in download mode and load flash memory (page 254). If the download fails, activate the Boot Diagnostics Menu (page 237) and run MISC UTILITIES / RUN MEMORY TESTS. If memory fails the test, replace the SDRAM DIMM. If memory tests OK, replace the flash memory with blank flash containing boot code and load flash memory again. 6. If the download fails again, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). 9. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Flash SIMM won't copy	1. Power off and unplug the printer. Remove the flash SIMM. Inspect the flash SIMM socket on the controller board. If the SIMM socket pins are bent or damaged, replace the controller board. After replacing the controller board, DO NOT make the printer READY—go to the next step immediately after replacing the controller board. 2. Download the latest code from IBM First (page 247). 3. Plug the printer in and power it on in download mode and load flash memory (page 254). 4. Make sure the blank SIMM is the same size as the SIMM to be copied. Install the SIMMs, making sure they are fully and correctly seated. Activate the Boot Diagnostic menu (page 237). From the Boot Diagnostics menu, select and run MISC UTILITIES / COPY FLASH SIMMS. 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. 5. Activate the Boot Diagnostic menu (page 237). From the Boot Diagnostics menu, select and run MISC UTILITIES / COPY FLASH SIMMS. If the new SIMM does not copy, replace the controller board (page 336) if it was not replaced earlier in this procedure. After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). 8. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
Slow throughput	Have the customer check the printer and host configurations.

Table 5. General Symptom List

Symptom	Corrective Action
Paper feeds poorly	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. Check for heavily tented horizontal perforations in the paper. If horizontal perforations are heavily tented, consider setting the “Set Platen at BOF” configuration option (in the Printer Control menu) to Open. (Refer to the *User’s Manual*.) 3. Power off and unplug the printer. Remove paper. Inspect the paper feed path for obstructions that could snag paper. Clear paper feed path of any obstructions. 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 and adjust the paper feed timing belt. Replace the belt if it is damaged. 6. Check and adjust the platen gap. 7. Check the dynamic paper tension. 8. If the platen gap is correct, remove the shuttle frame assembly (page 380) and check the following: 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. 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.

Table 5. General Symptom List

Symptom	Corrective Action
Paper feeds poorly (continued)	9. 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. On -D8C and -v20 models, check connector J103 on the controller board. 10. Plug in the printer and power it on. Load paper. Press **FORM FEED** 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. 11. Plug in the printer and power it on. Press **FORM FEED** and **VIEW** several times and check that paper moves in both directions. If paper does not move in both directions, the controller board or microcode is suspect. Do the following: 12. Save the printer configuration values. (Refer to the *User's Manual*.) 13. Clear NVRAM (page 253). 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 16. Download and install the latest code from IBM First (page 247). 17. Power on the printer in download mode and load flash memory (page 254). 18. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Printer does not print self tests	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Disconnect the operator panel cable from connector J110 on the controller board. Disconnect the operator panel cable from the operator panel. Check continuity of the operator panel cable assembly. Replace the operator panel cable assembly if it fails continuity test. 2. Connect the operator panel cable assembly to J110 on the controller board and to the operator panel. Power on the printer. Load paper. Run a self test. If the self test does not run, replace the operator panel assembly. 3. Check the shuttle for electrical shorts (page 268). 4. Plug in the printer and power it on. Run a self test. If the self test does not run, the controller board or microcode is suspect. Do the following: 5. Save the printer configuration values. (Refer to the *User's Manual*.) 6. Clear NVRAM (page 253). 7. Download and install the latest code from IBM First (page 247). 8. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 9. Download and install the latest code from IBM First (page 247). 10. Power on the printer in download mode and load flash memory (page 254). 11. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
Print format parameters change between print jobs.	1. Check the printer configuration for the proper values of CPI, LPI, print quality, forms length, and width. 2. Refer to the reset command description in the *User's Manual*.

Table 5. General Symptom List

Symptom	Corrective Action
Reverse paper feed: platen does not open	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 and adjust the platen open belt. Replace the belt if it is damaged. 3. Check and adjust the platen gap. 4. Power off and unplug the printer. Remove the paper guide assembly. Check that connector P106 is not connected upside down. 5. Disconnect connector P106 from the controller board. Check the resistance of connector P106/ PLAT M. Replace the platen open motor if it fails the resistance test. (Refer to the Main Wire Harness Test diagnostic in Chapter 2.) 6. Check the shuttle for electrical shorts (page 268). 7. Plug in the printer and power it on. Press **FORM FEED** and **VIEW** several times and check that paper moves in both directions. If the platen does not open during paper reverse, the controller board or microcode is suspect. Do the following: 8. Save the printer configuration values. (Refer to the *User's Manual*.) 9. Clear NVRAM (page 253). 10. Download and install the latest code from IBM First (page 247). 11. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 12. Download and install the latest code from IBM First (page 247). Power on the printer in download mode and load flash memory (page 254). 13. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
TOF is lost repeatedly	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 for heavily tented horizontal perforations in the paper. If horizontal perforations are heavily tented, consider setting the “Set Platen at BOF” configuration option (in the Printer Control menu) to Open. (Refer to the *User’s Manual*.) 4. Check and adjust the paper feed timing belt. Replace the belt if it is damaged. 5. Check the dynamic paper tension. 6. If the platen gap is correct, remove the shuttle frame assembly (page 380) and check the following: 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 and that their lower ends are seated in the groove on the upper forward edge of the platen. 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. 7. 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. Connect P107/PAPR M to J107 on the controller board. On -D8C and -v20 models, check connector J103 on the controller board. 8. Power on the printer. Load paper and set TOF. Press **FORM FEED** and **VIEW** several times and check that paper returns to TOF. Replace the paper feed motor if paper does not return to TOF.

Table 5. General Symptom List

Symptom	Corrective Action
TOF is lost repeatedly (continued)	9. Power on the printer. Press **FORM FEED** and **VIEW** several times and check that paper returns to TOF. If paper does not return to TOF, the controller board or microcode is suspect. Do the following: 10. Save the printer configuration values. (Refer to the *User's Manual*.) 11. Clear NVRAM (page 253). 12. Download and install the latest code from IBM First (page 247). 13. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). 16. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Printer resets to factory defaults	1. Check the printer configuration for the proper values of CPI, LPI, print quality, forms length, and width. 2. Refer to the reset command description in the *User's Manual*. 3. If the problem reappears, the controller board or microcode is suspect. Do the following: 4. Save the printer configuration values. (Refer to the *User's Manual*.) 5. Clear NVRAM (page 253). 6. Download and install the latest code from IBM First (page 247). 7. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 8. Download and install the latest code from IBM First (page 247). 9. Power on the printer in download mode and load flash memory (page 254). 10. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 5. General Symptom List

Symptom	Corrective Action
Ribbon	
Folding or feed problems with a ribbon	1. Check that both 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. 5. Inspect the paper print path for paper chaff, ink residue, and debris. Clean the shuttle frame assembly. 6. Clean the ribbon guides. 7. 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. 8. 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 media, power down the printer. Remove the paper guide assembly or pedestal top cover. Reseat connectors P106/LRP and P107/RRP on the controller board. 9. 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. Replace a ribbon post that fails the continuity test. 10. Check and adjust the platen gap.

Table 5. General Symptom List

Symptom	Corrective Action
Shuttle	
Shuttle does not move	1. Power off and unplug the printer. 2. Remove the ribbon. 3. Remove the shuttle cover. Adjust the gap between the MPU assembly and the flywheel to 0.010 ± .001 inch (0.254 ± 0.025 mm). Torque the 7/16 inch MPU clamp screw to 18 ± 1 inch-pounds (2.03 ± 0.11 N•m). 4. 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. 5. Remove the paper guide assembly or pedestal top cover. Check that the shuttle motor drive cable is connected to J116 on the controller board. Check the shuttle for electrical shorts (page 268). Check and adjust the platen gap. 6. 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. 7. Check continuity of the shuttle motor drive cable assembly. Replace shuttle motor drive cable assembly if it fails continuity test. 8. Power on the printer. Run a Shuttle Slow or Shuttle Fast test. If the shuttle does not move, replace the shuttle frame assembly. 9. Power on the printer. Run a Shuttle Slow or Shuttle Fast test. If the shuttle does not move, do the power supply operational check (page 274). If the power supply fails the check, replace it. If it passes the check, the controller board or microcode is suspect. Do the following: 10. Save the printer configuration values. (Refer to the *User's Manual*.) 11. Clear NVRAM (page 253). 12. Download and install the latest code from IBM First (page 247).

Table 5. General Symptom List

Symptom	Corrective Action
Shuttle does not move (continued)	13. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). After replacing the controller board, DO NOT make the printer READY, but proceed immediately to the next step. 14. Download and install the latest code from IBM First (page 247). 15. Power on the printer in download mode and load flash memory (page 254). 16. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
Shuttle is noisy	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 ribbon. 3. 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 ± 2 inch-pounds (3.39 ± 0.23 N•m). Torque the center captive 5/32 inch socket head screw to 30 ± 2 inch-pounds (3.39 ± 0.23 N•m). 4. Check the shuttle for electrical shorts (page 268). 5. Inspect the shuttle area for loose hardware. Tighten loose hardware. 6. 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. 7. Power on the printer. Run a shuttle test. Replace the shuttle frame assembly if it is noisy or rattles.

2 *Diagnostics*

Contents

Operator Print Tests

A set of print tests is included in the configuration menu structure for use as diagnostic tools. These are called the “Operator Print Tests” because they are available to the user. Use these tests to check the print quality and basic operation of the printer.

The Operator Print Tests are summarized below.

NOTE: Under the description of some tests is a list of items that may need to be adjusted or replaced if the test produces a bad print pattern. The items are listed in the order you should check them: simplest items first, complex items last.

- **Printer Demonstration** Prints a sample page showing every print mode, font, and pitch available in the printer.
- **Print Error Log** Prints the contents of the error log. The error log automatically records certain unit check conditions in a buffer in NVRAM that stores up to 50 messages. The most recent message is stored at the top of the list, the oldest message at the bottom of the list. If more than 50 messages occur before the log is cleared, the oldest messages are deleted, so that the log never contains more than 50 messages.
- **Print Ribbon Log** Prints the contents of the ribbon log. The printer keeps a log of up to 100 previously depleted ribbons, identifying them if they are again installed on the printer. This information is printed in a summary by type of all ribbons ever installed (including the 100 captured serial numbers and beyond). The ribbon log also captures any attempts to run Unknown1 or Unknown2 ribbons, and records this information in the log as “Ribbon Not Recognized.” The Ribbon Log is a permanent record; it cannot be cleared.
- **Ripple Print** A “sliding” alphanumeric pattern useful for identifying missing or malformed characters, improper vertical alignment, or vertical compression.
  Hammer bank cover
  Hammer spring
  Shuttle frame assembly
- **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.
  Ribbon
  Splined shaft skew adjustment
  Hammer bank cover
  MPU sensor
  Hammer springs
  Hammer coils (shuttle frame assembly)
- **All H’s** A pattern of all uppercase letter H’s useful for detecting missing characters or dots, smeared characters, or improper phasing.
  Ribbon
  Hammer bank cover
  MPU sensor

Hammer springs
Hammer coils (shuttle frame assembly)

- **All E's + FF** 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.
  Hammer bank cover
  Power supply board
  Paper motion sensor or cable
  Paper feed belt or motor
  Splined shaft bearings
  Tractors or tractor belts
- **Underlines** An underline pattern useful for identifying hammer bank misalignment.
  Hammer bank cover
  Hammer tips
  Paper feed belt or motor
  Splined shaft bearings
  Tractor bearings or belts
- **E Net Test Page** Prints the ethernet statistics stored in the ethernet Network Interface Card (NIC), if installed.

Selecting And Running Tests

To run Operator Print Tests use the printer configuration menus, as shown below:

Step	Press	Displayed Result	Notes
1.	Load paper and power on the printer.		
2.	**STOP**	NOT READY	Printer must be in NOT READY mode to access the tests.
3.	**RETURN + ENTER**	OPERATOR MENU UNLOCKED	Unlocking the **ENTER** key allows you to test the printer.
4.	**MENU**	OPERATOR MENU PRINTER CONTROL	First of series of configuration menus.
5.	**SCROLL**↑ until	OPERATOR MENU OPERATOR PRINT TESTS	Advances to the Operator Printer Tests menu.
6.	**ENTER**	OPERATOR PRINT TESTS PRINTER DEMONSTRATION*	Advances to first option in Operator Printer Tests menu.
7.	**SCROLL**↑ until	OPERATOR PRINT TESTS [TEST NAME]	Cycles through list of tests. Stop when your test displays.
8.	**ENTER**	OPERATOR PRINT TESTS [TEST NAME]	The test you selected starts printing.
9.	**STOP**	NOT READY	The printer test stops printing.

Customer Engineer (CE) Tests

A set of printer tests is included in the configuration menu structure for use as maintenance tools. These are called “Customer Engineer Tests” (CE Tests) because they are for your use; they are not available to the user through his documentation. You will use these tests in various troubleshooting and adjustment procedures. CE tests do not run at the rated speed of the printer.

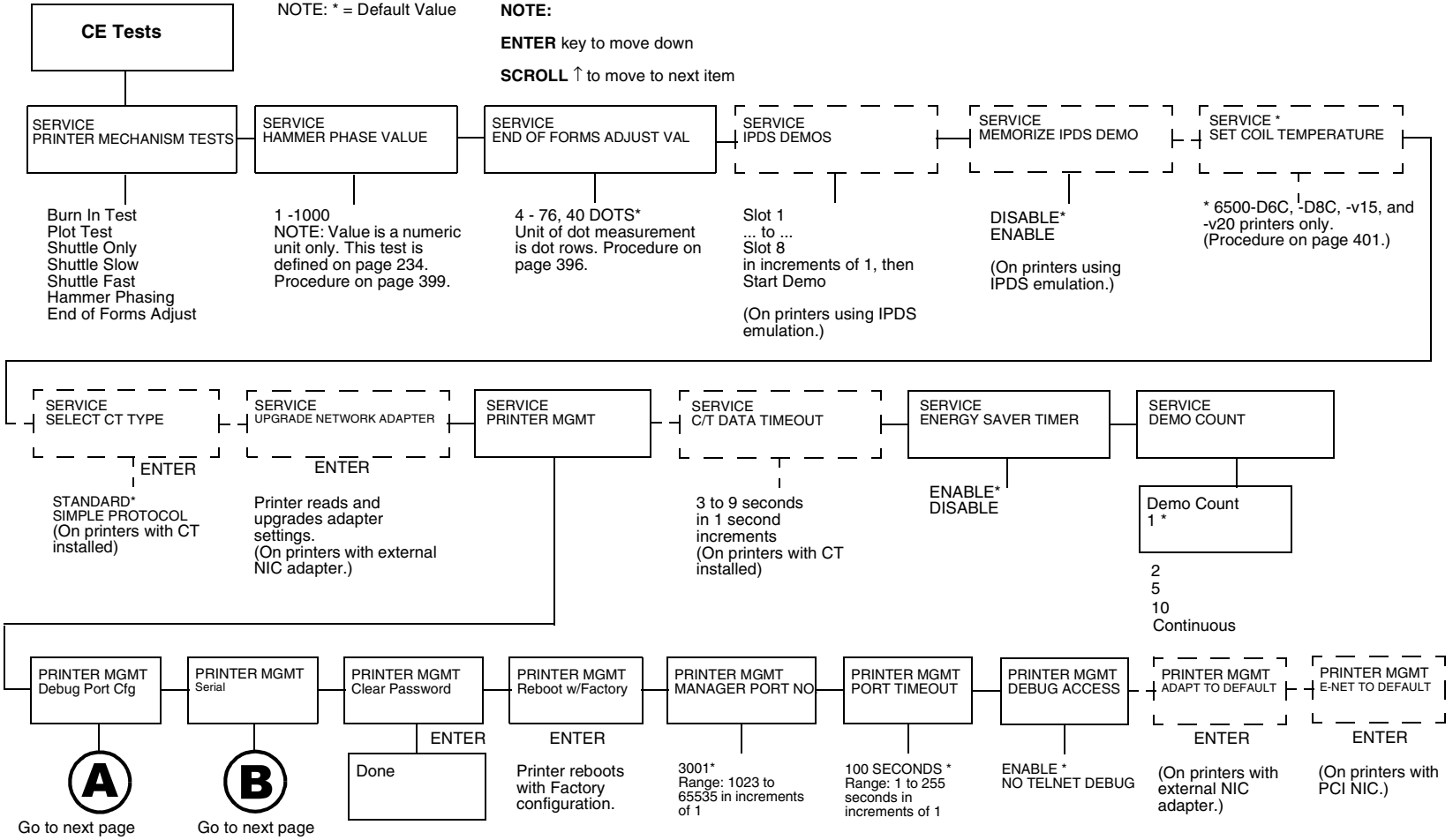


Figure 7. This figure shows the menu structure of the Customer Engineer Tests.

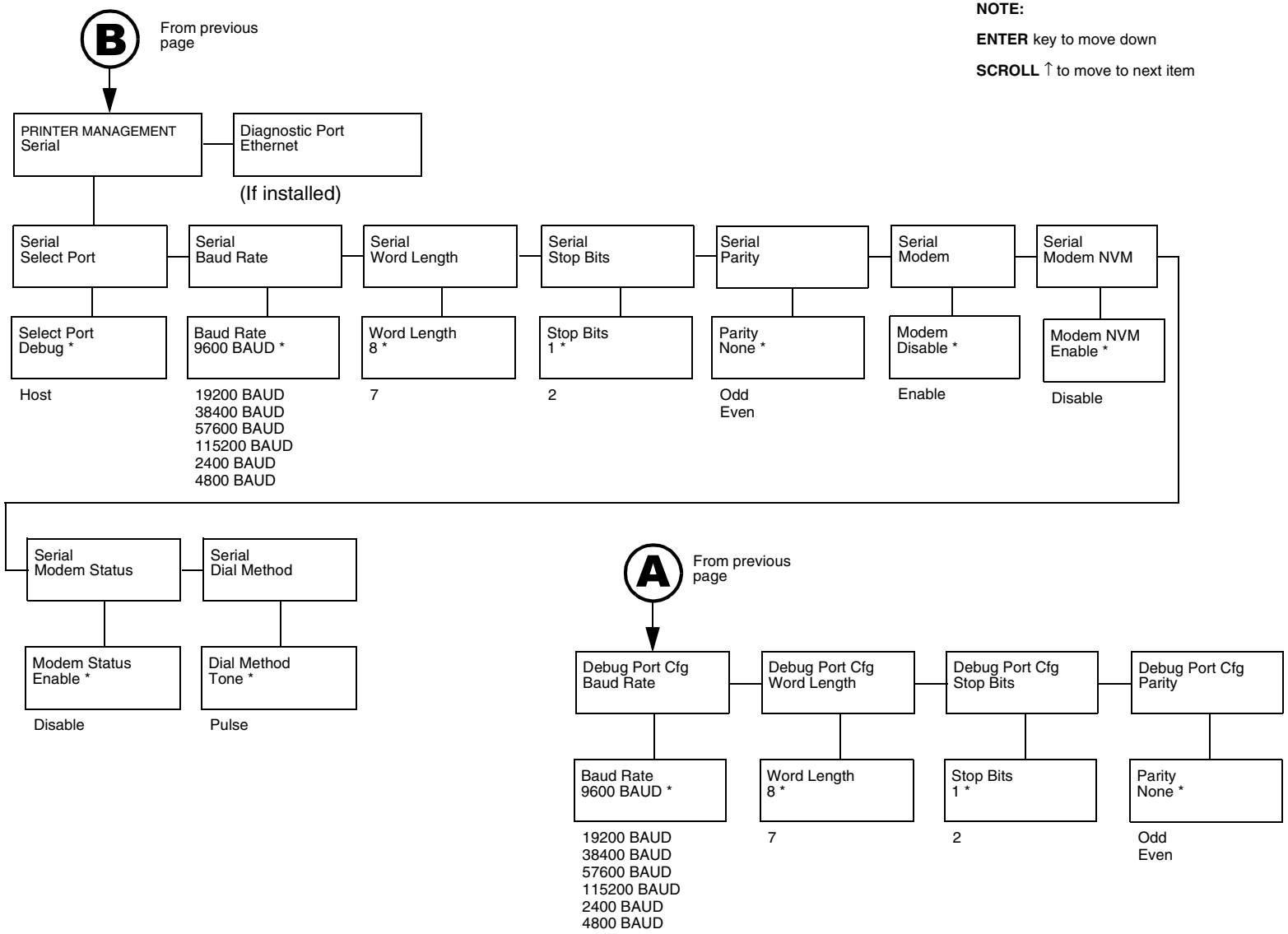


Figure 7 (continued). This figure shows the menu structure of the Customer Engineer Tests.

The CE Tests shown in Figure 7 are summarized below:

Printer Mechanism Tests

- **Burn In Test** Use of this test is *not recommended*. This test is used by the manufacturer to burn in the printer before it is shipped to the customer and has no value as a maintenance tool.
- **Plot Test** Prints all dot positions, creating a solid black band. Exercises the shuttle and hammer bank at maximum capacity.
  Power Supply board
  Hammer bank cover
  Hammer springs
  Hammer coils (the shuttle frame assembly)
- **Shuttle Only** This test runs only the shuttle.
- **Shuttle Slow** Verifies proper operation by exercising the shuttle and ribbon mechanisms at low speed. You can also use this test to check ribbon tracking and reversing.
- **Shuttle Fast** Verifies proper operation by exercising the shuttle and ribbon mechanisms at high speed. You can also use this test to check ribbon tracking and reversing.
- **Hammer Phasing** A hammer timing parameter that permits you to adjust the vertical alignment of dots in character printing.
- **End of Forms Adjust** A vertical comb pattern used to determine the number of dot rows from the completion of a paper out fault to the end of the paper.

Hammer Phase Value

The hammer phase value is a timing parameter that permits you to adjust 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 aluminum casting of the shuttle assembly, next to the motor housing. Use this value as your starting point when adjusting hammer phasing.

End of Forms Adjustment Value

This parameter determines where on the paper the printer will stop printing when an out of paper fault is detected. The unit of measurement is dot rows. The number of dot rows may be adjusted up or down 1/2 inch from the factory default of 40 dots.

Clear Error Log

This menu selection enables you to delete the stored contents of the error log. The error log automatically records certain unit check conditions in a buffer in NVRAM that stores up to 50 messages. The most recent message is stored at the top of the list, the oldest message at the bottom of the list. If more than 50 messages occur before the log is cleared, the oldest messages are deleted, so that the log never contains more than 50 messages.

Print Partial Line

If the final line of a data stream has no line feed or carriage return character it is retained in the buffer. DISABLE holds the line in the buffer; ENABLE permits the line to be printed after a timeout.

Top Exit Tear Distance

This parameter allows adjustment in 0.01 inch increments of the final location of page perforations when the top paper exit is used.

Set Coil Temperature

An automatic sequence in printer software that recalibrates hammer coil temperature. This procedure applies only to 6500-D6C, -D8C, -v15, and -v20 printers. See page 401.

Selecting And Running CE Tests

To run CE Tests you use the printer configuration menus, as shown below:

Step	Press	Displayed Result	Notes
1.	Load paper and power on the printer.		
2.	**STOP**	NOT READY	Printer must be in NOT READY mode to access the tests.
3.	**MENU + SCROLL↑ + CONFIG + SCROLL↓**	SERVICE PRINTER MECHANISM TESTS	Press all four keys at the same time.
4.	**ENTER**	PRINTER MECHANISM TESTS Burn In Test	Press **ENTER** to view the different mechanism tests.
5.	**SCROLL↑** until	PRINTER MECHANISM TESTS Plot Test	Cycles through list of tests. Stop when your test displays.
6.	**RETURN + ENTER**	OPERATOR MENU UNLOCKED	Unlocking **ENTER** key allows you to test the printer.
7.	**ENTER**	Plot Test Running	The test you selected starts printing. See Chapter 6 for instructions in the use of the Hammer Phasing and End of Forms Adjust tests.
8.	**STOP** or **START**	NOT READY	**STOP** halts the test, exits the menu, and puts the printer in the NOT READY state. **START** halts the test, exits the menu, and puts the printer in the READY state.

Boot Diagnostics Menu

Printer boot-up software contains a menu structure that you can access by holding down the **EJECT** and **STOP** keys while powering up the printer. These menus are not intended for the end user, but provide useful information for manufacturing and maintenance personnel. The boot diagnostic menu structure is depicted in Figure 8.

ATTENTION **Some options in the Boot Diagnostics menu can severely impair printer performance if incorrectly adjusted.**

Activating The Boot Diagnostics Menu

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

Exiting The Boot Diagnostics Menu

Method 1: Reset the printer from the Menu

1. Using the directional keys, move to the DIAGNOSTICS MENU / EXIT DIAGNOSTICS menu option. (See the menu map beginning on page 238.)
2. Press the **ENTER** key. The printer goes into startup initialization. (B30:STATUS INITIALIZING...)

Method 2: Cycle power

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

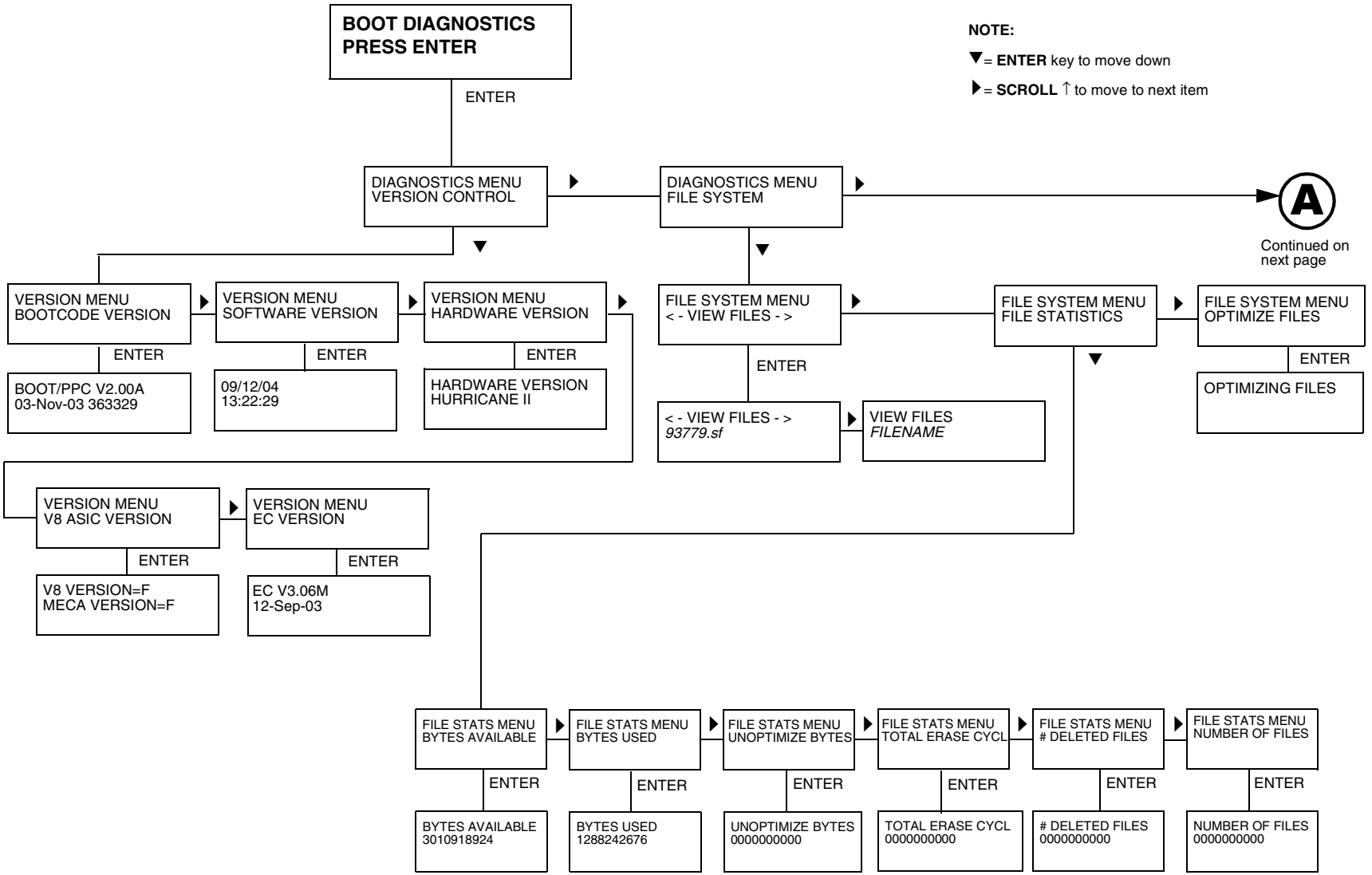


Figure 8. This figure shows the Boot Diagnostics Menu, and continues on the next page.

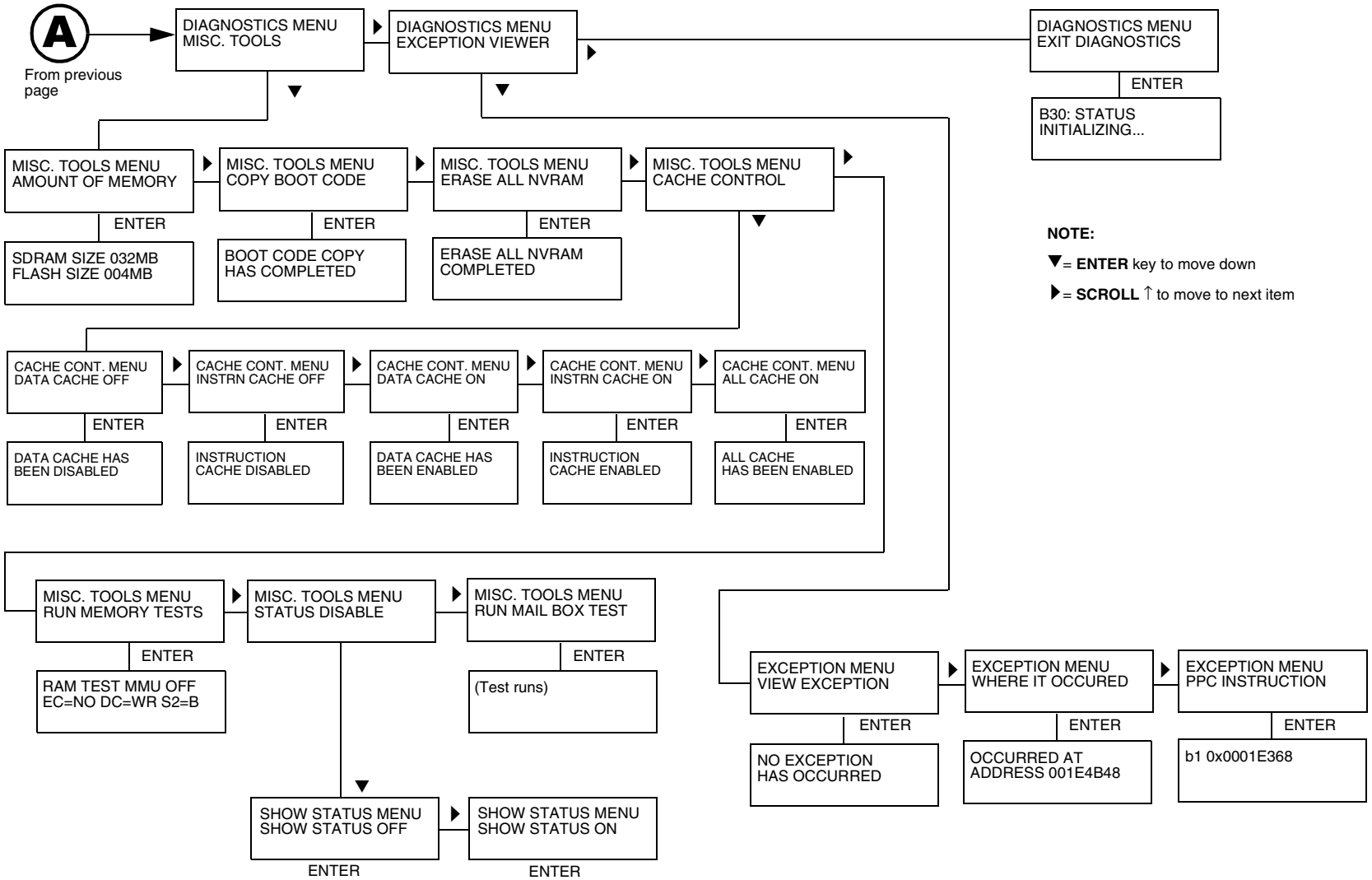


Figure 7. This figure shows the Boot Diagnostics Menu, and is continued from the previous page.

Hex Code Printout

A hex code printout (“hex dump”) prints every ASCII character received from the host computer with its corresponding two-digit hexadecimal code. Hex dumps are used to troubleshoot printer data reception problems by comparing the printed hex data to the data sent from the host.

In a hex dump, every character is printed as its assigned ASCII symbol and as the hexadecimal value of the character. A character that does not have a printed symbol (for example, a control character) is printed as a period (.) and the hex value of the control character.

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 465.

Step	Press	Displayed Result	Notes
1.	Install the ribbon, load paper, and power on the printer.		
2.	**STOP**	NOT READY	Puts printer in NOT READY mode.
3.	**RETURN + ENTER**	OPERATOR MENU UNLOCKED	Unlocking the **ENTER** key gives you access to the configuration menus.
4.	**MENU**	OPERATOR MENU PRINTER CONTROL	First of series of configuration menus.
5.	**ENTER**	PRINTER CONTROL INTERFACE SELECTION	Moves down to Interface Selection option.
6.	**SCROLL**↑ until	PRINTER CONTROL HEX PRINT MODE	Moves down to the Hex Print Mode option.
7.	**ENTER**	HEX PRINT MODE DISABLE*	Moves down to Disable, the active option.
8.	**SCROLL**↑	HEX PRINT MODE ENABLE	Moves to Enable, the alternate option.

Step	Press	Displayed Result	Notes
9.	**ENTER**	HEX PRINT MODE ENABLE*	Asterisk (*) indicates this choice is now active.
10.	**STOP**	NOT READY	Returns printer to NOT READY mode.
11.	**RETURN + ENTER**	OPERATOR MENU UNLOCKED	Relocks the **ENTER** key.
12.	**START**	READY	Puts printer in READY mode.
13.	Send a file from the host computer. The printer outputs a hex dump. Refer to the ASCII chart on page 465.		
14.	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.		

Printer Information Menu

You can view various printer statistics, such as hours of usage, and refer to these figures for preventive maintenance purposes. Printer statistics accumulate continuously; they do not reset when you power off the printer.

All of the printer statistics are set to zero at the factory after burn-in testing.

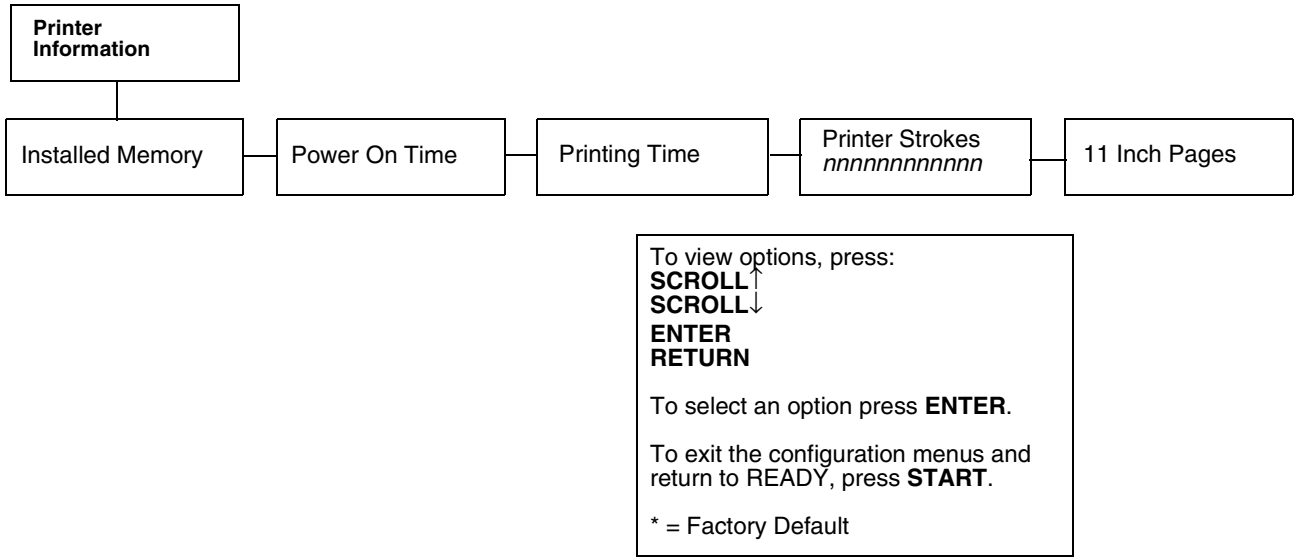


Figure 9. This figure shows the Printer Information Menu.

Installed Memory

Displays the amount of RAM in Megabytes installed in the printer.

Power-on Time

The cumulative time in hours that the printer has been powered on. The range is 0 to 30,000 hours.

Printing Time

The cumulative time in hours that the printer has actually been printing. The range is 0 to 30,000 hours.

Print Strokes

The cumulative number of back-and-forth shuttle strokes the printer has made during normal operation. The range is 0 to 4,000,000,000 shuttle strokes.

11 Inch Pages

The cumulative number of pages the printer has printed. The range is 0 to 363,000,000 pages.

Displaying Printer Information

You can get printer information by using the configuration menus, as shown below:

Step	Press	Displayed Result	Notes
1.	Install the ribbon, load paper, and power on the printer.		
2.	**STOP**	NOT READY	Puts printer in NOT READY mode.
3.	**RETURN + ENTER**	OPERATOR MENU UNLOCKED	Unlocking the **ENTER** key gives you access to the configuration menus.
4.	**MENU**	OPERATOR MENU PRINTER CONTROL	First of series of configuration menus.
5.	**SCROLL↑**	OPERATOR MENU PRINTER INFORMATION	Advances to the Printer Information menu.
6.	**ENTER**	PRINTER INFORMATION INSTALLED MEMORY	Advances to the first of the Printer Information menus.
7.	**SCROLL↑**	PRINTER INFORMATION [MENU NAME]	Stop when the menu you want is displayed.
8.	**ENTER**	[MENU NAME] [STATISTICS OR INFO]	Your selection displays the information.
9.	**STOP**	NOT READY	Returns printer to NOT READY mode.

Soft vs. Hard Reset

Resetting the printer returns it to a previous configuration. There are two kinds of reset.

Soft Reset

A soft(ware) reset clears printer memory then loads the power-up configuration into memory. (The procedure for saving configurations is described in the *User's Manual*.) 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.

Put the printer in the NOT READY state to do a soft reset:

1. Press the **STOP** key to put the printer in the NOT READY state.
2. Press the **STOP + ENTER** keys.
   The LCD displays "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 PSA3 controller board.

Controller Board Status LEDs At Power Up

At power up printer software turns on the amber status LED at the rear of the card cage. (Figure 10.) If a hardware problem is detected at power up the amber LED will blink continuously.

At power up printer hardware also turns on the green LED. (See Figure 10.) If a problem is detected with the software stored in the printer’s flash memory both the amber and green LEDs will blink alternately.

Under normal conditions, both LEDs remain on continuously.

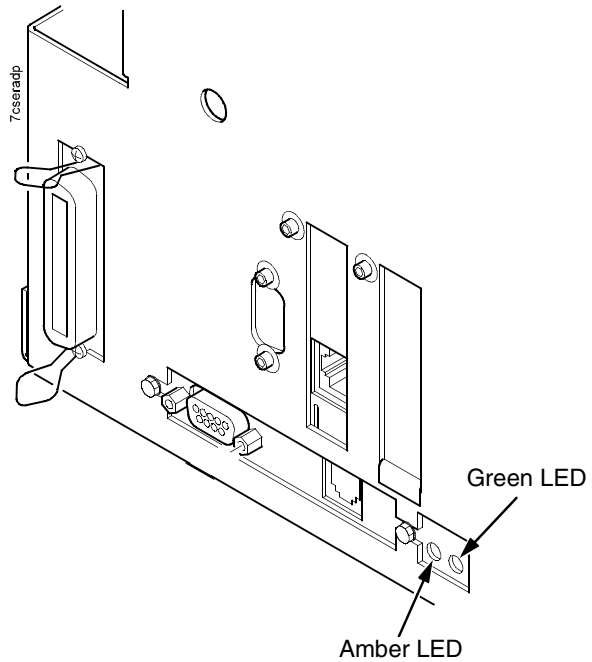


Figure 10. This Figure shows the amber and green status LEDs on the controller board

Troubleshooting A New Installation

Customers with new printers sometimes report “problems” that reflect unfamiliarity with the printer and manuals rather than true fault conditions. If a customer reports general printer problems and the printer was recently installed, check the following:

Printer Configuration

Many customers have difficulty configuring new printers for operation with their computer system. There are so many system configurations and parameter options that configuring a printer can be challenging to those who do not do it often. Check the customer’s host interface to the printer and make sure the printer configuration conforms to the host. If the customer has not yet made a configuration printout, show him how to print and store his printer’s configuration. (Refer to the *User’s Manual*.)

Documentation

Stress the importance of consulting the documents that come with printer. These manuals explain how to operate, care for, and troubleshoot the printer. The manuals also have helpful tips about how to choose media and obtain the best print quality.

RibbonMinder**

RibbonMinder is a software feature that 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, when installed in the printer, always contains the following encoded information:

- Identifies the ribbon as IBM
- The thickness and length of the ribbon fabric to select the correct motor stepper tables
- The expected yield, which is used by RibbonMinder software to set the ink depletion rate
- An 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; the input data are then decoded by the printer and interpreted by RibbonMinder software.

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

NOTE: The labels attached to each ribbon spool do not use the same 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 a brand new ribbon or one that has been flipped once.

RibbonMinder Operation

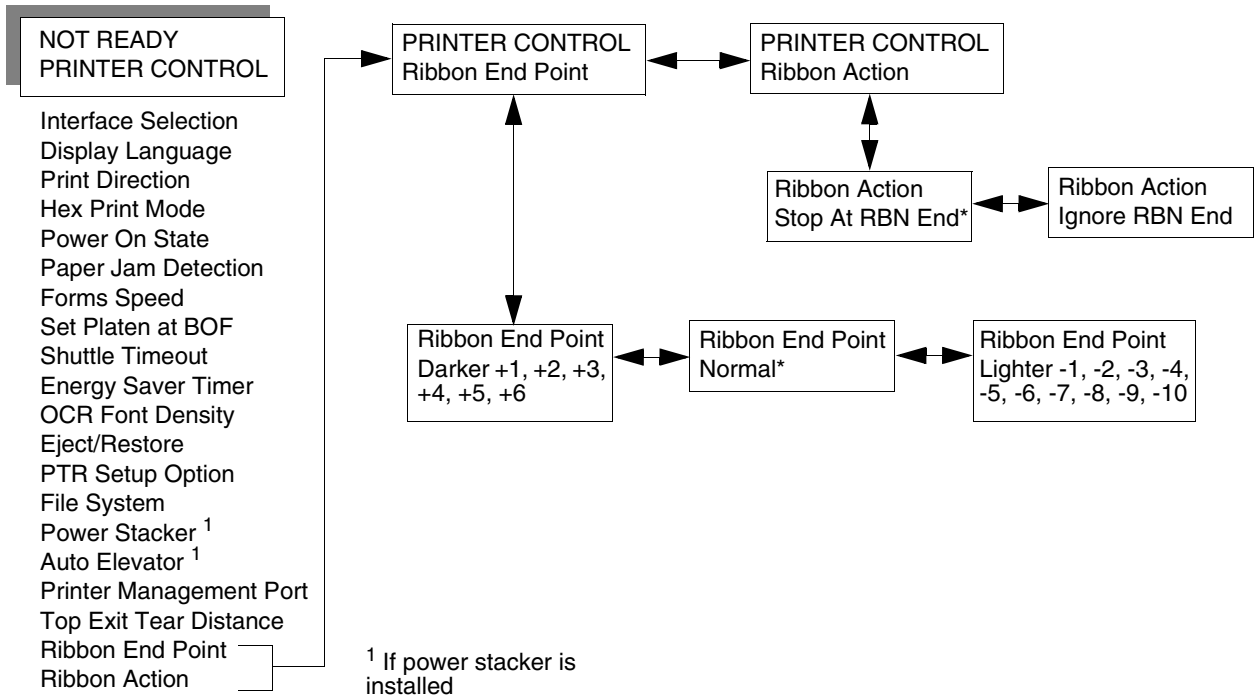
Ribbon ink consumption continuously displays on the printer operator panel LCD, decrementing as ink is consumed. At the default settings, when ribbon life reaches 2% the message changes to “301 RIBBON INK LOW / INSTALL NEW IBM RIBBON.” The operator panel status lamp flashes, but the printer continues to accept new print jobs until ribbon life reaches 0%, at which time the printer stops printing and enters the fault state.

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

Operator Panel Menus

RibbonMinder menus are located on the “PRINTER CONTROL” menu. (The *User’s Manual* explains how to navigate the menu system and has complete menu maps.) From the PRINTER CONTROL / Ribbon End Point menu, pressing the **ENTER** key brings up the first selection in the Ribbon End Point submenu. (See the figure below.) Pressing the **RETURN** key returns you to the previous menu. Pressing the **SCROLL**↓ or **SCROLL**↑ key from any of the lower level menus toggles the display between

the selections at that level. Pressing the **ENTER** key selects an item and the system inserts an asterisk (*) to indicate that this is now the default option.



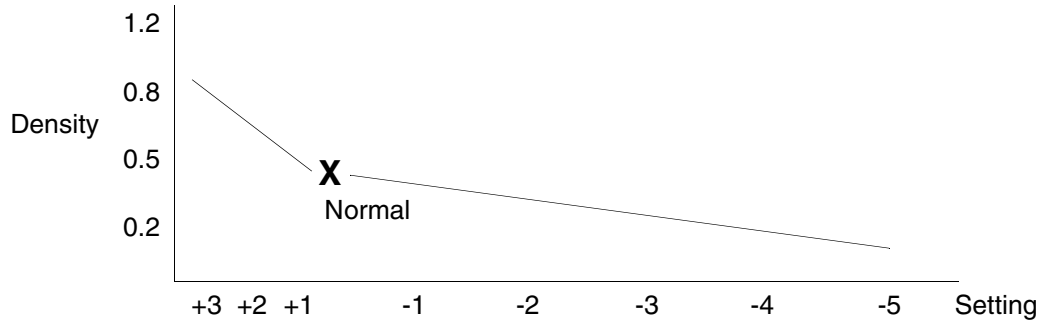
Ribbon End Point

Factory default is Normal. This value corresponds to the character life expectancy of the detected, authorized ribbon installed in the printer. RibbonMinder tracks ribbon life to the recommended end point before declaring 301 RIBBON INK LOW or 146 RIBBON INK OUT. This is a global setting: it is in effect for all printer configurations and cannot be set for individual printer configurations.

To change this setting, press the **SCROLL**↓ or **SCROLL**↑ key to select “Darker +1” through “Darker +6” (**SCROLL**↓) or “Lighter -1” through “Lighter -10” (**SCROLL**↑), where each increment or decrement corresponds to a predetermined set value (density). Pressing **SCROLL**↓ 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.

By changing this setting, you specify a point lower or higher at which the “301 RIBBON INK LOW” or “146 RIBBON INK OUT” message will display. The user can thus set ribbon life to match the required print density for a specific application. The graph below shows the relationship between print density and the Ribbon End Point settings.



For reference, the nominal starting density of a new black text ribbon is approximately 1.2, with a yield to 0.5 density of approximately 16 million HS characters. Incrementing the Darker setting will raise the density end point, while decreasing the 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 density, which increases the 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 this 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 long, 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 “146 RIBBON INK OUT / INSTALL NEW IBM RIBBON” displays on the operator 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 READY state by pressing **START**. 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 again return the printer to the READY state by pressing **START**. This routine can be repeated indefinitely, or until power to the printer is turned off. Once power is restored and a depleted ribbon is detected, “305 OLD RIBBON DETECTED / INSTALL NEW IBM RIBBON” displays, because the depleted ribbon was added to the Ribbon Log (page 251). A new ribbon must be installed to clear this condition.

When Ignore RBN End is selected, the ribbon life display remains on the operator panel, and the RibbonMinder continues to monitor ink consumption to the appropriate value as set by the Ribbon End Point (even though not enabled). When this end point is reached, the display will continuously show “RIBBON LIFE 0%” ink available and the system will continue to run with no other warning indications. The printer can be taken to NOT READY or the power cycled and RibbonMinder 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 “302 EXCESS RBN WEAR / INSTALL NEW IBM RIBBON” message. The ribbon serial number is added to the depleted ribbon log (page 251). This fault cannot be cleared by pressing **START**. 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

RibbonMinder software 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, RibbonMinder 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 the READY state and no print data are in the buffer. If no print data are present, the ribbon motors and shuttle stop and the printer remains READY. 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.

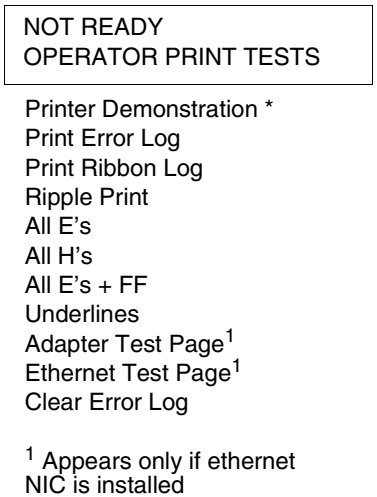
Previously used ribbons can be installed and used again to print, as long as they were not fully depleted and declared 146 RIBBON INK OUT.

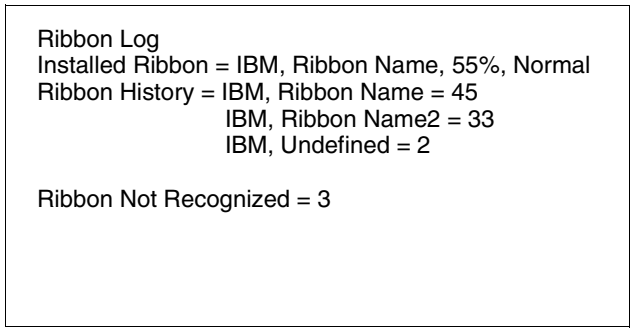
A ribbon can also be flipped over to print on the unused half. This situation occurs if printed images are narrow enough that only about half the ribbon is used at one time. When a ribbon is flipped it is treated as a new (different) ribbon, so if a ribbon is used across its full width and still flipped,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

The Ribbon Log

The printer identifies each ribbon by maker, type, and a unique identification code. RibbonMinder 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 the 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 printed in the log for review. 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.





Downloading Microcode From IBM First

This section explains how to obtain microcode for the 6500 printer. This process is done through the Lotus Notes IBM First R5 data base.

1. Create a directory named *6500* on the laptop to hold your 6500 code downloads. (If you do not know how to create directories, see someone familiar with PCs.)
2. Open Lotus Notes.
3. Open the IBM First R5 data base.
4. Click on the “Machines” button at the left of your screen.
5. Click on the “Microcode” button at the left of your screen.
6. Click on the “All Microcode” button at the left of your screen.
7. When the next screen reads “PSD Machine Microcode,” scroll down to the 6500 machine type and click on the icon. This will take you to the 6500 microcode page.
8. Under the “6500 - All Models” tab, find the code you need in the list, move your mouse pointer so it points to the icon of the needed file, and double-click with the left mouse button.
9. At the prompt “Unknown File Type” click **Save File...**
10. Enter your Lotus Notes password and click on “OK”.
11. At the “Save As...” dialog box, point to the down arrow just to the right of the “Save In” pane and select the folder (the directory; e.g., the 6500 folder you created in step 1) in which to save the file.
12. After you select the folder to receive the file, verify that the “File name” window has the correct name, then click **Save**.

NOTE: Do NOT change the *filename*.

13. The file will download to the directory you requested. You can now load this code into the printer’s flash memory, as explained on page 254.

Clear NVRAM

This procedure will erase any custom configuration sets the customer may have saved and may change the hammer phasing and paper out dots values.

1. If possible, make a configuration printout of all configurations. (Refer to the *User's Manual*.)
2. Set the printer power switch to O (off).
3. Press and hold down the **EJECT** and **STOP** keys.
4. While holding down the **EJECT** and **STOP** keys, set the printer power switch to 1 (on). Do not release the keys, but go immediately to the next step.
5. When "BOOT DIAGNOSTICS / PRESS ENTER" appears on the LCD, release the **EJECT** and **STOP** keys.
6. Press the **ENTER** key. "DIAGNOSTICS MENU / VERSION CONTROL" appears on the LCD.
7. Scroll right or left to "DIAGNOSTICS MENU / MISC. TOOLS" and press the **ENTER** key.
8. Scroll right or left to "MISC. TOOLS MENU / ERASE ALL NVRAM" and press the **ENTER** key.
9. The operator panel will then display "ERASE ALL NVRAM COMPLETED".
10. Set the printer power switch to O (off).
11. Wait 15 seconds.
12. Power on the printer in download mode and proceed immediately to the next step. (If the printer cannot be put into code download mode, got to step 19.)
13. Load microcode to the printer.
14. Using the configuration printouts, restore the customer's custom configurations if any had been established.
15. Adjust the hammer phasing (page 399).
16. Adjust the end of forms distance (page 396).
17. Models 6500-D6C, -D8C, -v15, and 6500-v20: adjust the coil temperature (page 401).
18. Return the printer to normal operation (page 331).
19. Proceed to the next troubleshooting step in the MIM procedure you are working.

Loading Flash Memory

Flash memory is contained in a SIMM (single in-line memory modules) located on the controller board. Printer control languages (the “emulations”) and printer operating system software are loaded into flash memory at the factory, but you will install this software in the following situations:

- The customer needs to upgrade printer software.
- The customer needs different emulation software.
- You have replaced the controller board.
- You have replaced the flash memory SIMM.

You can load software through the printer’s parallel port or, optionally, through ethernet port if the printer has the ethernet Network Interface Card (NIC) installed.

NOTE: To load software through the ethernet port (page 264) you must know the IP Address of the printer and the flash memory must be operational and contain basic printer code (it cannot be a blank replacement SIMM). The recommended procedure is to load through the parallel port.

Emulation and operating system software are stored as a single compressed file. The file is “executable;” you will expand it and copy it into printer flash memory with a single command.

DANGER

<4> Do not connect or disconnect any communications port, teleport, attachment connector, or power cord during an electrical storm.

<5> Power off the printer and disconnect the power cord before connecting or disconnecting a communication port, teleport, or attachment cable connector.

Loading Through The Serial Or Parallel Port

1. Download the correct level of microcode from IBM First (page 247).
2. If the printer has an internal ethernet Network Interface Card (NIC), you can optionally load through the ethernet port (page 264), but the recommended to procedure is to load through the parallel port.
   If you are loading flash memory through the parallel port, continue with this procedure.
3. Make a printout of *all* saved configurations. (Refer to the *User's Manual*.) Installing new software erases all saved configurations. You will use these printouts to restore printer configuration.
4. Set the printer power switch to O (off).
5. Unplug the AC power cord from the printer.
6. Disconnect all data input cables from the printer interface.
7. 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: You can connect the cable to the LPT2 port if the LPT1 port is in use. The load command is different if you use this port, so make sure you use the LPT2 commands in step 15.

8. Connect the data cable to the appropriate I/O port of the printer.
9. Plug the AC power cord into the printer.
10. Power on the computer.
11. On the printer operator panel, press and hold down the **START + EJECT** keys. Without releasing the keys, power the printer on. When you see "B30: STATUS INITIALIZING" on the on the LCD, release the keys.
12. Wait until you see "WAITING FOR DOWNLOAD" on the LCD before doing the next step. This can take up to 30 seconds to appear, depending on the emulations and interfaces installed in the printer.
13. Start a command prompt session on your computer. (The Start Menu icon is usually labeled **MS-DOS Prompt** or **Command Prompt**.)
14. At the command prompt type:
    `C:`<Enter>
    `cd \6500`<Enter> (In other words, change directories to the directory that contains the microcode executable file you downloaded from IBM First.)
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 you downloaded from IBM First and stored on your computer. 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.

To load the file through the LPT2 port on the computer, enter the following command:
***filename*.exe -pb2** <Enter>

NOTE: On a printer with a PSA3 controller board, when you power up in download mode (step 11) the printer is ready to accept data from all ports. When the printer receives data from one of the ports (based on the load command you give) the other ports shut down.

ATTENTION **Do not interrupt the downloading process once it has started. Interrupting a download will damage the flash memory on the controller board.**

16. While the file is copied into memory, the printer LCD informs you of the load process and status. (See Table 6, which follows.)
17. When the file has successfully loaded into memory and the printer has reset itself, set the printer power switch to O (off).
18. Unplug the AC power cord from the printer.
19. Power off the personal computer.
20. If you had to install a parallel data cable to the computer and printer in step 7, disconnect it from the computer and printer.
21. Reconnect the customer's data input cable(s) to the printer, if required.
22. Return the printer to normal operation (page 331).
23. Using the configuration printout(s) you made in step 3, reconfigure the printer. (Refer to the *User's Manual.)*

NOTE: A continuous IML cycle indicates coax/twinax code is being loaded into a printer with a missing, defective, or improperly installed Coax/Twinax board. If the printer is supposed to have this feature, reseat the Coax/Twinax board. If the printer is not supposed to have this feature, install new emulation code without the Coax/Twinax feature.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
CLEARING PROGRAM FROM FLASH	The program successfully loaded into printer RAM and the checksum matched. The old program is now being deleted from flash memory.	None
DIAGNOSTIC PASSED	The printer passed its memory and hardware initialization tests.	None
ERROR: DC PROGRAM NOT VALID	Printer cannot find the data controller program or the validation checksum is corrupted.	Download the program again: Power off the printer and start over at step 11. If the message occurs again, replace the flash memory.
ERROR: DRAM AT ADDRESS XXXXXXXX	The printer found a defective memory location.	Replace the controller board.
ERROR: EC PROGRAM NOT VALID	Printer cannot find the engine controller program or the validation checksum is corrupt.	Download the program again: Power off the printer and start over at step 11. If the message occurs again, replace the controller board.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: EC STOPPED AT STATE XXXX	Hardware fault in the engine controller.	1. Save the printer configuration values. (Refer to the *User's Manual*.) 2. Clear NVRAM (page 253). 3. Download and install the latest code from IBM First (page 247). 4. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). Do NOT make the printer READY, but proceed immediately to the next step. 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). 7. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: FLASH DID NOT PROGRAM	The printer encountered an error trying to program flash memory.	Download the program again: Power off the printer and start over at step 11. If the message occurs again, replace the flash memory.
ERROR: FLASH NOT DETECTED	The printer could not find any flash memory.	Install flash memory before attempting to download this program.
ERROR: NO DRAM DETECTED	The printer could not find any SDRAM.	Cycle power. If the message appears again, replace the controller board.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: NVRAM FAILURE	The non-volatile memory has failed.	1. Save the printer configuration values. (Refer to the *User's Manual*.) 2. Clear NVRAM (page 253). 3. Download and install the latest code from IBM First (page 247). 4. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). Do NOT make the printer READY, but proceed immediately to the next step. 5. Download and install the latest code from IBM First (page 247). 6. Power on the printer in download mode and load flash memory (page 254). 7. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: PROGRAM NEEDS MORE DRAM	The printer requires more SDRAM memory in order to run the downloaded program.	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.
ERROR: PROGRAM NOT VALID	The printer does not see a program in flash memory.	There is no program in printer memory. Go to step 4.

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: SECURITY KEY NOT DETECTED	The security key is missing or has failed.	1. Power off and unplug the printer. Remove the paper guide assembly or pedestal top cover. Check the security key at location U54 on the controller. If the key is absent, install the correct key. If the correct security key is present, go to the next step. 2. Save the printer configuration values. (Refer to the *User's Manual*.) 3. Clear NVRAM (page 253). 4. Download and install the latest code from IBM First (page 247). 5. Power on the printer in download mode and load flash memory (page 254). a. If you encounter loading problems, go to the appropriate error code for resolution. b. If you encounter the failure or message that brought you to this procedure, replace the controller board (page 336). Do NOT make the printer READY, but proceed immediately to the next step. 6. Download and install the latest code from IBM First (page 247).

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
ERROR: SECURITY KEY NOT DETECTED (continued)		7. Power on the printer in download mode and load flash memory (page 254). 8. If you encounter the failure after replacing the controller board, reinstall the original controller board and contact your DDS and Second Level Support.
ERROR: SHORT AT ADDRESS XXXX	Hardware failure in SDRAM or controller circuitry.	Cycle power. If the message appears again, replace controller board.
ERROR: WRITING TO FLASH	Hardware or software fault in flash memory.	Download the program again: Power off the printer and start over at step 11. If the message occurs again, replace the flash memory.
ERROR: WRONG CHECKSUM	The printer received the complete program but the checksum did not match. The data were corrupted during download.	Download the program again: Power off the printer and start over at step 11.
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.
LOADING PROGRAM FROM PORT XX%	The new program is loading into printer RAM. XX indicates how much of the program has loaded.	None
LOADING PROGRAM INTO FLASH	The printer has deleted the previous program from flash memory and is loading the new program into flash memory.	None
RESETTING . . . PLEASE WAIT	The printer finished loading the program into flash memory and is automatically resetting itself.	None

Table 6. Flash Memory Message Guide

Message	Explanation	Required Action
RESTORING BOOT CODE	Normal download initialization message.	None
SECURITY CODE VIOLATION	The software running or being downloaded does not match the security key code.	Install the correct key or program. (Key and program must match.)
SENDING PROGRAM TO EC PROCESSOR	The printer is loading the engine controller program into the engine controller.	None

Loading Through the Network Interface Card (NIC)

IMPORTANT **To load software through the NIC you need the IP Address of the printer and the flash memory must be operational and contain basic printer code (it cannot be a blank replacement SIMM).**

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

NOTE: If you have a problem loading code, call your Level 2 Support Group for assistance.

2. Set the printer power switch to O (Off).
3. Plug an ethernet cross-over cable (IBM P/N 09J7206, or equivalent from a local computer/electronics shop) into the NIC and your laptop.
4. Press and hold the **START + EJECT** keys. Without releasing the keys, power the printer on. When you see "B30 - STATUS: INITIALIZING" on the on the LCD, release the keys.
5. Wait until you see "WAITING FOR DOWNLOAD" on the LCD before proceeding. This can take up to 30 seconds to appear, depending on the emulations and interfaces installed in the printer.
6. Open the command prompt on the laptop. At the **`C:\>`** prompt type the following:
   `MD download`<Enter>
   `CD\`<Enter>
   `CD download`<Enter>

7. At the **C:\download>** prompt type:
   filename.exe<Enter> (Where *filename* is the six-digit microcode P/N)
   This will expand the file and create the **.prg** file needed in the next step.
8. Note the filename, which is a six digit number plus **.prg**.
   This .prg file is the file you will download into the NIC.
9. Start the FTP (file transfer protocol) program by typing:

   ftp *nnn.nnn.nnn.nnn*<Enter>
   (where *nnn.nnn.nnn.nnn* represents the IP Address of the printer.)
10. Log in to the printer by typing:

    root<Enter>

    You are given a password prompt.

NOTE: The default is no password. If the program requires a password, contact the system administrator.

11. At the password prompt, press <Enter>.
12. Once logged in, type the following sequence at the command prompt to download the *filename*.prg file to the printer:

    cd dest<Enter>
    cd d1prn<Enter>
    bin<Enter>
    put *filename*.prg<Enter>
    (where *filename*.prg is the file name you noted in step 8)

ATTENTION **Do not interrupt the downloading process once it has started. Interrupting a download will damage the flash memory on the controller board and NIC.**

13. When the download is complete, exit the FTP program by typing:

    quit<Enter>
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. Unplug the AC power cord from the printer.
16. If required, reconnect the data input cable(s) to the printer.
17. Plug the AC power cord into the printer.
18. Set the printer power switch to | (on).

19. Using the configuration printout(s) you made in step 1 on page 264, restore the printer configurations. (Refer to the *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:

- P/N 39U2691 — Field Kit, SPX, IBM MES, Code V/IGP
- P/N 39U2695 — Field Kit, SPX, IBM MES, IPDS

The SPX is an intelligent module that plugs into the debug port on the back of printers equipped with the PSA3 "Hurricane" controller board. The SPX is used only once; it automatically overwrites itself after successfully reprogramming a security key. This allows the end 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 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, as in Figure 11.
4. Power on the printer. The printer will begin its boot-up sequence.
5. When the printer detects a valid SPX, the operator 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..."

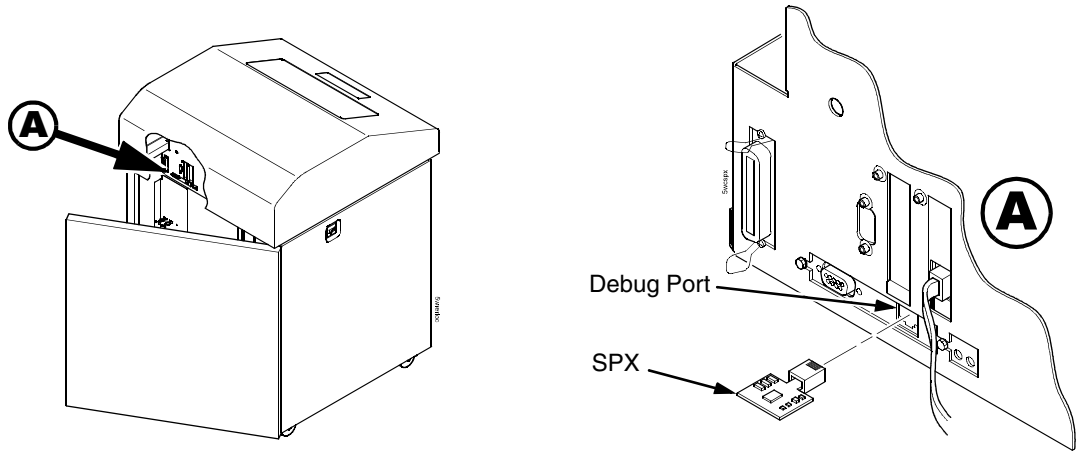


Figure 11. This figure shows where to insert the SPX.

7. When the security key is reprogrammed, the display will read:
   “REMOVE 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*.)

Shuttle Electrical Shorts Test

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 check —**
a) If you removed the shuttle cover during servicing and before you re-install the shuttle cover.
b) Before you replace the controller board.

1. Prepare the printer for maintenance (page 330).
2. Remove the shuttle cover (page 343).
3. 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.).
4. If you find any foreign metal parts or objects, carefully remove them.
5. Disconnect the hammer bank logic cable (P04) and the hammer bank power cable (P05) at the shuttle.
6. Set your Ohmmeter to the 10K Ohm scale or the scale closest to 10K Ohms.
7. 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.
8. Attach the common meter lead (usually black) to the shuttle frame.
9. 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.)
10. Attach the common meter lead to the shuttle frame, touch the positive lead to pins 2, 4, 6, 8, and 10 of hammer bank power plug J05 located on the terminator board on the shuttle. (Pin 1 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:

    1) If the resistance of any pin is less than 1000 Ohms, replace the shuttle frame assembly (page 380).

    2) 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.
11. Install the shuttle cover assembly (page 343).
12. Return the printer to normal operation (page 331).

Hammer Bank Power Cable Shorts Test

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

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Disconnect hammer bank power cable connector P105 from J105 on the controller board. (See Figure 42, page 424, 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 pins 2, 4, 6, 8, and 10 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 42, page 424, item 10.)
9. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
10. Return the printer to normal operation (page 331).

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 plastic shielding of the cable, exposing the copper wire inside. A short occurs when the exposed wire 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
- Operator Panel Assembly Intermediate Cable
- Power Stacker Logic and Power (Intermediate) Cables

The Procedure:

1. Prepare the printer for maintenance (page 330).
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 ground point on the printer (e.g., a bolt head on the shuttle casting).
6. Touch the positive meter lead (usually red) to another 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 - 3 seconds so that your meter will have 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 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 no shorts are detected for any of the remaining pairs, 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 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Disconnect cable connectors P106 and P107 from the controller board.
4. Refer to the Main Wire Harness Test Tables as you do the following substeps:
   a. Measure the resistance of the device(s) specified in the procedure you are working. (See page 284.)
   b. If you have an extra 60-pin coax/twinax expansion connector (P/N 24H8535) 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.
   c. To test motors, wait until the motor has cooled to room temperature, then use the table to test for winding continuity and for no shorts between windings and the motor frame. Rotate the motor by hand and test for shorts. If you find any shorts in a motor, replace it.
   d. Replace any defective devices.
5. Shuttle Motor test:
   a. Remove the shuttle cover assembly (page 343).
   b. Wait until the shuttle motor has cooled to room temperature.
   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 270):

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
- Operator Panel Assembly Intermediate Cable
- Power Stacker Logic and Power (Intermediate) Cables

Power Supply Operational Check

This procedure shows you how to use power supply tester 10R4059, 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).

ATTENTION **The power supply 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 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).

ATTENTION **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 12.)
5. Plug power supply connector P101 into the 12-pin connector on the power supply tester Load Block, as shown in Figure 12. 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.)

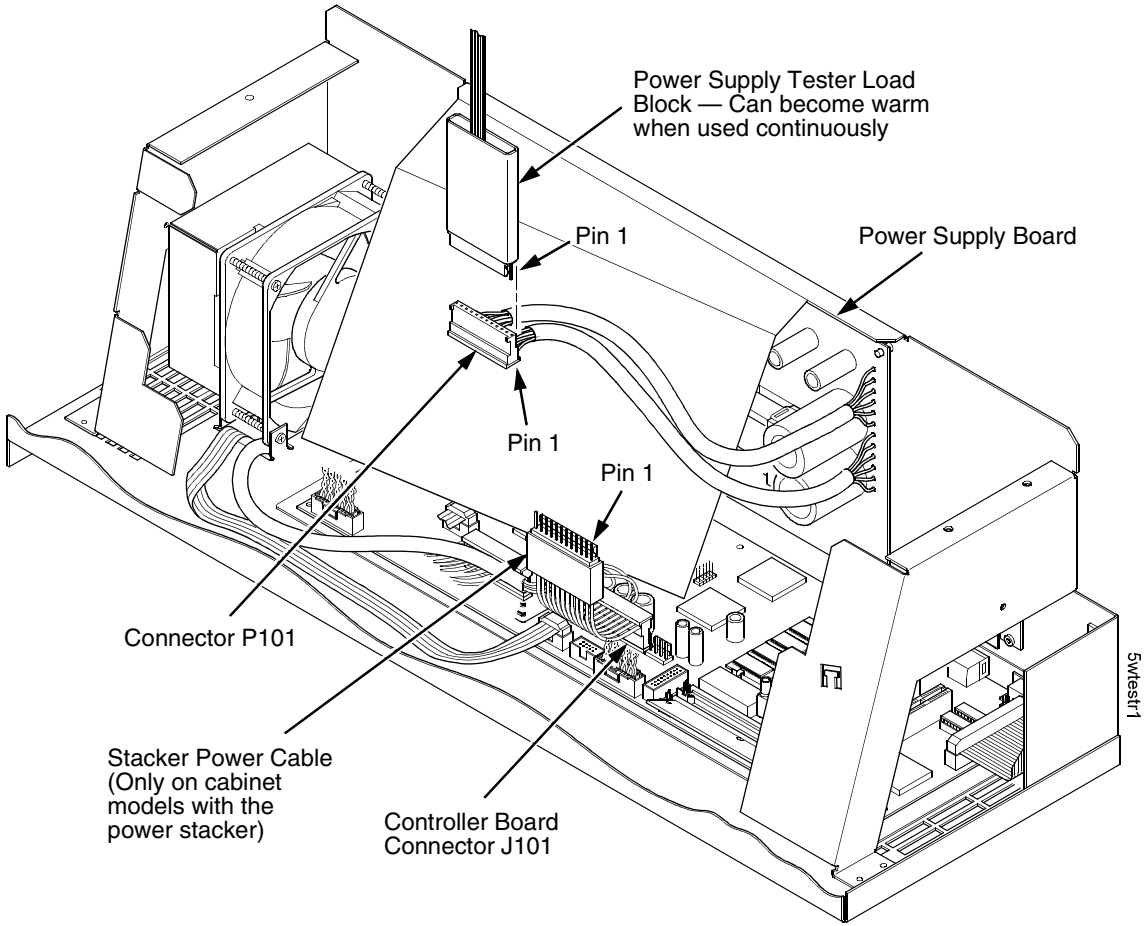


Figure 12. Connecting the Power Supply Tester

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 13.)
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 13.)
11. Measure the voltage at the NTEMPHI test point; it should be greater than 2.4 volts. (Figure 13.)
12. Measure the voltage at the +48 V test point; it should be less than 0.2 volts. (Figure 13.)
13. Measure the voltage at the +8.5 V test point; it should be less than 0.2 volts. (Figure 13.)
14. Press and HOLD IN the Push Button on the Monitor Block. (Figure 13.)
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.

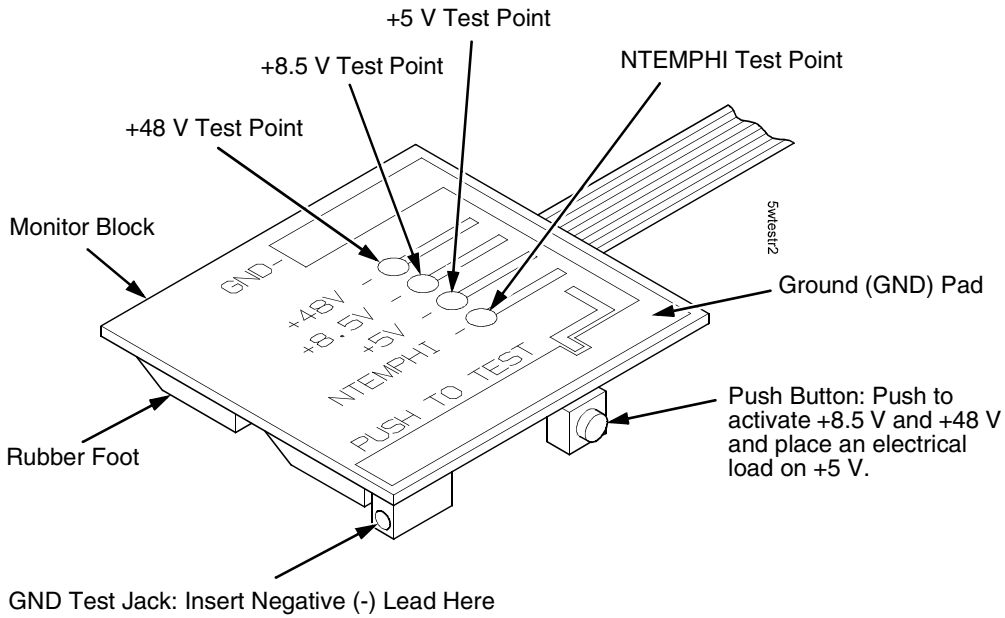


Figure 13. Testing the Power Supply

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 12.)
24. Connect power supply cable connector P101 to either the power stacker power cable or connector J101 on the controller board. (Figure 12.)
25. Cabinet Model: Remove the paper guide assembly (page 366).
    Pedestal Model: Remove the top cover assembly (page 344).
26. Return the printer to normal operation (page 331).

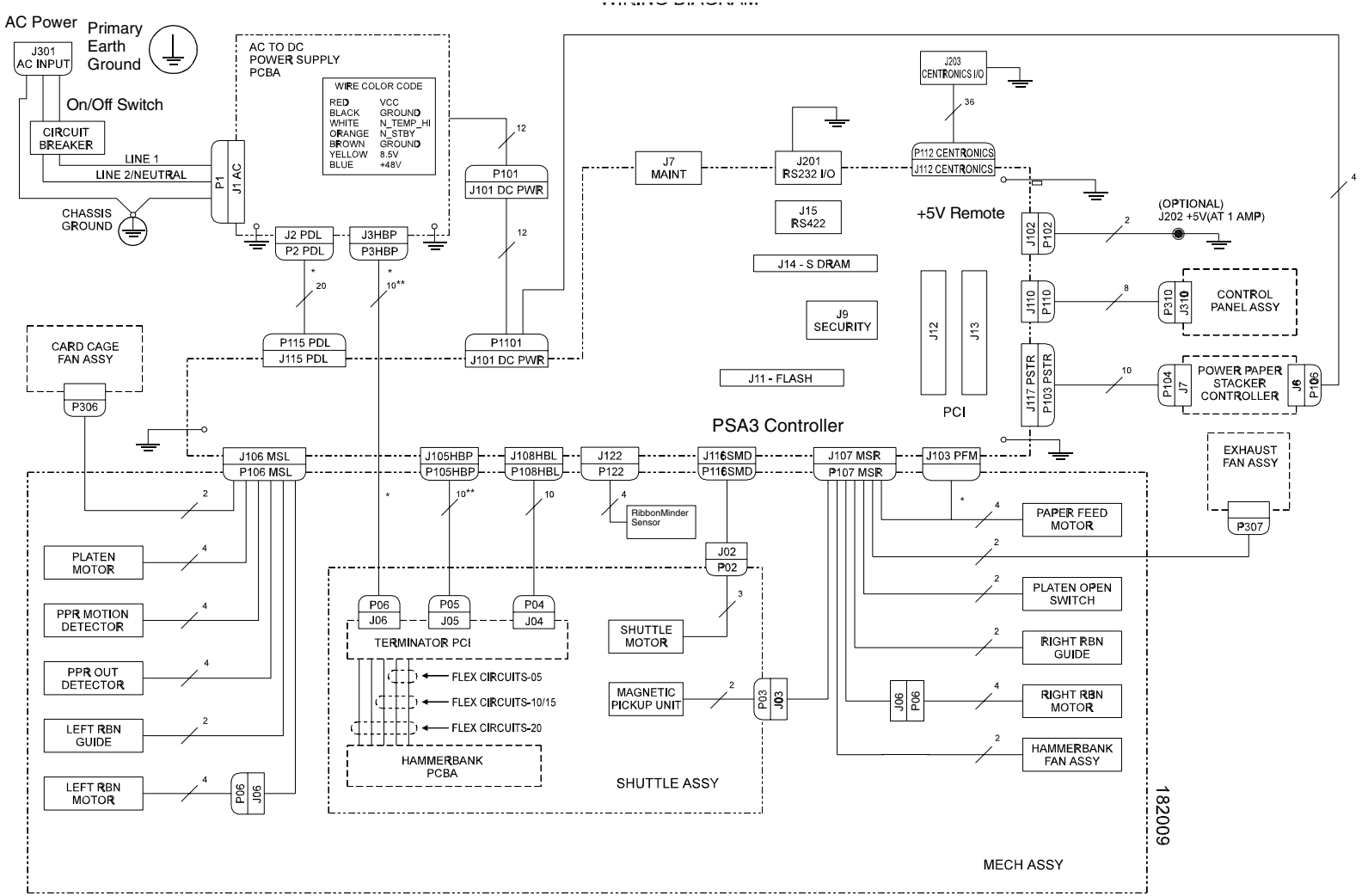
3 *Locations*

Locations Of Components And Assemblies

4 *Circuit Diagrams, Circuit Boards, Cables, and Switches*

Contents

Interconnection Diagram



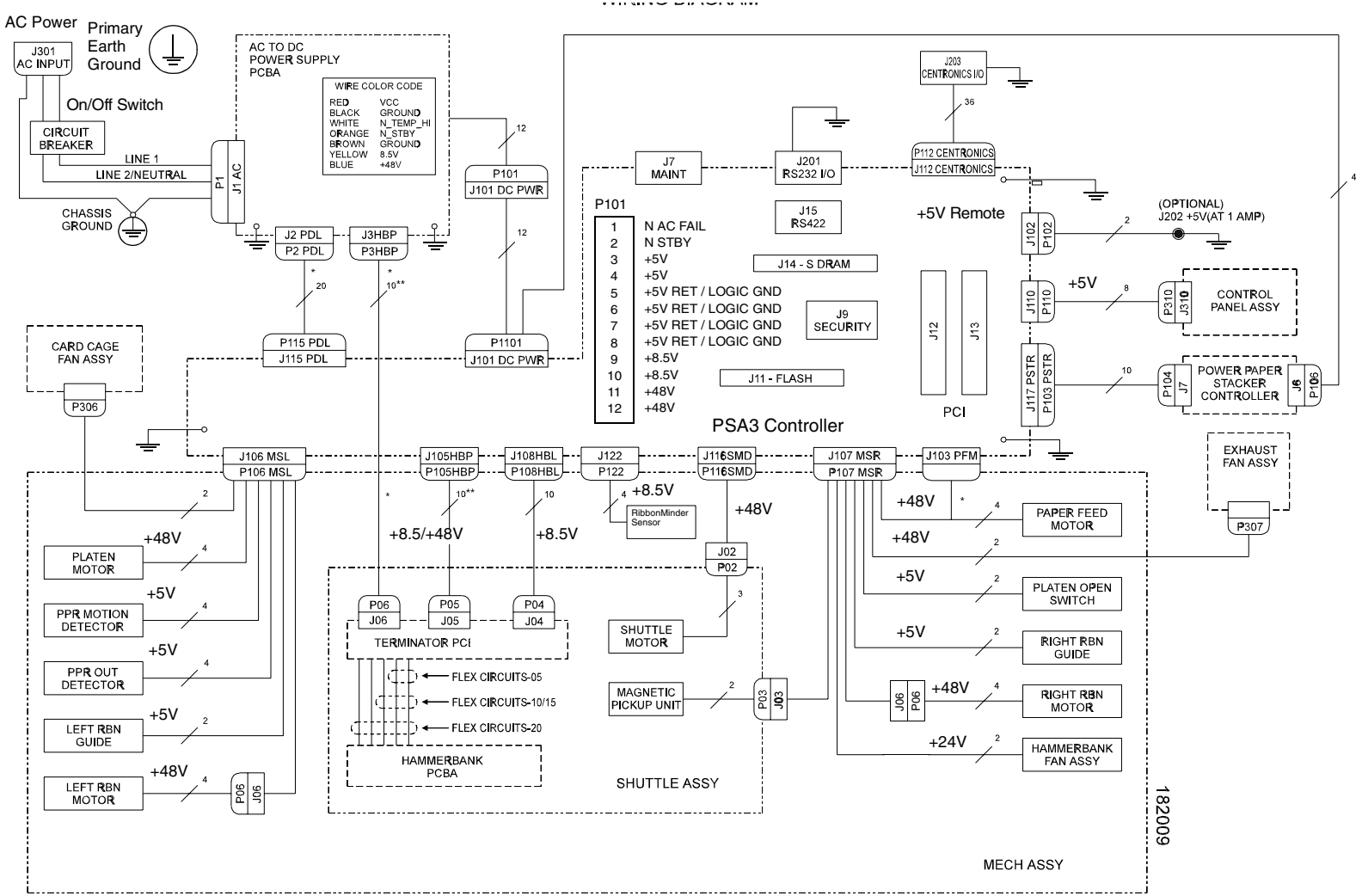
ABBR: MSL = MOTOR AND SENSOR,LEFT
MSR = MOTOR AND SENSOR,RIGHT
HBP = HAMMERBANK POWER PHASE DRIVER
PDL = PHASE DRIVER LOGIC
SMD = SHUTTLE MOTOR DRIVE
HBL = HAMMERBANK LOGIC,SIGNALS AND POWER
MAINT = MAINTENANCE JACK,RS232 (OPTIONAL)
PCBA = PRINTED CIRCUIT BOARD ASSEMBLY
PPR = PAPER
RBN = RIBBON

N = NUMBER OF CONDUCTORS IN CABLE

* = USED IN 20 ONLY

** = TWO WIRES PER SIGNAL - 20 WIRES TOTAL

Power Distribution Diagram



ABBR: MSL = MOTOR AND SENSOR,LEFT
MSR = MOTOR AND SENSOR,RIGHT
HBP = HAMMERBANK POWER PHASE DRIVER
PDL = PHASE DRIVER LOGIC
SMD = SHUTTLE MOTOR DRIVE
HBL = HAMMERBANK LOGIC,SIGNALS AND POWER
MAINT = MAINTENANCE JACK,RS232 (OPTIONAL)
PCBA = PRINTED CIRCUIT BOARD ASSEMBLY
PPR = PAPER
RBN = RIBBON

LEGEND:

N = NUMBER OF CONDUCTORS IN CABLE

* = USED IN 20 ONLY

** = TWO WIRES PER SIGNAL - 20 WIRES TOTAL

Main Wire Harness Test Tables, PSA3 Controller Board

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

Connectors are viewed from the top, as seen when plugged into the controller board.

Pin No.

P107 Connector

19 17	15 13	11 9	7 5 3 1
MPU	PLO	EHF*	PAPR M
CVO	RRP	HBF	RRIB M
20 18	16 14	12 10	8 6 4 2

Resistance

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 KΩ
PMD	14, 16 18, 20	8 Meg Ω Open
POD	13, 15 17, 19	8 Meg Ω Open

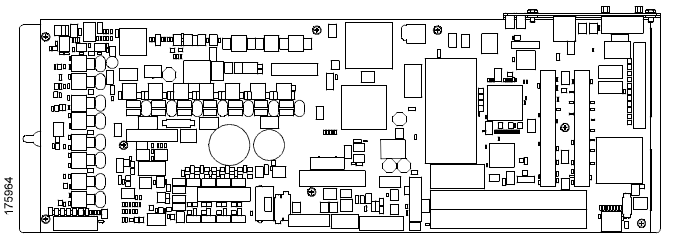
CCF = Card Cage Fan
LRIB M = Left Ribbon Motor
LRP = Left Ribbon Guide
PLAT M = Platen Open Motor
PMD = Paper Motion Detector (Switch)
POD = Paper Out Detect (Switch)

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 KΩ
EHF	9, 11	4.6 KΩ
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
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



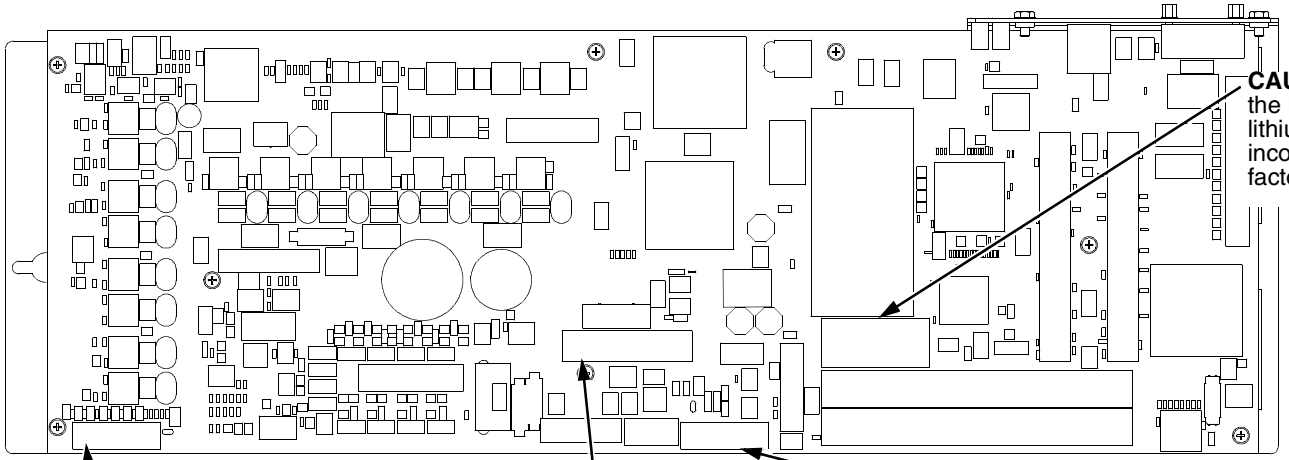
MOTOR NOTES:

All Motors: Let the motor cool to room temperature before you test it. 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 6500-v20, 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 KΩ. Fans driven by +24V measure 2 - 3 KΩ. 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.

PSA3 Controller



CAUTION: Do not try to remove or replace the NVRAM. The NVRAM contains a lithium battery that can explode if replaced incorrectly. NVRAM is replaced only at the factory.

Motor Sensor Left

J106

1	PLAT 1
2	RIB L1
3	PLAT 2
4	RIB L2
5	PLAT 3
6	RIB L3
7	PLAT 4
8	RIB L4
9	CC FAN +
10	L RBN POST +
11	CC FAN -
12	L RBN POST -
13	POD A
14	PMD A
15	POD K
16	PMD K
17	POD C
18	PMD C
19	POD E
20	PMD E

+48V

.01µF 10% 100V

Power Supply

J101

1	N TEMP HI
2	N STDBY
3	
4	VCC1
5	
6	
7	
8	
9	
10	
11	
12	

100 PF 10% 50V

.01µF 10% 100V

10 µF 10% 16V TANT

+8.5V

+48V

470 PF 10% 50V

470 PF 10% 50V

Motor Sensor Right

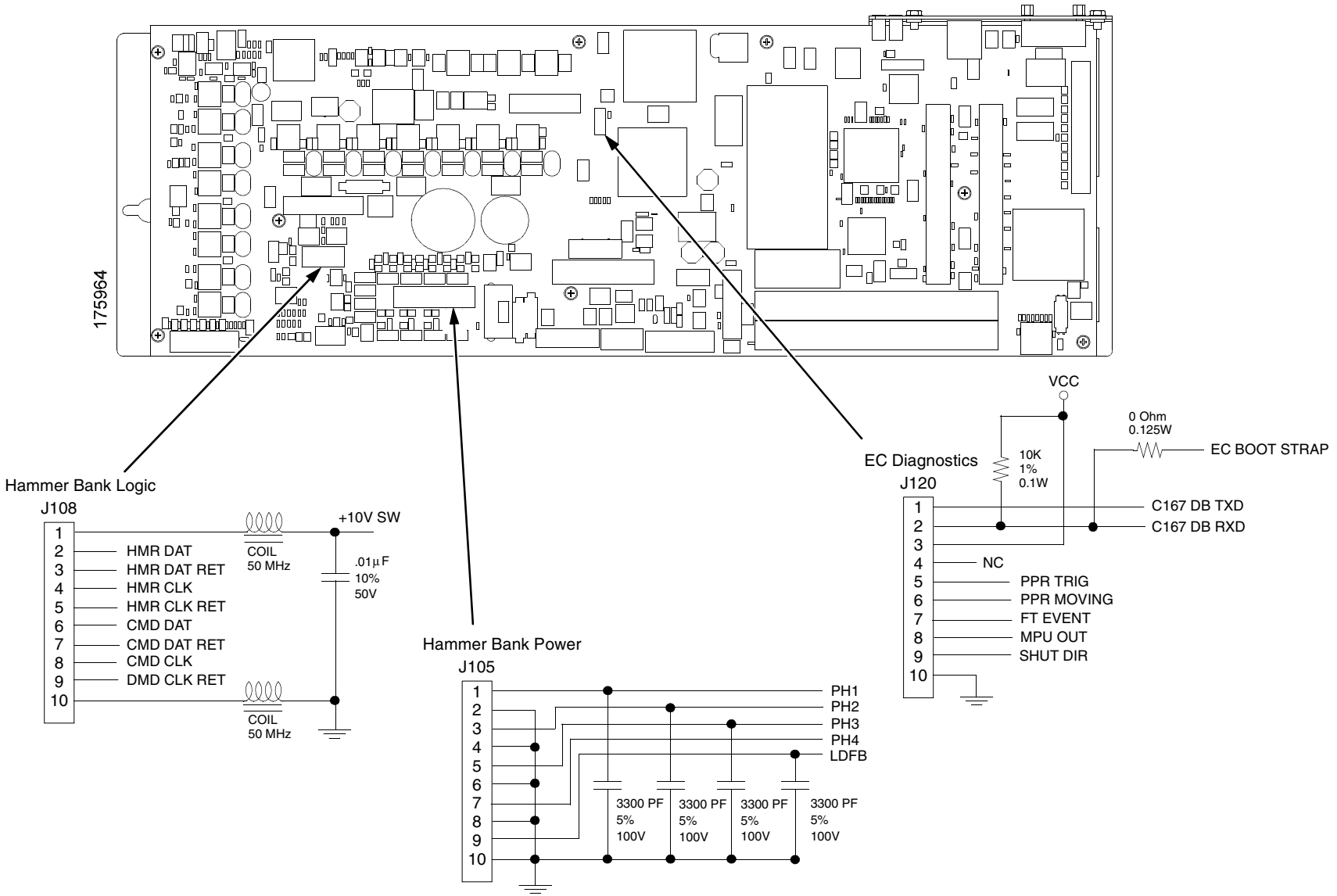
J107

1	PF 1
2	RIB R1
3	PF 2
4	RIB R2
5	PF 3
6	RIB R3
7	PF 4
8	RIB R4
9	EXH FAN +
10	
11	EXH FAN -
12	BANK FAN
13	PLAT OPEN SW
14	R RBN POST +
15	PLAT OPEN RET
16	R RBN POST -
17	MPU -
18	COVER OPEN SW
19	MPU +
20	COVER OPEN RET

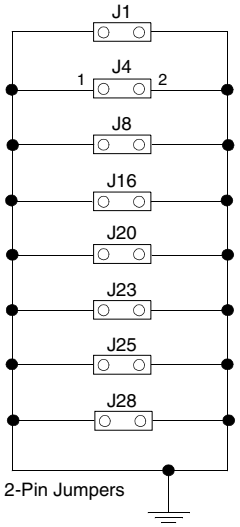
+48V

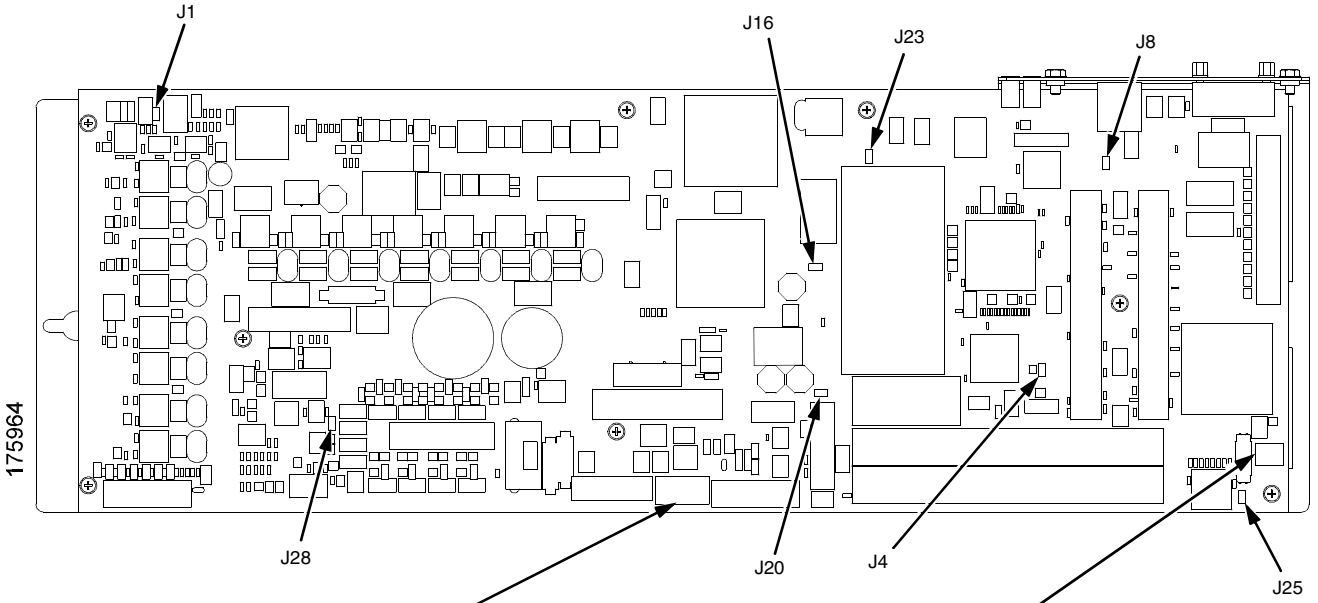
.01µF 10% 100V

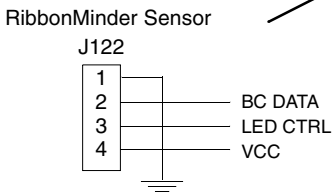
PSA3 Controller (continued)

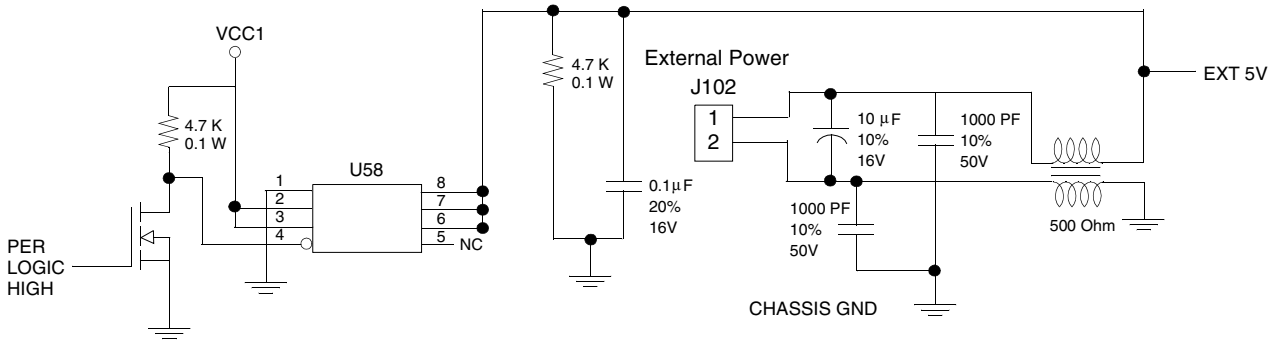


PSA3 Controller (continued)

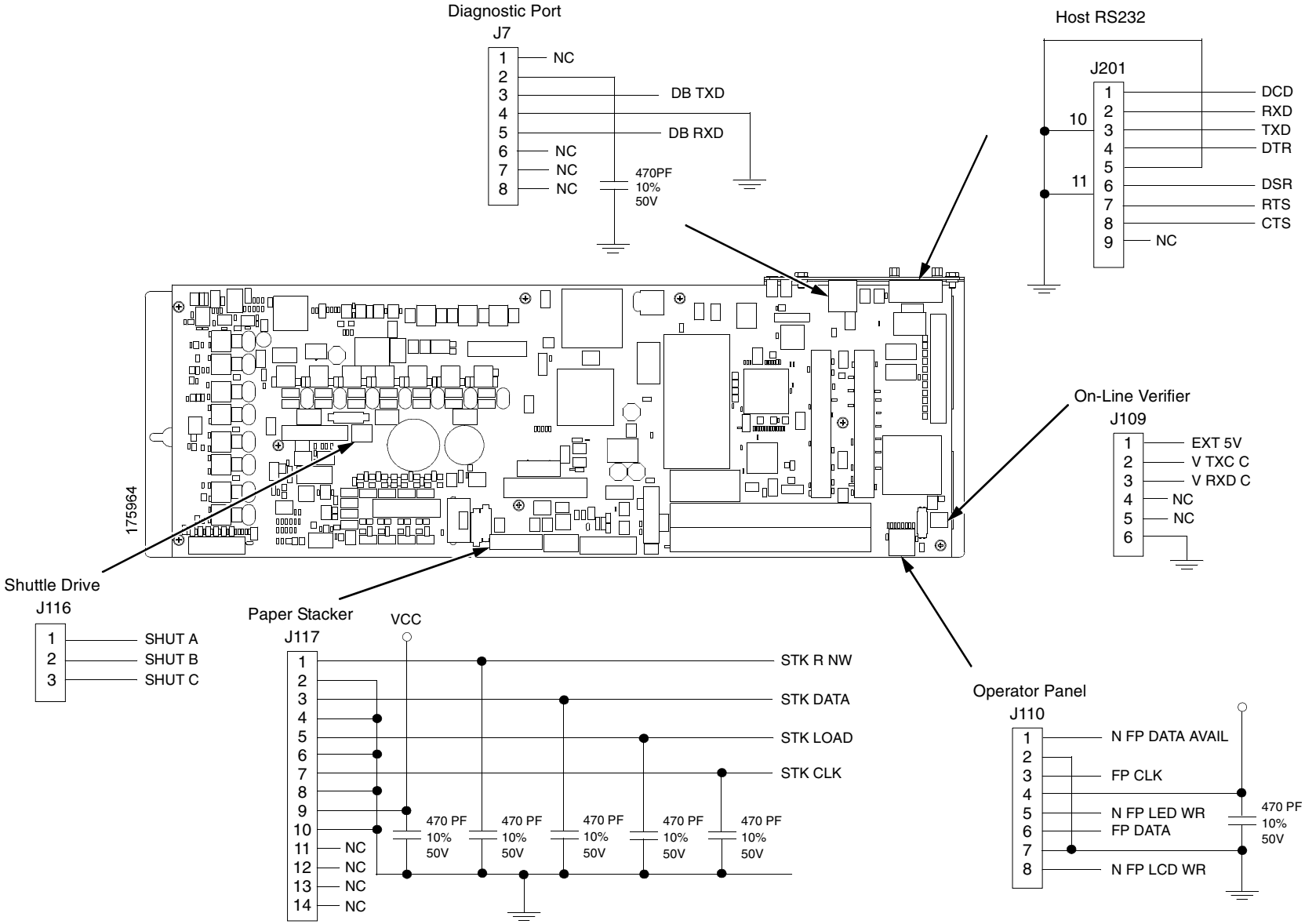




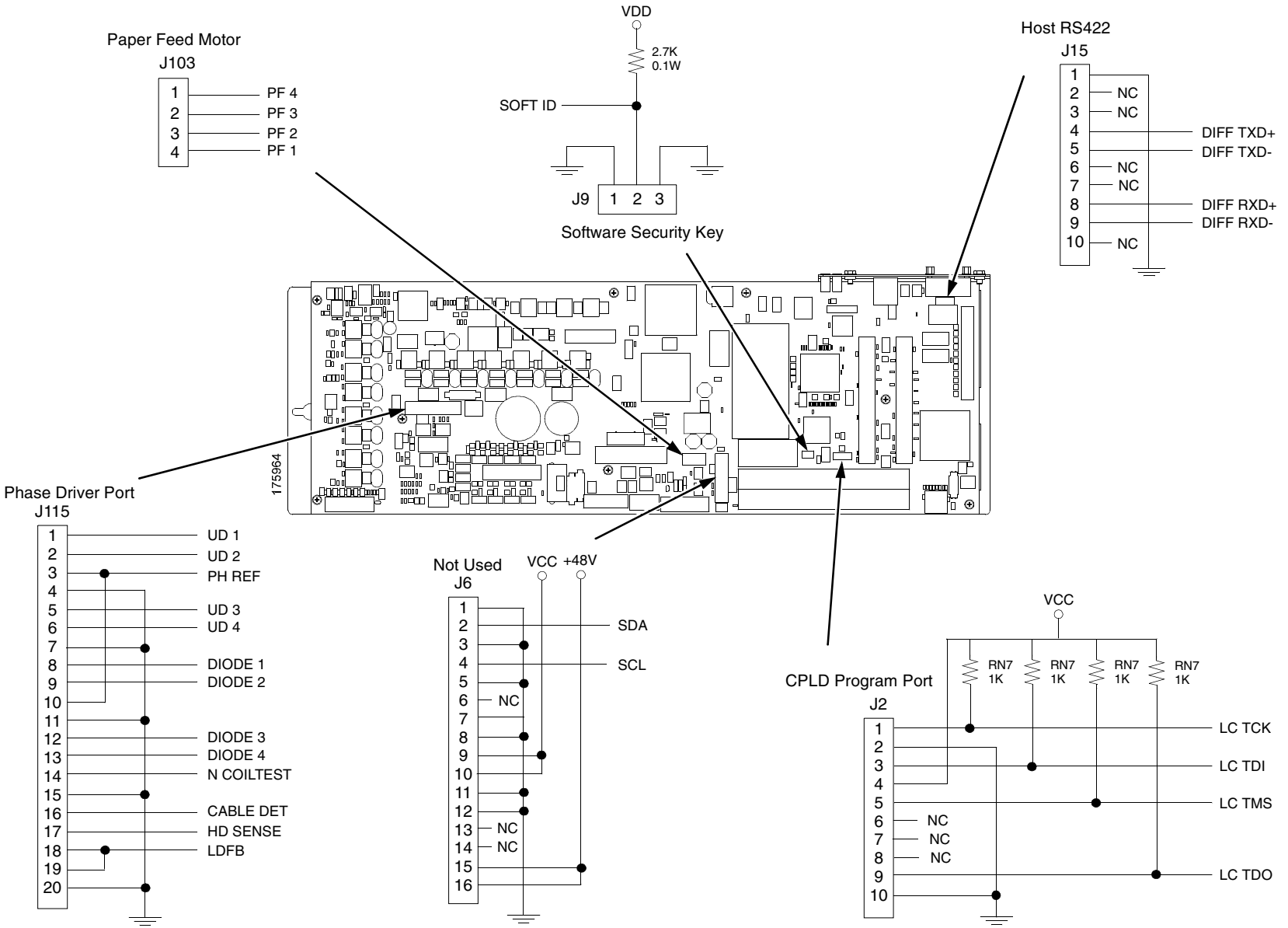




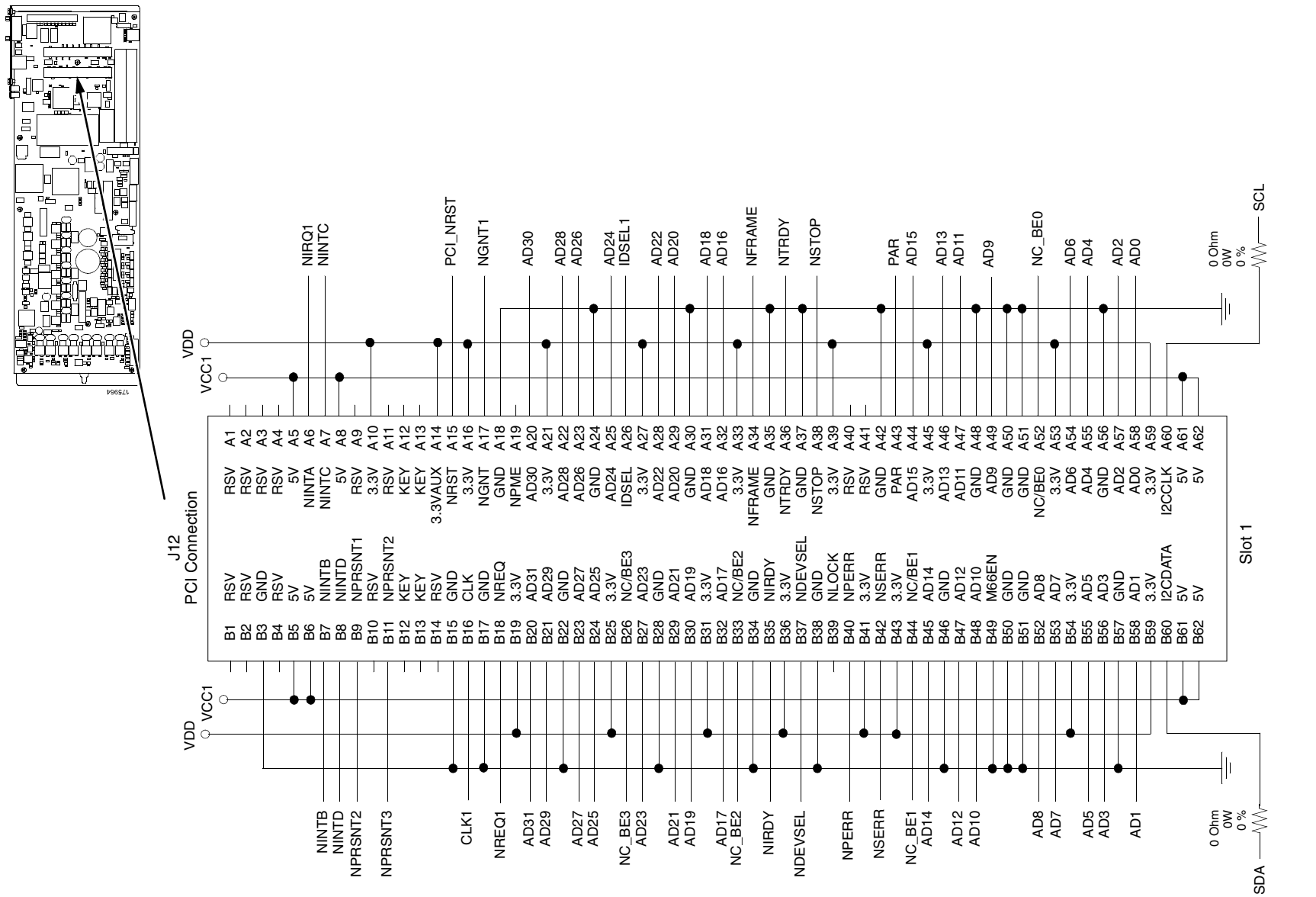
PSA3 Controller (continued)



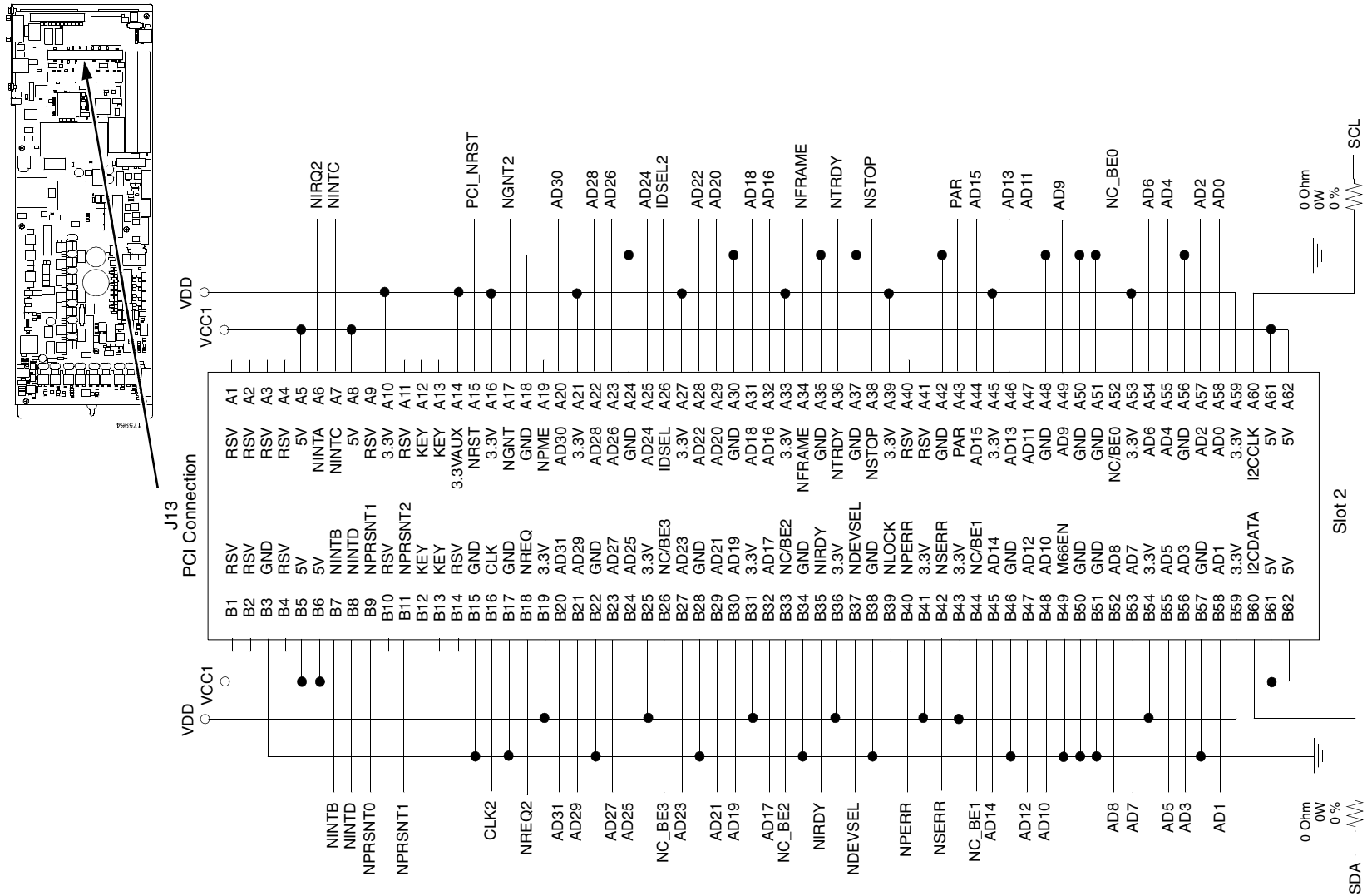
PSA3 Controller (continued)



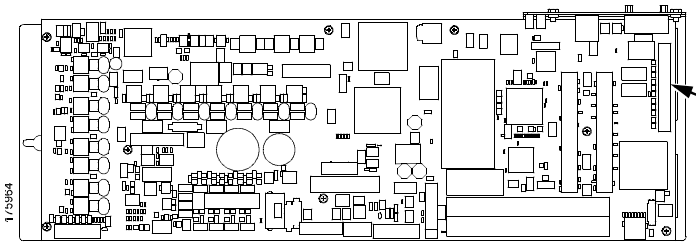
PSA3 Controller (continued)

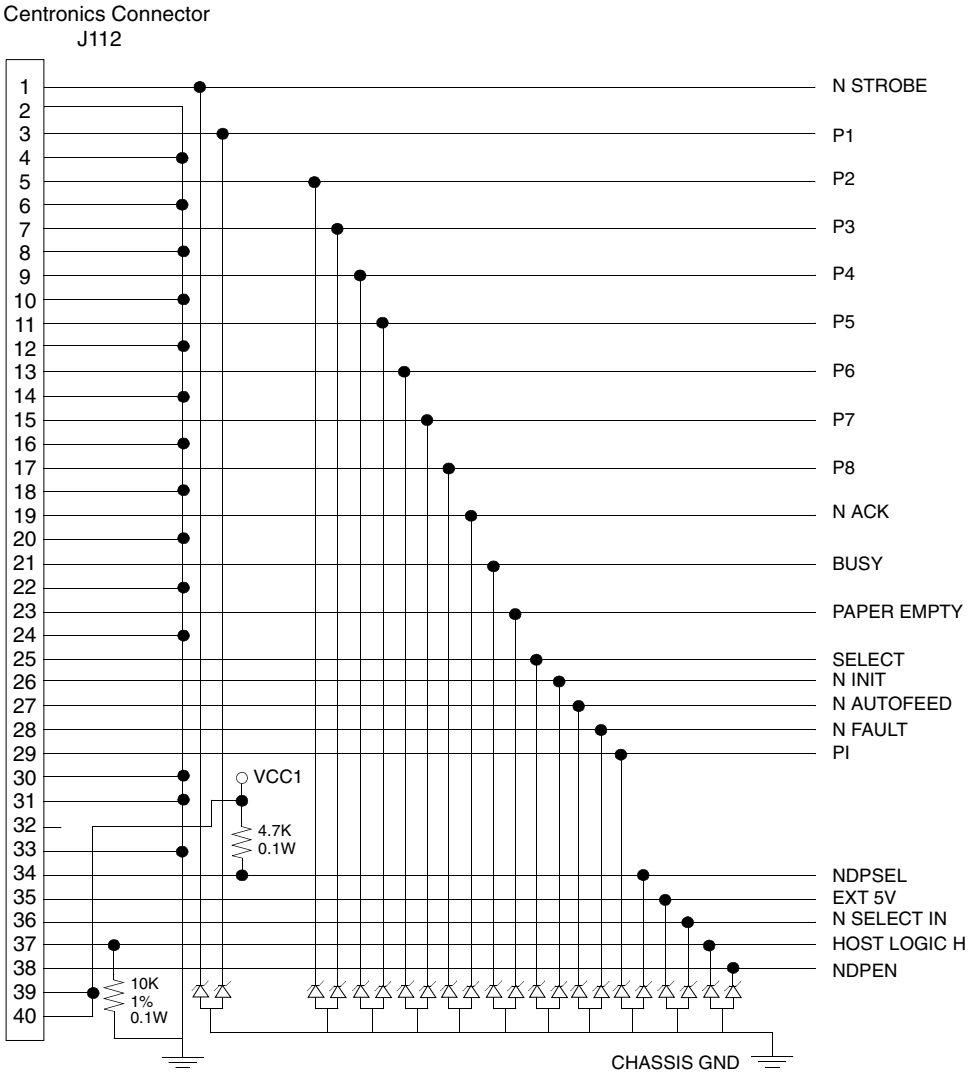


PSA3 Controller (continued)

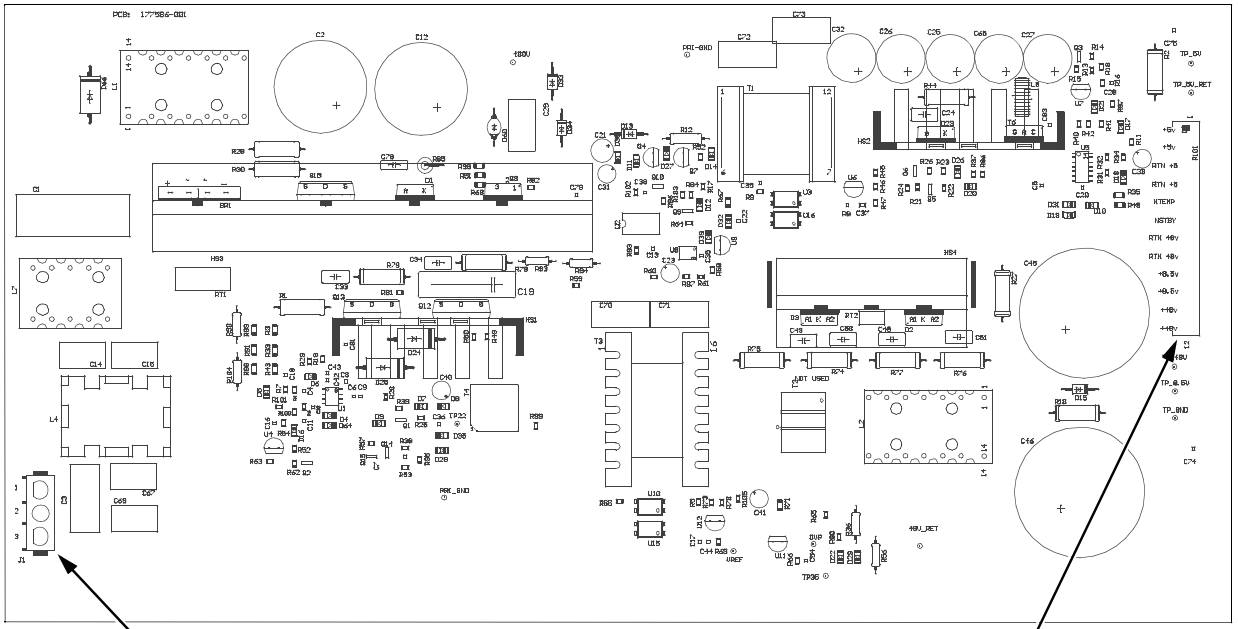


PSA3 Controller (continued)

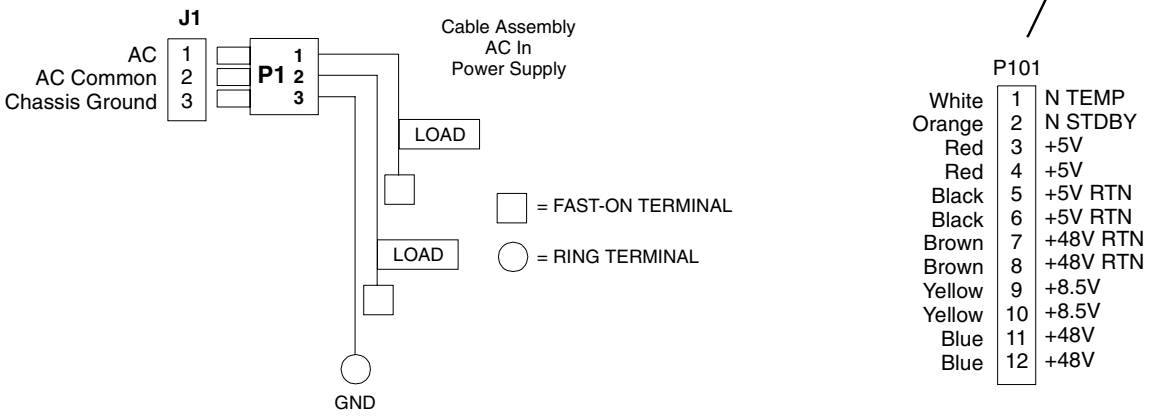




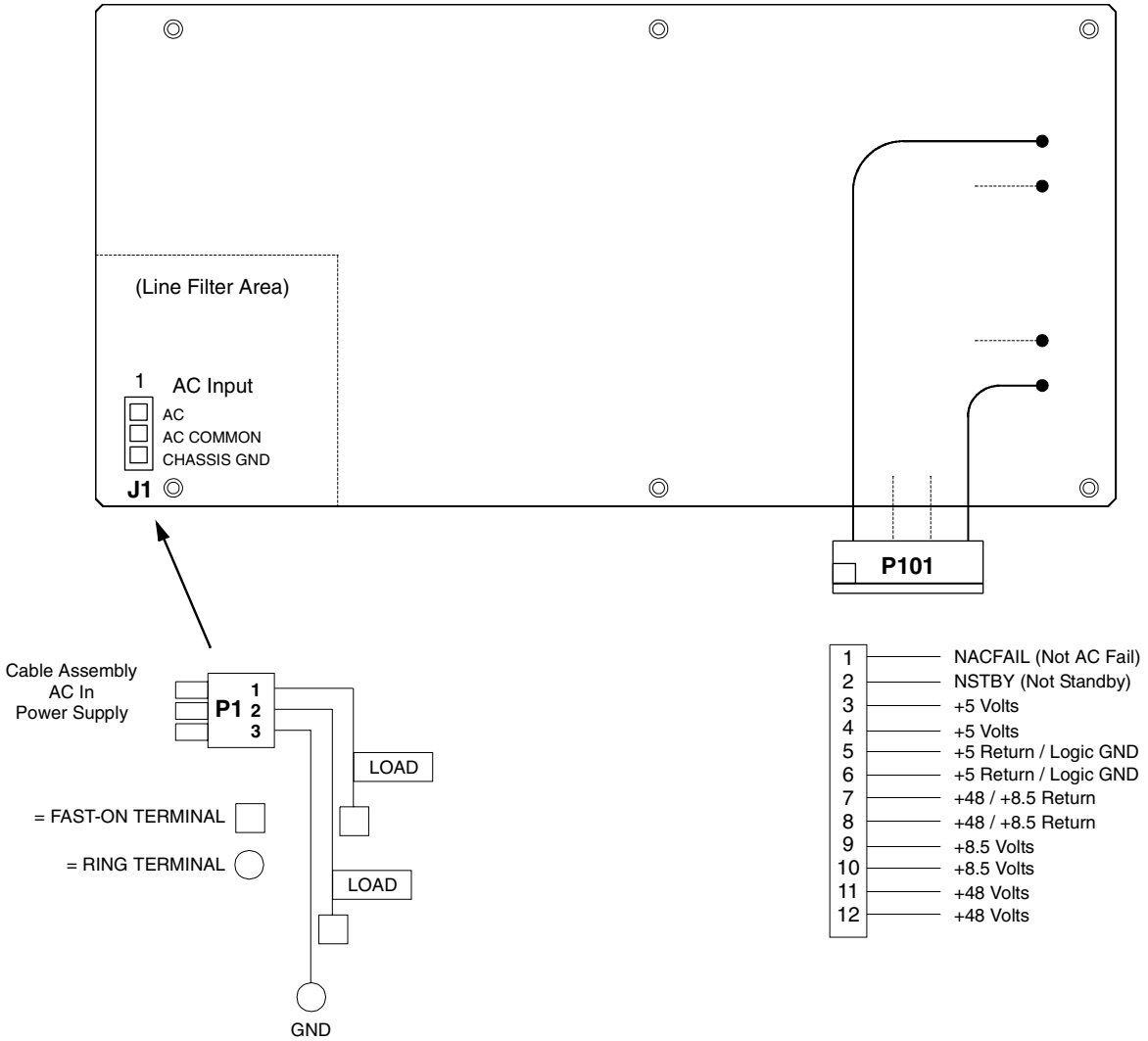
Power Supply: 6500-D3C, -D3P, -v05, -v5P, -v10, and -v1P



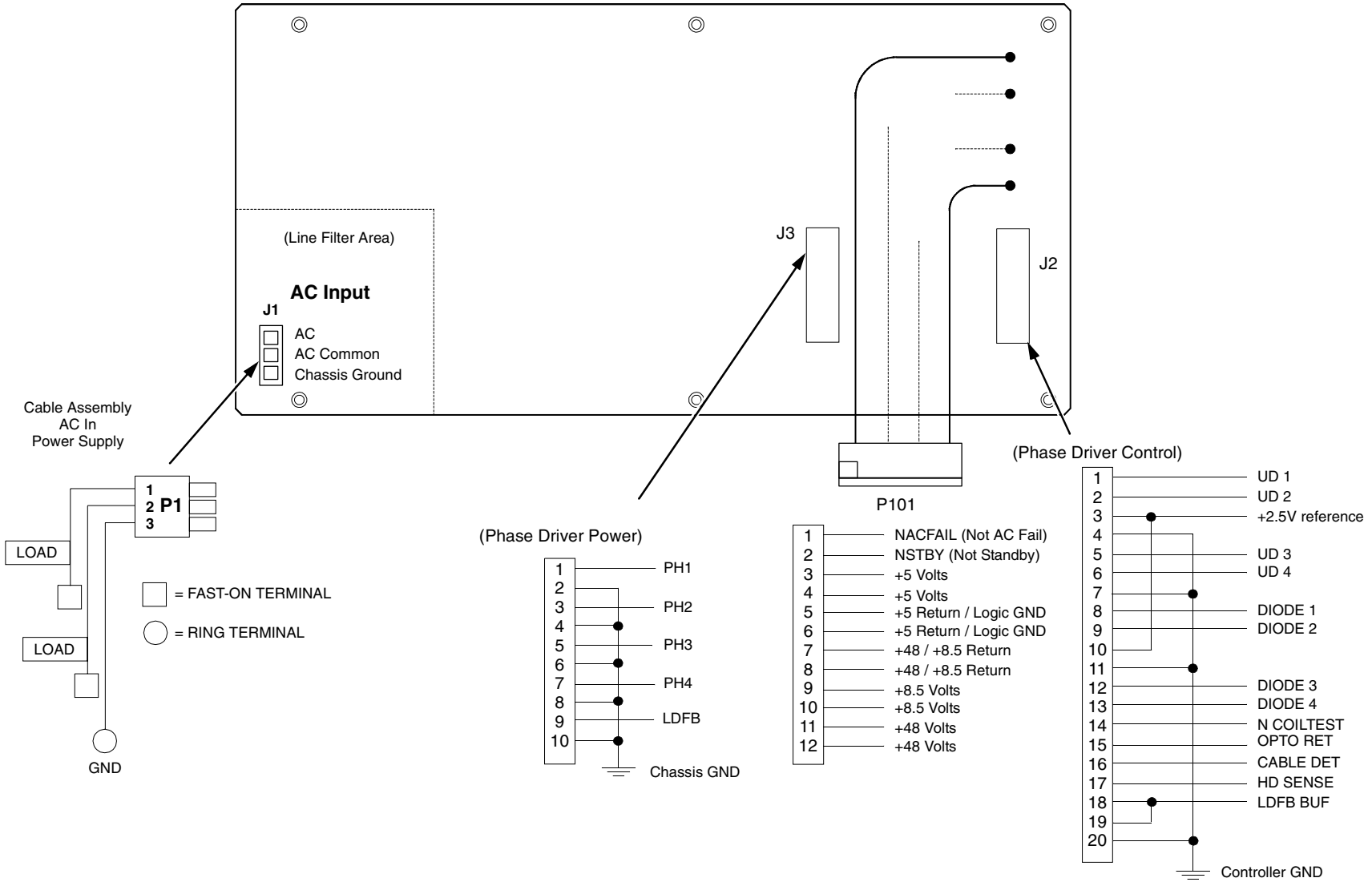
176096



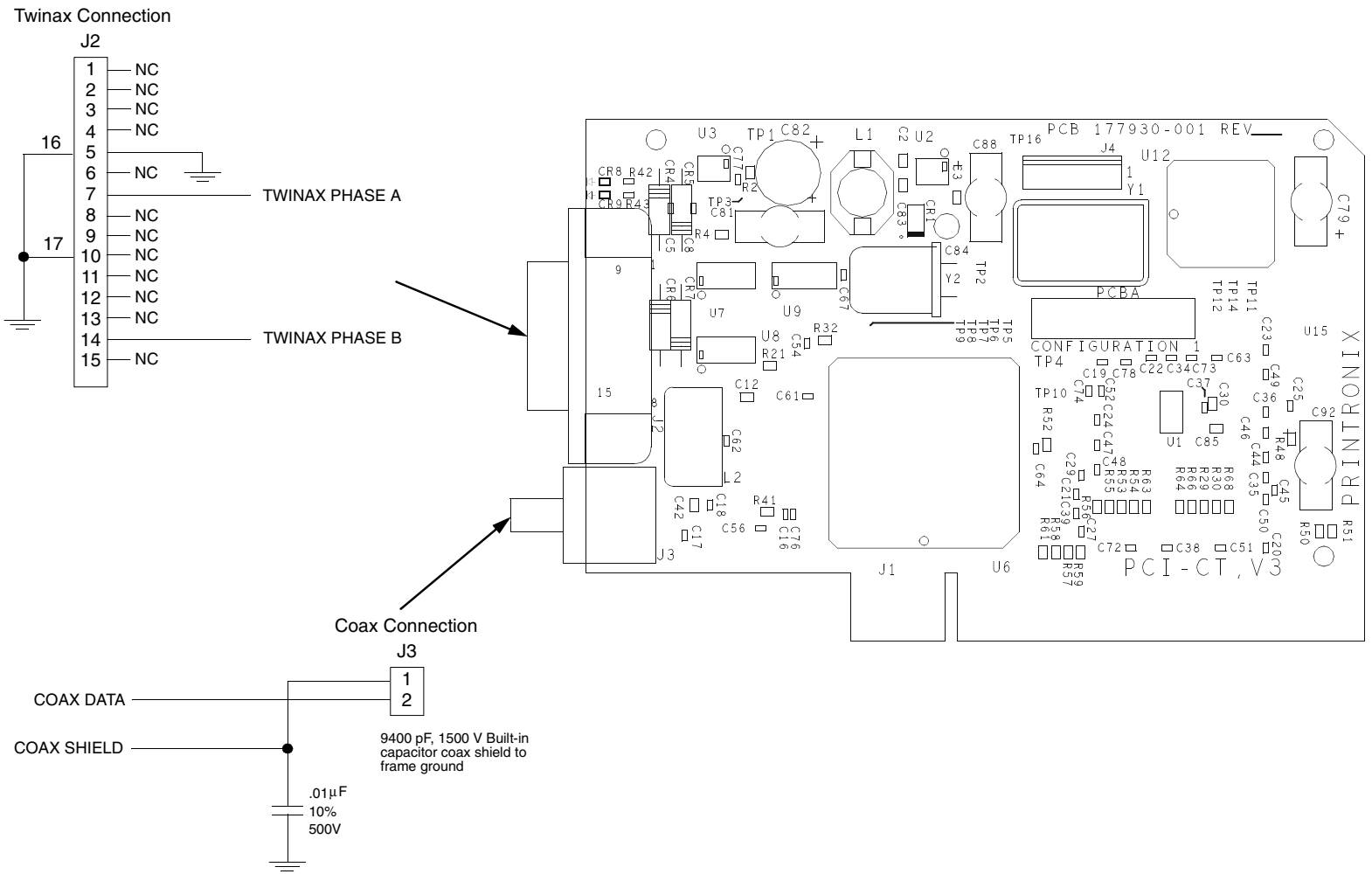
Power Supply: 6500-D6C and -v15



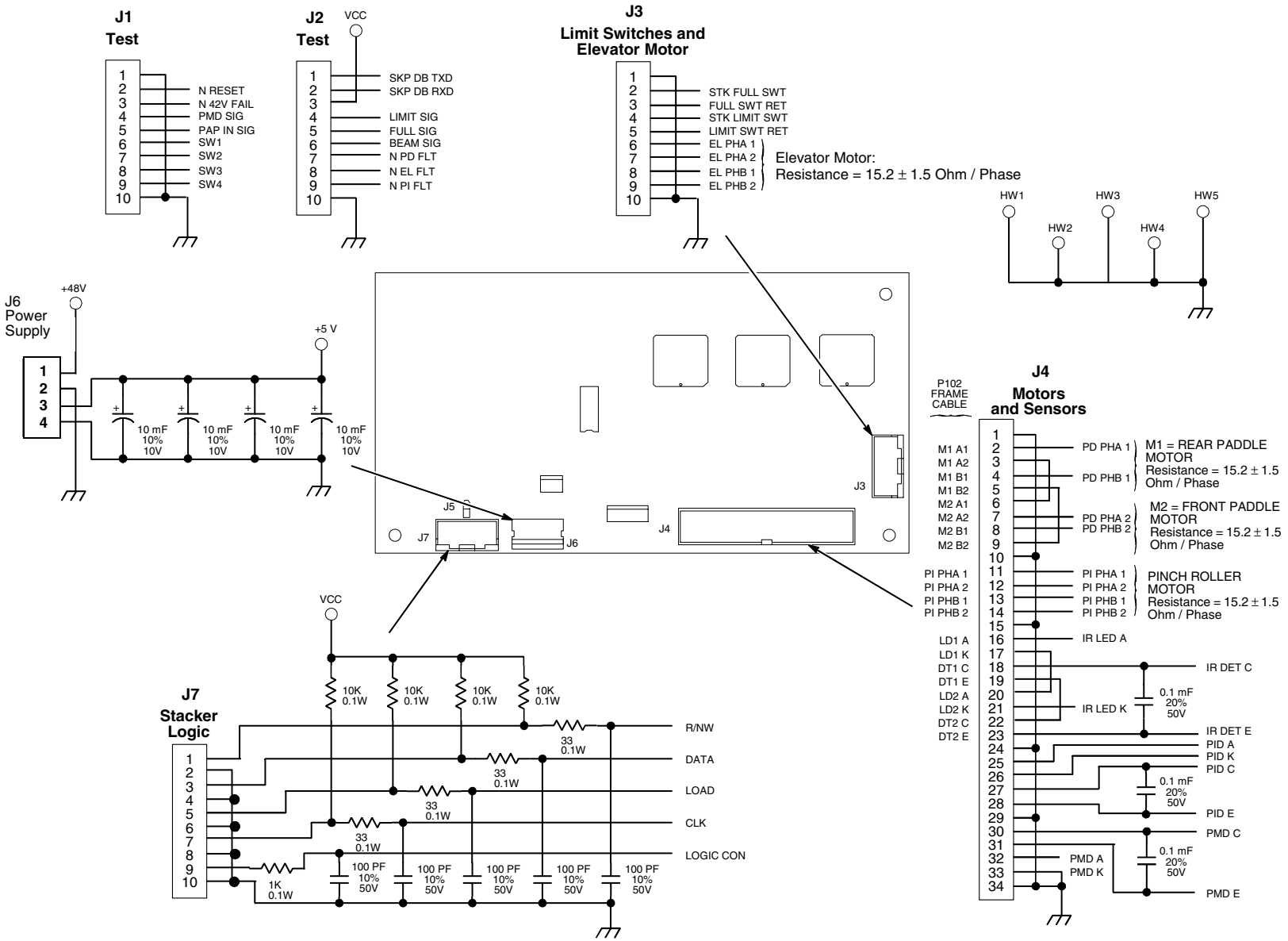
Power Supply: 6500-D8C and -v20



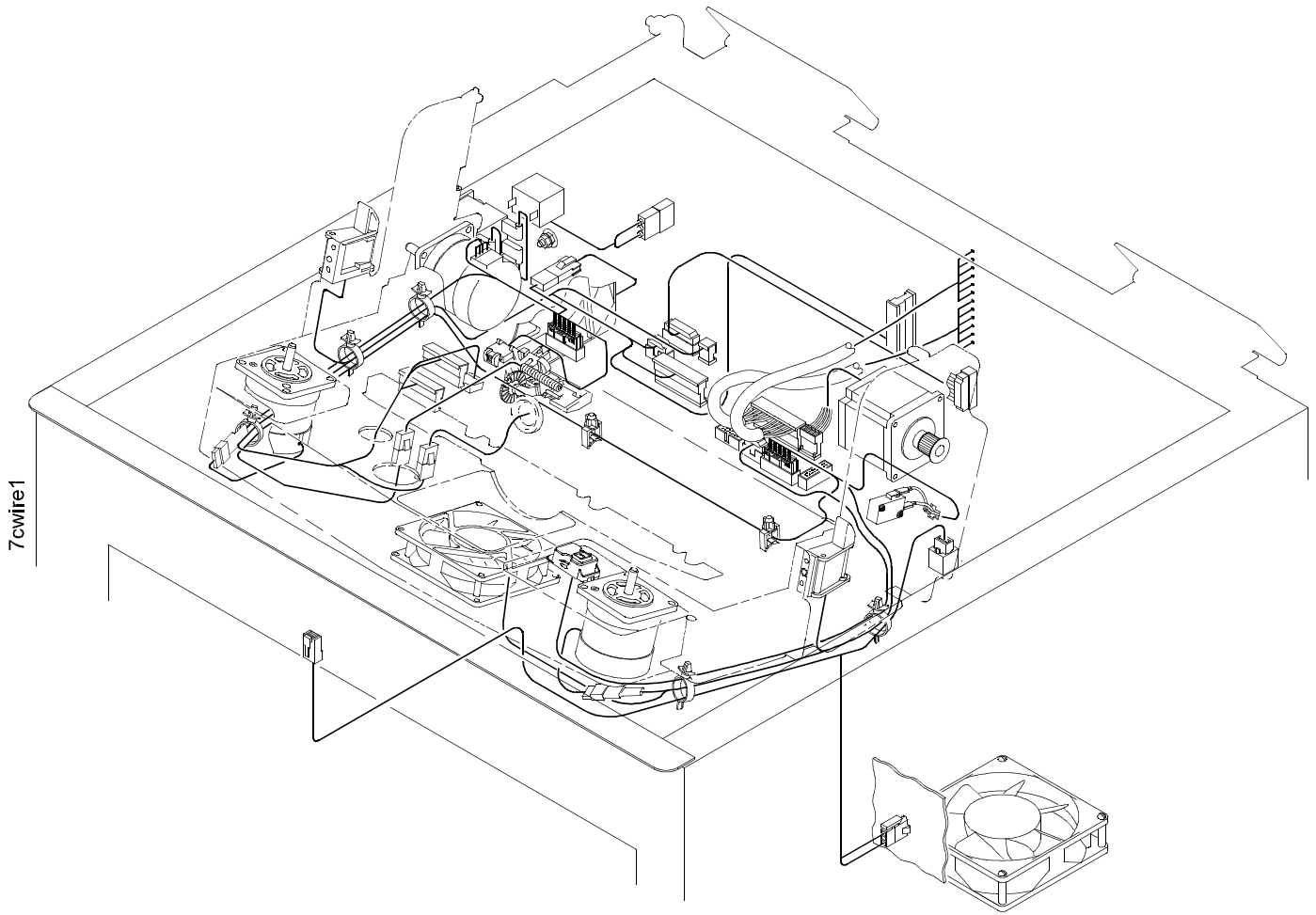
IBM Coax/Twinax Expansion Board for PSA3 Controllers



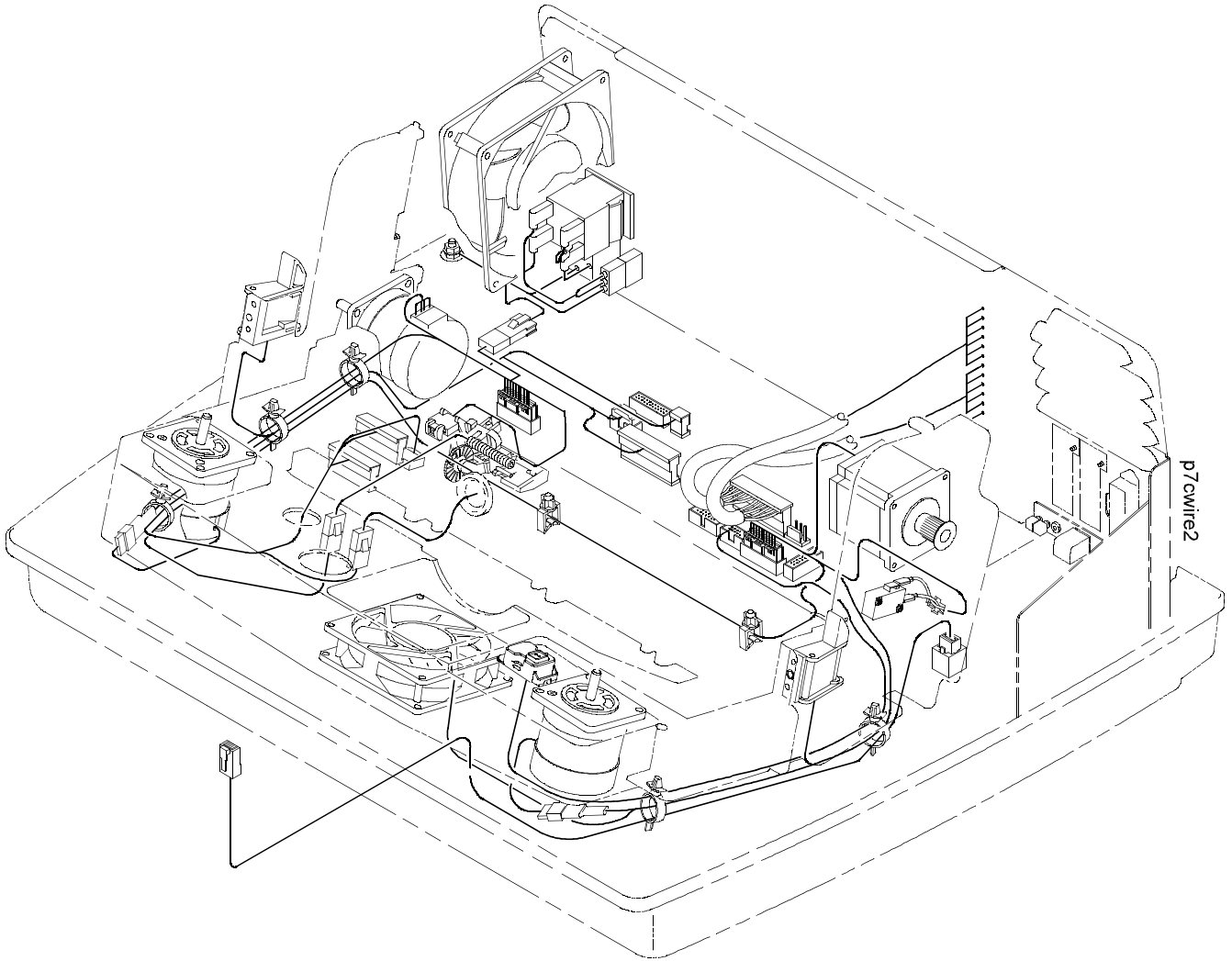
SureStak Power Stacker PCBA



Cable Routing, Cabinet Model

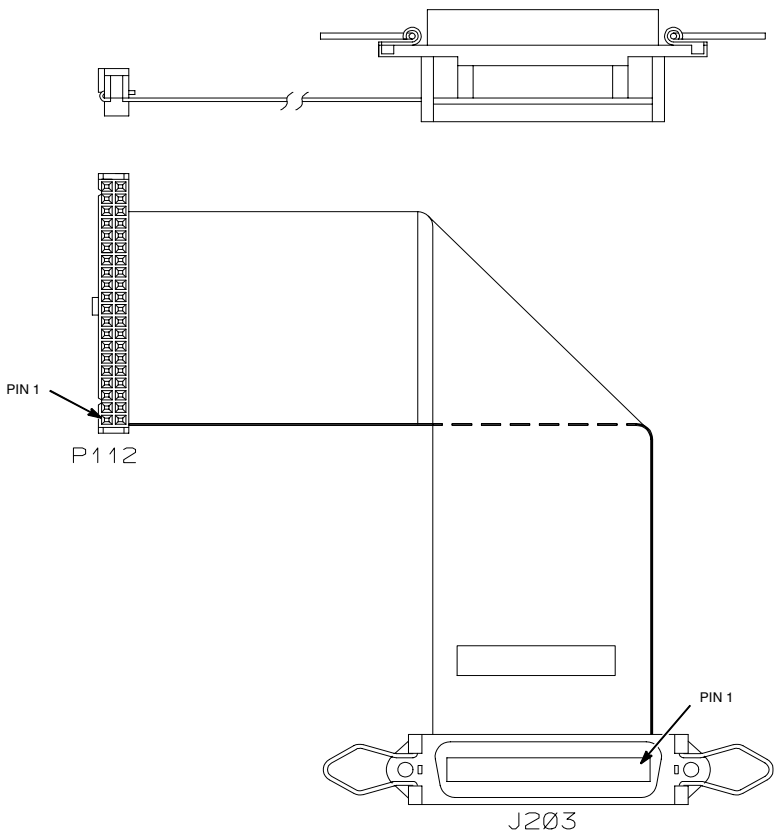


Cable Routing, Pedestal Model



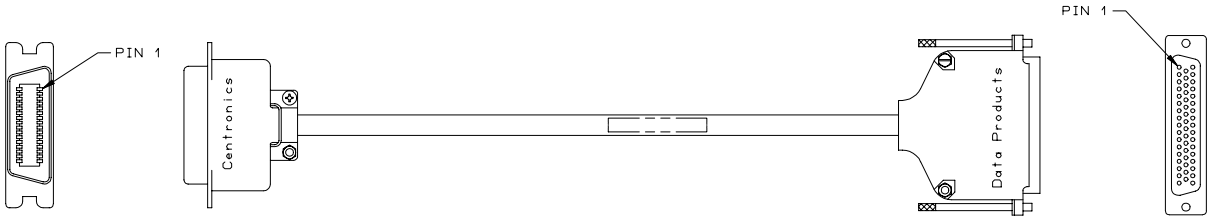
Cable Assembly, Centronics I/O

14H5287



Cable Assembly, Centronics/Dataproducts Adapter

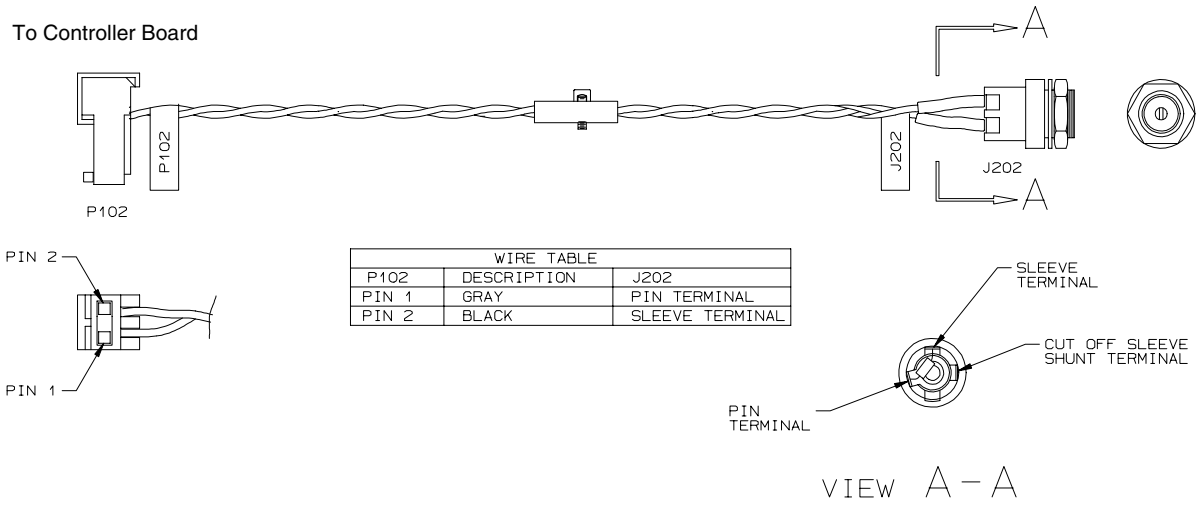
14H5522



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
	JUMPER WIRE	PIN 45
✳ GROUND		✳ PIN 46

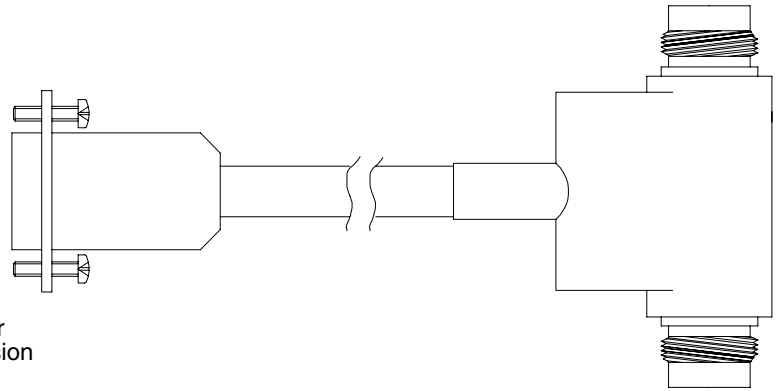
Cable Assembly, +5V Remote Power

14H5589

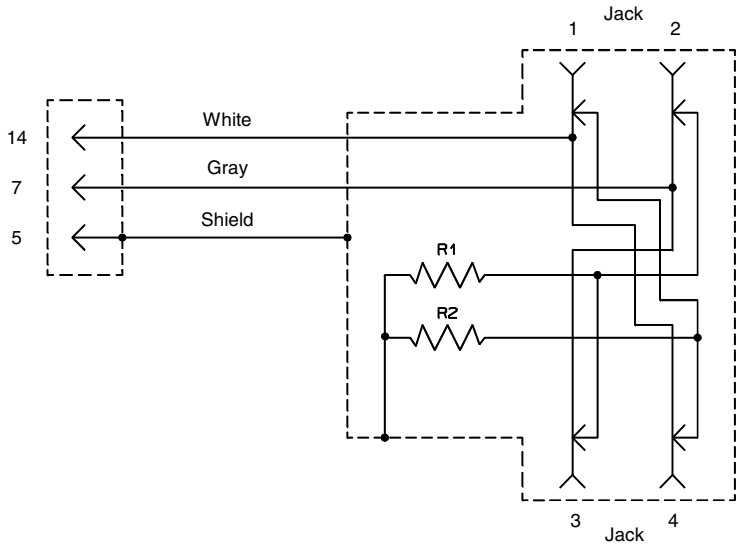


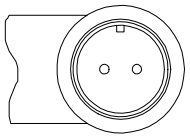
Cable Assembly, Twinax Auto-Termination

38F8254



NOTE: If the printer has a PSA3 controller and power stacker, Smart-T Cable Extension 75P2813 is also required (see the next page).





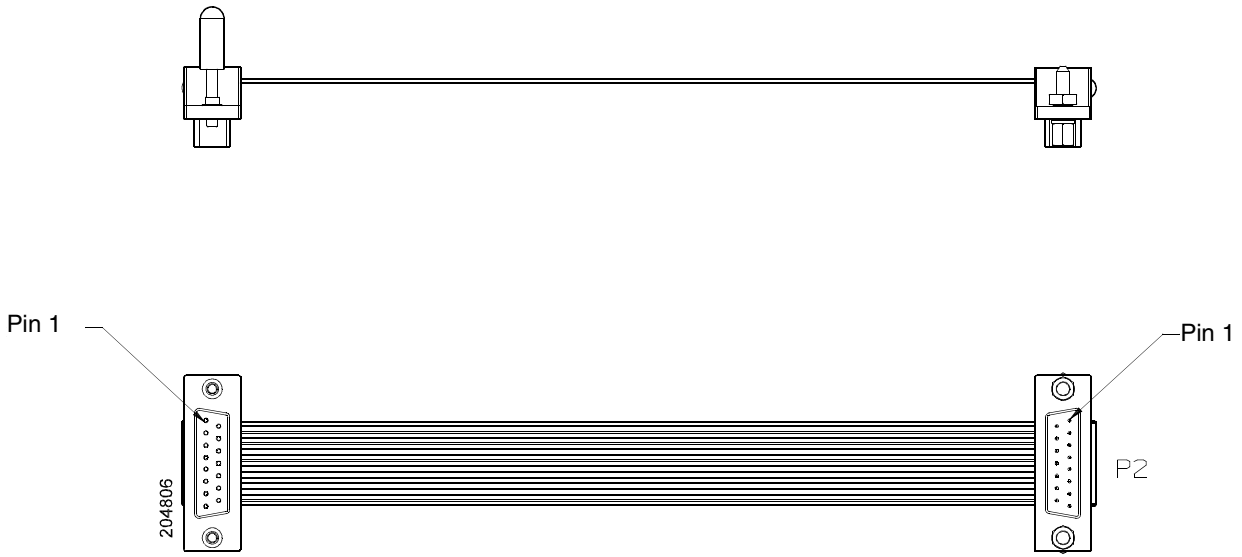
Resistance Chart

Pin	Pin	Ohms
1	2	110
3	4	110
1, 2, 3, 4	Shield	55
5	Shield	0
14	1, 4	0
7	2, 3	0

Cable Extension, Smart-T

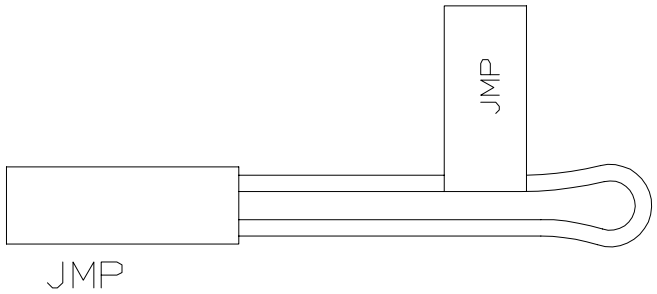
75P2813

NOTE: If the printer has a PSA3 controller and power stacker, this cable extension is also required. (See also Figure 51 on page 445.)

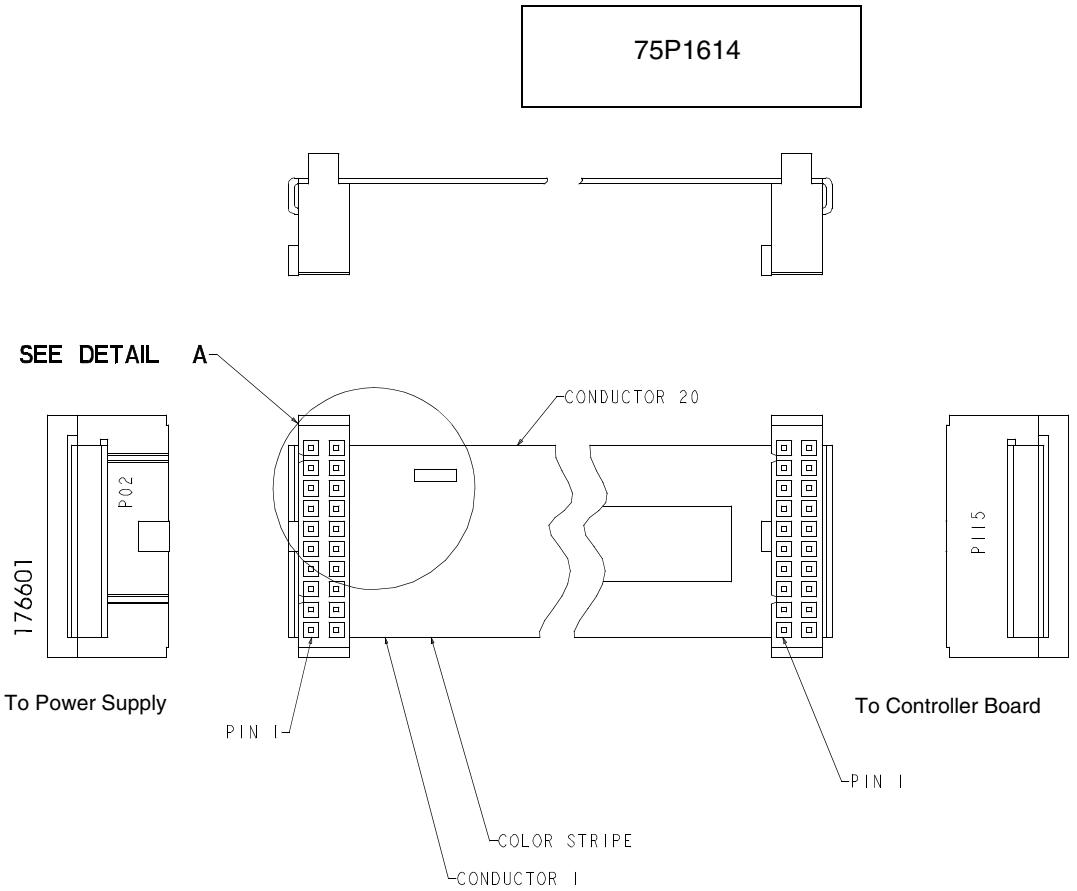


Cable Assembly, 2-Pin Jumper, 0.1 Ctr

41U1177

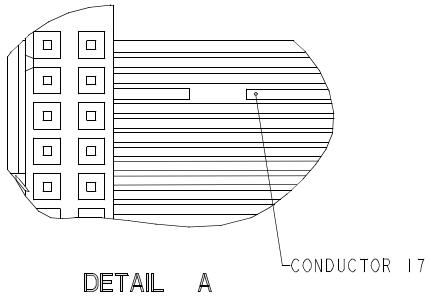


Cable Assembly, PS I/O, 2000



NOTE:

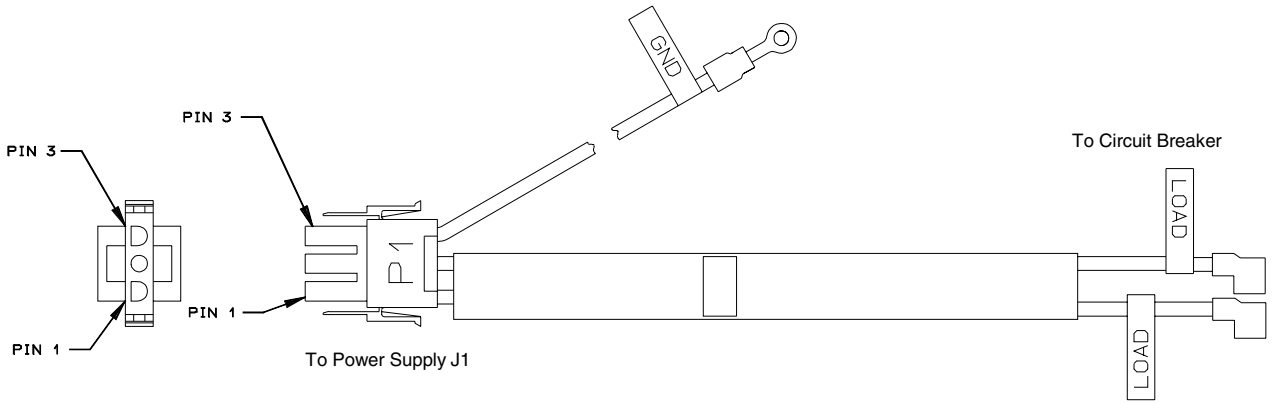
This cable is used only on the 6500-D8C and -v20.



TAB BLOCK	
DASH NO	DESCRIPTION
-001	STD
-901	SPARES

Cable Assembly, AC In, Power Supply

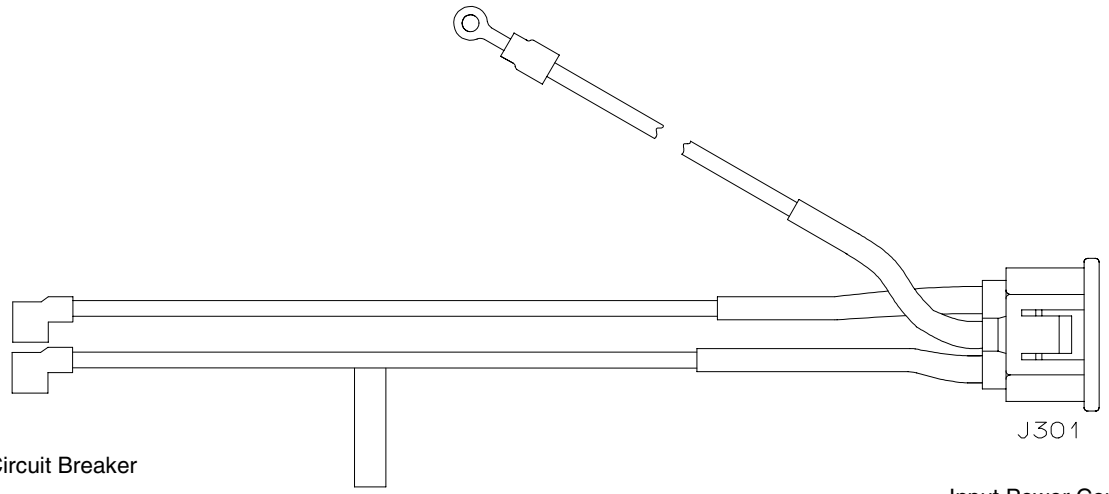
Part of AC Kit:
14H5289



PIN	WIRE COLOR
1	BLACK
2	WHITE
3	GREEN/YELLOW

Cable Assembly, AC Power Input

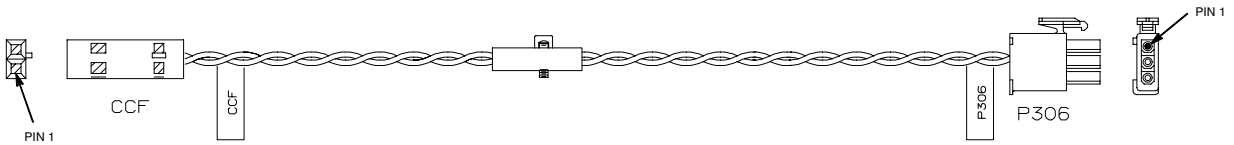
Part of AC Kit:
14H5289



PIN	WIRE COLOR
LINE	BLACK
NEUTRAL	WHITE
GROUND	GREEN/YELLOW

Cable Assembly, Card Cage Fan

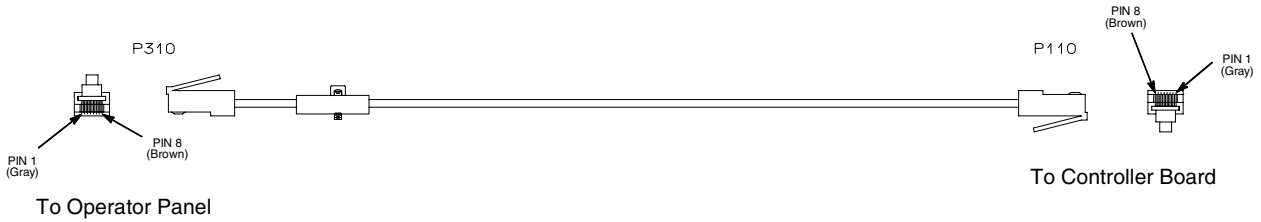
14H5285



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

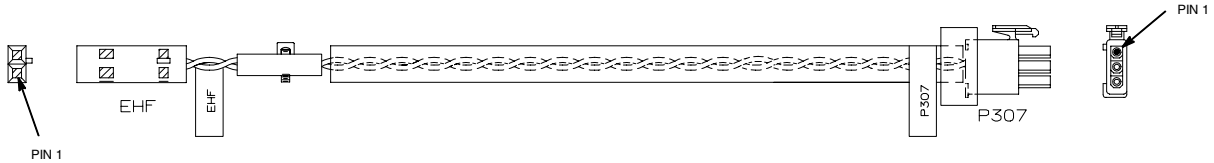
Cable Assembly, Operator Panel

14H5300



Cable Assembly, Exhaust Fan

14H5286



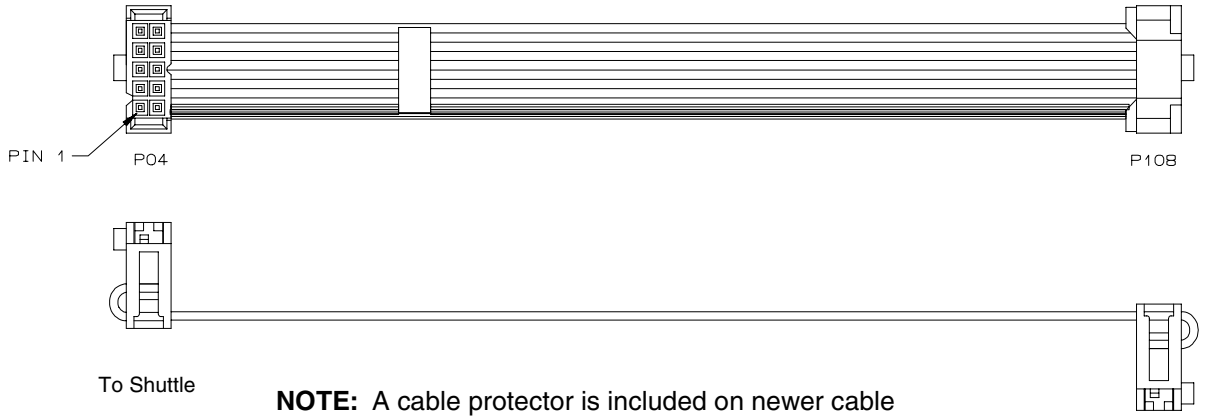
WIRE TABLE		
EHF	P307	WIRE COLOR
PIN 1	PIN 3	BLACK
PIN 2	PIN 2	GRAY
	PIN 1	N/C

Cable Assembly, Hammer Bank Logic

IMPORTANT:

Use this cable on all Infoprint 6500 printers. Same part number for -v20.

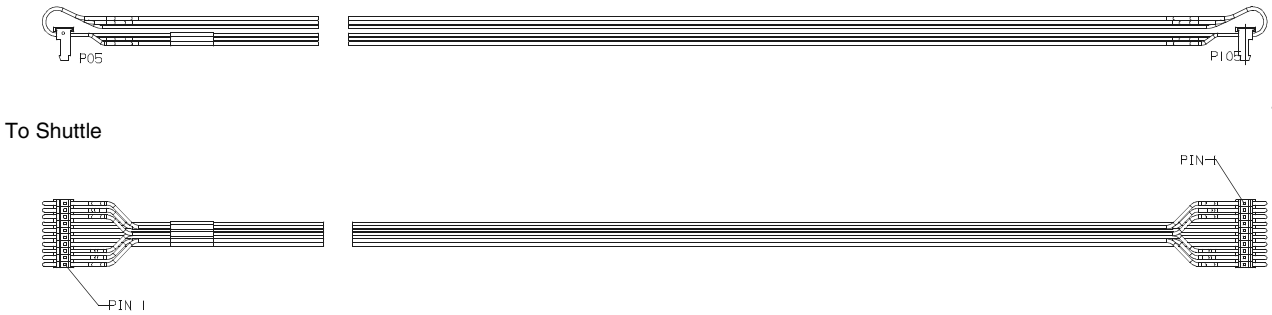
14H5279



NOTE: A cable protector is included on newer cable assemblies, which protects the shuttle end of the cable from chafing and abrasion.

A bag of 10 protectors is available under part number 75P8157, which also includes installation instructions.

Cable Assembly, Hammer Bank Power



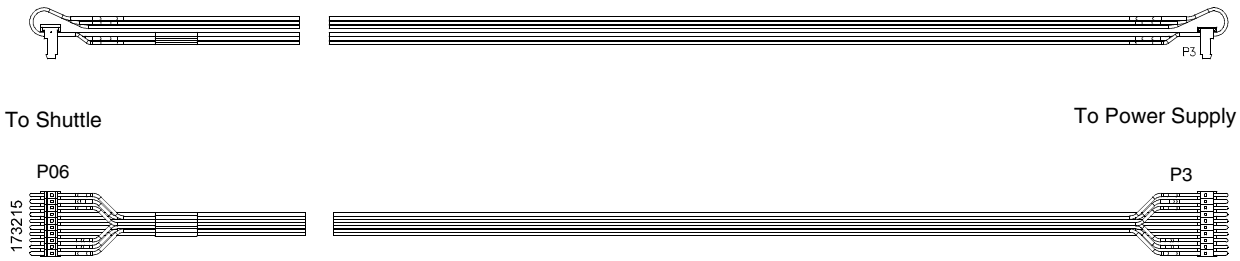
39U2533

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

IMPORTANT:

Use this cable on all Infoprint 6500 printers except the 6500-D8C and -v20. On the 6500-D8C and -v20 use 02N6214, shown on the next page.

Cable Assembly, Hammer Bank Power



02N6214

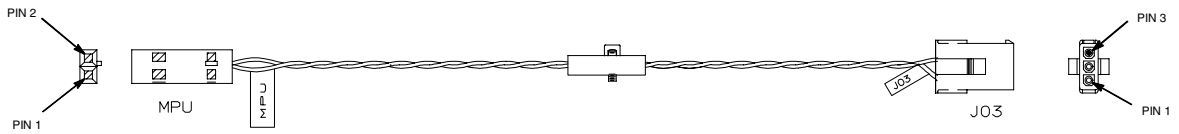
Wire Table	
P06	**P3**
2	1
1	2
4	3
3	4
6	5
5	6
8	7
7	8
10	9
9	10

IMPORTANT:

Use this cable on the 6500-D8C and -v20 printer. On all other Infoprint 6500 printers use 39U2533, shown on the previous page.

Cable Assembly, MPU

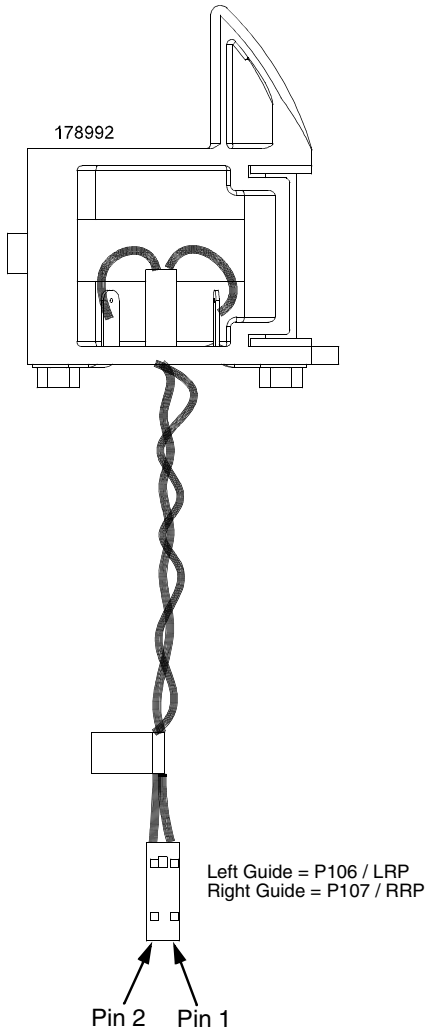
14H5329



WIRE TABLE		
MPU	J03	WIRE COLOR
1	1	BLACK
2	2	GRAY
	3	N/C

Cable Assembly, Ribbon Guide

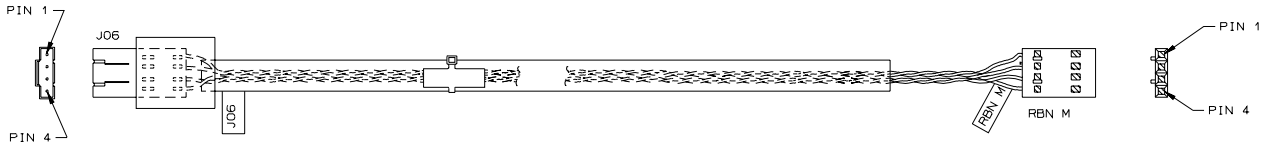
39U2539 — Left
39U2540 — Right



Pin Connection	
P106 (LRP) / P107 (RRP)	**Wire Color**
Pin 1	Black
Pin 2	Black

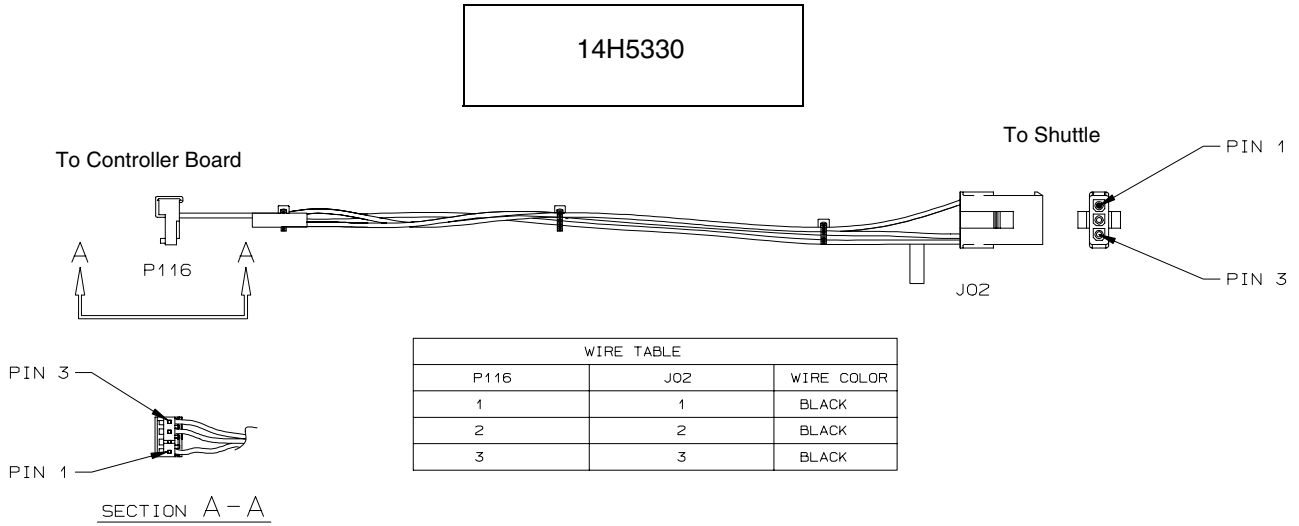
Cable Assembly, Ribbon Motor, Extension

63H7464



PIN CONNECTION		
J06	RBN M	WIRE COLOR
PIN 1	PIN 1	BROWN
PIN 2	PIN 2	ORANGE
PIN 3	PIN 3	RED
PIN 4	PIN 4	YELLOW

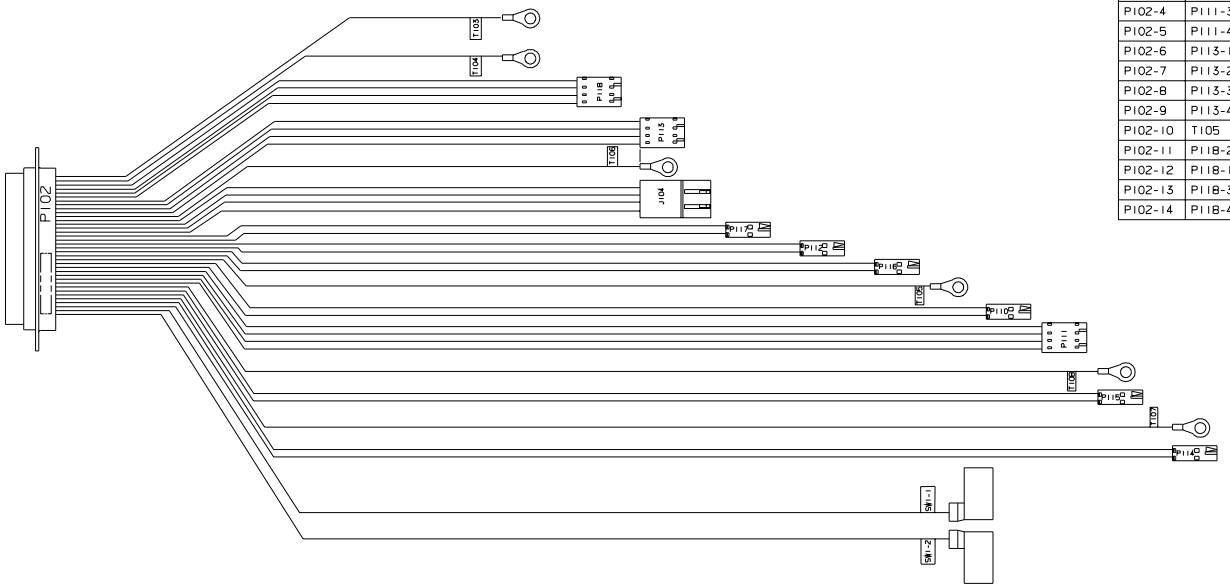
Cable Assembly, Shuttle Motor Drive



WIRE TABLE		
P116	J02	WIRE COLOR
1	1	BLACK
2	2	BLACK
3	3	BLACK

Frame Cable, Power Stacker

10R3912



REF DES		ITEM NO.	WIRE LG (XX±.25) (REF)
FROM	TO		
P102-1	T104	11	6.00
P102-2	P111-1	6	23.00
P103-3	P111-2		
P102-4	P111-3		
P102-5	P111-4		
P102-6	P113-1	6	11.50
P102-7	P113-2		
P102-8	P113-3		
P102-9	P113-4		
P102-10	T105	11	21.50
P102-11	P118-2	6	7.00
P102-12	P118-1		
P102-13	P118-3		
P102-14	P118-4		

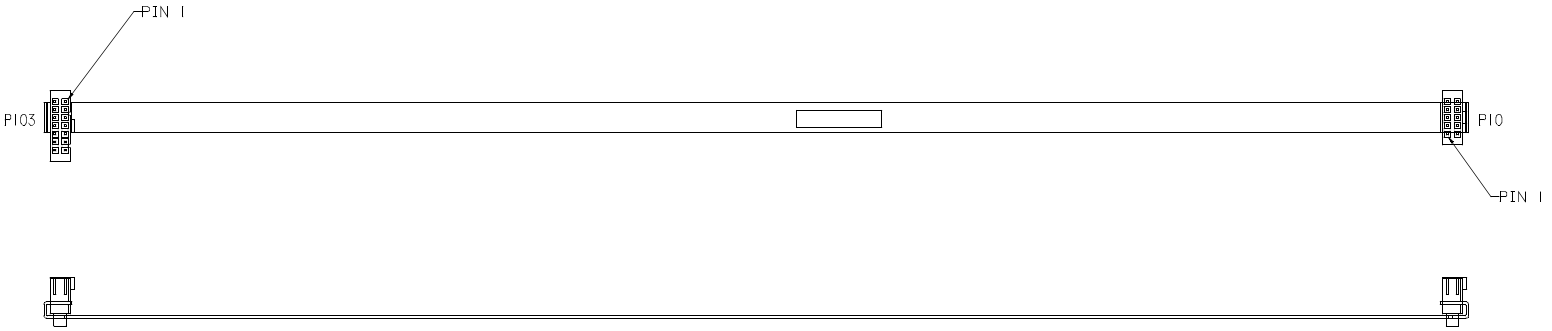
REF DES		ITEM NO.	WIRE LG (XX±.25) (REF)
FROM	TO		
P102-15	T106	11	11.50
P102-16	P110-2	3	22.50
P102-17	P110-1		
P102-18	P114-2	3	43.00
P102-19	P114-1		
P102-20	P112-2	3	12.50
P102-21	P112-1		
P102-22	P115-2	3	36.00
P102-23	P115-1		
P102-24	T107	11	43.00
P102-25	P117-2	3	12.00
P102-26	P117-1		
P102-27	P116-2	3	15.00
P102-28	P116-1		
P102-29	T108	11	36.00
P102-30	J104-3	7	11.50
P102-31	J104-4		
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,P102-29
8	P102-25,P102-26
9	P102-27,P102-28
10	P102-30 THRU P102-33
11	P102-35,P102-36

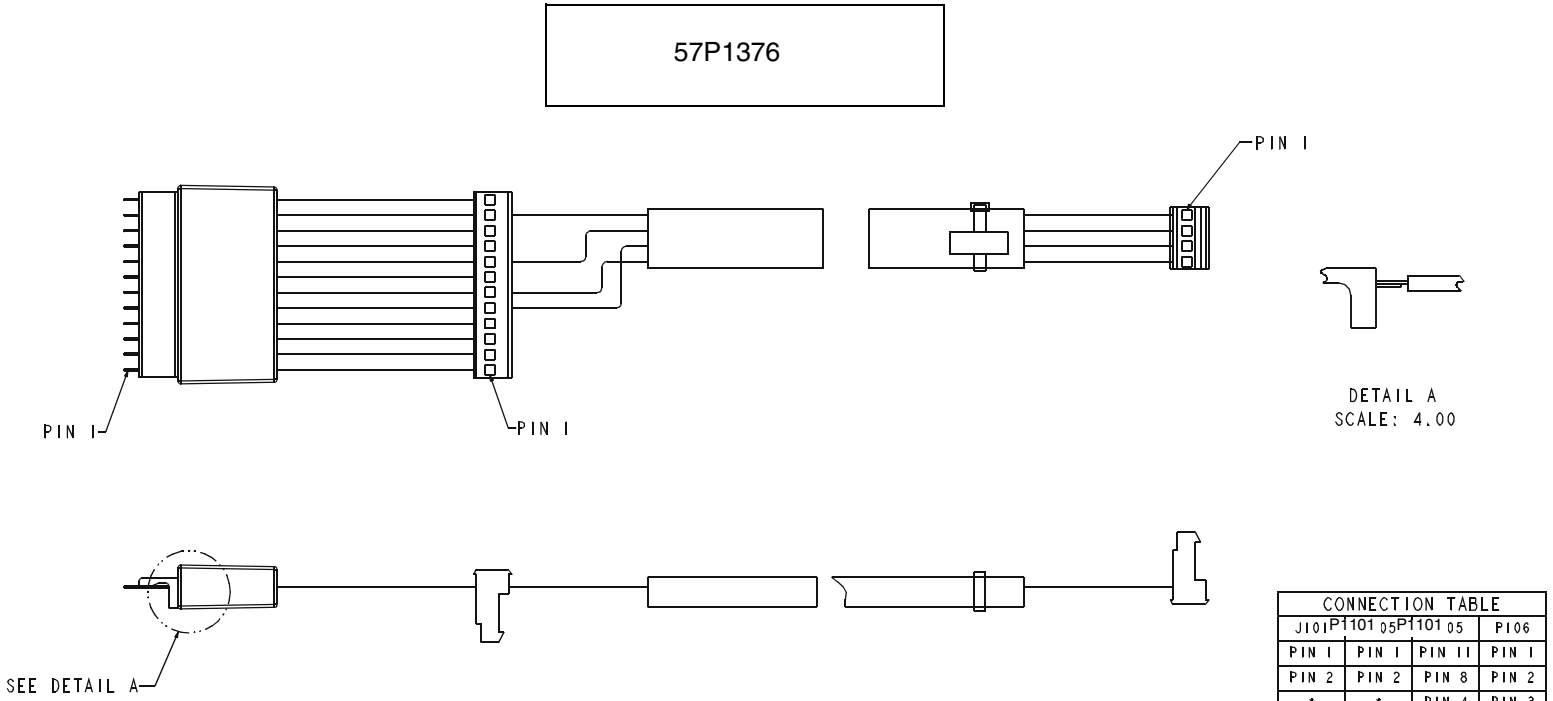
173824

Logic Cable, Power Stacker

10R4590



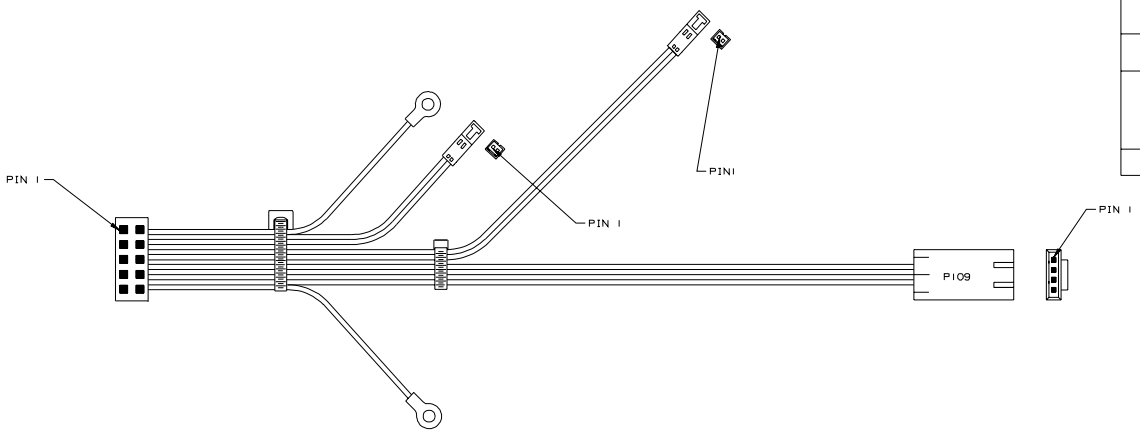
Power Cable, Power Stacker



CONNECTION TABLE			
J101	P1101 05	P1101 05	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		

Vertical Rail Cable, Power Stacker

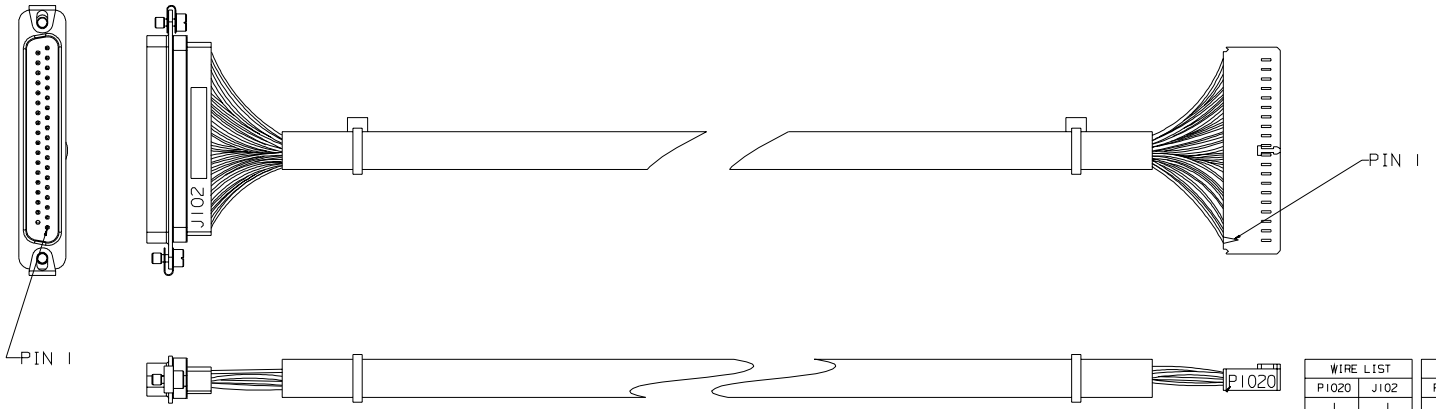
10R3913



CONNECTION TABLE			
FROM	TO	COMPONENTS	WIRE LENGTH (+/- .25")
P108-1	T102	202746-001	10.00"
P108-2 P108-3	J18A - PIN 1 J18A - PIN 2	203499-001	8.00"
P108-4 P108-5	J18B - PIN 1 J18B - PIN 2	203499-001	19.80"
P108-6 P108-7 P108-8 P108-9	P109 - PIN 1 P109 - PIN 2 P109 - PIN 3 P109 - PIN 4	202748-001 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



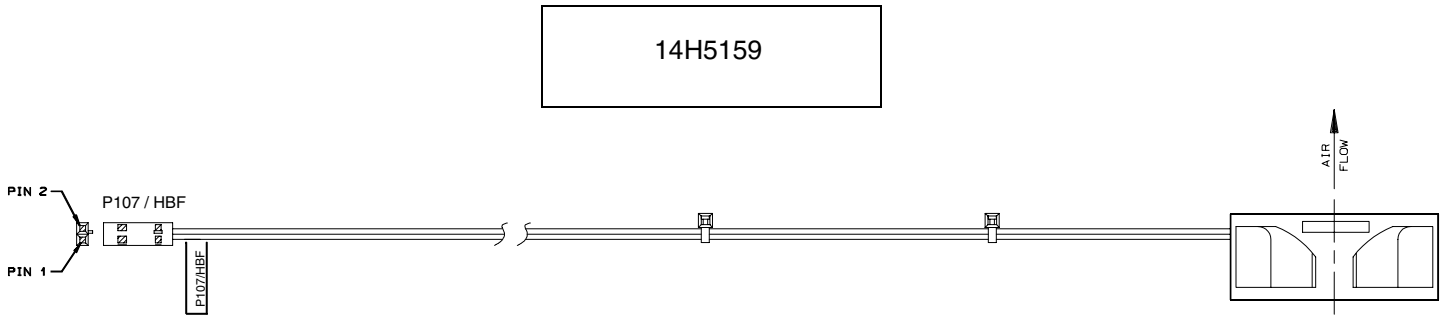
10R4053

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
25 AND 26
27 AND 28
30 THRU 33
35 AND 36

WIRE LIST	
P1020	J102
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20

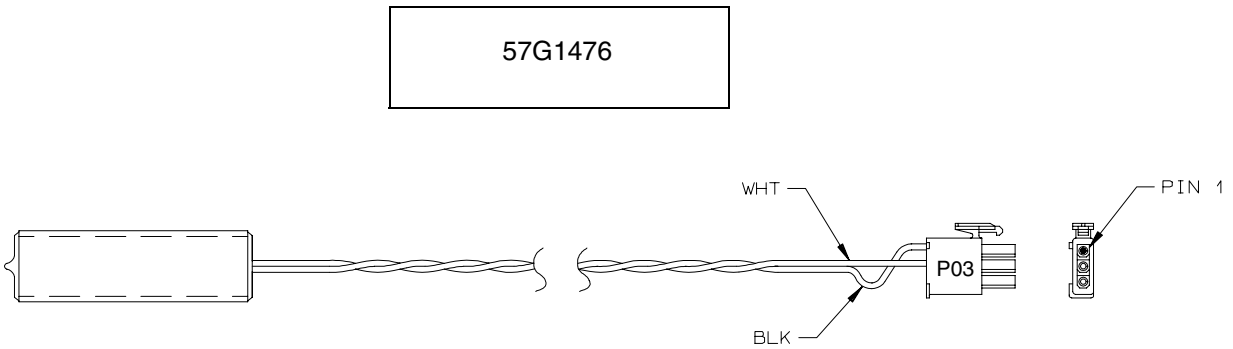
WIRE LIST	
P1020	J102
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	
38	
39	
40	

Fan Assembly, Hammer Bank



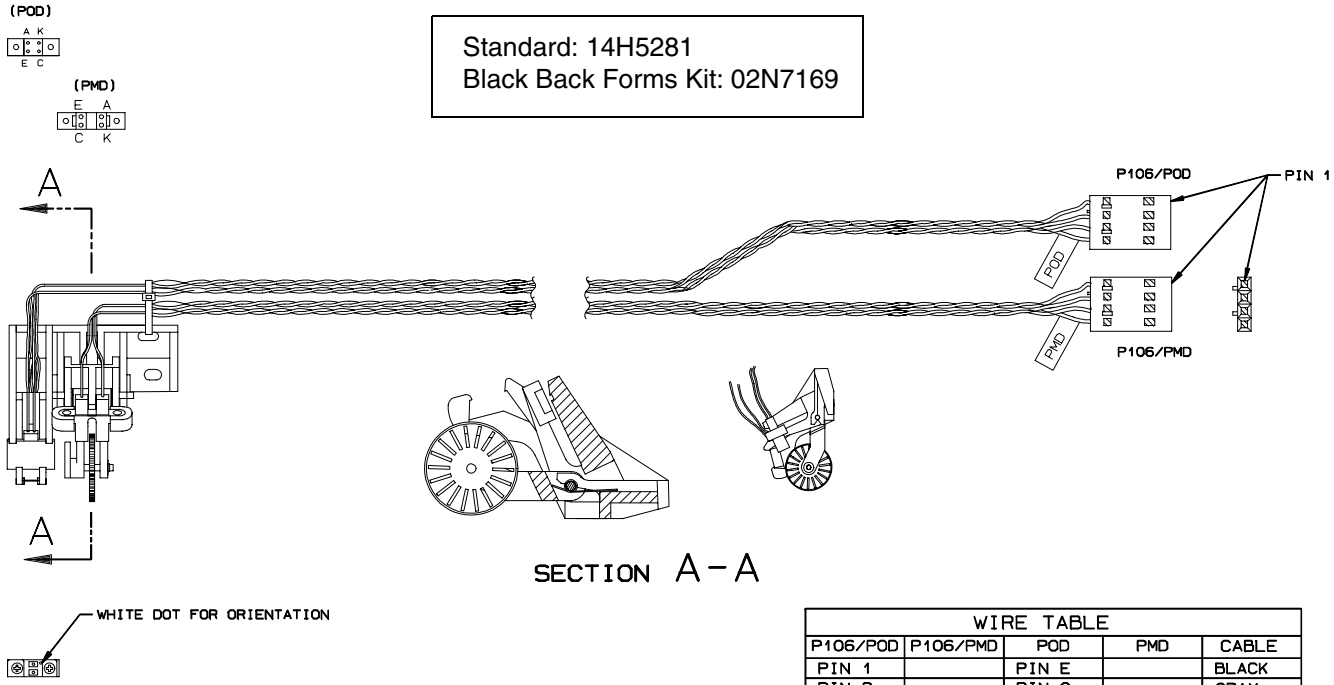
WIRE TABLE		
P107	POLARITY	HBF(J)
PIN 2	-	BLACK
PIN 1	+	RED

Magnetic Pickup (MPU) Assembly



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

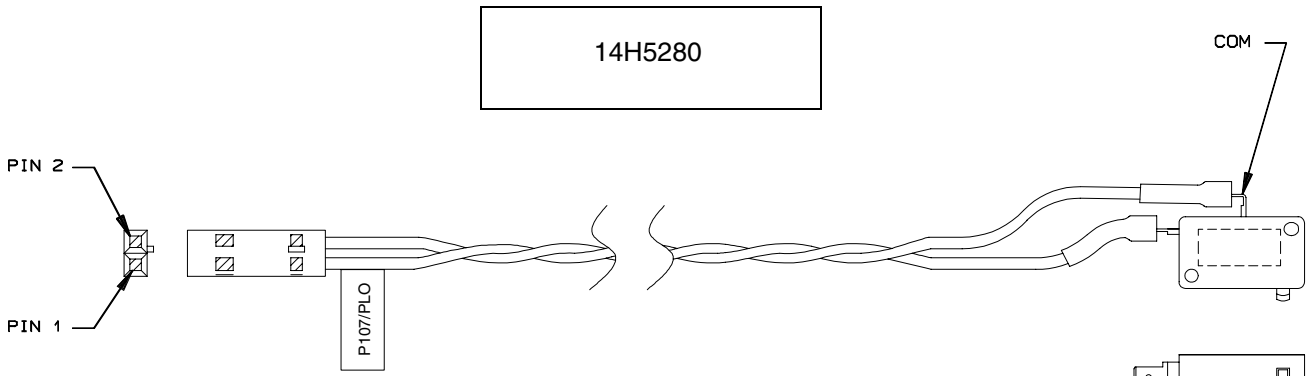
Switch Assembly, Paper Detector



Standard: 14H5281
Black Back Forms Kit: 02N7169

WIRE TABLE				
P106/POD	P106/PMD	POD	PMD	CABLE
PIN 1		PIN E		BLACK
PIN 2		PIN C		GRAY
PIN 3		PIN K		WHITE
PIN 4		PIN A		RED
	PIN 1		PIN A	BLACK
	PIN 2		PIN K	BROWN
	PIN 3		PIN C	ORANGE
	PIN 4		PIN E	RED

Switch Assembly, Platen Interlock



WIRE TABLE		WIRE COLOR
PIN NO.	INTERLOCK SWITCH	
PIN 1	COM	BLACK
PIN 2	NO	GRAY

5 *Removals and Adjustments*

About This Chapter

This chapter contains removal, installation, and adjustment procedures for the parts and assemblies that you can replace at the field service level of maintenance.

Removal and installation procedures are combined. These procedures begin on page 332.

Adjustment procedures begin on page 386.

Part numbers for replacement parts are listed in the Parts Catalog, which begins on page 408.

Tools And Materials

You need the following tools and materials to service the printer:

Item	Part No.
IBM Line Matrix Printer Configuration Utility Disk	63H7379
1-30 Inch-pound Torque Screwdriver	16F1661
ESD Wrist Strap	6405959
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	
Force Gauge, 20 lb.	25F9687

Item	Part No.
Grip Ring Pliers	9900317
Lubricant, Bearing, IBM #20	117397
DIP Module Extracting Tool	9900764
Nut Driver, 1/4 inch	
Nut Driver, 5/16 inch	
Open End Wrench, 7/32 inch	1650843
Open End Wrench, 5/16 inch	9900005
PLCC Module Pick Extraction Tool	73G5523
PLCC Module Plier Extraction Tool	10G3902
Screwdriver, Phillips, #1	73G5362
Screwdriver, Phillips, #2	73G5363
Spring Hook, Heavy Duty	
Tie Wraps	75X5972
Torque Screwdriver Adapter	39F8449
Torque Screwdriver Hex Adapter 3/32 inch	39F8451
Torque Screwdriver Hex Adapter 5/32 inch	39F8450
Torque Screwdriver Hex Adapter 3/16 inch	39F8455
Torque Screwdriver Hex Adapter 5/64 inch	16F1663
Torx** Bit Set (T7, T8, T9, T10, T15, T20, T25)	93F2830
Power Supply Test Tool	10R4059
DC Voltmeter w/ input impedance > 20,000 ohms/volt and capable of measuring 55 volts DC	

Preparing The Printer For Maintenance

Always do the following steps *before* you do any maintenance procedure:

DANGER

<3> Hazardous voltages are present in the printer with the power cord connected to the power source. Switch off printer power and unplug the printer power cord before proceeding.

<4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.

<5> Power off the printer and disconnect the power cord *before* connecting or disconnecting a communication port, teleport, or attachment cable connector.

ATTENTION **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.**

1. Power off the printer.
2. Unplug the printer power cord from the AC power source.
3. Disconnect the host data cable from the printer interface.
4. Open the printer cover.
5. Unload paper.
6. Read the entire adjustment procedure before you begin working on the printer.
7. Gather the necessary parts before you begin working on the printer.

Restoring The Printer To Operation

When you are finished servicing the printer, restore it to operation by following these steps:

1. Connect the host data cable to the printer interface.
2. Load paper.
3. Plug the AC power cord into the power source.
4. Close the cabinet doors.
5. Power on the printer.
6. Set the top-of-form. (Refer to the *User's Manual.)*
7. Select the emulation. (Refer to the *User's Manual.)*
8. Test printer operation by selecting and running one of the operator print tests (page 229).
9. Close the printer cover.

Removal And Replacement Procedures

This section contains removal/installation procedures for components that are replaceable at the field service maintenance level. These procedures are listed below.

IMPORTANT **Do not try to repair electronic components or assemblies in the field. Replace a malfunctioning electronic assembly with an operational spare. Most electronic problems are corrected by replacing the circuit board, sensor, or cable that causes the fault indication. The same is true of failures traced to the hammer bank coils and electronics: you must replace the entire shuttle frame assembly. It is not field repairable. (Hammer spring assemblies are the only replaceable components of the shuttle frame assembly.)**

List Of Procedures

Belt, Paper Feed Timing

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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 418, Figure 39, item 7).
4. Loosen (do not remove) the paper feed motor mount screws (page 434, Figure 46, item 10).
5. Work the paper feed timing belt off the paper feed motor pulley and the splined shaft pulley.

Installation

1. Work the paper feed timing belt onto the paper feed motor pulley and the splined shaft pulley.
2. Using the straight end of a force gauge, apply 15 pounds (66.7 N) of pressure to the paper feed drive motor near the mounting base of the motor. Use the splined shaft to steady the gauge.
3. Reduce tension to 12 pounds (53.4 N) and torque the paper feed motor mount bolts to 18 ± 2 inch-pounds (2.03 ± 0.23 N•m).

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

4. Snap the timing belt cover into the slots in the side plate (page 418, Figure 39).
5. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
6. Return the printer to normal operation (page 331).

Belt, Platen Open

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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 (page 431, Figure 45, item 24).
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 (page 434, Figure 46, item 19).
5. Push the motor toward the front of the printer to loosen the platen open belt.
6. Remove the platen open belt by sliding the belt off the platen open pulley.

Installation

1. Slide the platen open timing belt over the platen open pulley and the motor pulley and tighten the 1/16 inch setscrew.
2. Slide the motor pulley onto the platen open motor shaft and tighten the pulley setscrew.

ATTENTION **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.**

3. Slide the platen open timing belt over the platen open pulley and the motor pulley.
4. The spring will automatically tension the belt.
5. *Slowly* tighten the motor adjustment screw (page 434, Figure 46, item 15).

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, slowly loosen the motor adjustment screw and repeat steps 3 through 5.

6. Snap the platen open belt cover into the slots in the side plate (page 431, Figure 45, item 24).
7. Install the paper guide assembly (page 366).
8. Return the printer to normal operation (page 331).

Circuit Board: PSA3 Controller

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

Removal

1. Make a configuration printout of all configurations. (Refer to the *User's Manual.)*
2. Prepare the printer for maintenance (page 330).
3. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
4. Disconnect all cable connectors from the controller board. (See page 424.)
5. Loosen, but do not remove, the screws securing the controller shield near serial cable connector J201.
6. Remove any attachment cards, if equipped.
7. Save any standoff connections, if equipped.
8. Loosen, but do not remove, the screw securing the controller shield to the bottom of the card cage, on the left side near the card cage fan.
9. Slide the controller board to left until the keyway clears the screw securing the controller board to the bottom of the card cage.
10. Remove the controller board.
11. If you are removing the controller board for reasons other than replacement (i.e., you will re-install the original controller at some point), you do not need to remove the memory modules or security key. If you are replacing the controller board, remove the FLASH SIMM and Security Key (page 356), 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

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

1. If this is a replacement controller board, install the Flash Memory SIMM and Security Key on the new controller (page 356).
2. Position the controller board assembly in the card cage, shield side down, component side up. Engage the screw on the bottom of the card cage in the keyway in the controller shield. Slide the board to right until the serial cable connector J201 on the board lines up with the cutout in the card cage.
3. Tighten the screw securing the controller shield near serial cable connector J201.
4. Tighten the screw securing the controller shield to the bottom of the card cage.
5. Connect all cable connectors to the controller board. (See page 424.)
6. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).

IMPORTANT **If the original controller board was replaced with a new or refurbished board, 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.**

7. Do NOT make the printer READY. You will download code in the next step.
8. Load flash memory (page 254).
9. Models -D6C, -D8C, -v15, and -v20: adjust the coil temperature if the original controller board was replaced (page 401).
10. Adjust the hammer phasing (page 399).
11. Adjust the end of forms distance (page 396).
12. Return the printer to normal operation (page 331).
13. Using the configuration printout you made as step 1 of the removal procedure, reset and save the printer configuration

Circuit Board: Power Supply

CAUTION

<4> To prevent injury from electric shock, wait at least one minute after powering off before removing the power supply board.

ATTENTION **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 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Mark then disconnect all cable assemblies going to and from the power supply board. (See page 424, item 3.)
4. Loosen—do not remove—the screws securing the power supply board to top rear wall of the card cage. (See page 424, item 15.)
5. Grasp the power supply by the handling loops, tilt it forward, and lift it out of the printer.

Installation

1. Reverse steps 2 through 5 of the removal procedure.
2. Models 6500-D6C, -D8C, -v15, and -v20: adjust the coil temperature if the original power supply board was replaced by a new or refurbished power supply (page 401).
3. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
4. Return the printer to normal operation (page 331).

Circuit Breaker

Removal

1. Prepare the printer for maintenance (page 330).
2. Open the printer cover.
3. Remove the card cage fan (page 348).
4. Disconnect the four circuit breaker electrical leads.
   (Cabinet Model: See Figure 47, page 437.
   Pedestal Model: See Figure 41, page 422.)
5. Press in on the spring clips and remove the circuit breaker from the printer.

Installation

6. Press the circuit breaker into the cutout until the spring clips snap into place.
   (Cabinet Model: See Figure 47, page 437.
   Pedestal Model: See Figure 41, page 422.)

ATTENTION **Make sure the four leads are connected as shown on page 437 and page 422.**

7. Connect the four circuit breaker electrical leads.
   (Cabinet Model: See Figure 47, page 437.
   Pedestal Model: See Figure 41, page 422.)
8. Install the card cage fan (page 348).
9. Return the printer to normal operation (page 331).

Connector Shells

Some of the printer cable connectors are grouped inside connector shells (P/N 14H5288) that plug into connectors J106 and J107 on the controller board. The procedure below explains how to remove and install cable assemblies from any connector shell in the printer.

NOTE: There is a diagram of the P106 / P107 connector shells on the plastic cover over the power supply.

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Disconnect the cable connector shell containing the cable assembly that will be replaced.
4. Pull the side of the connector shell outward and gently pull the cable connector upward. (See Figure 14.) Notice that two-wire connectors are grouped across from two-wire connectors in a connector shell. Four-wire connectors are grouped across from four-wire connectors in a connector shell.
5. Disengage the lock tab(s) on the cable connector from the slots in the side of the connector shell.
6. Remove the cable connector from the connector shell. (Remove only the cable connector for the cable you are replacing; leave the rest in the shell.)

Installation

1. Position the cable connector in the connector shell. Two-wire connectors are always grouped across from two-wire connectors in a connector shell. Four-wire connectors are always grouped across from four-wire connectors in a connector shell. (See Figure 14.)
2. Pull the side of the connector shell outward and gently push the cable connector down into the connector shell.
3. Engage the tabs on the cable connector in the slots in the side of the connector shell. Press the sides of the connector shell inward to make sure all cable connector tabs are engaged in the shell slots.
4. Connect the cable connector shell to its printer connection.
5. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
6. Return the printer to normal operation (page 331).

P106 Connector Configuration

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

(Top View: As seen when plugged into the controller board.)

Pin No.

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)

P107 Connector Configuration

(Top View: As seen when plugged into the controller board.)

19 17 15 13	11 9	7 5 3 1
MPU PLO	EHF	PAPR M
CVO RRP	HBF	RRIB M
20 18 16 14	12 10	8 6 4 2

CVO = Cover Open (Switch)
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

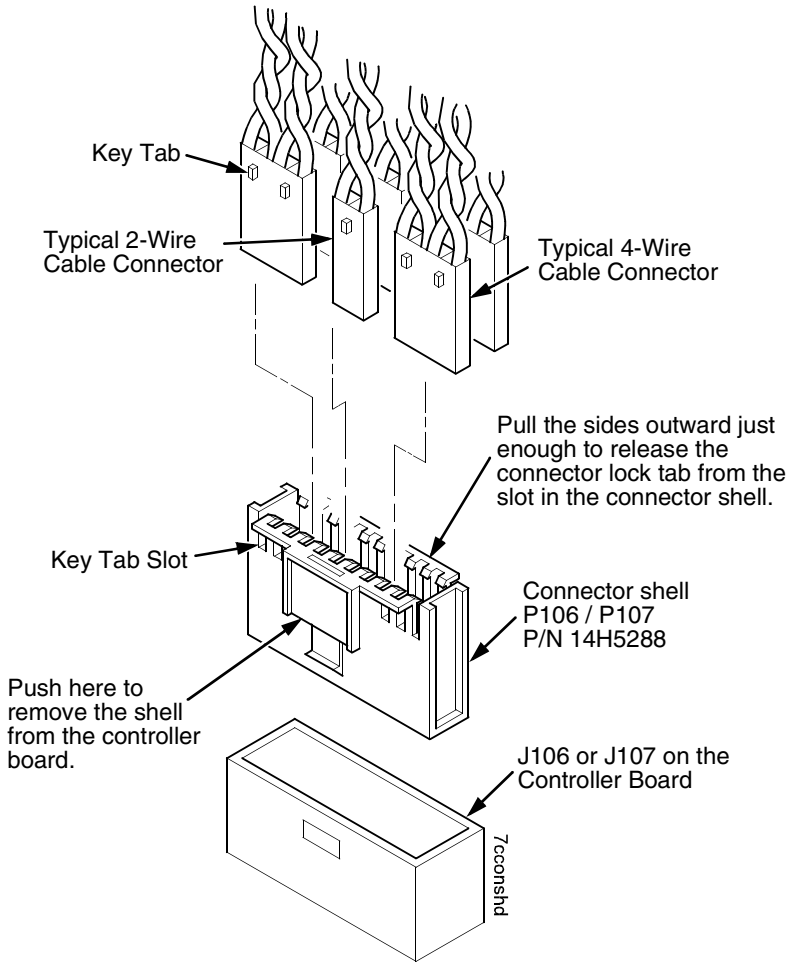


Figure 14. This figure shows how to assemble a cable connector shell.

Cover Assembly, Hammer Bank / Ribbon Mask

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the shuttle frame assembly (page 380).
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 15, page 342.)

Installation

ATTENTION **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.**

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 15, page 342.)
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 380).
5. Return the printer to normal operation (page 331).

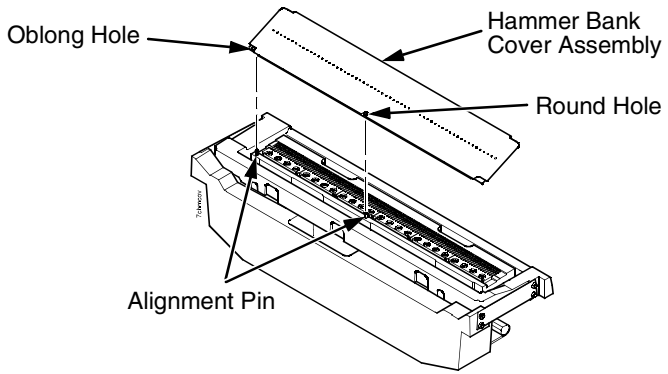


Figure 15. This figure shows how to install the hammer bank cover assembly.

Cover Assembly, Shuttle

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Loosen the shuttle cover screws (page 418, Figure 39, item 2).
4. Grasping the edges of the shuttle cover assembly, tilt up the rear edge 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 (page 418, Figure 39).

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

2. Tighten the shuttle cover screws (page 418, Figure 39, item 2).
3. Install the ribbon. (Refer to the *User's Manual*.)
4. Return the printer to normal operation (page 331).

Cover Assembly, Top, Pedestal Model

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the operator panel (page 365).
3. Remove the #2 Phillips screw in the lower left front corner of the top cover and the screw just to the right of the operator panel bracket. (See Figure 38, page 416, item 14.)
4. Loosen (do not remove) the two #2 Phillips hold-down screws on the rear of the printer. (See Figure 38, page 416, item 8.)
5. Lift the top cover assembly off the printer base.

Installation

1. To install the top cover assembly, reverse steps 2 through 5 of the removal procedure.
2. Return the printer to normal operation (page 331).

Dashpot

This procedure applies only to cabinet models.

Removal

CAUTION

<3> Two persons may be required to do this procedure. Prop or hold the top cover securely open while disengaging the dashpot.

1. Prepare the printer for maintenance (page 330).
2. Open the printer cover.
3. Open the floor cabinet rear door.
4. Pry back the spring retaining clips (page 414, Figure 37).
5. Remove the dashpot from the ball studs.

Installation

ATTENTION **Install the dashpot with the narrow rod uppermost.**

1. Position the dashpot against the ball studs on the upper and lower brackets with the narrow rod uppermost. (See page 414, Figure 37.)
2. Push the dashpot onto the ball joints and install the spring clips.
3. Close the printer cover. If necessary, adjust the position of the ball joint stud in the lower bracket to achieve smooth and complete closure.
4. Return the printer to normal operation (page 331).

Ethernet Interface Assembly

Removal

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

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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 NIC connector plate to the rear of the card cage. (See page 441, item 4.)
5. Angle the NIC out of the card cage cutout as you lift the NIC off the expansion connector on the controller board. (See page 441, item 1.

Installation

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

1. Reverse steps 2 through 5 of the removal procedure.
2. Return the printer to normal operation (page 331).

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.

Fan Assembly, Cabinet Exhaust

This procedure applies only to cabinet models.

Removal

1. Prepare the printer for maintenance (page 330).
2. Open the cabinet doors and the printer cover.
3. Remove the paper stacker. (See Figure 36, page 412.)
4. Remove the three screws securing the air exhaust duct. (The top screw is located near the right front of the card cage, in front of the square air holes in the printer base plate.) (See Figure 37, page 414.)
5. Disconnect the fan cable connector from connector P307 and remove the air exhaust duct.
6. Remove the fan cable connector from the cutout in the side of the air exhaust duct.
7. Remove the two fan mounting screws and the cabinet exhaust fan assembly.

Installation

ATTENTION **Install the fan so that air flow is DOWN.**

1. Position the cabinet exhaust fan assembly in the air exhaust duct so that air flow is down, and install the two screws securing the fan to the duct. (See Figure 37, page 414.)
2. Snap the fan cable connector into the cutout in the side of the air exhaust duct.
3. Move the air exhaust duct back into position and install the three screws.
4. Connect the cabinet exhaust fan cable connector to connector P307.
5. Install the paper stacker. (See Figure 36, page 412.)
6. Return the printer to normal operation (page 331).

Fan Assembly, Card Cage

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Disconnect the fan cable connector:
   Cabinet Model, Figure 46, page 434.
   Pedestal Model, Figure 41, page 422.
4. Cabinet Model: Remove the two fan mounting screws from the bottom of the fan. (See Figure 46, page 434, item 2.)
   Pedestal Model: Remove the four fan mounting screws and nuts. (See Figure 41, page 422, items 1 through 4.)
5. Remove the card cage fan assembly from the card cage.
6. Remove the shield between the card cage fan and bracket.

Installation

ATTENTION **Install the fan so the label faces toward the inside of the printer. Air flow is INTO the card cage.**

1. Reverse steps 2 through 6 of the removal procedure.
2. Return the printer to normal operation (page 331).

Fan Assembly, Hammer Bank

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 343).
4. Pedestal Model: Remove the top cover assembly (page 344).
5. Trace the hammer bank fan cable assembly back to the controller board connector J107, releasing it from all cable constraints. (See the cable routing diagrams on page 298 and page 299.)
6. Disconnect connector P107 from the controller board and remove the fan connector (HBF) from the connector shell. (See page 341.)
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 Figure 46, page 434.)

Installation

ATTENTION **Install the fan so the label faces up. Air flow is UP.**

NOTE: The hammer bank fan assembly is installed by angling it down and under the shuttle motor.

1. Feed the hammer bank fan cable connector (HBF) 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 Figure 46, page 434.)
2. Route the fan motor wires as shown on page 298 and page 299, connect fan cable connector (HBF) to P107, then connect P107 to J107 on the controller board. (See page 341.)
3. Install two screws in the locations shown in Figure 46 on page 434.
4. Pedestal Model: Install the top cover assembly (page 344).
5. Install the shuttle cover assembly (page 343).
6. Install the ribbon. (Refer to the *User's Manual*.)
7. Return the printer to normal operation (page 331).

Hammer Spring Assembly

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the shuttle frame assembly (page 380).
3. Carefully vacuum the shuttle frame assembly.
4. Remove the hammer bank cover assembly (page 342).

ATTENTION **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.**

NOTE: Replace a hammer spring assembly only if there is visible damage or broken parts can be seen in the assembly.

5. Remove the mounting screws from the old hammer spring assembly. (See Figure 16, page 351.)
6. Handling the hammer spring assembly by the mounting base only, gently pry the old hammer spring assembly off its mounting pins. (See Figure 16, page 351.)
7. Inspect the hammer bank and the old hammer spring assembly:
   a. If there is ink on the hammer bank mounting surface, the hammer spring assembly mounting surface, or the hammer spring neck or tines, reinstall the old hammer spring assembly and replace the shuttle frame assembly (page 380).
   b. If the old hammer spring assembly and the hammer bank are free of ink, install the new hammer spring assembly (page 352).

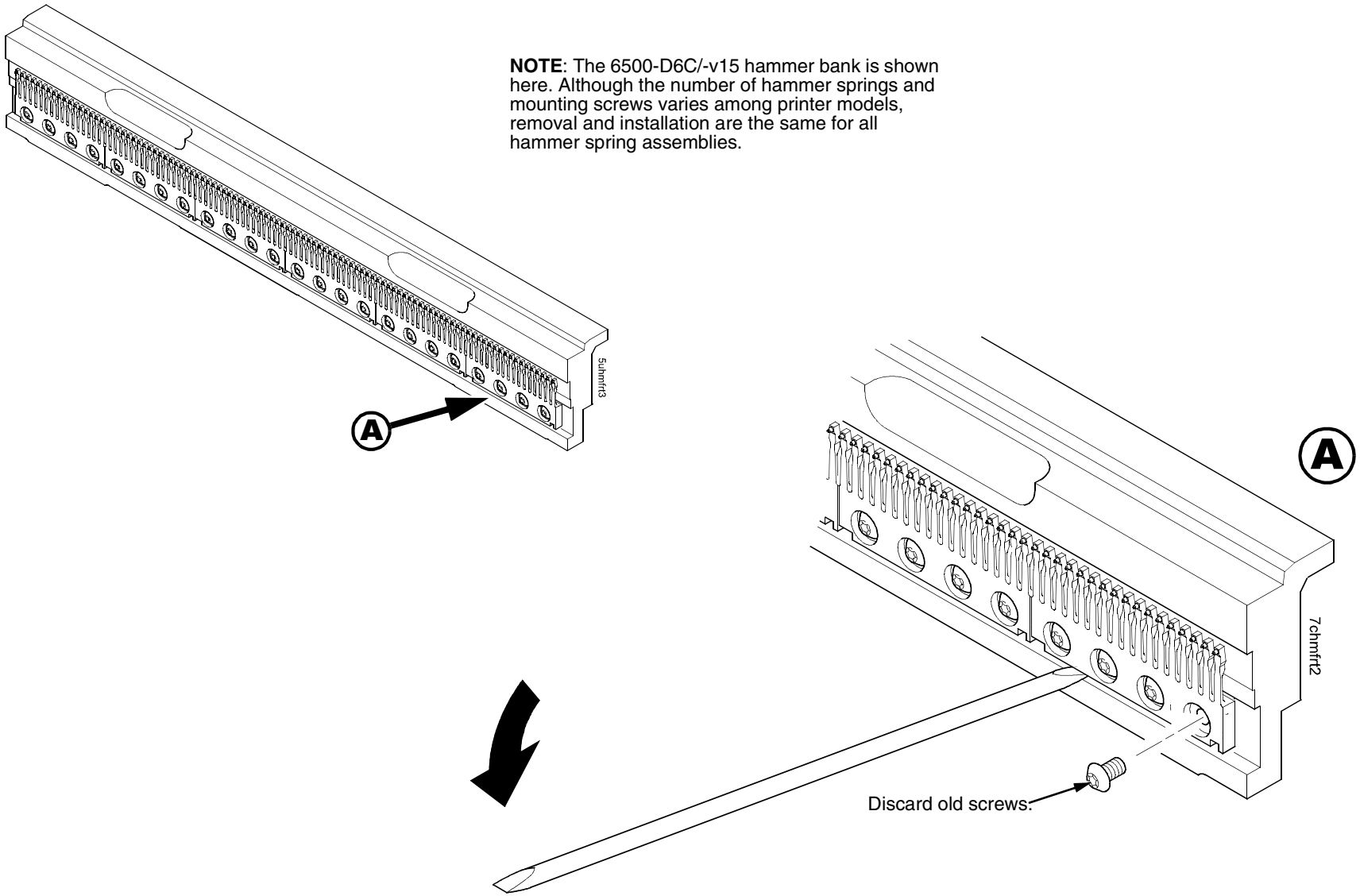


Figure 16. This figure shows how to remove a hammer spring assembly from the hammer bank.

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.

ATTENTION **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.**

NOTE: Replace a hammer spring assembly only if there is visible damage or you see broken parts in the assembly.

2. Handling it by the mounting base only, remove the new hammer spring 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 17, page 353.)
4. Continue pressing down on the mounting base of the the new hammer spring assembly as you install the mounting screws from the replacement kit. Using a Torx T-10 bit adapter, torque each screw to 14 inch-pounds (1.58 N•m). Tighten the center screw(s) first. (See Figure 17, page 353.)

NOTE: Use the 1-30 inch-pound Torque Screwdriver, IBM part number 16F1661.

5. Install the hammer bank cover assembly (page 342).
6. Install the shuttle frame assembly (page 380).
7. Install the ribbon and load paper.

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

8. Run an operator print test and check print quality (page 229):
   a. If print quality is acceptable, return the printer to normal operation (page 331).
   b. If print quality is still degraded, replace the shuttle frame assembly (page 380).

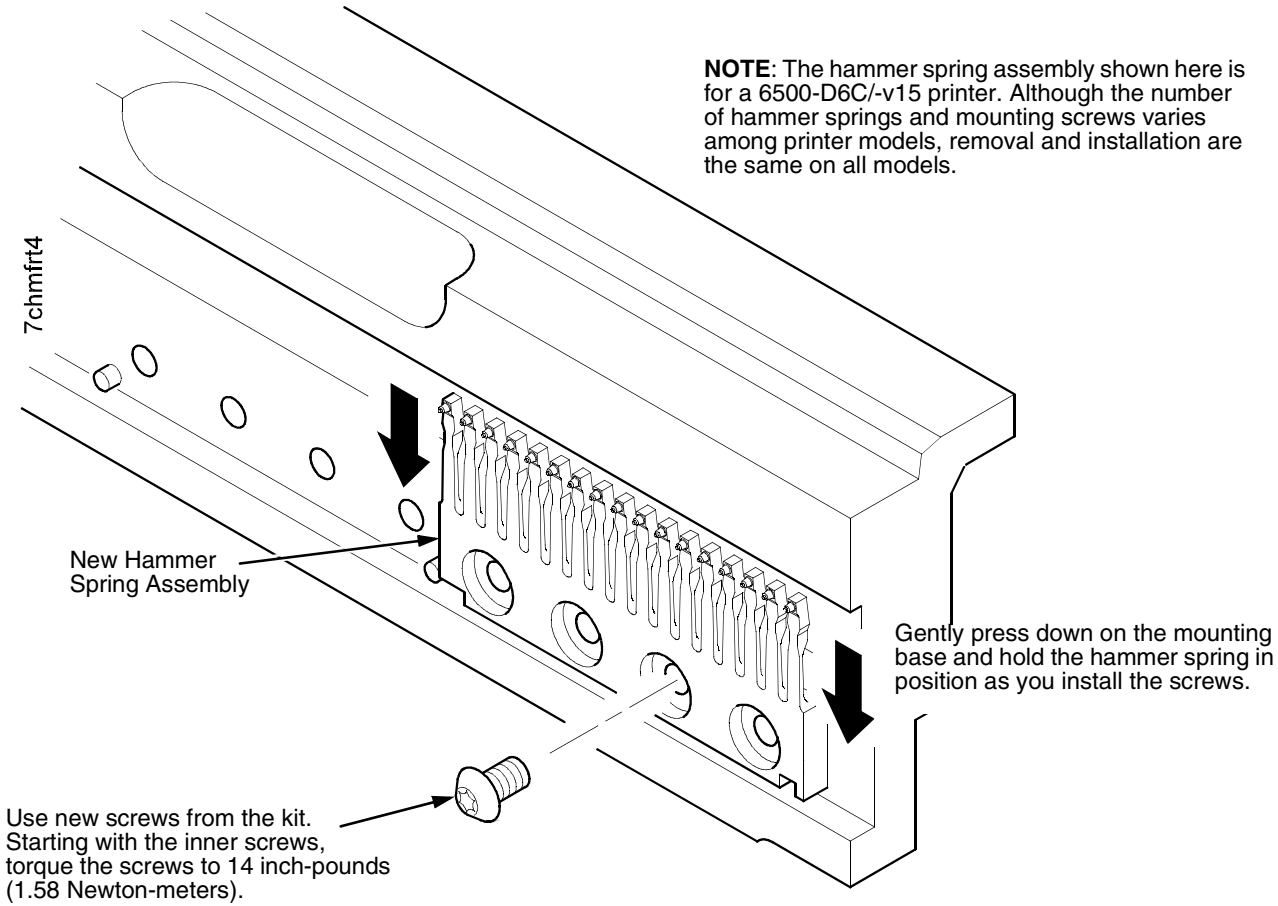


Figure 17. This figure shows how to install a hammer spring assembly onto the hammer bank.

IBM Coax/Twinax Expansion Board

Removal

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Remove the screw securing the coax/twinax I/O plate to the rear of the card cage. (See Figure 48, page 439, item 4.)
4. Carefully work the PCI-CT board upward and out of the expansion slot on the controller board. (See Figure 48, page 439, item 1.)

Installation

1. Reverse the steps of the removal procedure.
2. Return the printer to normal operation (page 331).

IMPORTANT **If the printer uses the twinax interface and has a power stacker, install the Smart-T cable extension between the twinax interface connector on the PCI-CT board and the twinax auto-termination (Smart-T) cable. (See Figure 51 on page 445.) The Smart-T cable extension cable permits the twinax auto-termination cable to clear the stacker elevator.**

Magnetic Pick-up (MPU) Assembly

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover (page 343).
4. Disconnect the shuttle cable assembly connector (page 427, Figure 43).
5. Disconnect the magnetic pick-up (MPU) cable connector (page 427, Figure 43).
6. Loosen the 7/64 inch hex MPU clamp screw (page 427, Figure 43).
7. Unscrew the MPU assembly from the MPU bracket.

Installation

1. Install the MPU assembly by screwing it into the MPU bracket (page 427, Figure 43).

NOTE: In the next step use the 1-30 inch-pound Torque Screwdriver, IBM part number 16F1661.

2. Using a feeler gauge, adjust the gap between the MPU assembly and the flywheel to 0.010 ± .001 inch (0.254 ± 0.025 mm). Torque the MPU clamp screw to 18 ± 2 inch-pounds (2.03 ± 0.23 N•m).
3. Check the gap between the MPU assembly and the flywheel with a feeler gauge:
   a. If the gap is 0.010 ± .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.

ATTENTION **Make sure the MPU cable is below the extension spring and does not touch the spring after the cable is connected.**

4. Connect the magnetic pick-up (MPU) cable connector.
5. Connect the shuttle cable assembly connector (page 427, Figure 43).
6. Install the shuttle cover (page 343).
7. Install the ribbon. (Refer to the *User's Manual*.)
8. Adjust the hammer phasing (page 399).
9. Return the printer to normal operation (page 331).

Memory and Security Key

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

Removal

1. Make a configuration printout of all saved configurations. (Refer to the *Setup Guide.)*
2. Prepare the printer for maintenance (page 330).
3. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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, gently open the side locks, angle the memory module upward, and remove it from the socket. (See Figure 18, page 359.)
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 security key, then lift and remove the security key. (See Figure 18.)

NOTE: 1. 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.
2. RoHS = 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.

KS/ KSSM	LQ1600K		Code Loads					Part Number	RoHS Complaint**
	GB	Big 5	TN	ANSI	CT	Code V / IGP	IPDS		
					X	X		39U2455	41U1162
					X	X	X	39U2456	41U1163
					X		X	39U2457	41U1164
					X			39U2458 *	41U1165

KS/ KSSM	LQ1600K		Code Loads					Part Number	RoHS Complaint**
	GB	Big 5	TN	ANSI	CT	Code V / IGP	IPDS		
				X		X		39U2463	41U1166
				X				39U2464	41U1167
			X			X		39U2467	41U1168
			X					39U2468	41U1169
	X							42R8893	42R8893
X		X						42R8894	42R8894
								42R8895	42R8895
* This is also the Base ASCII-only security key									
** Part numbers listed in the column labeled **RoHS Compliant** 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.									

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 18.)

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

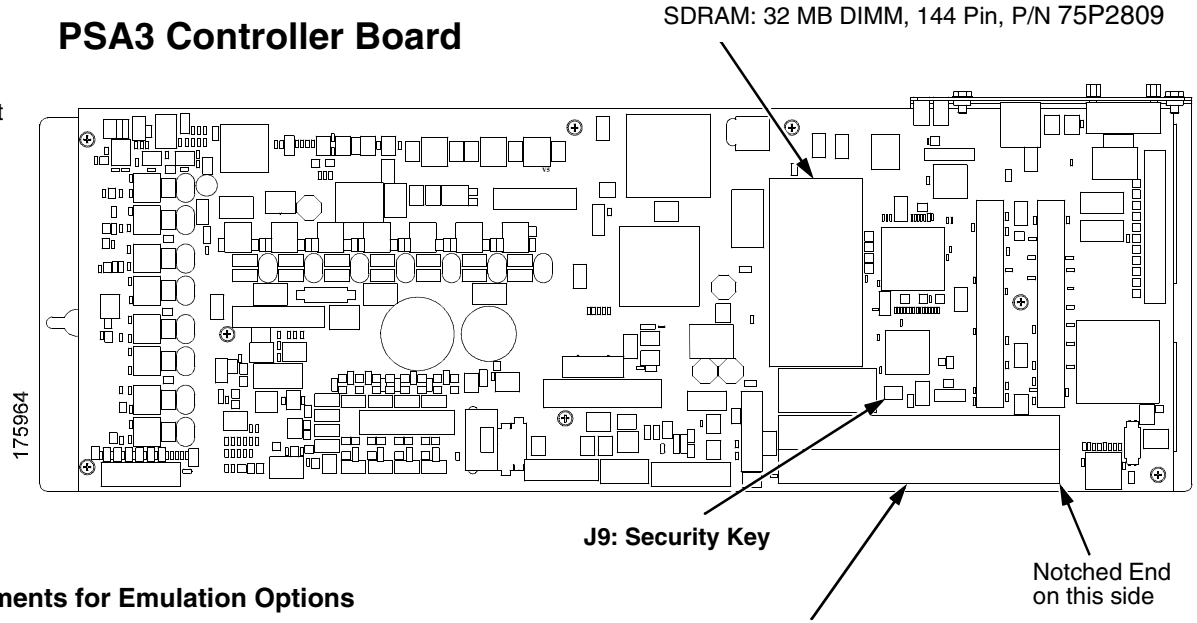
3. Insert the memory module at a 45 degree angle into the correct socket (see Figure 18) on the controller board:
   a. Insert the flash SIMM in socket J11 on the controller board at a 45 degree angle. Position the flash SIMM with the notched end toward the right side of the controller board. Press the SIMM gently into the socket until the edge connectors are seated, then press the SIMM downward until the side latches lock the SIMM is place. (See Figure 18, page 359.)

b. 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. (See Figure 18, page 359.)

4. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
5. Download the emulation (page 247).
6. Return the printer to normal operation (page 331).
7. Using the configuration printout(s) you made in step 1 of the removal procedure, reset and save the printer configuration(s). (Refer to the *Setup Guide.)*

PSA3 Controller Board

IMPORTANT:
The controller board does not support EDO RAM.



Memory Requirements for Emulation Options

Data Stream	LP+	IGP LP+	ANSI LP+	PGL ANSI LP+	VGL ANSI LP+	CT LP+	CT PGL LP+	CT VGL LP+	IPDS CT LP+	IPDS CT PGL LP+	IPDS CT VGL LP+	Hanzi GB/Big 5 Hangul KS/KSSM
Flash	8 MB	8 MB	8 MB	8 MB	8MB	8 MB	8 MB	8 MB	8 MB	8 MB	8 MB	16 MB
SDRAM (Permanent Installation)	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB
CT Installed	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No

Flash Memory:

J11: 72-pin Flash Memory SIMM:
8 MB = P/N 75P2810 (RoHS: 41U1176)
16MB = P/N 10R4054 (RoHS: 41U1160

(NOTE: J10 is not used)

Figure 18. This figure shows the locations of Memory Modules and Security Key on the PSA3 controller board.

Motor Assembly, Paper Feed

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Remove the timing belt cover by squeezing the top and bottom to release the plastic tabs from the slots in the side plate (page 418, Figure 39).
4. Model 6500-v20 only: take note of how the heat sink is installed on the paper feed motor. Remove and retain the screws securing the heat sink to the paper feed motor. Remove the heat sink and retain it for installation on the new paper feed motor.
5. Loosen the paper feed motor mount screws (page 434, Figure 46, item 10).
6. Trace the paper feed motor cables back to the controller board, releasing it from tie wraps. (See the cable routing diagrams on page 298 and page 299.)
7. Disconnect connector P107 from the controller board and remove the paper feed motor connector from connector P107. (See page 340.)

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 bolts (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 (page 434, Figure 46).
2. Connect the paper feed motor cable connector to connector P107, then connect P107 to J107 on the controller board. (See page 340.)
3. Model 6500-v20 only: install the heat sink to the base of the paper feed motor so that the heat sink is flush with the top edge of the motor and protrudes down toward the card cage. Torque the heat sink mounting screws to 18 inch-pounds (2.03 N•m).
4. Work the paper feed timing belt onto the paper feed motor pulley and the splined shaft pulley.
5. Using the straight end of a force gauge, apply 15 pounds (66.7 N) of pressure to the paper feed drive motor near the mounting base of the motor. Use the splined shaft to steady the gauge.
6. Reduce tension to 12 pounds (53.4 N) and torque the motor mount bolts to 18 ± 2 inch-pounds (2.03 ± 0.23 N•m). Use the 1-30 inch-pound Torque Screwdriver, IBM part number 16F1661.

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

7. Snap the timing belt cover into the slots in the side plate.
8. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
9. Return the printer to normal operation (page 331).

Motor Assembly, Platen Open

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Cabinet Model: Remove the card cage fan (page 348).
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 431, Figure 45, item 24).
5. Using a 5/32 inch hex key, loosen the upper motor mount screw (page 434, Figure 46, item 24).
6. 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 on page 298 and page 299.)
7. Remove the platen open cable connector from connector P106.
   (See page 340.)
8. Remove the 5/32 inch upper motor mount screw, platen spring post, and platen belt spring (page 434, Figure 46, items 24 through 26).
9. Remove the 5/16 inch lower motor mount screw (page 434, Figure 46, item 15).
10. Remove the platen open motor assembly.

Installation

1. Position the platen open motor assembly with the wires toward the rear (page 434, Figure 46, item 12).
2. Install the 5/16 inch lower motor mount screw and torque it to 30 inch-pounds (3.39 N•m). (See page 434, item 15.)
3. Install the 5/32 inch upper motor mount screw, platen spring post, and platen belt spring (page 434, items 24 through 26) such that the screw is just loose enough to permit movement of the motor in the slotted side plate.
4. Rotate the motor all the way forward and install the platen open belt and motor pulley.
5. Connect the platen motor cable connector to connector shell P106.
6. Connect shell connector P106 to the controller board and install tie-wraps to secure the motor cable. (See the wire routing diagrams on page 298 and page 299.)
7. Close the forms thickness lever all the way.
8. Adjust the platen open belt (page 389).
9. Snap the platen open belt cover into the slots in the side plate.
10. Cabinet Model: Install the card cage fan (page 348).
11. Cabinet Model: Install the paper guide assembly (page 366).
    Pedestal Model: Install the top cover assembly (page 344).
12. Return the printer to normal operation (page 331).

Motor Assembly, Ribbon Drive

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *Setup Guide*.)
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 (page 434, Figure 46).
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 8 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 331).

Operator Panel Assembly

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

Removal

1. Prepare the printer for maintenance (page 330).
2. Open the printer cover.
3. Disconnect the RJ-11 connector P310 from J2 on the back of the operator panel. (See Figure 37, page 414.)
4. Remove the two screws securing the operator panel to the panel bracket.
5. Remove the operator panel assembly from the panel bracket.

Installation

1. Engage the slot on the bottom of the operator panel on the bottom edge of the panel bracket cutout. (See Figure 37, page 414.)
2. Align the holes on the top rear of the operator 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 operator panel.
4. Return the printer to normal operation (page 331).

Paper Guide Assembly

This procedure applies only to cabinet models.

Removal

1. Prepare the printer for maintenance (page 330).
2. Open the printer cover.
3. Loosen—do not remove—the three paper guide assembly hold-down screws (Figure 19).
4. Slide the paper guide assembly to the left and lift it off the card cage.

Installation

1. Position the paper guide assembly offset slightly to the left on the card cage with the keyway cutouts over the three loosened hold-down screws (Figure 19).
2. Slide the paper guide assembly to the right, engaging the three hold-down screws in the keyway slots. Slide the paper guide assembly to the right as far as it will go.
3. Tighten the three hold-down screws (Figure 19).
4. Return the printer to normal operation (page 331).

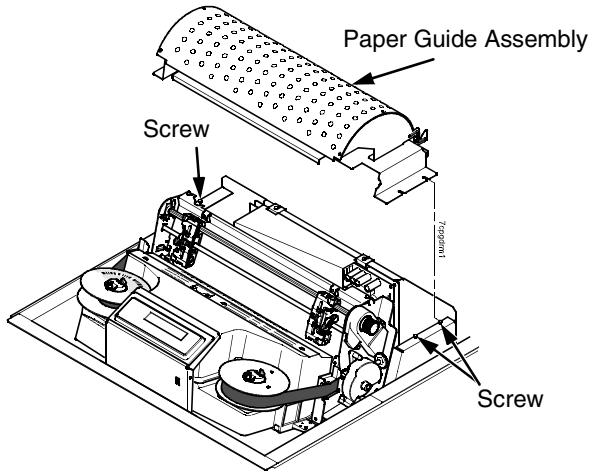


Figure 19. This figure shows how to remove the paper guide assembly from the card cage.

Paper Ironer


CAUTION

<2> 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. Remove the shuttle frame assembly (page 380).
2. Open the forms thickness lever.
3. Push the ends of the paper ironer toward the rear of the printer, disengage the tabs, then lift it up and out (page 431, Figure 45, item 3).
4. 6500-D6C, -D8C, -v15, and 6500-v20 models only: remove the auxiliary paper ironer, which is directly in front of the standard paper ironer

Installation

NOTE: The black tape on the paper ironer faces the paper detector switch assembly (toward the front of the printer).

1. Position the paper ironer so that the black tape is on the side that faces the paper detector switch assembly. (See page 431, Figure 45, item 3.)
2. Push the paper ironer down into the slots until the tabs engage.
3. 6500-D6C, -D8C, -v15, and 6500-v20 models only: install the auxiliary paper ironer in front of the standard paper ironer. (See also the NOTE on page 431, next to item 3.) Make sure the tabs on both paper ironers are firmly engaged.
4. Install the shuttle frame assembly (page 380).
5. Return the printer to normal operation (page 331).

Platen

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the shuttle frame assembly (page 380).
3. Remove the paper ironer (page 367).
4. Remove the three 1/4 inch screws securing the paper ironer bracket assembly and remove the assembly. (See page 431, Figure 45, items 4 through 6.)
5. Remove the platen open belt (page 335).
6. Remove the platen pulley page 431, Figure 45, item 21):
   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 431, Figure 45, 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 431, Figure 45, 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 431, Figure 45, 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 Figure 46, page 434, item 11, 13, and 14.)
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 shaft as you remove the platen. Make sure the copper wear saddles in the platen seat of the mechanism base stay in place.)

Installation

IMPORTANT **The dowel pins protruding from the ends of the platen are the platen shafts, and are not equal in length. The platen must be installed with the longer shaft on the right side as you face the printer from the front.**

1. Wipe the platen shafts clean of grease and debris.
2. Install two washers on the longer (right) platen shaft. (See Figure 20.)
3. Apply bearing lubricant to both platen shafts.

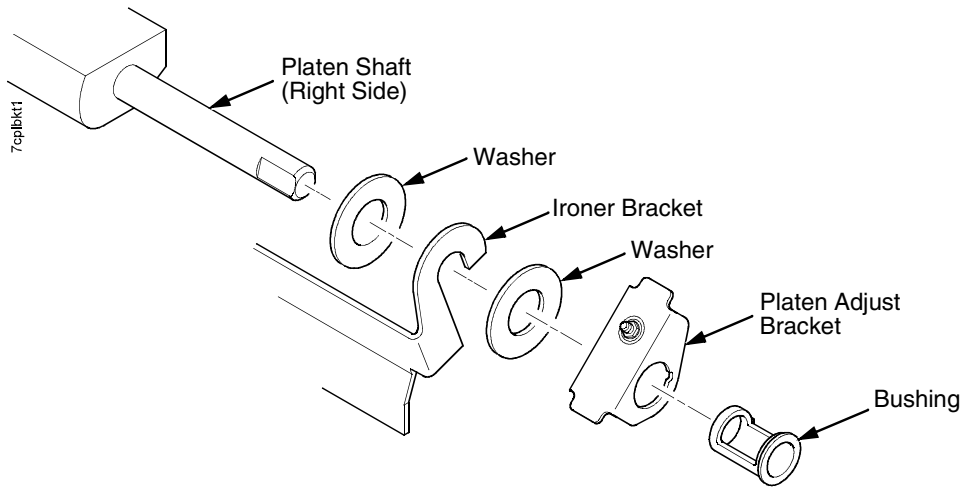


Figure 20. This figure shows how to Install the platen adjust bracket on the right side platen shaft.

4. Make sure the two wear saddles are set flush into the corners of the mechanism base platen seat. (See Figure 21.)
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.
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 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 adjustment brackets as shown in Figure 20.

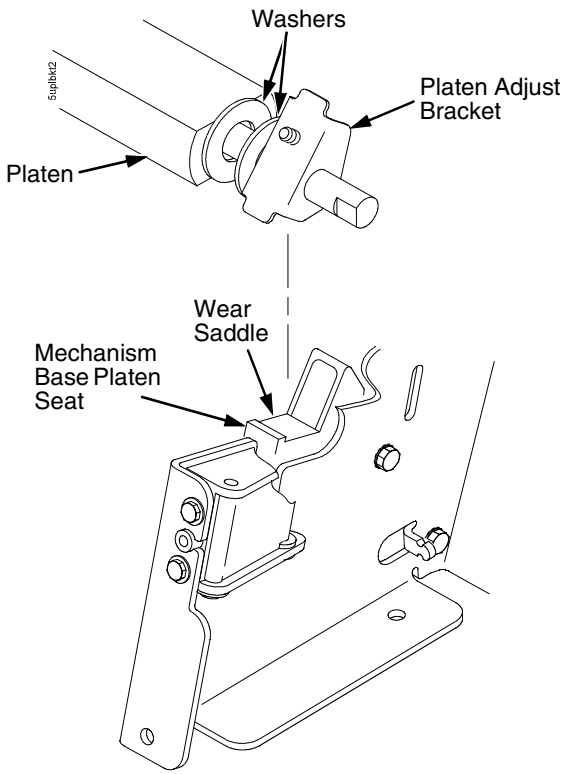


Figure 21. This figure shows how to position the platen adjust brackets on the mechanism base and wear saddles.

9. Slide the right ribbon guide assembly into the side plate and install the two 7/32 inch screws and washers. (See Figure 46, page 434, items 11, 13 and 14.)
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 Figure 45, page 431, item 26.)
12. Apply bearing lubricant to the nylon bearings in the two spring links, slide the spring links onto the two platen shafts, and connect the springs to the spring hooks in the side plates. (See Figure 45, page 431, items 16, 17, and 18.)

13. Apply bearing lubricant to the two platen shafts on both sides, between the ends of the platen and the platen adjustment brackets.
14. Install the paper ironer bracket. (See Figure 20, page 369):
    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 goes between the left platen adjustment bracket and the platen.

       For the right side of the platen, a washer goes on both sides of the paper ironer hook and the hook goes to the left of the right platen adjustment bracket. (See Figure 20, page 369.)

    b. Install and torque three screws to 20 ± 2 inch-pounds (2.26 ± 0.23 N•m).
15. Push the platen to the left.
16. Install the platen stop assembly onto the right side platen shaft, pressing the interlock switch out of the way as the lever slides past it. Tighten the 7/64 inch clamp screw. (See Figure 45, page 431.) 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. 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 and platen open motor pulley (page 335).
19. Install the paper ironer with the black tape towards the rear of the printer (page 367).
20. Install the shuttle frame assembly (page 380).
21. Adjust the platen gap (page 392).
22. Adjust the platen open belt (page 389).
23. Check ribbon guide alignment (page 394).
24. Check the hammer phasing (page 399).
25. Return the printer to normal operation (page 331).

Platen Stop Assembly

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

Removal

1. Prepare the printer for maintenance (page 330).
2. Loosen—do not remove—the 7/64 inch clamp screw and pull the platen stop assembly off the platen shaft. (See page 431, Figure 45, items 12 through15.)

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. Tighten the 7/64 inch clamp screw. (See Figure 45, page 431.) 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 331).

Resistors, Terminating

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 22, page 374.)

If the standard terminating resistor pack is not compatible with the 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-Up)	RP2 (Pull-Down)
Factory Default	470 Ohm	1K Ohm
Alternate 1	220 Ohm	330 Ohm
Alternate 2	1K Ohm	None

Removal

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Locate the terminating resistor packs. (See Figure 22, page 374.)
4. Using a chip puller, remove the packs.

Installation

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

1. Using a chip installation tool, install the resistor packs in the correct socket. (See Figure 22, page 374.)
2. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
3. Return the printer to normal operation (page 331).

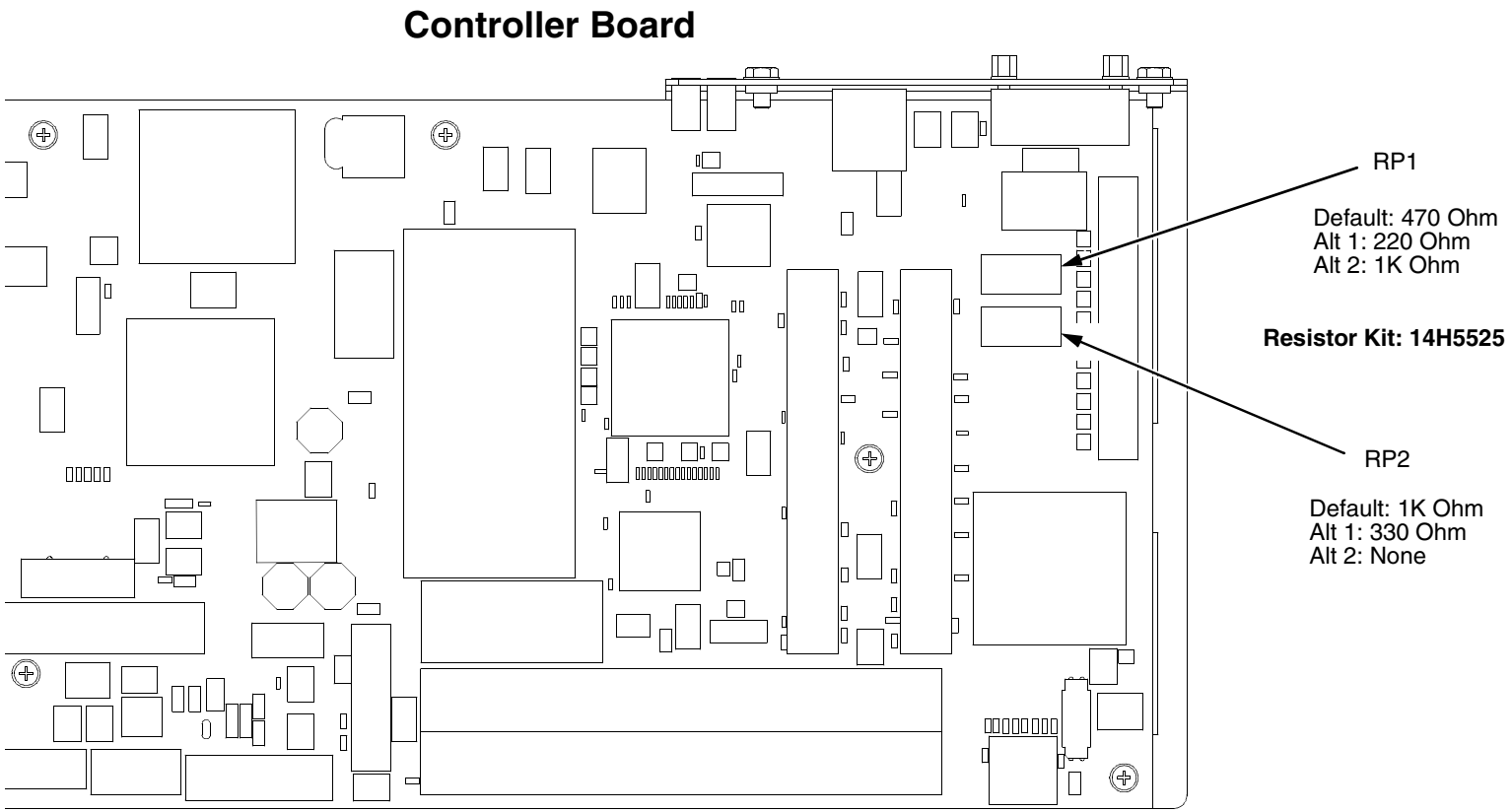


Figure 22. This figure shows the size and location of the terminating resistors on the controller board.

Ribbon Guide Assembly (L/R)

Removal

1. Prepare the printer for maintenance (page 330).

NOTE: The right ribbon guide is shown in Figure 46. The removal procedure is the same for the left ribbon guide.

2. Cut and remove the tie wrap from the tie wrap hole to free the ribbon guide cable (page 434, Figure 46).
3. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
4. Trace the ribbon guide cable back to the controller board, releasing it from the cable restraints as you go. (See cable routing diagrams on page 298 and page 299.)
5. For the left ribbon guide, disconnect connector shell P106 from the controller board. For the right ribbon cable, disconnect connector shell P107 from the controller board.
6. Trace the ribbon guide wires to the connector shell, and remove the cable connector from the connector shell (page 340).
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.
8. Slide the ribbon guide assembly out of the side plate.

Installation

NOTE: The right ribbon guide is shown in Figure 46. The installation procedure is the same for the left ribbon guide.

1. Reverse steps 2 through 8 of the removal procedure above.
2. Align the ribbon guides (page 394).
3. Return the printer to normal operation (page 331).

RibbonMinder** Sensor

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Remove the screw securing the RibbonMinder sensor to the base casting. (See page 431, Figure 45, 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 RibbonMinder 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 331).

Shaft, Splined

IMPORTANT **NOTE: 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 330).
2. Remove the static brush assembly.
3. Remove the paper supports from the splined shaft and support shaft. (See page 429, item 4.)
4. Remove the paper feed timing belt (page 334).
5. Unlock the left and right tractors and slide them to the center of the shaft.
6. Remove the screw securing the right tractor shaft plate and remove the plate (page 429, items 7 and 8).
7. 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 429, items 3, 5, and 6).
8. 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 23.)
2. Grasping the vertical adjustment knob, 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 23.)
3. Install the tolerance ring on the left end of the splined shaft (page 429, item 5).
4. Insert the tolerance ring lead-in portion into the sealed ball bearing in the left tractor shaft plate (page 429, 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 right side plate. The splined shaft will protrude about 1/16 inch from the ball bearing.
5. Install the right tractor shaft plate and screw (page 429, 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 334).
7. Set the paper feed timing belt tension (page 387).

8. Install the paper supports on the splined and support shafts. (See page 429, item 4.)
9. Install the static brush assembly.
10. Return the printer to normal operation (page 331).

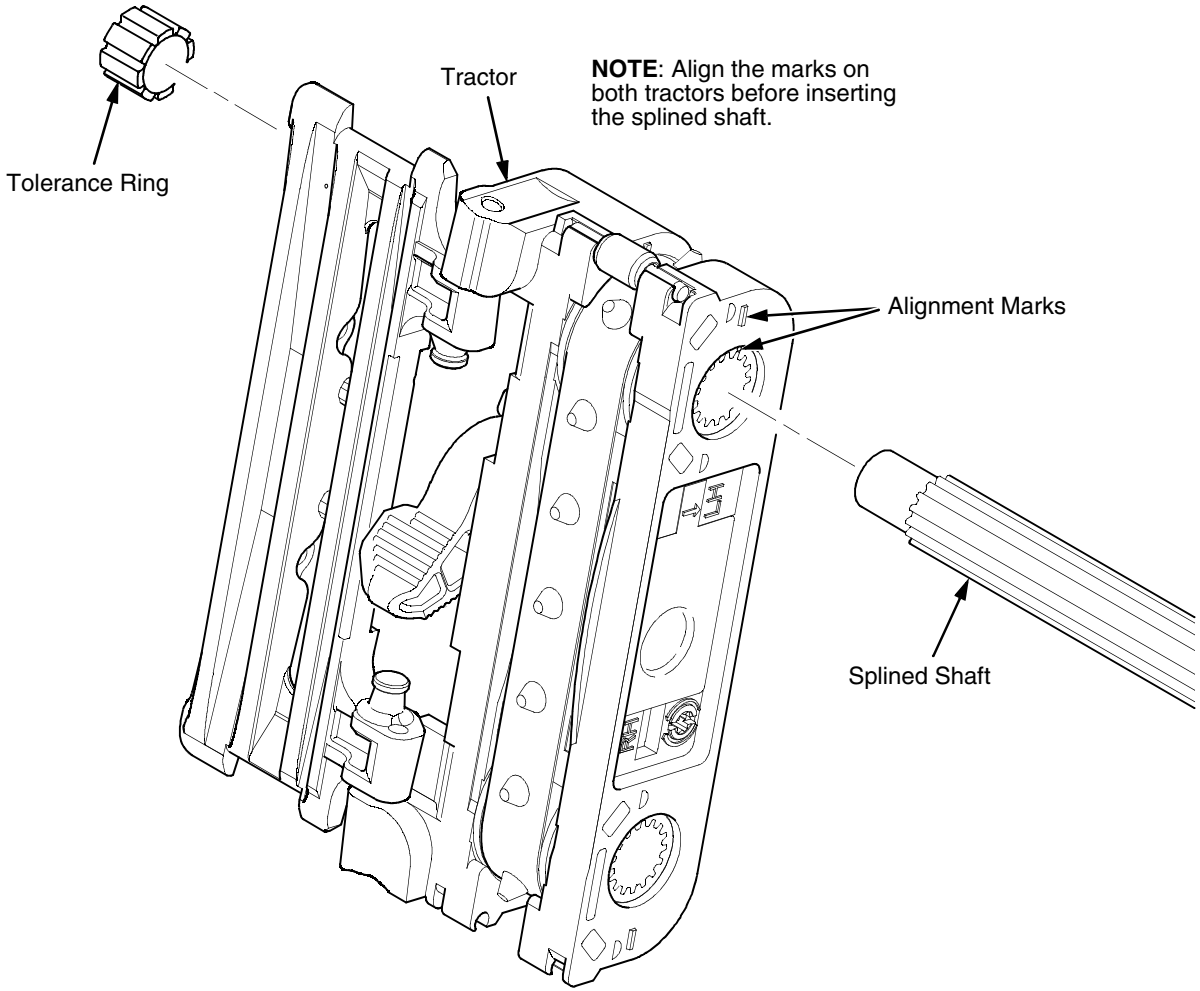


Figure 23. This figure shows how to install the splined shaft into the paper feed tractors.

Shaft, Support

IMPORTANT

NOTE: 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 330).
2. Unlock the tractors and slide them to the far right.
3. Remove the static brush assembly.
4. Remove the paper supports from the splined shaft and support shaft. (See page 429, item 4.)
5. Remove the screw and right tractor shaft plate (page 429, items 7 and 8).

NOTE: Hold the tractors while removing the support shaft.

6. Slide the support shaft to the right, out of the tractors and the right side plate. (See page 429, items 9 and 10.)

Installation

1. Slide the support shaft into the right side plate and through the lower holes in the tractors. (See page 429, 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 429, items 2 and 12.)
3. Install the right tractor shaft plate and screw (page 429, 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 429, item 4.)
5. Install the static brush assembly.
6. Insert the lower ends of the paper supports into the groove in the upper forward edge of the platen.
7. Return the printer to normal operation (page 331).

Shuttle Frame Assembly

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 343).
4. Disconnect the MPU cable connector (page 427, Figure 43).

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

5. Disconnect the shuttle motor cable connector (page 424, Figure 42).
6. Disconnect the hammer drive and hammer logic cables connectors from the terminator board on the shuttle frame assembly.
7. Loosen the side 5/32 inch socket head clamp screws and pull the clamps back and off the guide shaft. Do not remove the clamps.
8. Loosen the center 5/32 inch socket head screw enough to release the shuttle frame assembly from the base casting.
9. Unlock and slide the tractors outward as far as they will go on the tractor support shaft.
10. Grasping the support legs cast on both sides of the shuttle motor, lift the shuttle frame assembly out of the base casting. **Lift it slowly and carefully: the shuttle frame assembly is heavy; it weighs about 18 pounds (8 Kg).**

Installation

1. Install the hammer bank / ribbon mask cover assembly (page 342), if it was removed.

ATTENTION **To prevent electrostatic damage to electronic components, wear a properly grounded static wrist strap when handling circuit boards, the shuttle frame assembly, and any other electronic component.**

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. Holding the shuttle frame assembly by the support legs cast on both sides of the shuttle motor, set it into the base casting. **Use both hands: the shuttle frame assembly is heavy** (page 424, Figure 42).
3. 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.
4. Pull the shuttle frame assembly toward the front of the printer and hold it in this position while you do step the next step.

IMPORTANT **Do not over tighten the shuttle frame assembly hold-down screws.**

5. Slide the side clamps over the guide shaft and torque the 5/32 inch socket head clamp screws to 30 ± 2 inch-pounds (3.39 ± 0.23 N•m).

NOTE: Use the 1-30 inch-pound Torque Screwdriver, IBM part number 16F1661.

6. Torque the center captive 5/32 inch socket head screw to 30 ± 2 inch-pounds (3.39 ± 0.23 N•m).
7. Connect the hammer drive and hammer logic cable connectors to the terminator board on the shuttle frame assembly.
8. Connect the shuttle motor cable connector.
9. Route the MPU cable under the extension spring and connect the MPU cable connector. (See Figure 43, page 427, item 4.) Make sure the MPU cable does not touch the extension spring after it is connected.
10. If the shuttle frame assembly is a new or refurbished unit, adjust the platen gap (page 392); otherwise, skip to step 11.
11. Install the shuttle cover assembly (page 343).
12. Install the ribbon. (Refer to the *User's Manual*.)
13. Models 6500-D6C, -D8C, -v15, and 6500-v20: adjust the coil temperature if the original shuttle frame assembly was replaced (page 401).
14. Adjust the hammer phasing (page 399).
15. Return the printer to normal operation (page 331).

Spring, Extension, Hammer Bank

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

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 343).
4. Unhook the extension spring from the spring lugs on the hammer bank and shuttle frame. (See Figure 43, page 427.)

Installation

1. Put a dab of IBM #20 bearing lubricant on both spring lugs.

ATTENTION **Make sure the extension spring does not touch the MPU cable after installation.**

2. Hook the extension spring over the spring lugs. (See Figure 43, page 427.)
3. Install the shuttle cover assembly (page 343).
4. Install the ribbon. (Refer to the *User's Manual*.)
5. Return the printer to normal operation (page 331).

Switch Assembly, Paper Detector

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Remove the two screws securing the paper detector switch assembly. (See Figure 46, page 434, items 3 and 4.)
4. Trace the paper detector switch cables back to the controller board, releasing the cables from the restraints under the base casting. (See cable routing diagrams on page 298 and page 299.)
5. Disconnect connector shell P106 from the controller board.
6. Remove switch cable connectors PMD and POD from connector P106 (page 340).
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 screws securing it to the printer base. (See Figure 46, page 434, items 3 and 4.)
2. Check the PMD sensor arm range: make sure it travels freely and completely back into the sensing cavity.
3. Route switch cables PMD and POD back to the controller board, installing the cables in the restraints under the base casting. (See cable routing diagrams on page 298 and page 299.)
4. Connect switch cables PMD and POD to the connector P106 (page 340), then connect P106 to controller board connector J106.
5. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
6. Check and adjust the End of Forms Distance (page 396).
7. Return the printer to normal operation (page 331).

Switch Assembly, Platen Interlock

Removal

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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 on page 298 and page 299.)
5. Disconnect connector shell P107 (P7) from the controller board.
6. Remove the platen interlock cable connector from the connector shell (page 340).
7. Remove two screws securing the platen interlock switch assembly. (See Figure 45, page 431.)
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. Fully close the forms thickness lever (position ‘A’).
2. Position the platen interlock switch assembly on the switch bracket and install finger tight the two screws securing it to the bracket. (See Figure 45, page 431, item 11.)
3. Insert a 0.011 inch (0.028 cm) feeler gauge between the bottom of the interlock switch assembly and the shaft of the platen stop assembly, gently push down on the interlock switch, and torque the mounting screws to 8 inch-pounds (0.9 N•m). Remove the feeler gauge.
4. Route the switch cable through the cutout in the right side plate and to the controller board. (See cable routing diagrams on page 298 and page 299.)
5. Connect the platen interlock switch cable to the connector shell P107 (P7) (see page 340), then connect the connector shell to the controller board.
6. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
7. Return the printer to normal operation (page 331).

Tractor (L/R)

Removal

1. Prepare the printer for maintenance (page 330).
2. Remove the splined shaft (page 377).
3. Remove the support shaft (page 379).
4. Remove the tractors.

Installation

1. Using the replacement tractors, install the support shaft (page 379).
2. Install the splined shaft (page 377).
3. Return the printer to normal operation (page 331).

Adjustment Procedures

Infoprint 6500 printers are durable, low-maintenance machines, but some components and systems require occasional adjustment.

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

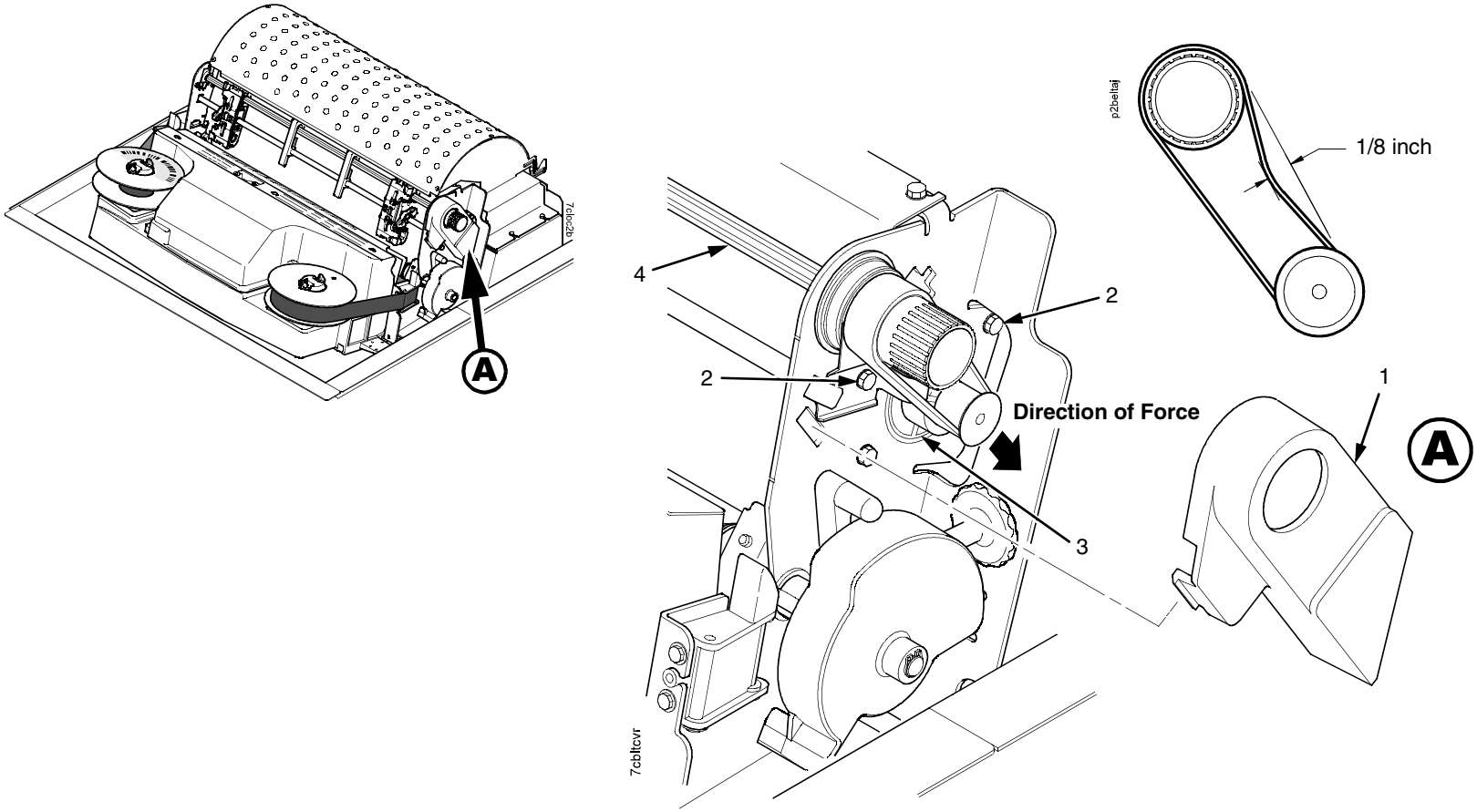
List Of Adjustments

Belt, Paper Feed Timing, Adjustment (Figure 24)

1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
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 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) near the mounting base of the motor. Use the splined shaft (4) to steady the gauge.
6. Reduce tension to 12 pounds (53.4 N) and torque the paper feed motor mount bolts (2) to 18 ± 2 inch-pounds (2.03 ± 0.23 N•m).

NOTE: Belt tension is correct if the belt deflects 1/8 inch midway between the pulleys, using a deflection force of 2 to 4 pounds (approximately 9 to 18 Newtons).

7. Snap the timing belt cover (1) into the slots in the side plate.
8. Cabinet Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
9. Return the printer to normal operation (page 331).



Legend:

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

Figure 24. This figure shows how to adjust the paper feed timing belt.

Belt, Platen Open, Adjustment (Figure 25)

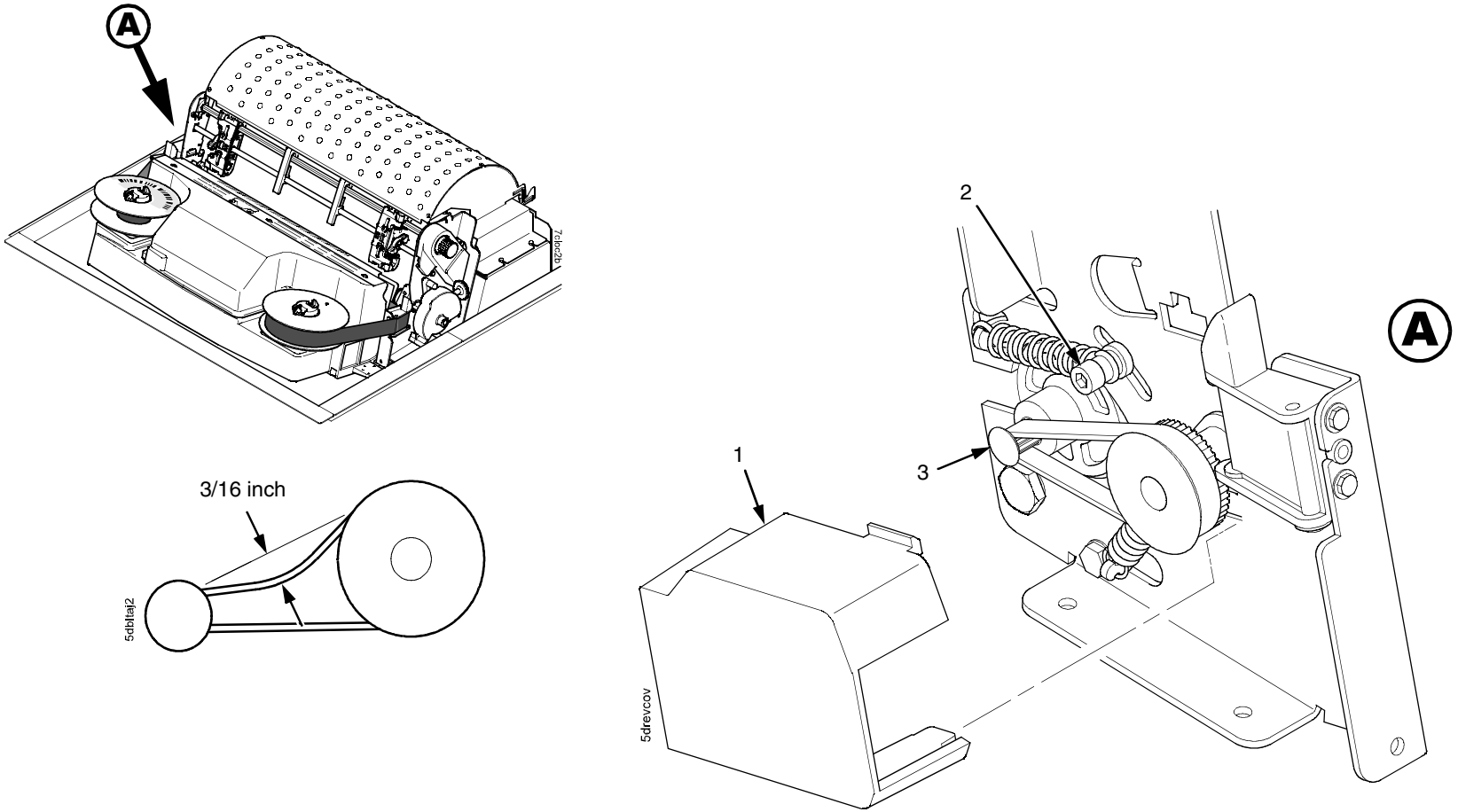
1. Prepare the printer for maintenance (page 330).
2. Cabinet Model: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
3. Remove the platen open belt cover (1) by squeezing the top and bottom to release the plastic tabs from the slots in the side 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.

ATTENTION **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 midway between the pulleys, using a deflection force of 2 to 4 pounds (approximately 9 to 18 Newtons). 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 Model: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
10. Return the printer to normal operation (page 331).



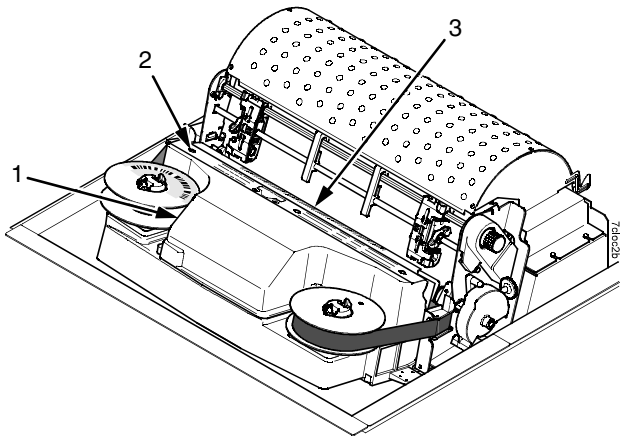
Legend:

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

Figure 25. This figure shows how to adjust the platen open belt.

Paper Scale Alignment (Figure 26)

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 343).
6. Print a full 136 column line by selecting and running one of the operator print tests (page 229).
7. Check alignment of the scale to the print at column positions 1 and 136.
8. If adjustment is necessary, loosen the three button-head 5/64 inch 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 screws (2).
11. Close the printer cover.



Legend:

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

Figure 26. This figure shows how to adjust the paper scale.

Platen Gap Adjustment (Figure 27)

IMPORTANT **Only do this procedure if the original equipment shuttle frame assembly or platen has been replaced by a new or refurbished unit.**

1. Prepare the printer for maintenance (page 330).
2. Remove the ribbon and paper. (Refer to the *User's Manual*.)
3. Remove the shuttle cover assembly (page 343).
4. Loosen the platen open belt (page 389, 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.

ATTENTION **Do not force the platen against the feeler gauge. Damage to the hammer tips will result.**

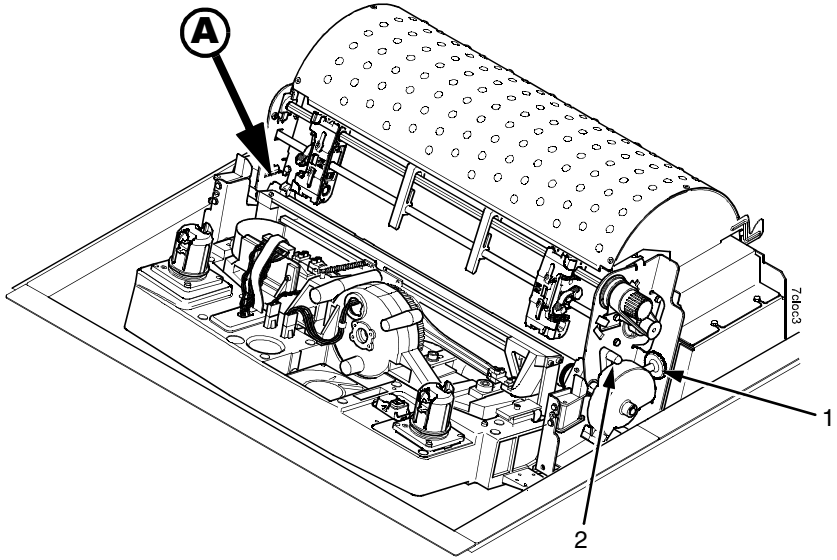
7. Insert a 0.012 inch (0.30 mm) flat feeler gauge (3) straight down between the hammer bank cover plate (4) and ribbon mask (5), within four hammer positions of the left end of the hammer bank.

ATTENTION **Adjust the platen set screws less than 1/4 turn on one side, then check the other side. Adjustment sensitivity is approximately 0.03 inch per revolution of the set screw. Also, insert the feeler gauge no more than two inches down from the top of the ribbon mask.**

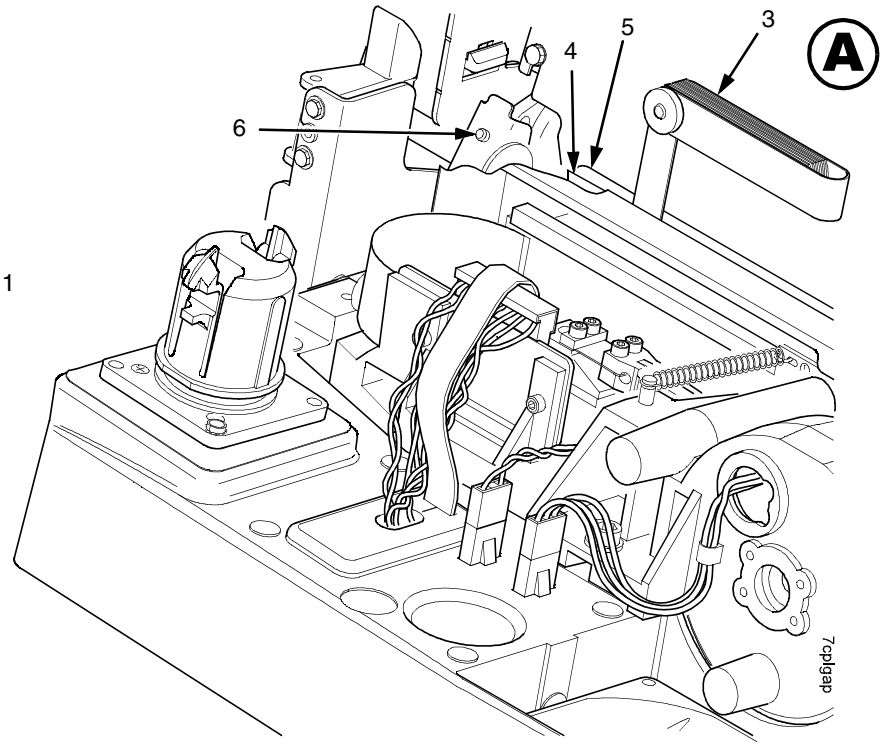
8. Gently close the forms thickness lever (2). As the platen is closing, gently slide the feeler gauge up and down, keeping it between the hammer tips and ribbon mask. If the feel is too tight as the platen closes, adjust the 3/32 inch set screw (6) counterclockwise. If the feel is too loose, adjust the set screw clockwise. With the forms thickness lever closed all the way, the feeler gauge should contact both the 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 389).

NOTE: Gap widths other than 0.012 inch (0.30 mm) in the middle and inner sections of the platen are okay, provided the gap at each end of the platen is 0.012 inch (0.30 mm).

12. Install the shuttle cover assembly (page 343).
13. Install the ribbon. (Refer to the *User's Manual*.)
14. Check the hammer phasing adjustment (page 399).
15. Return the printer to normal operation (page 331).



NOTE: Left side adjustment shown. Right side is the same.



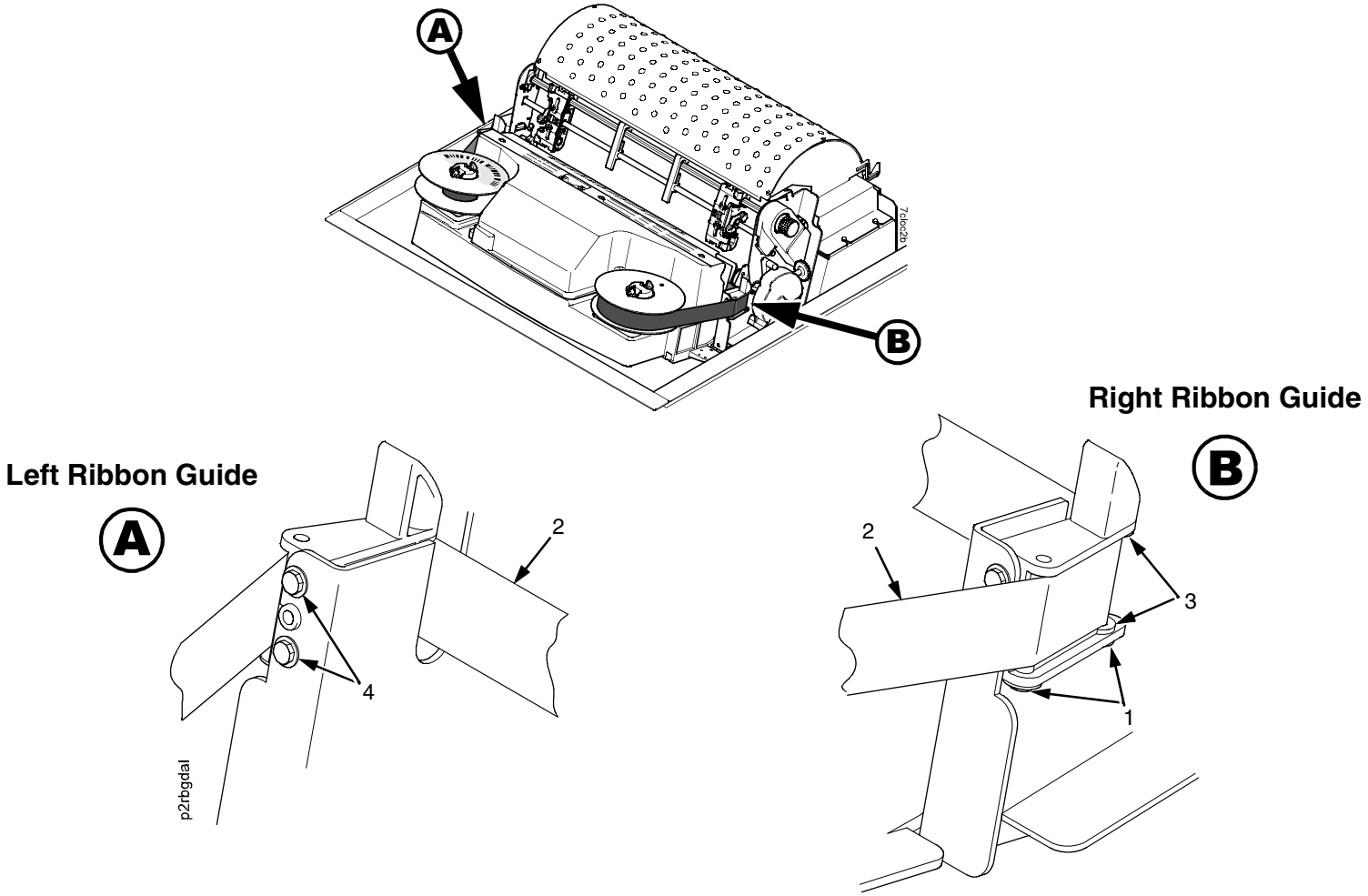
Legend:

1) Platen Stop Knob
2) Forms Thickness Lever
3) Feeler Gauge (0.012 inch or 0.30 mm)
4) Hammer Bank Cover
5) Ribbon Mask
6) Set Screw, 3/32 inch hex (2)

Figure 27. This figure shows how to adjust the platen gap.

Ribbon Guide Alignment (Figure 28)

1. Open the printer cover.
2. Load paper.
3. Install the ribbon. (Refer to the *User's Manual*.)
4. Using the PRINTER MECHANISM TESTS: Shuttle Slow test (page 232), 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 PRINTER MECHANISM TESTS: Shuttle Slow (page 232).
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 steel 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.



Legend:

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

Figure 28. This figure shows how to align Ribbon Guide Alignment

Adjusting The End Of Forms Distance

This procedure tests and sets the distance from the page perforation at which an END OF FORMS 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 END OF FORMS ADJUST self-test to verify that this parameter is set correctly.

NOTE: Do this procedure only if a new paper detector switch assembly has been installed, or if you are sure that the end of forms adjustment is incorrect. An END OF FORMS triggering distance of 1 or 2 dot rows from the perforation is acceptable; 5 to 7 dot rows off indicates adjustment is required.

Also, although it is not required, it is advisable to test the End of Forms distance with 6-part paper, in order to verify correct printing with multi-part forms.

The procedure below describes how to run the END OF FORMS ADJUST printer test and modify the END OF FORMS ADJUSTMENT VALUE.

1. Power on the printer.
2. Load paper and set the top of form. Make sure the forms thickness lever is closed. Open the cabinet front door.
3. 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 29.) This creates a hole that will trigger an END OF FORMS condition, but allows printing to the right of the hole (which would occur on the platen in a true paper out condition).
4. Cut or tear a four inch square in the manner described above, on every third sheet, until you have made 3 or 4 holes.
5. If the printer is in READY mode, press **STOP** to put it in NOT READY mode.
6. Press **RETURN + ENTER** to unlock the Enter key.
7. Press **MENU + CONFIG + SCROLL** ↑ **+ SCROLL** ↓ to enter the CE Tests menu. (Press all four keys at the same time.)

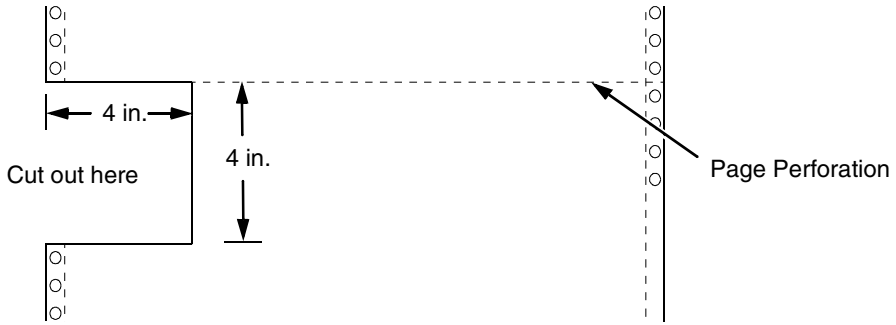


Figure 29. This figure shows how to prepare paper for the paper out adjustment test.

8. The display will show “SERVICE / PRINTER MECHANISM TESTS”, the first menu item. Press **Enter** to enter the mechanism tests menu.
9. Press **SCROLL**↑ or **SCROLL**↓ until “PRINTER MECHANISM TESTS / END OF FORMS ADJUST” is on the display.

   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.

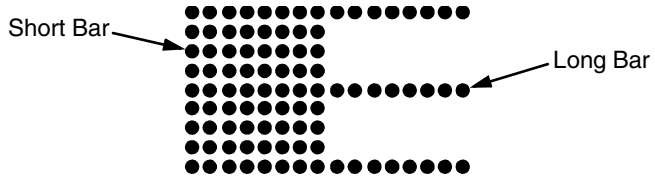


Figure 30. This figure shows the long and short bars on the vertical comb pattern that prints for the forms adjustment test.

10. Press **ENTER** until the END OF FORMS ADJUST test starts.
    The comb pattern will print until the display shows “001 END OF FORMS / LOAD FORMS.”
11. Remove the paper from the tractors and examine the area of the page perforation.

    If a bar from the comb pattern just meets the perforation, the end of forms adjustment distance is correct. (A bar exactly on perforation is ideal; 1 or 2 dot rows off is OK; 5 to 7 dot rows off is too much.) Unless you wish to restart the procedure with 6-part paper, you may stop the test here, and skip to step 22. (See the note at the beginning of this procedure.)

    If the comb pattern stopped short of the perforation or printed beyond the perforation, go to step 12.
12. 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.

13. Reload the paper and set the top of form.
14. Press **MENU + CONFIG + SCROLL** ↑ **+ SCROLL** ↓ to enter the CE Tests menu. (Press all four keys at the same time.)
15. The display will show “SERVICE / PRINTER MECHANISM TESTS,” the first menu item. Press **SCROLL**↑ or **SCROLL**↓ until “SERVICE / END OF FORMS ADJUSTMENT VALUE” is on the display.
16. Press **ENTER**. The top line of the display will show “END OF FORMS ADJUSTMENT VALUE” and the bottom line will show the current setting for the number of dots.

17. Press **ENTER**. The number of dots will move up to the top line of the display.
18. Using the **SCROLL**↑ or **SCROLL**↓ key, adjust the *XX* DOTS value up or down by the number of dots you counted in step 12. (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.)
19. 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.)
20. Press **STOP** to put the printer into NOT READY mode.
21. Run the END OF FORMS ADJUST and the END OF FORMS ADJUSTMENT VALUE tests until the comb pattern prints at an acceptable distance from the page perforation. (Return to step 7.)
22. When the End of Forms Adjustment is acceptable, reload the paper, feed it past any remaining unused holes that you tore in it, and set the top of form.
23. Press **RETURN + ENTER** to lock the **ENTER** key.
24. Press **START** to put the printer into READY mode.

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 horizontal 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 124 PAPER FIFO UNDERFLOW occurs, the phase value may be too high. Try a lower value.

The factory prints the initial phase value on the aluminum casting of the shuttle assembly, next to the motor housing. Adjust the phasing to this value and recheck the horizontal alignment. When 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 NVRAM. If the value is changed when not printing, the printer will return to its default phasing value when powered off then back on.**

1. Install the ribbon.
2. Load full width (136 column) paper.
3. Power on the printer and set top of form.
4. Press **STOP** to put the printer into NOT READY mode.
5. Press **RETURN + ENTER** to unlock the Enter key.
6. Press **MENU + CONFIG + SCROLL** ↑ **+ SCROLL** ↓ to enter the CE Tests menu. (Press all four keys at the same time.)
7. The display will show “SERVICE / PRINTER MECHANISM TESTS”, the first menu item. Press **ENTER** to enter the mechanism tests menu.
8. Press **SCROLL**↑ or **SCROLL**↓ until “PRINTER MECHANISM TESTS / HAMMER PHASING” is on the display.
9. Press **ENTER**. The printer begins printing all H’s, each line preceded by the phasing index number.
10. Press **RETURN**. The display will show “SERVICE / PRINTER MECHANISM TESTS”.
11. Press **SCROLL** ↑ or **SCROLL** ↓ until “SERVICE / HAMMER PHASE VALUE” is on the display.
12. Press **ENTER**. The top line of the display will show “HAMMER PHASE VALUE” and the bottom line will show the current phasing index number.

13. Press **ENTER**. The phasing index (followed by an asterisk) will move up to the top line of the display.
14. Press **SCROLL** ↑ or **SCROLL** ↓ to increase or decrease the phasing index, then press **ENTER** to activate the value as it prints. Continue to increase or decrease the phasing index until the pattern of H's appears as shown below:

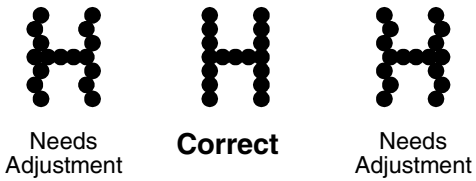


Figure 31. This figure shows incorrect and correct H patterns to illustrate vertical misalignment of text characters.

15. When the print pattern is acceptable, press **STOP**. Printing stops, and the printer automatically enters the current phase index value into NVRAM. The display shows "NOT READY".
16. Press **RETURN + ENTER** to lock the **ENTER** key.
17. Close the printer cover. Press **START** to put the printer into READY mode.

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

Coil Temperature Adjustment

This procedure applies only to models 6500-D6C, -D8C, -v15, and 6500-v20.

Do this procedure if the printer's original controller board, power supply board, or shuttle frame assembly have been replaced.

Do not do this procedure if the controller board, power supply 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. Raise the printer cover.
2. Power on the printer.
3. If the printer is in the READY state, press the **STOP** key. The printer must be in the NOT READY state to do this procedure.
4. Press **MENU + CONFIG + SCROLL** ↑ **+ SCROLL** ↓. (Press all four keys at the same time.)
   "SERVICE / PRINTER MECHANISM TESTS" appears on the display.
5. Press **RETURN + ENTER** to unlock the **ENTER** key.
6. Press the **SCROLL** ↑ or **SCROLL** ↓ key until "SERVICE / SET COIL TEMPERATURE" appears on the display.
7. Press **ENTE**R. The display tells you to "PLEASE WAIT" while the coil temperature is set by an automatic calibration sequence in printer software.
8. When the display again reads "SERVICE / SET COIL TEMPERATURE" press **RETURN + ENTER** to lock the **ENTER** key.
9. Press **STOP** to exit the menu and put the printer in the NOT READY state.

   - OR -

10. Press **START** to exit the menu and put the printer in the READY state.
11. Coil temperature is now set. Power off the printer and close the printer cover.

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. Make sure the ribbon is installed in the printer.
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 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. (See Figure 32.)
5. Fold a two-inch piece of plastic tape over the top sheet, mid way between the sides, as shown in Figure 32.

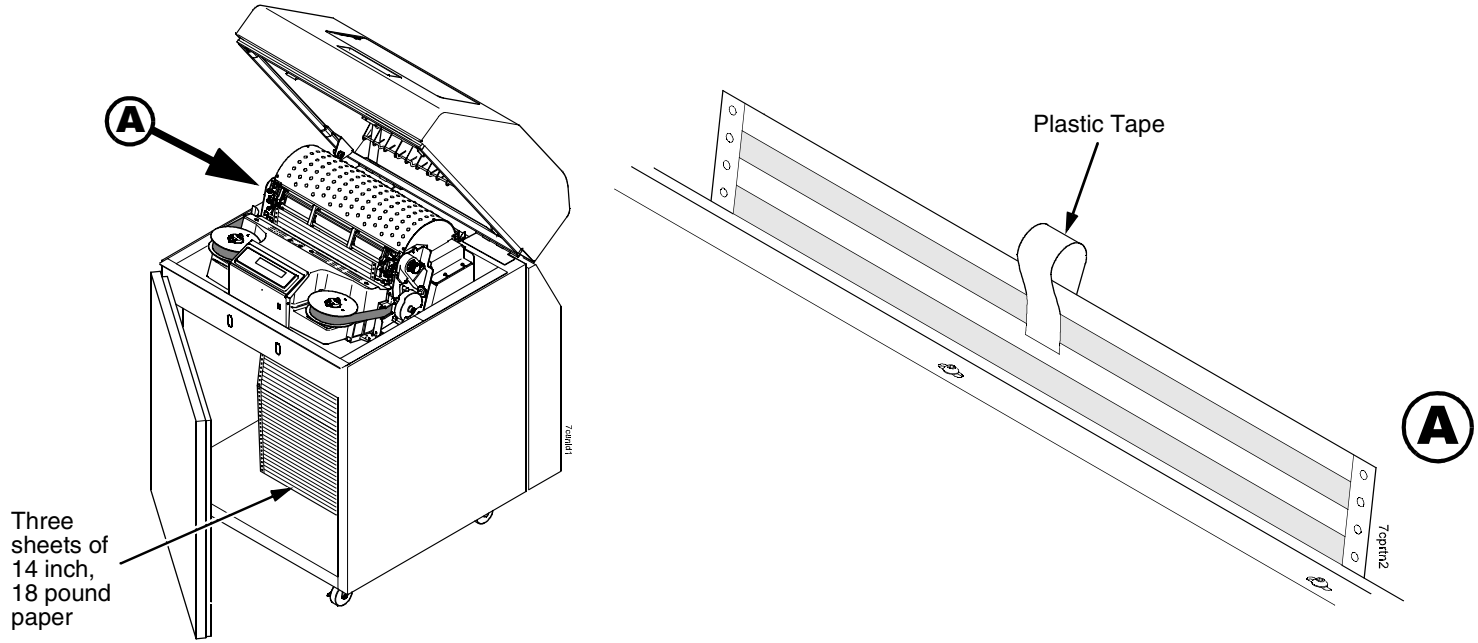


Figure 32. This figure shows how to prepare paper for measuring dynamic paper tension.

6. Close the forms thickness lever all the way (pointer at ‘A’).
7. Attach the hook of a “fish scale” force gauge through the tape you installed in step 5. (See Figure 33.)
8. 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. (See Figure 33.)

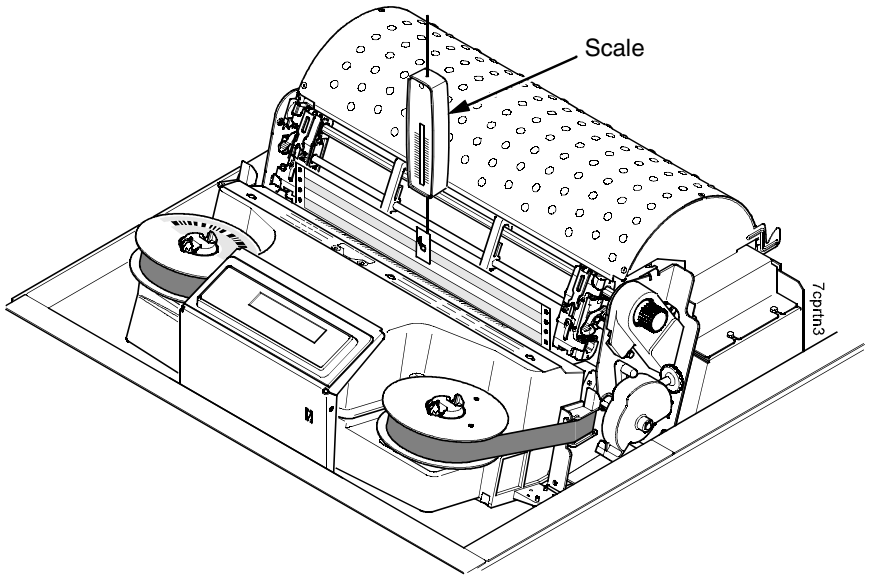


Figure 33. This figure shows how to use the “fish scale” to measure paper tension.

9. Repeat steps 6 through 8 several times and calculate the average value of force on the gauge.
10. The average tension should be 9 to 14 ounces (255 to 397 grams). If the average value is greater than 15 ounces (425 grams), paper handling and print quality problems are likely to occur.

11. If the average value is greater than 15 ounces, check the platen gap (page 392), adjust if necessary, and recheck the dynamic paper tension.
12. If the platen gap is correct, remove the shuttle frame assembly (page 380) and check the following:
    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. (See Figure 46, page 434.)
    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

Print compression can be reduced by adjusting the tension of the tractor belts. The procedure below removes the slack that might 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 402). Always adjust both tractors.**

1. Prepare the printer for maintenance (page 330).
2. Adjust the dynamic paper tension (page 402).
3. Carefully note the initial position of the adjustment screws. (See Figure 34.)

ATTENTION **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 clockwise one detent to increase tension. On the inner side of the right tractor, use a Torx T-10 driver to rotate the adjustment screw counter-clockwise one detent to increase tension. (See Figure 34.)
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 and call support for further assistance.
8. Return the printer to normal operation (page 331).

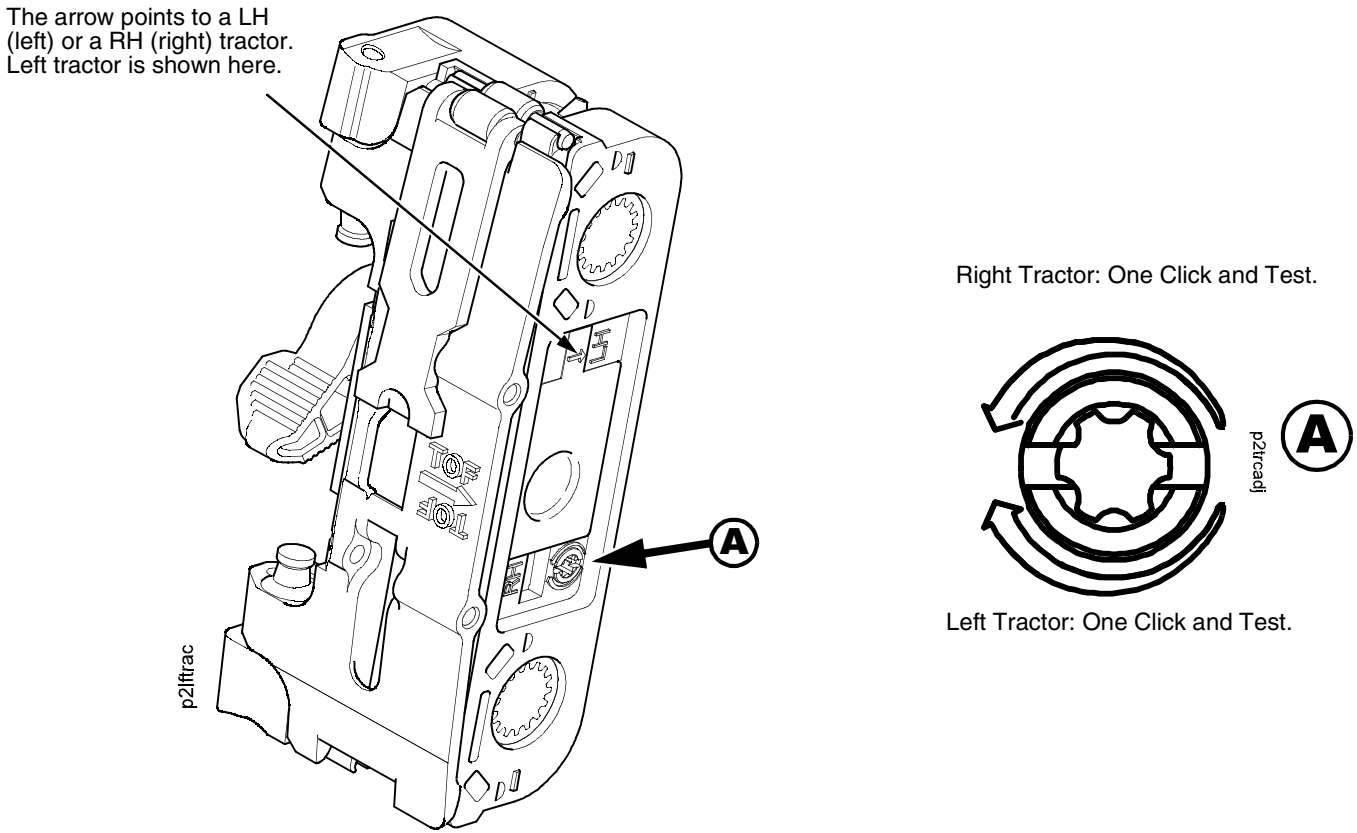


Figure 34. This figure shows how to adjust the tension of a tractor belt.

Ethernet Initialization

To initialize the ethernet interface, do the following steps:

1. Power on the printer.
2. Wait for “READY / ETHERNET ADAPTER IS READY” to display on the LCD.
3. If the printer is in the READY state, press the **STOP** key. The printer must be in the NOT READY state to do this procedure.
4. Press **MENU + CONFIG + SCROLL** ↑ **+ SCROLL** ↓. (Press all four keys at the same time.)
   “SERVICE / PRINTER MECHANISM TESTS” appears on the display.
5. Press **RETURN + ENTER** to unlock the **ENTER** key.
6. Press the **SCROLL** ↑ or **SCROLL** ↓ key until “SERVICE / PRINTER MGMT” appears on the display.
7. Press **ENTER**. “PRINTER MGMT / DIAGNOSTIC PORT” appears on the display.
8. Press **ENTER**. “DIAGNOSTIC PORT” (and the current diagnostic port setting) appears on the display. If the current setting is “DEBUG ETHERNET*”, go to step 11.
9. Press **SCROLL** ↑ until “DIAGNOSTIC PORT / DEBUG ETHERNET” appears on the display.
10. Press Enter. An asterisk (*) appears next to the selection, indicating it is now the diagnostic port.
11. Press **RETURN + ENTER** to lock the **ENTER** key.
12. Press **STOP** to exit the menu and put the printer in the NOT READY state.
13. Power off the printer, wait a few seconds, then power on the printer to activate the new diagnostic port.

6 *Parts Catalog*

Organization Of This Chapter

This chapter contains drawings of the electromechanical assemblies comprising the printer. Following each illustration is a list of the illustrated parts and their part numbers. Items marked “Ref” (reference) are not spared, or are part of another assembly, or are shown elsewhere.

Part numbers listed in the column labeled **RoHS Compliant** 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.

Illustrated Parts Breakdown

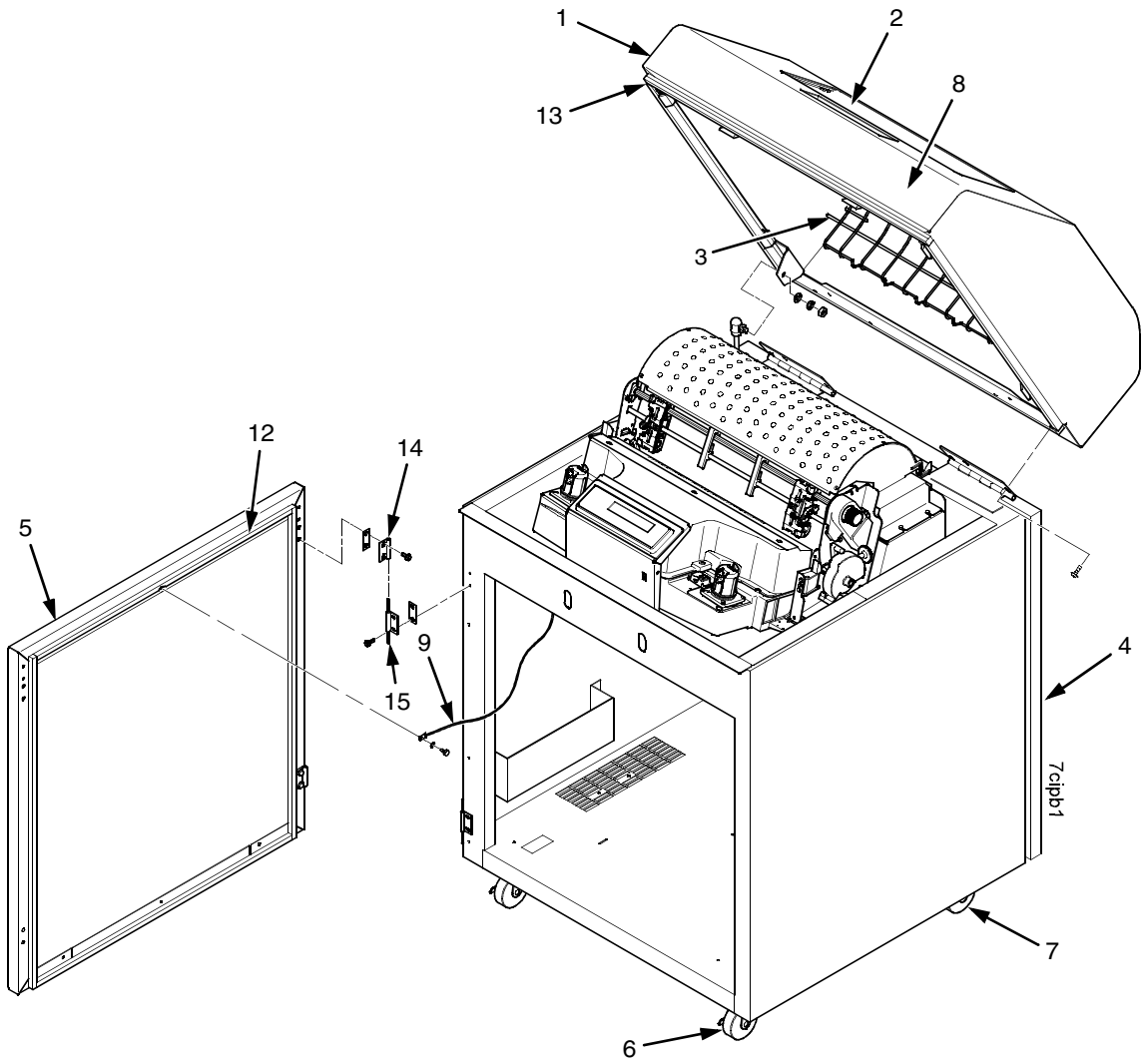


Figure 35. This illustrated parts breakdown shows the top cover, doors, casters, and shipping kit on a cabinet model.

(Figure 35)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2474	39U2474	Cover, Common Top, Cab (Black)	Includes mounting hardware
2	57G1492	57G1492	Window, Top Cover	Not visible in Figure 35
3	39U2512	39U2512	Wireform Paper Guide Assembly	
4	39U2475 39U3010 39U2489	39U2475 39U3010 39U2489	Front Door Assy, Stealth Black Rear Door Assy, Stealth Black (no power stacker) Rear Door Kit (with power stacker)	Includes item 14
5	39U2475	39U2475	Door Kit, F/R Cab (Black)	Includes item 14
6	57G1485	57G1485	Caster, with Brake	Two at front
7	57G1486	57G1486	Caster, without Brake	Two at rear
8	39U2477	39U2477	Logo, IBM Infoprint 6500	
9	30H4008	30H4008	Wire Rope, Front and Rear	One on each door (Rear not shown in Figure 35)
10	30H3986 24H8963	30H3986 24H8963	Re-Ship Kit, Cabinet Model, without power stacker Re-Ship Kit, Cabinet Model, with power stacker	Not shown in Figure 35 Not shown in Figure 35
11	14H5572	14H5572	Hardware Kit	Not shown in Figure 35. Contains all of the SAE fasteners used in the printer.
12	63H7510	63H7510	Door Seal Kit	
13	63H7398 30H4010	63H7398 30H4010	Top Cover Seal Kit Magnetic Seal	Foam only, three pieces Foam with magnet, one piece
14	93F7037	93F7037	Door Hinge, Top	Included in items 4 and 5
15	57G1484	57G1484	Door Hinge, Bottom	

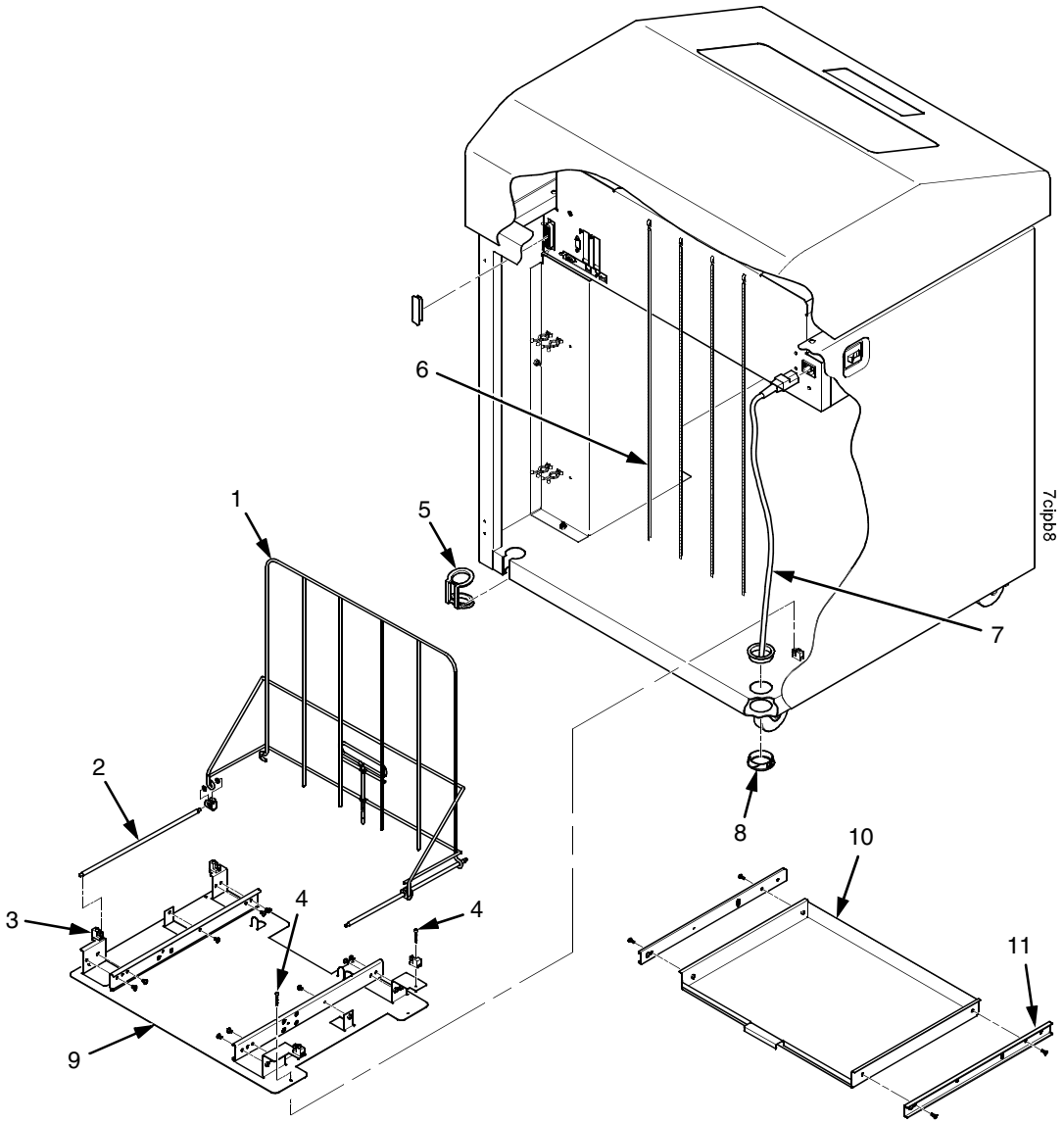


Figure 36. This illustrated parts breakdown shows the passive paper stacker and paper chains in a cabinet model.

(Figure 36)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	57G7176	57G7176	Passive Stacker	
2	30H3981	30H3981	Guide Rail, Stacker	
3	04H4779	04H4779	Clip, Rail	
4	Ref	Ref	Screw, 6-32 x 0.875 (4)	
5	14H5296	14H5296	Spares Kit, Grommet	
6	14H5272	14H5272	Chain Assembly Kit	Kit contains eight chains
7	57G7260	57G7260	Power Cord, U.S.	
8	Ref	Ref	Grommet, Power Cord (2)	Included in item 5
9	39U2545	39U2545	Field Kit, Tray, Cab, Rear, Black	Factory or field option. Includes items 10, 11, and power stacker paper tent 75P1183
10	Ref	Ref	Rear Tray	Part of item 9
11	75P1182	75P1182	Slide Set, Ball Bearing	Part of item 9

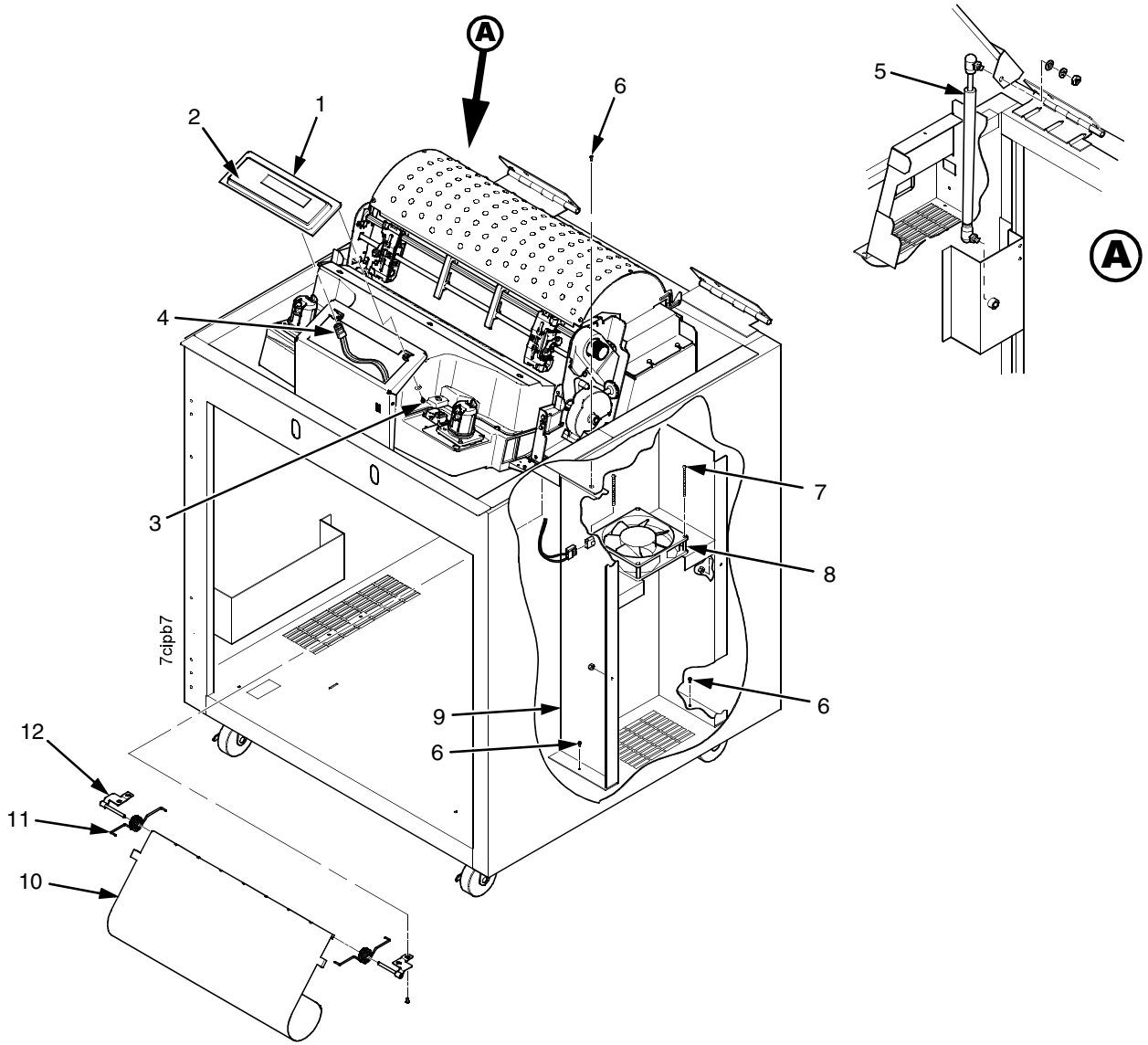


Figure 37. This illustrated parts breakdown shows the operator panel and cabinet details in a cabinet model.

(Figure 37)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2478	41U1137	Operator Panel, Cabinet	Includes mounting hardware
2	10R4007	10R4007	Operator Panel Overlay, English	
	10R4008	10R4008	Operator Panel Overlay, French	
	10R4009	10R4009	Operator Panel Overlay, German	
	10R4010	10R4010	Operator Panel Overlay, Spanish	
	10R4011	10R4011	Operator Panel Overlay, Italian	
	10R4012	10R4012	Operator Panel Overlay, Dutch	
	10R4013	10R4013	Operator Panel Overlay, Brazilian Portuguese	
	10R4014	10R4014	Operator Panel Overlay, Polish	
	42R8896	42R8896	Operator Panel Overlay, 6500-D China	
3	Ref	Ref	Screw, Hex w/Lock Washer (2)	6-32x.375
4	14H5300	14H5300	Cable Assy, Operator Panel	
5	57G1481	57G1481	Dashpot Kit	Includes ball studs, spring clips, and mounting hardware
6	Ref	Ref	Screw w/Lock Washer (3)	6-32x.375
7	Ref	Ref	Screw w/Lock Washer (2)	6-32x.175
8	57G1440	57G1440	Fan Assembly	
9	Ref	Ref	Duct, Air Exhaust	
10	10R4630	10R4630	Paper Entrance Guide	Model -D8C and -v20
11	10R4631	10R4631	Spring, Paper Entrance Guide (2)	Model -D8C and -v20
12	10R4632	10R4632	Bracket, Paper Entrance Guide, Right	Model -D8C and -v20
	10R4633	10R4633	Bracket, Paper Entrance Guide, Left	Model -D8C and -v20

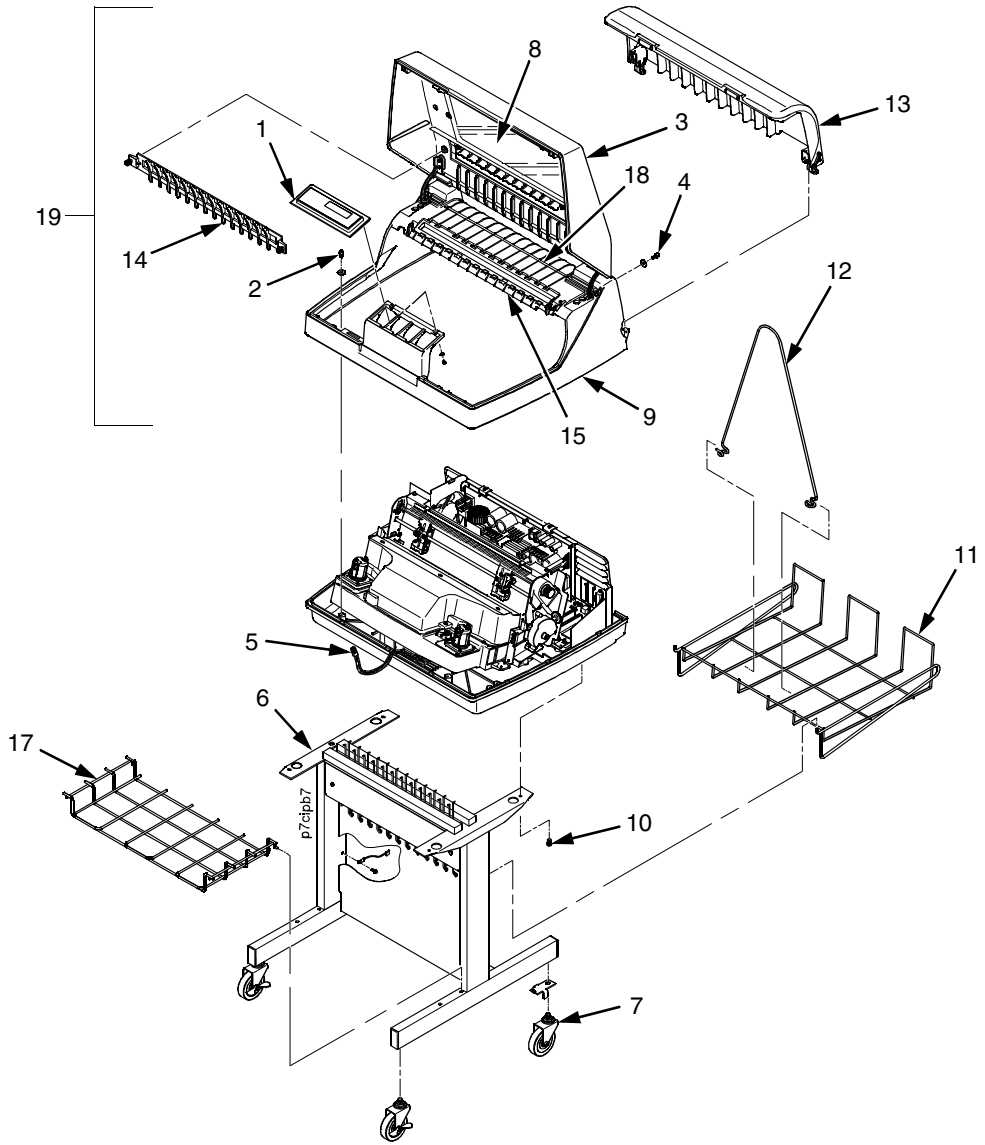


Figure 38. This illustrated parts breakdown shows the main assemblies of a pedestal model and the shipping kit.

(Figure 38)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2479	41U1138	Operator Panel, Pedestal	
2	Ref	Ref	Screw, Captive (2)	
3	39U2482	39U2482	Lid Assembly, Pedestal	
4	Ref	Ref	Screw (2)	
5	14H5300	14H5300	Cable Assembly, operator panel	
6	39U2480	39U2480	Pedestal Kit, Grey	
7	39U2481	39U2481	Field Kit, Caster Kit, Ped	
8	39U2507	39U2507	Window, Top Cover	
9	Ref	Ref	Housing, Pedestal, V3	
10	Ref	Ref	Screw (4)	10-32x.625
11	63H5118	63H5118	Paper Tray	
12	28P0595	28P0595	Paper Fence, Rear, Ped	
13	39U2541	39U2541	Rear Acoustic Shroud	Optional feature
14	39U2520	39U2520	Panel, Lid, Quick Access	
15	39U2519	39U2519	Panel, Quick Access, Ped	
16	39U2504	39U2504	Re-Ship Kit, Pedestal	Not shown in Figure 38
17	24H8533	24H8533	Paper Tray, Front, Ped	
18	39U2532	39U2532	Static Brush, Pedestal	
19	39U2531	39U2531	Top Cover, Pedestal, Base Assembly	

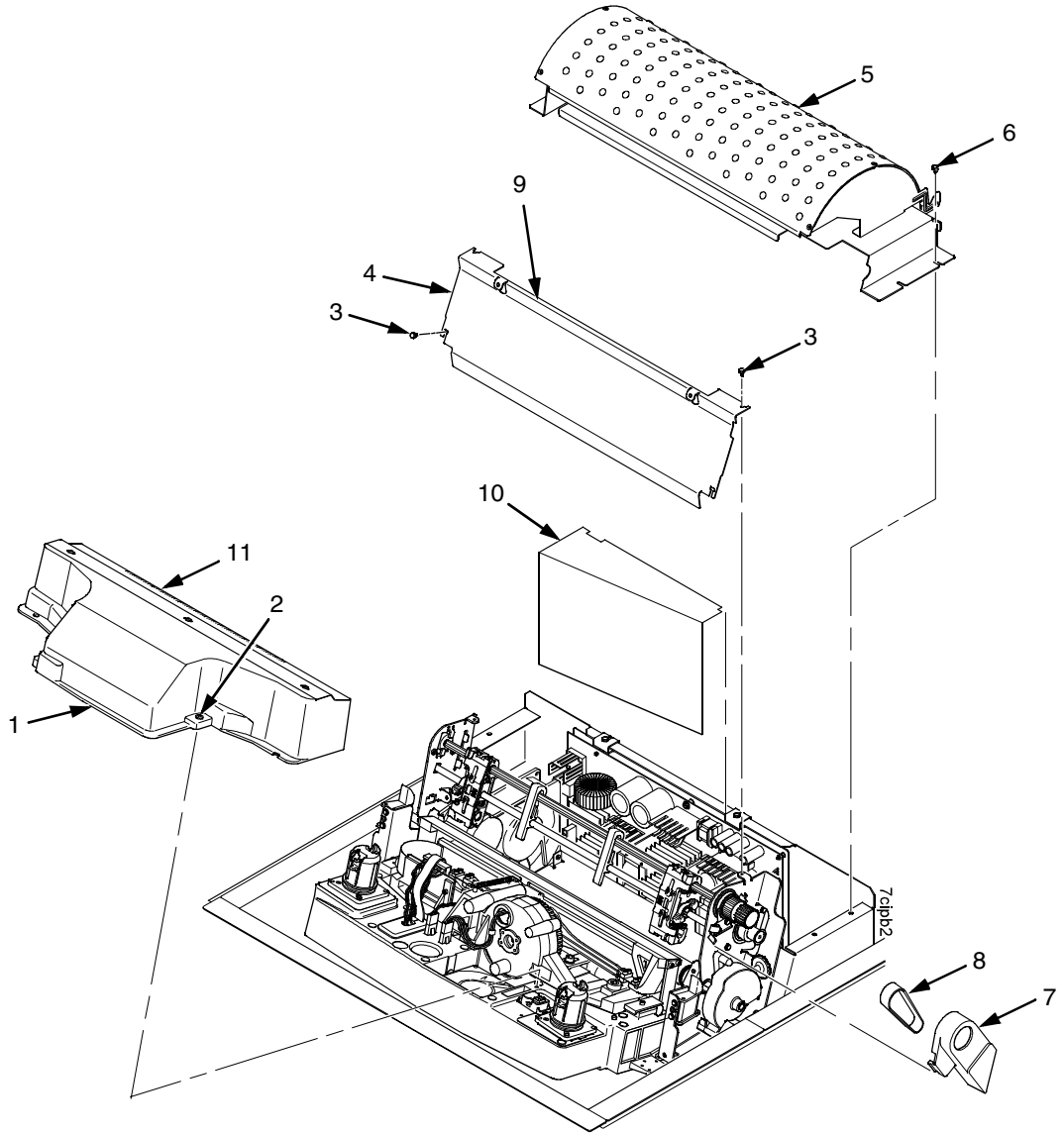


Figure 39. This illustrated parts breakdown shows the inside covers and card cage of a cabinet model.

(Figure 39)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2542	39U2542	Shuttle Cover Assembly	Air Shroud Assembly. Includes items 2 and 11.
2	Ref	Ref	Screw, Captive (2)	10-24x.62 with O-ring, .125x.250x.06
3	Ref	Ref	Screw, Thread Forming (4)	6-32x.25
4	Ref	Ref	Barrier Shield	
5	57P1746	57P1746	Paper Path, V3	All cabinet models
6	Ref	Ref	Screw, w/Lock Washer (3)	6-32x.25 and #6 Flat Washer
7	54P1379	54P1379	Platen/Paper Feed Cover Kit	Paper feed belt cover shown in Figure 39. Platen open belt cover: item 24, page 431.
8	57G1468	57G1468	Belt, Timing, 050P, 100 Teeth	Paper Feed Belt
9	08H7954	08H7954	Anti-Static Brush Kit	Mounts to top of item 4
10	Ref	Ref	Power Supply Insulator	Taped to card cage along upper edge
11	14H5179	14H5179	Paper Scale	

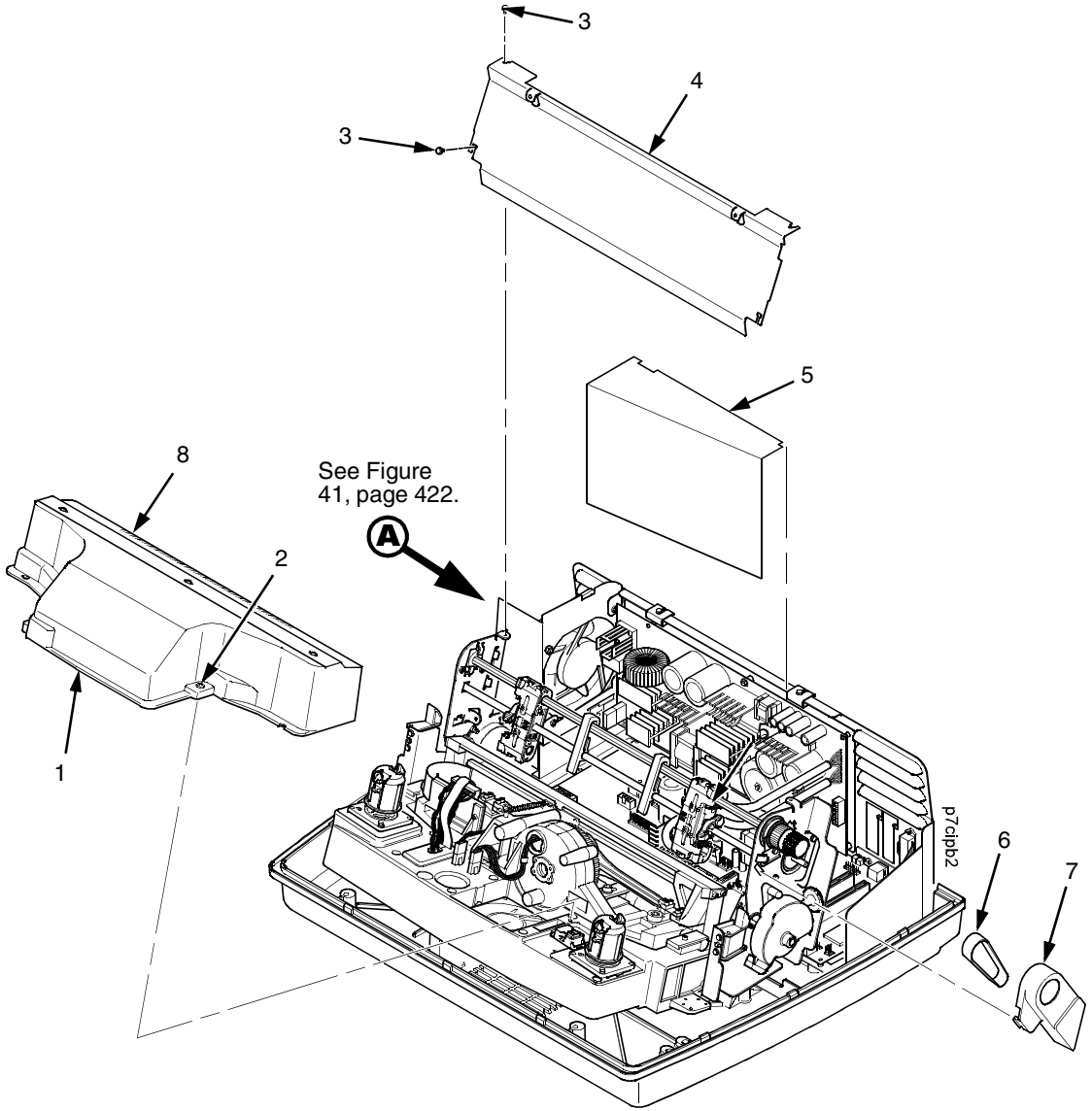


Figure 40. This illustrated parts breakdown shows the inside covers and card cage of a pedestal model.

(Figure 40)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2542	39U2542	Shuttle Cover Assembly	Air Shroud Assembly. Includes items 2 and 8.
2	Ref	Ref	Screw, Captive (2)	10-24x.62 with O-ring, .125x.250x.06
3	Ref	Ref	Screw, Thread Forming (4)	6-32x.25
4	Ref	Ref	Barrier Shield	
5	Ref	Ref	Power Supply Shield	Taped to card cage along upper edge
6	57G1468	57G1468	Belt, Timing, 050P, 100 Teeth	Paper Feed Belt
7	54P1379	54P1379	Platen/Paper Feed Cover Kit	Paper feed belt cover shown in Figure 40. Platen open belt cover: item 24, page 431.
8	14H5179	14H5179	Paper Scale	

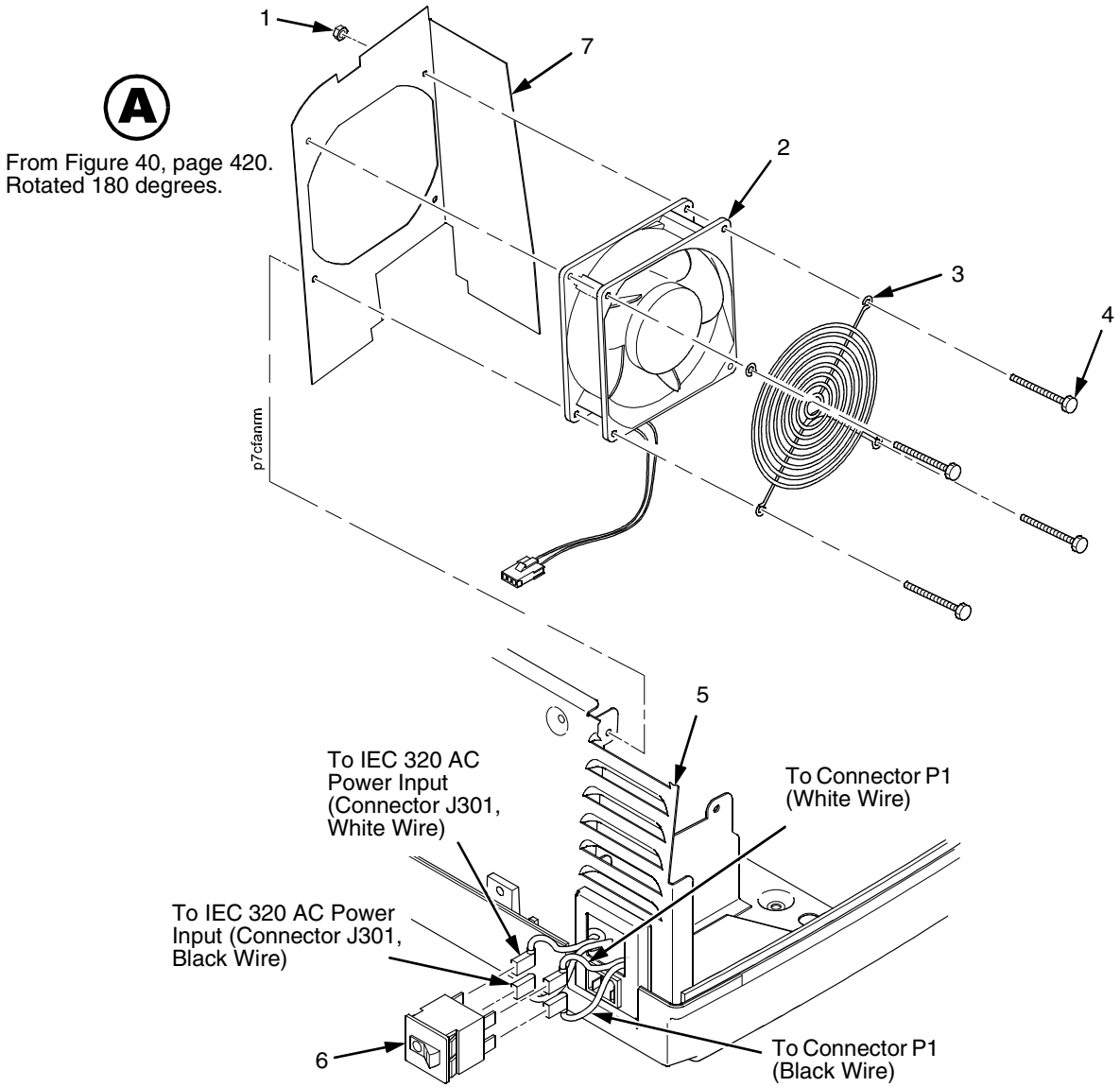


Figure 41. This illustrated parts breakdown shows the card cage fan assembly and circuit breaker on a pedestal model.

(Figure 41)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	Ref	Ref	Nut, 6-32 (1)	Upper right fan corner only
2	57G1440	57G1440	Card Cage Fan Assembly	Air flow is into card cage
3	Ref	Ref	Fan Guard	
4	Ref	Ref	Screw, w/Lock Washer (4)	6-32x.1.75
5	Ref	Ref	Card Cage, Pedestal	
6	14H5571	14H5571	Circuit Breaker	
7	Ref	Ref	Baffle, Power Supply, Ped	

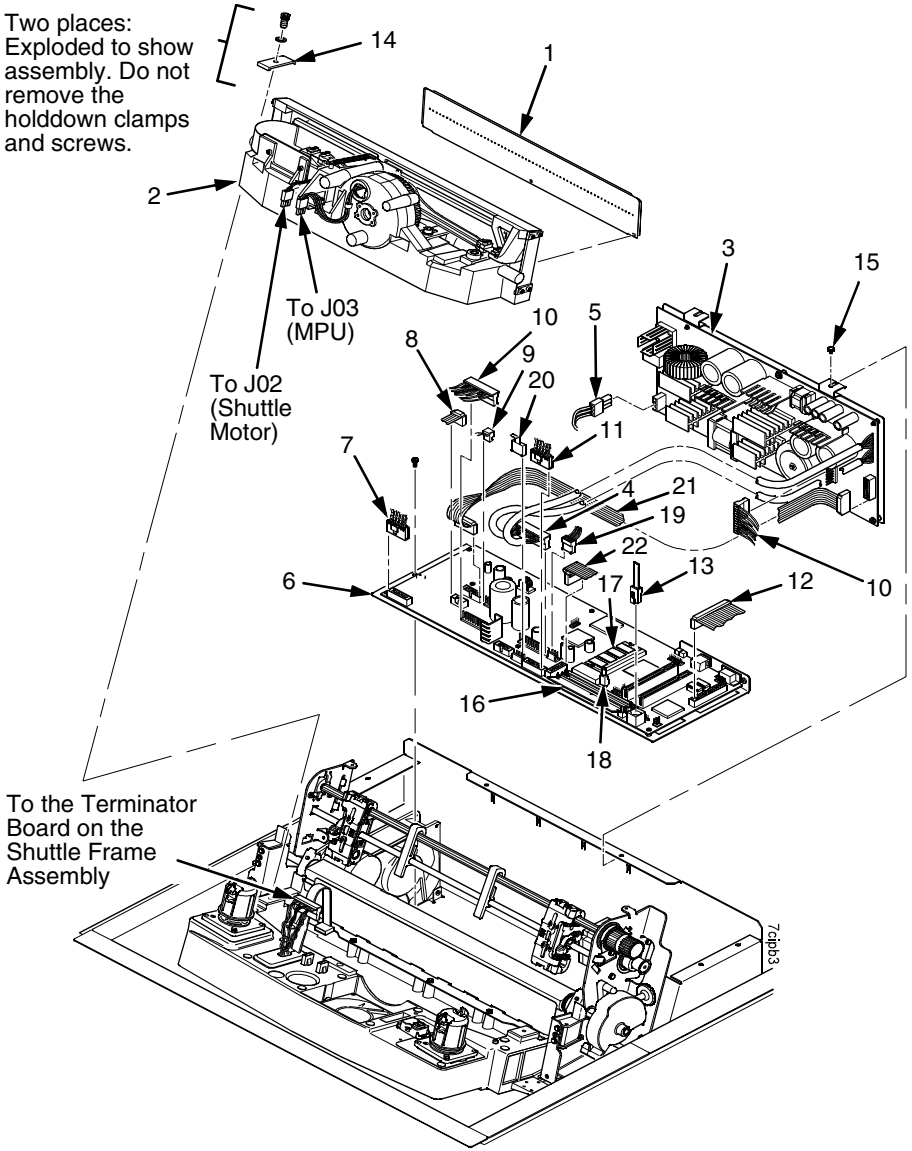


Figure 42. This illustrated parts breakdown shows the shuttle assembly and the circuit boards inside the card cage.

(Figure 42)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2494	39U2494	Ribbon Mask/Hammer Bank Cover Assy, 500	Model -v05 and -v5P
	39U2495	39U2495	Ribbon Mask/Hammer Bank Cover Assy, 1000	Model -D3C, -D3P, -v10, and -v1P
	39U2496	39U2496	Ribbon Mask/Hammer Bank Cover Assy, 1500	Model -D6C and -v15
	39U2508	39U2508	Ribbon Mask/Hammer Bank Cover Assy, 2000	Model -D8C and -v20
2	42R8890	42R8890	Shuttle Assembly, Spare, Hanzi	Model -D3C and -D3P
	42R8891	42R8891	Shuttle Assembly, Spare, Hanzi	Model -D6C
	42R8892	42R8892	Shuttle Assembly, Spare, Hanzi	Model -D8C
	75P2183	75P2183	Hammer Spring Assembly, Hanzi	Model -D3C and -D3P
	75P2184	75P2184	Hammer Spring Assembly, Hanzi	Model -D6C
	10R4386	10R4386	Hammer Spring Assembly, Hanzi	Model -D8C
	39U2498	41U1145	Shuttle Assembly, 05	Model v05 and v5P
	39U2500	41U1143	Shuttle Assembly, 10	Model v10 and v1P
	39U2502	41U1141	Shuttle Assembly, 15	Model v15
	39U2506	41U1139	Shuttle Assembly, 20	Model v20
	54P1527	54P1527	Hammer Spring Assembly, 05	Model v05 and v5P
	54P1528	54P1528	Hammer Spring Assembly, 10	Model v10 and v1P
	54P1529	54P1529	Hammer Spring Assembly, 15	Model v15
	75P2817	75P2817	Hammer Spring Assembly, 20S	Model v20
3	39U2548	41U1149	Power Supply, PFC, 5/10	Model D3C, D3P, v05, v5P, v10, v1P
	39U2547	41U1151	Power Supply, PFC, 15	Models D6C and v15
	39U2549	41U1153	Power Supply, PFC, 20	Model D8C and v20 (Figure 42)
4	Ref	Ref	P101 Cable Connector	Part of item 3
5	Ref	Ref	Cable Assy, AC-In, Power Supply	Part of Field Kit AC Assy 14H5289
6	39U2546	41U1155	Controller PCBA, (V5)	
7	14H5288	14H5288	Housing, Connector Kit (P106/P107)	P106, Motor Sensor, Left
8	14H5279	14H5279	Hammer Bank Logic Cable Assembly	See also page 312.
9	14H5330	14H5330	Shuttle Motor Cable Assembly	

Item No.	Part No.	RoHS Compliant	Description	Notes
10	39U2533 02N6214	39U2533 02N6214	Hammer Bank Power Cable Assembly Hammer Bank Power Cable Assembly	Use on all except D8C and v20 Models D8C and v20 only
11	14H5288	14H5288	Housing, Connector Kit (P106/P107)	P107, Motor Sensor, Right
12	14H5287	14H5287	Centronics I/O Cable Assembly	See also page 300.
13	14H5300	14H5300	Operator panel Cable Assembly	See also page 310.
14	14H5211	14H5211	Clamp, Shaft, Receiving	
15	Ref	Ref	Screw, Captive, Power Supply (3)	
16	75P2810 10R4054	41U1176 41U1160	SIMM, Flash Memory, 8 MB SIMM, Flash Memory, 16 MB	Must install in slot J11. J10 is not used. See also page 359.
17	75P2809	41U1159	DIMM, SDRAM, 32MB, 144 Pin	
18	Ref	Ref	Security Key (Comes with emulation)	For part numbers see page 359
19	Ref	Ref	Paper Feed Motor	
20	Ref	Ref	RibbonMinder Bar Code Sensor Assembly	
21	54P1456	54P1456	Cable Assembly, PS I/O, 2000	Used only on D8C and v20. (See also page 306.)
22	Ref	Ref	Not Used	

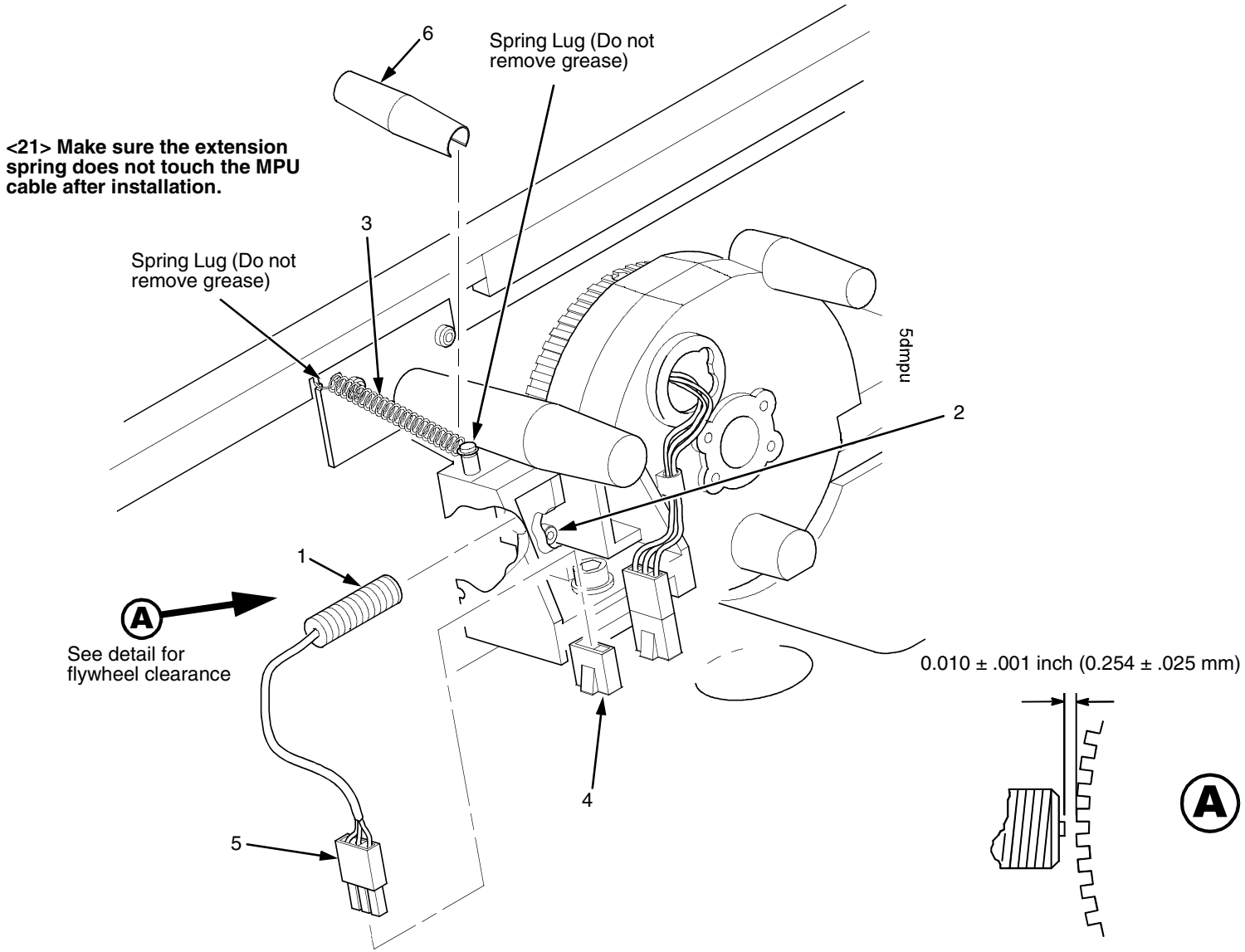
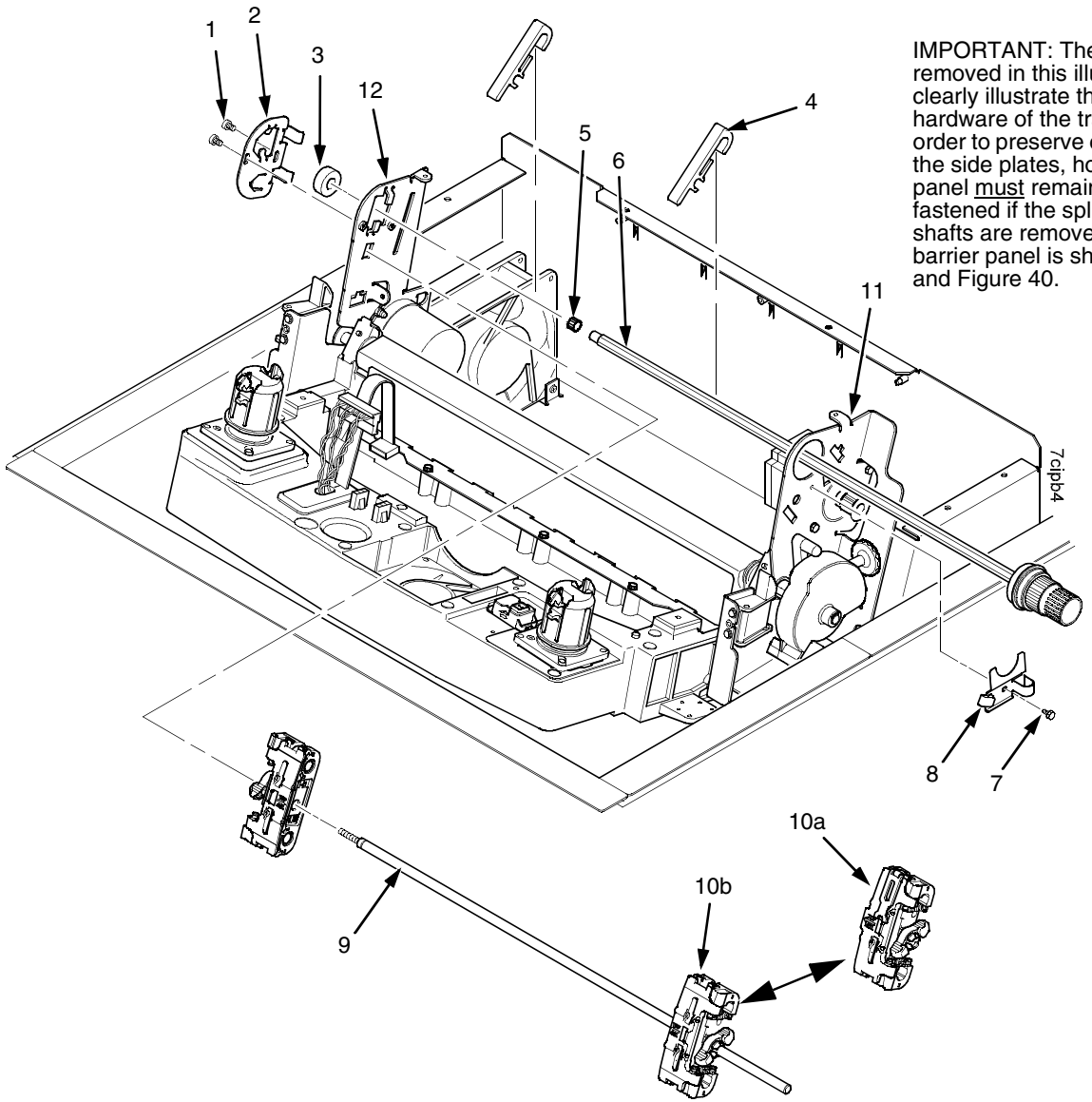


Figure 43. This illustrated parts breakdown shows the magnetic pickup unit (MPU) and extension spring.

(Figure 43)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	57G1476	57G1476	Magnetic Pickup Assy (MPU)	
2	Ref	Ref	Screw, Socket Cap, 6-32x.38	
3	30H3985	30H3985	Spring, Hammer Bank	
4	14H5329	14H5329	Cable Assembly, MPU	
5	Ref	Ref	MPU Cable Connector (P03)	
6	10R4587	10R4587	Anti-Rotation Spring Constraint	Model -D8C and -v20 only



IMPORTANT: The barrier panel is removed in this illustration to more clearly illustrate the mounting hardware of the tractor shafts. In order to preserve correct alignment of the side plates, however, the barrier panel must remain installed and fastened if the splined or support shafts are removed or replaced. The barrier panel is shown in Figure 39 and Figure 40.

Figure 44. This illustrated parts breakdown shows the tractors and tractor shafts.

(Figure 44)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob (Self-Tapping) (2)	
2	Ref	Ref	Plate, Tractor Shaft, Left	
3	54P1474	54P1474	Bearing, Ball, Sealed	
4	39U2537	39U2537	Paper Support (2)	
5	54P1475	54P1475	Tolerance Ring,.37X.25,.006 THK,SS	
6	39U2510	39U2510	Splined Shaft Assembly (Blue Handle)	
7	Ref	Ref	Screw, Socket Cap, 6-32x.312 Trilob (Self-Tapping)	
8	Ref	Ref	Plate, Tractor Shaft, Right	
9	57P1181	57P1181	Support Shaft	
10a	39U2543	39U2543	Tractor Set, With Steel Rollers, 20 (Blue)	Model -D8C and -v20 with or without power stacker. Includes L&R tractors.
10b	39U2544	39U2544	Tractor Set, Non-Rollers, 05/10/15 (Blue)	All others without Power Stacker. Includes L&R tractors.
11	Ref	Ref	Right Side Plate	
12	Ref	Ref	Left Side Plate	

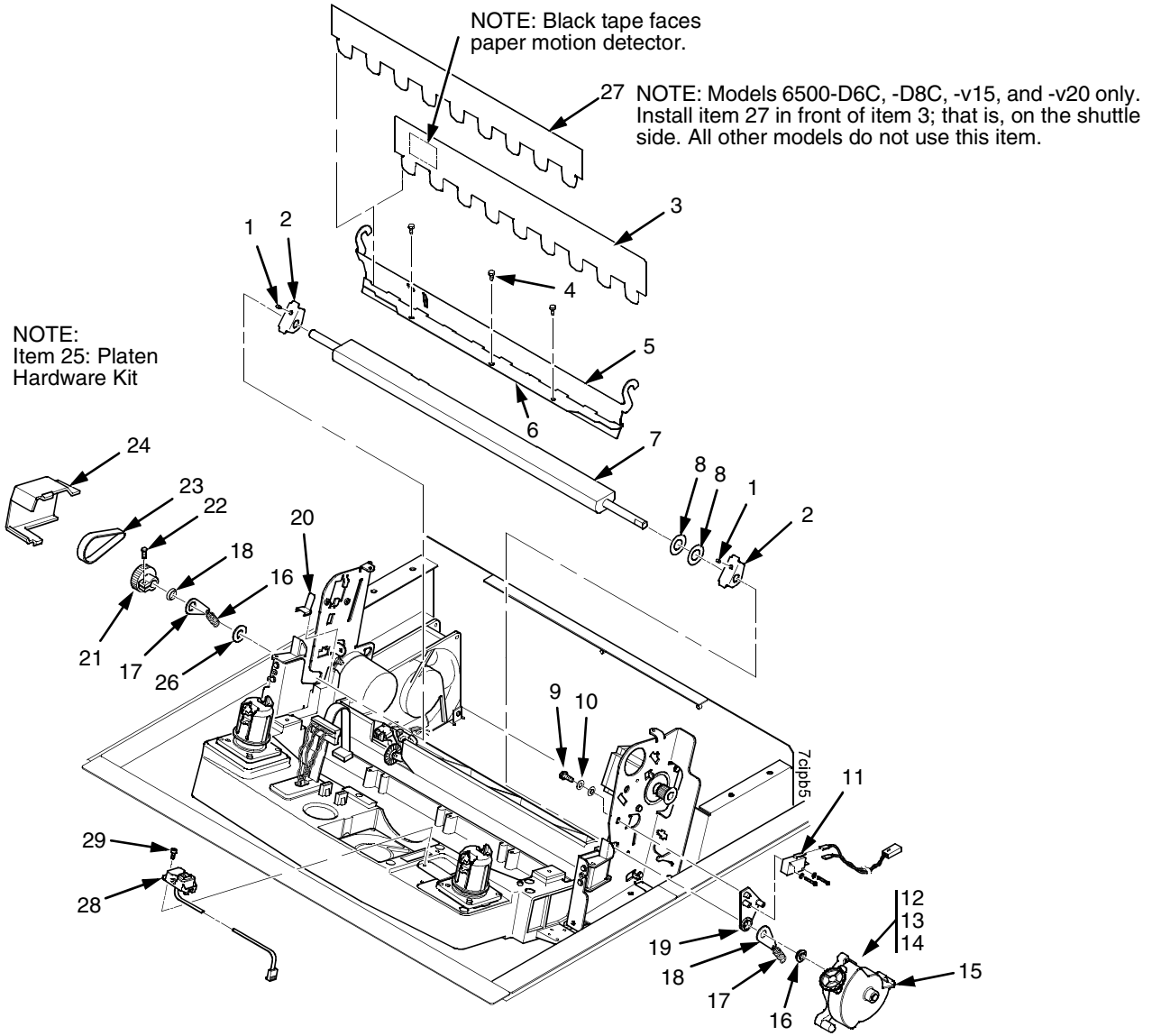


Figure 45. This illustrated parts breakdown shows the platen and paper ironer assemblies.

(Figure 45)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	Ref	Ref	Setscrew	Part of item 25
2	Ref	Ref	Bracket, Platen (2)	Part of item 25
3	57G1469	57G1469	Ironer Assembly, Reverse Paper Feed	
4	Ref	Ref	Screw, Thread Forming (3)	6-32x.25
5	54P1476	54P1476	Ironer Bracket/Plate Field Kit	
6	Ref	Ref	Plate, Ironer	Part of item 5
7	10R4285 10R4286	10R4285 10R4286	Platen Assembly E-platen (Urethane coated)	All -v models All D-Series models
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	39U2509	39U2509	Platen Switch Kit	Platen Interlock Switch
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	39U2538	39U2538	Platen Stop Lever Kit	
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

Item No.	Part No.	RoHS Compliant	Description	Notes
20	Ref	Ref	Wear Saddle, Platen (2)	Part of item 25
21	57G1514	57G1514	Platen Pulley, Driven	
22	Ref	Ref	Screw, Socket Cap, 6-32x.44	Part of item 21
23	57G1467	57G1467	Belt, Timing, 312W, 87 Teeth	Platen Open Belt
24	54P1379	54P1379	Platen/Paper Feed Cover Kit	Platen open belt cover shown in Figure 45. Paper feed belt cover: page 418, item 7.
25	10R3798	10R3798	Platen Hardware Kit	
26	Ref	Ref	Platen Washer	Part of item 25
27	75P8169	75P8169	Paper Ironer, Auxiliary	Models v15 and v20 only: install this part in front of item 3; that is, on the shuttle side. All other models do not use this item.
28	39U2555	39U2555	Sensor Assembly, RibbonMinder/Barcode	
29	Ref	Ref	Screw	

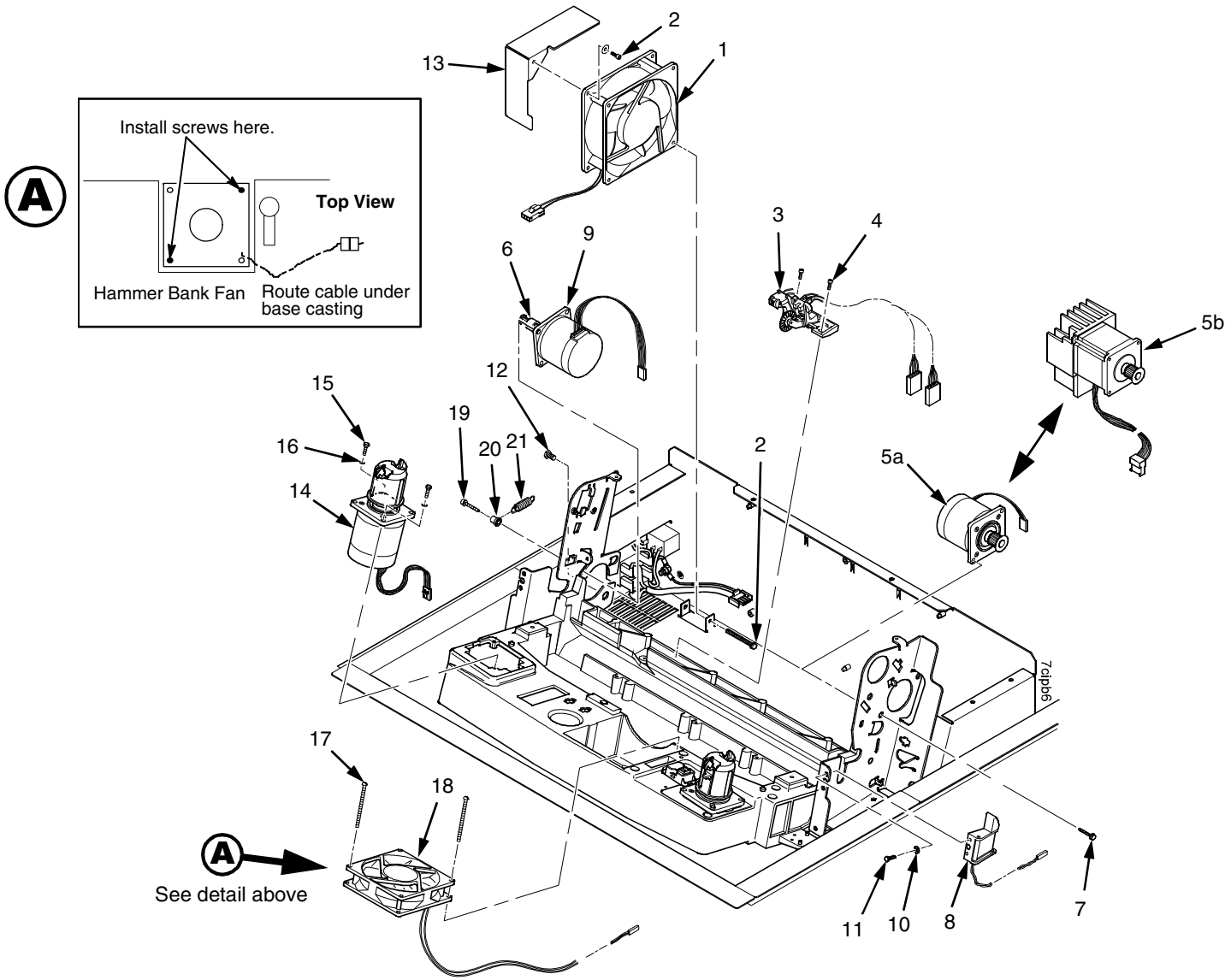


Figure 46. This illustrated parts breakdown shows the motors, cooling fans, and the paper detector switch.

(Figure 46)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	57G1440	57G1440	Fan Assembly	Air flow is into card cage
2	Ref	Ref	Screw, w/Lock Washer (3)	Two 6-32x1.75 on botton One 6-32x0.50 on top left
3	14H5281 02N7169	14H5281 02N7169	Paper Detector Switch Assy Paper Detector Switch Assy	Standard switch Black Back forms
4	Ref	Ref	Screw, Thread Forming, 6-32x.375 (2)	
5a 5b	10R4779 10R3342	10R4779 10R3342	Paper Feed Motor Assy, All Except Model D8C/v20 Paper Feed Motor Assy, Model D8C/v20	 Model -D8C and -v20 only: Re-use the original heat sink. Install it on the motor base and torque the mounting screws to 18 inch-pounds (2.03 N•m).
6	Ref	Ref	Motor Pulley, Platen Open, Driver	Part of item 9
7	Ref	Ref	Screw, Hex w/Lock Washer (2)	10-32x.50
8	39U2540 39U2539	39U2540 39U2539	Ribbon Guide Cable Assembly, RH Ribbon Guide Cable Assembly, LH	
9	54P1453	54P1453	Platen Open Motor Assembly	Includes item 6
10	Ref	Ref	Washer, Flat #4 (2)	
11	Ref	Ref	Screw, Hex w/Lock Washer (2)	4-40x.38
12	Ref	Ref	Screw, Hex w/Lock Washer (2)	10-32x.50
13	Ref	Ref	Shield, Card Cage Fan	
14	39U2534	39U2534	Ribbon Motor Assembly, w/Hub	Includes ribbon hub
15	Ref	Ref	Screw, Hex w/Lock Washer (2)	6-32x.50
16	Ref	Ref	Washer, Flat #6 (2)	

Item No.	Part No.	RoHS Compliant	Description	Notes
17	Ref	Ref	Screw, w/Lock Washer (2)	6-32x1.25
18	14H5159 54P1454	14H5159 54P1454	Hammer Bank Fan Assembly, All Except D8C/v20 Hammer Bank Fan Assembly, Model D8C/v20	Air flow is up. Air flow is up.
19	Ref	Ref	Screw, Socket Cap, 10-24x.75	
20	Ref	Ref	Post, Platen Belt Spring	
21	Ref	Ref	Spring, Platen Belt	

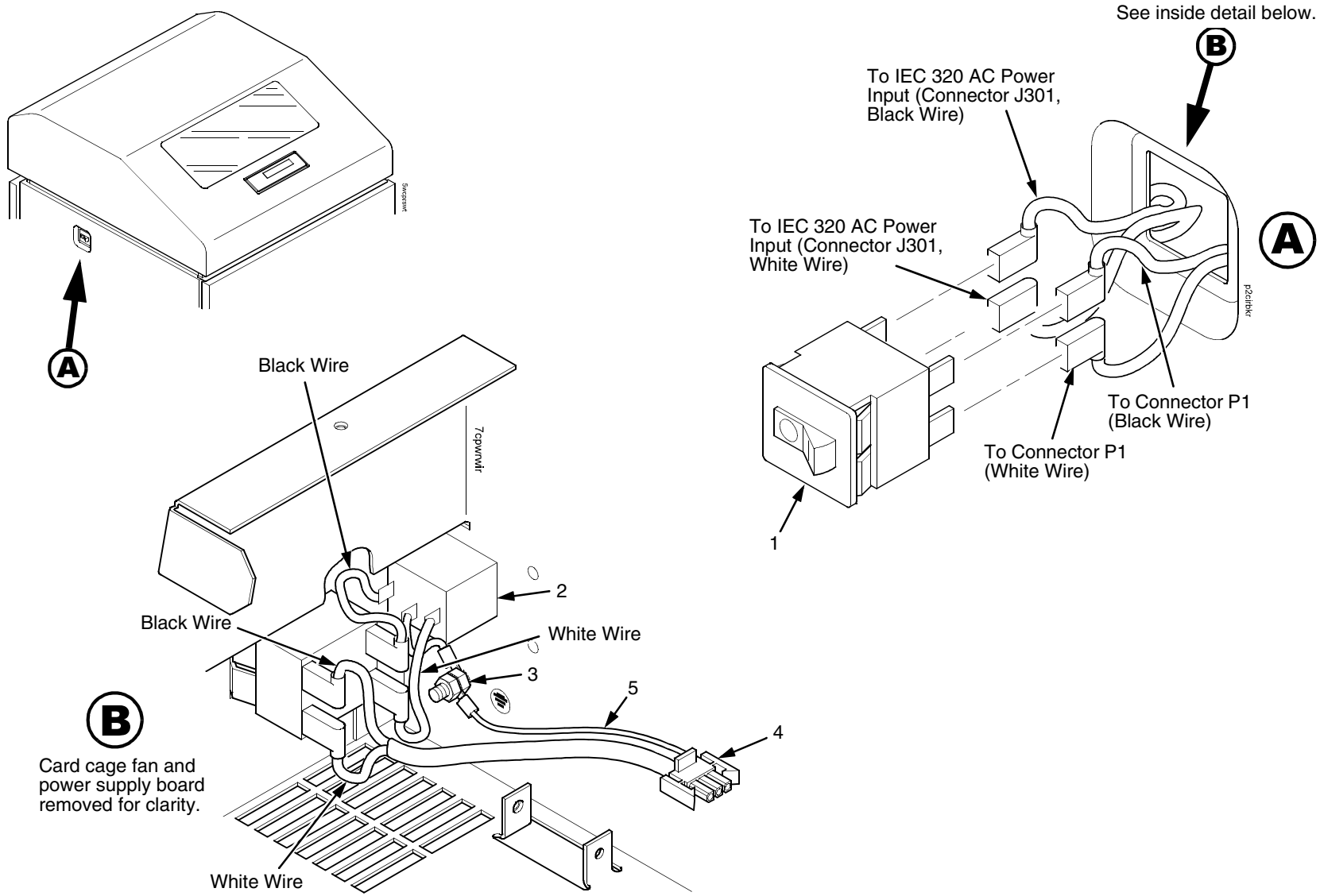


Figure 47. This illustrated parts breakdown shows the circuit breaker in cabinet models.

(Figure 47)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	14H5571	14H5571	Circuit Breaker	
2	Ref	Ref	IEC 320 AC Power Connector	Connector J301
3	Ref	Ref	Chassis Ground Stud	
4	Ref	Ref	Connector P1	To power supply board connector J1 AC
5	Ref	Ref	Cable Assy, AC-In, Power Supply	Part of Field Kit, AC Assy 14H5289

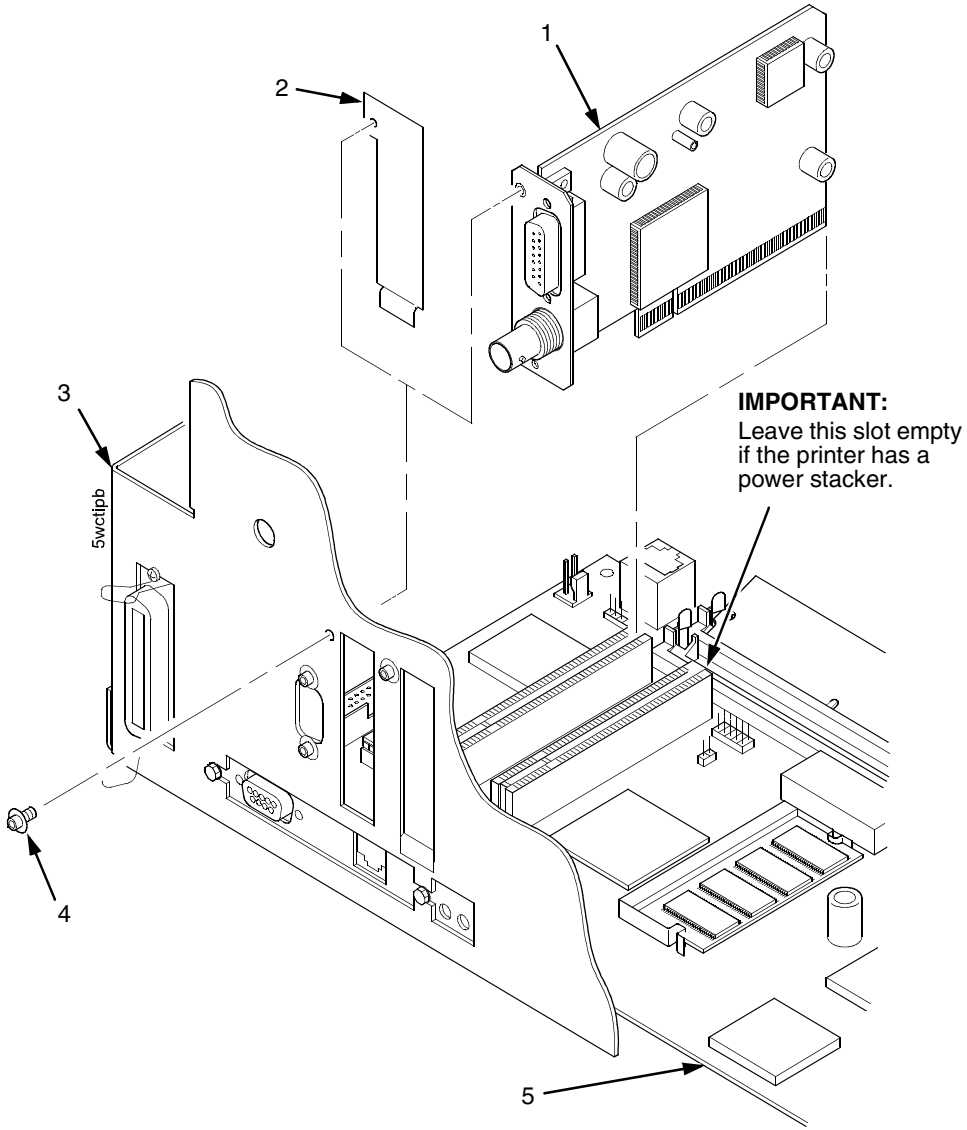


Figure 48. This illustrated parts breakdown shows the IBM coax/twinax expansion board.

(Figure 48)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	39U2757	41U1161	Spare PCBA, PCI-CT, V3	
2	Ref	Ref	Plate, PCI Cover	
3	Ref	Ref	Card Cage	
4	Ref	Ref	Screw	
5	Ref	Ref	Controller Board	

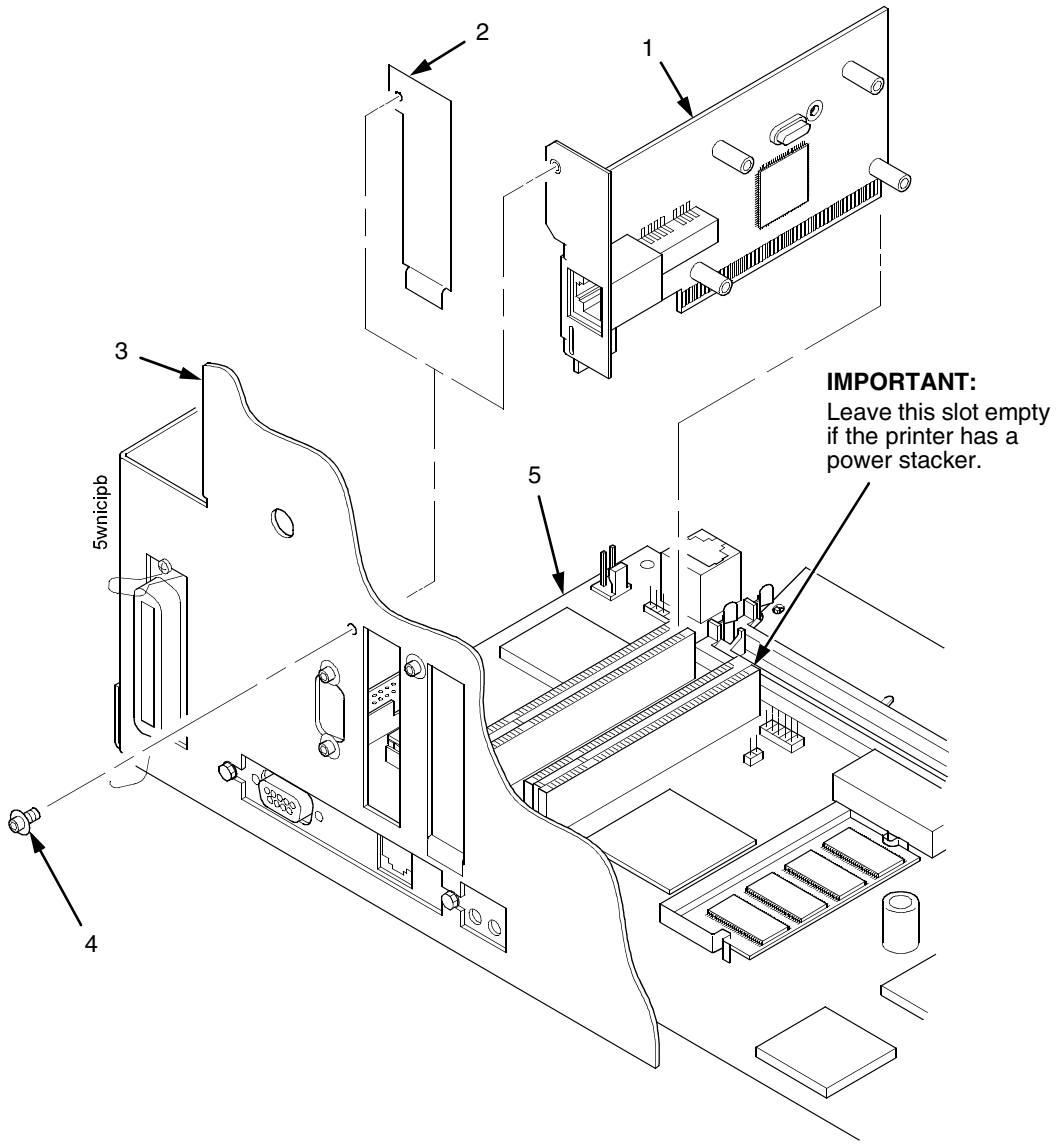


Figure 49. This illustrated parts breakdown shows the ethernet interface assembly.

(Figure 49)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	75P2812 39U2514	41U1157 41U1136	Spare PCBA, PCI-NETWORK Spare PCBA, PCI Wireless	
2	Ref	Ref	Plate, PCI Cover	
3	Ref	Ref	Rear of Card Cage	
4	Ref	Ref	Screw	
5	Ref	Ref	Controller Board	

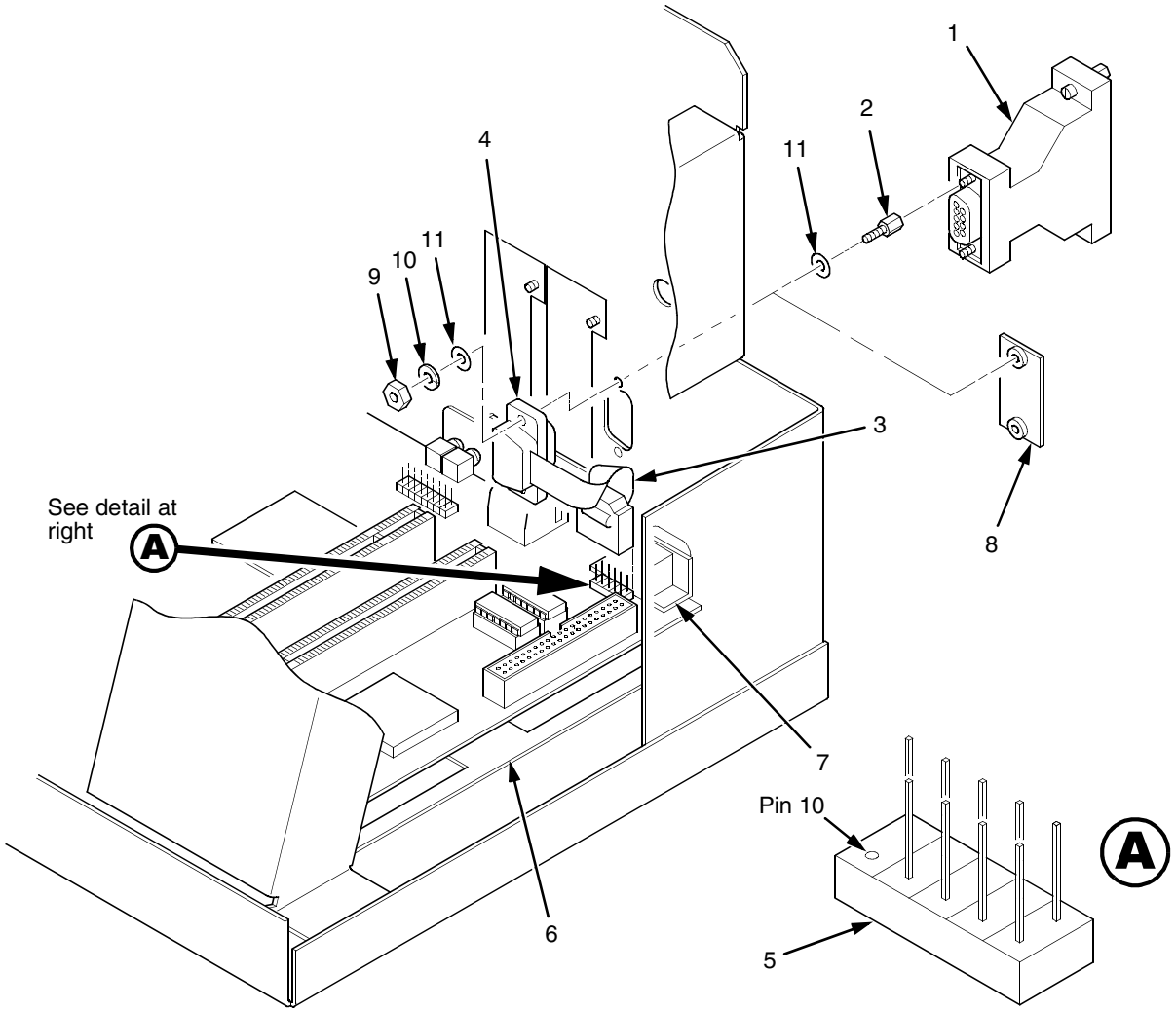


Figure 50. This illustrated parts breakdown shows the RS-422 interface.

(Figure 50)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	75P1621	41U1135	PCBA, RS422 ADAPTER, DB9/DB25	
2	10R4588	10R4588	Screwlock Kit, Female (2)	
3	75P1625	75P1625	Cable Assembly, RS-422, I/O	
4	Ref	Ref	RS-422 Connector, 9-Pin	
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

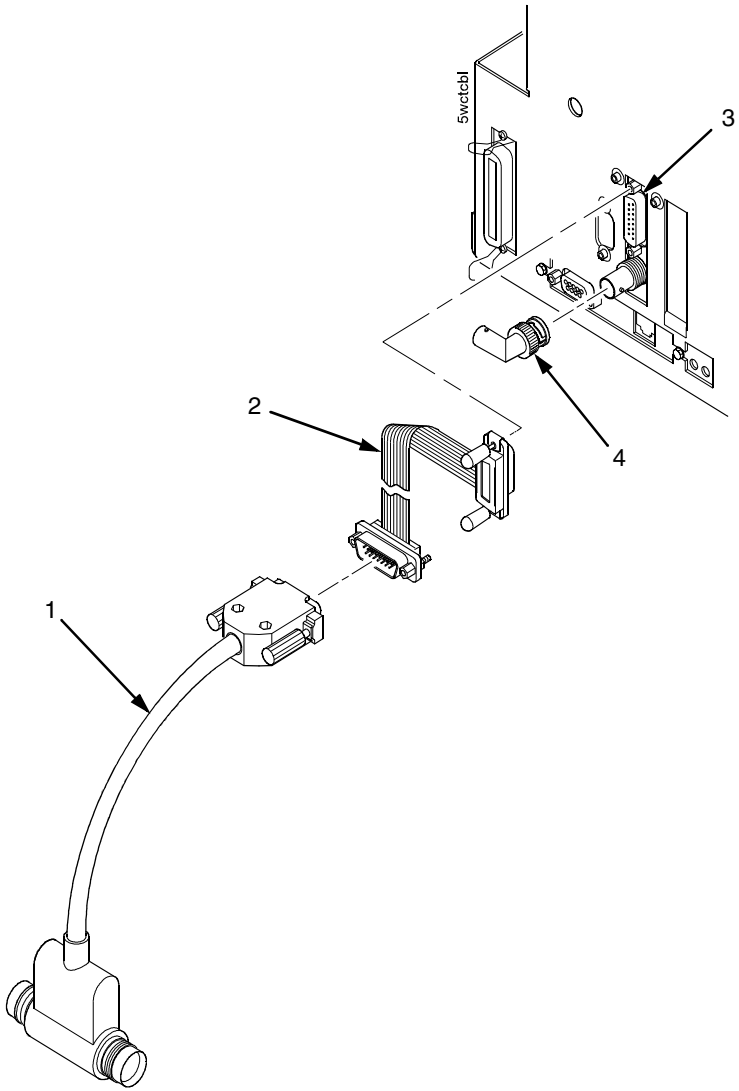


Figure 51. This illustrated parts breakdown shows the twinax extension cable required if the printer has a PSA3 controller board, a twinax interface, and the power stacker.

(Figure 51)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	01P5948	01P5948	Twinax Auto-Termination Cable (“Smart-T”)	
2	75P2813	75P2813	Cable, Extension, Smart-T	Required in printers with the power stacker so the twinax auto-termination cable will clear the stacker elevator. (See also page 304.)
3	Ref	Ref	PCI-CT Twinax Connector	
4	Ref	Ref	PCI-CT Coax Connector	

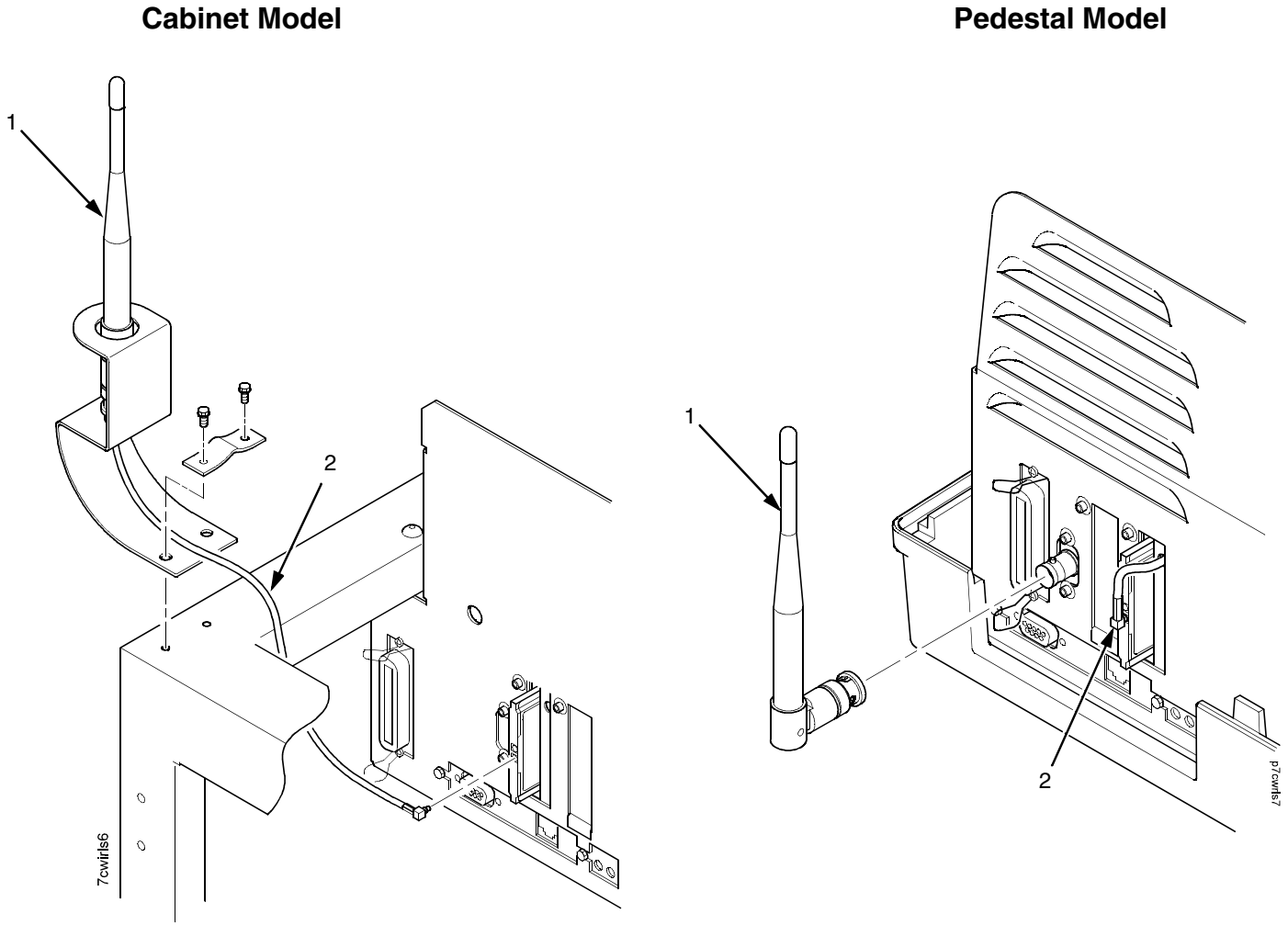


Figure 52. This illustrated parts breakdown shows the dipole antenna and cable used with the optional wireless NIC.

(Figure 52)

Item No.	Part No.	RoHS Compliant	Description	Notes
1	10R3183	10R3183	Antenna, Rubber Duck, Dipole, S24	
2	75P2249	75P2249	Cable, MMCX-BNC, 10 inch, S24	

7 *Preventive Maintenance*

Contents

Cleaning The Printer

Aside from normal replenishment of paper and ribbons, the only preventive maintenance required for the printer is periodic cleaning.

Because operating conditions vary widely, the user must determine how often to clean the printer.

There is no guarantee that the user will clean the printer regularly, however, so you should clean the printer whenever you are called to service it.

DANGER

<2> Switch off printer power and unplug the printer power cord before cleaning the printer.

ATTENTION

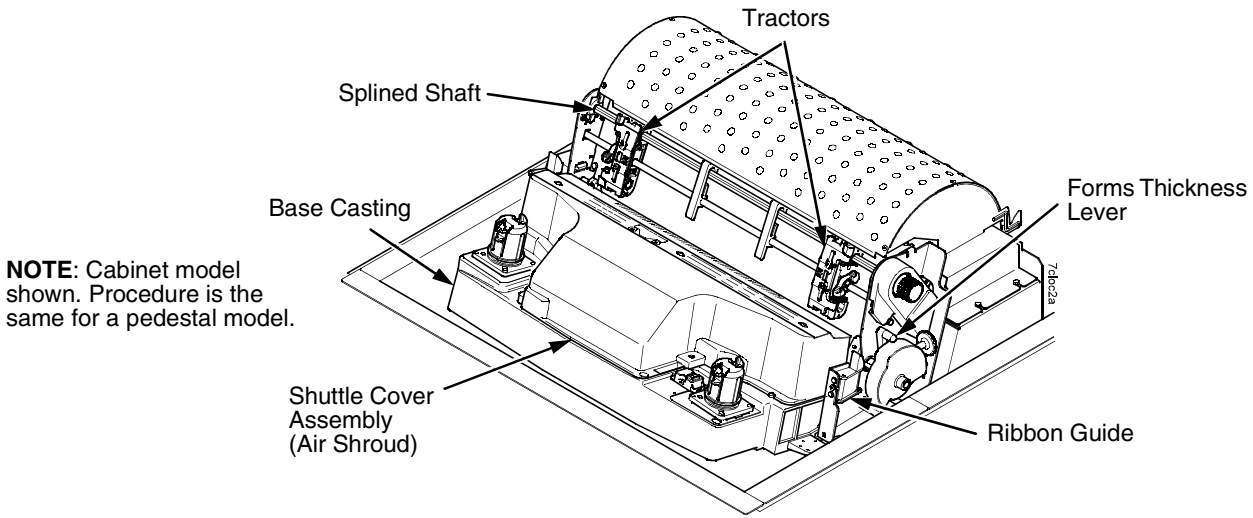
Do not use abrasive cleaners, particularly on the window.
Do not drip water into the printer. Damage to the equipment will result.
Do not spray directly onto the printer when using spray solutions (spray the cloth, then apply the dampened cloth to the printer).
Do not vacuum circuit boards.

Cleaning The Exterior

1. Power off the printer.
2. Disconnect the AC power cord from the power source.
3. Wipe the outside of the enclosure with a clean, lint-free cloth dampened (not wet) with water and a mild detergent or window cleaning solution.
4. Dry the enclosure with a clean, lint-free cloth.
5. Clean the inside of the printer, as described below.

Cleaning The Interior

1. Power off the printer.
2. Disconnect the AC power cord from the power source.
3. Open the printer cover.
4. Remove paper from the printer.
5. Remove the ribbon.
6. Using a soft-bristled, non-metallic brush, wipe paper dust and ribbon lint off the tractors, shuttle cover assembly, base casting, and ribbon guides. Vacuum up the residue. (See Figure 53.)
7. Wipe the splined shaft and the ribbon guides with a soft cloth.
8. Vacuum up dust or residue that has accumulated inside the lower cabinet.
9. Wipe the interior of the lower cabinet with a clean, lint-free cloth dampened with water and a mild detergent or window cleaning solution.
10. Dry the cabinet interior with a clean, lint-free cloth.
11. Clean the shuttle frame assembly, as described below.



NOTE: Cabinet model shown. Procedure is the same for a pedestal model.

Figure 53. This figure shows where to clean inside the cabinet or top cover.

Cleaning The Shuttle Frame Assembly

1. Remove the shuttle cover assembly (page 343).
2. Remove the shuttle frame assembly (page 380).
3. Remove the paper ironer (page 367).

CAUTION

<2> Over time the upper edge of the paper ironer can become sharp. To avoid cutting yourself, always handle the paper ironer on the sides.

4. Wipe the paper ironer with a soft cloth to remove lint, ink, and paper residue.
5. Install the paper ironer (page 367).
6. Remove the hammer bank / ribbon mask cover assembly (page 342).

ATTENTION **The thin plate (ribbon mask) of the hammer bank cover assembly is fragile. Do not over-bend or kink the ribbon mask when handling and cleaning the hammer bank cover assembly.**

7. Using a clean soft cloth, wipe the hammer bank cover and ribbon mask to remove lint, ink, and paper residue. Clean the holes in the cover strips. Carefully wipe between the hammer bank cover and the ribbon mask (early models).

ATTENTION **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. (See Figure 54.) Vacuum up any residue.

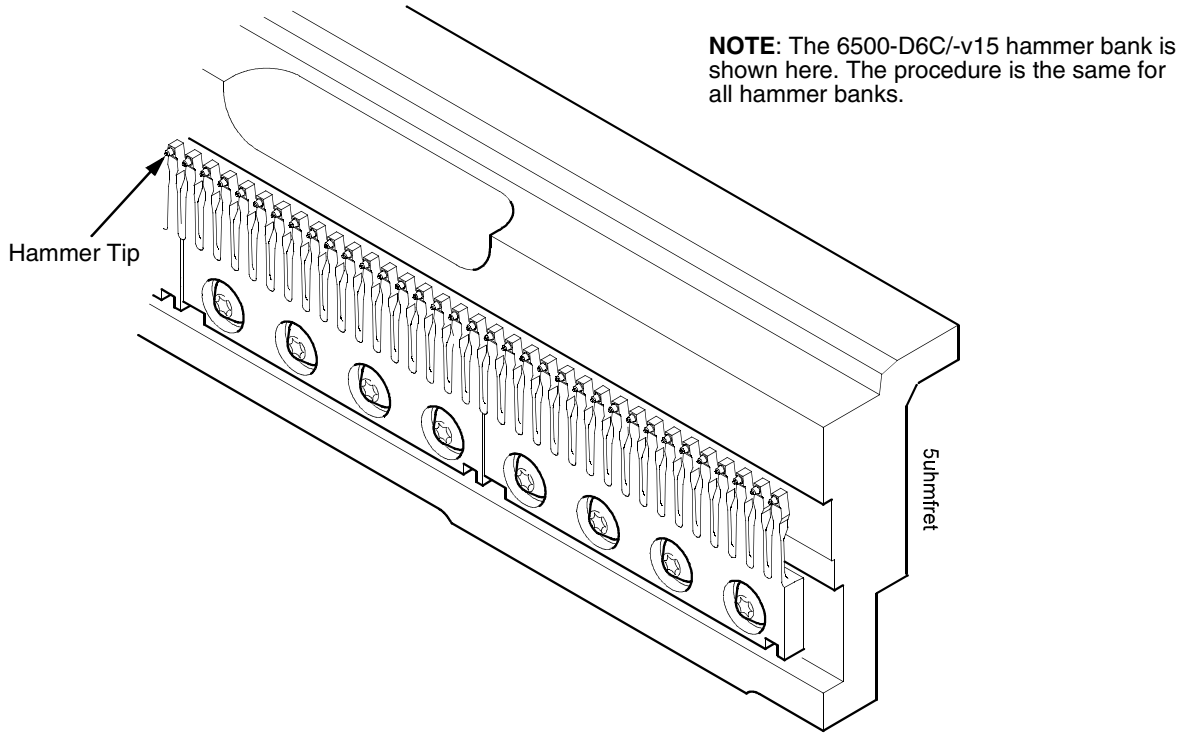


Figure 54. This figure shows a hammer tip for cleaning.

ATTENTION **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 342).
10. Install the shuttle frame assembly (page 380).
11. Install the shuttle cover assembly (page 343).
12. Clean the card cage fan assembly, as described on the next page.

Cleaning The Card Cage Fan Assembly

1. Cabinet Models: Remove the paper guide assembly (page 366).
   Pedestal Model: Remove the top cover assembly (page 344).
2. Vacuum the card cage fan assembly and surrounding areas to remove paper particles, dust, and lint. (See Figure 55.)
3. Cabinet Models: Install the paper guide assembly (page 366).
   Pedestal Model: Install the top cover assembly (page 344).
4. Install the ribbon.
5. Close the printer cover.
6. Connect the AC power cord to the power source.

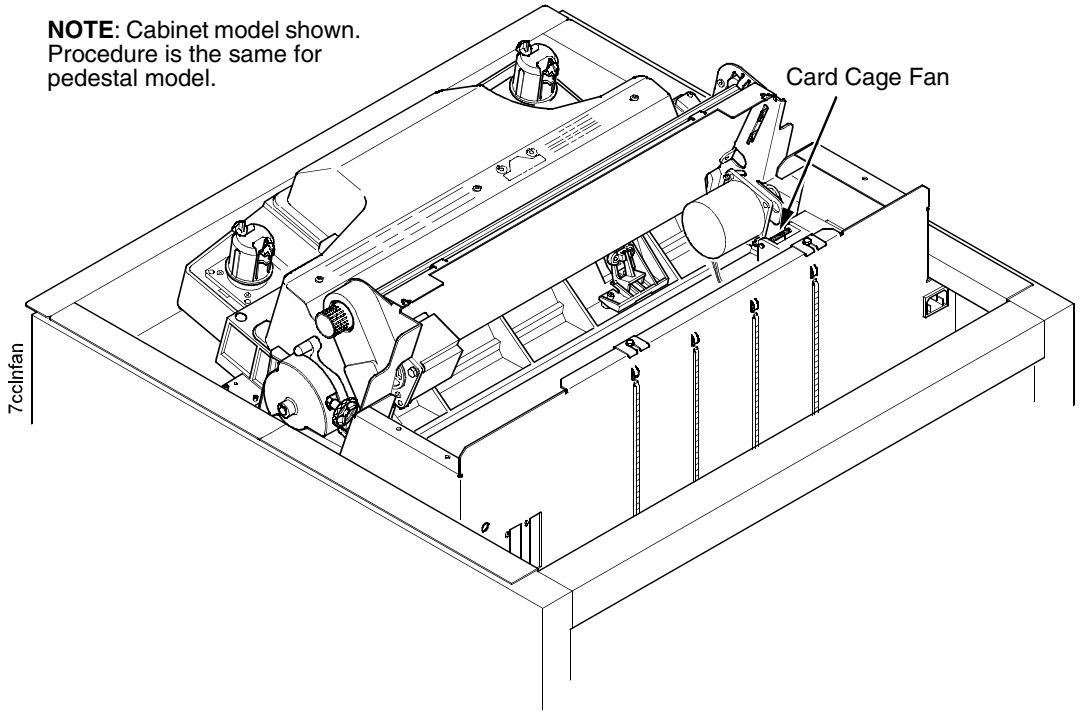


Figure 55. This figure points out the card cage fan assembly for cleaning.

A Installing And Relocating The Printer

Installing And Configuring The Infoprint 6500 Printer

Installation and configuration of the printer are covered in the *IBM Infoprint 6500 Line Matrix Printer: User's Manual, English*, Form No. S544-5957.

Installation, configuration, and troubleshooting of the Network Print Server are covered in three documents:

- *IBM Network Print Server Ethernet Administrator's Guide,* Form No. S246-0111
- *IBM Network Print Server Token-Ring Administrator's Guide,* Form No. S246-0112
- The *Network Print Server Technical Reference Manual* is included on a diskette that comes with the Network Print Server. This "softcopy" document is in Adobe** Acrobat** Reader format.

Installation, configuration, and troubleshooting of the 10/100Base-T Network Interface Card is covered in the *IBM 6400 / 6400-i / Infoprint 6500 Line Matrix Printer: Ethernet Interface User's Manual*, Form No. G550-0440.

Relocating The Infoprint 6500 Printer

Kits containing shipping and packing material are available for cabinet and pedestal model printers:

- Re-Ship Kit, Cabinet Model, without power stacker, P/N 30H3986
- Re-Ship Kit, Cabinet Model, with power stacker, P/N 24H8963
- Re-Ship Kit, Pedestal, P/N 39U2504

B *Communication Adapters*

Contents

Ethernet Interface Assembly

The ethernet LAN option is a 10/100Base-T network interface card (NIC) that can be installed at the factory or ordered as a field kit. The NIC plugs directly into a PCI slot on the PSA3 controller board. This NIC does not have LEDs or DIP switches. (See Figure 49 on page 441.)

NOTE: To remove and install the ethernet interface, see page 346. To convert the printer from an ethernet back to a parallel interface, remove the NIC from its I/O slot and re-install the cover plate in the cutout of the rear wall of the card cage.

Ethernet Troubleshooting Tips

Tip 1: Infoprint 6500 IPDS Communication Failure

Problem: the customer can “ping” the printer but cannot print to it from an IPDS host, or under certain conditions IPDS is disabled even though the customer can “ping” the printer.

Due to enhancements in the latest microcode update, the ethernet card may need to be reset. Do the following:

1. Power on the printer.
2. Telnet into the printer.
3. Type the following: **`list pserver`** and press the **ENTER** key.
   a. A bad printer says **`d4prn for port 5001`**.
   b. A good printer says **`dipdsprn for port 5001`**.
4. Type **`list dest`** and press the Enter key.
   a. A bad printer has “-” next to **`d4prn`**.
   b. A good printer has **`prn`** next to **`dipdsprn`**.
5. For a bad printer, type **`store pserver from default`** and press the **ENTER** key.
6. Type **`reset`** and press the **ENTER** key. The printer should drop the telnet connection.

Tip 2: Ethernet Port Not Enabled, PMU Not Communicating

Problem: if the ethernet port is not enabled, under the Debug menu the following message will occur when trying to connect to a printer:

> "The network address given in the printer properties was reached, but the printer port is busy. This may occur when another user is accessing the same printer, or when another logical printer is connected to the same address."

To solve this problem, the ethernet option must be enabled to allow the PMU to establish communication with the ethernet card.

1. Power on the printer.

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *User's Manual* (S544-5957) for configuration menu information.

2. Wait for the "READY / ETHERNET IS READY" message to display.
3. If the READY indicator is on, press the **STOP** key. The printer must be in the NOT READY state.
4. Press **MENU**. "OPERATOR MENU / QUICK SETUP" appears on the display.
5. Press **RETURN + ENTER** to unlock the **ENTER** key.
6. Press the **SCROLL**↑ or **SCROLL**↓ key until "OPERATOR MENU / PRINTER CONTROL" appears on the display.
7. Press **ENTER**. "PRINTER CONTROL / INTERFACE SELECTION" appears on the display.
8. Press **SCROLL**↑ or **SCROLL**↓ until "PRINTER CONTROL / PRINTER MANAGEMENT PORT" appears on the display.
9. Press **ENTER**. "PRINTER MANAGEMENT PORT / < current setting>" appears on the display.
10. Press **SCROLL**↑ or **SCROLL**↓ until "PRINTER MANAGEMENT PORT / ETHERNET" appears on the display
11. Press **ENTER**. An asterisk (*) appears next to ETHERNET, indicating it is now the active port.
12. Press **RETURN + ENTER** to lock the **ENTER** key.
13. Press **START** to exit the menu and put the printer in the READY state.

Tip 3: Connecting Laptop to Printer via Ethernet Port for Diagnosing Communication Problems

Problem: An increasing need to test Infoprint 6500 ethernet printers for communications problems.

NOTE: If you support the 2710 printers using this ethernet port, write down the IP address information before you make any changes. This will ensure that you can re-enter the address information when you are done. You must write this information down because there is no way to set up a second ethernet connection.

1. Obtain an ethernet cross-over cable from a computer or electronics shop, or order one using IBM P/N 09J7206.
2. Power up the laptop computer.
3. Click on START/SETTINGS/NETWORK AND DIALUP CONNECTIONS.
4. Right click on Local area connection for the ethernet port.
5. Click on properties in the pop-up window.
   a. Select the Internet Protocol (TCPIP) option.
   b. Click on the Properties button.
   c. Select the “use the folllowing IP address” bullet.
6. Enter the IP address of the printer plus or minus 1 in the last numeric octet.
   Example: if the printer’s IP address is 192.078.067.192, enter 192.078.067.193
7. Enter the subnet mask address of the printer.
8. Enter the default gateway address of the printer.
9. Click on OK.
10. Verify the IP address in the printer is correct by printing en ethernet test page.
11. Connect the cross-over cable from the laptop to the printer.
12. Reboot the laptop, then the printer.
13. Make the printer READY.
14. Open a command prompt on the laptop.
15. Ping the printer by typing the following and press Enter:
    `ping xxx.xxx.xxx.xxx`
    where *xxx.xxx.xxx.xxx* = IP address of the printer

NOTE: Do not enter the zeroes (0) in the IP address when pinging. Example: 192.78.67.192

16. If you get a reply of request timed out, reboot the printer and try again. If you still get the timed out error, refer to the ethernet User’s Manual for further diagnostics, or call your DDS for assistance.

17. Disconnect the laptop. Repeat steps 3through 5b.
18. Select “Obtain an IP Address Automatically.”
19. Click on OK.
20. Reboot the laptop and all should be back to normal.

Tip 4: Telnet to the Printer

Only do this procedure after you have successfully pinged the NIC by following the steps in Tip 4 above.

1. At the command prompt, type the following:
   `telnet` ***`xxx.xxx.xxx.xxx`***
   where *xxx.xxx.xxx.xxx* is the IP address of the printer.

   You should get a logon request. If not, reset the NIC in accordance with the NIC *User’s Manual*.

   If you get a logon request, refer to the ethernet interface *User’s Manual* for the userid and password.
2. Logon to the NIC using the proper userid and password.

   (For 6400, 4400, and Infoprint 6500 NICs, there is no password; you only have to use the userid **`root`**.)
3. If steps 1 and 2 are successful, you have verified that communication is established and the NIC is working.

Tip 5: Printer Does Not Communicate

Before doing the steps in this tip, make sure the printer has the latest microcode installed and the NIC card is the correct one for this printer. Make a configuration printout and verify that the ethernet version is the latest. Print the ethernet test page and verify the IP Address information.

Do this procedure using your laptop computer with an ethernet crossover cable connected to the printer.

NOTE: Read this tip completely before doing any of the steps listed below.

1. Can you “ping” the printer from the laptop? For instructions on how ping the printer, see Tip 4.
   If yes, go to step 2.
   If no, go to Tip 3.
2. Can you telnet to the printer from the laptop? For instructions on how to telnet to the printer, see Tip 5.
   If yes, go to step 3.
   If no, go to Tip 3.
3. Can you print to the printer from the laptop? For instructions on how to PRINT (LPR) to the printer, see Tip 7.
   If yes, advise the customer the problem is in their network and must contact their Network Administrator.
   If no, do the steps in Tip 7 again.

If still no, go to Tip 2.
If it still fails, replace the NIC.

For TCP/IP IPDS communication problems, do the following steps:

1. Print the ethernet test page from the printer.
2. Go to the heading TCP SOCKET PRINT MANAGER.
3. Find TCP PORT 5001 and verify that the destination is “dipdsprn” NOT “d4prn”.
4. If port 5001 destination is “d4prn”, go to Tip 1.
5. If port 5001 destination “dipdsprn”, the problem lies with the host computer. Advise the customer to contact his Network Administrator.

Tip 6: Print (LPR) to Printer

1. Connect the laptop computer to the printer using the ethernet crossover cable.
2. Open a command prompt on the laptop.
3. Create a text file to print by doing the following:
   a. Type **`EDIT`** on the command line and press ENTER.
   b. An edit doc window pops up. Type any amount of text in this window.
   c. Click on **File**, then select **Save As** from the pulldown menu.
   d. Type a name for this file and use the .txt extension. For example, **`test1.txt`**
   e. Write down the path to this file from the **Save As** window. It should be C:\ by default.
   f. Close this window.
4. Type the following on the command line:
   `LPR -S` ***`ipaddress of printer`*** **`-P d1prn`** ***`filename`*** <Enter>
5. Verify that the text file printed.

If the procedure above does not work, do the following procedure:

1. On the laptop computer, close all windows and click on **Start** > **Settings** > **Printers** and check your list of printers to see if you have a GENERIC TEXT ONLY printer.
   If not, click on the Add Printer icon and add a GENERIC TEXT ONLY printer on LOCAL PORT LPT1.

If you already have a GENERIC TEXT ONLY printer, right click on it, select SET AS DEFAULT, then right click on it again and go to PROPERTIES.

2. On the laptop, click on the PORTS tab, then click on the ADD PORT button. On the Printer Ports window, click on STANDARD TCP/IP PORT and click on NEW PORT. On the next screen, select NEXT, then type in the printer's IP address (example: 192.168.1.103) in the top box of the ADD Standard TCP/IP Port Wizard window and leave the name field alone, it will fill automatically. Hit NEXT and on the following screen select GENERIC NETWORK CARD and hit NEXT. On the following screen hit FINISH.

NOTE: If you have already configured a TCP/IP port you can select the old port and reconfigure it by selecting the Configure Port button.

3. On the laptop, while still on the PORTS tab, make sure your new TCP/IP port is selected and hit CONFIGURE PORT. Make sure that RAW is selected under PROTOCOL and then hit OK.
4. On the the laptop, click on the ADVANCED tab of the GENERIC TEXT ONLY properties windown and make sure that Print Directly To The Printer is selected. Next, click on the GENERAL tab and leave the laptop in this mode.
5. Connect the ethernet crossover cable from the laptop to the printer's ethernet port, if you have not already done so.
6. On the laptop, from the GENERAL tab select the Print Test Page button at the bottom of the window.

IBM Coax/Twinax Expansion Board

This is the CT interface. To remove and install this board, see page 354.

C Power Cords And Adapters

Part Number	Description
1332167	Line Cord, IBM, Japan
1838573	Line Cord, IBM, 12 Feet, United States, 220 Volt
1838574	Line Cord, 220V 6 Feet Non-Lock, United States, Canada
6952299	Power Cord, 110V 12 Feet Non-Lock, United States, Canada, Brazil, Cayman Islands, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Liberia, Panama, Saudi Arabia, Phillipines, Honduras, Peru, Columbia, Nicaragua, Bermuda, Bahamas, Barbados, Bolivia, Guyana, Ecuador, Haiti, Jamaica, Venezuela, Netherlands, Antilles, Trinidad, Suriname, Taiwan, Tobago, Saint Lucia, Indonesia
8509386	Cable, PC RS-232, IBM
13F9940	Power Cord, China, Detach
13F9980	Line Cord, IBM, Europe (EMEA)
13F9998	Line Cord, IBM, Denmark
14F0016	Line Cord, IBM, Pakistan, South Africa
14F0034	Line Cord, IBM, India, United Kingdom
14F0052	Line Cord, IBM, Switzerland
14F0070	Line Cord, IBM, Chile, Italy
14F0088	Line Cord, 9 Feet, Israel
21F4342	Cable, AS/400*, RS-232, IBM
38F8254	Twinax Auto-Termination Cable

Part Number	Description
58F2861	Conn, Cable, RISC System/6000*, IBM
92F3176	Cable, PC Parallel, IBM
57G7260	Line Cord, 8 Foot, Chicago (Power Cord, 125V, 10A, 8 ft.)
57G7261	Power Cord, 6 Feet, Non-Lock, United States, Canada,110 Volt
08H7968	Coax Adapter Cable for use with Multi-Platform Interface
14H5335	Twinax Auto-Termination Cable (47 Inches)
14H5541	DP Adapter
63H7362	Cable, RISC System/6000*
63H7364	Cable, AS/400, RS-232
63H7366	Cable, PC Parallel
63H7368	Cable, PC RS-232
63H7456	LAN Power Coupling
01P6419	Line Cord, IBM, China
10R4039	Power Cord, Generation II, Korea
10R4040	Power Cord, Generation II, Japan
10R4041	Power Cord, Generation II, China
39U5103	Line Cord, IBM, Australia

D *ASCII Codes*

Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex
NUL	0	00	DLE	16	10		32	20	0	48	30
SOH	1	01	DC1	17	11	!	33	21	1	49	31
STX	2	02	DC2	18	12	+	34	22	2	50	32
EXT	3	03	DC3	19	13	#	35	23	3	51	33
EOT	4	04	DC4	20	14	$	36	24	4	52	34
ENQ	5	05	NAK	21	15	%	37	25	5	53	35
ACK	6	06	SYN	22	16	&	38	26	6	54	36
BEL	7	07	ETB	23	17	+	39	27	7	55	37
BS	8	08	CAN	24	18	(	40	28	8	56	38
HT	9	09	EM	25	19	)	41	29	9	57	39
LF	10	0A	SUB	26	1A	*	42	2A	:	58	3A
VT	11	0B	ESC	27	1B	+	43	2B	;	59	3B
FF	12	0C	FS	28	1C	,	44	2C	<	60	3C
CR	13	0D	GS	29	1D	-	45	2D	=	61	3D
SO	14	0E	RS	30	1E	.	46	2E	>	62	3E
SI	15	0F	US	31	1F	/	47	2F	?	63	3F

Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex
@	64	40	V	86	56	l	108	6C	é	130	82
A	65	41	W	87	57	m	109	6D	â	131	83
B	66	42	X	88	58	n	110	6E	ä	132	84
C	67	43	Y	89	59	o	111	6F	à	133	85
D	68	44	Z	90	5A	p	112	70	å	134	86
E	69	45	[	91	5B	q	113	71	ç	135	87
F	70	46	\	92	5C	r	114	72	ê	136	88
G	71	47	]	93	5D	s	115	73	ë	137	89
H	72	48	^	94	5E	t	116	74	è	138	8A
I	73	49	_	95	5F	u	117	75	ï	139	8B
J	74	4A	`	96	60	v	118	76	î	140	8C
K	75	4B	a	97	61	w	119	77	ì	141	8D
L	76	4C	b	98	62	x	120	78	Ä	142	8E
M	77	4D	c	99	63	y	121	79	Å	143	8F
N	78	4E	d	100	64	z	122	7A	É	144	90
O	79	4F	e	101	65	{	123	7B	æ	145	91
P	80	50	f	102	66	l	124	7C	Æ	146	92
Q	81	51	g	103	67	}	125	7D	ô	147	93
R	82	52	h	104	68	~	126	7E	ö	148	94
S	83	53	i	105	69		127	7F	ò	149	95
T	84	54	j	106	6A	Ç	128	80	û	150	96
U	85	55	k	107	6B	ü	129	81	ù	151	97

Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex
ÿ	152	98		174	AE		196	C4		218	DA
Ö	153	99		175	AF		197	C5		219	DB
Ü	154	9A		176	B0	_	198	C6		220	DC
°	155	9B		177	B1	+	199	C7		221	DD
£	156	9C	@	178	B2		200	C8	+	222	DE
+	157	9D	#	179	B3		201	C9		223	DF
x	158	9E		180	B4		202	CA	+	224	E0
_	159	9F	+	181	B5		203	CB	_	225	E1
á	160	A0	+	182	B6		204	CC	+	226	E2
í	161	A1	+	183	B7		205	CD	+	227	E3
ó	162	A2	_	184	B8		206	CE	_	228	E4
ú	163	A3	1	185	B9		207	CF	+	229	E5
ñ	164	A4		186	BA	_	208	D0		230	E6
Ñ	165	A5	»	187	BB	+	209	D1	•	231	E7
ª	166	A6		188	BC	+	210	D2	_	232	E8
_	167	A7	¢	189	BD	+	211	D3	+	233	E9
¿	168	A8	¥	190	BE	+	212	D4	_	234	EA
«	169	A9		191	BF		213	D5	+	235	EB
	170	AA		192	C0	–	214	D6	_	236	EC
1/2	171	AB		193	C1	+	215	D7	_	237	ED
1/4	172	AC		194	C2	+	216	D8		238	EE
¡	173	AD		195	C3		217	D9		239	EF

Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex	Character	Decimal	Hex
	240	F0		244	F4	º	248	F8		252	FC
_	241	F1		245	F5	¿	249	F9		253	FD
	242	F2	_	246	F6	I	250	FA		254	FE
3/4	243	F3		247	F7		251	FB		255	FF

NOTE: For the hardware handshake XON/XOFF commands:
XON = Ctrl Q (DC1)
XOFF = Ctrl S (DC3)

E *SureStak** Power Stacker*

Contents

Introduction

The SureStak** Power Stacker is a factory-installed option for high speed cabinet model printers that mechanically directs the paper from the print area to the paper stack. The power stacker is mounted in the rear of the cabinet and has its own operator panel. It is designed to work with forms from 5 to 12 inches (12.7 to 30.5 cm) long. Using longer or shorter paper can cause error messages and unpredictable behavior of the stacker. The power stacker can handle forms from 3 to 16 inches (76 to 406 mm) wide with no paper tent in the pull-out tray, and from 3 to 15.5 inches (76 to 394 mm) wide with the paper tent installed in the pull-out tray.

IMPORTANT **Access to the stacker assembly is restricted while it is in the cabinet. You must remove the stacker assembly from the printer to service it.**

This appendix has three sections:

- How to operate the power stacker.
- Removal/installation instructions for the stacker assembly and 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 power stacker assembly.

How To Operate The Power Stacker

Figure 56 shows the locations of the principal components of the power stacker.

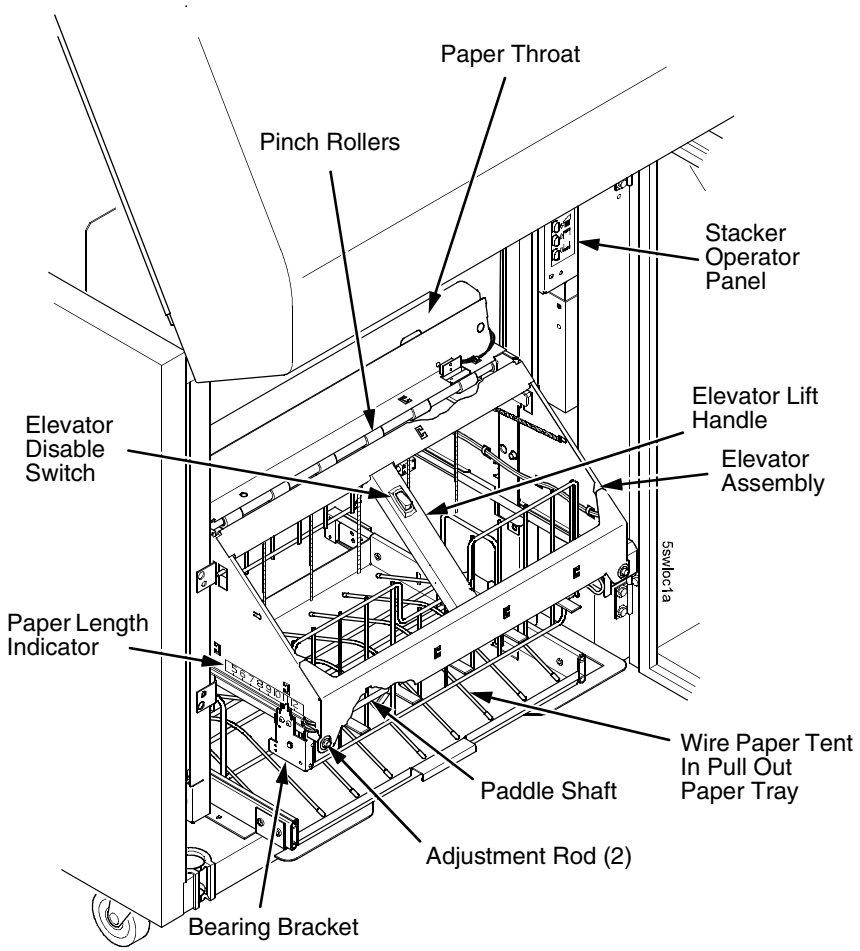


Figure 56. This figure shows the locations of the main parts of the power stacker.

Stacker Operator Panel

The stacker operator panel is behind the rear door of the cabinet. (Figure 57.)

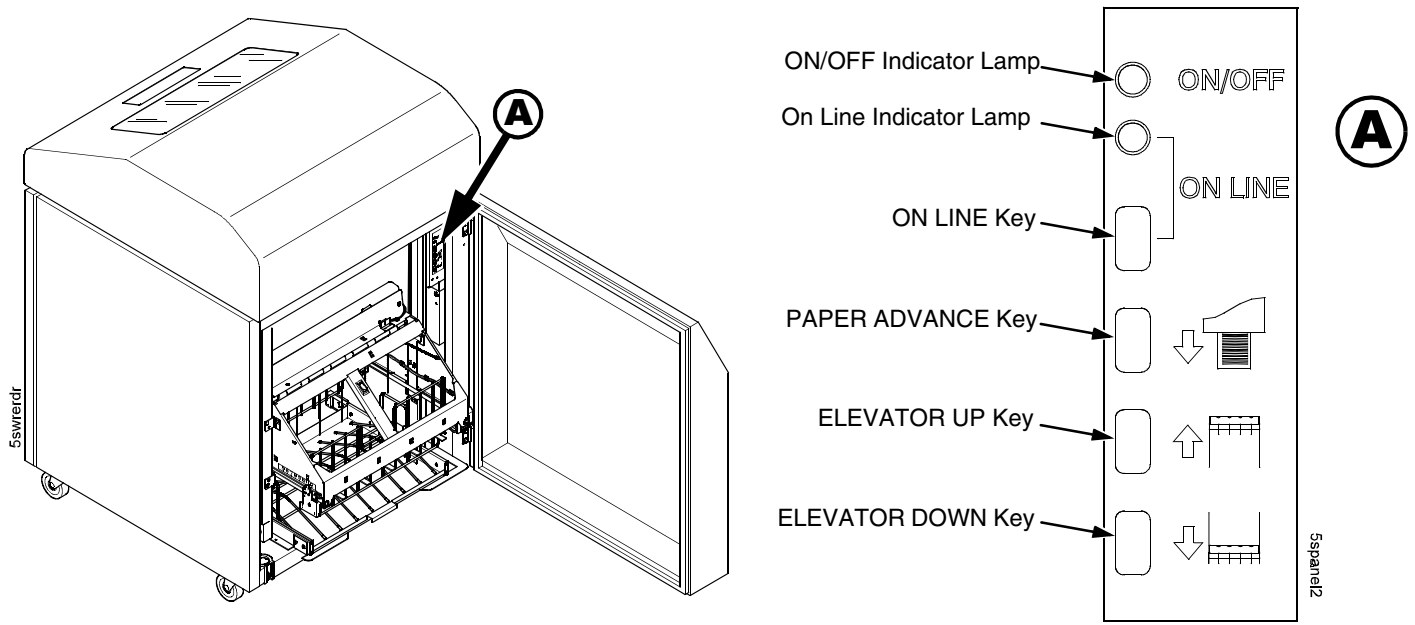


Figure 57. This figure shows the location of the power stacker operator panel and the keys on the operator panel.

- **ON/OFF Indicator Lamp** — Lit when printer power is on. Unlit when printer power is off.
- **ON LINE Indicator Lamp** — Lit when printer is in the READY state. Unlit when printer is in the NOT READY state.
- **ON LINE** Key — Toggles the printer between the READY and NOT READY states.
- **PAPER ADVANCE** Key — Moves paper one form length, as defined by the currently active form length. This key is active only when the printer is in the NOT READY state.
- **ELEVATOR UP** Key — Moves the elevator to its highest position. This key is active only when the printeris in the NOT READY state.
- **ELEVATOR DOWN** Key — Moves the elevator to its lowest position. This key is active only when the printer is in the NOT READY state.

Using The Power Stacker

1. Set the printer power switch to | (On).
2. Open the rear door of the cabinet.
3. On the stacker operator panel, press **ON LINE** to take the printer offline (NOT READY). (Figure 57.)
4. Press the **ELEVATOR UP** key and wait for the elevator assembly to reach the top of its travel. (Figure 57.)
5. If the paper you will use is not wider than 15.5 inches (39.5 cm) install the wireform paper tent in the pull out paper tray. (Figure 58.) If the paper is wider than 15.5 inches (39.5 cm) leave the paper tent out of the printer.

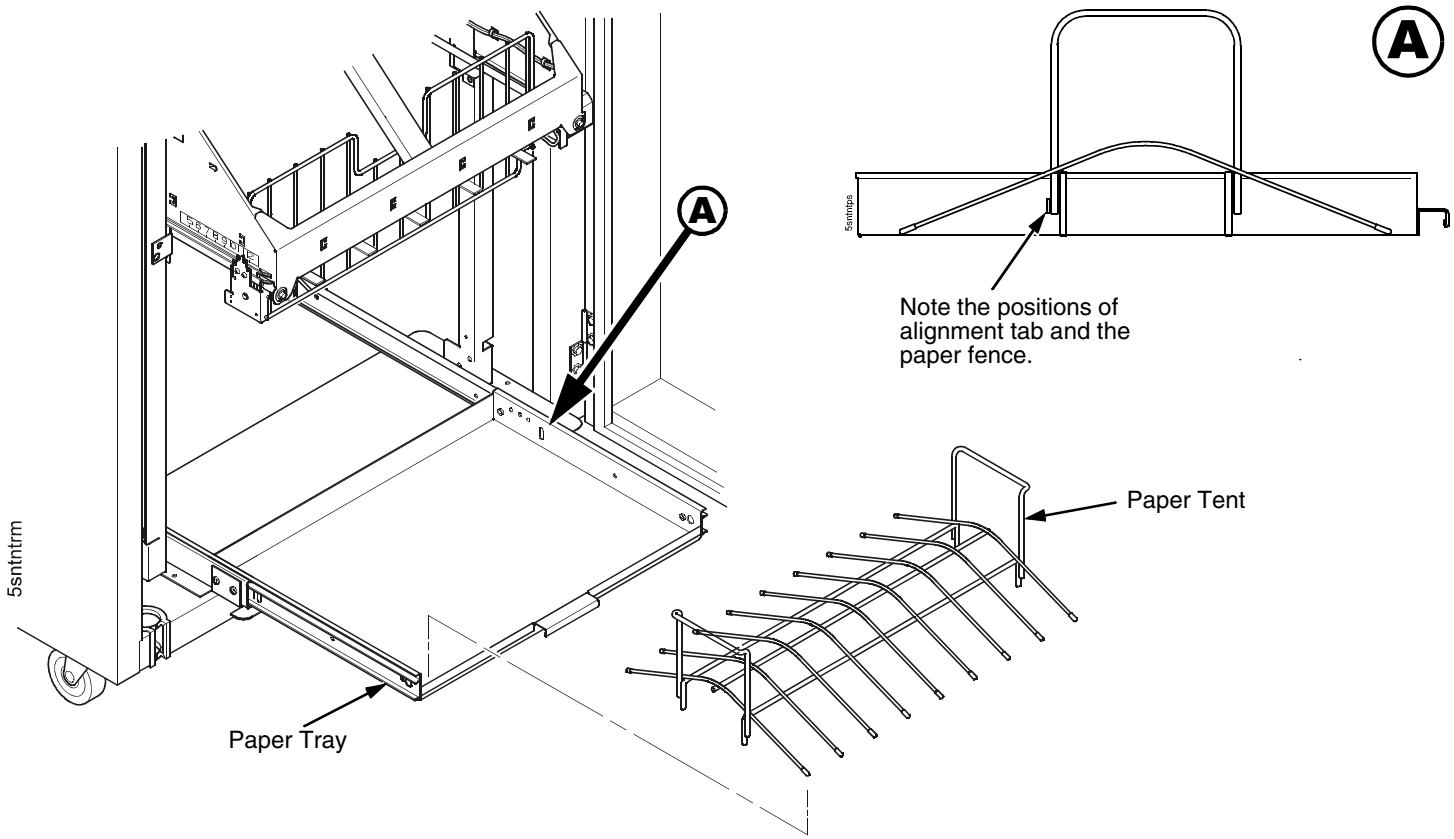


Figure 58. This figure shows how to install the paper tent in the paper tray.

6. Push or pull the paddle shaft toward the front or the rear of the printer and set the paper length by aligning indicator notch on the bearing bracket with the paper length indicator. (Length range: 5 to 12 inches.) (Figure 59.)

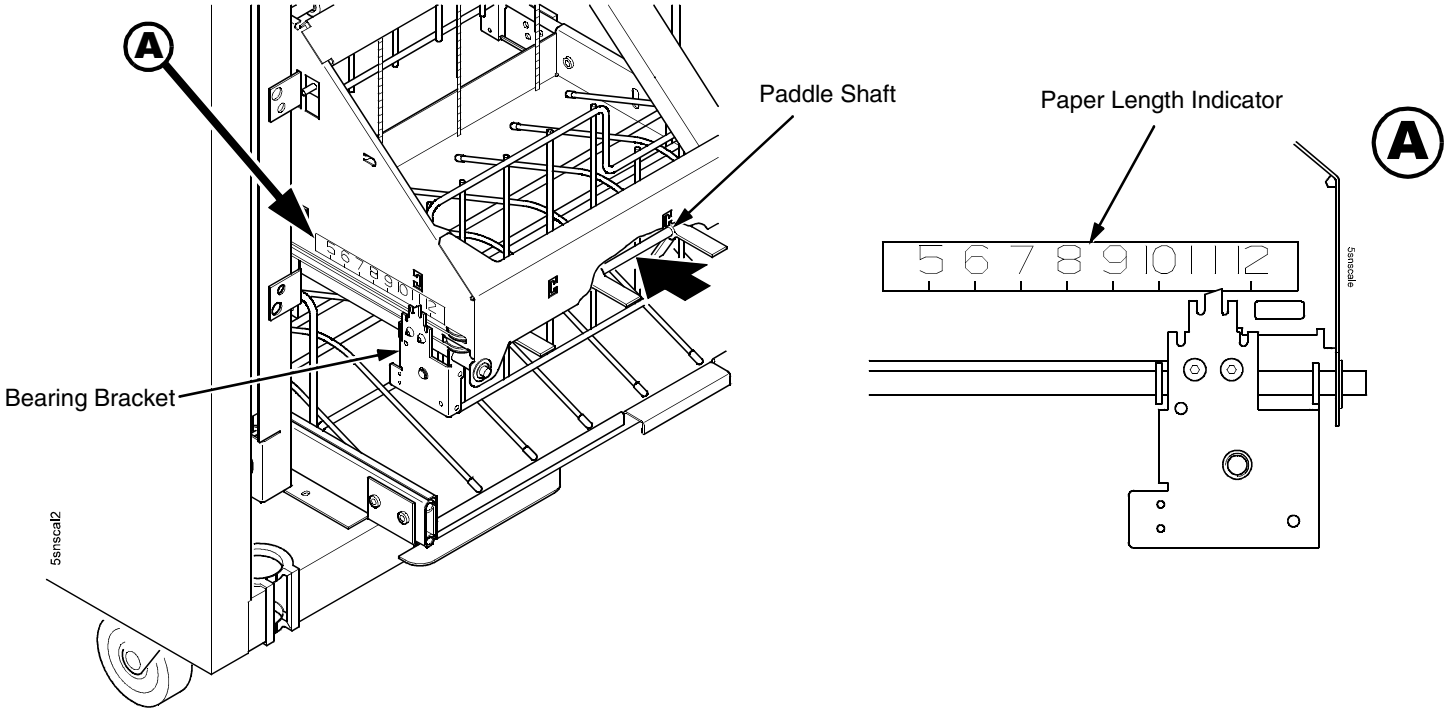


Figure 59. This figure shows how to set the paper length on the power stacker.

Loading and Starting the Power Stacker

1. Press the **PAPER ADVANCE** key on the the stacker operator panel and hand feed the paper down into the paper throat. Continue to advance the paper until it reaches the wire tent and there are 3 to 5 extra sheets in the stacker. Make sure the paper passes through the throat of the paper stacker. (Figure 60.)
2. Stack the three to five sheets of paper on top of the wire paper tent, making sure the paper bends with the natural fold.

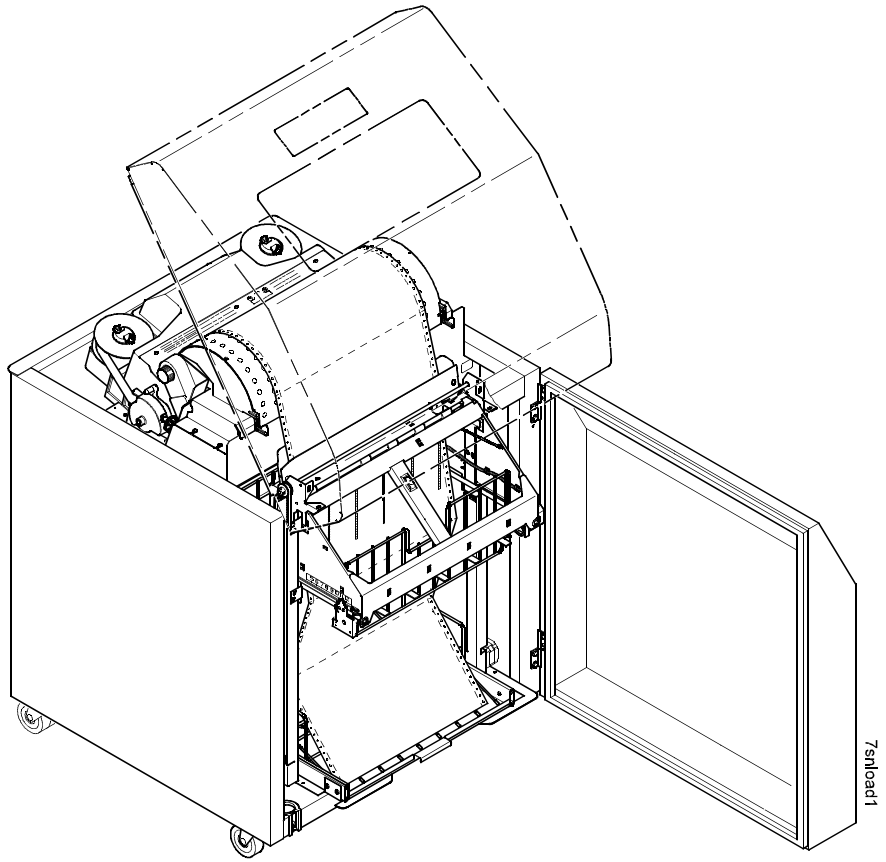


Figure 60. This figure shows the path of paper as it moves through the power stacker.

3. Press the **ON LINE** key on the front or rear operator panel to put the printer in the online state. The stacker elevator will descend to its lowest position. (Figure 61.)

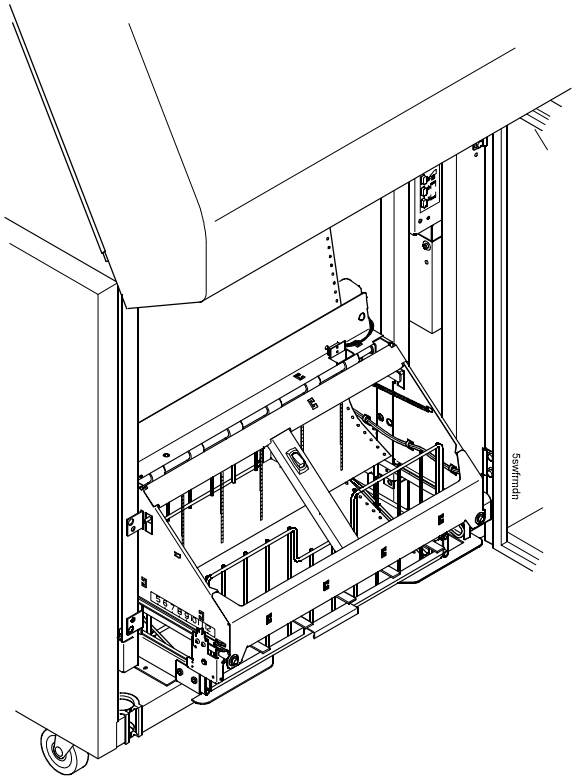


Figure 61. This figure shows the power stacker in the print position.

4. Check that the paper is still centered between the paper guides.
5. Close the cabinet rear door.
6. If necessary, set Top Of Form. (Refer to the *User's Manual.)*

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. Because of the electromechanical nature of the system, 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. The inspection and tests below will allow you to make sure the stacker is operating correctly. 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 509).
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 207).

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 () 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 operator panel.
2. From the rear operator 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 NOT READY state (offline), press the ELEVATOR UP key on the rear operator 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 at the customer's site, 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 51.
5. With the power stacker still at its highest position, enable the power stacker using the configuration menu atthe 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 operator print test (page 229), 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 229) 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 018 STACKER FULL CHECK STACKER when the elevator reaches the top of its travel.
10. Lower the elebator 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 205.
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. 017 STACKER JAM CHECK STACKER 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 7 on page 480 and troubleshoot the appropriate symptom. When the stacker is operational, clear the error log and place the printer in the READY state.

Stacker Motor Check

1. Power off the printer.
2. Open the rear cabinet door.
3. Unfasten the cable clamp holding the stacker operator 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 customer.	Various causes possible.	page 203
017 STACKER JAM CHECK STACKER	Message on operator panel LCD.	This message is triggered when the elevator cannot reach the top or bottom limit switch before timing out.	page 51
018 STACKER FULL CHECK STACKER	Message on operator panel LCD.	Status message: the power paper stacker is full.	page 51

Table 7. Power Stacker Problems

Symptom	Origin of Symptom	Explanation	Solution
019 STACKER FAULT CHECK STACKER	Message on operator panel LCD.	1. The stacker elevator may be obstructed. The message will always occur if the user presses the ELEVATOR UP key on the stacker operator 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.	page 52
Stacker “chatters” at upper or lower limit	Reported by customer.	Various causes possible.	page 205
Stacker does not stack properly	Reported by customer.	Various causes possible.	page 206
Stacker elevator does not move	Reported by customer.	Various causes possible.	page 206
Stacker elevator moves by itself	Reported by customer.	Various causes possible.	page 206
Stacker limit switch check	Other troubleshooting procedures.	This procedure 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 207

Table 7. Power Stacker Problems

Symptom	Origin of Symptom	Explanation	Solution
Stacker motor check	Other troubleshooting procedures.	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 the procedure, return to the procedure that sent you there.	page 208
Stacker not operating	Reported by customer.	Same as “Printer does not detect presence of power stacker”	page 203

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 62.)

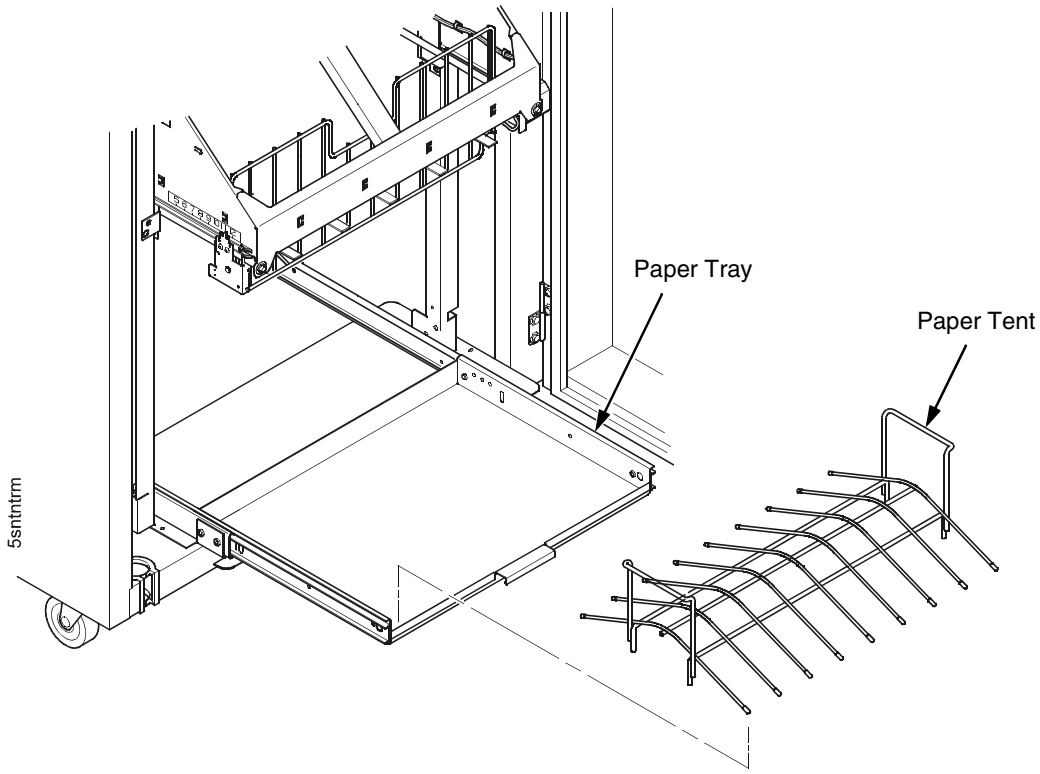


Figure 62. This figure shows how to remove the paper tent.

5. Cut the tie wrap (if present) and remove the paper fence. (Figure 63.)

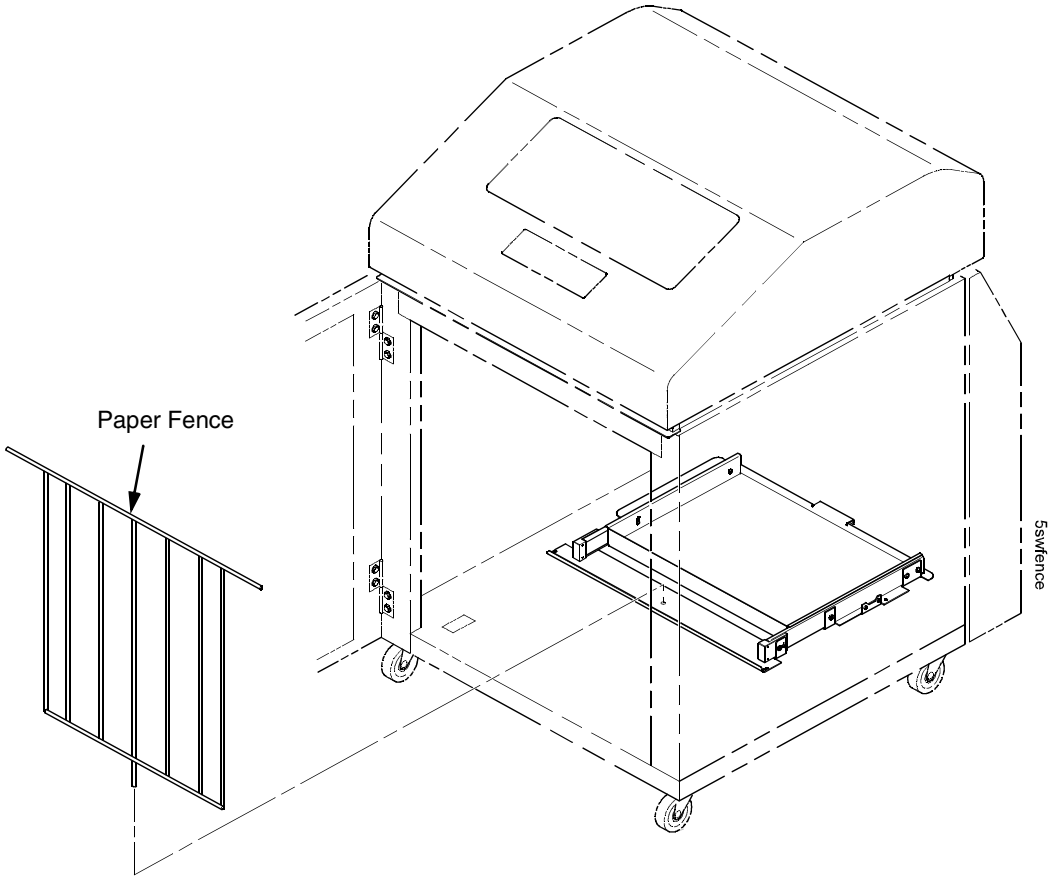


Figure 63. This figure shows how to remove the paper fence.

6. Remove the screws, washers, and standoff from the stacker operator panel. (Figure 64.)

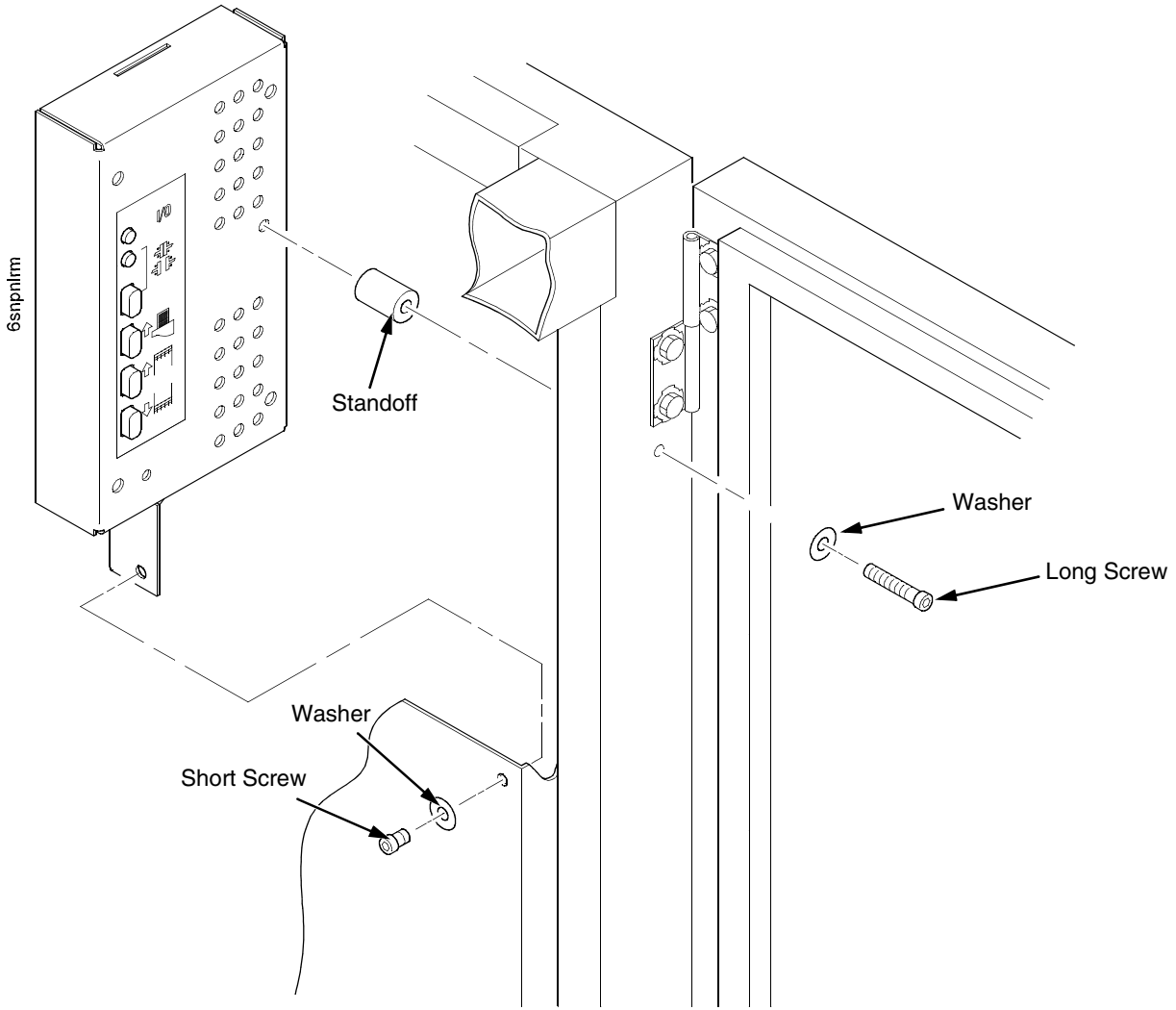


Figure 64. This figure shows how to remove an early stacker operator panel from the cabinet frame.

7. Remove four cables from the stacker operator panel, and remove the stacker operator panel. (Figure 65.)

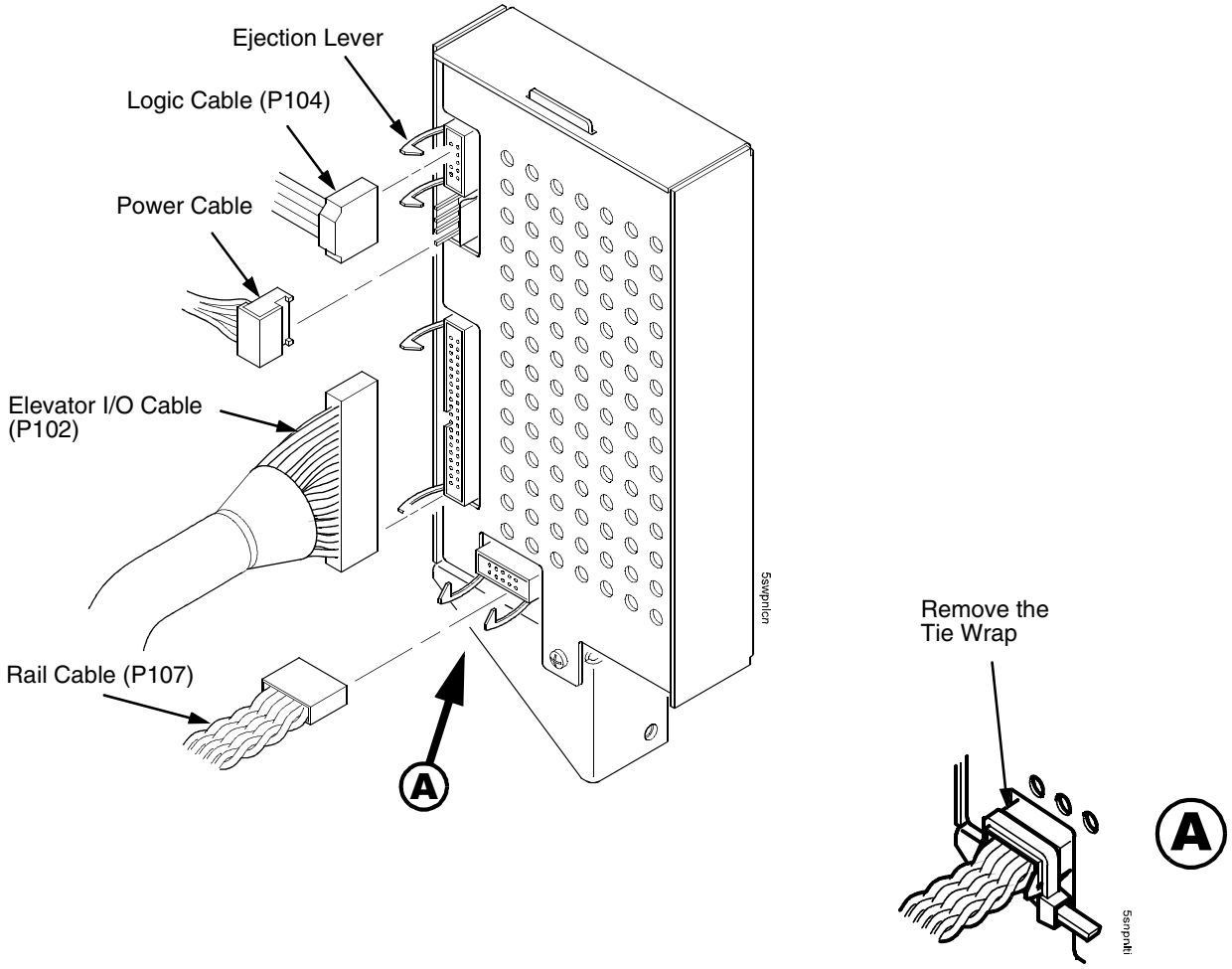


Figure 65. This figure shows how to remove the cables from the rear of the stacker operator panel.

8. 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 66.)
9. Remove the two Torx T-10 screws securing the stacker base to the cabinet floor. (Figure 66.)
10. Remove the two Torx T-10 screws that secure the rail bracket to the cabinet floor. (Figure 66.)

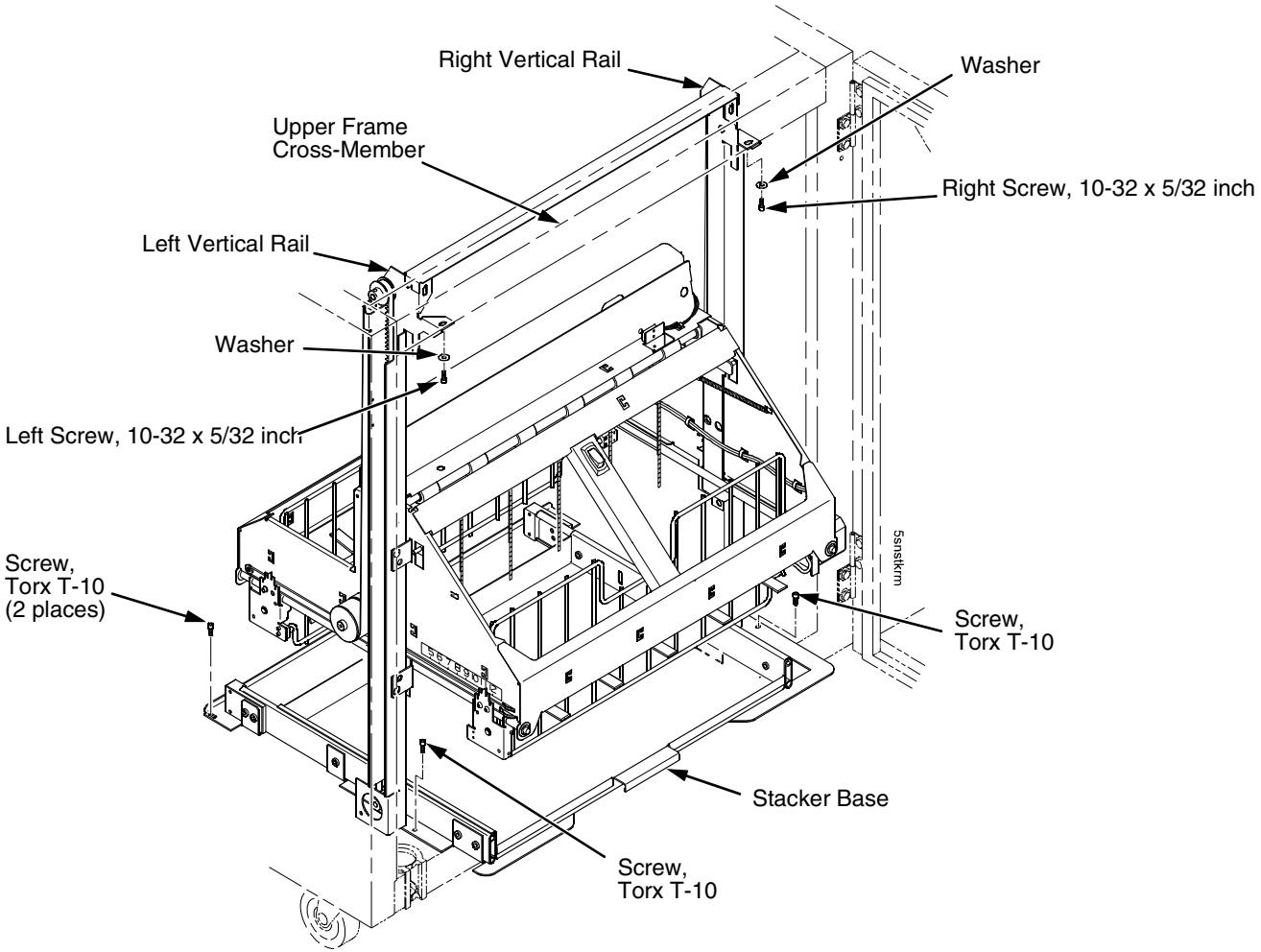


Figure 66. This figure shows which screws to remove to prepare the stacker for removal from the cabinet.

11. Pull the paper tray out until the holes in the rails permit access to the M3 buttonhead screws. (Figure 67)
12. 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 67.)

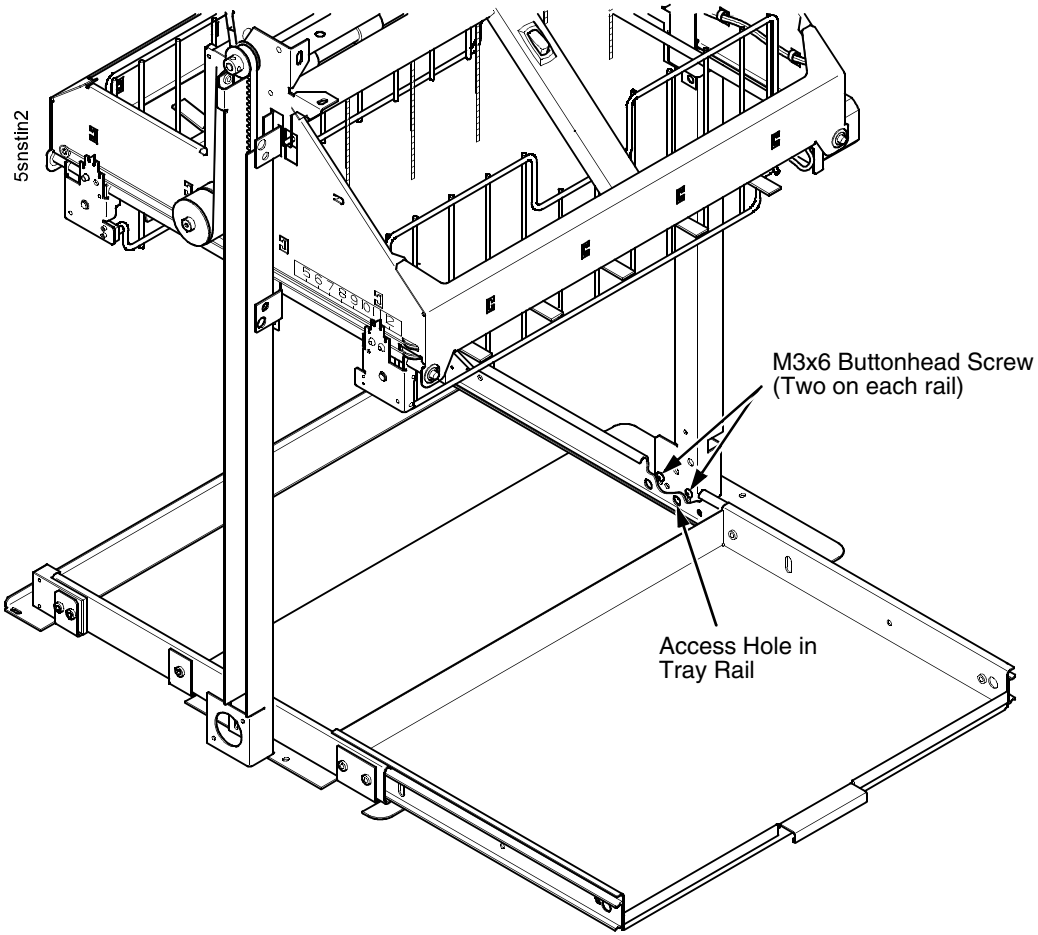


Figure 67. This figure shows how to loosen the lower screws in the vertical rails of the stacker.

13. Lower the elevator assembly to its lowest position.
14. 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 68.)

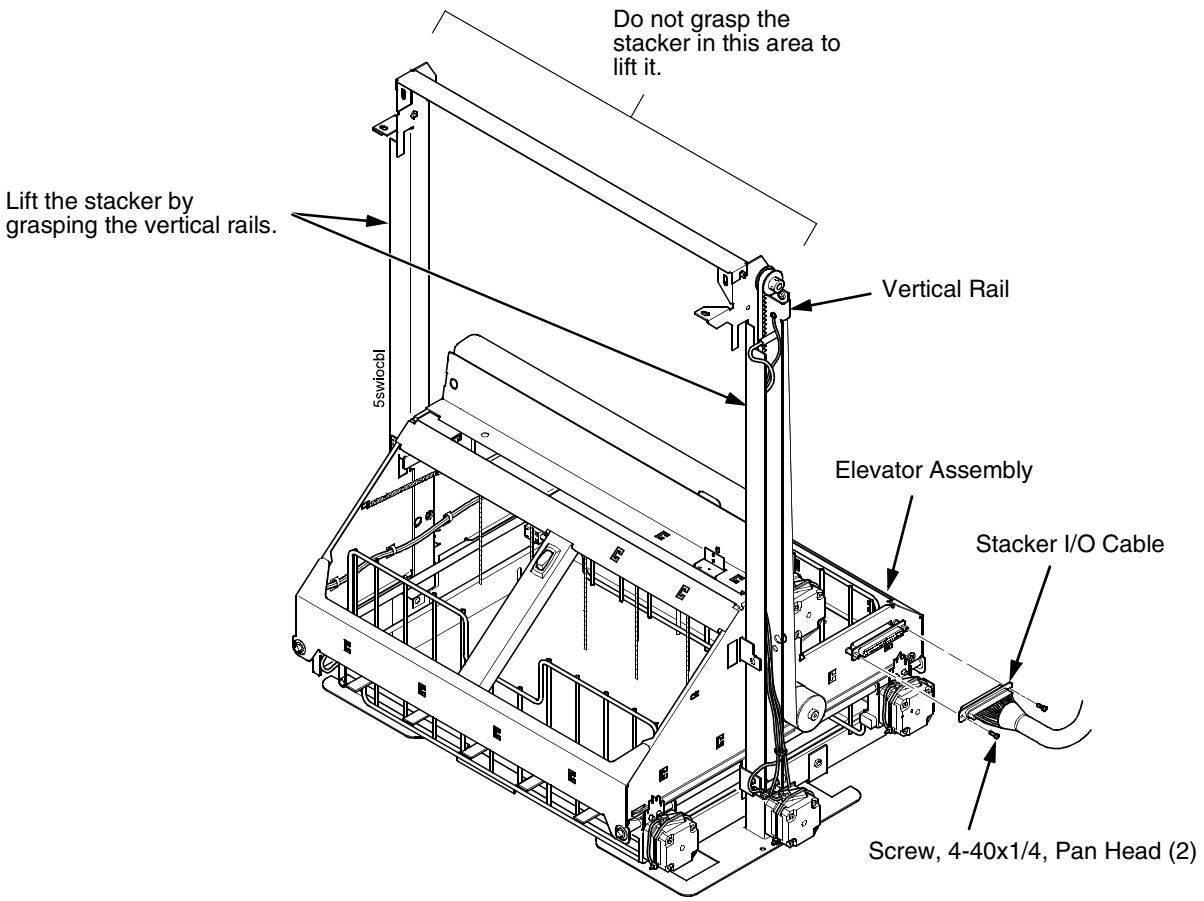


Figure 68. This figure shows where to disconnect the stacker I/O cable from the stacker elevator.

NOTE: It may be easier to wear gloves for the next step.

15. Slide the entire 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. Slide the stacker assembly to the rear and angle it out of the cabinet, as shown in Figure 69.

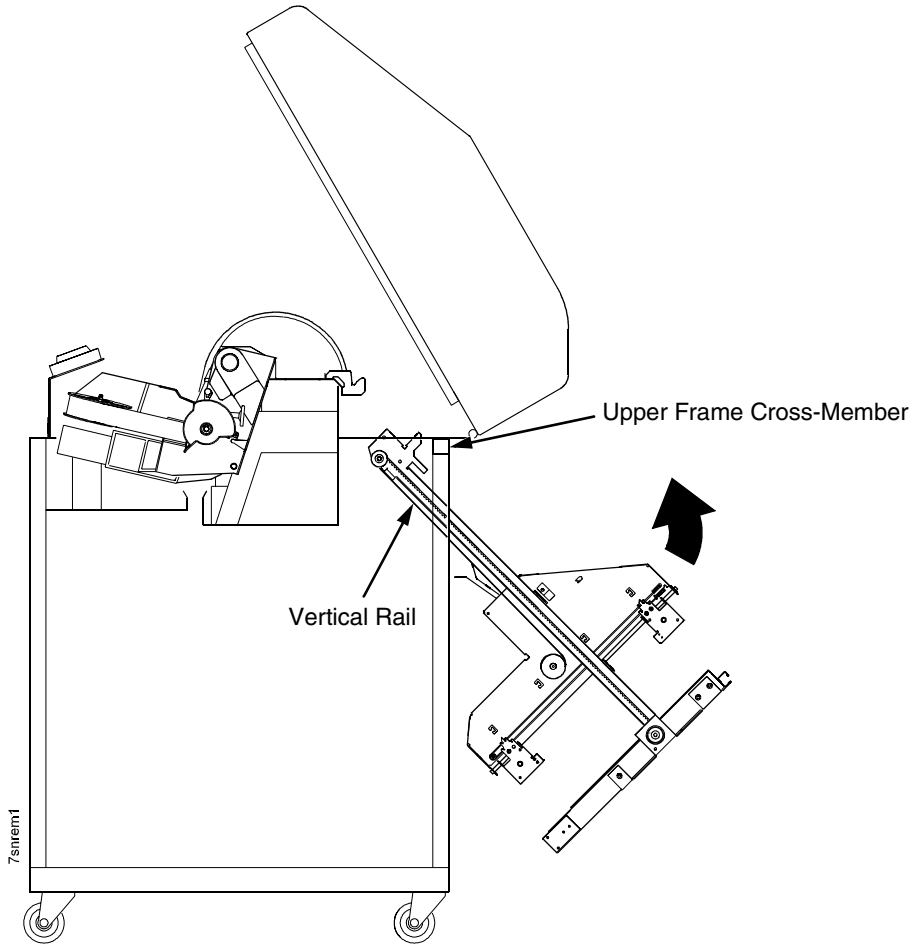


Figure 69. This figure shows how to remove the stacker assembly from the rear of the printer cabinet.

Installing The Power Stacker

NOTE: This procedure is for complete installation of the power stacker, including cable assemblies and the stacker operator 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 screws that secure the paper guide assembly. Slide the paper guide assembly to the left and lift it off the card cage. (Figure 70.)

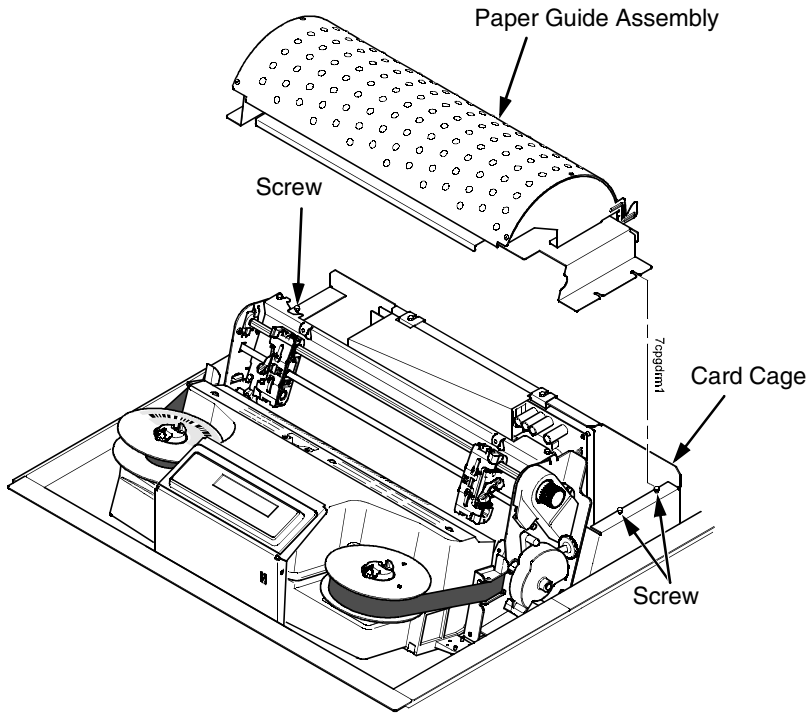


Figure 70. This figure shows how to remove the paper guide assembly from the card cage.

5. Connect the power stacker logic cable P103 to connector J117 on the controller board. (Figure 71.)
6. Disconnect the power supply cable from connector J101 on the controller board. (Figure 71.)
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 71.)
8. Route the stacker power cable in front of the controller board and down through the cutout under the card cage fan. (Figure 71.)
9. Route the stacker logic cable in front of the controller board and down through the cutout under the card cage fan. (Figure 71.)

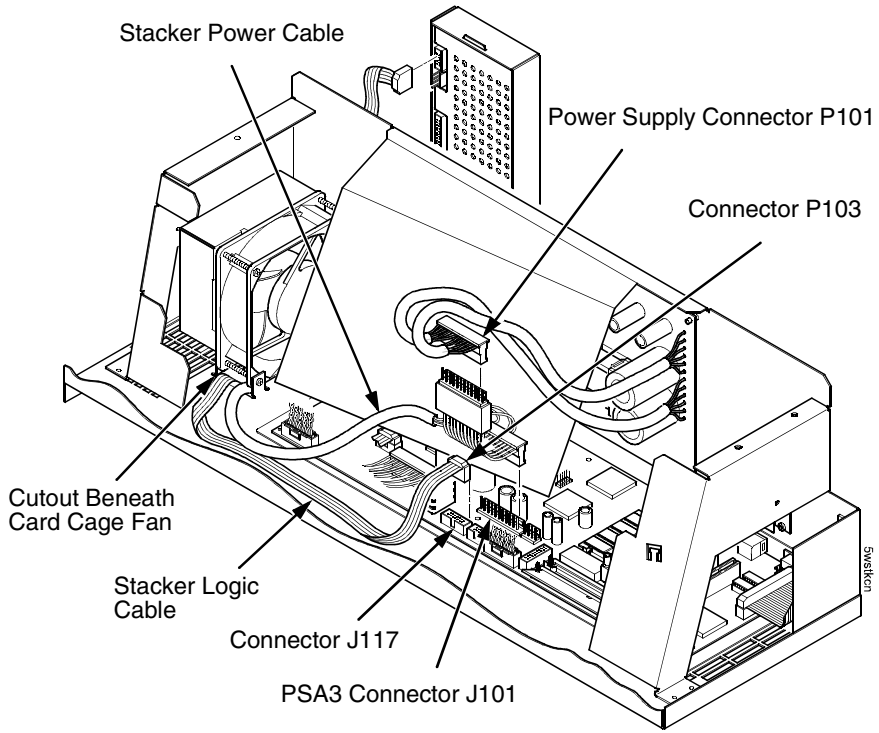


Figure 71. This figure shows where to attach the power stacker power and logic cables on the PSA3 controller board.

10. Pull the paper tray out until the holes in the rails permit access to the M3 buttonhead screws. (Figure 72.)
11. 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 72.)

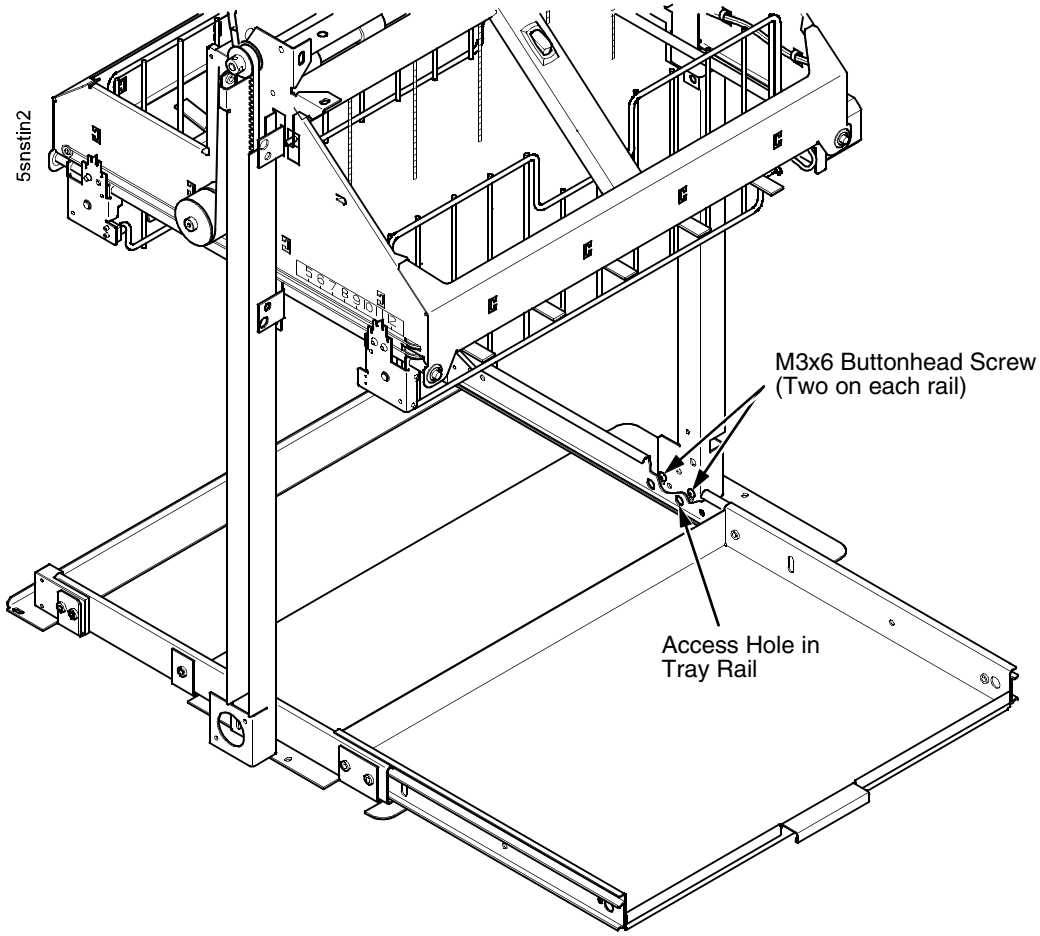


Figure 72. This figure shows how to loosen the lower screws in the vertical rails of the stacker.

12. Position the elevator assembly at the bottom of the vertical rails. (Figure 73.)
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 73.

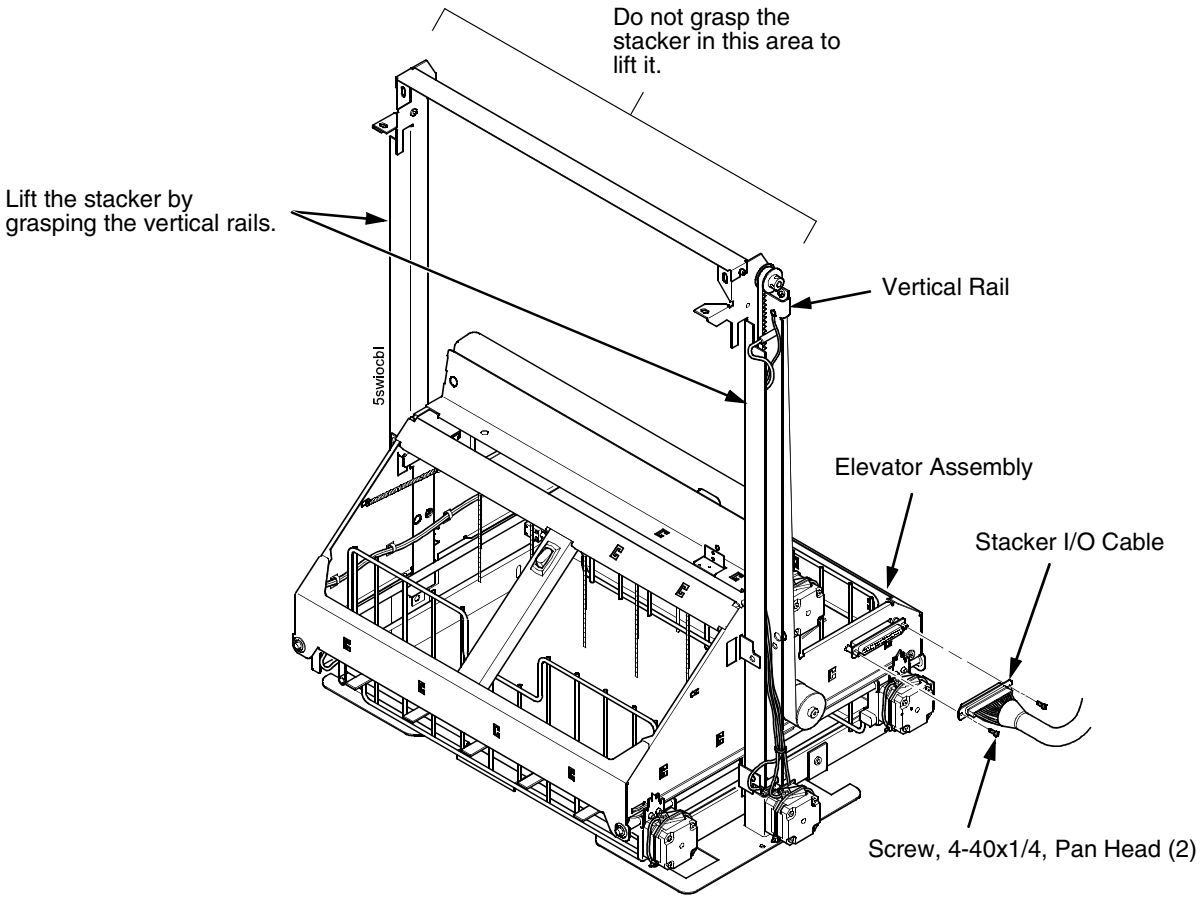


Figure 73. This figure shows where to connect the stacker I/O cable to the stacker elevator.

ATTENTION **The power 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. (Refer to Figure 77a.) Leave the stacker loose in the rear of the cabinet.
15. Gather the stacker rail cable, elevator I/O cable, logic cable, and power cable. Route the cables outboard of the elevator assembly. (Figure 74.)

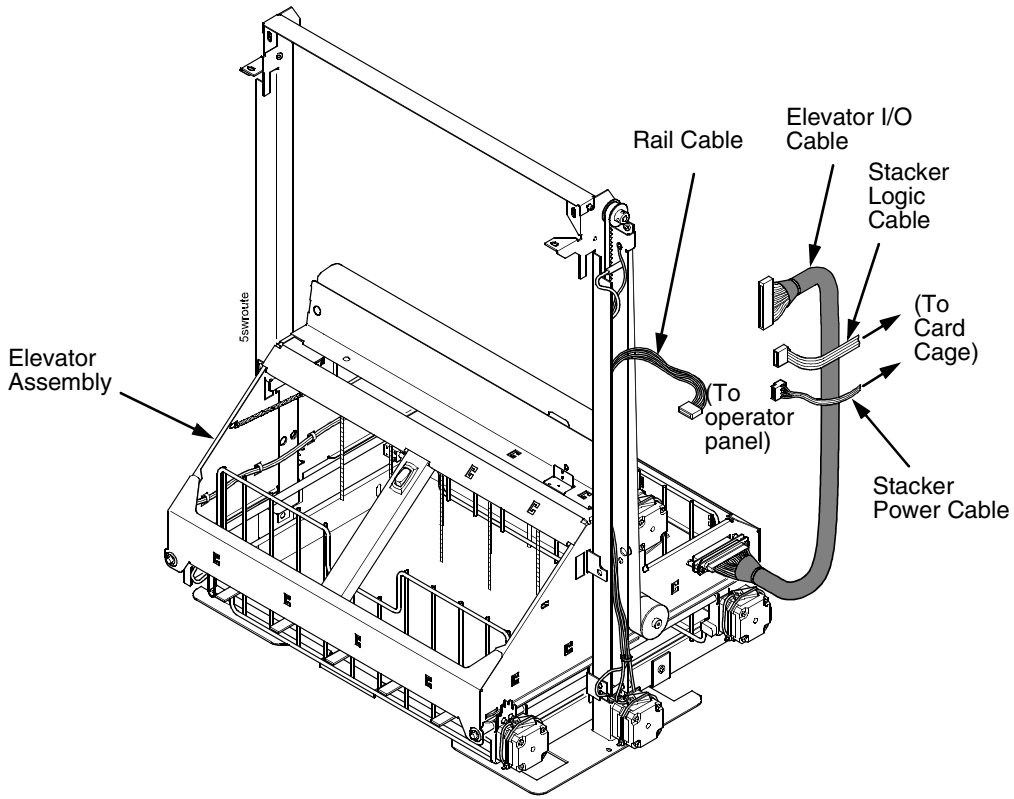


Figure 74. This figure shows how to route the stacker cables from the elevator and frame rail to the card cage.

16. Connect the stacker cables to the rear of the stacker operator panel assembly and make sure the ejector levers close over the connectors. (Figure 75.)
17. Press rail cable connector P107 into the operator panel until the ejectors close, then tie wrap the ejectors to the connector. (Figure 75, detail.)

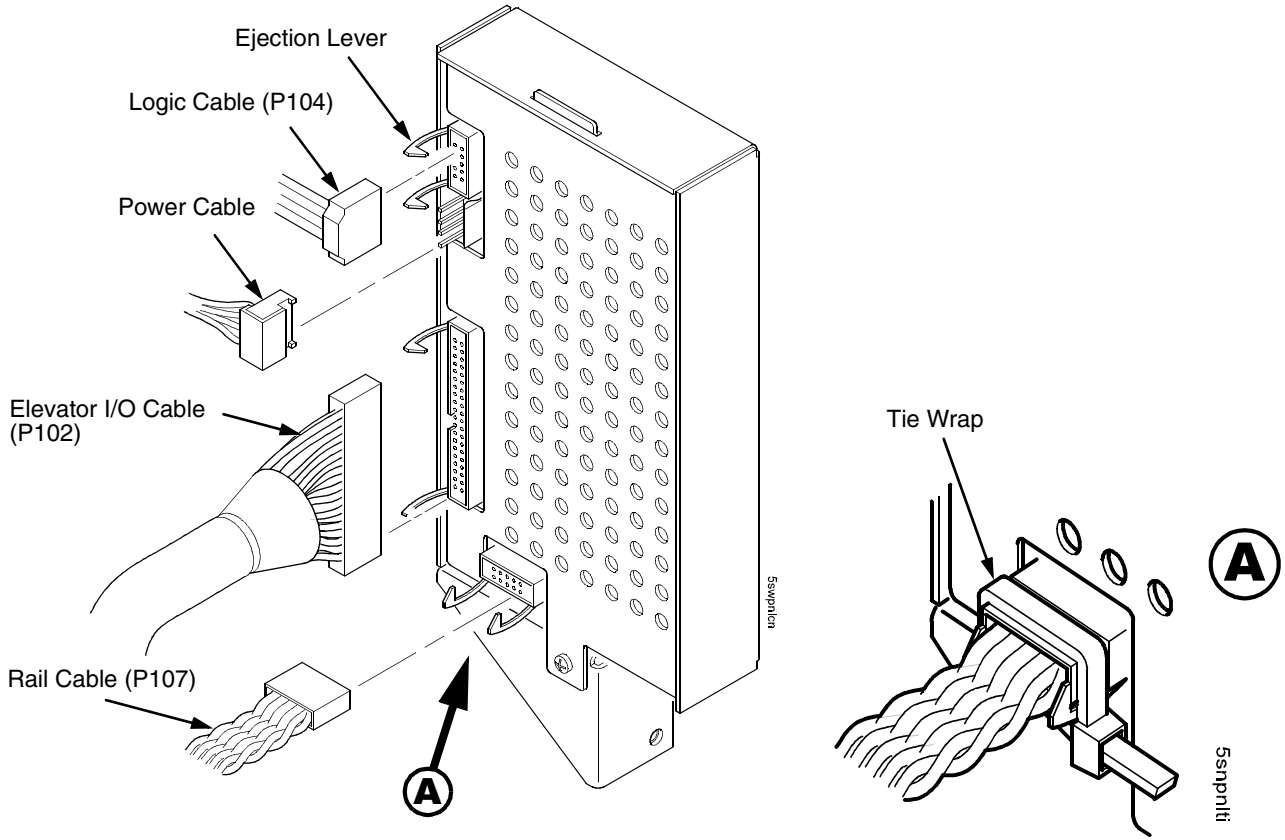


Figure 75. This figure shows how to install the operator panel cables to the rear of the stacker operator panel.

18. Apply the double-sided tape to one end of the operator 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 operator panel into position and install the upper mounting screw finger tight in the operator panel. (Figure 76.)
19. Inspect the distance between the operator panel lower bracket and the inner panel of the cabinet.
    a. If the operator panel lower bracket is flush with the cabinet inner panel, proceed to step 20.
    b. If there is a gap between the operator panel lower bracket and the cabinet inner panel, do the following:
        1) Peel the backing off the spacer adhesive. (Figure 76.)
        2) Align the spacer with the holes in the lower bracket and inner panel. (Figure 76.)
        3) Press the spacer adhesive against the inner panel. (Figure 76.)
20. Install the lower mounting screw and washer. Tighten the upper mounting screw. (Figure 76.)

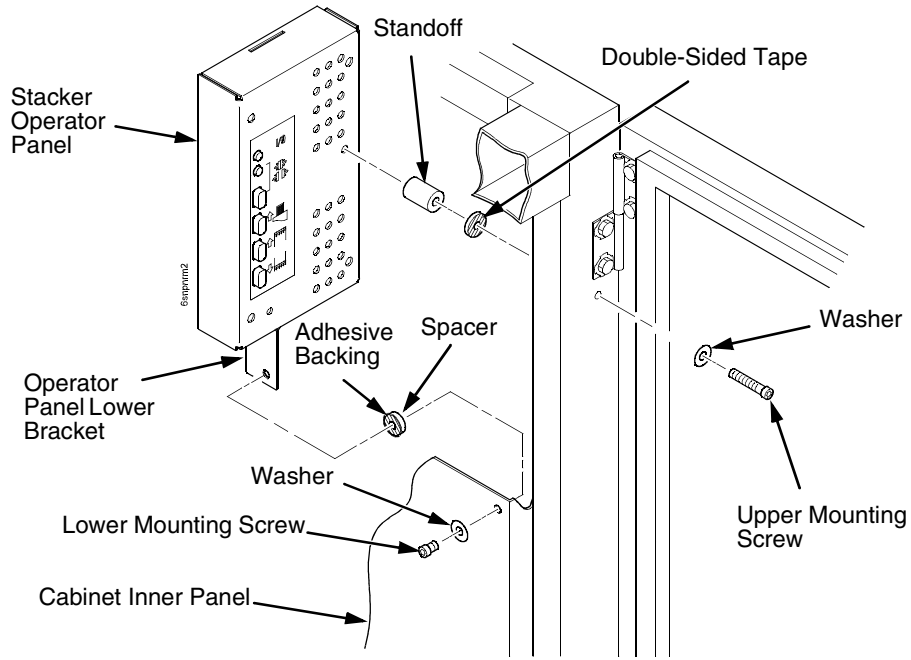


Figure 76. This figure shows how to install the stacker operator panel in the rear of the cabinet.

NOTE: It may be easier to wear gloves for the next three steps.

21. Work the stacker base rearward and engage the upper brackets of the vertical rails under the upper frame cross-member. (Figure 77b.)
22. Align the holes in the vertical rail brackets with the holes in the upper frame cross-member. (Figure 77c and Figure 78.)
23. Align the holes in the stacker base with the holes in the cabinet floor. (Figure 77c and Figure 78.)

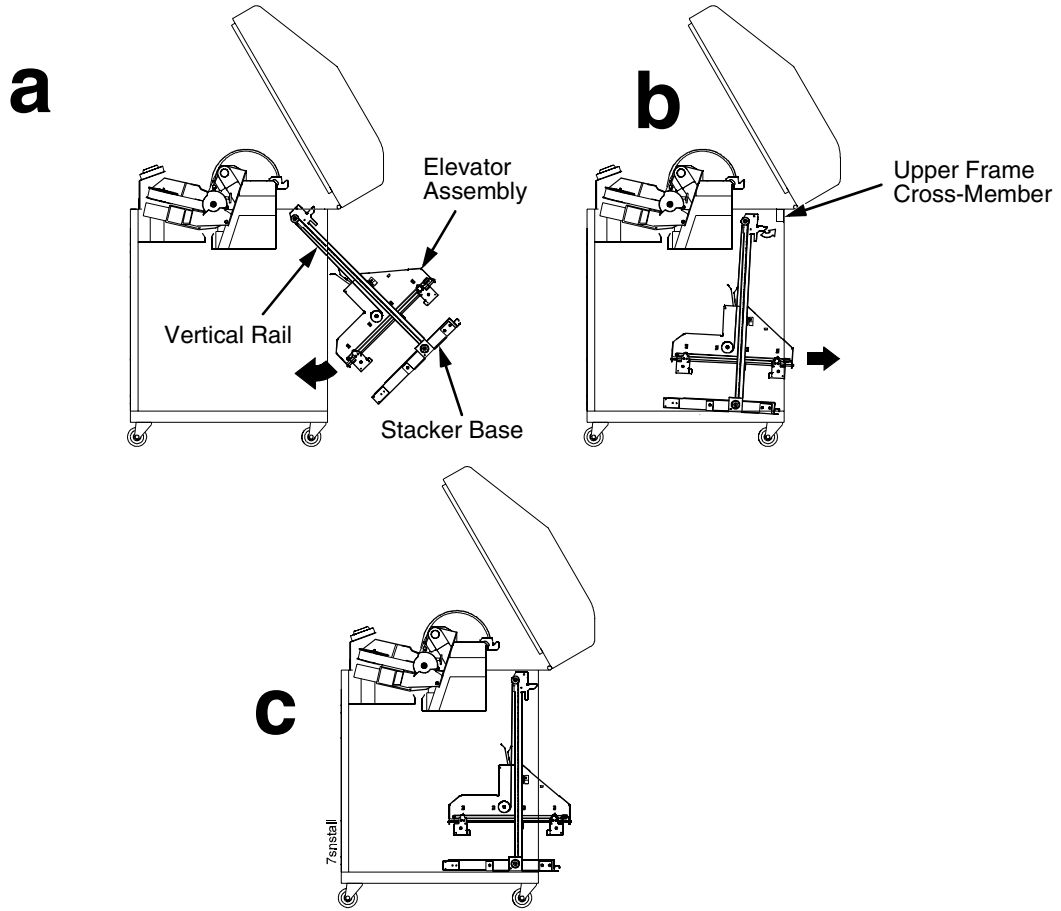


Figure 77. This figure shows how to position the stacker assembly in the rear of the cabinet.

24. 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 78.)
25. Install and tighten the two Torx T-10 screws securing the stacker base to the cabinet floor. (Figure 78.)
26. Install and tighten the two Torx T-10 screws that secure the rail bracket to the cabinet floor. (Figure 78.)

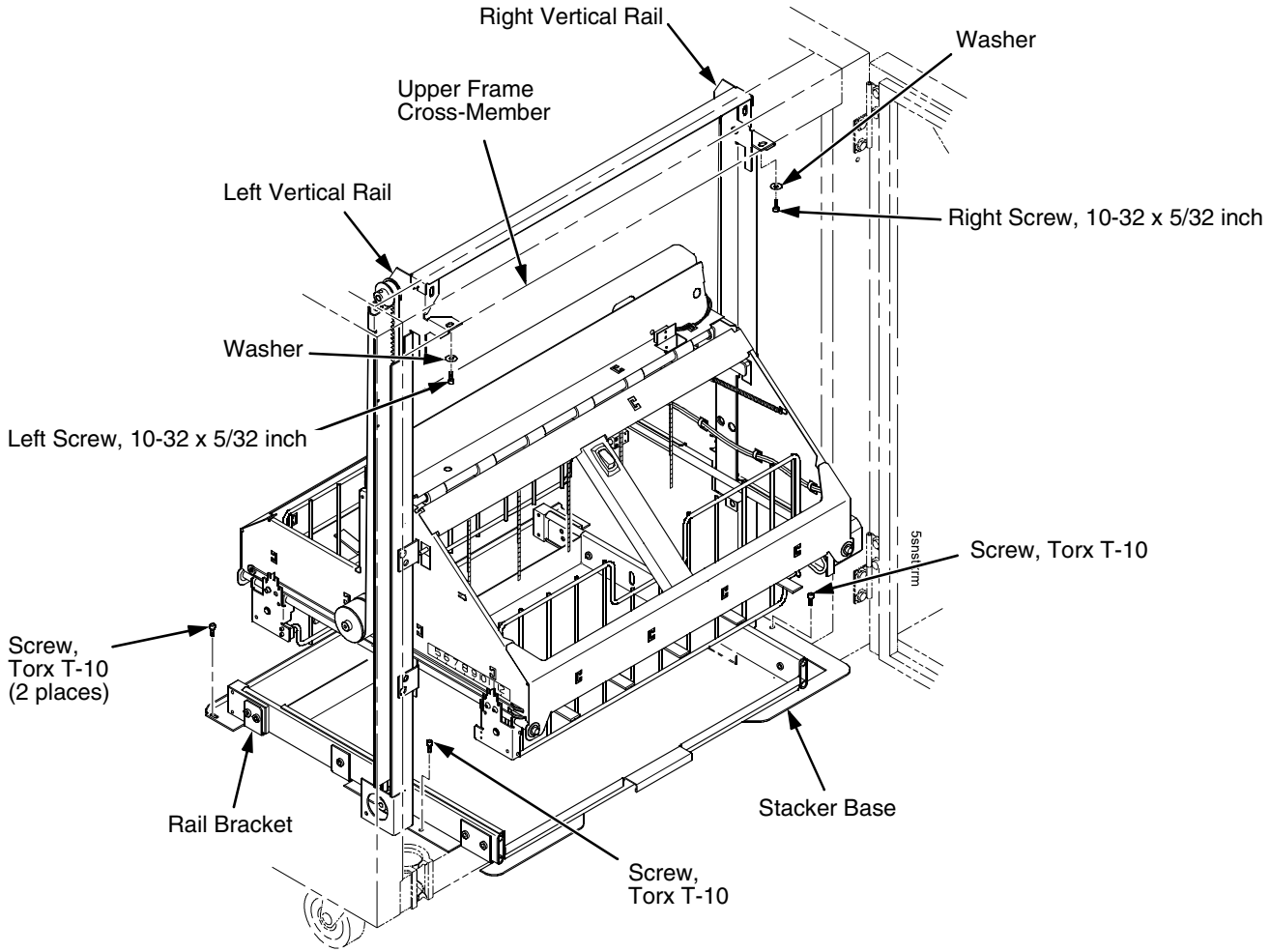


Figure 78. This figure shows which screws to install to secure the stacker assembly in the rear of the cabinet.

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 78.)
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 72.)
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 operator 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 79.)

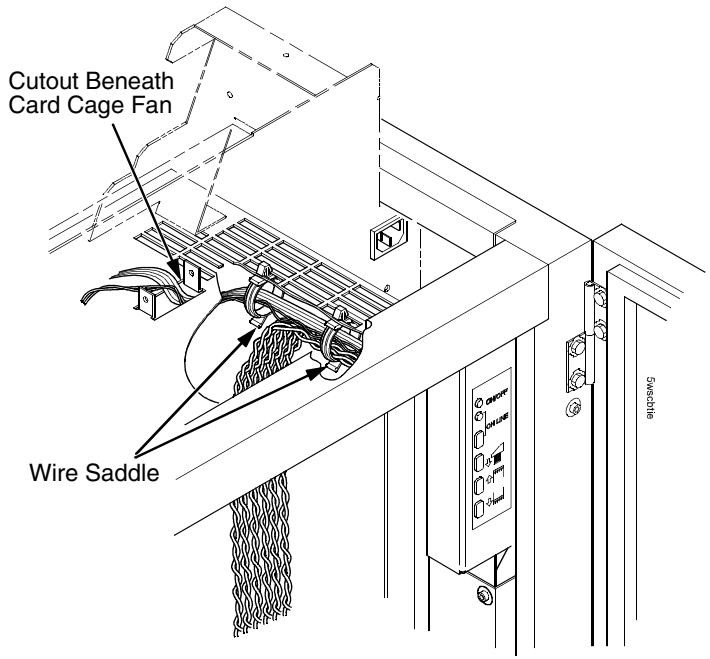


Figure 79. This figure shows how to bundle and route the stacker cables beneath the card cage and behind the operator panel.

33. Install the paper fence. (Figure 80.)

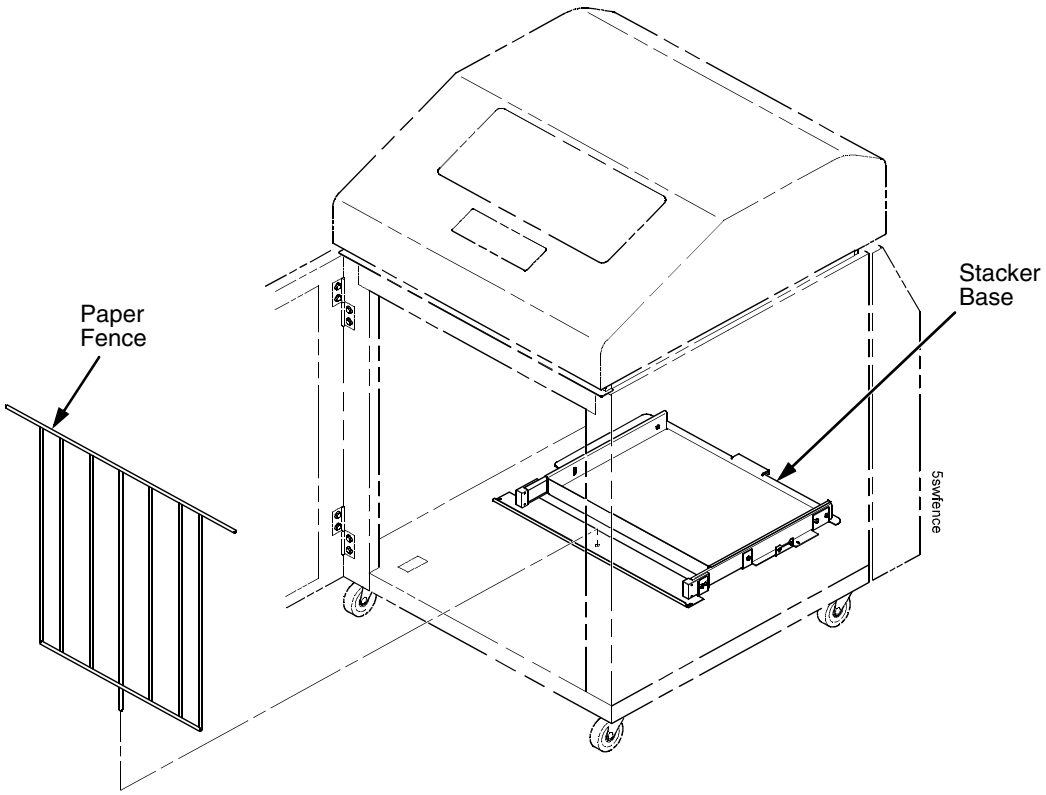


Figure 80. This figure shows how to install the paper fence in the cabinet.

34. If the paper you will use is not wider than 15.5 inches (39.5 cm) install the wire paper tent in the pull out paper tray. (Figure 81.) If the paper is wider than 15.5 inches (39.5 cm) leave the paper tent out of the printer.

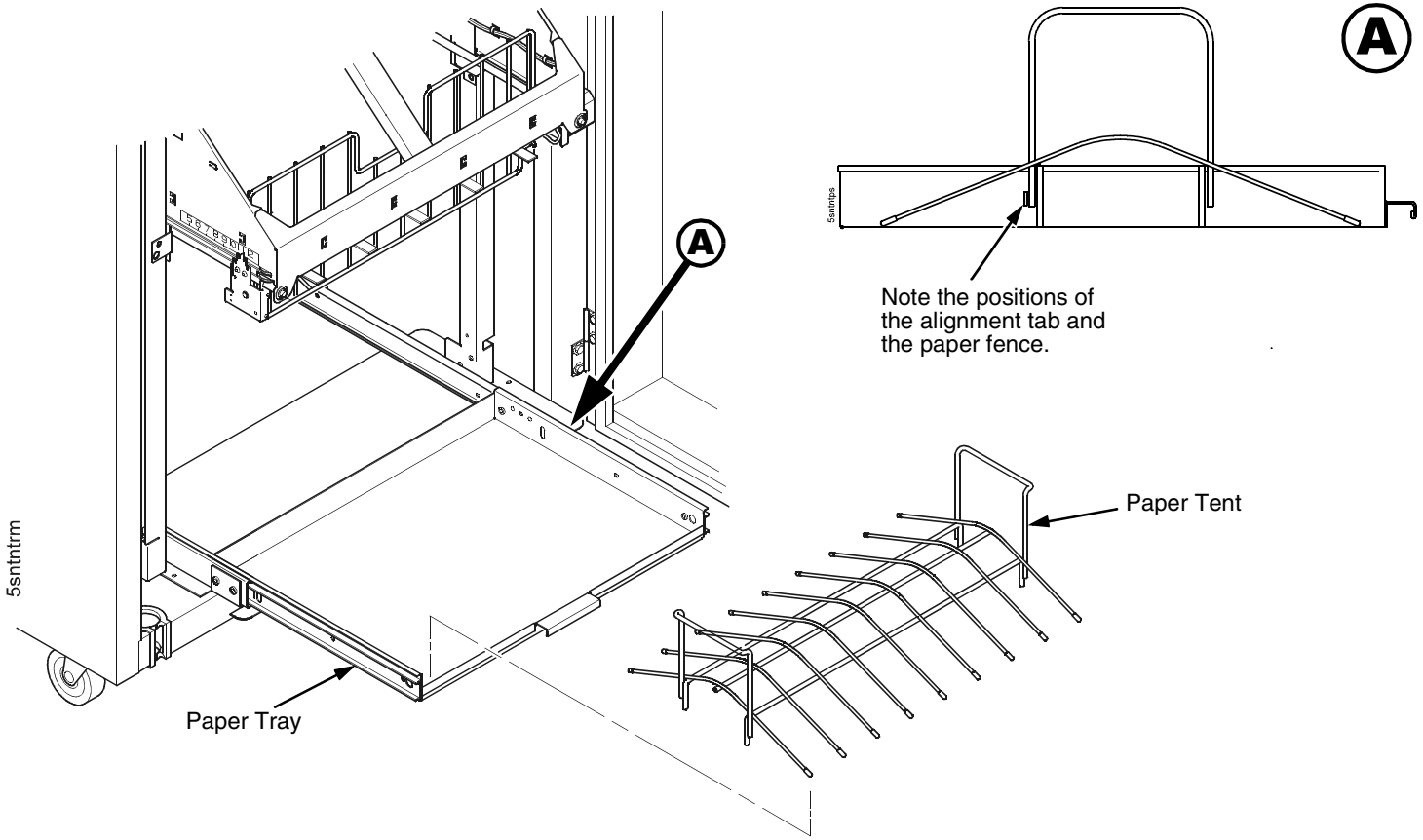


Figure 81. This figure shows how to install the paper tent in the paper tray.

35. Install the paper path that you removed in step 4.
36. Install paper and test stacker operation.

Replacing The Constant Force Spring

1. Remove the stacker assembly from the printer (page 483).

ATTENTION **In the next step, do not over-tighten the tie wraps or string. Tighten the tie wraps or string just enough to hold the elevator up.**

2. Raise the elevator assembly to about 1/4 inch short 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 82.)

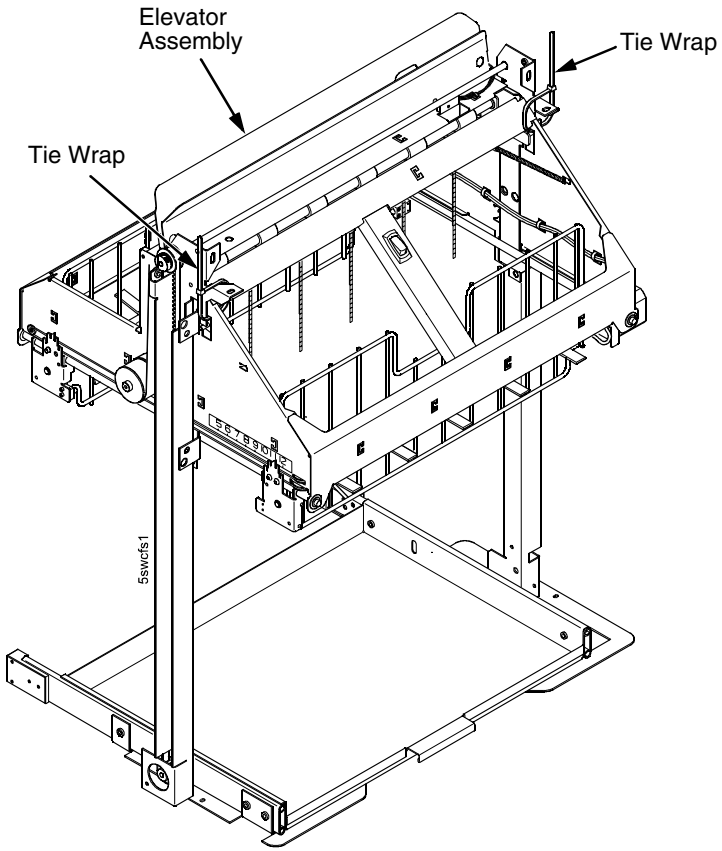


Figure 82. This figure shows how to tie the elevator assembly preparatory to removing the constant force spring.

CAUTION

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 83.)
4. Firmly gripping the spring and drum, remove the rail screw and washer securing the spring to the vertical rail. (Figure 83.)
5. Position a new constant force spring on the vertical rail and install the rail screw and washer. (Figure 83.)
6. Install the shoulder screw, large washer, spacer, and small washer as shown in Figure 83.

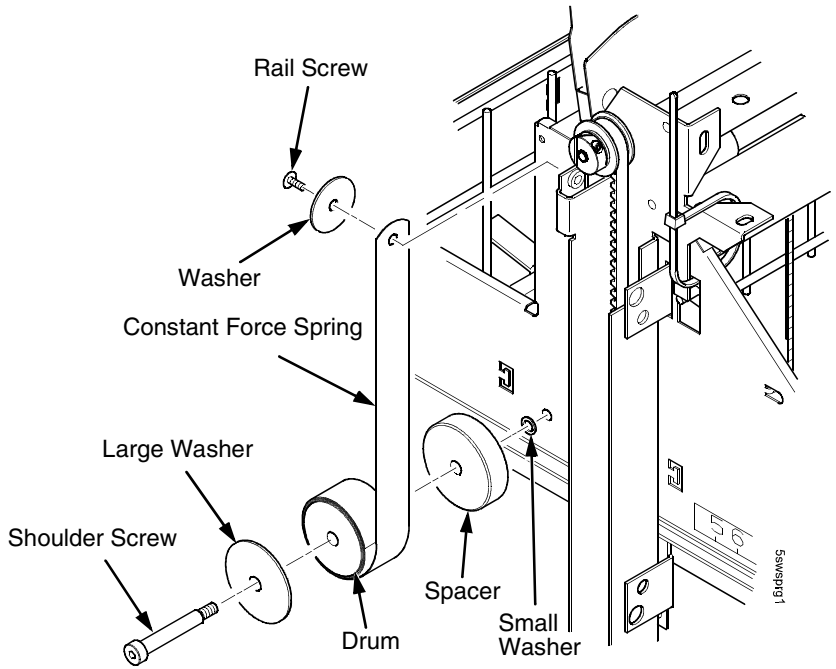


Figure 83. This figure shows how to remove the constant force spring from the stacker assembly.

Replacing The Timing Belts

1. Remove the stacker assembly from the printer (page 483).
2. Raise the elevator assembly to its highest position and secure it to the vertical rails using tie wraps or string. (Figure 82, page 503.)
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 84.) 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 84.) Go to step 5.

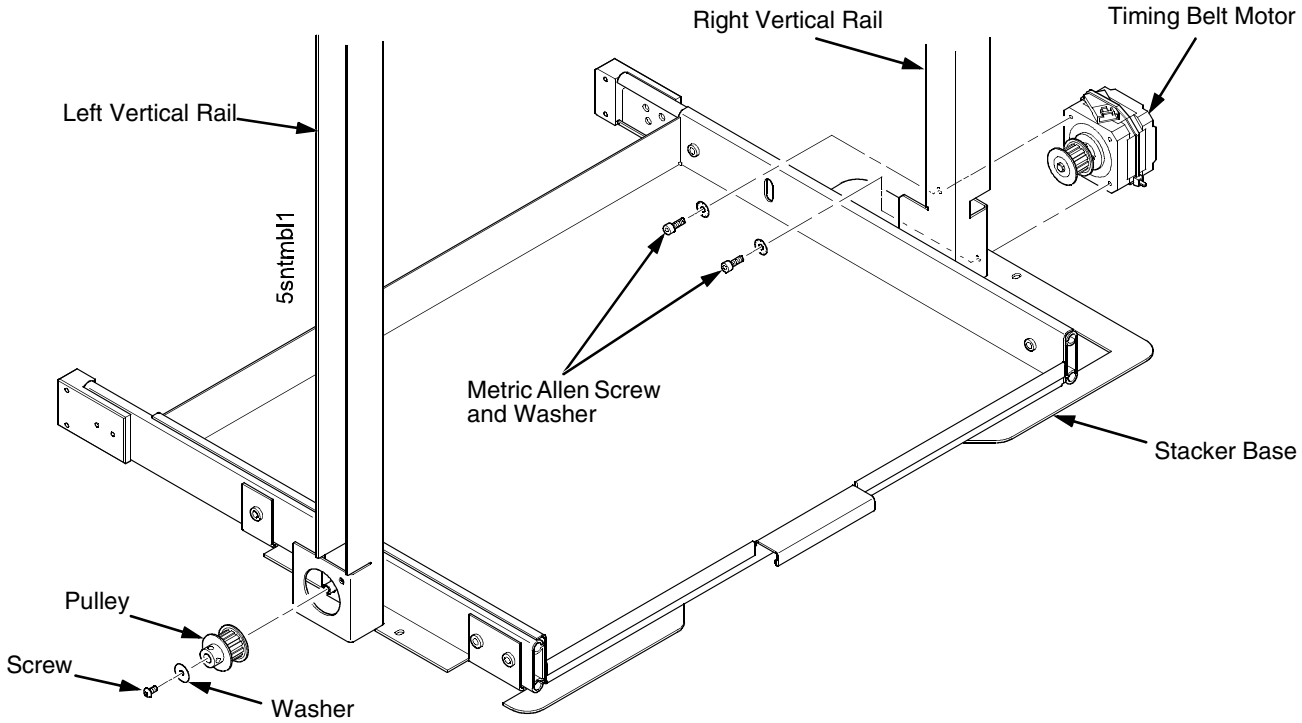


Figure 84. This figure shows how to remove the timing belt pulley and timing belt motor.

5. Loosen the two setscrews on the motor pulley and remove the pulley. Unplug the motor cable, if necessary. (Figure 85.) Go to step 6.

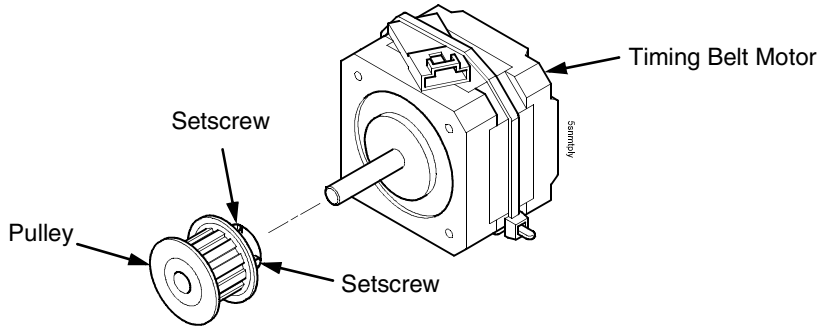


Figure 85. This figure shows how to remove the pulley from the timing belt motor.

6. Remove the shoulder screw, washers, and spacer that secures the constant force spring to the vertical rail. (Figure 86.)

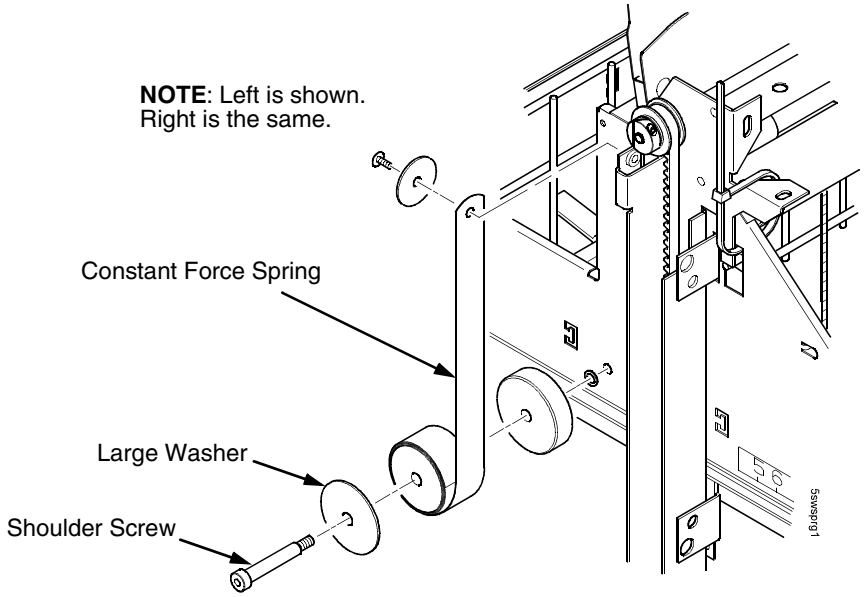


Figure 86. This figure shows how to release the constant force spring.

7. Remove two Allen screws from the belt clamp that secures the timing belt to the stacker frame. (Figure 87.)

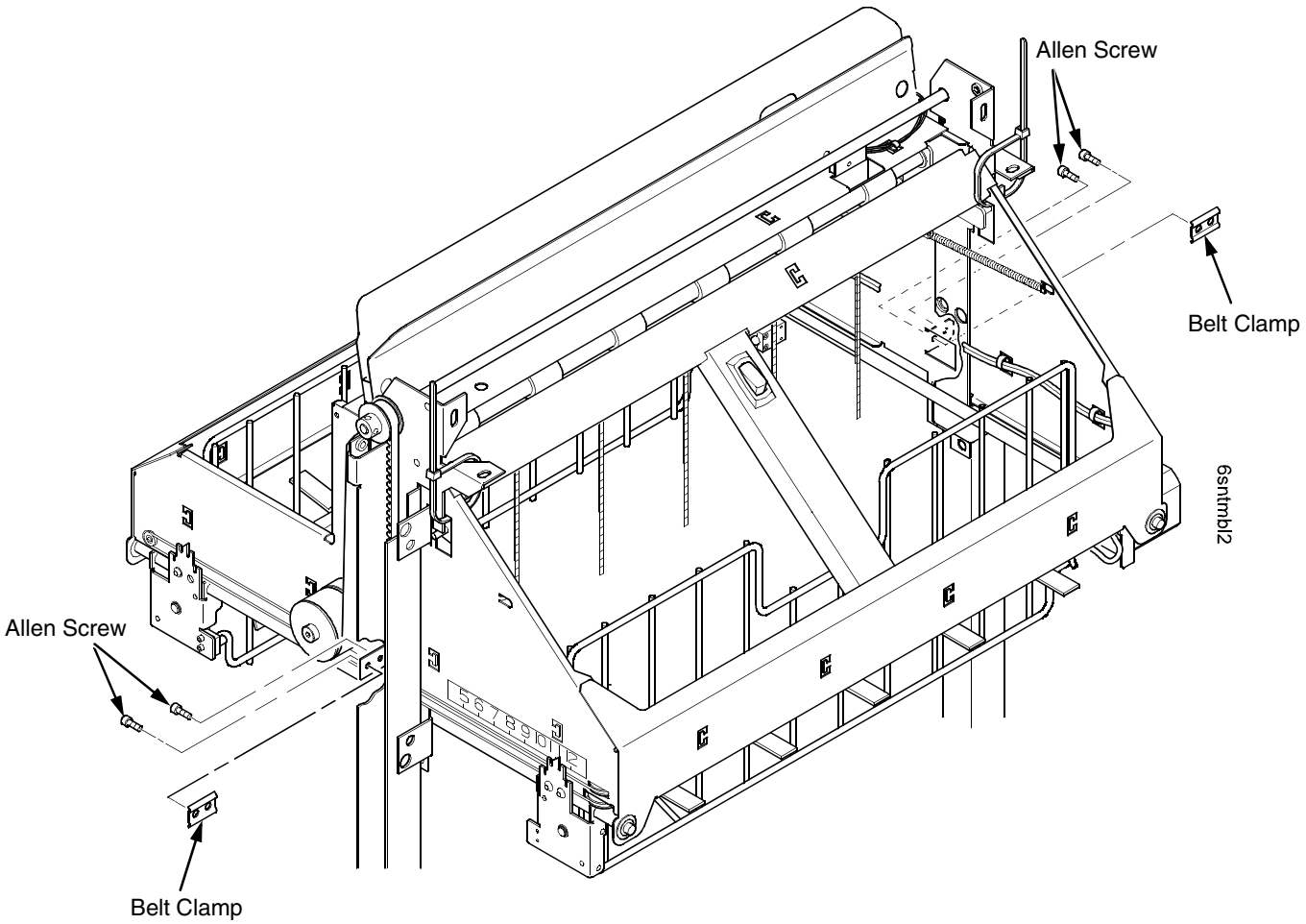


Figure 87. This figure shows how to remove the timing belt clamps.

8. Remove the timing belt by working it around the vertical rail and constant force spring. (Figure 88.)

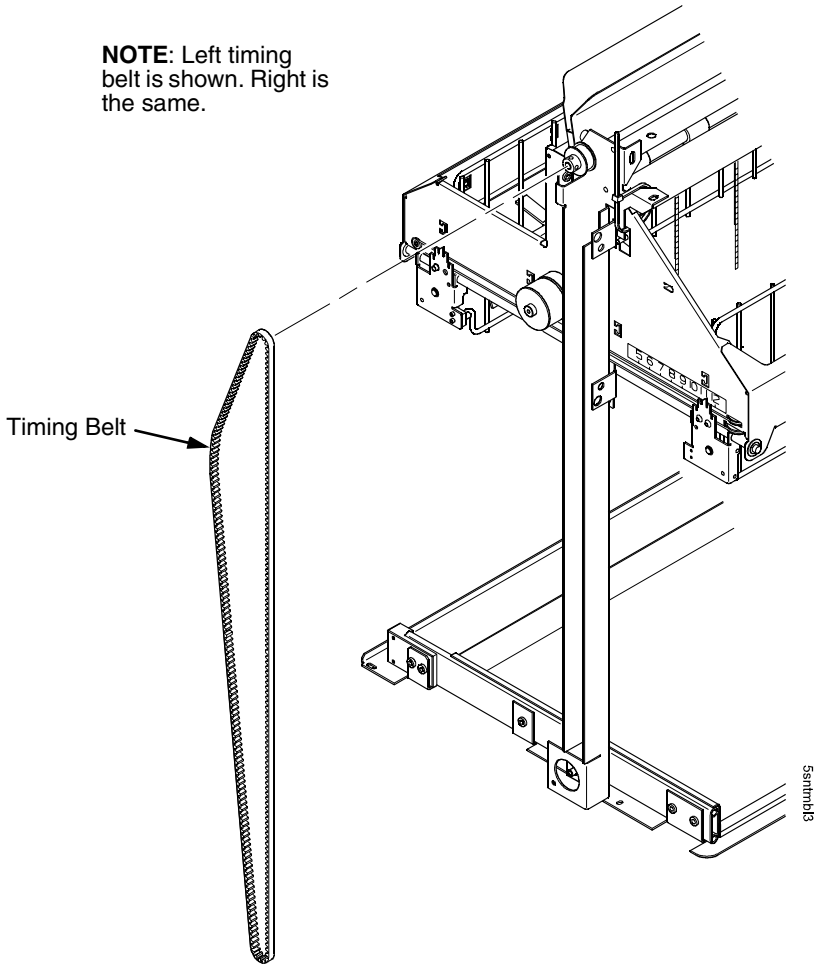


Figure 88. This figure shows how to remove the timing belt.

9. To install a timing belt, reverse the steps of this procedure.

Replacing The Roller Drive Shaft

1. Remove the stacker assembly from the printer (page 483).
2. Unhook the right bearing pivot plate's extension spring from the tab on the elevator. (Figure 89.)
3. Using an M-2 Allen wrench, remove the screw securing the right bearing pivot plate to the elevator. (Figure 89.)

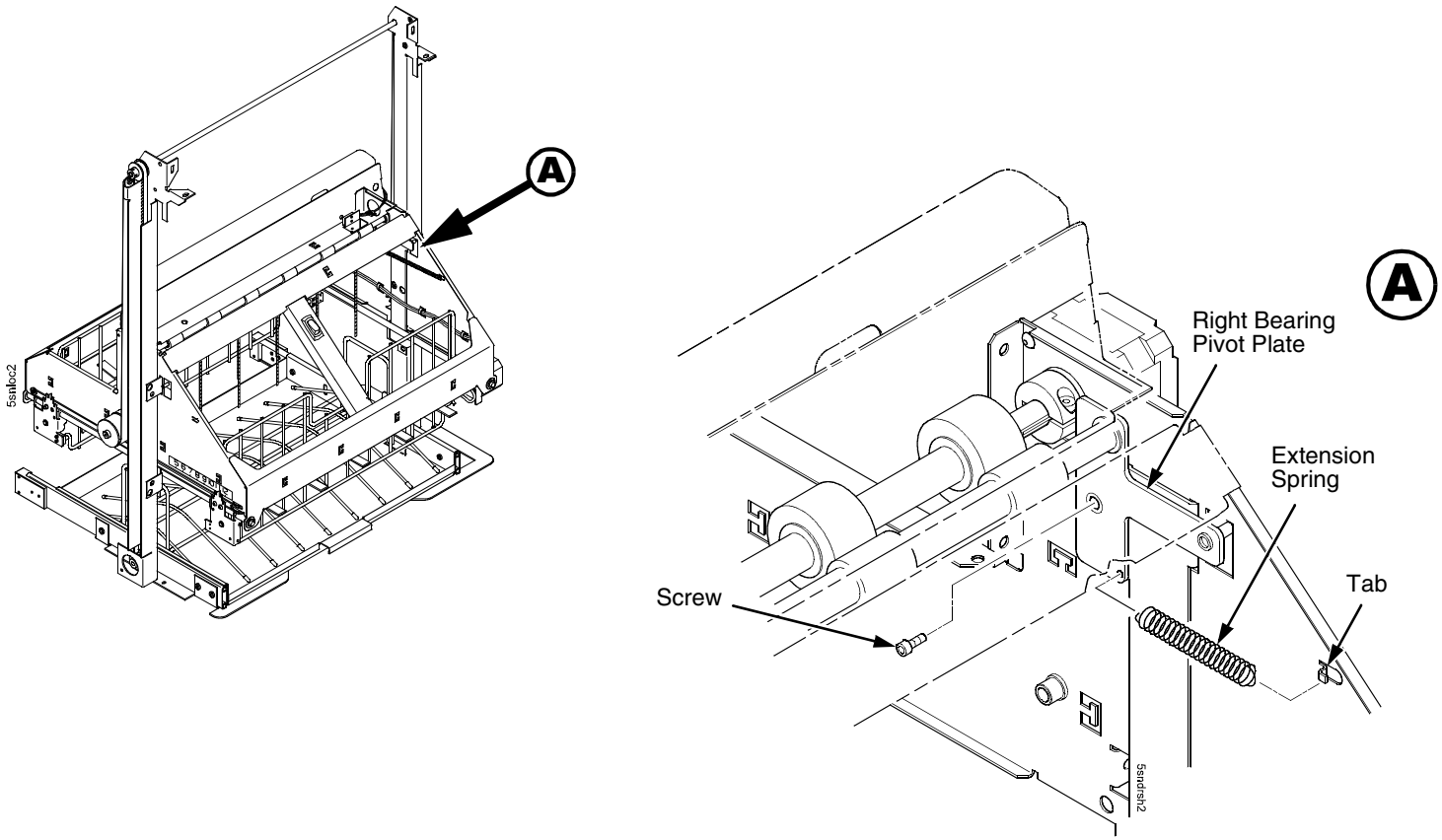


Figure 89. Right Bearing Pivot Plate and Extension Spring

4. Move the idler shaft enough to expose the lower mount screw of the power stacker stepper motor. (Figure 90.)
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 stepper motor to the elevator. (Figure 90.)
7. Using a 9/64 inch Allen wrench, loosen (do not remove) the collar screw securing the collar to the roller drive shaft. (Figure 90.)
8. Support the roller drive shaft with one hand and pull the stepper motor shaft out of the roller drive shaft. Let the motor hang from its cables.

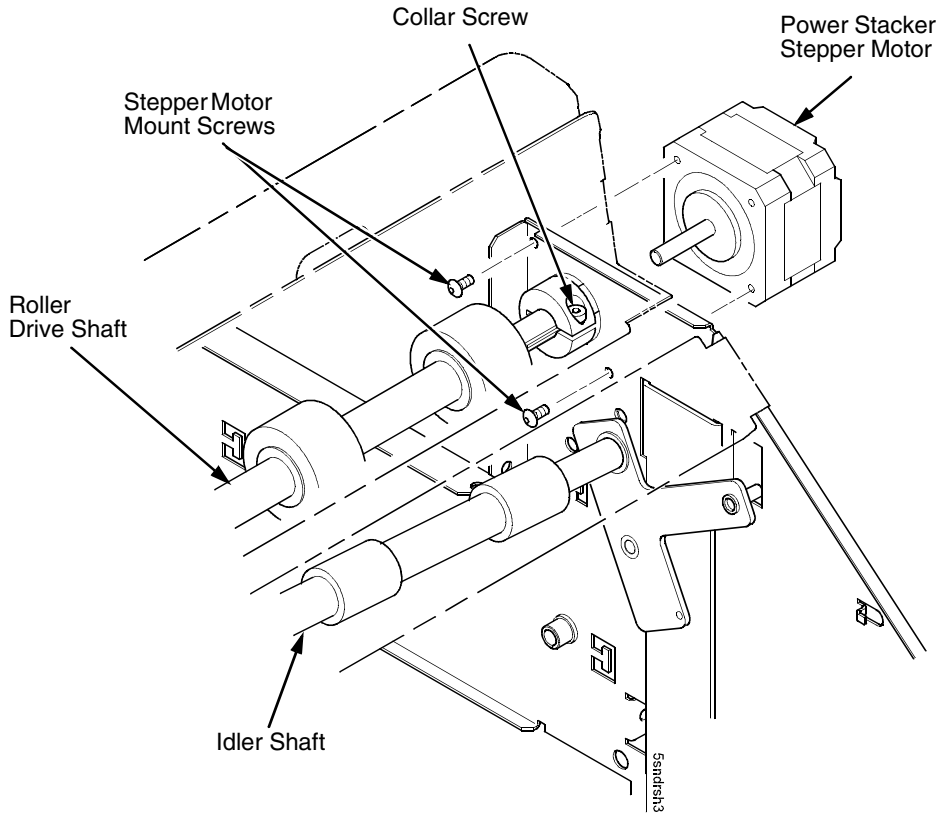


Figure 90. Power Stacker Stepper Motor

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 91.)
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 91.)
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 91.)
12. Remove the new roller drive shaft, new 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 91.)
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.

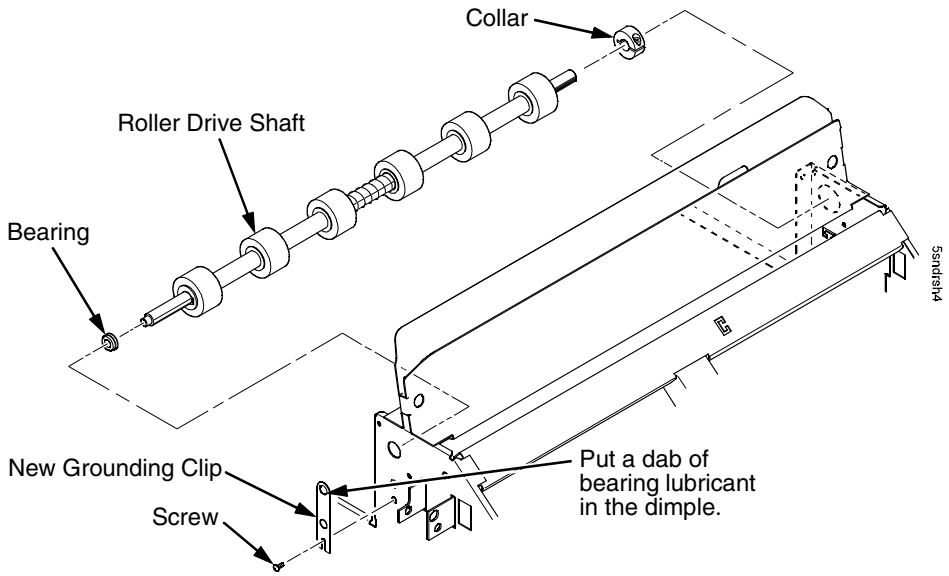


Figure 91. Roller Drive Shaft

Illustrated Parts Breakdown

The Illustrated Parts Breakdown (IPB) consists of exploded drawings of the power stacker assembly and subassemblies. Parts are listed following each drawing.

Only replaceable parts are assigned part numbers. If a part or assembly is damaged but does not have a part number, replace the next higher assembly for which a part number is listed; otherwise, replace entire power stacker assembly.

Part numbers listed in the column labeled **RoHS Compliant** 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 page 513.

List of Illustrations

NOTE: The stacker operator panel and stacker cables are not illustrated but are listed on page 515.

NOTE: The stacker operator panel and stacker cables are not illustrated but are listed on page 515.

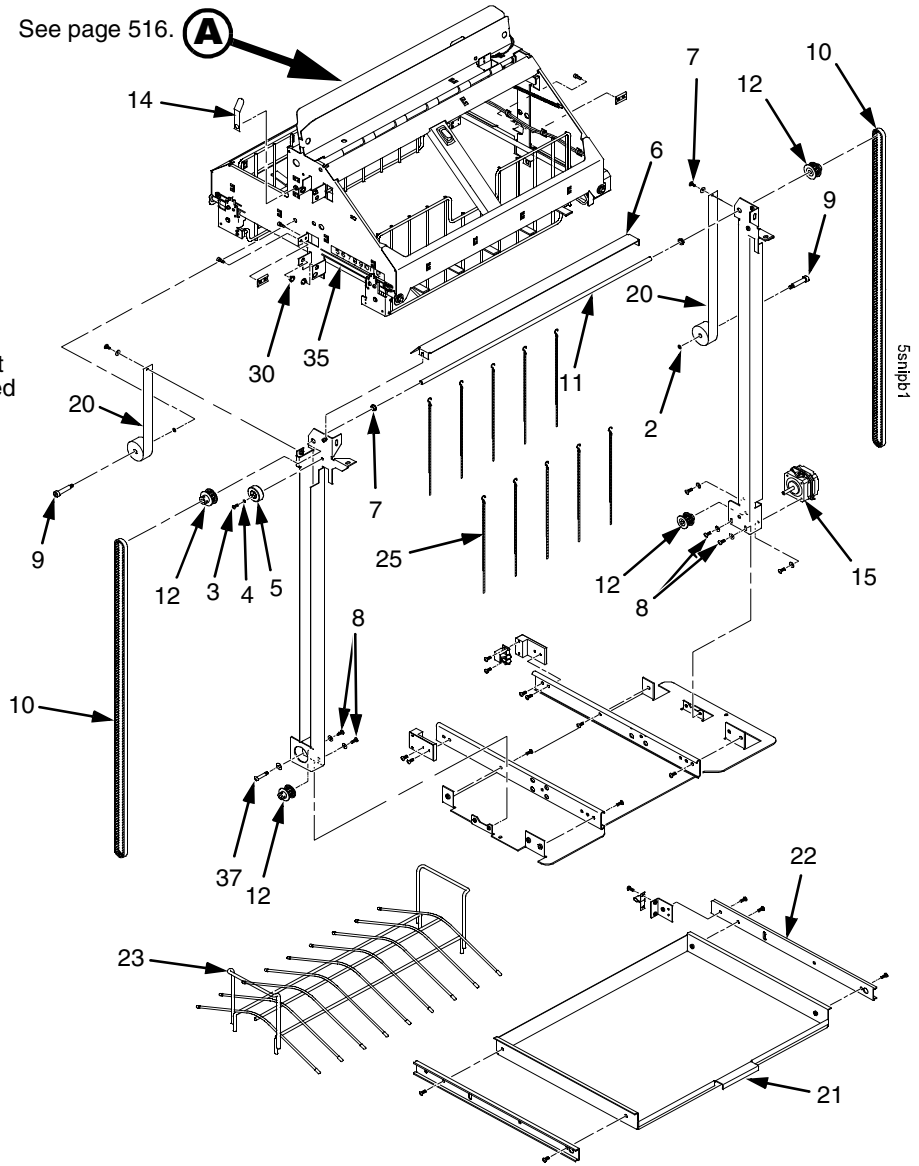


Figure 92. This illustrated parts breakdown shows how the vertical rails attach the elevator to the stacker base and tray.

(Figure 92)

Item No.	Part No.	RoHS Compliant	Description	Notes
2	Ref	Ref	Washer, 5/16 X .200 X .030, Stainless Steel	
3	Ref	Ref	Screw, Hex Skt Btn Hd, Zinc M3X8mm	
4	Ref	Ref	Washer, Shim, .125 ID X .010 inch Thick	
5	Ref	Ref	Timing Belt Tensioner Assy, Pwr Stkr	
6	39U2535	39U2535	Paper Deflector (Black)	
7	Ref	Ref	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	24H8968	24H8968	Timing Belt	
11	39U2511	39U2511	Shaft, Lift	
12	17R7812	17R7812	Pulley, Timing, Fairloc,12T	
14	10R2841	10R2841	Clip, Ground, Dimpled, Pwr Stkr	Part of item 47, but can be ordered separately
15	24H8969	24H8969	Motor Assembly, Power Stacker	Elevator motor (Figure 92) Paddle motor (Figure 93)
16	54P1469	54P1469	Motor, Stepper, Power Stacker	Paper puller motor (Figure 93)
20	24H8970	24H8970	Constant Force Spring	
21	39U2545	39U2545	Field Kit, Tray, Cab, Rear, Black	
22	75P1182	75P1182	Slide, Ball Bearing, Rear Tray	
23	75P1183	75P1183	Tent, Paper, Stacker	
25	24H8971	24H8971	Chain	Mount chains outboard of shafts

Item No.	Part No.	RoHS Compliant	Description	Notes
30	Ref	Ref	Nylon Plug	
35	24H8973	24H8973	Cable	
36	24H9004	24H9004	Stacker Hardware Kit	Kit not illustrated
37	Ref	Ref	Screw, Shoulder, 8-32	Part of item 36
38a	54P1541	54P1541	Switch Assy, Reed Limit, V3	Not illustrated; attaches to right vertical rail
38b	54P1478	54P1478	Switch Assy, Rocker, V3	Shown in Figure 93
	39U2550	41U1147	Operator Panel Assembly, Rear, Black	Not illustrated
	10R3913	10R3913	Rail Cable, Power Stacker	See page 322
	57P1376	57P1376	Power Cable, Power Stacker	See page 321
	10R4590	10R4590	Logic Cable, Power Stacker	See page 320
	10R3912	10R3912	Frame Cable, Power Stacker	See page 319
	10R4053	10R4053	Elevator I/O Cable, Power Stacker	See page 495
	39U2489	39U2489	Rear Door, Extended, Power Stacker	Not illustrated
	24H8963	24H8963	Re-Ship Kit, Printer w/Power Stacker	Not illustrated

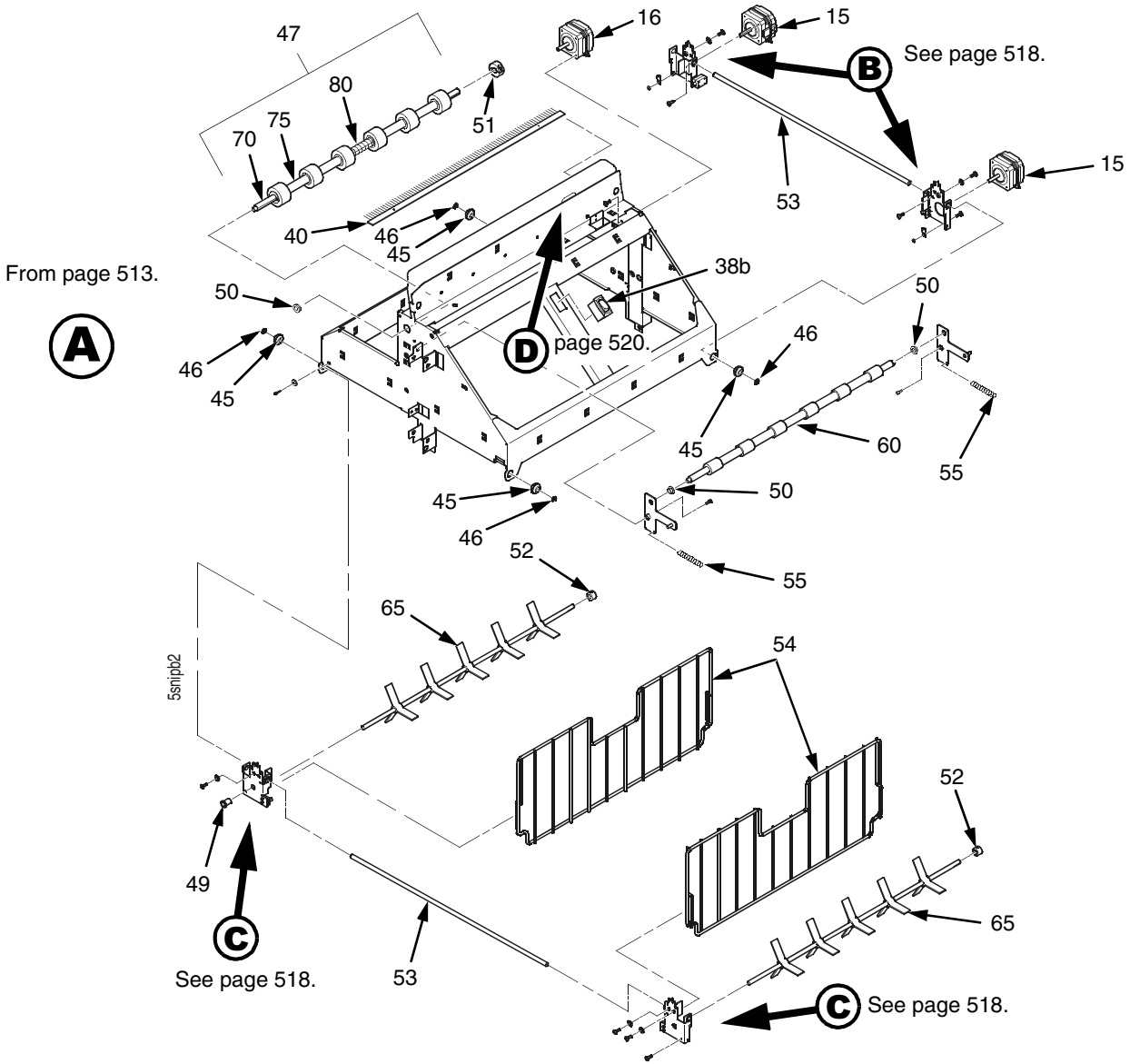


Figure 93. This illustrated parts breakdown is an exploded view of the stacker elevator, showing the motors, rollers, and paddles.

(Figure 93)

Item No.	Part No.	RoHS Compliant	Description	Notes
36	24H9004	24H9004	Stacker Hardware Kit	Kit not illustrated
38b	54P1478	54P1478	Switch Assy, Rocker, V3	
40	24H8978	24H8978	Anti-Static Brush	
45	Ref	Ref	Shear Grommet	Part of item 36
46	Ref	Ref	Cap Nut	Part of item 36
47	10R4840	10R4840	Drive Shaft Assy (Roller Drive Shaft)	Includes items 14, 70, 75, and 80
	24H8988	24H8988	Drive Roller	
	53P8334	53P8334	Grease (Shell Darina Grease 1)	For Drive Shaft
49	Ref	Ref	Bearing, Flanged	Part of item 36
50	Ref	Ref	Bearing	Part of item 36
51	24H9003	24H9003	Collar Clamp	
52	Ref	Ref	Collar, Setscrew	Part of item 36
53	24H8997	24H8997	Support Shaft	
54	01P4689	01P4689	Fence, Wireform	
55	24H8981	24H8981	Extension Spring	
60	24H8982	24H8982	Idler Roller	
65	24H8983	24H8983	Paddle, Power Stacker	
70	24H9005	24H9005	Driver Shaft (also spared as a lone item)	Also sold separately
75	24H9006	24H9006	Spacer (also spared as a lone item)	Also sold separately
80	39U2513	39U2513	Compression Spring (also spared as a lone item)	Also sold separately

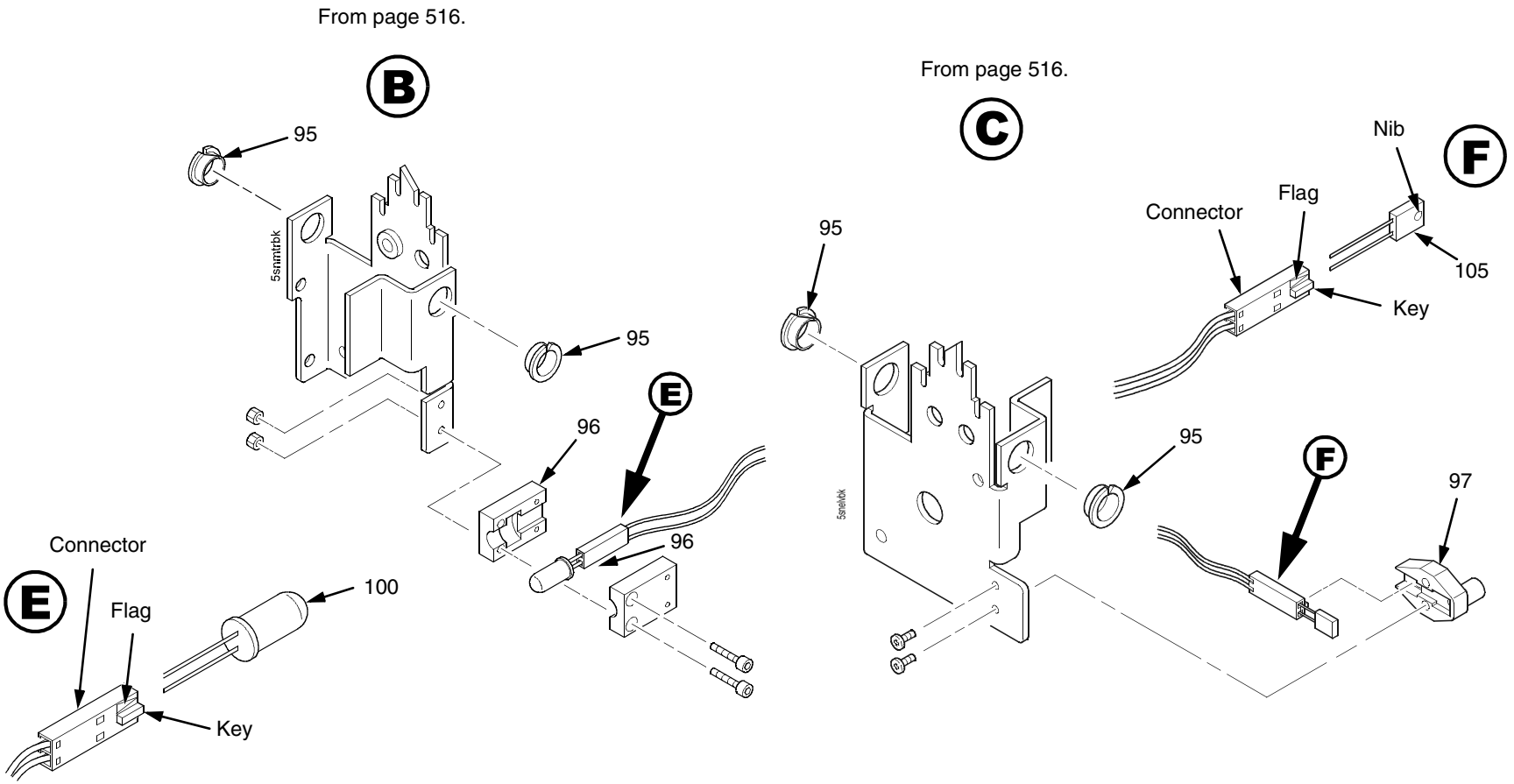


Figure 94. This illustrated parts breakdown is an exploded detail view of a motor bracket with its infrared LED and an elevator bracket with its rectifier and LED.

(Figure 94)

Item No.	Part No.	RoHS Compliant	Description	Notes
36	24H9004	24H9004	Stacker Hardware Kit	Kit not illustrated
95	Ref	Ref	Clip-On Bearing	Part of item 36
96	24H8999	24H8999	Holder, LED, Round	
97	24H9000	24H9000	Holder, LED, Flat	
100	Ref	Ref	LED, IR, T-1, 3/4	
105	Ref	Ref	Photodarlington, NPN, Rectifier	

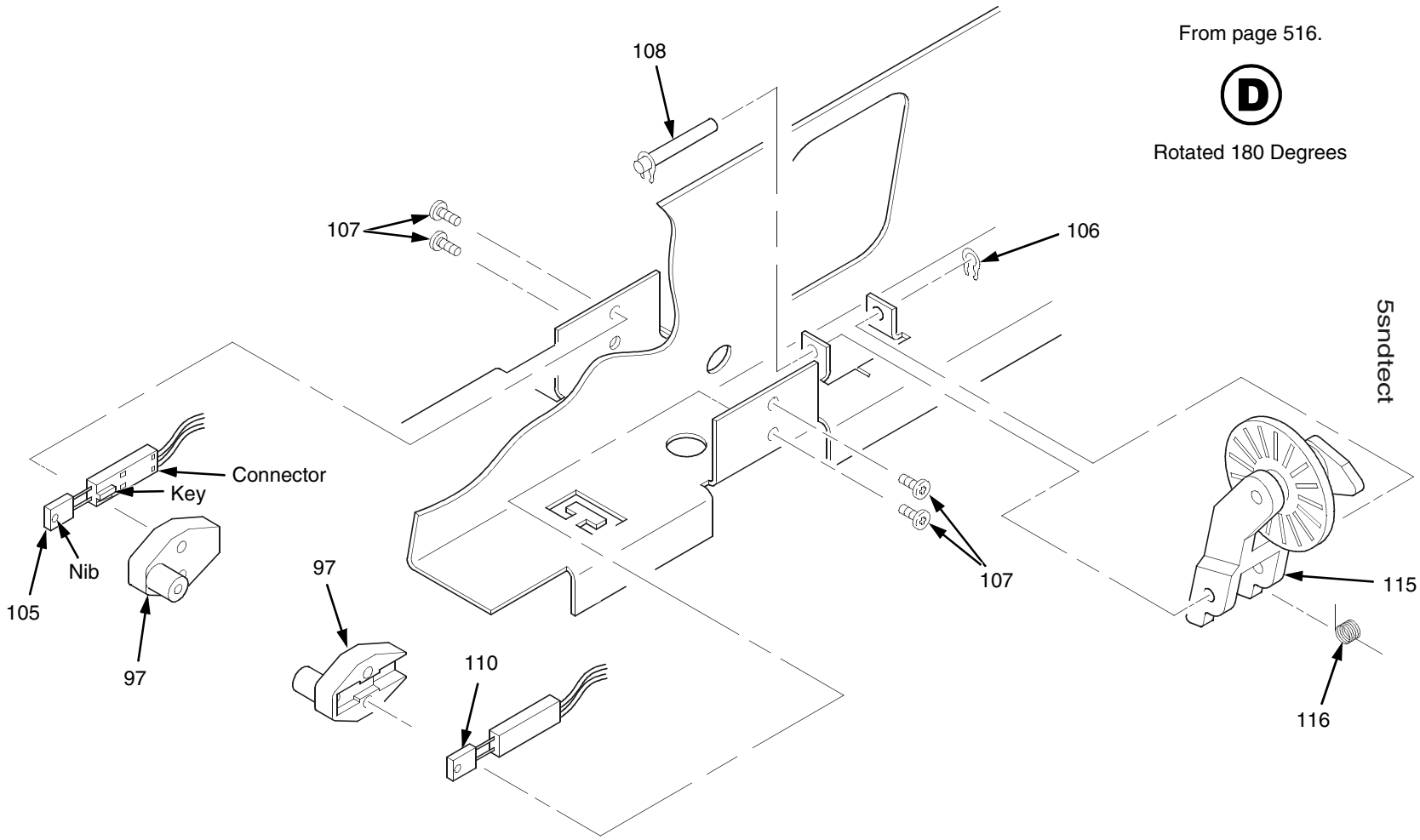


Figure 95. This illustrated parts breakdown is an exploded detail view of the paper motion detector.

(Figure 95)

Item No.	Part No.	RoHS Compliant	Description	Notes
36	24H9004	24H9004	Stacker Hardware Kit	Kit not illustrated
97	24H9000	24H9000	Holder, LED, Flat	
105	24H8990	24H8990	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	02N8327	02N8327	Field Kit, Power Stacker, PMD	Paper Motion Detector
116	Ref	Ref	Spring, Torsion	Part of item 115

F *Printer Specifications*

Contents

Ribbon Specifications

The ribbon life is based on IBM tests conducted in accordance with ANSI Standard X3A.182. Actual ribbon life will vary depending upon the user's quality criteria, condition of the printer, machine settings, paper quality, and bar code requirements. Label yield depends on label format, bar code symbology, and other parameters. Label yield with high-performance scanning equipment may exceed these yields. Use only the ribbon listed below.

P/N	Description	Length (Yards)
39U2551	Ribbon, 6pk, IBM, 6500	100

Ordering Ribbons

IBM Printing Supplies are distributed through Priority Fulfillment Services (PSFweb) and a worldwide network of dealers. Please contact one of the following numbers to place an order for IBM 6500-v ribbons or to locate an IBM Printing Supplies Dealer in your area:

United States and Canada

Please call 1-888-IBM-PRINT

EMEA

IBM Supplies Fulfillment Operations (ISFO) at 31-43-350 2756 (within the Netherlands call: 043-350 2756.) Toll free numbers to ISFO have been established in the following countries:

Belgium	0800 71950	Germany	0800 18 18 005
Denmark	800 15534	Norway	800 11389
Finland	08001 13110	Spain	900 983131
France	0800 905 5871	Sweden	0207 94270
Italy	800 820094	UK	08009 68679

AP and LA

Please call 1-972-881-0733 ext. 3234

Warranty Information

The approximate average yields given are not a warranty or guarantee of minimum life and are provided to assist in initial supplies planning. Actual usage should be used to establish the supply's life in the end user's application. Many factors such as print coverage per page, machine settings, paper type and size, and environmental conditions affect supply life.

Supply warranties are only for defects in materials and workmanship at the time of shipment and installation. They are not for print count life or normal wear and tear, nor for any print count minimum. Contact your place of purchase for warranty return instructions.

Paper Specifications

The following paper specifications are general guidelines. Always test paper stock applications to determine print quality.

Paper	• Edge-perforated, fan-fold, 3 to 17 inches (7.62 to 43.18 cm) wide*, 3 to 16 inches with stacker, 2 to 24 inches (5.08 to 60.96 cm) long**, 5 to 12 inches with stacker. • Single-part: 15 pound (57 g/m^2) to 100 pound (377 g/m^2) stock. • Sheet Thickness: 0.025 inches (0.064 cm) maximum • Multi-part carbon: 1 to 6 part forms, maximum 12 pound (45 g/m^2) ply of upper plies. • Multi-part carbonless, maximum of 6-part forms. Test readability of greater than 4-part forms. • Recycled paper not recommended with stacker.	
Paper Drive	Two adjustable tractors with 6-pin engagement	
Slew Rate	Fast	Slow
6500-D3C	20 ips	10.4 ips
6500-D3P	16 ips	10.4 ips
6500-D6C	25 ips	10.4 ips
6500-D8C	32 ips	18 ips
6500-v05	12 ips	10.4 ips
6500-v5P	12 ips	10.4 ips
6500-v10	20 ips	10.4 ips
6500-v10 w/Stacker	20 ips	10.4 ips
6500-v1P	16 ips	10.4 ips

6500-v15	25 ips	10.4 ips
6500-v15 w/Stacker	25 ips	10.4 ips
6500-v20 w/Stacker	36 ips	18 ips
6500-v20	36 ips	18 ips

Labels

On Backing: One-part continuous perforated fan-fold back form. Labels must be at least 1/6 inch (0.42 cm) from the fan-fold perforation. Backing adhesive must not squeeze out during printing.

Sheet Size: 3 to 17 inches (7.62 to 43.18 cm) wide*, including the two standard perforated tractor feed strips. A maximum sheet length of 16 inches (40.64 cm) between top and bottom perforations.**

Thickness Not to exceed 0.025-inch (0.064 cm), including backing sheet.

*On pedestal models, when using the rear paper exit, the maximum form width is 16 inches (40.64 cm).

**On cabinet models, forms longer than 12 inches can be used by opening the front and rear printer doors.

Printer Dimensions and Weight

Cabinet Models

Height: 41 inches (103.3 cm)

Width: 27 inches (68.6 cm)

Depth: 29 inches (73.7 cm)

Weight: 225 lbs. (102.1 kg) unpackaged
237 lbs. (112. kg) unpackaged with power stacker
285 lbs. (129.3 kg) packaged
297 lbs. (139 kg) packaged with power stacker

Pedestal Models

Height: 35.5 inches (90.2 cm)

Width: 24.6 inches (62.5 cm)

Depth: 30 inches (76.2 cm)

Weight: 120 pounds. (54.4 kg) unpackaged
160 pounds. (72.6 kg) packaged

Environmental Characteristics

Temperature

Operating: 50° to 104° F (10° to 40°C) up to 5000 feet (1524 meters), 50° to 90° F (10° to 32°C) up to 8000 feet (2438 meters)

Storage: -40° to 158° F (- 40° to 70°C)

Relative Humidity

Operating: 15% to 80% (noncondensing)

Storage: 15% to 90% (noncondensing)

Noise Levels

	Cabinet Models						Pedestal Models		
Acoustic Noise Levels per ISO 9296	-D3C	-D6C	-D8c	-v05 -v10	-v15	-v20	-D3P	-v5P	-v1P
Printing	50 dB	52 dB	55 dB	50 dB	52 dB	55 dB	60 dB	62 dB	66 dB
	6.7 Bel	7.0 Bel	7.1 Bel	6.7 Bel	7.0 Bel	7.1 Bel	7.5 Bel	7.8 Bel	8.2 Bel
Standby	46 dB	46 dB	42 dB	46 dB	46 dB	42 dB	46 dB	46 dB	46 dB
	6.3 Bel	6.3 Bel	5.8 Bel	6.3 Bel	6.3 Bel	5.8 Bel	6.3 Bel	6.3 Bel	6.3 Bel

	Cabinet Models	Pedestal Models
NOTE: Cabinet model noise levels listed are with the cabinet doors closed. Levels are higher if the doors are open. Pedestal model noise levels listed are for rear paper exit. Levels are higher for top paper exit.		

Electrical Characteristics

Test conditions: 136 column paper, all upper case E's.

Model	Voltage (±10%)	Frequency (±10%)	Amperes	Watts (Operating)	BTU/Hr (Operating)	Watts (Energy Saver Mode)	BTU/Hr (Energy Saver Mode)
6500-D3C	AC 100 - 120V	50 - 60 Hz	3.5A	350W	1195	28W	96
	AC 200 - 240V	50 - 60 Hz	1.6A	350W	1195	28W	96
6500-D3P	AC 100 - 120V	50 - 60 Hz	3.5A	350W	1195	28W	96
	AC 200 - 240V	50 - 60 Hz	1.6A	350W	1195	28W	96
6500-D6C	AC 100 - 120V	50 - 60 Hz	5A	460W	1571	28W	96
	AC 200 - 240V	50 - 60 Hz	2A	460W	1571	28W	96
6500-D8C	AC 100 - 120V	50 - 60 Hz	5.5A	540W	1844	28W	96
	AC 200 - 240V	50 - 60 Hz	2.1A	540W	1844	28W	96
6500-v05	AC 100 - 200V	50 - 60 Hz	3.5A	350W	1195	28W	96
	AC 200 - 240V	50 - 60 Hz	1.6A	350W	1195	28W	96
6500-vP5	AC 100 - 200V	50 - 60 Hz	3A	275W	940	28W	96
	AC 200 - 240V	50 - 60 Hz	1.5A	275W	940	28W	96

Model	Voltage (±10%)	Frequency (±10%)	Amperes	Watts (Operating)	BTU/Hr (Operating)	Watts (Energy Saver Mode)	BTU/Hr (Energy Saver Mode)
6500-v10	AC 100 - 200V	50 - 60 Hz	3.5A	350W	1195	28W	96
	AC 200 - 240V	50 - 60 Hz	1.6A	350W	1195	28W	96
6500-v1P	AC 100 - 200V	50 - 60 Hz	3.5A	300W	1025	28W	96
	AC 200 - 240V	50 - 60 Hz	1.6A	300W	1025	28W	96
6500-v15	AC 100 - 200V	50 - 60 Hz	5A	460W	1571	28W	96
	AC 200 - 240V	50 - 60 Hz	2A	460W	1571	28W	96
6500-v20	AC 100 - 200V	50 - 60 Hz	5.5A	540W	1844	28W	96
	AC 200 - 240V	50 - 60 Hz	2.1A	540W	1844	28W	96

Interfaces

Type	Standard	IEEE 1284 Parallel, Centronics Parallel, RS-232/RS-422 Serial (optional), Dataproducts Parallel.
	Optional	Coax, Twinax, Dataproducts Long Line, Ethernet 10/100Base-T
Logic Levels	TTL/EIA-232-E, EIA-422-B	
Data Format:	ASCII	
Compatibility	EIA-232-E, EIA-422-B, PC Parallel, Dataproducts, IEEE 1284, Twinax, Coax, Ethernet	

Transfer Rates	Up to 200K bytes/sec on parallel interfaces Up to 19.2 K baud on RS-232 serial interface Up to 115.2K baud on RS-422 serial interface
Buffer	16 kilobytes on serial interfaces 16 kilobytes on parallel interfaces

Cables

A power line cord is provided with the printer, but no data cables. Data cable requirements and ordering information are listed below:

ASCII Serial/Parallel: The 6500-v printer is connected to personal computers and controllers via industry standard EIA-232-E and PC-parallel printer cables. For Dataproducts interfaces, you will need to obtain a Dataproducts cable. Contact your IBM service representative to order the following:

- EIA-232-E Cable
- PC-Parallel Cable
- Dataproducts Adapter Feature

AS/400: The 6500-v is connected to the AS/400 ASCII Workstation Controller via the following IBM cables, available through your IBM service representative:

- 20 ft. RS-232
- 40 ft. RS-232

RISC System/6000: For RS-232 attachment to the IBM RISC System/6000, the following are required:

- IBM Async cable EIA-232/V.24
- Printer/terminal interposer EIA-232
- Serial Cable Kit (PN 12H1204)

Coax/Twinax Interface Feature: Contact your IBM service representative for attachment requirements.

Printing Rates

The printing speed of text is measured in lines per minute (lpm), and is a function of the selected font and the vertical dot density. Printing speed is independent of the number of characters configured in the character set repertoire. Print rates for lines containing attributes such as bold or emphasized printing, superscripts, subscripts, or elongated attributes will decrease to not less than half the rates of the font without such attributes. The exact print rate of lines containing these attributes depends on the specific print job, but software maximizes the throughput by dynamically determining which dot rows contain adjacent dots and must be printed in two strokes. Table 8 and Table 9 list nominal printing rates for 6500-v printers.

The reverse paper feed capability allows the printing of multiple densities on a single line. This is useful in printing forms and text together or in mixing different fonts on a print line. Use of multiple densities and reverse paper feed also affects throughput.

Table 8. 6500-v Nominal Print Rates of Text

PRINT QUALITY DOT DENSITY (DPI) Note 1	CHARACTERS PER INCH	DOT MATRIX Note 2	PERFORMANCE							
			Uppercase Only LPM				Descenders & Underline LPM			
			500	1000	1500	2000	500	1000	1500	2000
CORRESPONDENCE 90 (180) x96	10 12 15	7(13) x 9+3 6(11) x 9+3 (9) x 9+3	200	400	600	842	500	306	459	648
DATA PROCESSING 60(120) x72	10 12 13.3 15 17.1	5(9) x 7+2 4(7) x 7+2 4(7) x 7+2 3(5) x 7+2 3(5) x 7+2	375	750	1125	1500	300	600	900	1200
HIGH SPEED 60(120) x 48	10 12 13.3	5(9) x 5+1 4(7) x 5+1 4(7) x 5+1	500	1000	1500	2000	428	865	1284	1714
Note 1	A (B) x C, where:		A is maximum horizontal dot density B is horizontal dot placement density C is vertical dot density							
Note 2	D (E) x F + G, where:		D is maximum number of dots that may be placed on E horizontal positions F is number of vertical dots for uppercase symbols G is number of dots available for descenders							

Table 9. 6500-v Nominal Print Rates of Graphic Images

PRINT QUALITY DOT DENSITY (DPI) Note 1	CHARACTERS PER INCH	DOT MATRIX Note 2	PERFORMANCE			
			Plot Mode IPM			
			500	1000	1500	2000
CORRESPONDENCE 90 (180) x 96	10 12 15	7(13) x 9+3 6(11) x 9+3 (9) x 9+3	21	42	61	87
DATA PROCESSING 60(120) x 72	10 12 13.3 15 17.1	5(9) x 7+2 4(8) x 7+2 4(8) x 7+2 3(5) x 7+2 3(5) x 7+2	42	83	127	167
HIGH SPEED 60(120) x 48	10 12 13.3	5(9) x 5+1 4(7) x 5+1 4(7) x 5+1	62	124	186	250
Note 1	A (B) x C, where:		A is maximum horizontal dot density B is horizontal dot placement density C is vertical dot density			
Note 2	D (E) x F + G, where:		D is maximum number of dots that may be placed on E horizontal positions F is number of vertical dots for uppercase symbols G is number of dots available for descenders			

G Metric Conversion Tables

Length

Multiply	By	To Obtain
foot	0.3048*	meter
foot	30.48*	centimeter
foot	304.8*	millimeter
inch	0.0254*	meter
inch	2.54*	centimeter
inch	25.4*	millimeter
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
inch-pound	0.11298	Newton-meter
foot-pound	1.3558	Newton-meter
Newton-meter	8.8511	inch-pound
Newton-meter	0.7376	foot-pound
pound	4.4482	Newton
Newton	0.22481	pound

Mass and Density

Multiply	By	To Obtain
pound*	0.4535924	kilogram
ounce*	28.34952	gram
kilogram	2.204622	pound
gram	0.03527397	ounce
* avoirdupois		

Temperature

From	To	Use Formula
temperature Celsius (tc)	temperature Fahrenheit (tf)	tf = 1.8tc + 32
temperature Fahrenheit (tf)	temperature Celsius (tc)	tc = (tf -32)/1.8

Power

Multiply	By	To Obtain
Btu (International Table) / hour	0.2930711	Watt
Watt	3.412141	Btu (International Table) / hour
Watt	0.001359621	horsepower (metric)
horsepower (metric)	735.499	Watt

H *Torque Table*

The table below establishes the torque requirements for routine installation of threaded fasteners. These requirements apply to fasteners made of steel, at a minimum engagement of 3.5 threads, including chamfer and countersink. For the most accurate torquing, apply anti-seize compound to fastener threads before you torque the fastener.

Fastener sizes are listed as *Numbered Size - Threads Per Inch*. (For example, 2-56 means “a No. 2 screw with 56 threads per inch.”)

Carbon Steel Fasteners (ANSI B18.6.3 - 1972)				
Fastener Size	**Into Alum. or Brass** 25,000 psi ultimate tensile strength	**Into Steel** 60,000 psi ultimate tensile strength	**Into Weld/Press Studs or Nuts**	**Into Medium Carbon Steel Fasteners** 100,000 psi ultimate tensile strength
2-56	25 ± 2 in oz	36 ± 2 in oz	30 ± 2 in oz	*
4-40	62 ± 4 in oz	75 ± 5 in oz	70 ± 5 in oz	*
6-32	122 ± 7 in oz	150 ± 10 in oz	135 ± 10 in oz	*
8-32	11 ± in lb	18 ± 1 in lb	18 ± 1 in lb	*
10-24	20 ± 1 in lb	25 ± 1.5 in lb	21 ± 1 in lb	*
10-32	15 ± 1 in lb	29 ± 2 in lb	29 ± 1 in lb	*
1/4 - 20	40 ± 3 in lb	62 ± 4 in lb	62 ± 4 in lb	105 ± 5 in lb

Carbon Steel Fasteners (ANSI B18.6.3 - 1972)				
Fastener Size	**Into Alum. or Brass** 25,000 psi ultimate tensile strength	**Into Steel** 60,000 psi ultimate tensile strength	**Into Weld/Press Studs or Nuts**	**Into Medium Carbon Steel Fasteners** 100,000 psi ultimate tensile strength
Fastener Sizes		**Torque for Routine Tightening of Threaded Fasteners**		
4-40 UNC & 4-48 UNF		4 ± 1 in lb		
6-32 UNC & 6-40 UNF		11 ± 1 in lb		
8-32 UNC & 8-36 UNF		19 ± 1 in lb		
10-24 UNC & 10-32 UNF		25 ± 1 in lb		

I *Abbreviations*

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

Abbreviation	**Definition**
KΩ	1,000 Ohms
MegΩ	1,000,000 Ohms
µF	microfarad (10^{-6} farad)
µs	microsecond (10^{-6} second)
µsec	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
CE	Customer Engineer
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

CTL	Control
CTS	Clear to Send
CUR	Current
CVO	Cover Open Switch
D0, D1, etc.	Data Bit 0, Data Bit 1, etc.
DAT	Data
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
DHIO	Dual Hammerbank Input/Output
DMA	Direct Memory Access
DP	Data Processing, DataProducts
DPI	Dots Per Inch
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)
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 (Operator Panel)
FTIC	Fire Timer Integrated Circuit
GND	Ground
HB	Hammer Bank
HBA	Hammer Bank ASIC
HBF	Hammer Bank Fan
HBL	Hammer Bank, Left
HBP	Hammer Bank Power

HBR	Hammer Bank, Right
HD	Hammer Driver
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 Processor
IML	Initial Microcode Load
INST	Instruction
INT	Interrupt
IPM	Inches Per Minute
I/O	Input/Output
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
M1	Rear Paddle Motor, Power Stacker
M2	Front Paddle Motor, Power Stacker
M	Motor
MAIN	Maintenance Jack, RS-232 (Optional)
MECA	Mechanism Engine Control ASIC
MECH	Mechanism
MF	microfarad (10^{-6} farad)
MH	Mounting Hole
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MOT	Motor
MPU	Magnetic Pickup (Unit)
ms	millisecond (10^{-3} second)
MSL	Motor and Sensors, Left
MSR	Motor and Sensors, Right
N	Negative True
N/C	Not Connected
NC	Not Connected
NIC	Network Interface Card (optional ethernet interface)
NLQ	Near Letter Quality
No.	Number
NOVRAM	Non-volatile Random Access Memory
ns	nanosecond (10^{-9} second)

NVRAM	Non-volatile Random Access Memory
NT	Not
OLV	On Line Verify
OP	Operand
P5	+ 5 V DC
(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 Detector
PE	Printer Error, Paper Empty
PER	Peripheral Device
PF	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
PHA	Phase A
PHB	Phase B
PI	Paper Instruction
PLAT	Platen
PLM	Platen Motor

PLO	Platen Open Switch
PMD	Paper Motion Detect (Switch)
PN	Pin
P/N	Part Number
PO	Paper Out
POD	Paper Out Detector Switch
PPR	Paper
PROM	Programmable Read-Only Memory
PS	Power Supply
PSA3	Manufacturer’s designation of the controller board used in Infoprint 6500 printers
PS5	Power Supply + 5 Volt
PTR	Pointer, Printer
PWM	Pulse Width Modulation
PWR	Power
R	Right
RBN	Ribbon
RD	Read
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	**R**estriction **o**f **H**azardous **S**ubstances: a part or assembly that complies with 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
RTPU	Real-Time Processing Unit
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
STBY	Standby
STK	Power Stacker
SW	Switch, Software
SYNC	Synchronize
TCB	Task Control Block
TEMP	Temperature
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

V_{SS}	Voltage at Source
V8	A special ASIC on the controller board containing circuits that help the data controller (DC) operate.
WAN	Wide Area Network
WR	Write
w/	With
w/o	Without
XMT	Transmit

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