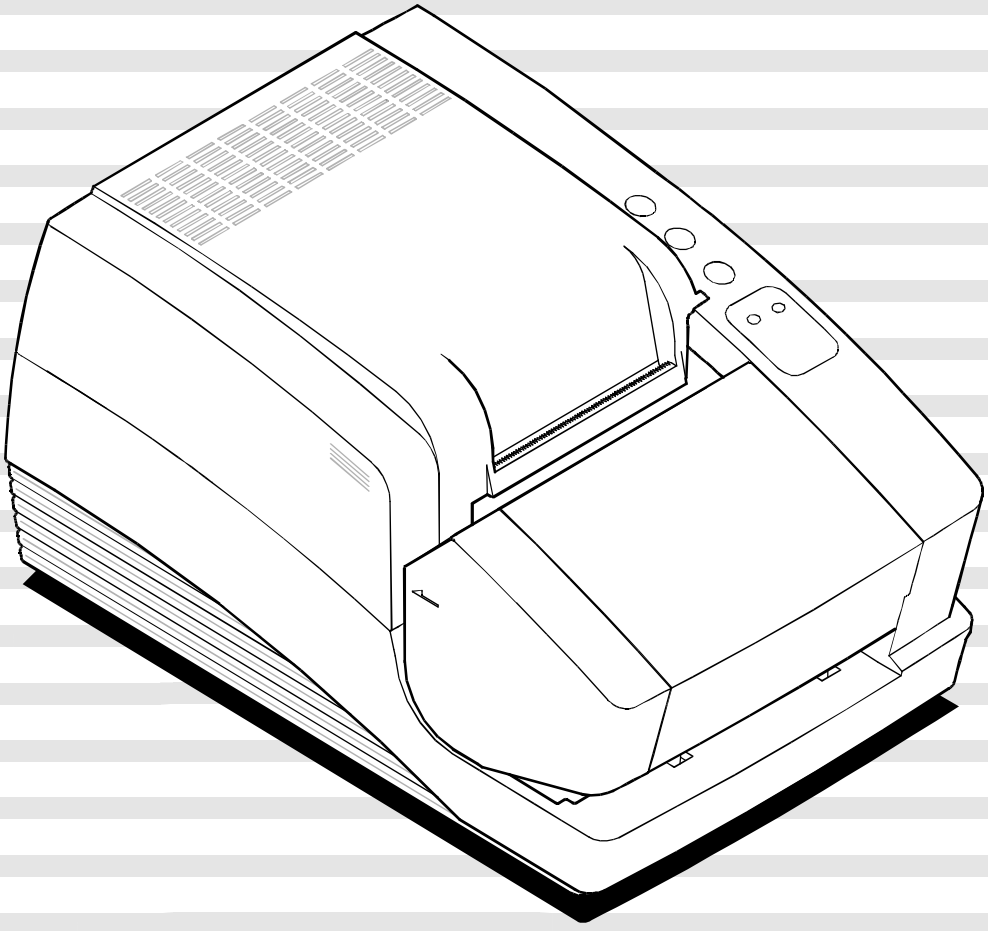
P_COS SERIES 90PLUS

MAINTENANCE MANUAL



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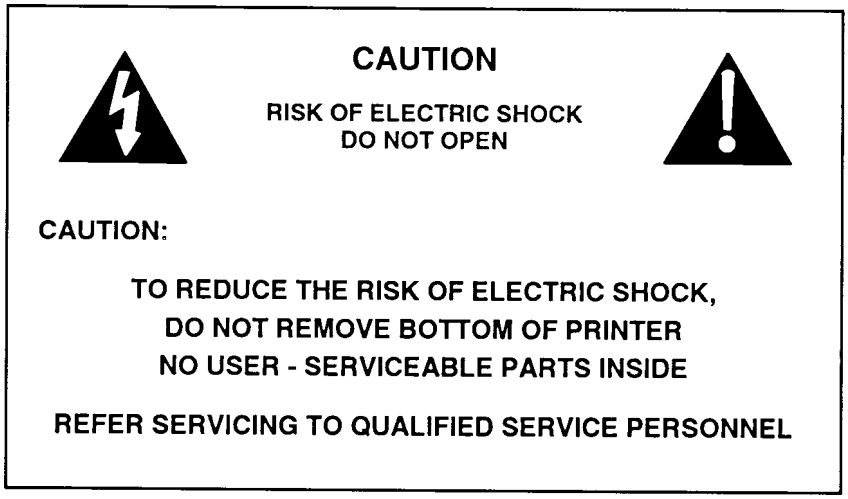

WARNING: To prevent fire or shock hazard, do not expose this printer to rain or moisture.

Disclaimer

Information in this publication is subject to change without notice. However, as product improvements become available, Ithaca Peripherals will make every effort to provide updated information for the products described in this publication.

Ithaca Peripherals cannot guarantee that changes in software and equipment made by other manufacturers, and referred to in this publication, do not affect the applicability of the information in this publication.

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Federal Communications Commission Radio Frequency Interference Statement

The Series 90PLUS printer complies with the limits for a Class A computing device, in accordance with the specifications in Part 15 of the FCC rules, which are designed to minimize radio frequency interference during installation. However, there is no guarantee that radio or television interference will not occur in any particular installation. If the equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on while the radio or television is on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the radio or television receiving antenna;
- Relocate the printer with respect to the receiver; or
- Plug the printer and receiver into different outlets.

If necessary, the user should consult their dealer or an experienced radio/television technician for additional suggestions.

The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio/TV Interference Problems*. This booklet is available from the United States Government Printing Office, Washington, DC 20402. Ask for stock number 004-000-00345-4.

Canadian Department of Communications Radio Interference Statement

The Series 90PLUS printer does not exceed Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

UL, CSA, VDE, CE Statement

Ithaca Peripherals' printers are UL and CSA listed, VDE certified, and carry the CE mark.

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PRODUCT INFORMATION

WHAT IS IN THIS BOOK?

WHO SHOULD READ THIS BOOK?

This book is a maintenance guide intended for trained, service technicians.

WHAT DOES IT COVER?

This book only covers the Series 90PLUS printer, not the entire point-of-sale system, but it will tell you all you need to know about properly maintaining and servicing the printer. You will learn how to clean and adjust the printer, troubleshoot problems, and disassemble the printer.

This book also provides some general and technical information about the printer, so you will learn what the features are, how reliable it is, and what its printing capabilities are.

WHERE CAN YOU FIND MORE INFORMATION?

A *Programmer's Guide* is available if you need to know how to program a point-of-sale terminal or a PC to work with the printer. It describes the commands the printer recognizes to perform its functions.

An *Operator's Guide* is also available and is intended for new and experienced operators. It covers setting up and using the Series 90PLUS printer with any point-of-sale system. For information about ordering these books, refer to the next section.

CONTACTING ITHACA PERIPHERALS

Contact your dealer first for general information about the Series 90PLUS printer and how it works with your system. If you need more specific information about the printer, you may contact Ithaca Peripherals directly. The Sales and Technical Support Departments will be able to help you with most of your questions.

To order supplies or send a printer in for service, the Technical Support Department can help. Also, contact the Technical Support Department to receive information about your warranty, technical advice, or additional information about the Series 90PLUS printer. To order supplies or receive information about other products by Ithaca Peripherals, contact the Sales Department.

You may reach both the Sales and Technical Support Departments at the following address and phone or fax numbers:

Ithaca Peripherals
20 Bomax Drive
Ithaca, NY 14850

Main phone	(607) 257-8901
Main fax	(607) 257-8922
Sales fax	(607) 257-3868
Technical support fax	(607) 257-3911
Technical support E-mail	techsupport@ithper.com
Web site	http://www.ithper.com

WARRANTY INFORMATION

OPTIONS

All Ithaca Peripherals PcOS Series 90PLUS printers come with a standard 24-month warranty covering both parts and labor. An optional warranty, covering both parts and labor for an additional 12 months, may be purchased separately.

For more information concerning the warranty options, please contact your dealer or the Sales Department at Ithaca Peripherals. See “Contacting Ithaca Peripherals” on page 1.

ORDERING SUPPLIES

You may order supplies by calling Ithaca Peripherals or by faxing the order form that was shipped in the box with the printer. If you would like more forms, call Ithaca Peripherals at (607) 257-8901, and ask for the Sales Department. If you already have forms, fax the order to (607) 257-3868.

You may order the following supplies:

- Paper,
- Ribbon cassettes,
- Take-up spool,
- Print head and clamp, and
- Cables.

PAPER

Paper	Type	Dimensions	Stock Number
Receipt paper	Single-ply	3.25 inches (width) 3.5 inches (diameter) 240 feet (length)	100-2203
Receipt-journal paper	Double-ply	3.25 inches (width) 3.5 inches (diameter) 125 feet (length)	100-2206
Receipt-journal paper	Triple-ply	3.25 inches (width) 3.5 inches (diameter) 85 feet (length)	100-2207

RIBBON CASSETTES

Color	Supplier	Stock Number
Black	Ithaca Peripherals	100-7565
Purple	Ithaca Peripherals	100-7859

Note: The warranty may be voided if other than genuine Ithaca Peripherals ribbons are used.

TAKE-UP SPOOL

Take-up Spool	Stock Number
Journal take-up spool	90-6415

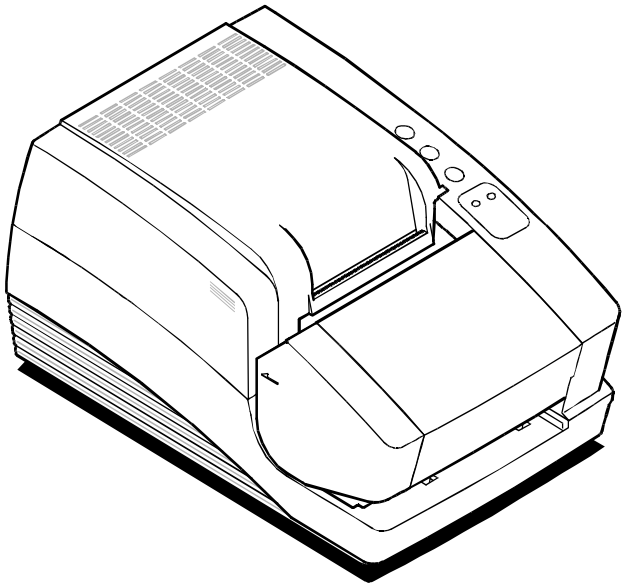
PRINT HEAD AND CLAMP

Print Head and Clamp	Stock Number
Print head	90-7337
Print head clamp	06-0571

CABLES

Cables	Stock Number
110V power cable	06-0561
230V power cable	06-0806
Parallel-communication cable	253-9800007
Serial-communication cable PC, 9-pin female to 9-pin female PC, 9-pin female to 25-pin female	 10-2020 10-2021

DESCRIPTION OF THE SERIES 90PLUS PRINTER



The PcOS (personal computer, point-of-sale) Series 90PLUS printer is a stand-alone, 40-column, high-speed impact printer. The Series 90PLUS printer performs a variety of functions in a point-of-sale environment and is available in the following models:

- Model 91PLUS: Receipt only
- Model 92PLUS: Receipt and Journal
- Model 93PLUS: Receipt, Journal, and Slip/Validation
- Model 94PLUS: Receipt and Slip/Validation

SERIES 90PLUS MODELS

Each of the four models in the Series 90PLUS line of printers has its own unique set of features.

PcOS Model 91PLUS Receipt Printer

The Model 91PLUS is a receipt printer used for applications requiring high-speed printing of receipts and single-line validation.

- 300 characters per second bidirectional printing
- 42-column printing at 15 characters per inch

PcOS Model 92PLUS Receipt and Journal Printer

The Model 92PLUS is a receipt and journal printer used for applications requiring a transaction audit trail (journal) in addition to high-speed printing of receipts and single-line validation.

- 300 characters per second bidirectional printing
- 42-column printing at 15 characters per inch
- Journal take-up

PcOS Model 93PLUS Receipt, Journal, and Slip/Validation Printer

The Model 93PLUS is a receipt, journal, and slip/validation printer used for applications requiring up to 17 lines of print on inserted forms such as checks (in validation mode) or charge slips, guest checks, or personal checks (in slip mode). In addition, it provides the same high-speed journal and receipt printing as the Model 92PLUS.

- 300 characters per second bidirectional printing
- 42-column printing at 15 characters per inch
- Journal take-up
- Form insertion sensor
- 17-line validation
- Front slip insertion

PcOS Model 94PLUS Receipt and Slip/Validation Printer

The Model 94PLUS is a receipt and slip/validation printer used for applications requiring up to 17 lines of print on inserted forms such as checks (in validation mode) or charge slips, guest checks, or personal checks (in slip mode). It does not include the journal take-up assembly.

- 300 characters per second bidirectional printing
- 42-column printing at 15 characters per inch
- Form insertion sensor
- 17-line validation
- Front slip insertion

STANDARD FEATURES

The following features and items are standard on all Series 90PLUS printers:

- Centronics parallel interface with 2K buffer
- Internal international power supply (95 to 265 VAC)
- Operating controls and lights
  - Power ON/OFF switch and indicator
  - Paper feed button
  - Forms release button
  - Resume button
  - Alarm and form LED's
- Paper-low sensor
- Operator controlled self-test
- Cash drawer connector (RJ12) and driver (24V, 1.5 amp pulse for approximately 150 ms; drawer open/closed status reporting)
- Nine-pin stored energy print head
- Short line-seeking logic
- Characters and graphics
  - Lowercase characters with descenders
  - 300 characters per second bidirectional printing
  - 42-column printing at 15 characters per inch
  - Emphasized and enhanced print
  - IBM compatible all-points-addressable (APA) graphics
- Software controlled vertical spacing
- Snap-on ribbon cassette
- Steel receipt tear-off bar

OPTIONAL FEATURES

The optional features either replace a standard feature or enhance the operation of the printer. All optional features are installed at the factory and must be selected when the printer is ordered.

- RS-232C serial communication interface
- RS-422 serial communication interface
- Journal cover lock
- Custom colors and logo

TECHNICAL SPECIFICATIONS

PRINTING SPECIFICATIONS

- Printing method — impact dot matrix
- Head wire arrangement — 9 pins in line
- Print wire diameter — 0.012 inch (0.34 mm)
- Print wire pitch — 0.013 inch (0.35 mm)
- Print directions — bidirectional, logic-seeking
- Print zone — 2.80 inches (71.12 mm)

PRINT CHARACTERISTICS

The Series 90PLUS printer prints characters in a variety of pitches as shown in the following table. Each pitch can also be printed in a variety of styles affecting the appearance of the characters and the speed of the printer.

For information about programming the printer to print a particular pitch or style, please refer to the *Programmer's Guide*. You can order the *Programmer's Guide* from Ithaca Peripherals. See "Contacting Ithaca Peripherals" on page 1.

Pitch (in characters per inch)	Maximum Characters per Line	Characters per Second
8	22	250
10	28	270
12	32	300
15	42	300
17.1 (condensed)	48	300
20 (super-condensed)	56	300
24 (super-condensed)	66	300
4 (double-wide)	11	150
6 (double-wide)	16	150
7.5 (double-wide)	21	150
8.5 (condensed, double-wide)	24	150
10 (condensed, double-wide)	28	150
12 (super-condensed, double-wide)	33	150

RELIABILITY

- Mean time between failure (except print head) 30,000 hours (Model 91PLUS)
- Print head life 200 million characters
- Mean time to repair 15 minutes

DIMENSIONS

- Width 7.30 inches (185.42 mm)
- Length 12.25 inches (311.15 mm)
- Height 6.00 inches (152.40 mm)

WEIGHT

- Approximate weight 10 pounds
- Approximate shipping weight 13 pounds

POWER REQUIREMENTS

The Model 90PLUS printer is designed to be AC self-powered in domestic and international markets. The printer is equipped with a universal, input power supply that is designed to operate worldwide without modification.

Supply Voltage Rating (VAC)	Supply Voltage Range (VAC)	Frequency (Hz)	Rated Power (watts)	Current Idle (amps)	Current Printing (amps)
100 - 240	90 - 264	47 - 63	45	0.08 @ 120VAC 0.04 @ 240VAC	0.9 @ 120VAC 0.4 @ 240VAC

ENVIRONMENTAL CONDITIONS

The printer will run its best when stored and operated in an environment that meets the following temperature and humidity conditions:

- Operating temperature 0° to 50°C (32° to 122°F)
- Storage temperature -10° to +60°C (-14° to +140°F)
- Operating relative humidity 10% to 90% (noncondensing)
- Storage relative humidity 5% to 90%

COMMUNICATION INTERFACES AND CASH DRAWER CONNECTORS

SERIAL CABLE

Cable Requirements

The PcOS Series 90PLUS printer requires an RS-232C shielded cable, no more than 50 feet long. The cable must be UL and CSA approved.

RS-232C Communication

The RS-232C interface uses the following protocol and communication characteristics:

- Up to 19.2K baud
- Up to 6K buffer
- Ready/Busy or XON/XOFF protocol
- Communications diagnostic mode

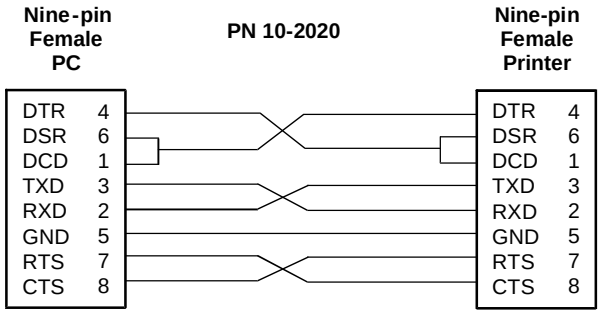
Pin Assignments for 9-pin Printer Connector

Pin	Name	Description
1	DCD	Data carrier detect
2	RX	Receive data
3	TX	Transmit data
4	DTR	Data terminal ready
5	GND	Signal ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	SSD	Secondary data

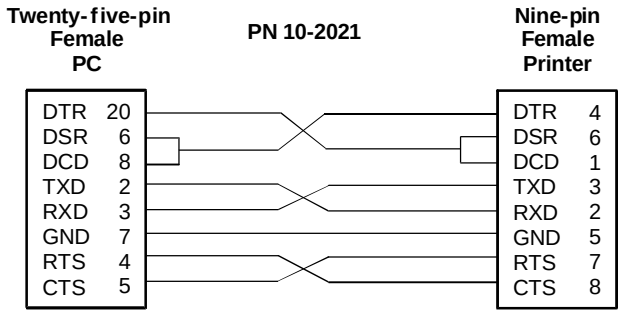
Serial Cable Configurations

The following cable configurations are for different host requirements.

Serial PC to Series 90PLUS (null modem)
Use the Ithaca Peripherals cable, part number 10-2020, for PcOS Series 90PLUS printers connected to PC's or PS/2's with 9-pin serial ports.



Serial AT to Series 90PLUS (Null Modem)
Use the Ithaca Peripherals cable, part number 10-2021, for PcOS Series 90PLUS printers connected to PC's or PS/2's with 25-pin serial ports.



PARALLEL CABLE

Cable Requirements

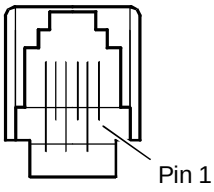
The PcOS Series 90PLUS printer requires a 25-pin male D-shell connector at the printer. To connect the printer to most PC's, use Ithaca Peripherals part number 253-9800007, 25-pin male to 25-pin male parallel interconnect cable.

Pin Assignments

Pin(s)	Signal	Description	Direction
1	STROBE	Clock data to printer	Host to printer
2 through 9	D0 - D7	Data	Host to printer
10	ACK\	Printer accepted data	Printer to host
11	BUSY	Printer is busy	Printer to host
12	PE	Paper out/status	Printer to host
13	SLCT	Printer selected	Printer to host
14	AUTOFD	Autofeed paper	Host to printer
15	ERR\	Printer error	Printer to host
16	INIT\	Initialize the printer	Host to printer
17	SLIN	Select printer	Host to printer
18 through 25	GND	Ground	

CASH DRAWER PIN ASSIGNMENTS

Function	Drawer 1	Drawer 2
Drawer Drive +	Pin 4	Pin 4
Drawer Drive -	Pin 5	Pin 1
Status Signal	Pin 2	Pin 2
Status Ground	Pin 3	Pin 3
Frame Ground	Pin 6	Pin 6



CLEANING AND ADJUSTMENTS

CLEANING THE PRINTER

Remove paper dust periodically by using a vacuum cleaner or air compressor.

> **Caution:** Do not use alcohol or petroleum-based chemicals to clean the printer as these will damage the plastic parts. The carriage rack is particularly sensitive and will be permanently damaged if exposed to these chemicals. Take special care not to get the cleaner on any electronic components.

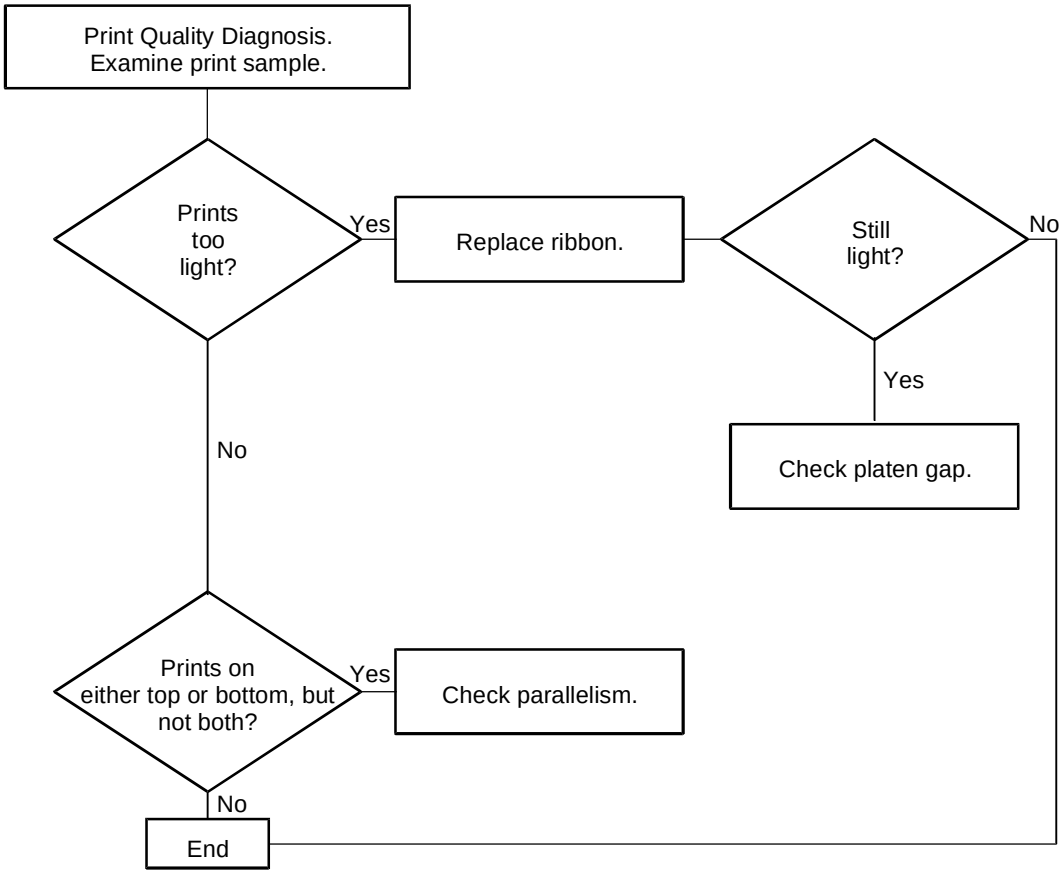
None of the internal parts of the printer require lubrication or routine maintenance. Apply a common cleaner such as fantastik® or Formula 409® to a damp cloth and gently wipe the surface of the printer and keypad.

MAKING ADJUSTMENTS

The adjustments described in this section are required only to correct print head drag or print quality flaws. If the print density on a print sample is consistent from top to bottom and the print head does not drag, no adjustment is necessary. If the print head drags, adjust the platen gap for the thickness of paper being used. If the print sample is inconsistent, adjust the print head parallelism.

DIAGNOSING THE PRINT QUALITY

Use the flowchart on the following page to determine which procedure to use to correct a specific print problem.



Note: For additional print problems not covered in this flow chart, refer to the troubleshooting chart on page 55.

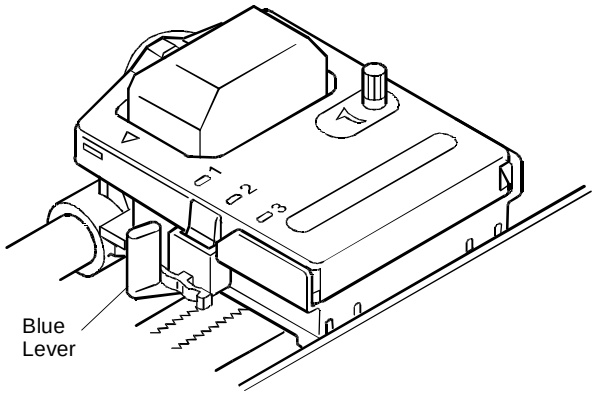
NECESSARY TOOLS

The following list provides the tools needed to adjust the platen gap.

- #1 Phillips screwdriver
- Thickness gauge: 0.016 inch (0.406 mm)
- Paper clip

Caution: Using the wrong tools may cause personal injury or printer damage. Be sure to use the proper tools when maintaining or servicing the Series 90PLUS printer.

ADJUSTING THE PLATEN GAP



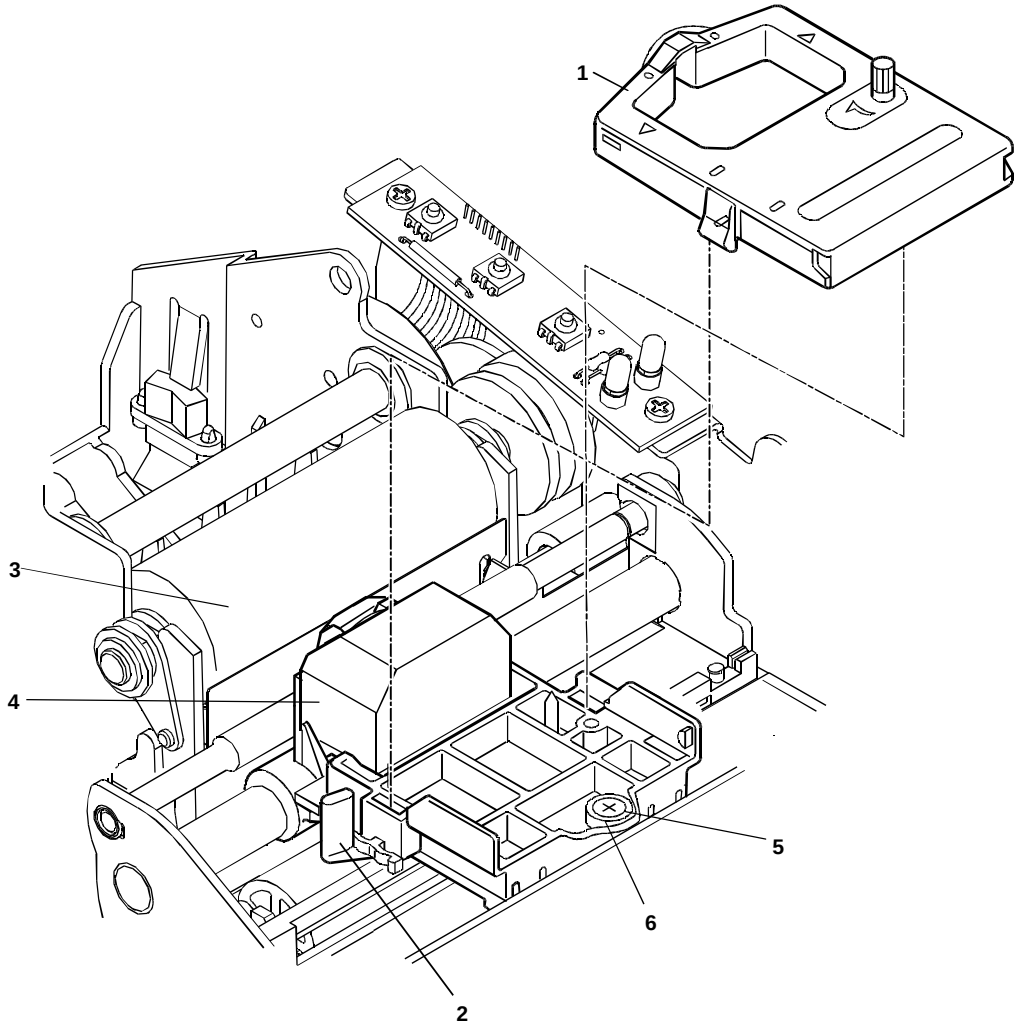
The gap between the print head and the platen can be adjusted to accommodate the thickness of different paper. If the gap is not set properly, the characters may smudge, the print head may jam, and the density of the characters may be less than ideal.

Adjust the print head gap by moving the blue lever, located to the left of the ribbon cassette, to one of three positions.

Set the gap to one of the following:

- Position 1 One-ply paper
- Position 2 Two-ply paper
- Position 3 Three-ply paper

ADJUSTING THE PLATEN PARALLEL TO THE PRINT HEAD



1. Turn off the printer.
2. Remove all paper from the printer.
3. Remove the ribbon cassette (1).
4. Set the range adjustment lever (2) to position 1 (towards the rear of the printer). The range adjustment lever (2) is the blue lever on the print head (4).
5. Sight along the length of the platen (3) from the side of the printer to observe the parallelism of the air gap between the platen (3) and the print head (4).
6. Press down on the outer ring of the adjusting gear (6) with the straightened end of a paper clip, and turn the adjusting screw (5) with a #1 Phillips screwdriver until the gap measures 0.016 ± 0.003 inch (0.406 ± 0.0762 mm).

ASSEMBLY/DISASSEMBLY

PRECAUTIONS FOR DISASSEMBLY

Before disassembling any part of the printer, be sure the power is turned off. Disconnect the AC power cord, the communication cable, and the cash drawer cables.

Caution: The controller board and PC board keypad can easily be damaged by static electricity. Observe ESD precautions. Wear a grounded wrist strap, and use a static mat or other protected work surface. Do not place the printed circuit boards directly on the printer or floor.

NECESSARY TOOLS

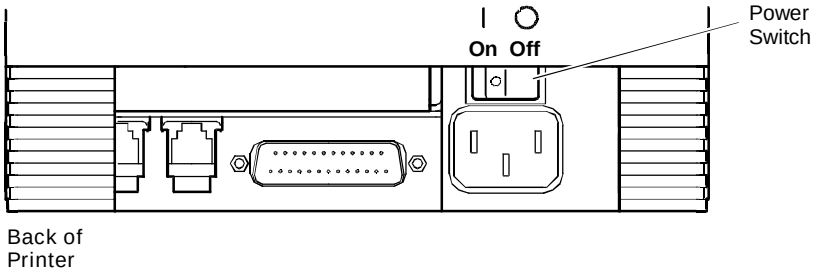
The following list provides the necessary tools for properly maintaining the Series 90PLUS printer.

- Screwdrivers
  - #0 Phillips
  - #1 Phillips
  - #2 Phillips
  - Small flat blade
  - Large flat blade
- Nut driver
  - 3 mm
- Miscellaneous
  - Thickness gauge: 0.016 inch (0.406 mm)
  - Hobby knife
  - Small needle-nose pliers

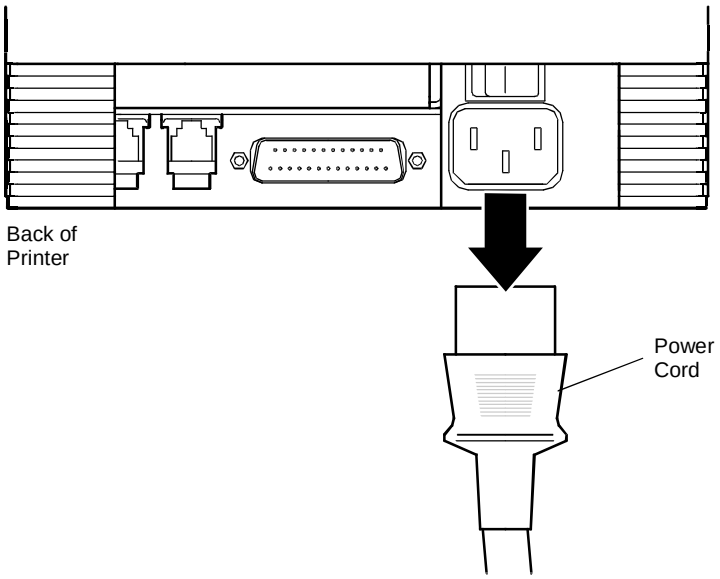
Caution: Using the wrong tools may cause personal injury or printer damage. Be sure to use the proper tools when maintaining or servicing the printer.

DISCONNECTING THE POWER CORD

Caution: The printer must be grounded through the three-prong power connector. Do not use a ground-defeating adapter.



1. Be sure the power switch is turned off.

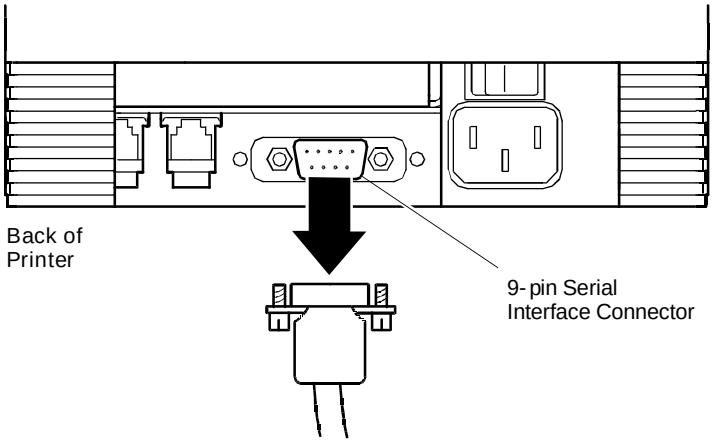


2. Disconnect the external AC power source and the power cord from the power socket located on the back of the printer.

DISCONNECTING THE COMMUNICATION CABLE

Depending on the interface your system uses, either disconnect the serial or parallel communication cable from the appropriate connector on the back of the printer.

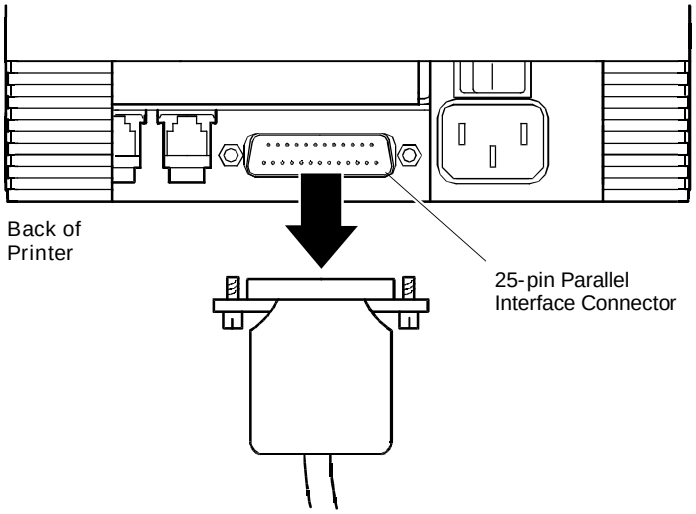
DISCONNECTING THE SERIAL CABLE



1. Turn off the printer and the host system or PC.
2. Loosen the two mounting screws on each side of the cable connector.
3. Disconnect the 9-pin serial interface cable from the connector located on the back of the printer.

   Refer to “Communication Interfaces and Cash Drawer Connectors” on page 9 for information on the serial cable requirements.

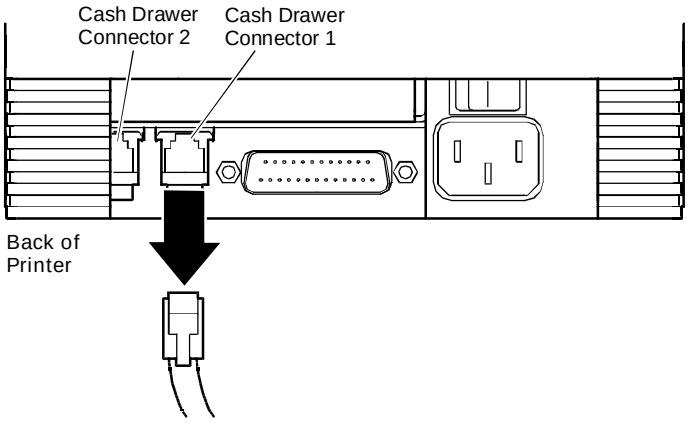
DISCONNECTING THE PARALLEL CABLE



1. Turn off the printer and the host system or PC.
2. Loosen the two mounting screws on each side of the cable connector.
3. Disconnect the 25-pin parallel interface cable from the connector located on the back of the printer.

   Refer to “Communication Interfaces and Cash Drawer Connectors” on page 9 for information on the parallel cable requirements.

DISCONNECTING THE CASH DRAWER CABLES

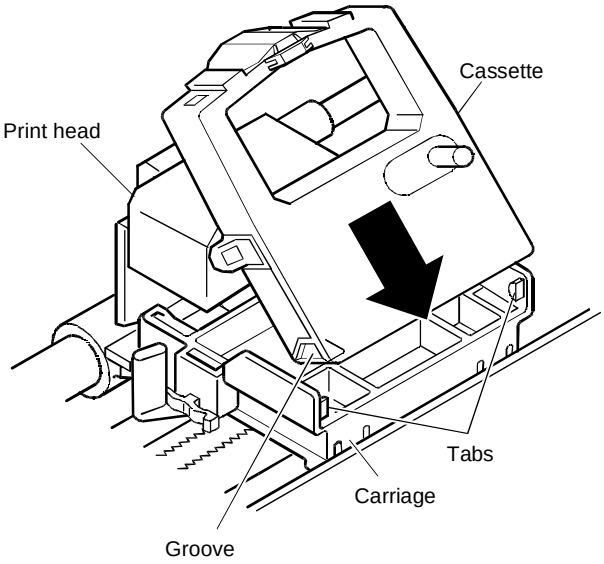


1. Turn off the printer.
2. Disconnect the cash drawer cables from the connectors located on the back of the printer. Adapters are available for connecting cash drawers equipped with BNC-style connectors. (A modular, telephone-style connector is standard). If you need an adapter, contact the Technical Support Department at Ithaca Peripherals. See “Contacting Ithaca Peripherals” on page 1.

REMOVING THE RIBBON CASSETTE

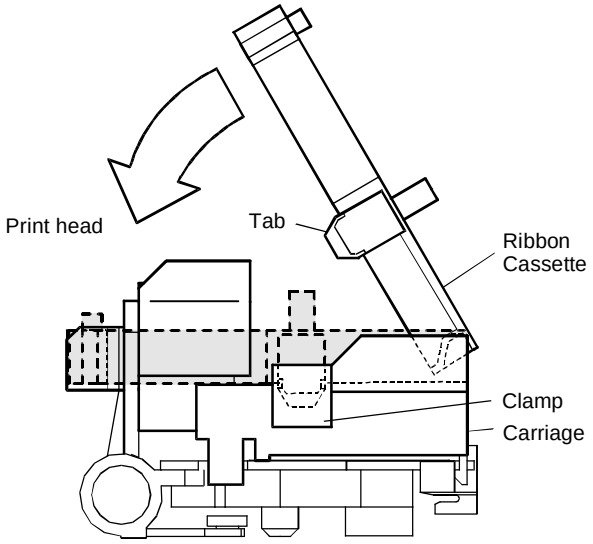
Grasp both sides of the cassette. Lift and rock the cassette towards you. Do not pull the cassette straight up.

INSTALLING THE RIBBON CASSETTE

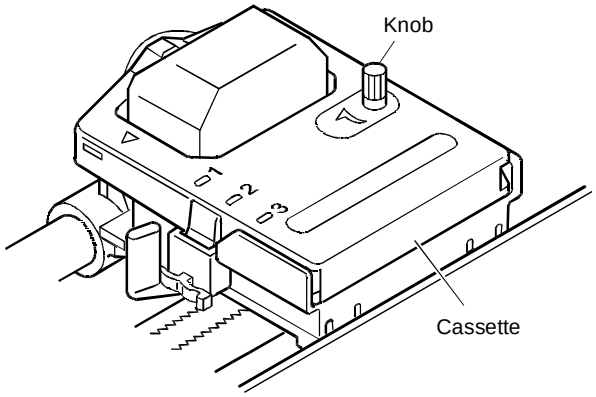


1. Holding the ribbon cassette with the Mylar guide facing away from you, insert the front of the cassette into the carriage.

Note: It is important to fit the front edge of the ribbon cassette into the carriage first. Do not place the ribbon cassette flat on the carriage.



2. Rock the ribbon cassette forward, toward the print head, and then press down on it until the tabs on the cassette snap into the clamps on the carriage.



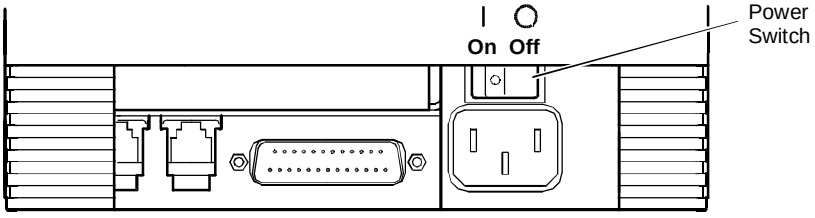
3. Tighten the ribbon by turning the knob on the cassette clockwise.
4. Close the cassette cover.
5. Turn the printer back on (if already installed).

PRINT HEAD

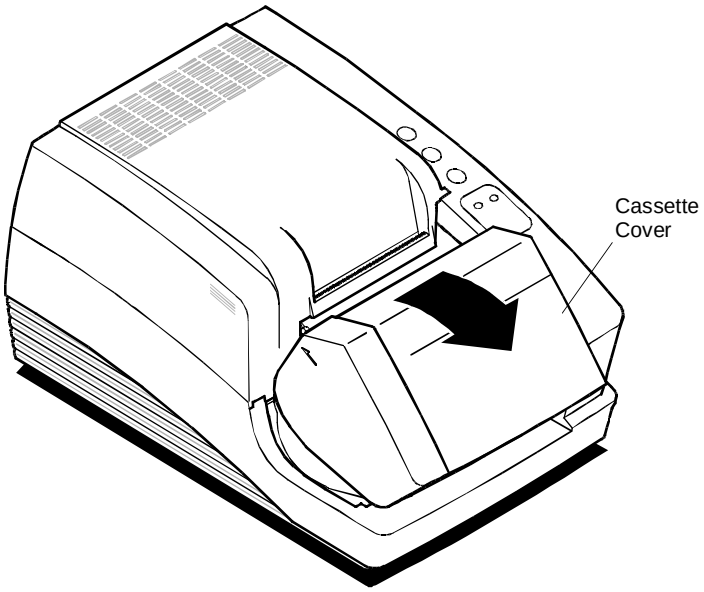
Replace the print head when the characters are consistently misprinting.

REMOVING THE USED PRINT HEAD

Caution: The print head can get very hot.

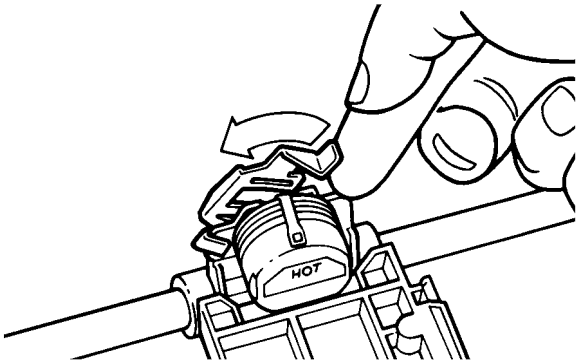


1. Turn off the printer, and allow the print head to cool for at least three minutes before replacing it.

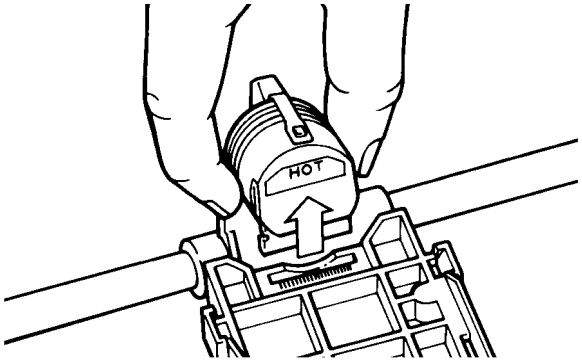


2. Open the cassette cover.
3. Remove the ribbon cassette.

Note: In the following illustrations, the heat sink is not shown for clarity.



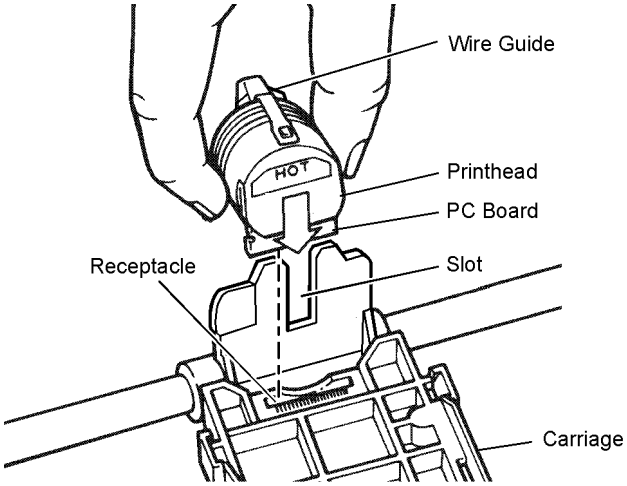
4. Open the print head clip by grasping the tab on the right side of the clip and rotating it from right to left.



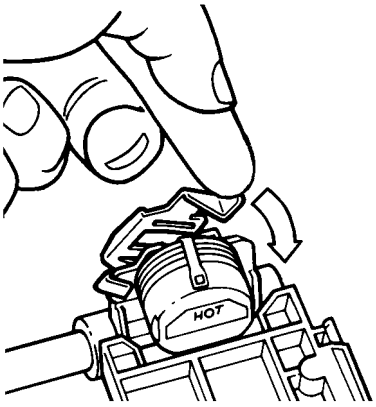
5. Lift the print head straight up out of the carriage.

INSTALLING THE NEW PRINT HEAD

Note: In the following illustration, the heat sink is not shown for clarity.

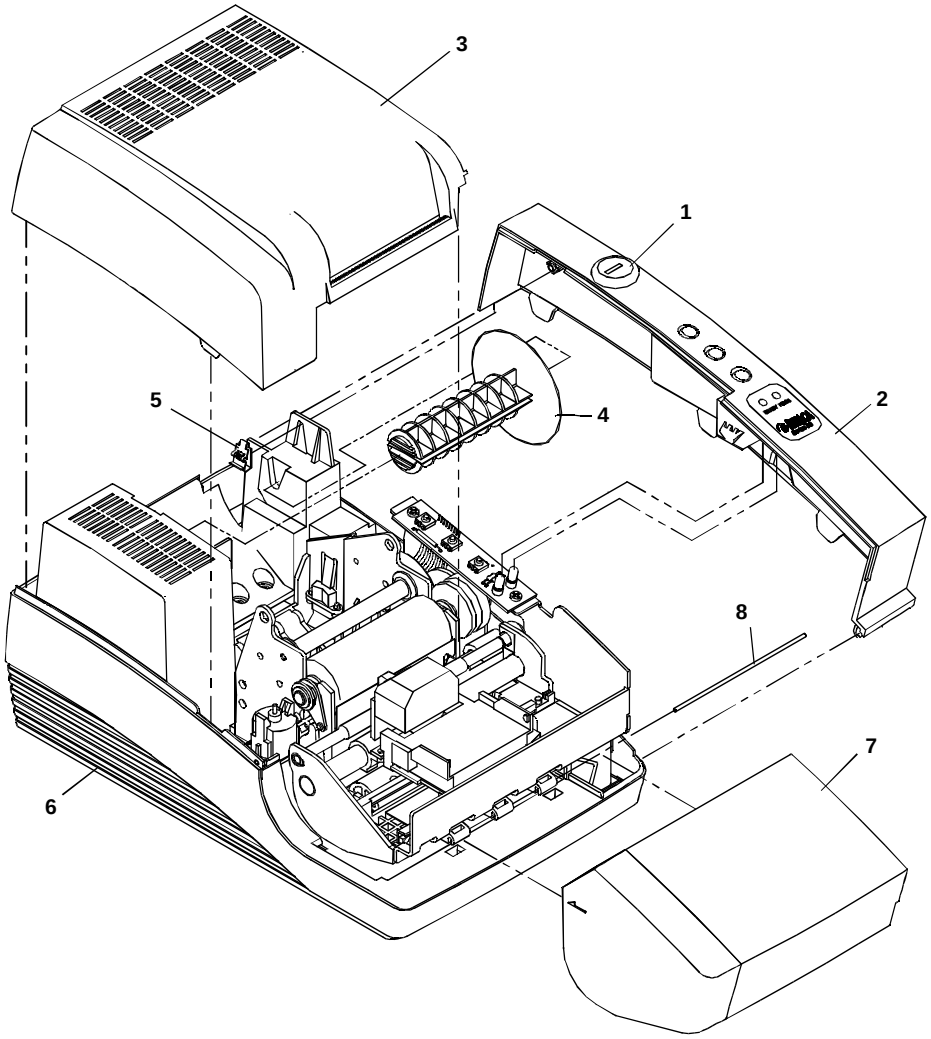


1. Slide the black wire guide on the back of the print head into the slot on the carriage. Make sure the tabs on the wire guide hold the print head against the carriage.
2. Align the PC board on the bottom of the print head with the receptacle on the carriage.
3. Press the print head into the carriage. Do not force the PC board into the receptacle. Make sure it is lined up properly.

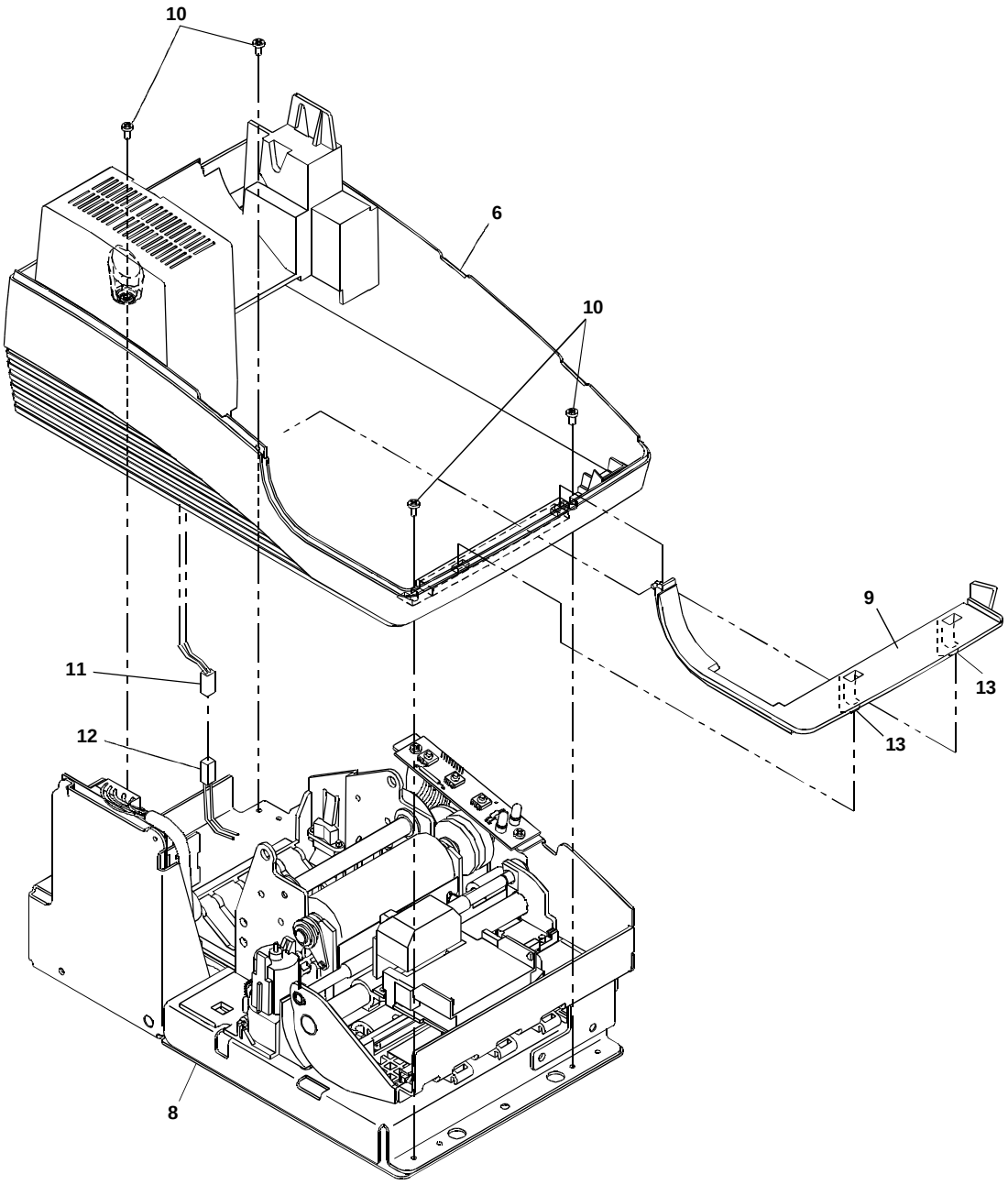


4. Close the print head clip by rotating it from left to right and latching it into place.
5. Replace the ribbon cassette, and then close the cassette cover.

REMOVING THE COVERS



1. Unlock the optional journal lock (1) located on the right cover (2).
2. Open the paper cover (3) until it unsnaps from the base cabinet (6).
3. Remove the take-up spindle (4).
4. Remove the clip (5). Use needle-nose pliers to squeeze the open ends on the clip, and carefully pull it out. Move the back corner of the right cover (2) to the right until the star stud clears the tower on the base cabinet (6). Rotate the back corner up and to the front until it is free from the base cabinet.
5. Open the cassette cover (7). Pull the hinge pin (8) out from the right, and remove the cassette cover.



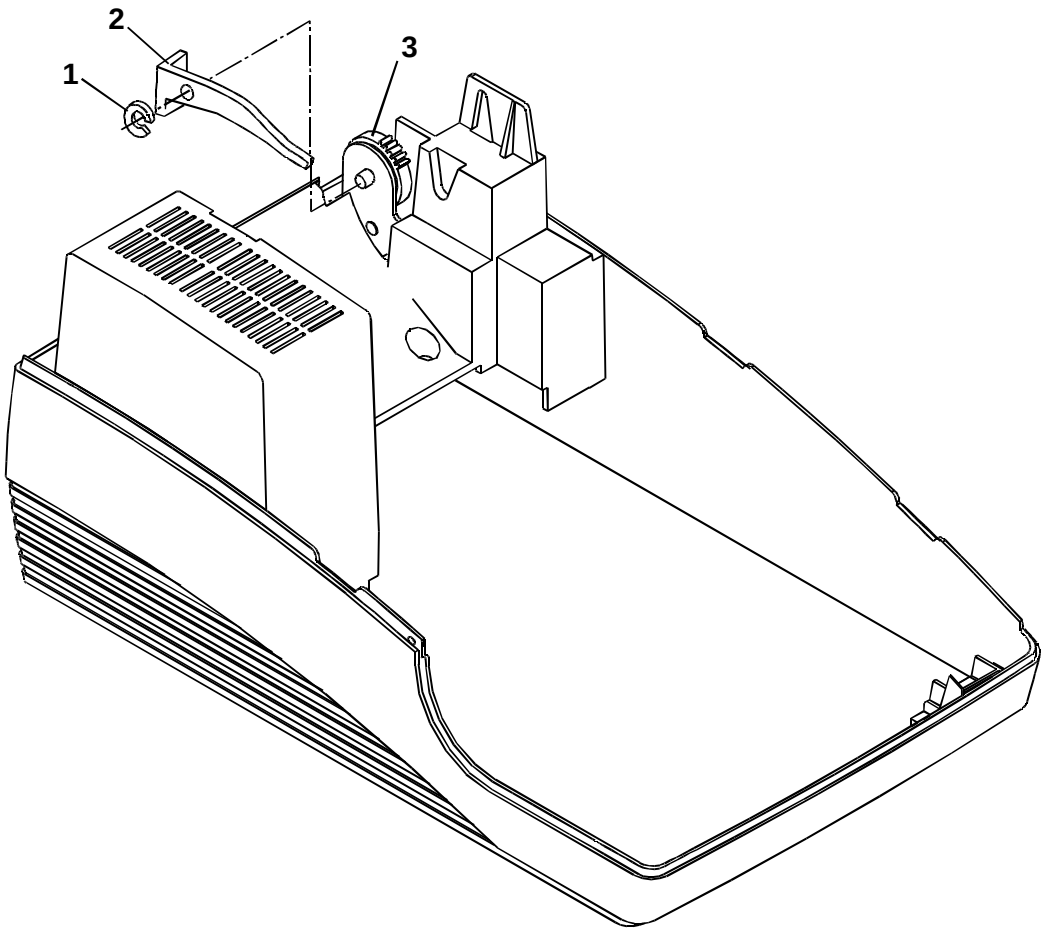
6. From the bottom of the mechanical/electrical base assembly (8), insert a flat blade screwdriver through the holes in the front, and unlatch the tabs (13) holding the cabinet bezel (9) to the base cabinet (6). Push on the left side of the cabinet bezel (9) to free the pin from the cabinet base.

7. Remove the four screws (10) holding the base cabinet (6) to the mechanical/electrical assembly (8). Lift the back of the base cabinet up and slide forward.

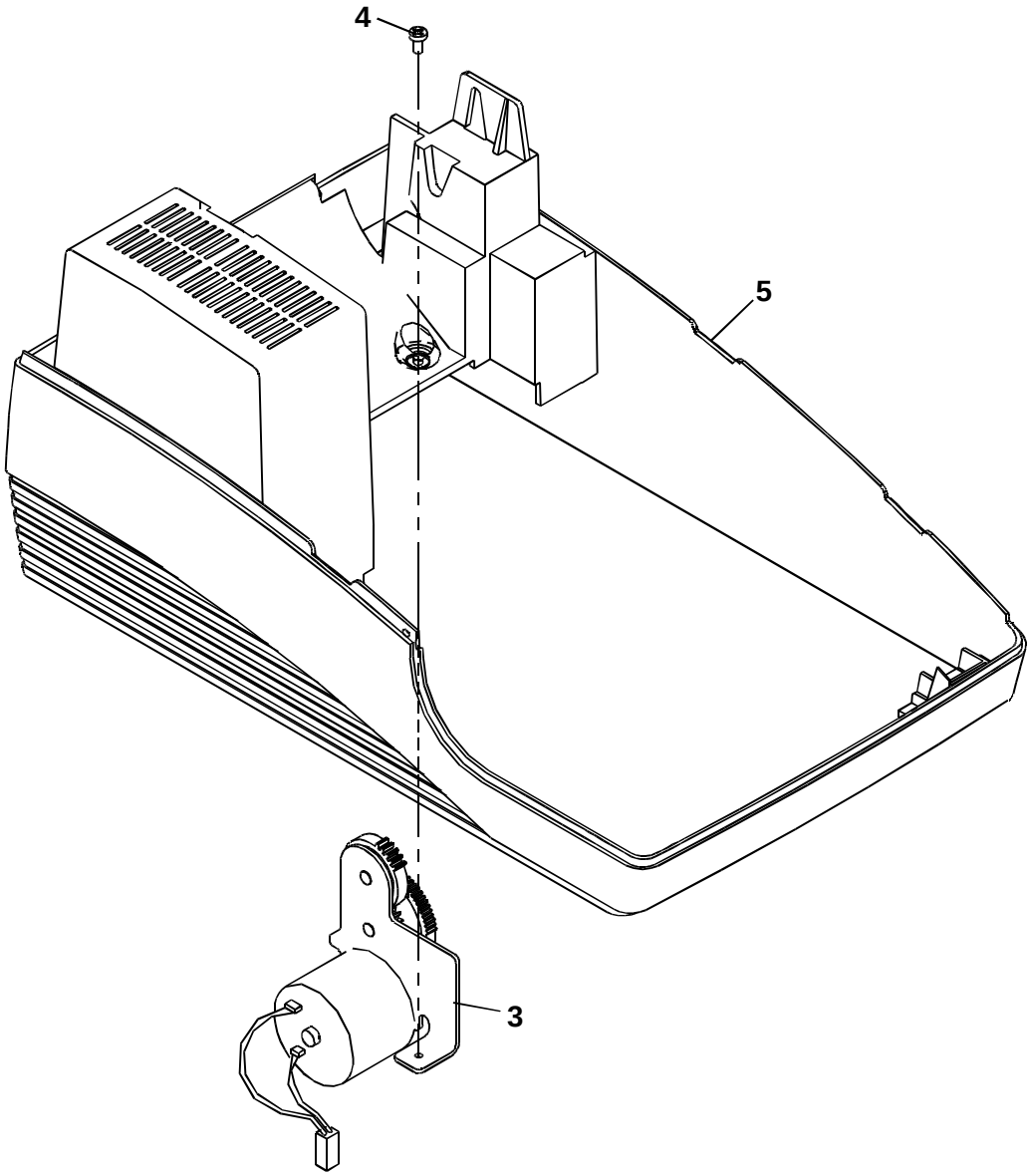
8. Models 92PLUS and 93PLUS, disconnect the take-up harness (11) from the take-up extension cable (12).

TAKE-UP MOTOR ASSEMBLY KIT

Models 92PLUS and 93PLUS

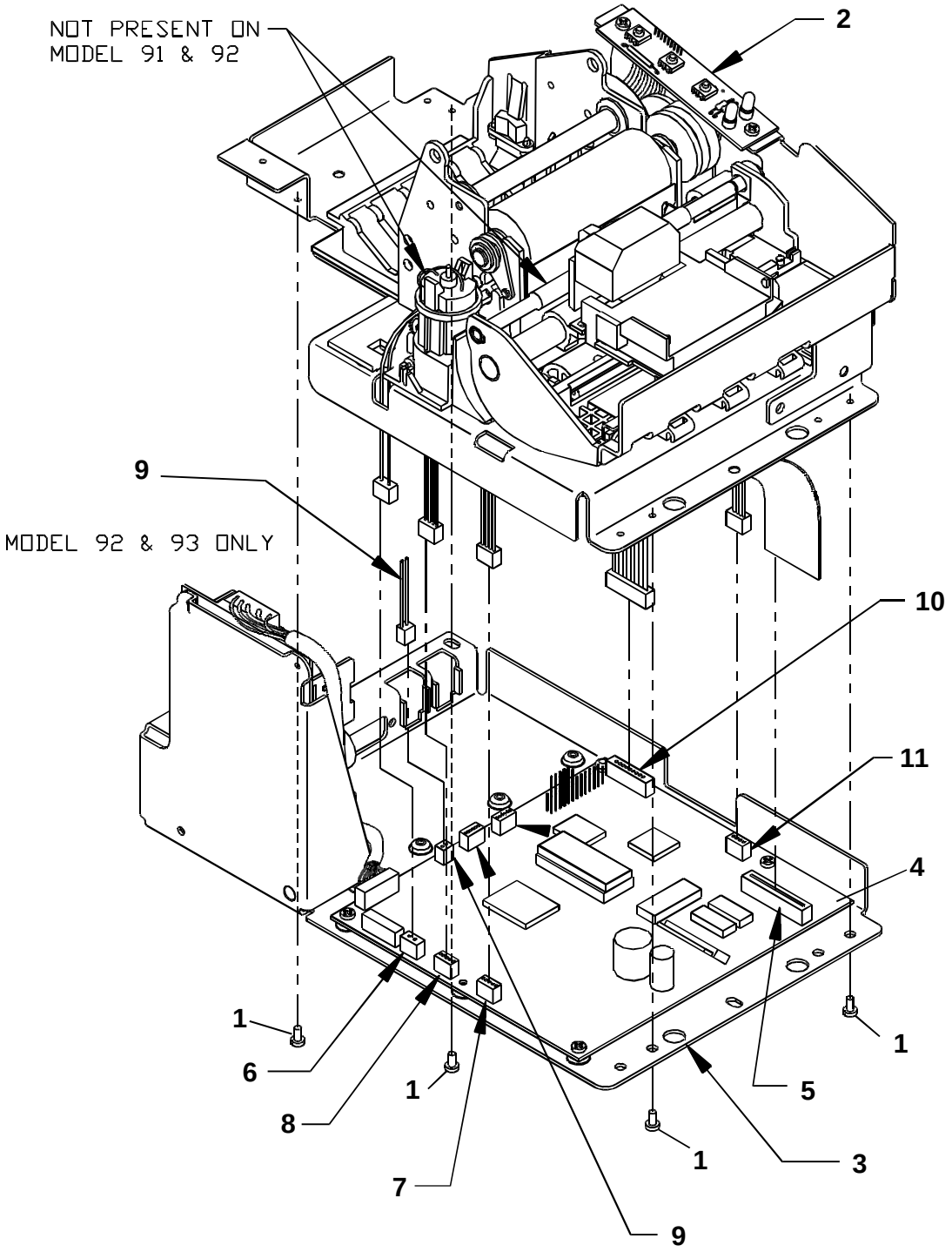


1. Remove the covers. See page 26.
2. Remove the E-ring (1) and slide off the arm (2) from the take-up motor assembly (3).



3. Remove the screw (4) holding the take-up assembly (3) to the base cabinet (5).
4. Release the take-up motor assembly (3) from the base cabinet (5). Move the bottom of the take-up motor assembly to the right until it clears the tab on the back wall of the base cabinet.

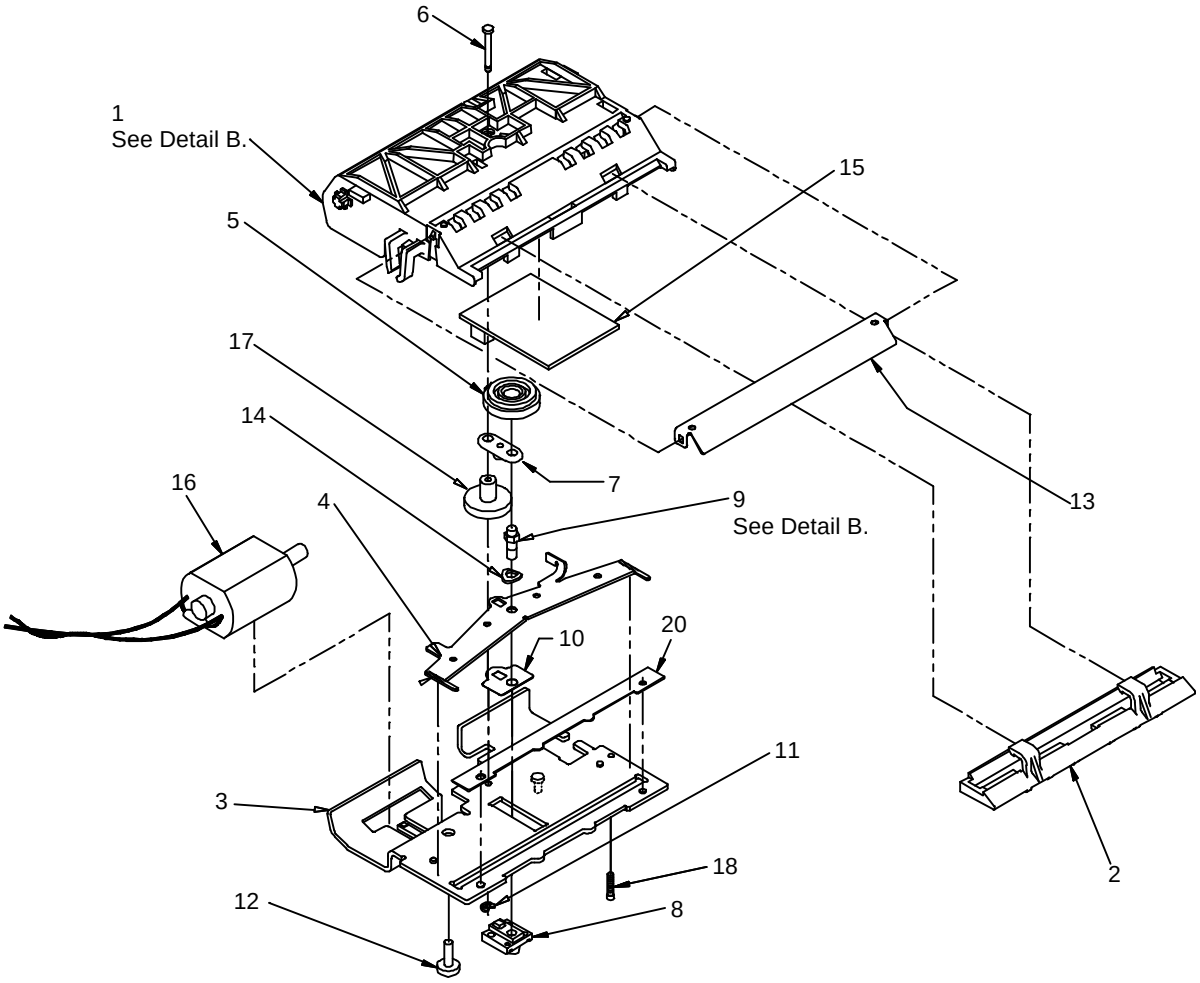
MECHANICAL BASE ASSEMBLY

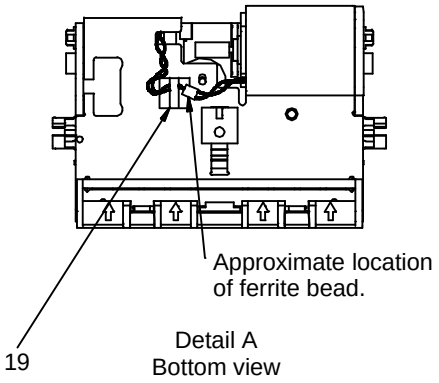


1. Remove the covers. See page 26.
2. Remove the four screws (1), two in front and two in back, holding the mechanical base (2) to the electronic base assembly (3).
3. Lift the mechanical base (2), and disconnect the following harnesses from the controller board assembly (4): cam plate motor (6); head cable (5); slip-in sensor (7); paper-low sensor (8); take-up motor extension (9); keypad (10); and receipt line feed stepper-motor (11). Refer to the chart below for connector locations on the controller board.
4. Remove the slip-in sensor harness (7) and paper-low sensor harness (8) from the tabs on the left and back of the insulator.
5. Remove the receipt line feed stepper-motor harness (11) from the tab on the right side of the insulator.

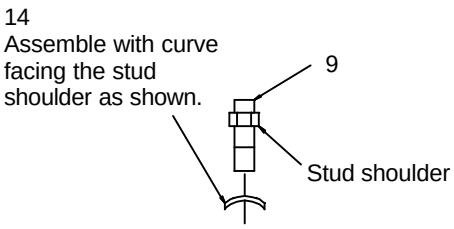
Type of Harness	**Controller Board Location**
Head cable	CN8
Cam plate motor	CN7
Slip-in sensor	CN9
Paper-low sensor	CN15
Take-up motor extension (Models 92PLUS and 93PLUS)	CN4
Keypad	CN5
Receipt line feed stepper-motor	CN3

KNIFE DISASSEMBLY

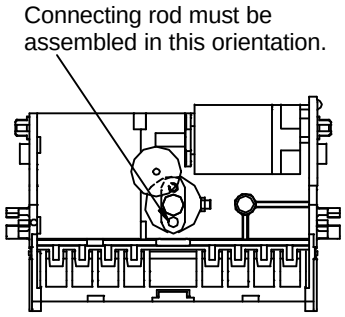




Detail A
Bottom view



Detail B
Scale 2 = 1



Detail C

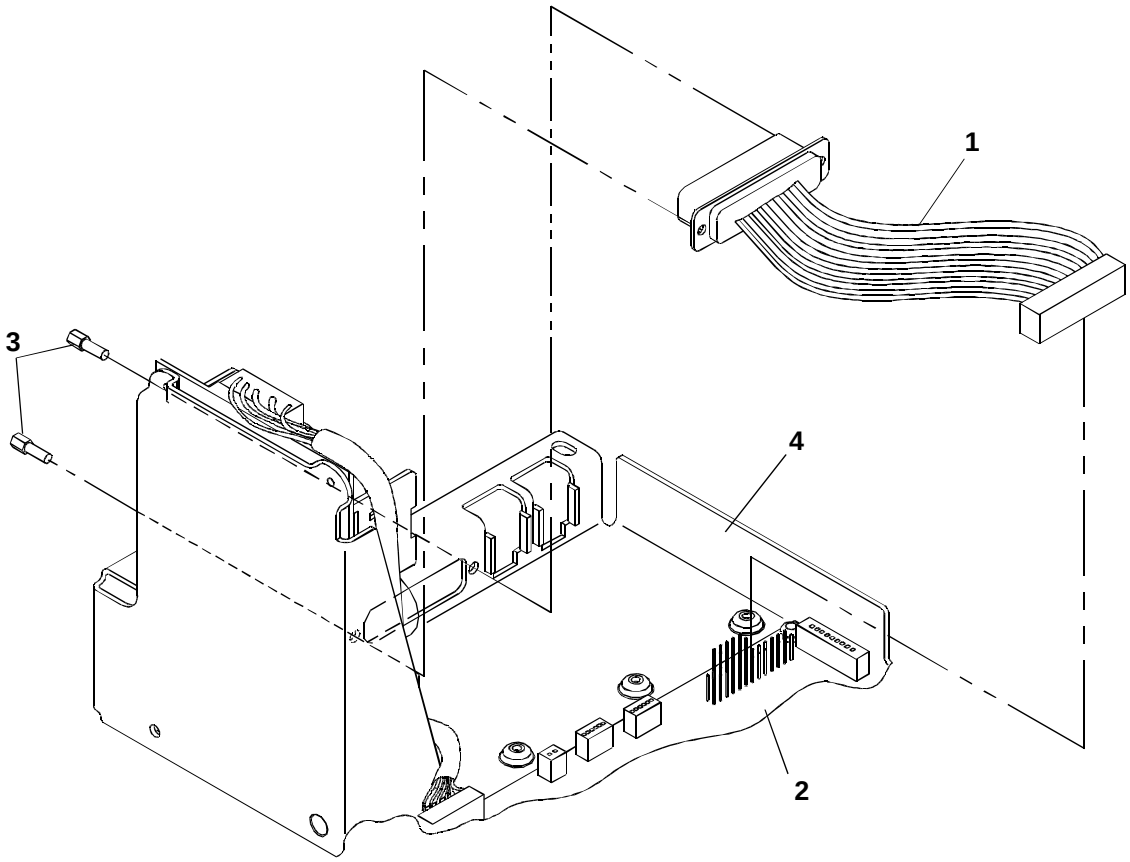
Caution: The knife blade is extremely sharp.

1. Turn the cutter assembly upside down, remove the screw (12), and pull out the knife guide (2). If necessary unsnap and remove the tear-off (13).
2. Remove the screw (18) and the E-ring (11), and separate the knife plate assembly (3) from the knife frame.
3. Remove the connecting rod (7) and the compound gear (17) from the knife pin (6). Remove the knife gear (5) and the knife pin from the knife frame.
4. Disconnect the knife motor connector (16) from the PCB assembly (15). Unthread the knife motor harness from the wire retainer (19), and remove the knife motor.
5. Pull the PCB assembly out of the knife frame (1).
6. To remove the knife blade (4), unscrew the drive stud (9). This will also release the Teflon film (10), spring washer (14), knife slider (8), and shear blade (20).

Installation notes

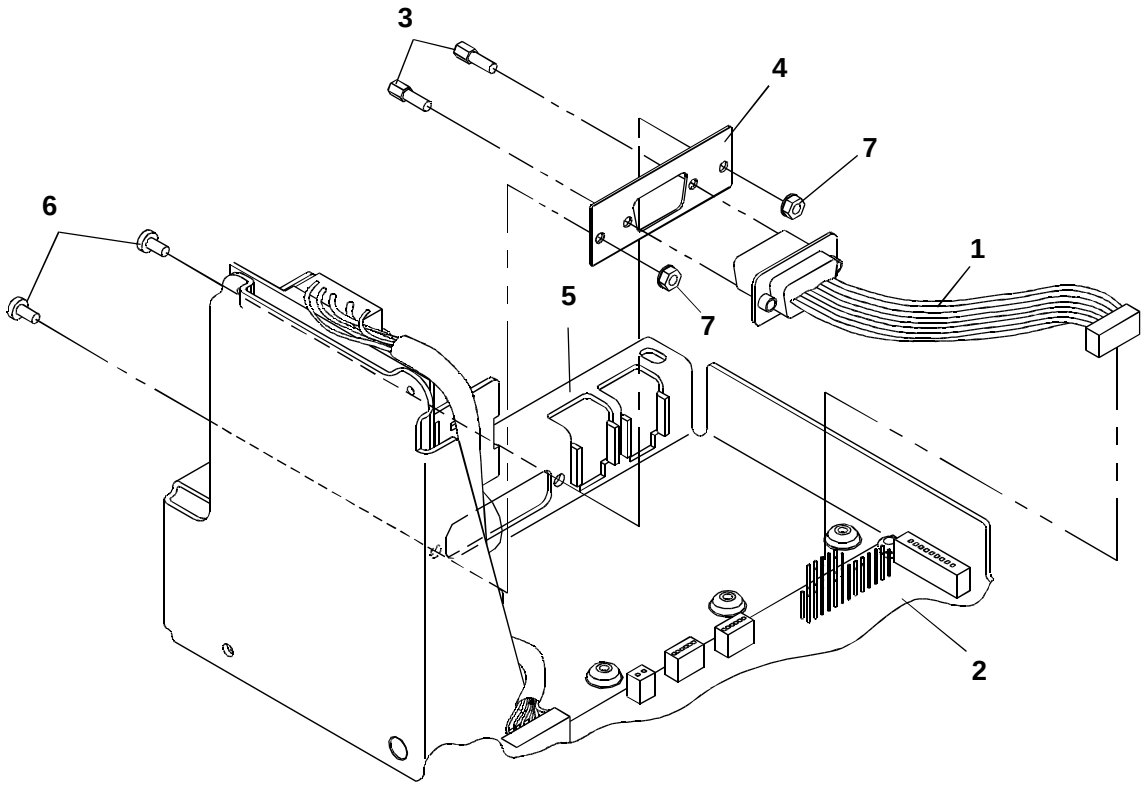
1. Position the ferrite bead on the knife motor harness as shown in Detail A.
2. Refer to Detail C for the correct orientation of the connecting rod. Lubricate the four points on the knife frame with Teflon Anti-Seize Lube.
3. Install the spring washer with the curve facing the stud shoulder as shown in Detail B.
4. The slider must be replaced if disassembled. The stud must be retorqued to 4.5 ± 1 in. lbs. and then loosened one-quarter turn.

25-PIN PARALLEL INTERFACE CABLE



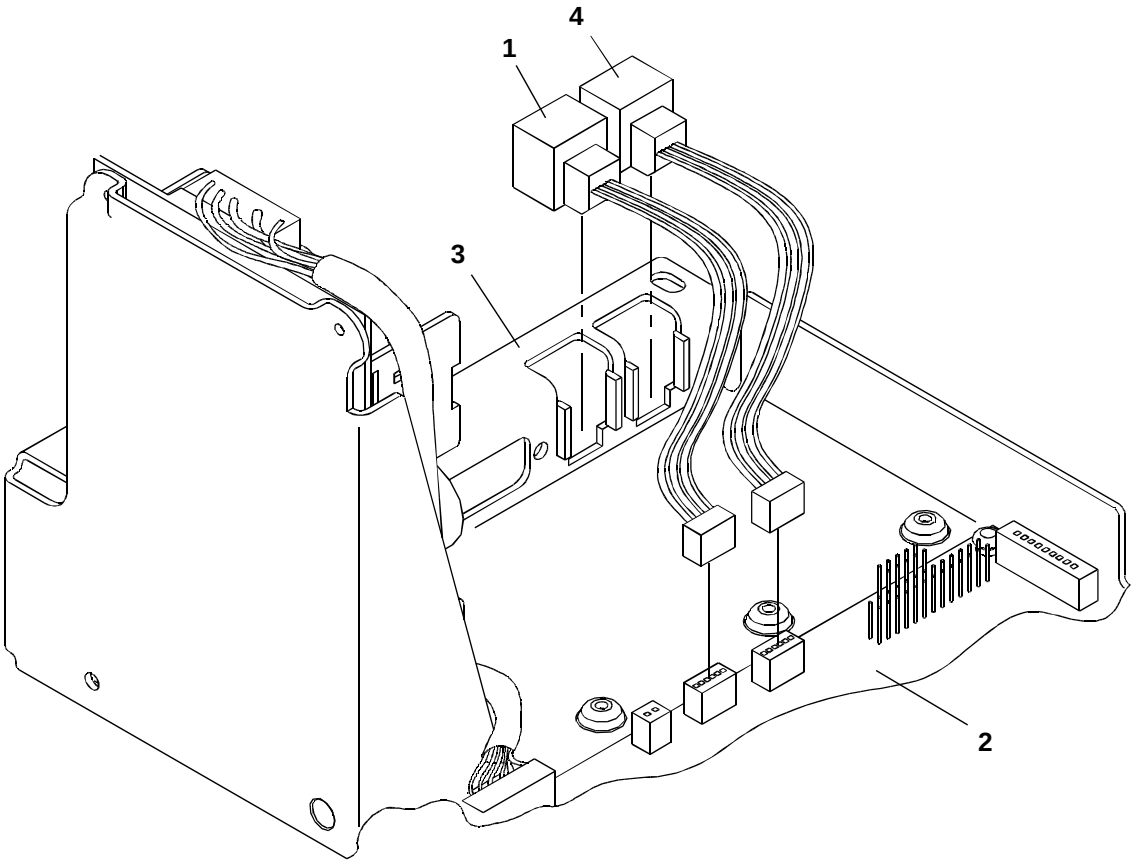
1. Remove the mechanical base assembly. See page 30.
2. Disconnect the 25-pin parallel interface cable (1) from the connector, CN13, on the controller board (2).
3. Unscrew the two jack screws (3) holding the cable to the electronic base (4).

9-PIN SERIAL INTERFACE CABLE



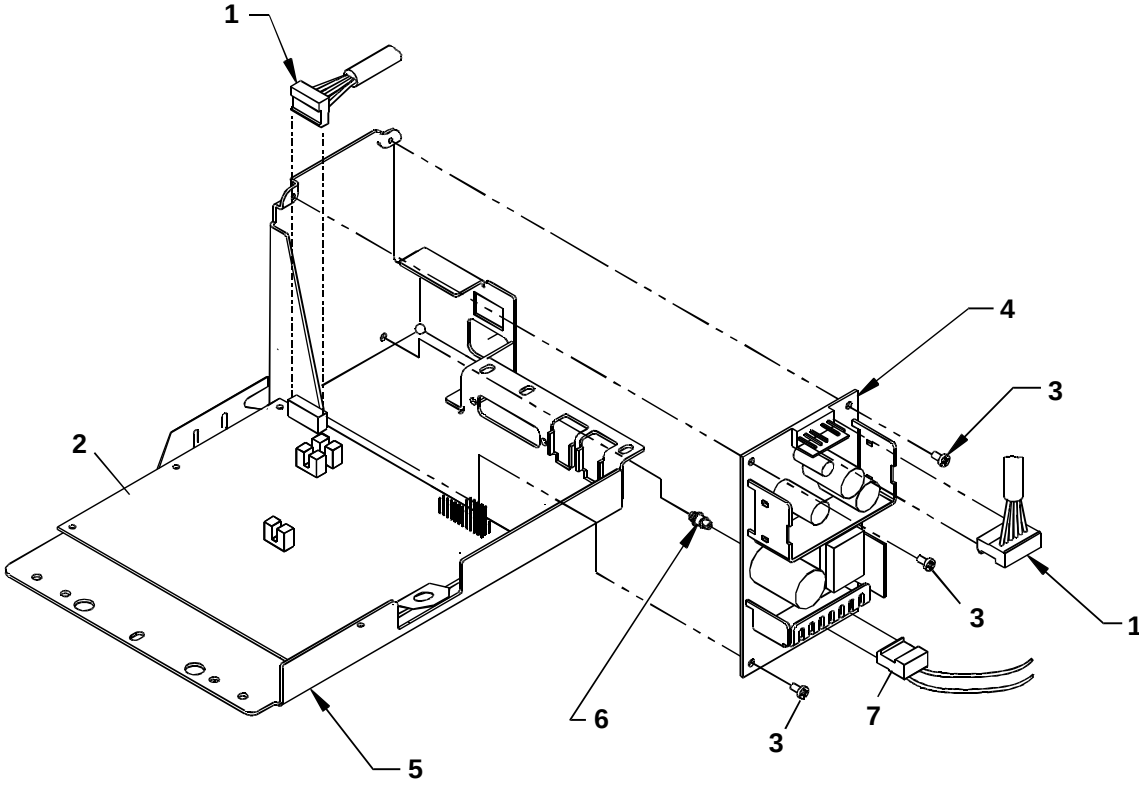
1. Remove the mechanical base assembly. See page 30.
2. Disconnect the 9-pin serial interface cable (1) from the connector, CN14, on the controller board (2).
3. Unscrew the two jack screws (3) holding the cable to the adapter plate (4).
4. Remove the adapter plate (4) from the electronic base (5) by unscrewing the two screws (6) from the two nuts (7).

CASH DRAWER HARNESSES



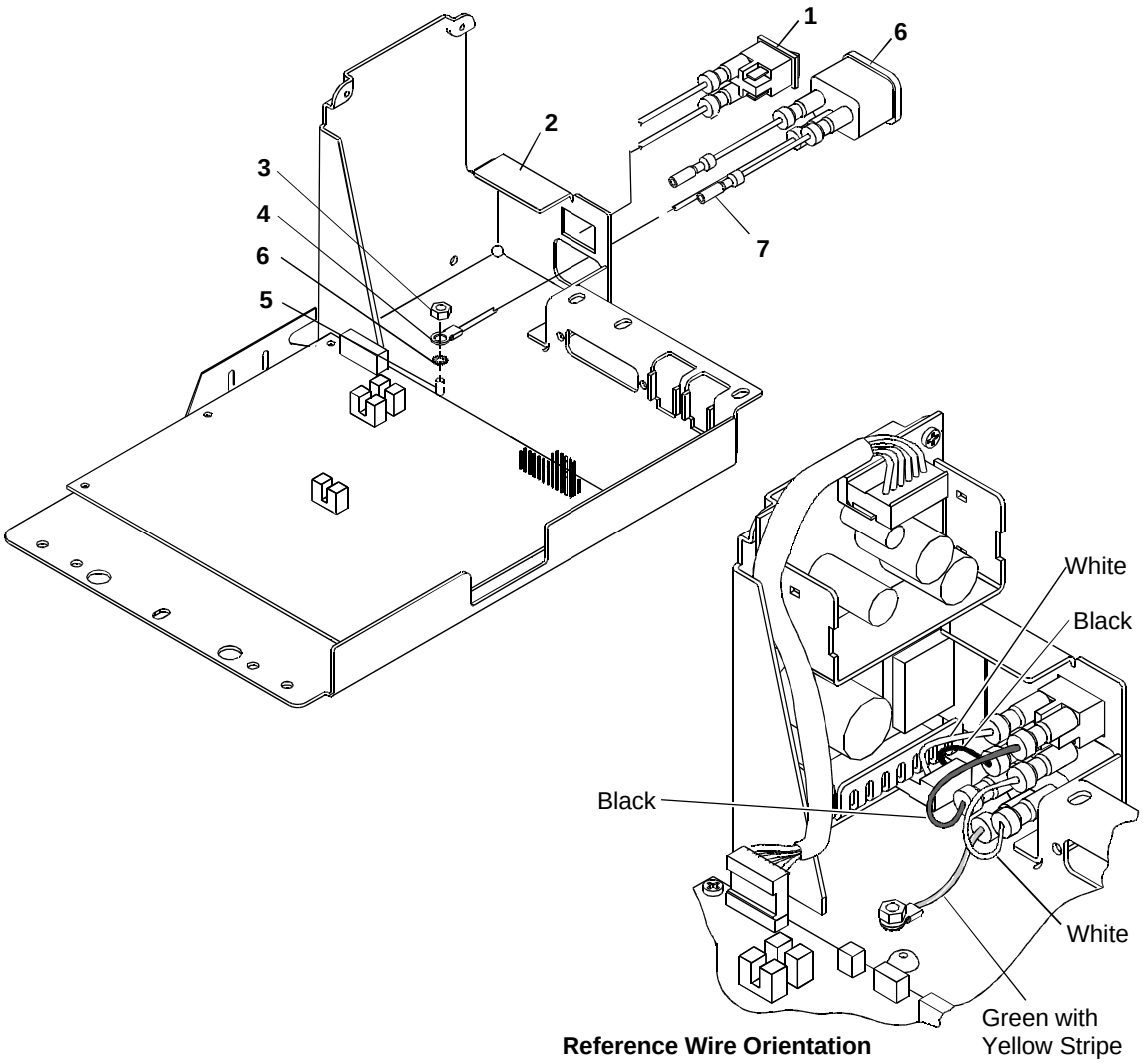
1. Remove the mechanical base assembly. See page 30.
2. Disconnect Cash Drawer Harness #1 (1) from the connector, CN11, on the controller board (2).
3. Pull the harness up and out of the electronic base assembly (3).
4. Disconnect Cash Drawer Harness #2 (4) from the connector, CN12, on the controller board (2).
5. Pull the harness up and out of the electronic base assembly (3).

POWER SUPPLY ASSEMBLY



1. Remove the mechanical base assembly. See page 30.
2. Disconnect the DC power harness (1) from the connector, CN10, on the controller board (2).
3. Unscrew the three screws (3) holding the power supply (4) to the electronic base (5).
4. Depress and push the power assembly standoff (6) through the side of the electronic base (5).
5. Lift the power supply assembly (4) up, and disconnect the power switch harness (7).

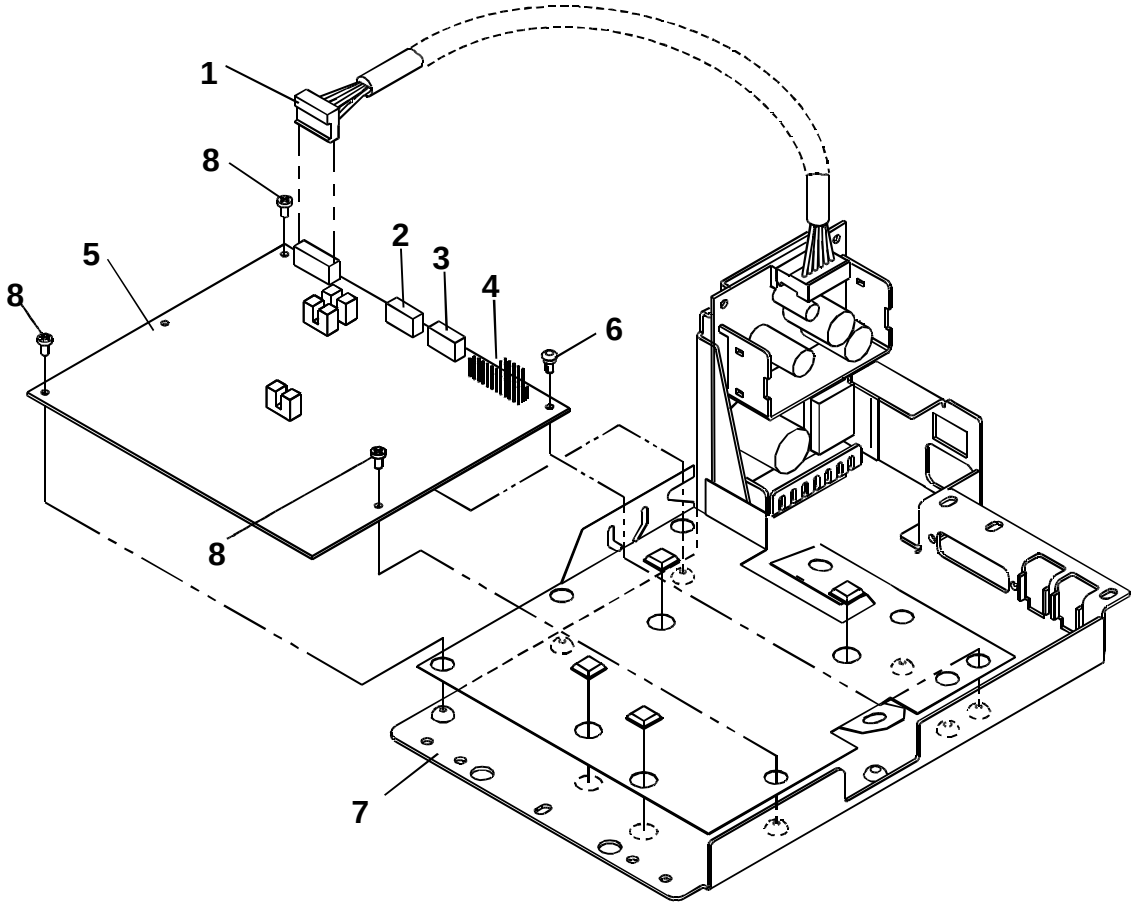
POWER SWITCH AND AC INLET ASSEMBLY



Reference Wire Orientation

1. Remove the power supply. See page 37.
2. Unplug the AC inlet assembly wires (7) from the power switch assembly (1).
3. Remove the power switch assembly (1) by squeezing the tabs on the sides of the switch and pushing it out of the electronic base (2).
4. Unscrew the nut (3) holding the ground wire (4) to the stud (5) on the electronic base (2). Remove the lock washer (6) from the stud.
5. Remove the AC inlet assembly (6) by squeezing the tabs on the top and bottom of the assembly.

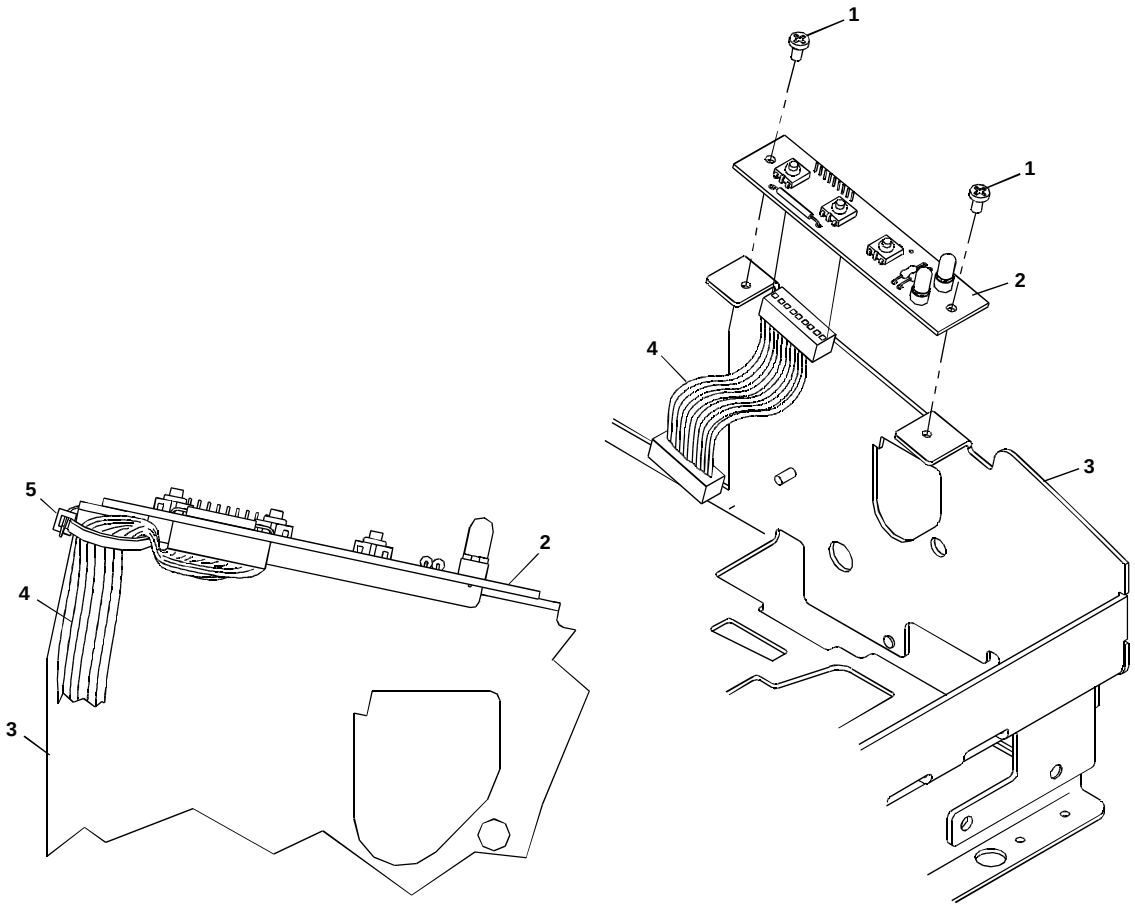
CONTROLLER BOARD ASSEMBLY



1. Remove the mechanical base. See page 30.
2. Disconnect the DC power harness (1), left cash drawer harness (2), right cash drawer harness (3), and the interface cable (4) from the connectors on the controller board (5). See the chart below for locations on the controller board.
3. Remove the snap rivet (6) from the electronic base assembly (7). To remove the snap rivet, locate it on the bottom of the electronic base, push the center pin up into the outer jacket, depress the tabs on the outer jacket, and push it through the electronic base.
4. Remove the three screws (8) holding the controller board (5) to the electronic base assembly (7).

Type of Harness	Controller Board Location
DC power	CN10
Left cash drawer (Cash Draw Harness #1)	CN11
Right cash drawer (Cash Draw Harness #2)	CN12
Interface cable (25-pin parallel)	CN13
Interface cable (9-pin serial)	CN14

KEYPAD PC BOARD



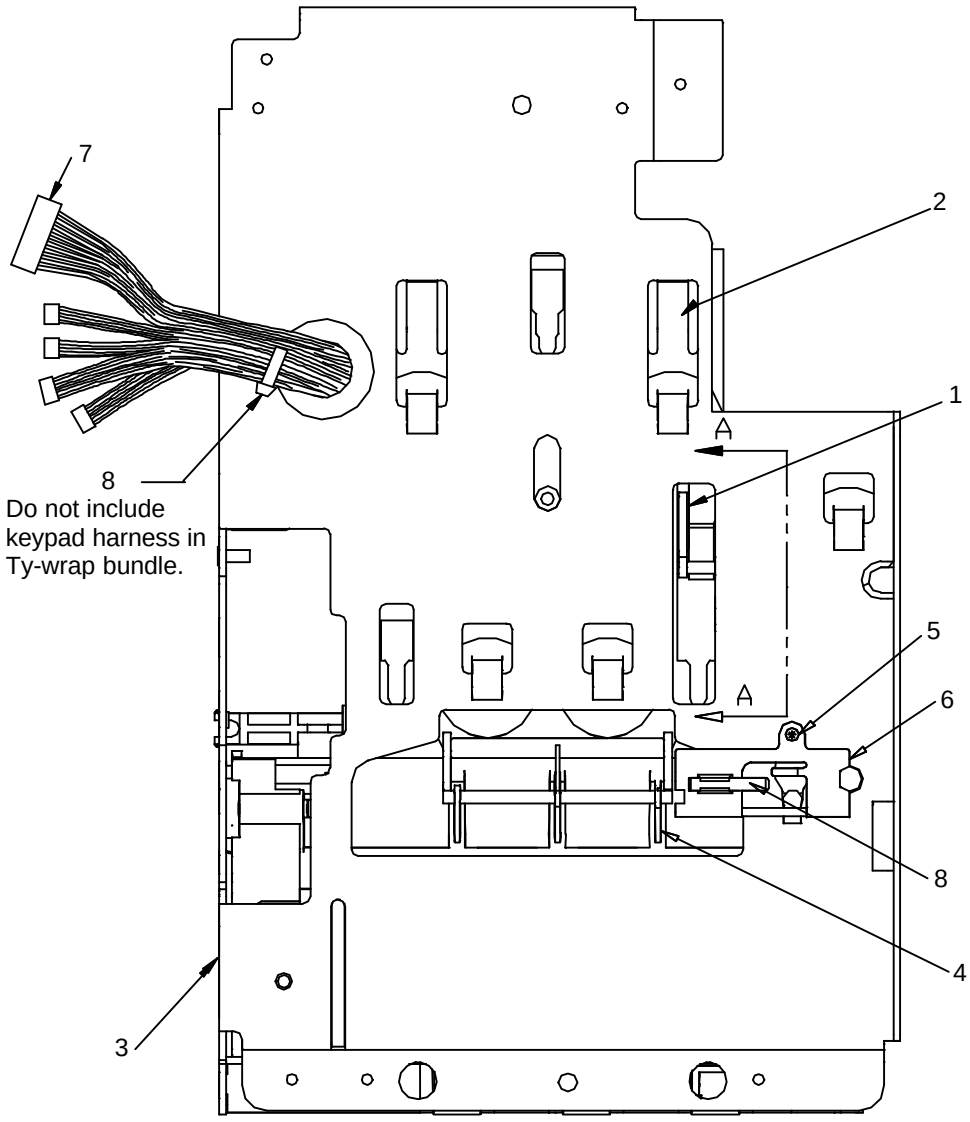
1. Remove the mechanical base assembly. See page 30.
2. Remove the two screws (1) holding the keypad PC board (2) to the mechanical base assembly (3).
3. Lift the keypad PC board (2) from the mechanical base assembly (3), and disconnect the keypad harness (4).
4. Cut the Ty-wrap (5) to remove the keypad harness (4).

Installation note

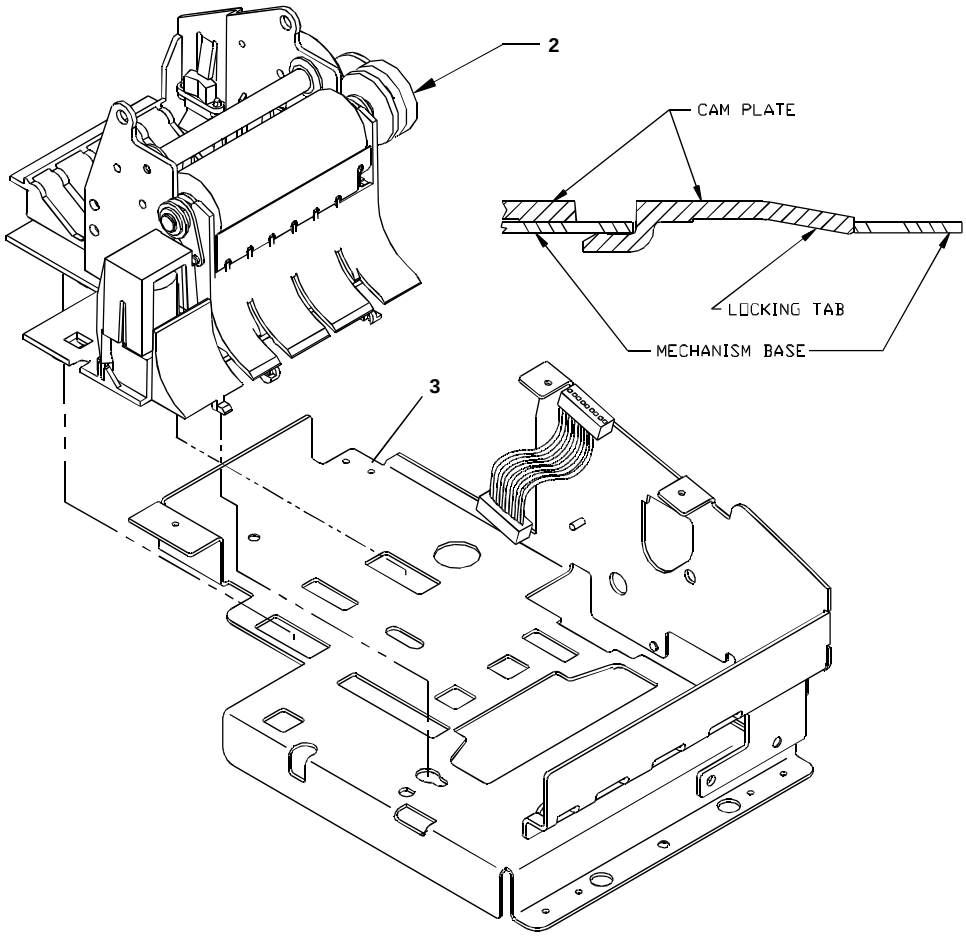
When replacing the Ty-wrap (5), the knot and trimmed end should be positioned towards the inside of the base wall.

CARRIER/CAM PLATE

Models 93PLUS and 94PLUS



1. Remove the mechanical base assembly. See page 30.
2. Disassemble the cam sensor flag (1) from the carrier/cam assembly (2), located under the mechanical base assembly (3). To remove, securely grab the narrow portion of the flag and pull down. Tip the flag to the right and wiggle out to the left.
3. Remove the slip-stop sensor flag or bank validation flag (4) from the carrier/cam assembly (2).
4. Remove the screw and pull off the magnet mounting bracket (6).



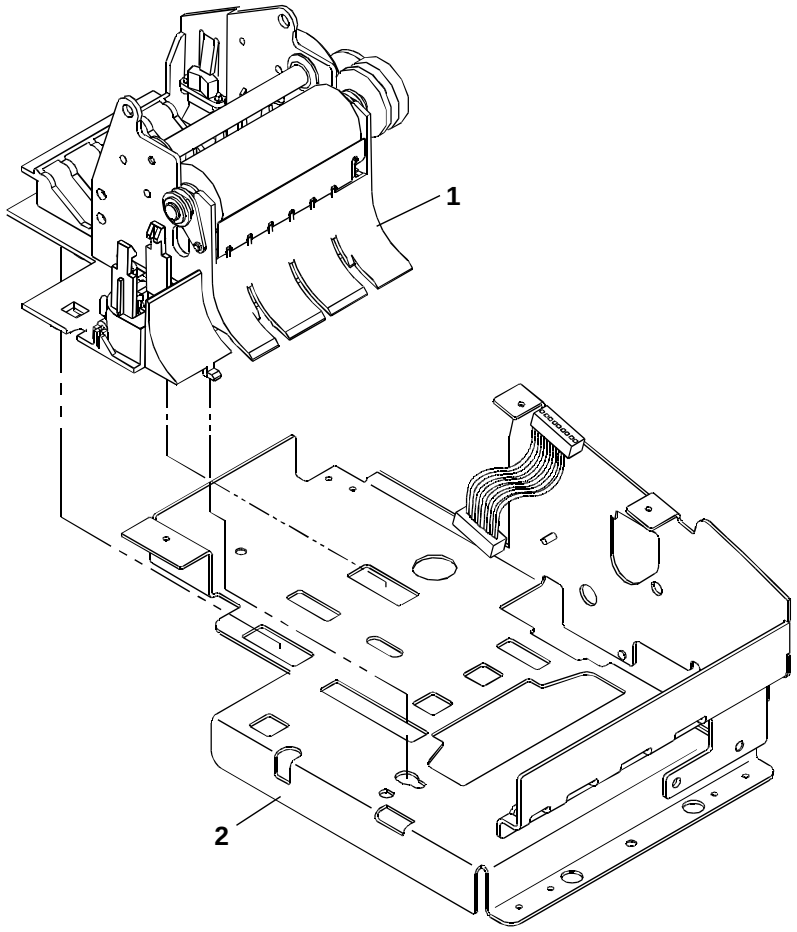
5. Release the lock tabs, and slide the carrier/cam assembly (2) backwards until it is released from the mechanical base assembly (3).

6. Carefully pull the cables (7) out of the mechanical base assembly (3).

Installation note

1. To reinsert the cam sensor flag, wiggle in the flag on the left side. Lift up on the flag and snap into place.

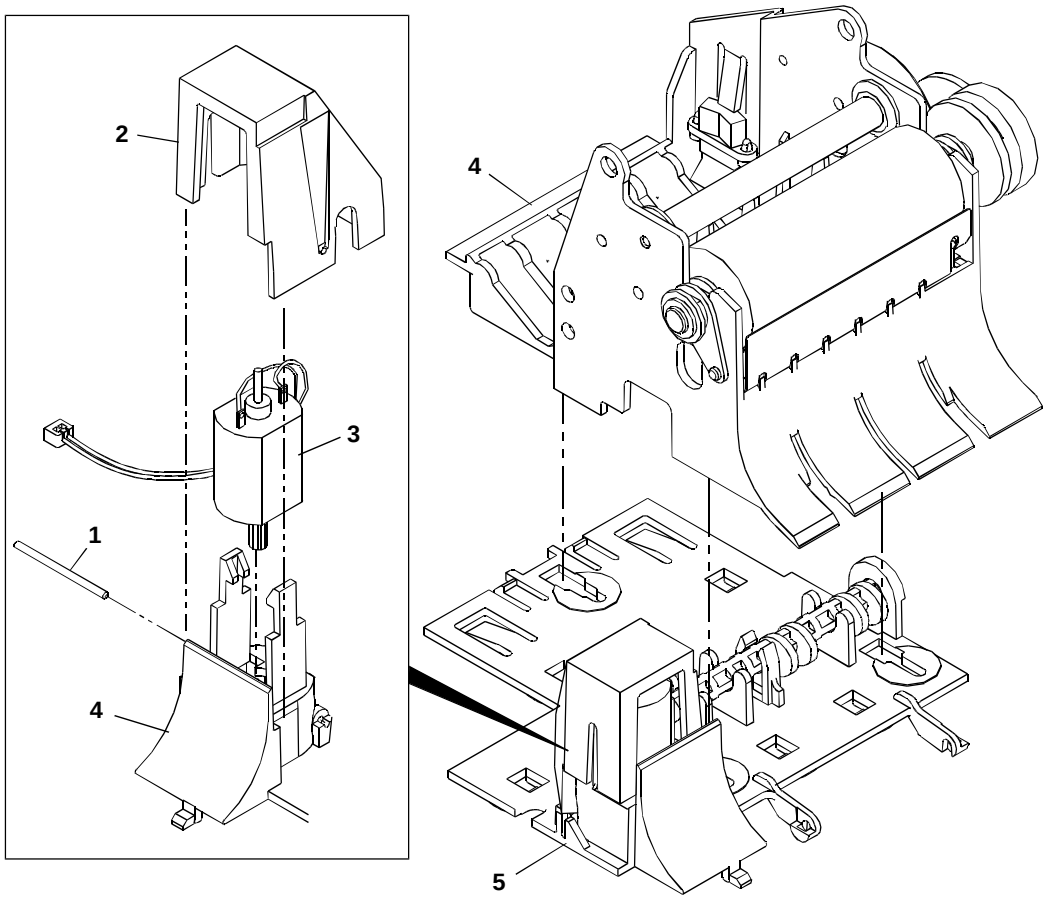
Models 91PLUS and 92PLUS



1. Remove the mechanical base. See page 30.
2. Release the lock tabs, and slide the carrier/cam assembly (1) backwards until it is released from the base (2).

CAM PLATE

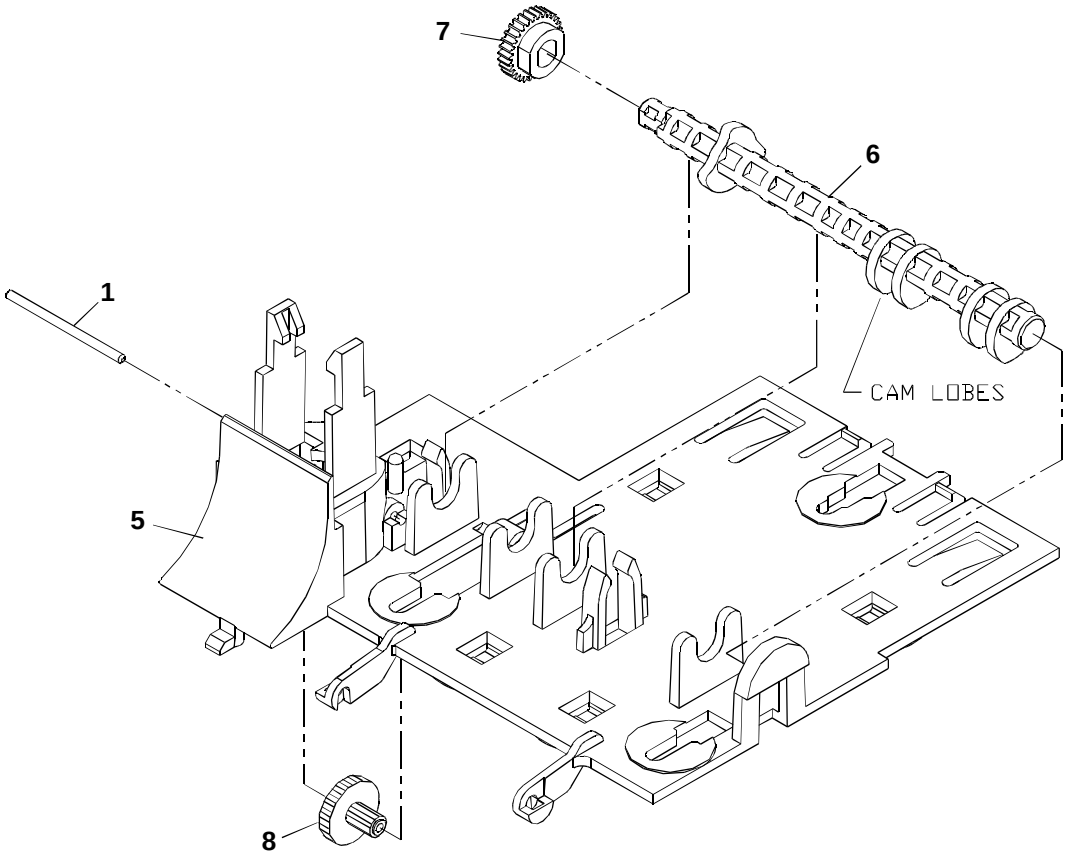
Models 93PLUS and 94PLUS



1. Remove the carrier/cam plate. See page 41.
2. Partially remove the pin (1) to the left until the motor shroud (2) is free from the cam plate (5).

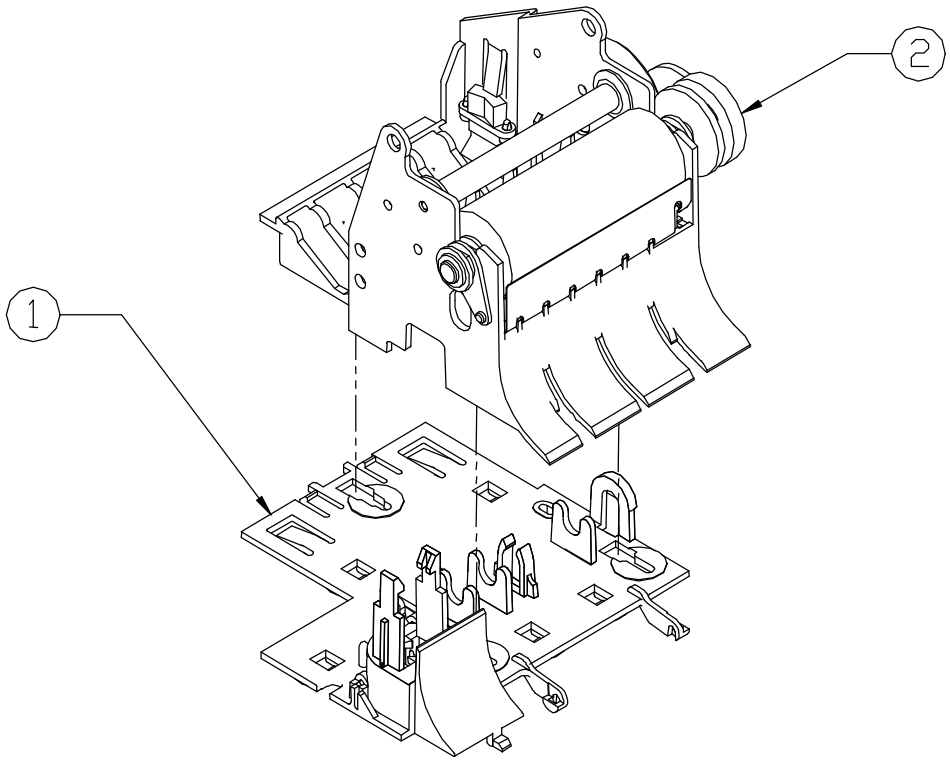
Caution: Do not pull the pin all the way out or the gear drive will not be functional.

3. Separate the tabs and lift out the cam plate motor (3).
4. The cam lobes must face downward (toward the cam plate). Rock the carrier assembly forward (4), and slide it backwards until is released from the cam plate (5).



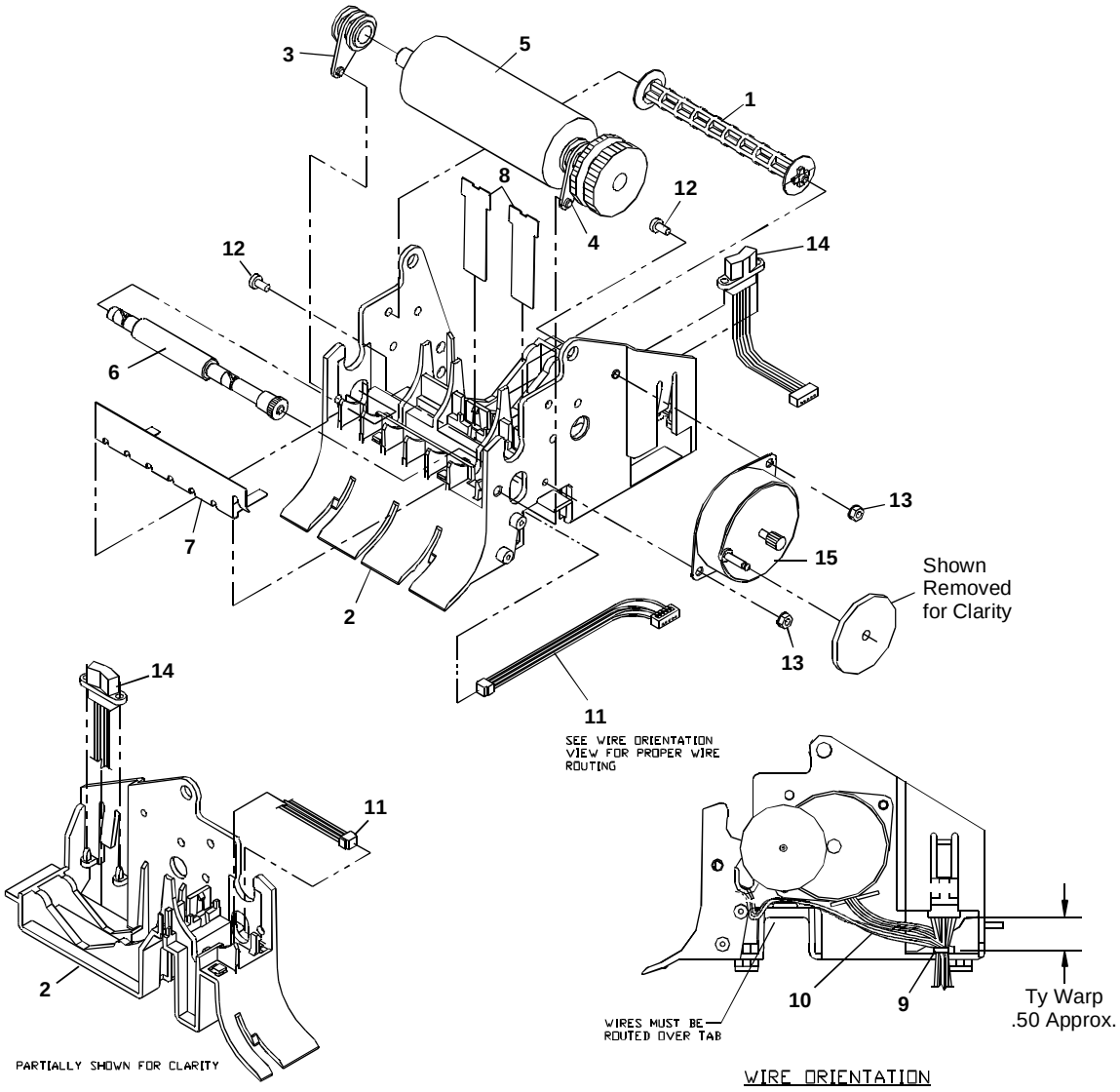
5. Push back on the tab behind the cam shaft (6), and lift the cam shaft out of the cam plate (5).
6. Slide the cam shaft gear (7) off the left end of the cam shaft (6).
7. Slide the pin (1) to the left, and remove the compound gear (8).

Models 91PLUS and 92PLUS



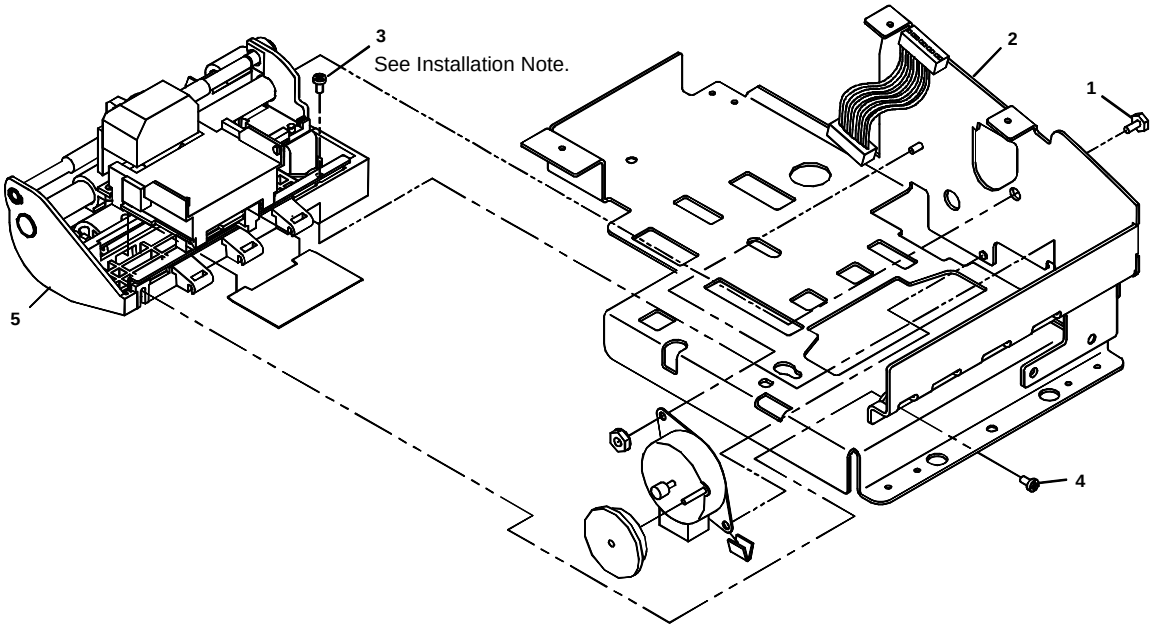
1. Remove the carrier/cam plate. See page 41.
2. Slide the carrier assembly (2) backward until it is released from the cam plate (1).

CARRIER ASSEMBLY



1. Remove the cam plate. See page 44.
2. Unsnap the receipt roller (1) from the forms comp carrier (2).
3. Rotate the bearings (3 and 4) on each side of the platen assembly (5) forward until the platen assembly can be lifted out.
4. Remove the left platen bearing (3) from the platen assembly (5).
5. Lift the pressure shaft (6) up, and slide it through the hole on the right side of the forms comp carrier (2).
6. Unsnap the spring plate (7) from the forms comp carrier (2).
7. Models 93PLUS and 94PLUS only. Unsnap the forms comp springs (8) from the forms comp carrier (2).
8. Cut the Ty-wrap (9) securing the motor wires and sensor harnesses (11 and 14).
9. Unscrew the two screws (12) and two hex nuts (13) holding the line feed motor assembly (15) to the forms comp carrier (2).
10. Unsnap the paper-low sensor (14) from the forms comp carrier (2) by pushing the tab to the right.
11. Models 93PLUS and 94PLUS only. Unsnap the forms-in sensor (11) assembly from the forms comp carrier (2) and slide out.

REMOVING THE PRINT MECHANISM ASSEMBLY

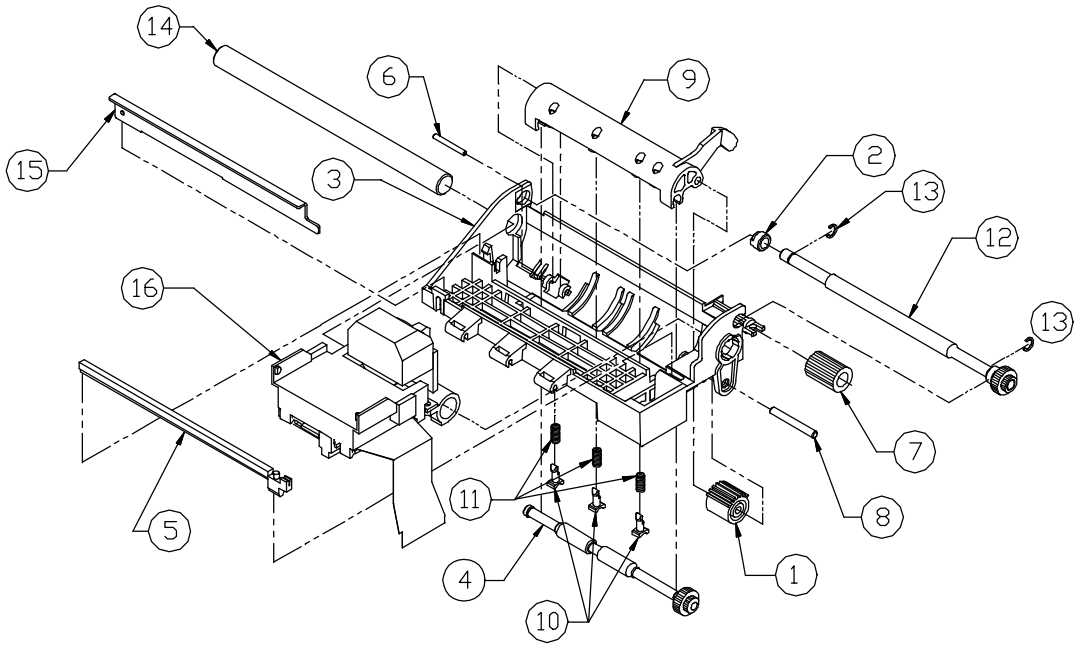


1. Remove the carrier/cam plate. See page 41.
2. Remove the carriage shaft screw (1) from the right side of the base assembly (2).
3. Remove the screw (3) holding the print mechanism (5) to the base assembly (2).
4. Remove the screw (4) holding the carriage rail to the base assembly (2).
5. Remove the head cable tape from the bottom of the print mechanism frame.
6. Lift the print mechanism (5) out of the base assembly (2). Gently pull the head cable through the slot.

Installation note

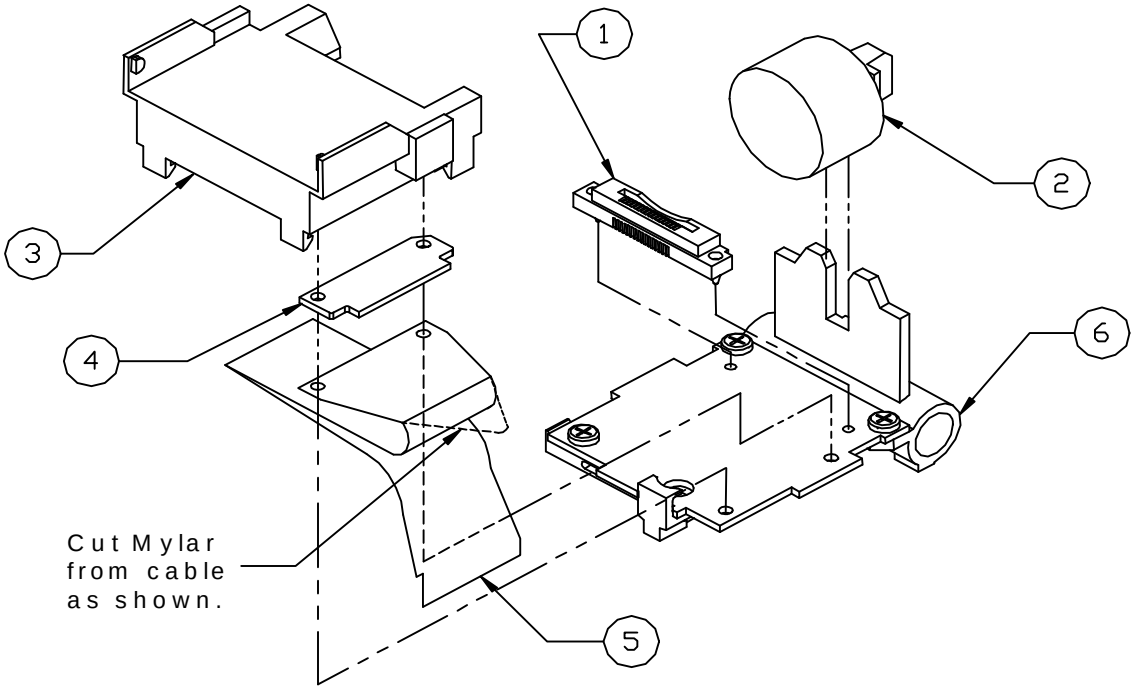
When installing the screw (3), torque to 5 ± 1 inch per pound.

PRINT MECHANISM ASSEMBLY



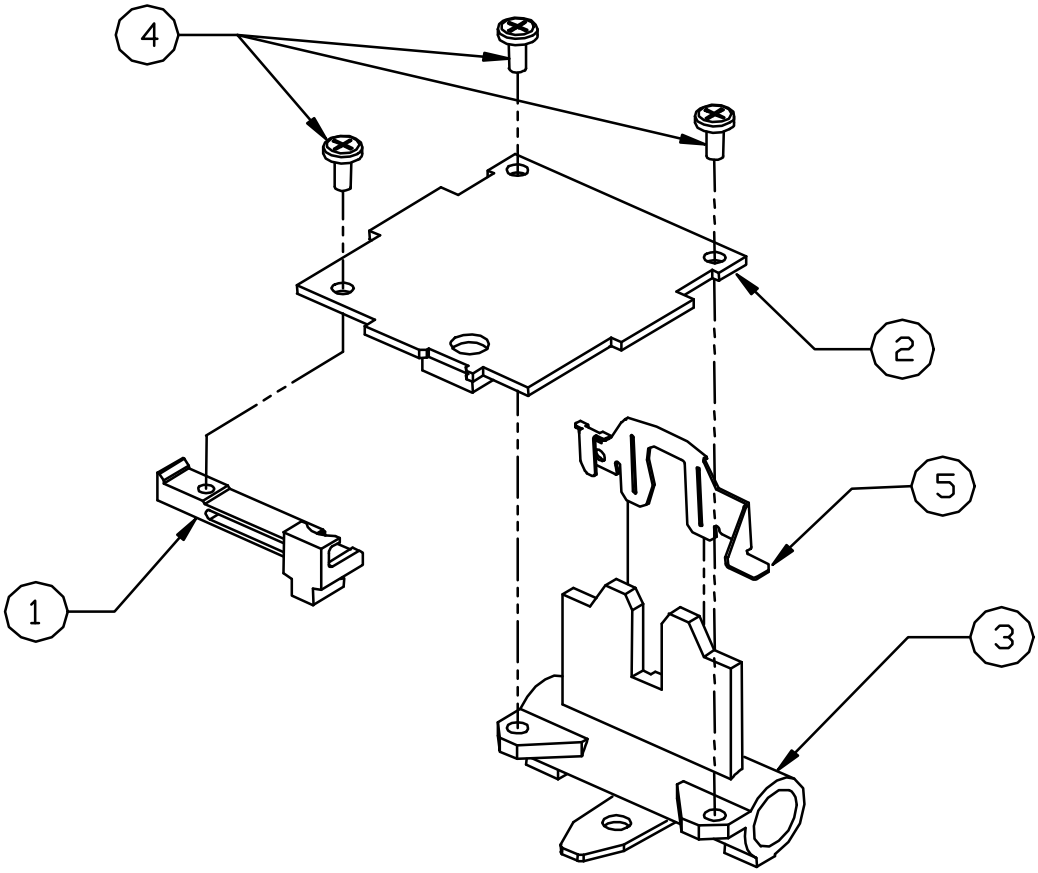
1. Remove the print mechanism assembly. See page 49.
2. Lift the left side of the carriage rail (15), and slide it out of the print mechanism frame (3).
3. Slide the carriage shaft (14) to the right, and pull out of the print mechanism frame (3) and carriage assembly (16).
4. Remove the carriage assembly (16). Be careful when pulling the ribbon cable out of the frame.
5. Release the tab on the left side of the frame, and lift out the space rack (5).
6. Remove the idler gear (7) from the frame by squeezing the tabs together with pliers and pushing the gear to the right.
7. Remove the two clips (13) from the validation shaft assembly (12), and slide the validation shaft assembly right until it is free from the frame. Slide the feed-roll bearing (2) out of the frame.
8. Snap the slip-drive shaft (4) out of the actuator (9).
9. Remove the actuator (9) and idler gear (1) by removing the small pin (6) from the left side of the frame and sliding the large pin (8) out of the frame and idler gear (1).
10. Turn the print mechanism assembly upside down to remove the shaft before releasing the actuator from the frame. Flip right-side up, and gently slide the actuator out of the frame.
11. To remove the actuator bearings (10) and actuator compression springs (11) from the actuator (9), turn the actuator over. Rotate the bearings 90°. They will easily pop out.

CARRIAGE ASSEMBLY



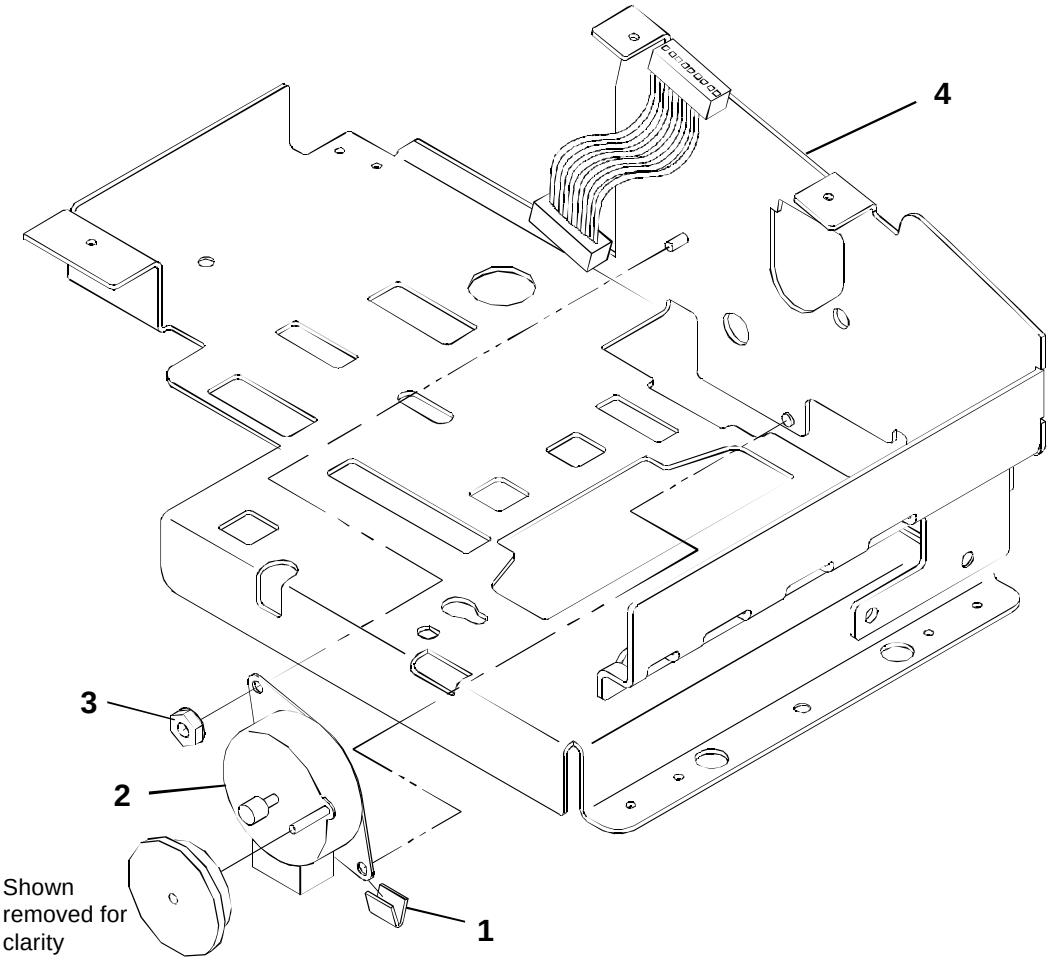
1. Disassemble the print mechanism assembly. See page 50.
2. Remove the print head (2). See page 23.
3. Release the four tabs holding the ribbon feed gear assembly (3) to the carriage motor assembly (6). Use caution not to separate the ribbon feed gear assembly parts.
4. Remove the print head connector (1).
5. Remove the head cable (5) and the rubber pressure contact (4) from the bottom of the ribbon feed gear assembly (3).

CARRIAGE MOTOR



1. Disassemble the carriage assembly. See page 51.
2. To remove the print head clamp (5), gently pry the back of the clamp over the pin on the back of the carriage roller (3).
3. Remove the front screw (4), and take off the slider (1).
4. Remove the back two screws (4) to separate the spacer motor assembly (2) from the carriage roller (3).

LINE FEED MOTOR



1. Remove the print mechanism assembly. See page 49.
2. Remove the line feed motor (2) by prying off the Tinnerman clip (1) and removing the hex nut holding the motor to the base assembly (4).

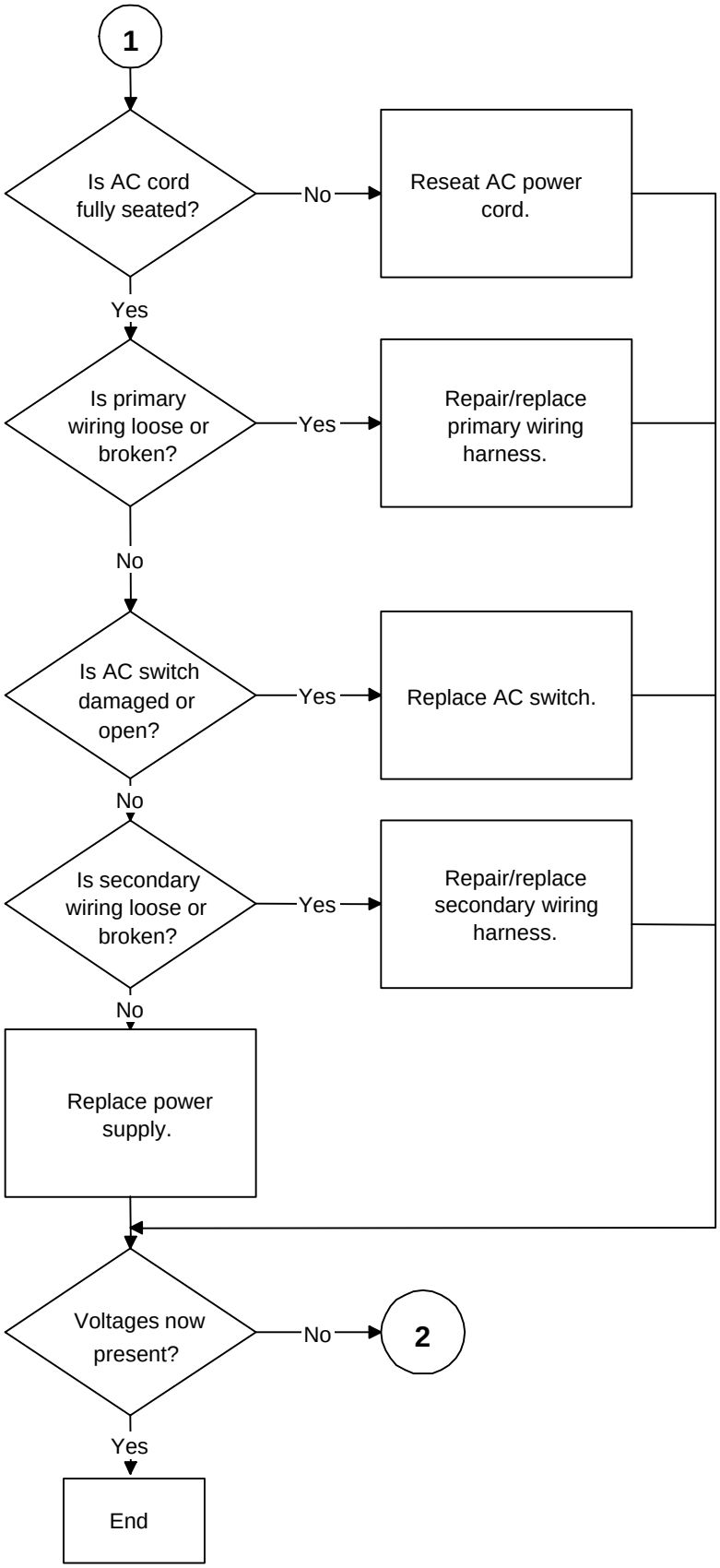
TROUBLESHOOTING

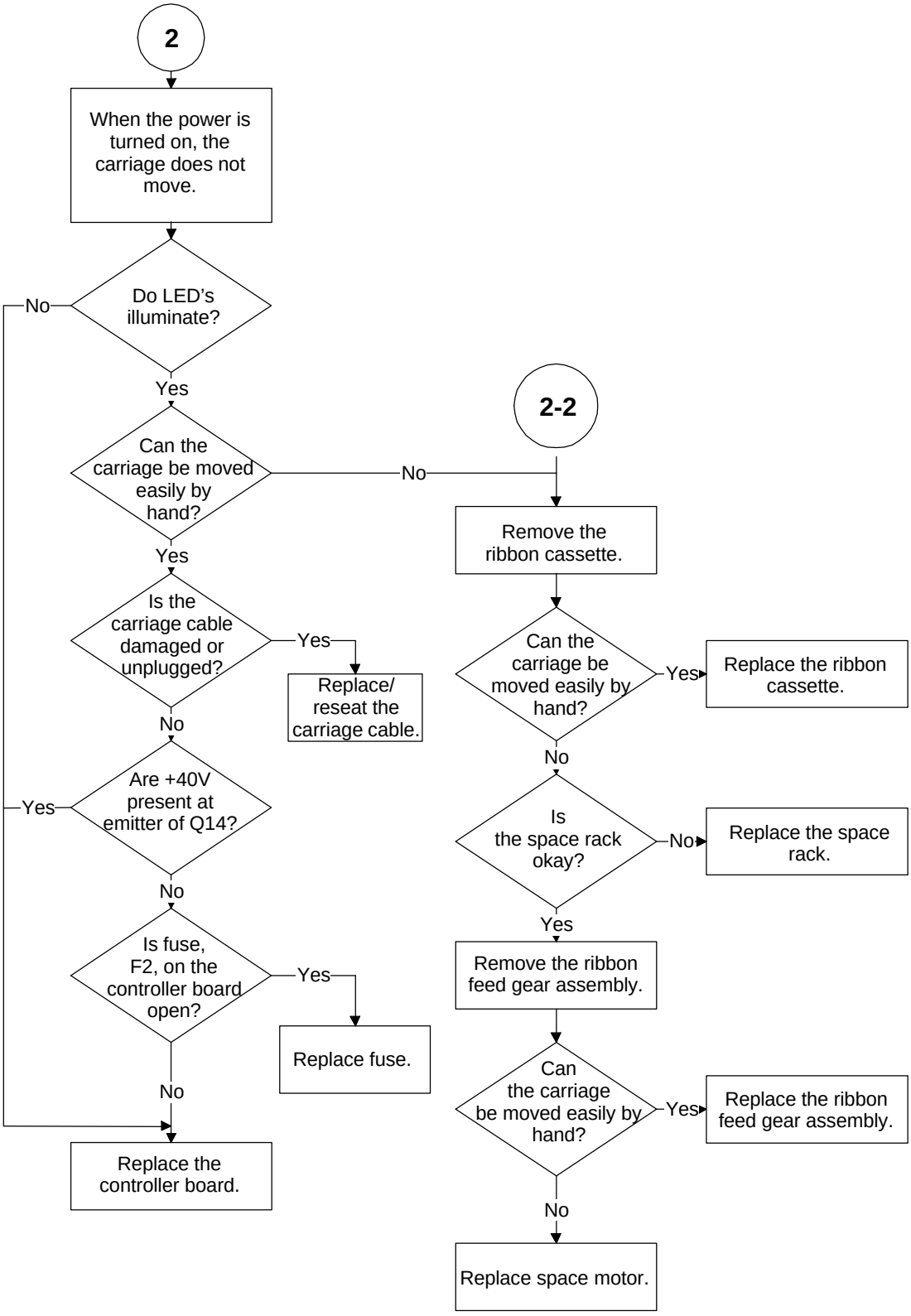
This chapter provides solutions to problems that may occur with the printer. Use the table to determine the problem, then refer to the specified flow chart that describes the corrective action for that problem.

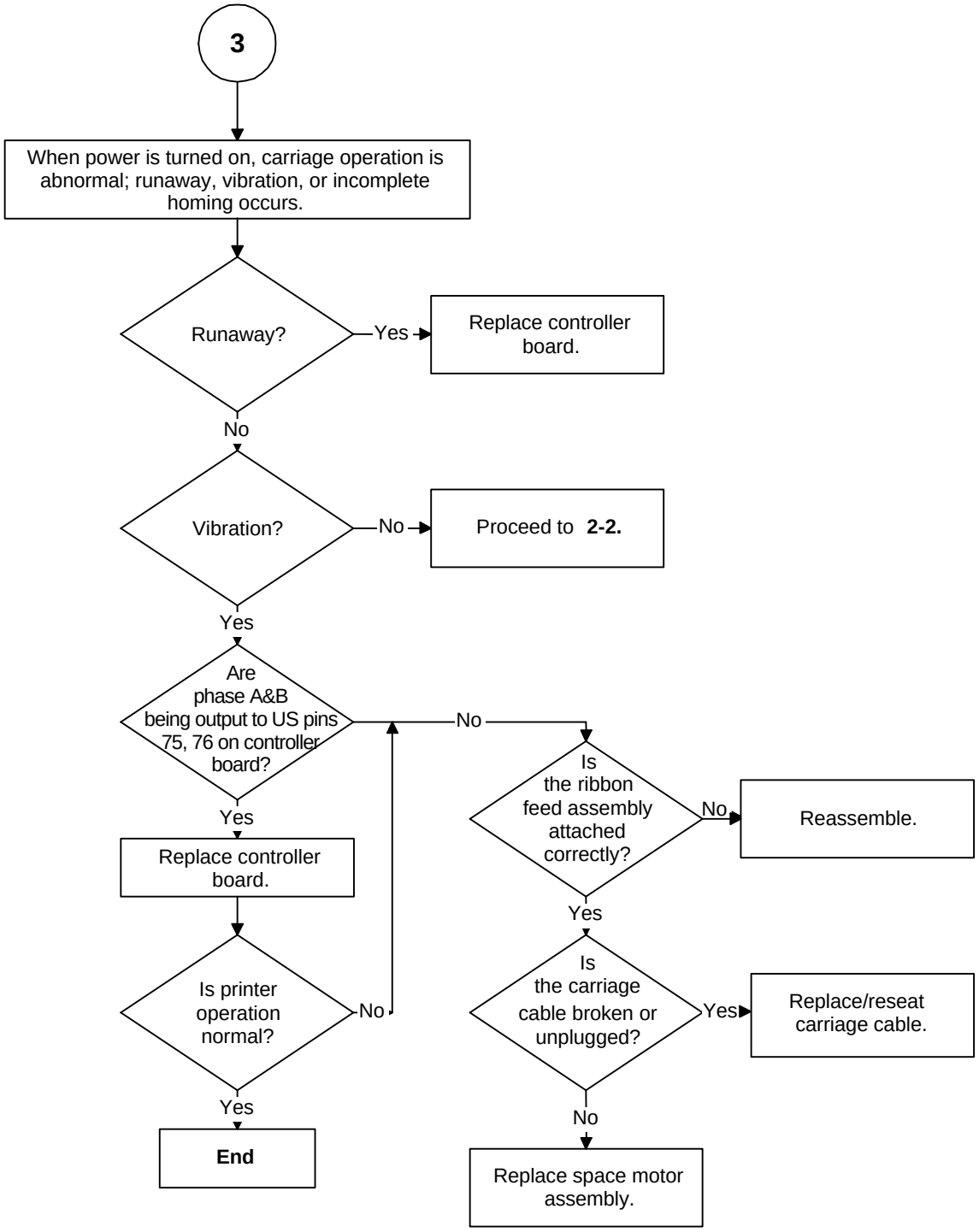
Following the flow charts is a section that describes checking the connection circuits and resistance for the print head, space motor, and line feed motor.

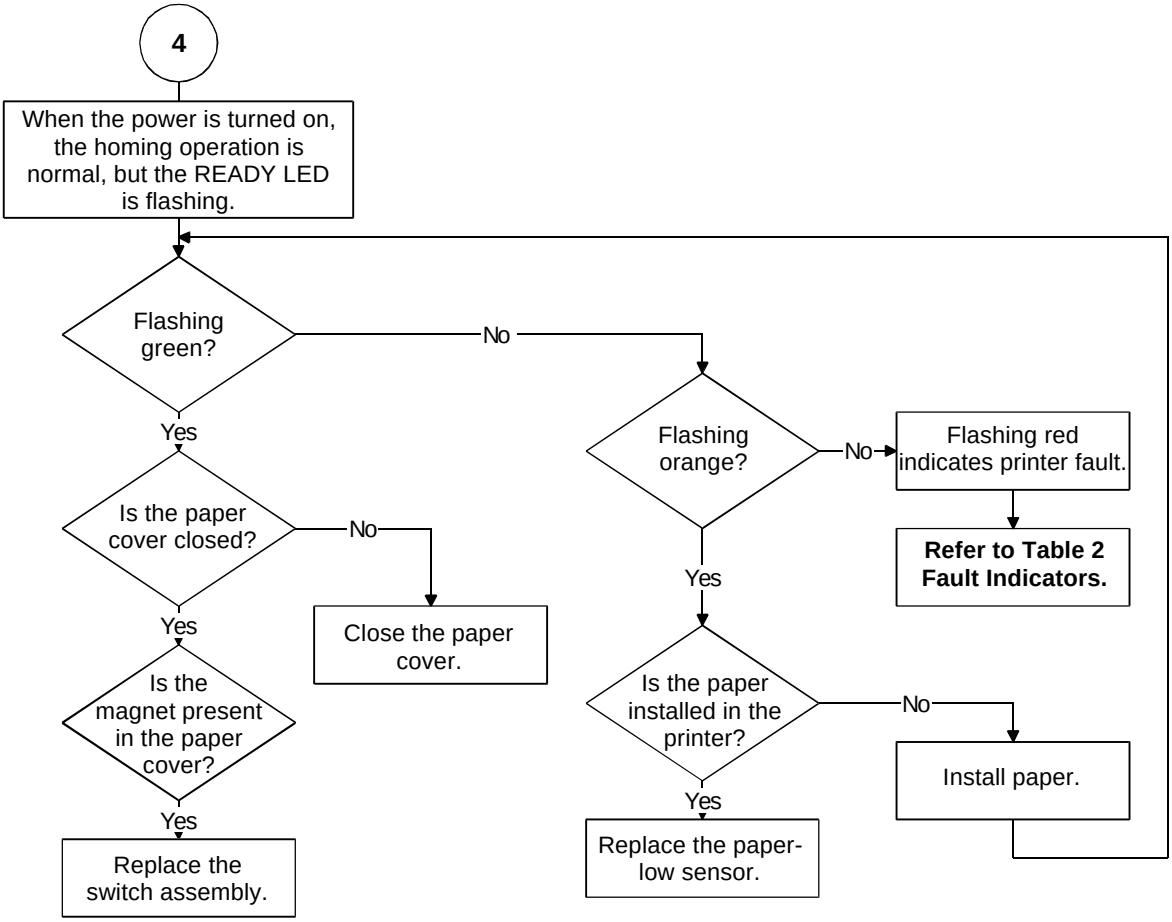
DETERMINING THE PROBLEM

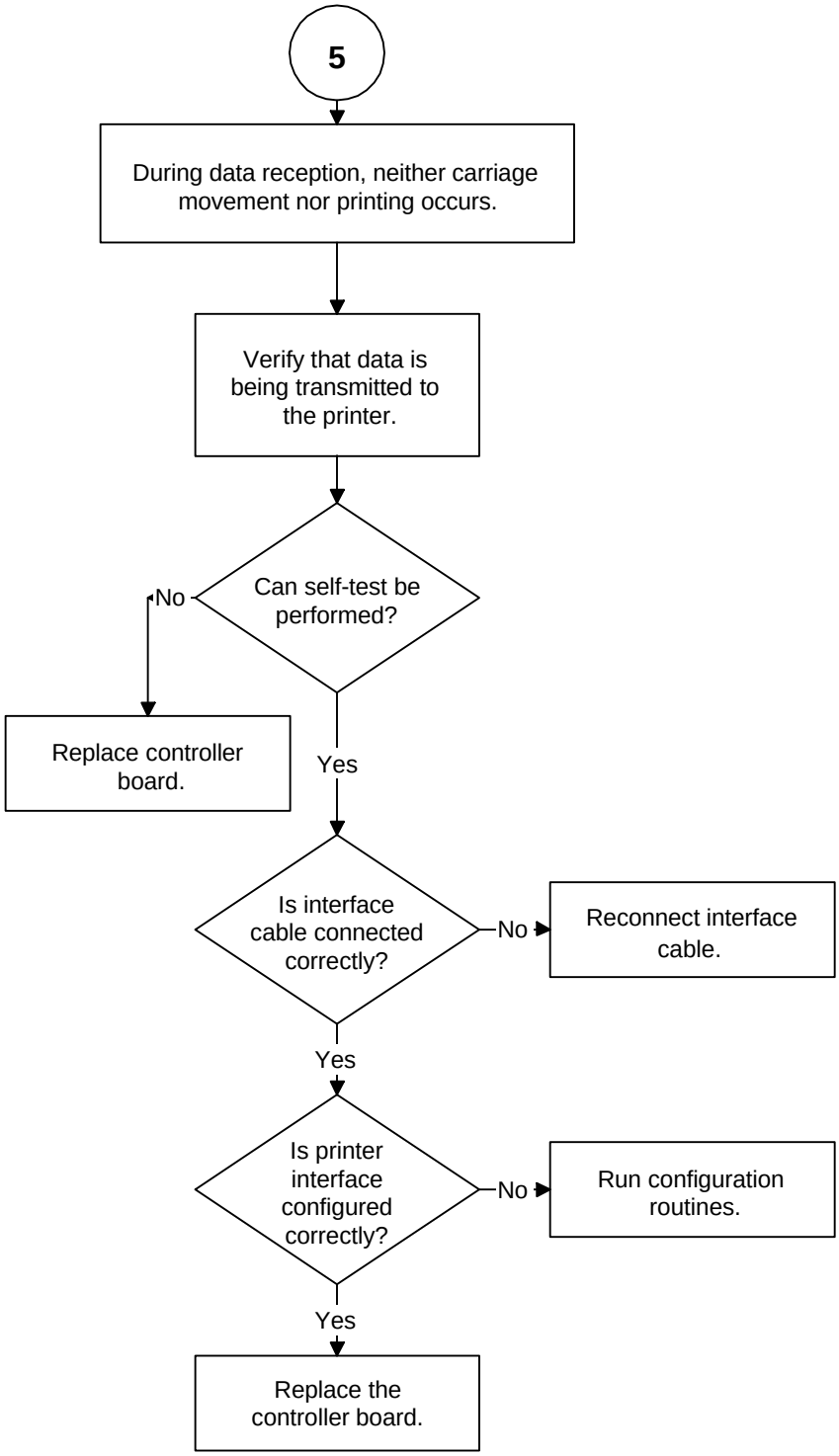
When Problem Occurs	Description of Problem	Refer to Flow chart
Trouble at power on	Switches or lights do not function on the keypad, and the carriage does not move.	1
	Carriage does not move, and the power LED is lit.	2
	Carriage does not operate normally; runaway, vibration, or incomplete homing occurs.	3
	Carriage homes normally, but indicator display does not operate normally.	4
Trouble during data reception or printing	Spacing or printing does not occur.	5
	Spacing operates normally, but printer does not print.	6
	Printer stops printing.	7
	Wrong characters are printed or some characters are not printed.	8
	Some dots do not print.	9
	Print is not dark enough.	10
Forms handling	Receipt does not line feed.	11
	Slip does not line feed.	12
	Carrier assembly does not open or close.	13
	Slip will not load from the front of the printer.	14
	Top validation failure occurs.	15

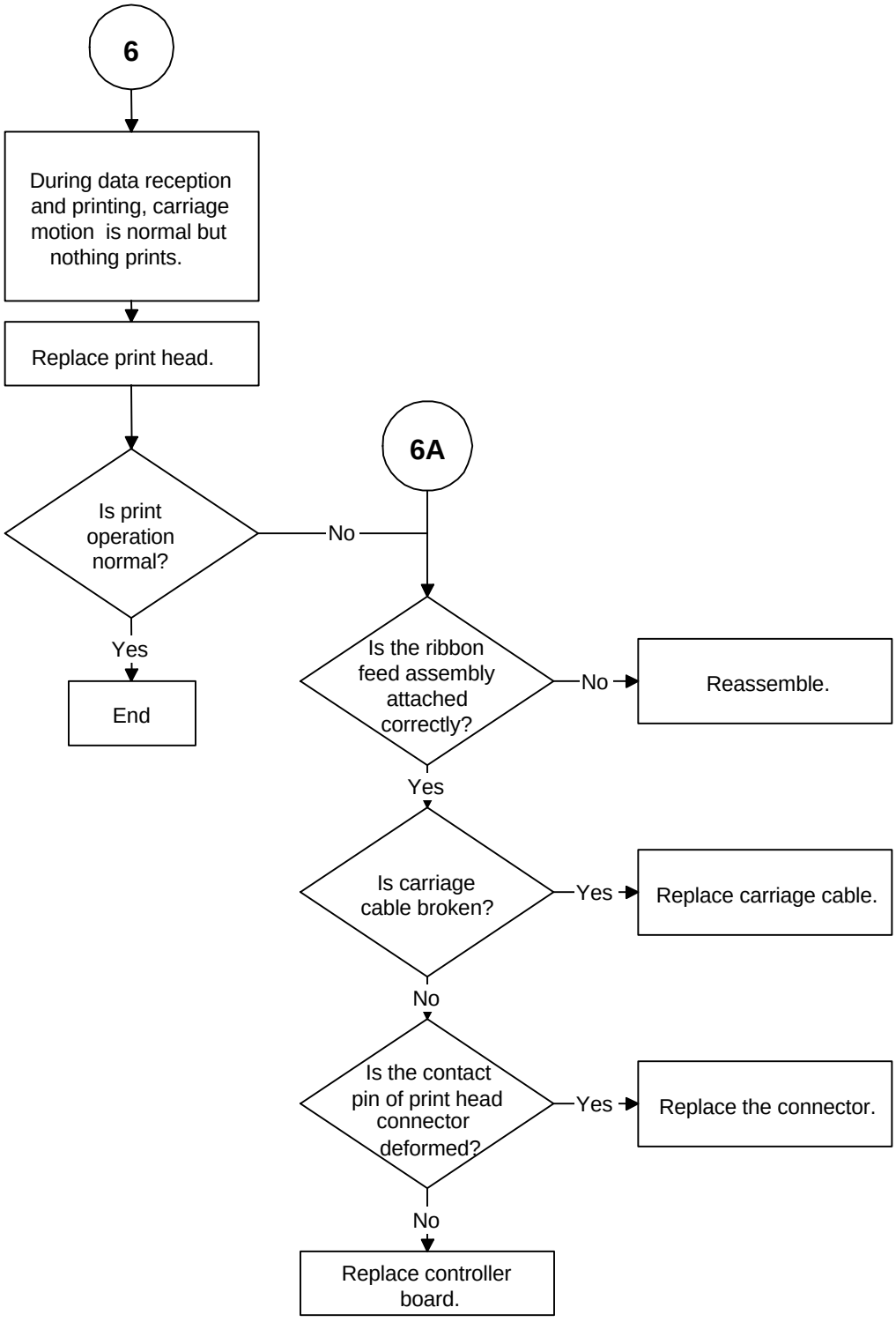

1
Is AC cord fully seated?
No
Reseat AC power cord.
Yes
Is primary wiring loose or broken?
Yes
Repair/replace primary wiring harness.
No
Is AC switch damaged or open?
Yes
Replace AC switch.
No
Is secondary wiring loose or broken?
Yes
Repair/replace secondary wiring harness.
No
Replace power supply.
Voltages now present?
No
2
Yes
End

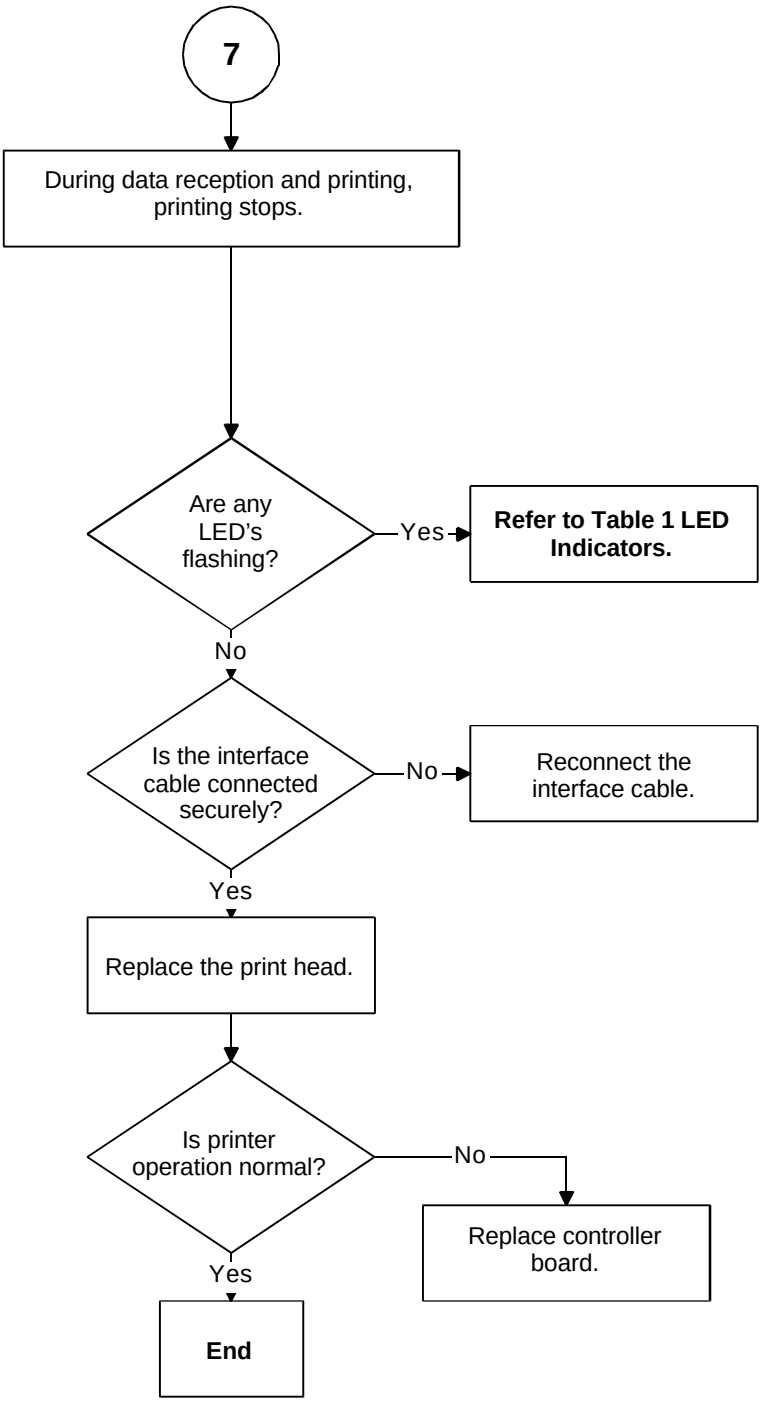

2
When the power is turned on, the carriage does not move.
Do LED's illuminate?
No
Yes
Can the carriage be moved easily by hand?
No
Yes
Is the carriage cable damaged or unplugged?
Yes
Replace/ reseat the carriage cable.
No
Are +40V present at emitter of Q14?
Yes
No
Is fuse, F2, on the controller board open?
Yes
Replace fuse.
No
Replace the controller board.
2-2
Remove the ribbon cassette.
Can the carriage be moved easily by hand?
Yes
Replace the ribbon cassette.
No
Is the space rack okay?
No
Replace the space rack.
Yes
Remove the ribbon feed gear assembly.
Can the carriage be moved easily by hand?
Yes
Replace the ribbon feed gear assembly.
No
Replace space motor.

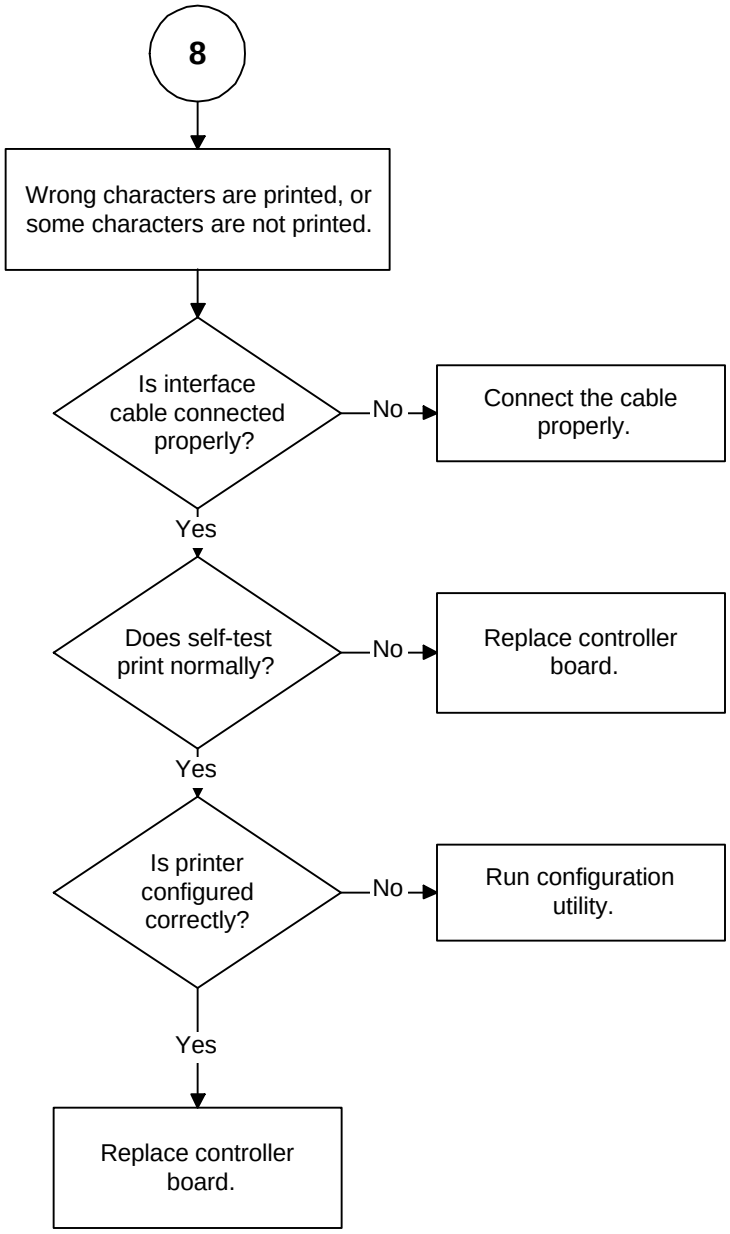

3
When power is turned on, carriage operation is abnormal; runaway, vibration, or incomplete homing occurs.
Runaway?
Yes
Replace controller board.
No
Vibration?
No
Proceed to 2-2.
Yes
Are phase A&B being output to US pins 75, 76 on controller board?
No
Yes
Replace controller board.
Is printer operation normal?
No
Yes
End
Is the ribbon feed assembly attached correctly?
No
Reassemble.
Yes
Is the carriage cable broken or unplugged?
Yes
Replace/reseat carriage cable.
No
Replace space motor assembly.

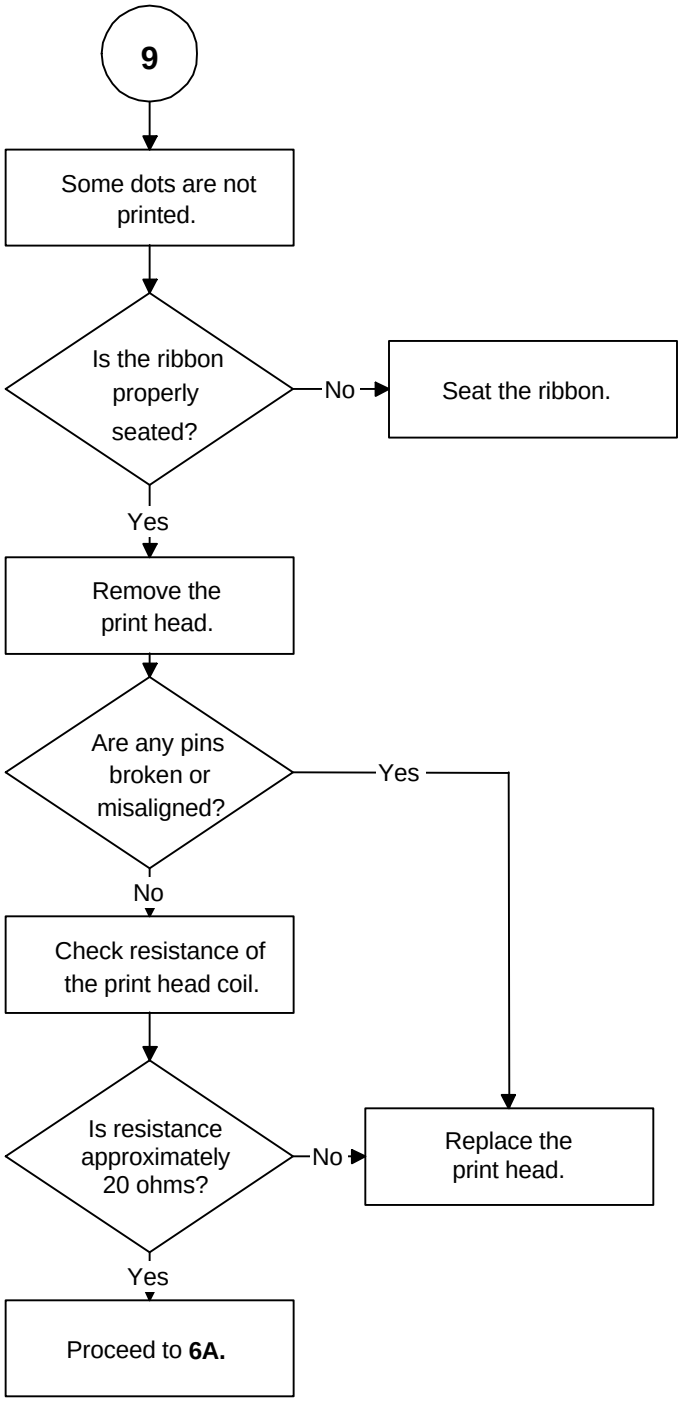

4
When the power is turned on, the homing operation is normal, but the READY LED is flashing.
Flashing green?
No
Yes
Is the paper cover closed?
No
Close the paper cover.
Yes
Is the magnet present in the paper cover?
Yes
Replace the switch assembly.
Flashing orange?
No
Flashing red indicates printer fault.
Refer to Table 2 Fault Indicators.
Yes
Is the paper installed in the printer?
No
Install paper.
Yes
Replace the paper-low sensor.

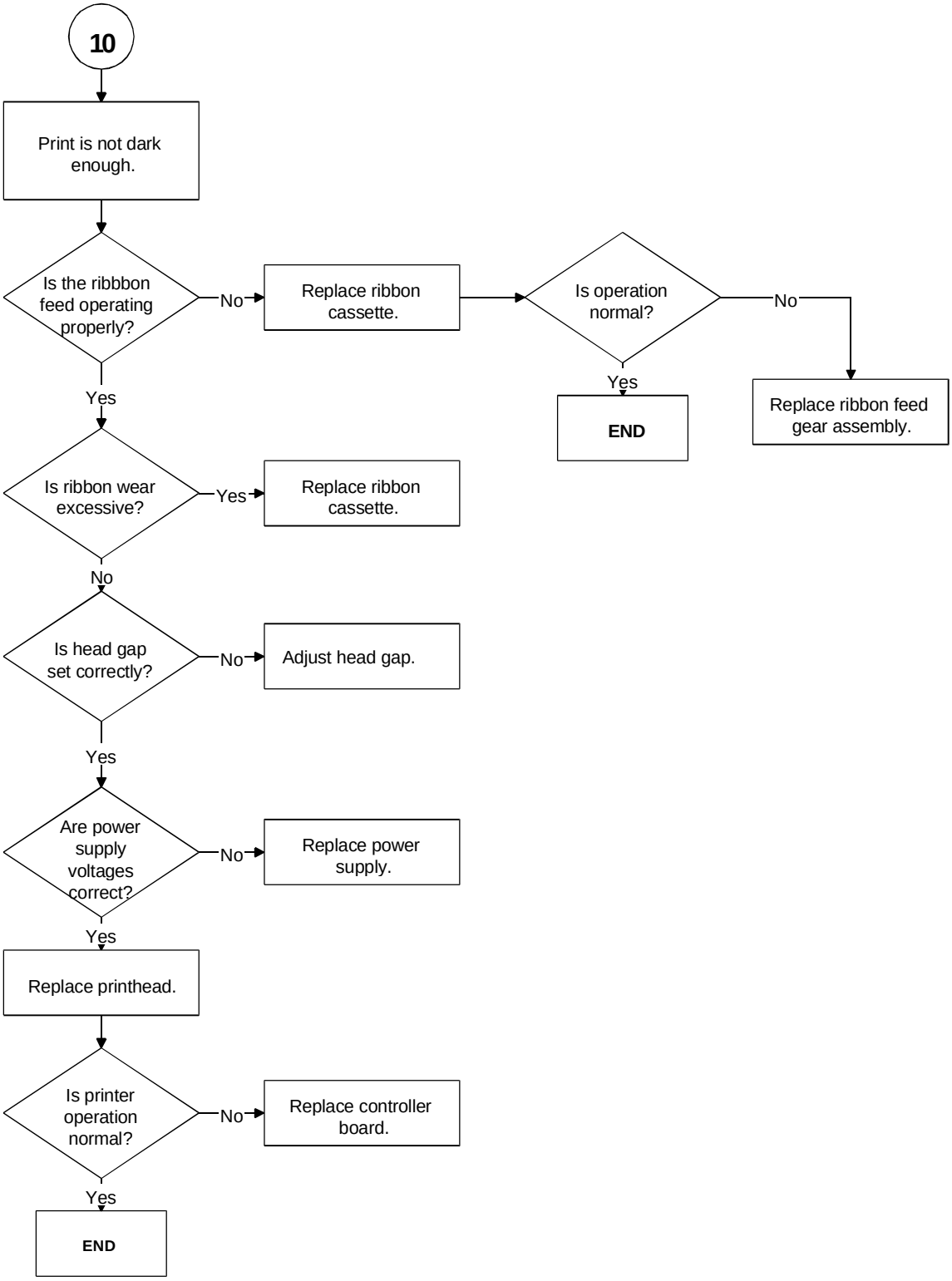

5
During data reception, neither carriage movement nor printing occurs.
Verify that data is being transmitted to the printer.
Can self-test be performed?
No
Replace controller board.
Yes
Is interface cable connected correctly?
No
Reconnect interface cable.
Yes
Is printer interface configured correctly?
No
Run configuration routines.
Yes
Replace the controller board.

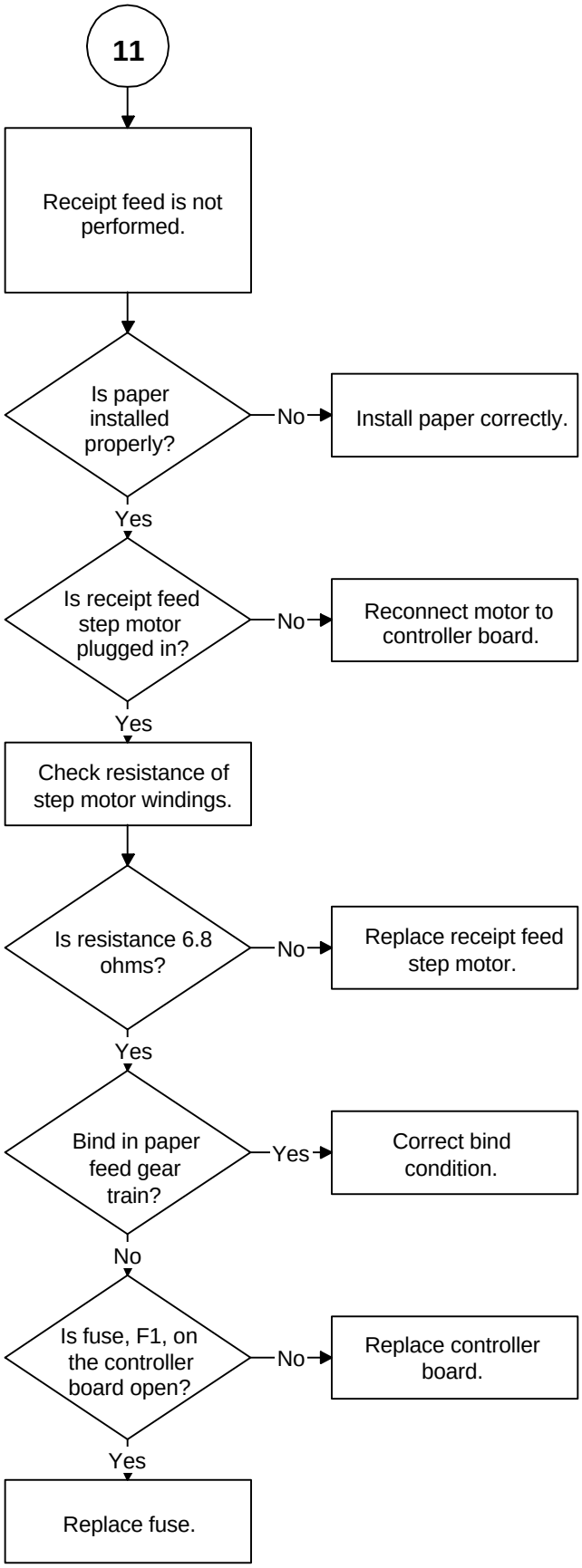

6
During data reception and printing, carriage motion is normal but nothing prints.
Replace print head.
Is print operation normal?
No
Yes
End
6A
Is the ribbon feed assembly attached correctly?
No
Reassemble.
Yes
Is carriage cable broken?
Yes
Replace carriage cable.
No
Is the contact pin of print head connector deformed?
Yes
Replace the connector.
No
Replace controller board.

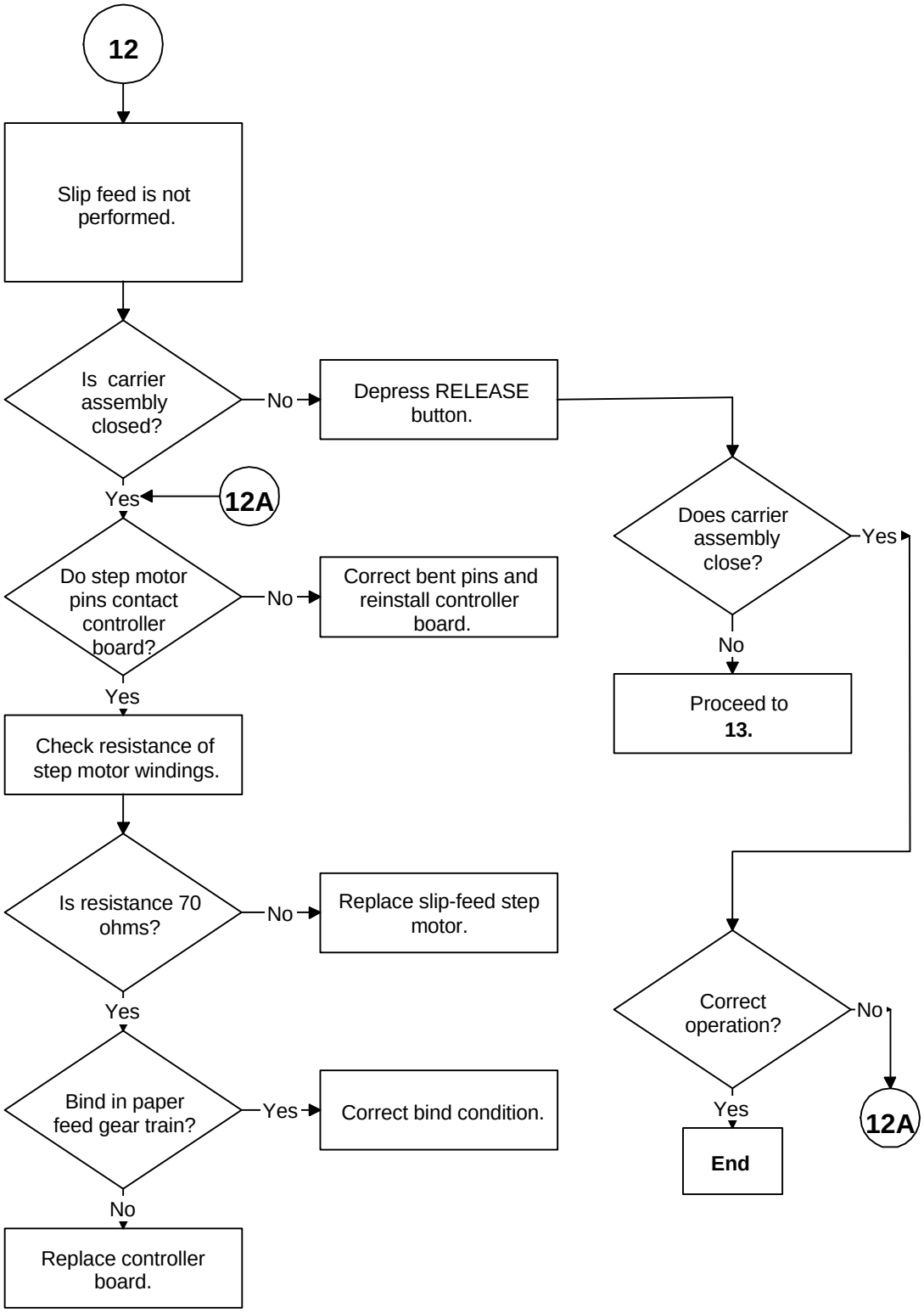

7
During data reception and printing, printing stops.
Are any LED's flashing?
Yes
Refer to Table 1 LED Indicators.
No
Is the interface cable connected securely?
No
Reconnect the interface cable.
Yes
Replace the print head.
Is printer operation normal?
No
Replace controller board.
Yes
End

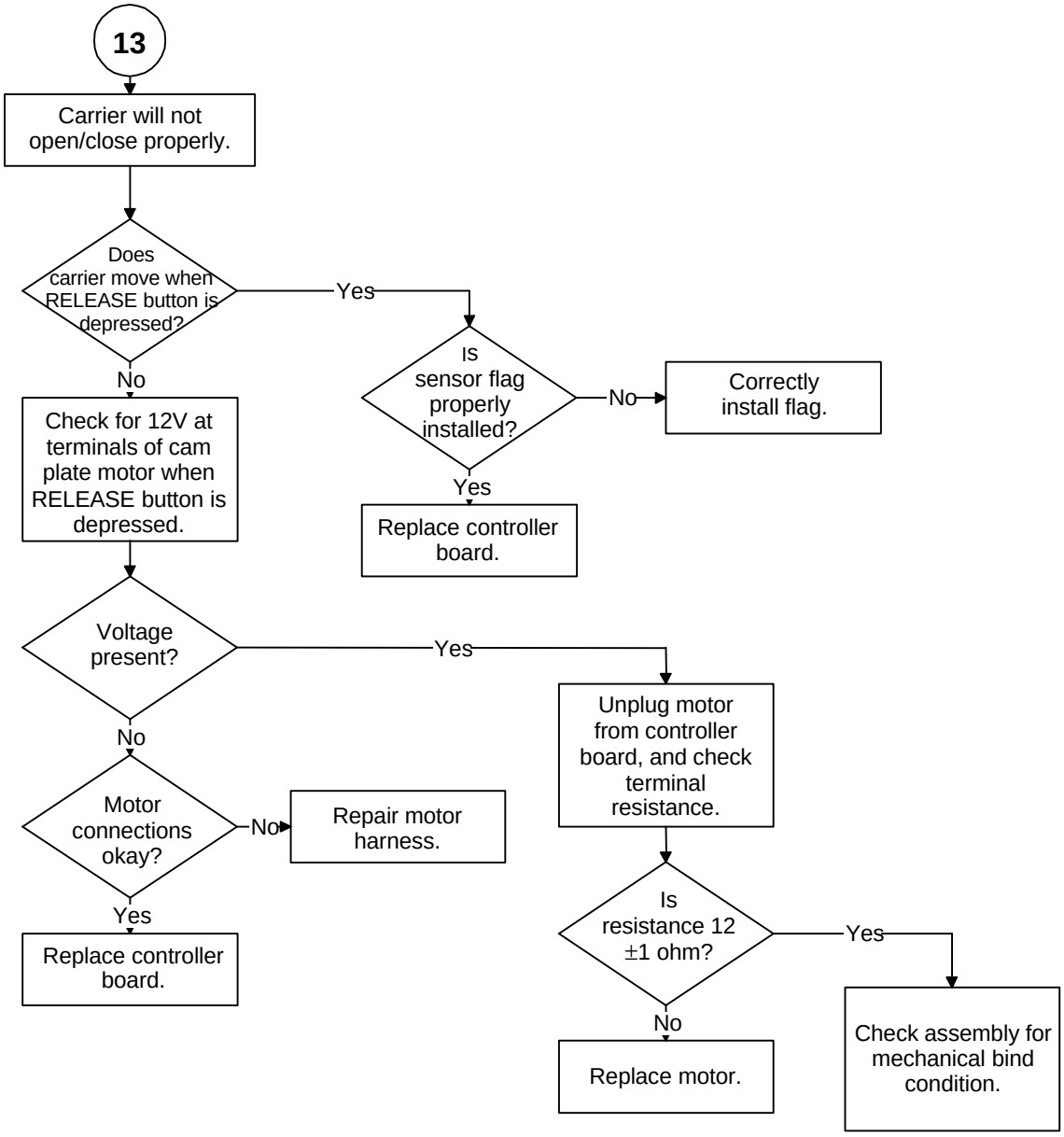

8
Wrong characters are printed, or some characters are not printed.
Is interface cable connected properly?
No
Connect the cable properly.
Yes
Does self-test print normally?
No
Replace controller board.
Yes
Is printer configured correctly?
No
Run configuration utility.
Yes
Replace controller board.

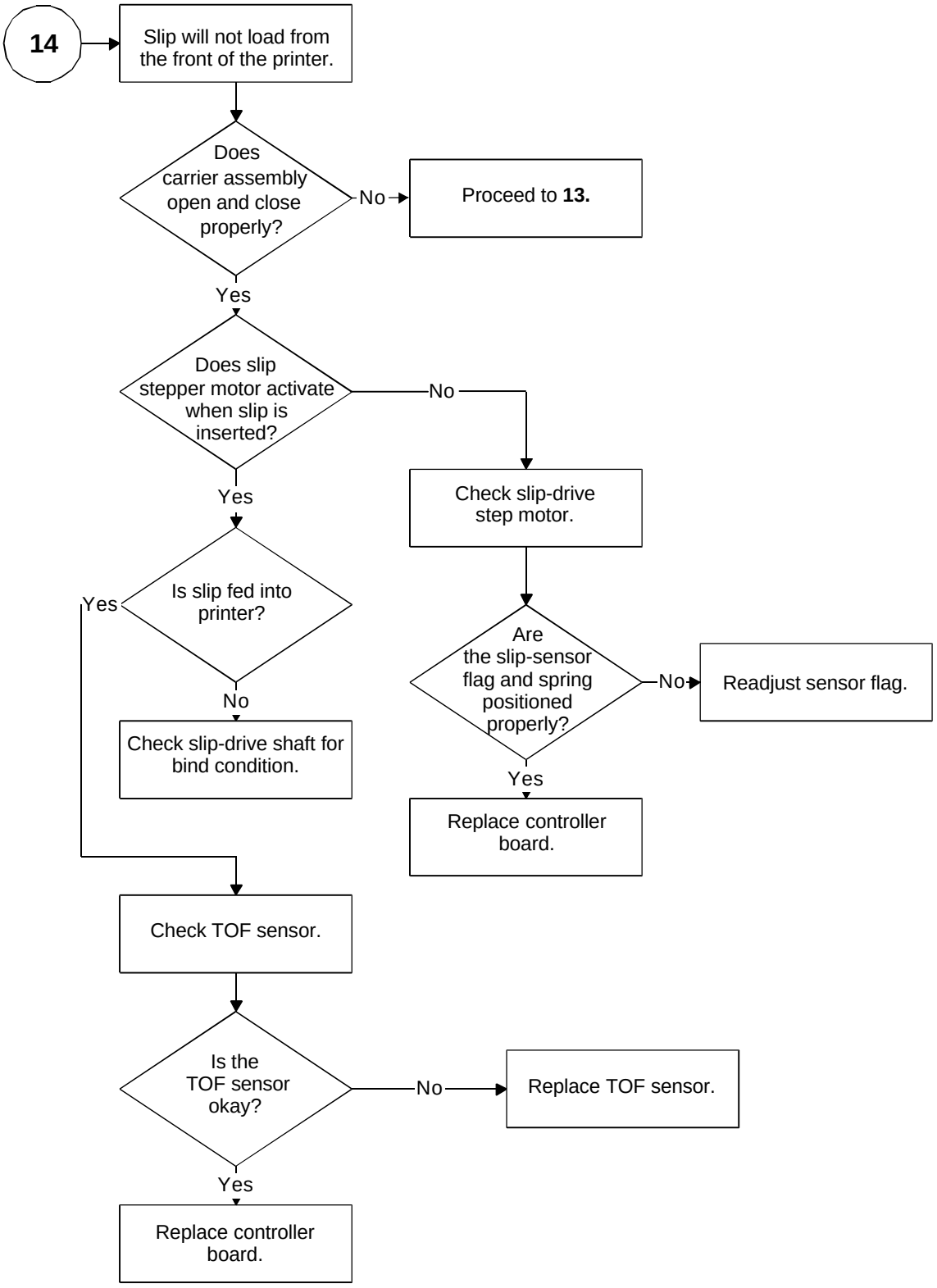

9
Some dots are not printed.
Is the ribbon properly seated?
No
Seat the ribbon.
Yes
Remove the print head.
Are any pins broken or misaligned?
Yes
No
Check resistance of the print head coil.
Is resistance approximately 20 ohms?
No
Replace the print head.
Yes
Proceed to **6A.**

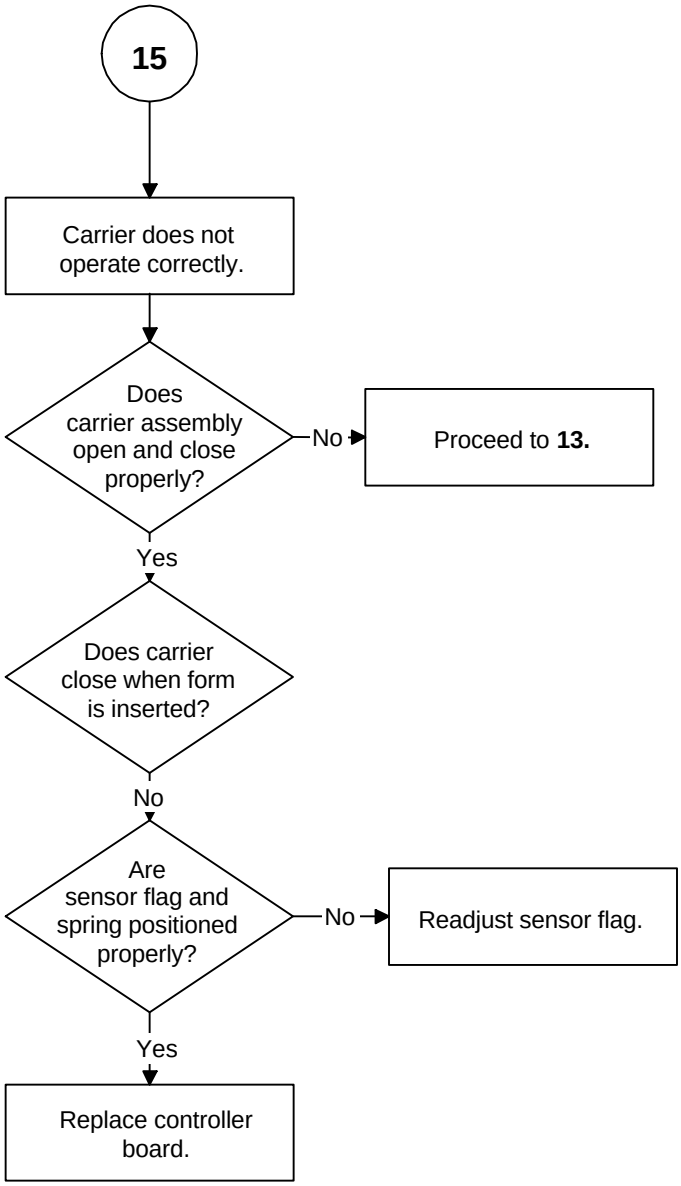

10
Print is not dark enough.
Is the ribbbon feed operating properly?
No
Replace ribbon cassette.
Is operation normal?
No
Replace ribbon feed gear assembly.
Yes
END
Yes
Is ribbon wear excessive?
Yes
Replace ribbon cassette.
No
Is head gap set correctly?
No
Adjust head gap.
Yes
Are power supply voltages correct?
No
Replace power supply.
Yes
Replace printhead.
Is printer operation normal?
No
Replace controller board.
Yes
END


11
Receipt feed is not performed.
Is paper installed properly?
No
Install paper correctly.
Yes
Is receipt feed step motor plugged in?
No
Reconnect motor to controller board.
Yes
Check resistance of step motor windings.
Is resistance 6.8 ohms?
No
Replace receipt feed step motor.
Yes
Bind in paper feed gear train?
Yes
Correct bind condition.
No
Is fuse, F1, on the controller board open?
No
Replace controller board.
Yes
Replace fuse.


12
Slip feed is not performed.
Is carrier assembly closed?
No
Depress RELEASE button.
Yes
12A
Does carrier assembly close?
Yes
No
Proceed to 13.
Do step motor pins contact controller board?
No
Correct bent pins and reinstall controller board.
Yes
Check resistance of step motor windings.
Is resistance 70 ohms?
No
Replace slip-feed step motor.
Yes
Correct operation?
No
Bind in paper feed gear train?
Yes
Correct bind condition.
Yes
12A
No
End
Replace controller board.


13
Carrier will not open/close properly.
Does carrier move when RELEASE button is depressed?
Yes
No
Is sensor flag properly installed?
No
Correctly install flag.
Yes
Replace controller board.
Check for 12V at terminals of cam plate motor when RELEASE button is depressed.
Voltage present?
Yes
No
Unplug motor from controller board, and check terminal resistance.
Motor connections okay?
No
Repair motor harness.
Yes
Replace controller board.
Is resistance 12 ±1 ohm?
Yes
No
Replace motor.
Check assembly for mechanical bind condition.


14
Slip will not load from the front of the printer.
Does carrier assembly open and close properly?
No
Proceed to **13.**
Yes
Does slip stepper motor activate when slip is inserted?
No
Yes
Check slip-drive step motor.
Is slip fed into printer?
Yes
No
Are the slip-sensor flag and spring positioned properly?
No
Readjust sensor flag.
Yes
Check slip-drive shaft for bind condition.
Replace controller board.
Check TOF sensor.
Is the TOF sensor okay?
No
Replace TOF sensor.
Yes
Replace controller board.


15
Carrier does not operate correctly.
Does carrier assembly open and close properly?
No
Proceed to **13.**
Yes
Does carrier close when form is inserted?
No
Are sensor flag and spring positioned properly?
No
Readjust sensor flag.
Yes
Replace controller board.

LED INDICATORS

There are two indicators. One is READY and the other is STATUS (Form). The READY indicator is tricolored: red, green, or orange.

The printer can be in any of the following states.

STATE	**READY** Indicator	**FORM** Indicator
1. Ready The printer is ready to receive data and print.	Green	OFF
2. Printer not ready Cover is open.	Flashing green	OFF
3. Ready but waiting for a form	Orange	(status)
Request slip form		Slow flash
Request validation form		Fast flash
Request form be removed		Medium flash
4. Ready, but low on receipt paper	Flashing orange/green	OFF
5. Printer errors		
Out of paper	Flashing orange	OFF
Slip-load failed		Slow flash
Printer fault (See page 72.)	Flashing red	OFF
6. Menu mode	Flashing orange/green/red	OFF
7. Test mode	Flashing red/orange	OFF
8. Printer failure	Orange	OFF
9. Watchdog fault (printer resets)		

Table 1 LED Indicators

PRINTER FAULT INDICATORS

If the printer indicates printer fault, the error is not recoverable. The printer must be restarted and may lose information. To aid in printer troubleshooting, the RESUME key will activate an extended diagnostic indication. This key will blink the status indicator a number of times. The number of blinks indicates the fault.

The printer fault errors are as follows.

Faults during operation		
	1	Motor move time out
	2	Motor move retry fault
	3	Motor move fault (moved in wrong direction)
	4	Space motor locked
	5	Motor homing fault
	6	Motor acceleration fault
	7	Printing fault
	8	Fault while centering
	9	Forms compensation fault
Faults during Level 0 diagnostics		
	10	ROM check-sum failure
	11	RAM failure
	12	Configuration EEPROM failure
	13	Processor test fault
	14	EEPROM check-sum failure
Faults that can happen anytime		
	15	Firmware control fault (loss of program control)

Table 2 Fault indicators

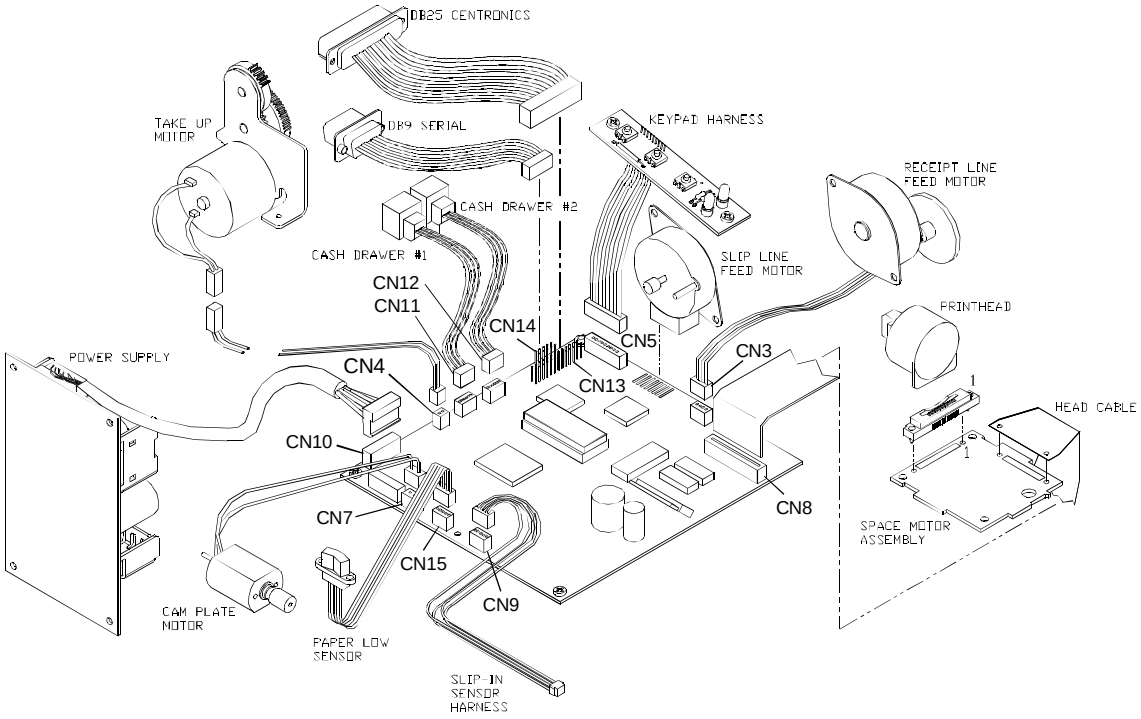
After the fault code is displayed, restart the printer by pressing the RESUME and RELEASE keys simultaneously.

If the EEPROM check-sum fault occurs (Fault Code 14), the EEPROM can be set to defaults by pressing the RESUME and LF keys simultaneously. The printer will be functional but must be reconfigured. This procedure is only to allow reconfiguration and not to recover printer function in the field.

If the indication is printer failure, the print controller is not running and is being held in reset. If this failure occurs, the printer is not functional and should be serviced.

If the printer appears to go through a power cycle by itself, the hardware watchdog has detected a fault. This fault is generally a hardware failure or an external interference. If the fault is a hardware failure, the printer will continue to cycle through its diagnostics and then reset. If this happens, the printer must be

serviced. If the fault is caused by external interference like electrostatic discharge (ESD), the printer will generally recover. (Note: The parallel-port INIT pin causes a soft reset.)

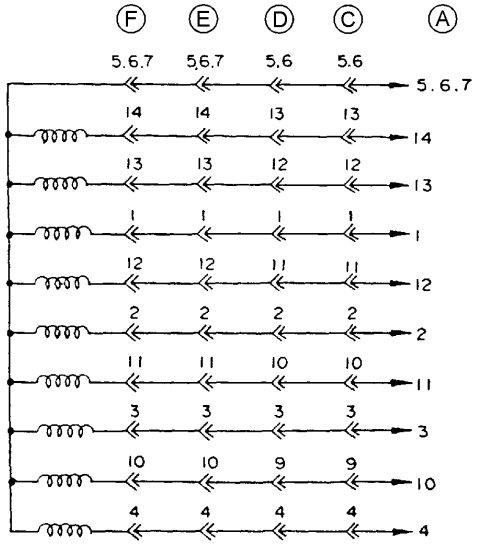
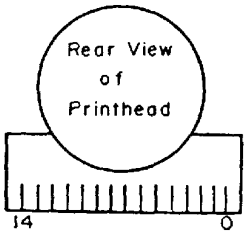


Note: This illustration is referenced by the letters in the troubleshooting flow charts and in the illustrations on the following three pages.

CHECKING CONNECTIONS AND RESISTANCE

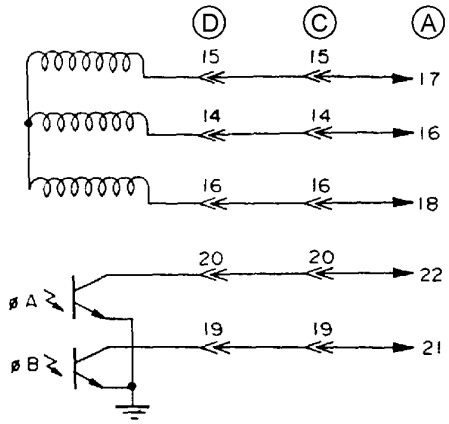
PRINT HEAD

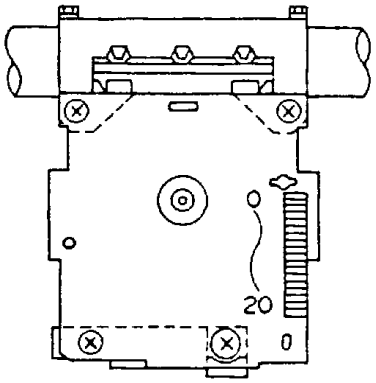
The following illustration shows the connection circuit for the print head. To check the circuit of Wire #1 on the print head, use Pin 5, 6, or 7 and measure with a meter to Pin 14 at Location A. The resistance should read approximately 20 ohms.

Pins at Connection	Signals	Pins on Print head	Rear of Print head
	Common	5, 6, 7	
	Wire #1	14	
	Wire #2	13	
	Wire #3	1	
	Wire #4	12	
	Wire #5	2	
	Wire #6	11	
	Wire #7	1	
	Wire #8	10	
	Wire #9	4	

SPACE MOTOR ASSEMBLY

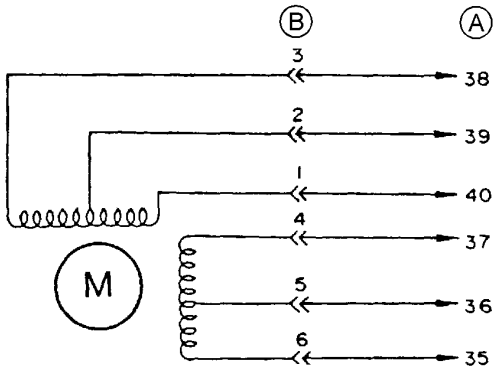
The following illustration shows the connection circuit for the space motor assembly and the pins on the space motor. The resistance should be approximately 21 ohms between pads 17 and 16, 16 and 18, and 17 and 18 on the space motor.

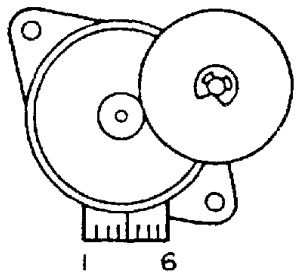
Pins at Connection	Signals	Pins on Space Motor
	V U W A B	15 14 16



LINE FEED MOTOR (SLIP)

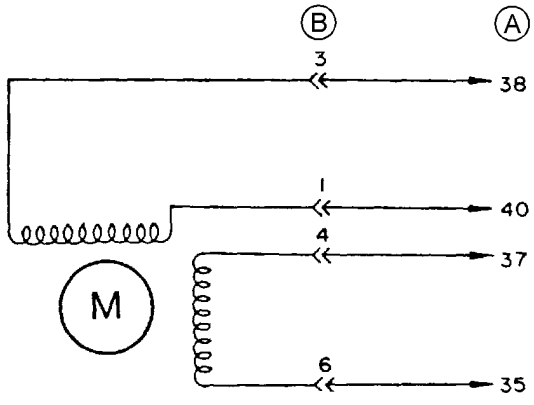
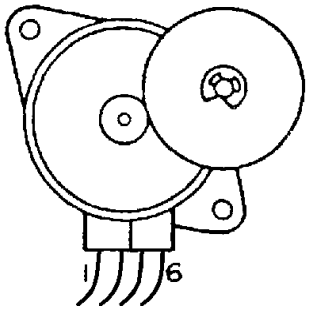
The following illustration shows the connection circuit for the line feed motor. The resistance of each coil should be approximately 70 ohms between pads 38 and 39, 39 and 40, 37 and 36, and 36 and 35 on the line feed motor.

Pins at Connection	Signals	Pins on Line Feed Motor
	Phase 1 Common Phase 3 Phase 2 Common Phase 4	3 2 1 4 5 6



LINE FEED MOTOR (RECEIPT)

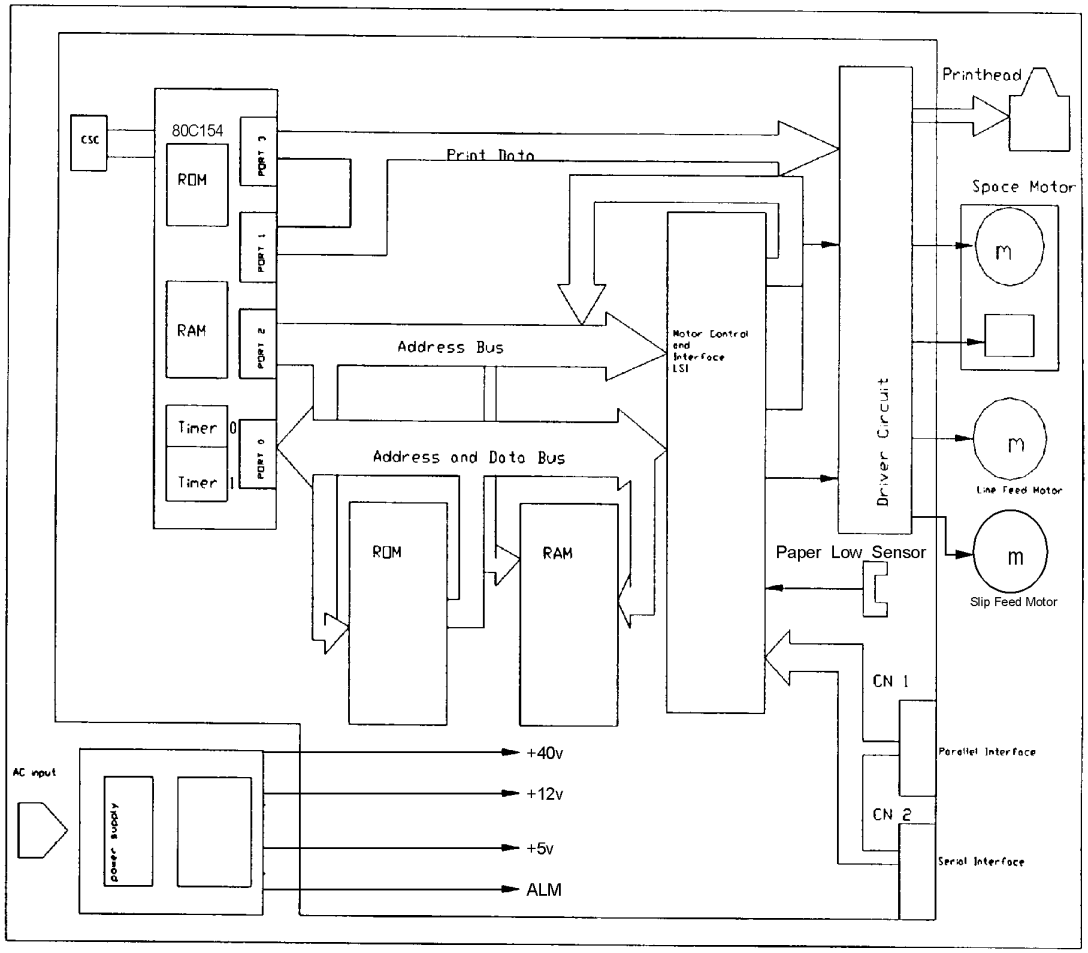
The following illustration shows the connection circuit for the line feed motor. The resistance of each coil should be approximately 6.8 ohms.

Pins at Connection	Signals	Pins on Line Feed Motor
	Phase 1 Phase 3 Phase 2 Phase 4	

APPENDIX A: THEORY OF OPERATION

ELECTRICAL OPERATION

CIRCUIT OPERATION



The electrical section of the printer consists of the components shown in the above diagram.

The control board contains the microprocessor, its peripheral circuits, and all associated drive circuits for the print head, line feed motor, slip-feed motor, journal take-up motor, cash drawers, and sensors.

The printer control signals from the host system (PC or terminal) are brought directly to the control board from the rear panel on the printer.

MICROPROCESSOR AND PERIPHERAL CIRCUITS

MICROPROCESSOR (U1: 80C154)

The microprocessor is the nucleus of the control board. It controls the peripheral circuits.

PROGRAM ROM (U4)

The program ROM stores the control program for the printer.

PROGRAM RAM (U2)

The program RAM stores printer configuration information.

RAM (U5)

The RAM stores data such as received print information.

LSI (M7U042-026)

The M7U042-026 motor control LSI has the following functions:

- Space motor speed control

  This function accelerates and decelerates the space motor in accordance with commands from the microprocessor and controls the space motor speed in each printing mode.

- Dot-timing generation

  This function generates the dot timing signal (/IPT), synchronized with the printing speed in accordance with the output signals (PHASE A, B) of the encoder on the space motor, and sends the timing information to the microprocessor.

- I/O ports

  The input and output ports control signals in accordance with the commands input from the microprocessor.

- Address latch

  The address latch fastens the low-order 8-bits of the address (A0 to A7). These bits are used as an address for read/write operations with peripheral devices.

- Address decoder

  The address decoder decodes the address signal (A11 to A15) and sends the /RAMSEL4 signal.

INITIALIZATION

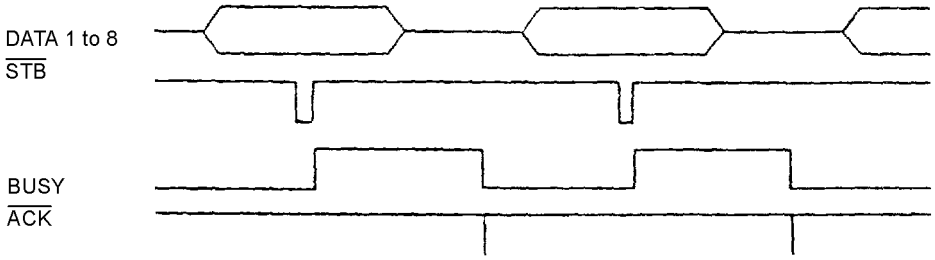
The printer is initialized when the power is turned on or when the parallel interface signal, I-PRIME, is received from the host computer.

Initialization begins with the RSTOUT signal output from the reset circuit to reset U1 (microprocessor), and U3 (LSI).

When reset is complete, the program starts with mode settings of U1, U3, and U5, memory (ROM and RAM) check, AM initialization, and carriage homing. The program finally establishes the interface signals (output of ACK signal, BUSY signal, etc.), lights the select indicator, and informs the host system that the printer is ready for data reception (in the data reception wait state). This completes the initialization routine.

INTERFACE CONTROL

PARALLEL INTERFACE



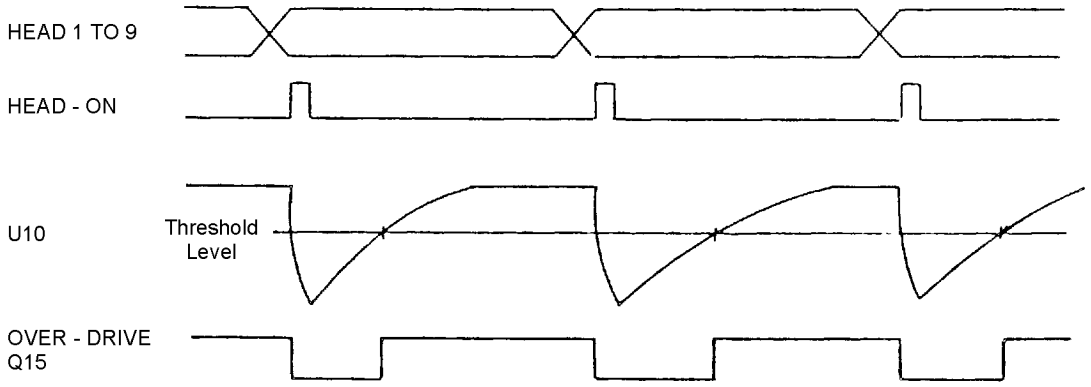
Data from the interface is input through the connector (CN13), and the interface LSI (U3: 7U042-026) latches the input data in sync with the /STB signal.

The BUSY signal is on during data processing. When the processing is complete, the BUSY signal is turned off, and an /ACK signal is sent to request more data.

SERIAL INTERFACE

The data from the interface is input through the connector (CN14), and the serial drive (U18: DS1229S), with data I/O to the microprocessor.

PRINT HEAD DRIVE CIRCUIT

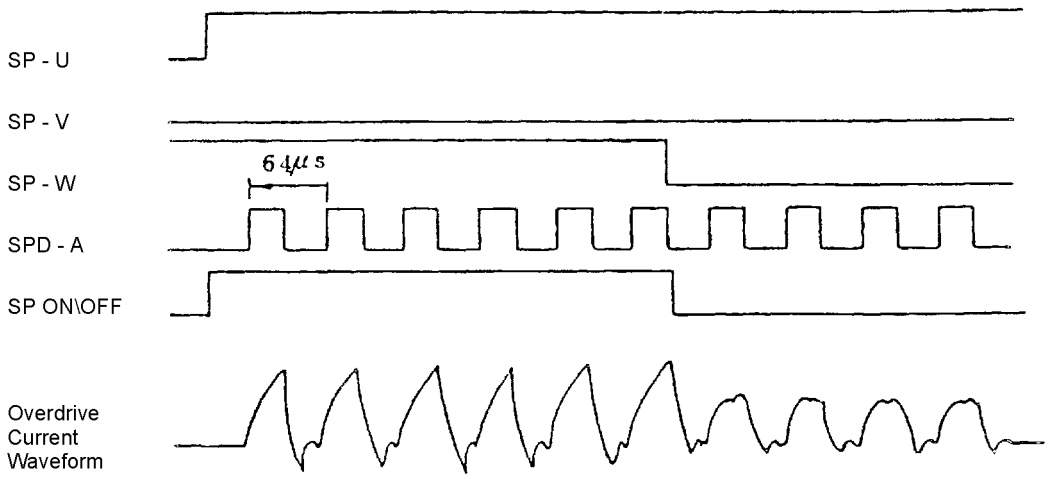


The print head circuit drives the head magnets corresponding to the HEAD DATA 1 to 9 signals in accordance with the HEAD-ON signal allowing the print head to print characters.

When the HEAD-ON signal goes high, the RC integrator (R76 and C24) determines the head drive time. The integrator lengthens the drive time if the drive voltage (+40V) lowers, and shortens the drive time if the voltage rises. This maintains a consistent print-wire impact force.

CARRIAGE DRIVE

SPACE MOTOR CONTROL

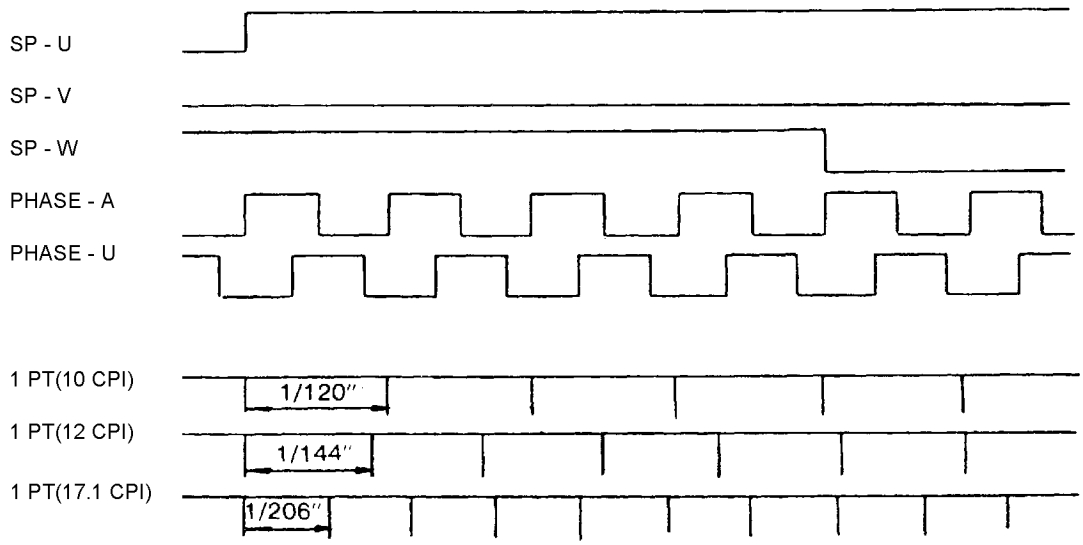


The motor control LSI (U3: M74042-026) outputs the space motor phase signals (SP-U, SP-V, SP-W) in accordance with the spacing command from the microprocessor and at the same time outputs the overdrive signal (SPD-A).

The SPD-A signal is a fixed-period pulse signal whose pulse width is controllable by the program. The SPD-A signal is also used to control the motor drive time.

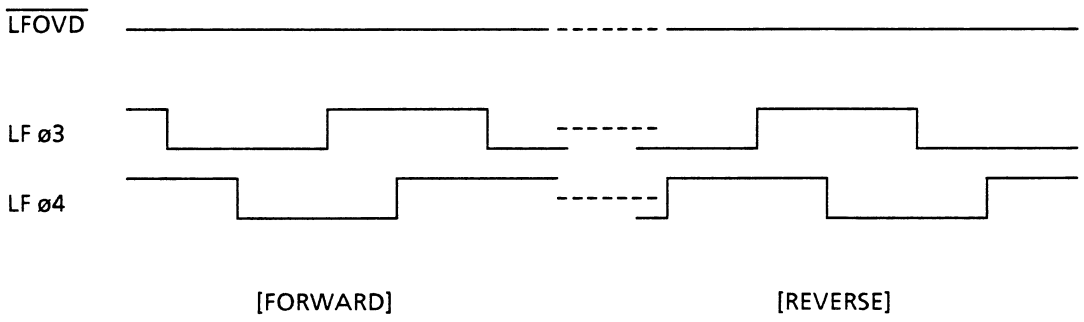
The SP ON/OFF signal is output during acceleration and deceleration when greater torque is required. The motor driver (MTDV) moves the space motor in accordance with these signals. Pins 9 and 11 of the MTDV are for the overvoltage (9) and overcurrent (11) protective circuits.

SLIT ENCODER



Space motor PHASE-A and PHASE-B signals are generated by a photo-sensor and a slit disk. The control LSI (U3: M7U042-026) frequency divides these edge pulse signals at a rate dependent upon the print pitch, and outputs the /IPT signal to provide dot-on and carriage-position timing.

LINE FEED



The line feed motor is held stationary with the LF HOLD signal (minute holding current: approximately 24 mA) while it is at a stop.

During line feed operation, the line feed motor is driven by a large current supplied in accordance with the LF OVD signal.

ALARM CIRCUITS

DRIVE CIRCUIT FAULT ALARM CIRCUIT

This is a protective circuit that makes the power supply shutdown when a fault occurs in the print head drive circuit, space motor drive circuit, line feed motor drive circuit, or their peripheral circuits.

This circuit operates by monitoring the drive time using the HDALM, SPALM, and LFALM signals interlocked with the overdrive signal of each drive circuit. If the drive time of any circuit exceeds the specified time, the drive circuit fault alarm outputs an ALM signal to the power supply.

In the event that there is a component failure in the drive circuits, two fuses are located on the controller board to prevent further damage. Fuse, F1, will blow if there is a component failure in the line feed motor drive circuit. Fuse, F2, will blow if there is a component failure in the space motor drive circuit.

HEAD OVERHEAT ALARM CIRCUIT

In order to protect the head coils, the overheat alarm circuit monitors the head temperature using the built-in thermistor of the print head.

If heavy-duty printing is performed continuously for a long time, the print head temperature rises. When the print head temperature reaches approximately 100°C, a head overheat alarm occurs. At this point, the print mode is switched from bidirectional to unidirectional to reduce the duty-cycle, which in turn lowers the temperature of the print head. When the print head temperature returns below the alarm detection temperature, bidirectional printing is resumed.

When the temperature of the print head rises during operation, the resistance of the thermistor lowers, and the potential of the comparator's (U10) negative input lowers to invert the comparator's output, causing the HEAD TEMP signal to be output to the control LSI.

The printer will slow down printing until the temperature falls back below the threshold. This is a normal operation and will not cause any data loss. Do not turn the printer off or data loss will result.

POWER SUPPLY

The power supply is a self-contained, integrated, switching, power supply. The internal fuse, F1, located on the power supply will blow if the supply has an internal fault. The power supply has the following outputs: +5 VDC, +12 VDC, and +40 VDC, and an alarm signal input.

AC INPUT

The AC input connector and power switch are located on the back of the printer.

MECHANICAL OPERATION

PRINT HEAD MECHANISM AND OPERATION

The print head is spring-loaded, using a permanent magnet and can be easily removed or installed. The print head is mounted on a carriage that runs parallel to the platen and is connected with the control circuit via the circuit board.

The print head consists of the following items:

- Wire guide,
- Wires,
- Armature assembly,
- Yoke,
- Springs,
- Spacer,
- Magnet assembly,
- Thermistor, and
- PC board.

Print Head Operation

When the print head is in the nonprinting state, each armature is attracted by the permanent magnet, and the springs holding the armatures are compressed by the thickness of the spacer. Therefore, the print wires, which are fastened to the individual armatures, are held retracted within the wire guide.

When signals corresponding to a character to be printed are detected by the control circuit, currents flow through the corresponding coils to nullify the magnetic flux generated by the permanent magnet assembly. With the magnetic flux nullified, the print-wire coil armatures are driven toward the platen by the force of the armature springs. The print wires, fastened to the armatures, are ejected from the tip of the wire guide and strike the paper through the ribbon.

After the character is printed, the magnetic flux of the permanent magnet assembly attracts the armatures again which retract the print wires back into the wire guide.

The print head has a built-in thermistor to prevent the coils from overheating.

SPACE MECHANISM AND OPERATION

The spacing operation is performed by the DC motor driving the carriage frame, which is guided by the carriage shaft mounted parallel to the platen. The DC motor is mounted on the bottom of the carriage frame.

The space mechanism consists of the following items:

- DC motor with motor gear,
- Carriage frame,
- Carriage shaft,
- Space rack,
- Slit sensor, and
- Slit disk.

The carriage, with the print head and space motor mounted on it, moves parallel to the platen along the carriage shaft. As the space motor rotates counterclockwise, the motor gear is driven to the right along the space rack, and as a result, the carriage is also driven to the right.

The spacing mechanism is designed such that when the space motor rotates one turn, the carriage frame moves 0.80 inch (20.32 mm).

Motor rotation also moves the slit disk, and the slits pass through the slit sensor. The position of the carriage frame can be obtained by counting the number of slits detected by the slit sensor.

RIBBON FEED MECHANISM AND OPERATION

The ribbon feed mechanism feeds the ribbon synchronously with the spacing operation and is driven by the space motor.

The ribbon feed mechanism consists of the following items:

- Ribbon feed gear assembly,
- Ribbon gear (space motor), and
- Ribbon cartridge.

Ribbon Feed Operation

As the space motor rotates, the ribbon gear on the space motor shaft rotates to move the drive gear in the ribbon cartridge via the ribbon feed gear assembly. As a result, the ribbon is fed.

During bidirectional printing, the ribbon gear rotational direction reverses every time the carriage reverses direction. In this case, the gears in the ribbon feed gear assembly switch the rotational direction to feed the ribbon in a fixed direction.

Ribbon Cartridge

A one-way feed-endless ribbon is used. To assure clear print, ink is replenished by the built-in ink tank in the ribbon cartridge.

PAPER FEED MECHANISM AND OPERATION

The printer has two motors that feed paper. The receipt-drive feed motor and a slip-drive feed motor, depending on what operation the printer is performing one or both of the motors will be feeding paper.

Receipt Feed Motor

The printer feeds paper by rotating the platen assembly, which is driven by the receipt feed motor through a speed reduction gear. The paper is pinched between the receipt pressure roller and platen.

The receipt-paper feed mechanism consists of the following items:

- Stepper motor with gear,
- Receipt pressure roller , and
- Platen assembly.

The receipt-paper feed-stepper motor is mounted on the right side of carrier assembly, and its rotation is transmitted through the receipt-feed motor drive train.

Slip Feed Motor

The printer feeds paper by rotating the feed rollers, which are driven by the slip feed motor through a speed reduction gear. The paper is pinched between the feed roller and spring plate. This maintains constant pressure regardless of the thickness of the paper or form.

The slip-paper feed mechanism consists of the following items:

- Stepper motor with gear,
- Feed roller, and
- Spring plate.

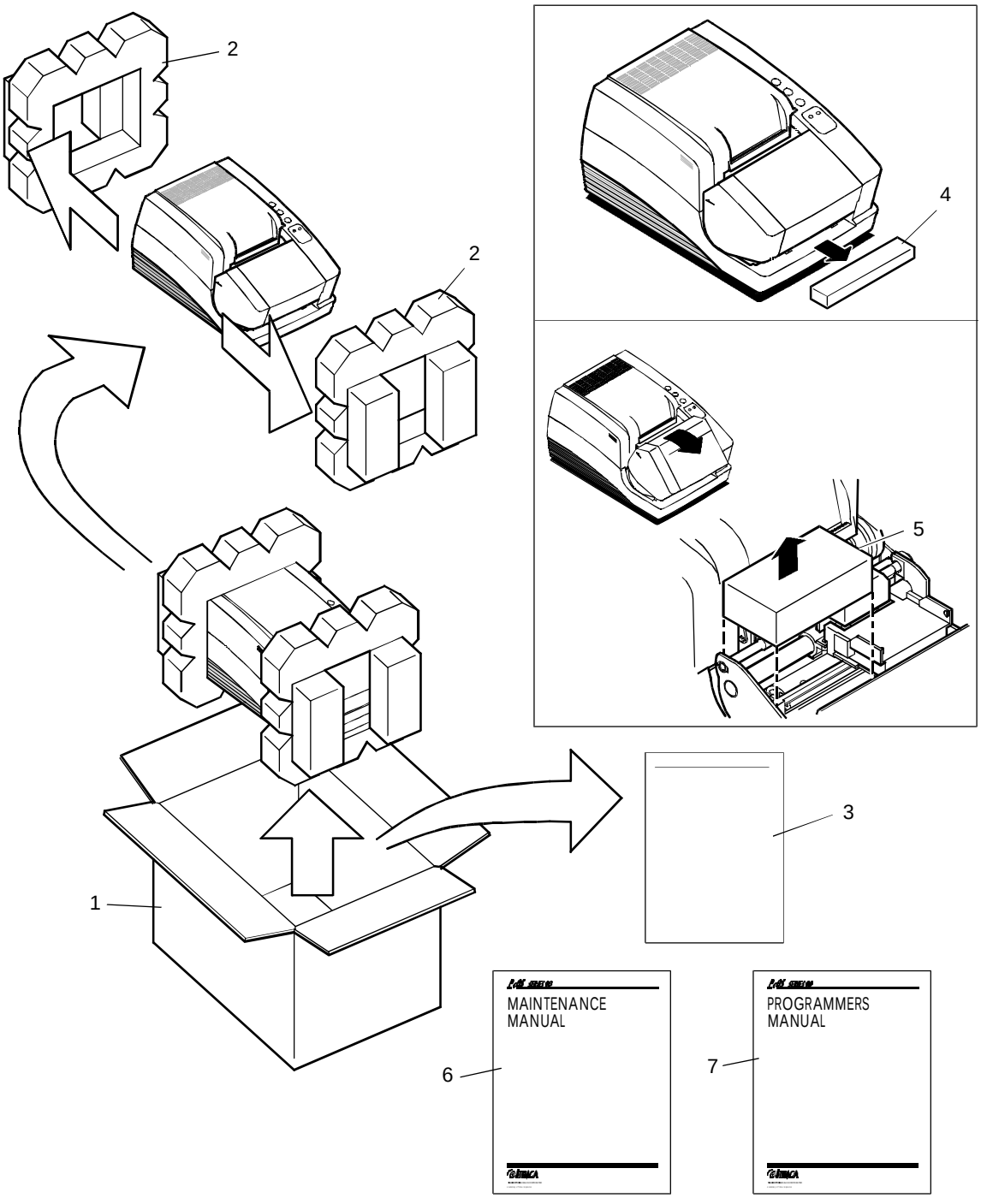
The slip-paper feed-stepper motor is mounted on the right side of the mechanism base plate, and its rotation is transmitted through the slip-feed motor drive train.

PAPER-LOW DETECTION MECHANISM AND OPERATION

Paper is detected in the printer by an optical sensor. When the sensor no longer perceives that the paper is next to it, a paper-low condition exists. The printer begins to count line feeds to determine the actual end of the paper roll.

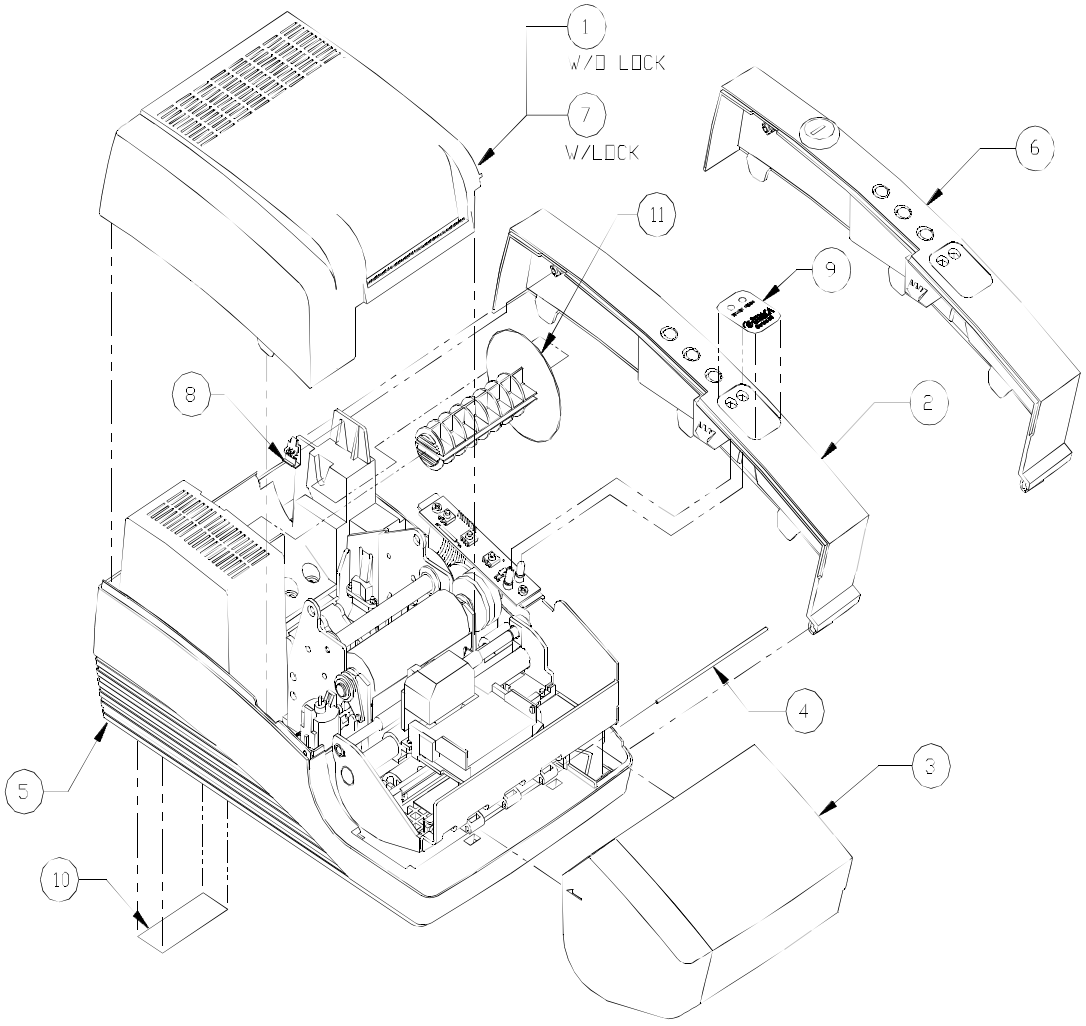
APPENDIX B: PARTS LISTS

PACKING MATERIALS/PUBLICATIONS



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-7578	1	Carton
2	90-7577	1	Foam set
3	90-9439	1	Publications kit, (includes the Operator’s Guide)
4	90-7570	1	Cantilever restraint
5	90-7568	1	Print head restraint
6	90-7899	1	Maintenance Manual
7	100-7586	1	Programmer’s Guide

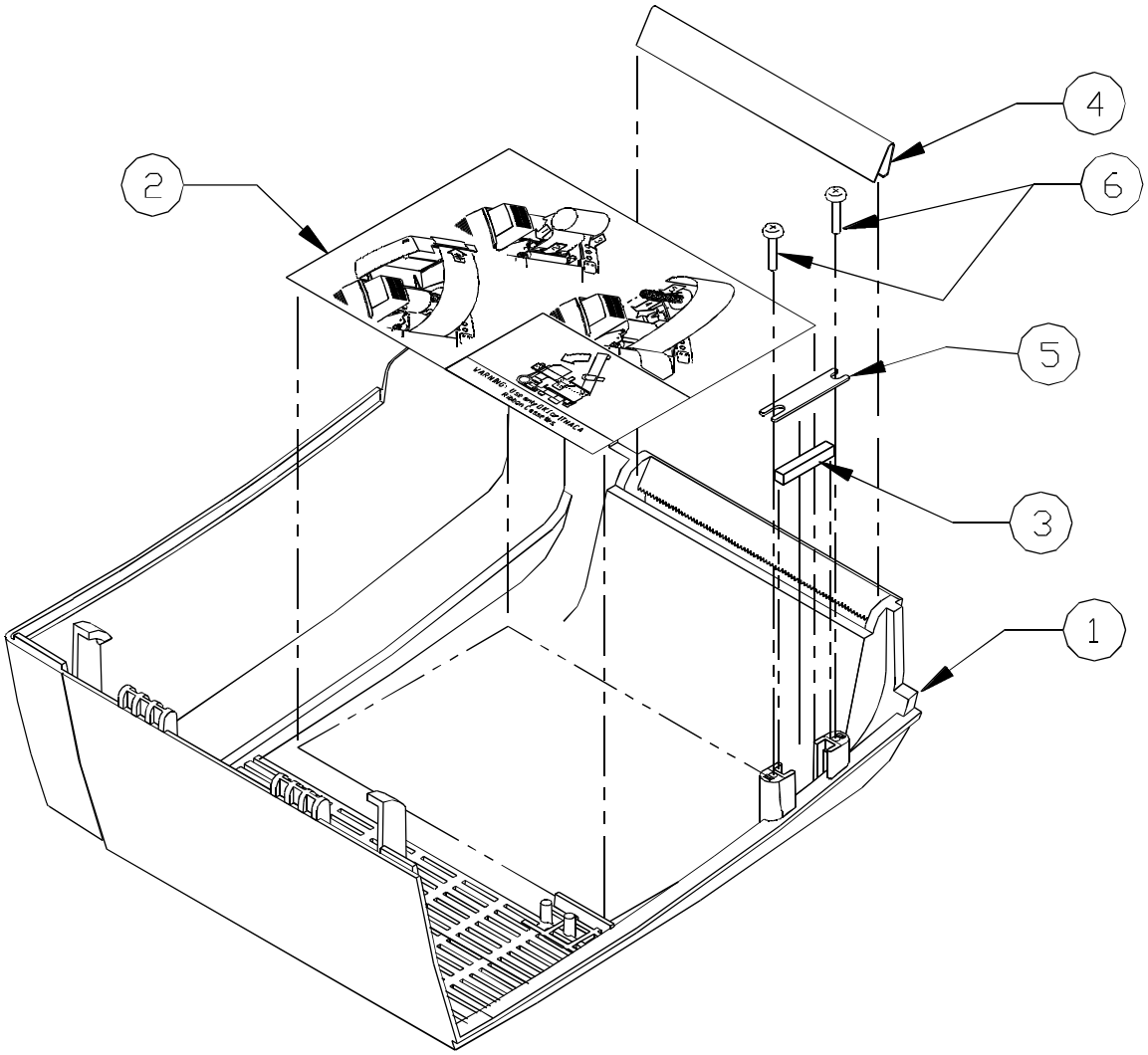
PRINTER ASSEMBLY



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-7923	1	Cover – Paper without lock (light tan)
1	90-7927	1	Cover – Paper (gray)
1	90-7926	1	Cover – Paper (knife) (light tan)
2	90-7464	1	Assembly – Right cover without lock (light tan)
2	90-7879	1	Assembly – Right cover (OKI keypad)
2	90-7934	1	Assembly – Right cover (gray)
3	90-6422	1	Cover – Cassette (light tan)
3	90-7912	1	Cover – Cassette (gray)
3	90-7893	1	Cover – OKI Cassette
4	90-6425	1	Pin – Hinge
5	90-7551*	1	Assembly – Mechanical/Electrical Base
6	90-7470	1	Cover – Right with lock (light tan)
6	90-7880	1	Assembly – Right cover with lock (OKI keypad)
7	90-7924	1	Cover – Paper with lock (light tan)
7	90-7925	1	Cover – Paper with lock and knife (light tan)
8	98-6326	1	Clip – Right cover
9	90-6639	1	Label - Keypad (Ithaca)
9	90-7867	1	Label – Keypad (No logo) (light tan)
9	90-7892	1	Label – Keypad (OKI)
9	90-9040	1	Label – Keypad (gray)
9	90-7977	1	Label – Keypad (Hewlett Packard)
9	90-9179	1	Label – Keypad (UTC)
9	90-9402	1	Label – Keypad (OKI Latin America)
10	98-7152*	1	Plate – Serial IP
11	90-6415	1	Spindle – Take-up
14	90-7893	1	Cover – OKI cassette

* Not available as a spare part

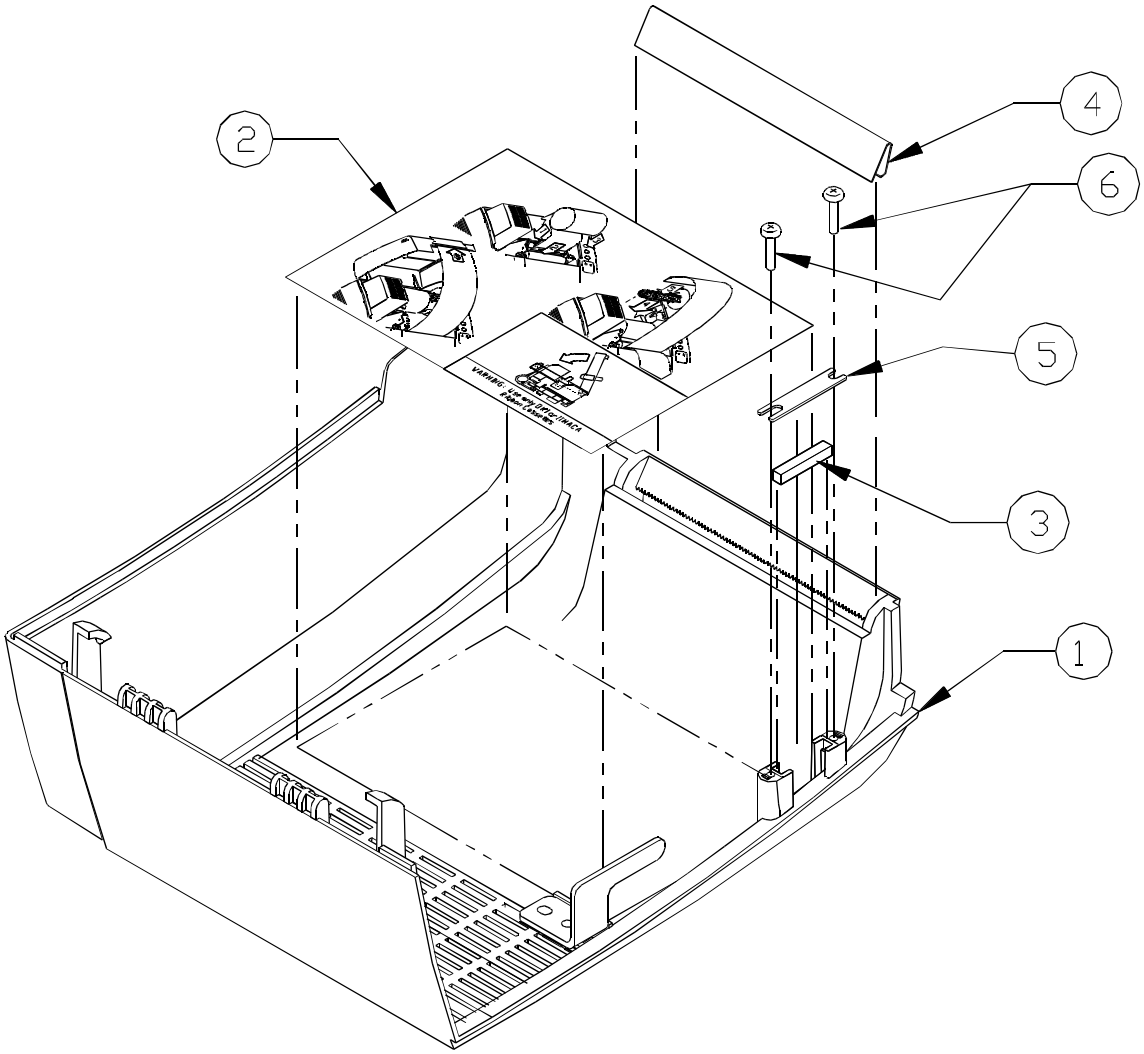
PAPER COVER ASSEMBLY



ITEM NO.	PART NO.	QTY	DESCRIPTION
	90-7923	1	Assembly – Paper Cover
1	90-9786*	1	Cover – Paper without lock
2	90-7455	1	Label – Paper loading
3	98-6498*	1	Magnet – Bar
4	90-6040*	1	Tear-off
5	90-6499*	1	Retainer – Magnet
6	98-9093*	2	Screw – M3x5mm PHPS PHD

* Not available as a spare part

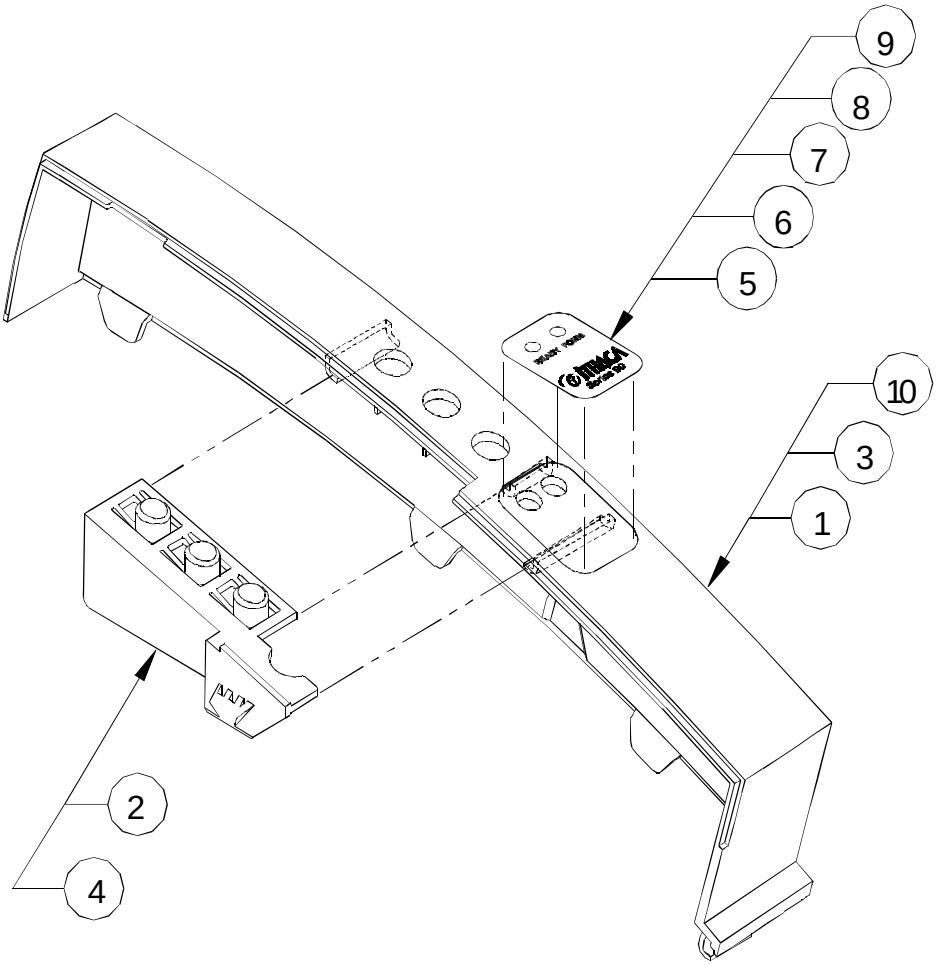
PAPER COVER ASSEMBLY WITH LOCK



ITEM NO.	PART NO.	QTY	DESCRIPTION
	90-7924	1	Assembly – Paper cover with lock
1	90-9789*	1	Cover – Paper with lock
2	90-7455	1	Label – Paper loading
3	98-6498*	1	Magnet – Bar
4	90-6040*	1	Tear-off
5	90-6499*	1	Retainer – Magnet
6	98-9093*	2	Screw – M3x5mm PHPS PHD

* Not available as a spare part

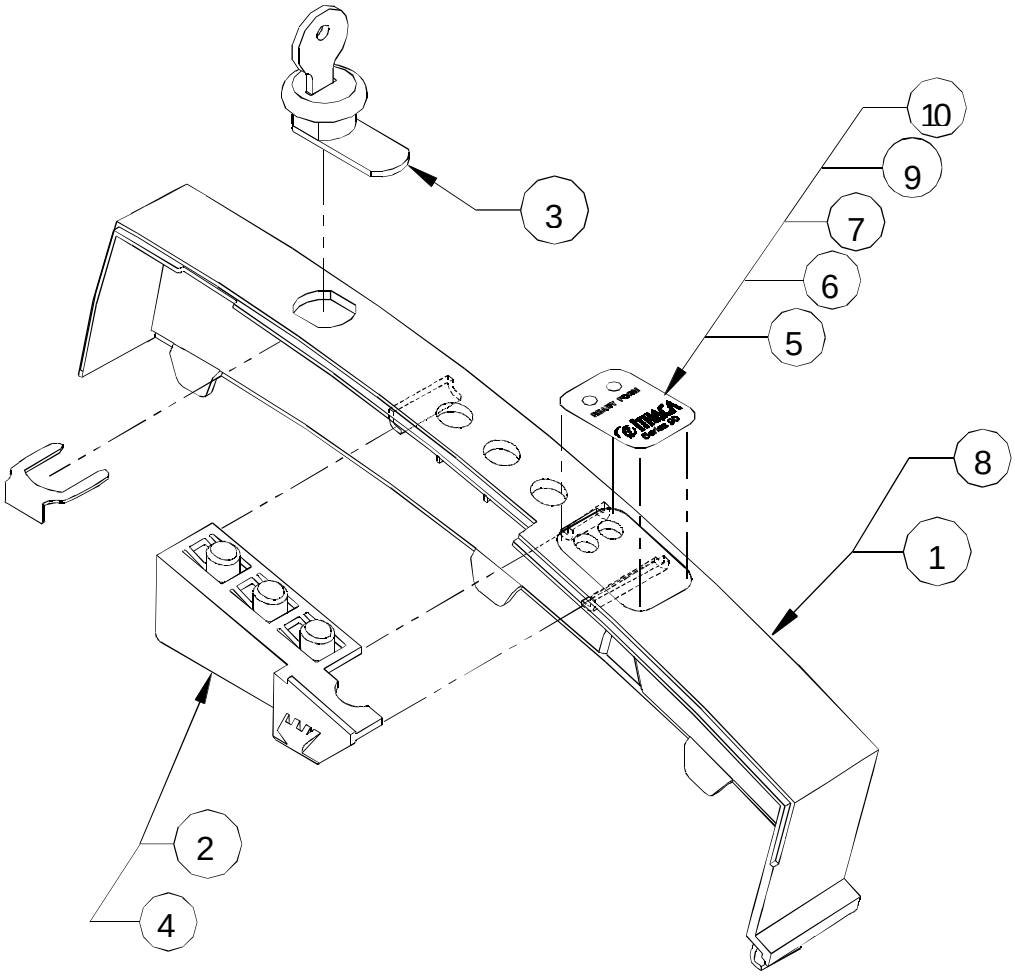
RIGHT COVER ASSEMBLY (90-7464)



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-6322	1	Cover – Right (Ithaca)
2	90-6418	1	Button – PCB (green)
3	90-6323	1	Cover – Right (OKI)
4	90-6419	1	Button – PC board (OKI, gray)
5	90-6639	1	Label – Keypad (Ithaca)*
6	90-7867	1	Label – Keypad (No logo)*
7	90-7892	1	Label – Keypad (OKI)*
8	90-9040	1	Label – Keypad (No logo) (gray)*
9	90-7977	1	Label – Keypad (Hewlett Packard)*
10	90-7929	1	Cover – Right (gray)

* Order separately from Assembly 90-7464.

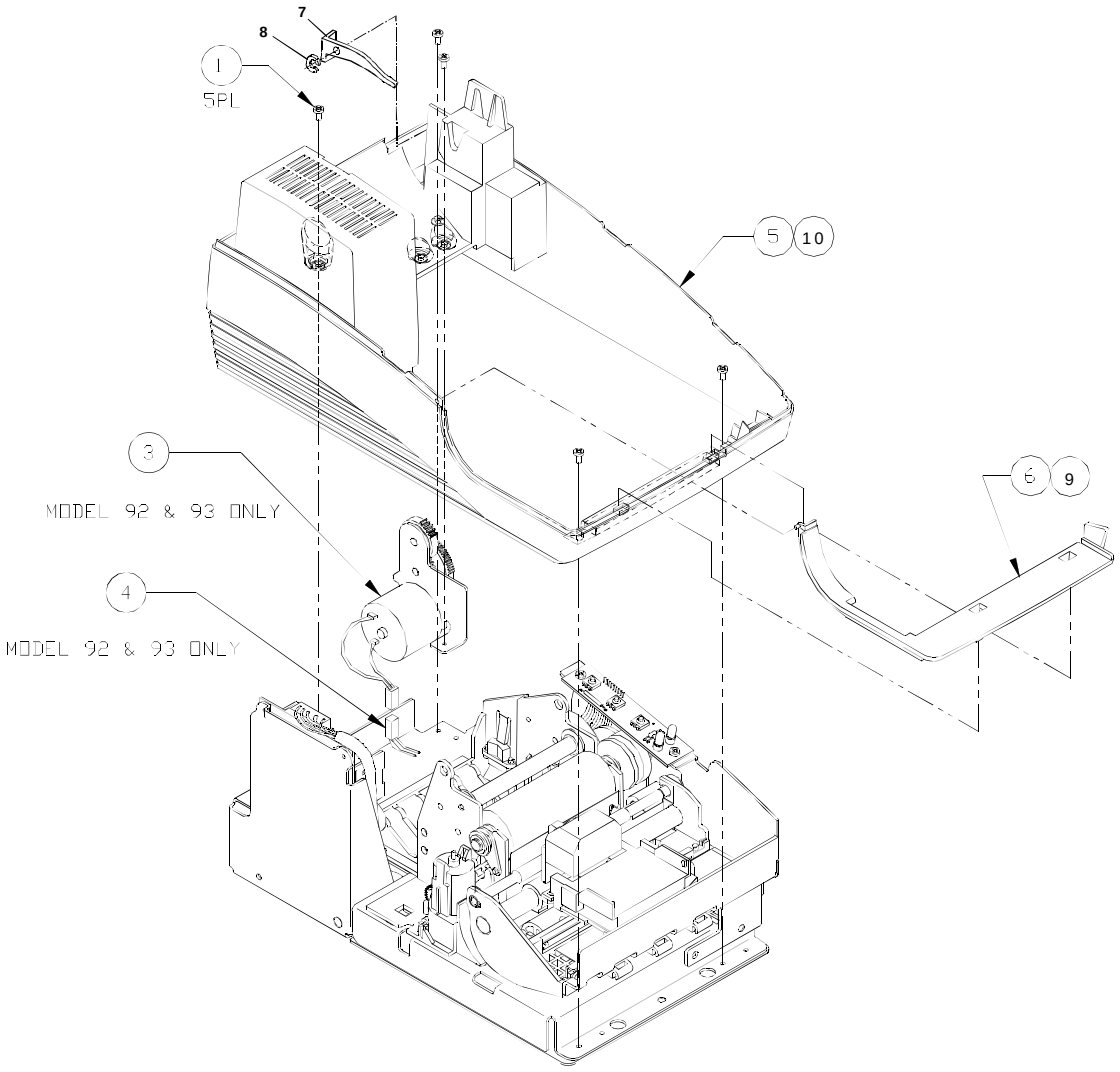
RIGHT COVER ASSEMBLY WITH LOCK (90-7470)



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-6322	1	Cover – Right (Ithaca)
2	90-6418	1	Button – PCB (green)
3	90-6429	1	Assembly – Journal lock
4	90-6419	1	Button – PC board (OKI gray)
5	90-6639	1	Label – Keypad (Ithaca)*
6	90-7867	1	Label – Keypad (No logo)*
7	90-7892	1	Label – Keypad (OKI)*
8	90-6323	1	Cover – Right (OKI gray)
9	90-9040	1	Label – Keypad (No logo) (gray)*
10	90-7977	1	Label – Keypad (Hewlett Packard)*

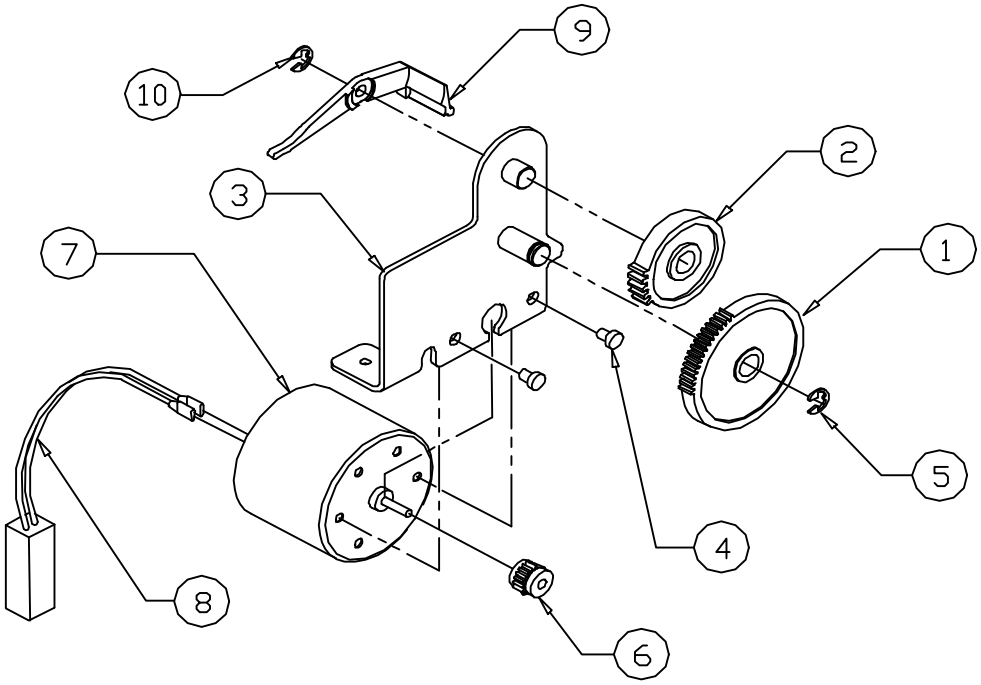
* Order separately from Assembly 90-7464.

BASE CABINET AND TAKE-UP MOTOR



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	98-0611	5	Screw – M3x6mm PHPS PHD
3	90-7462	1	Assembly – Take-up motor
4	90-6641	1	Cable – Journal take-up intermediate
5	90-6320	1	Base – Cabinet (light tan)
6	90-6321	1	Bezel – Cabinet (light tan)
7	90-6460	1	Arm
8	520-9800002	1	Keeper – E-ring (5133-12)
9	90-7906	1	Bezel – Cabinet (gray)
10	90-7901	1	Base – Cabinet (gray)

TAKE-UP MOTOR ASSEMBLY (90-7462)



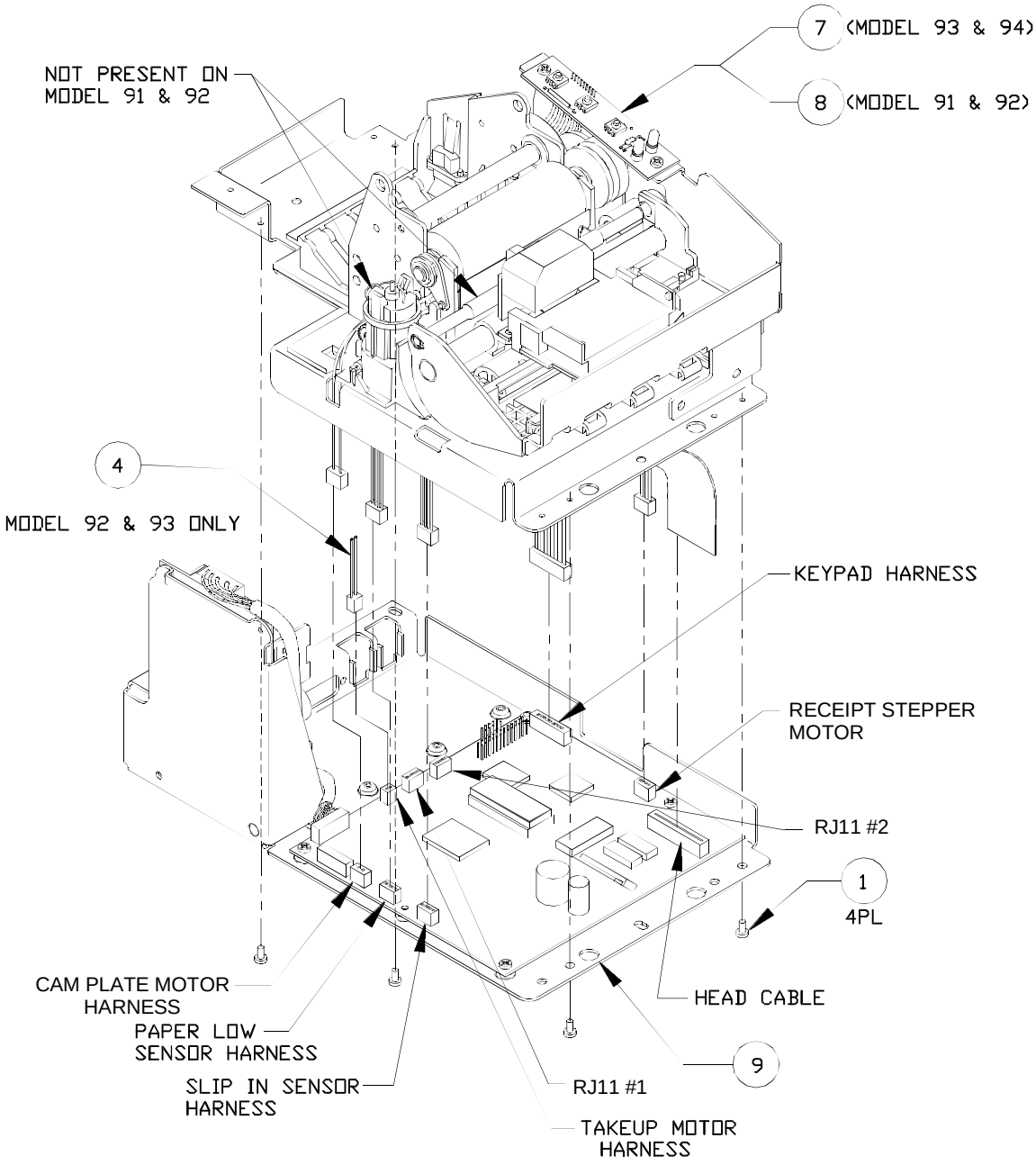
Notes

1. White wire of 90-6624 to be connected to negative (-) terminal of 06-1187.
2. Black wire of 90-6624 to be connected to positive (+) terminal of 06-1187.

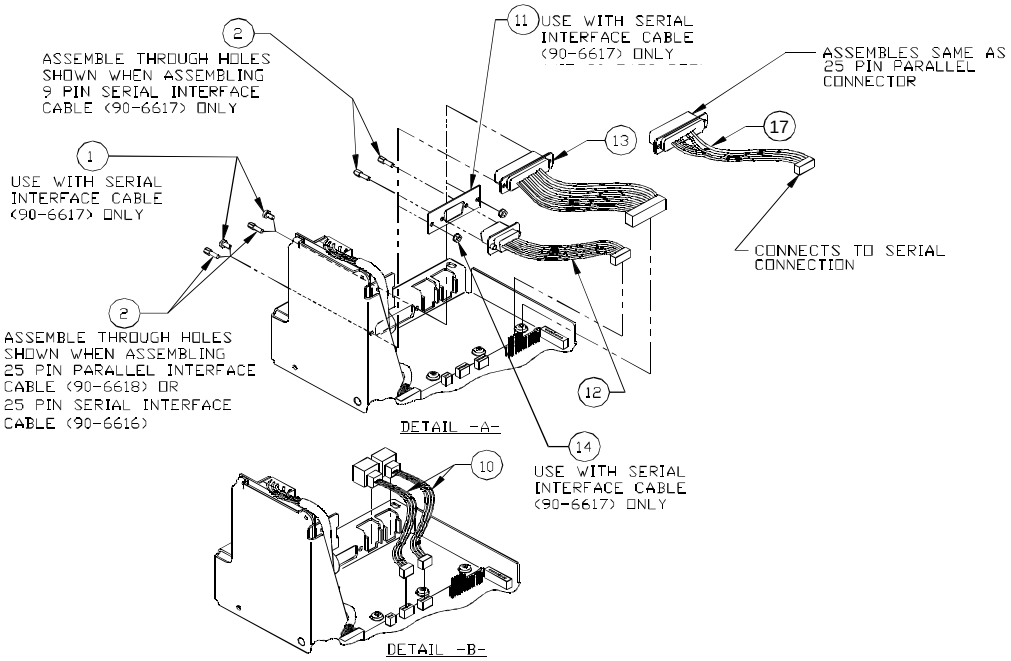
ITEM NO.	PART NO.	QTY	DESCRIPTION
1	06-1112*	1	Gear – Idler
2	10-1315*	1	Gear – Slip drive
3	90-9782*	1	Bracket – Motor
4	98-1182*	2	Screw – M2.6x4mm PHPS PHD
5	520-9800006*	1	Retainer – E-ring
6	06-1118*	1	Gear – 2 mm diameter, pinion
7	06-1187*	1	Motor – SOHO DC MICRO
8	90-6624	1	Cable – Take-up
9	90-6460	1	Arm
10	520-9800002	1	Retainer – E-ring (5133-12)

* Not available as a spare part

MECHANICAL/ELECTRICAL BASE ASSEMBLY



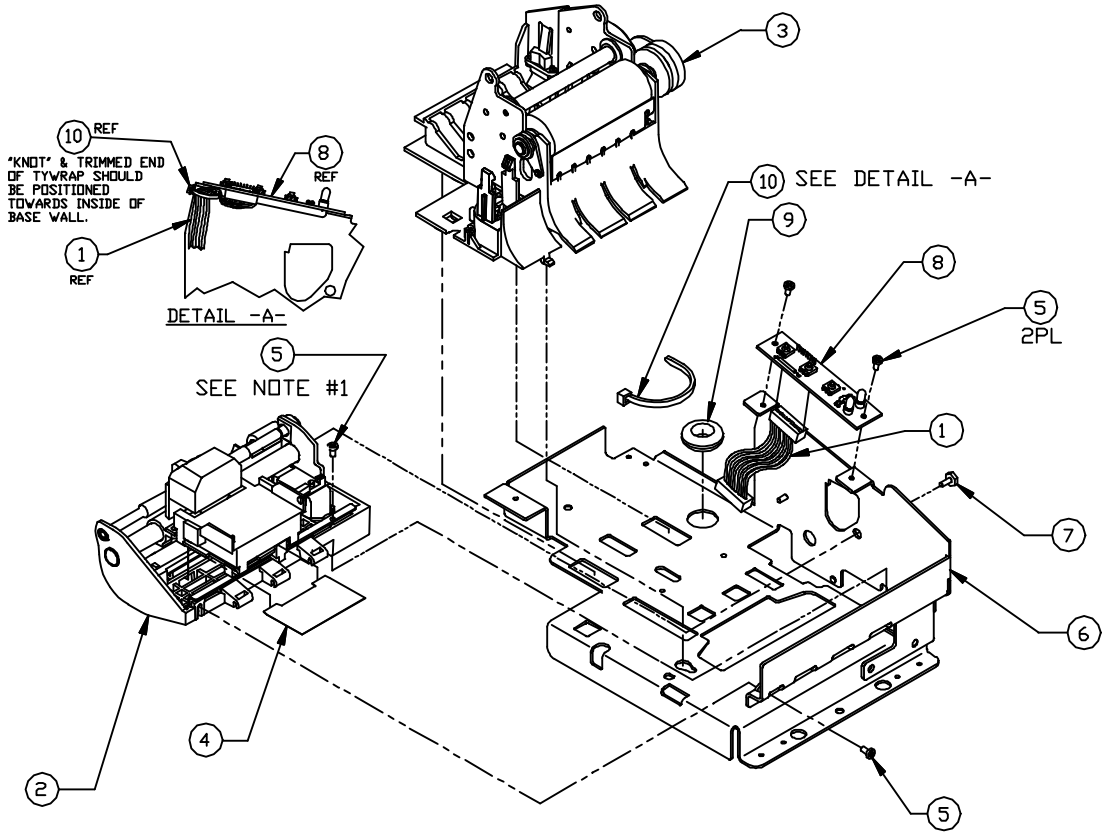
MECHANICAL/ELECTRICAL BASE ASSEMBLY (CONTINUED)



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	98-0611	6	Screw – M3x6mm PHPS PHD
2	98-2033	2	Jack screw
4	90-6641	1	Cable – Journal take-up intermediate
7	90-7550*	1	Assembly – Mechanism base M93PLUS and M94PLUS
7	90-9294*	1	Assembly – Mechanism base (3” paper; M93PLUS and M94PLUS)
8	90-7582*	1	Assembly – Print mechanism M91PLUS and M92PLUS
8	90-9295*	1	Assembly – Mechanism base (3” paper; M91PLUS and M92PLUS)
9	90-7440*	1	Assembly – Electronic base
10	90-6615	2	Cable – Cash drawer
11	90-6120	1	Plate – Adapter
12	90-6617	1	Cable – 9-pin serial interface
13	90-6618	1	Cable – 25-pin parallel interface
14	98-0621	2	Nut – M3 SEMS
17	90-6616	1	Assembly – Cable 25-pin serial harness (M91PLUS)

* Not available as a spare part

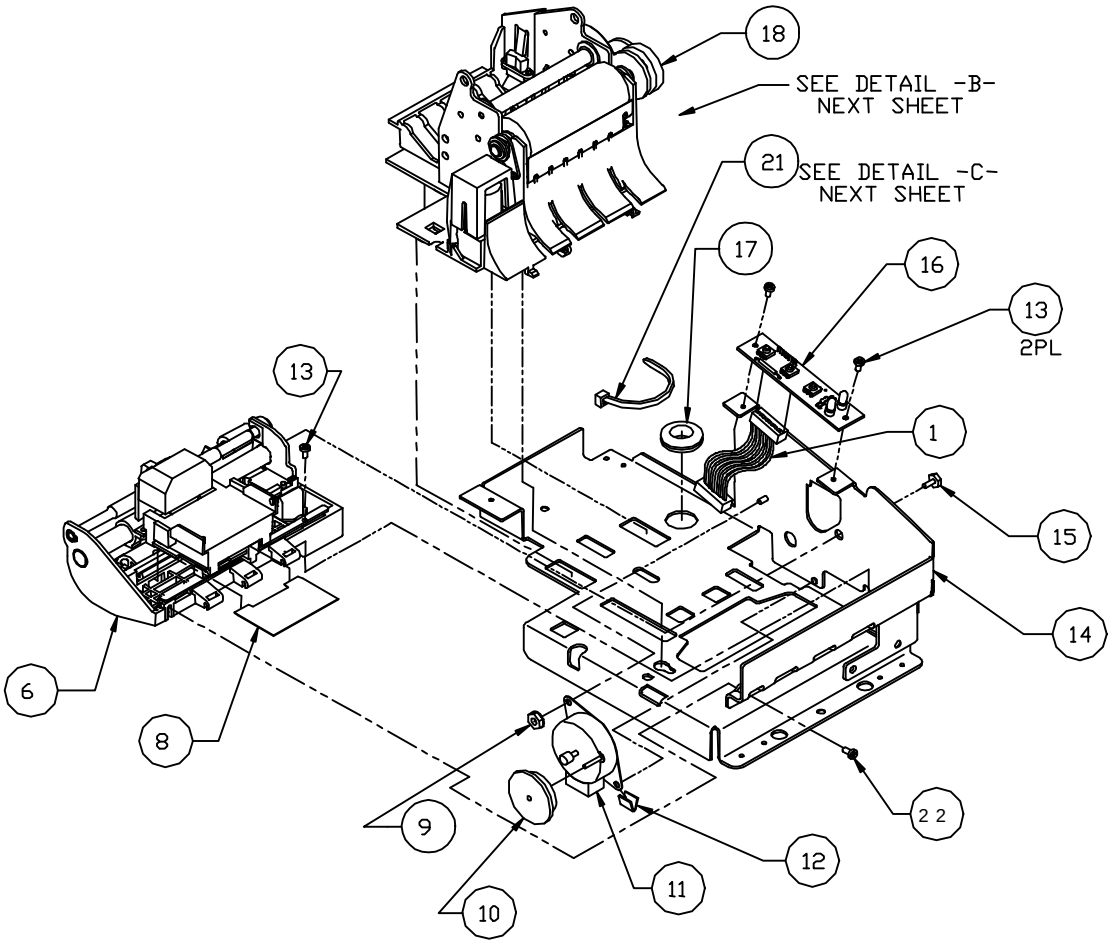
MECHANISM BASE ASSEMBLY - MODELS 91PLUS AND 92PLUS



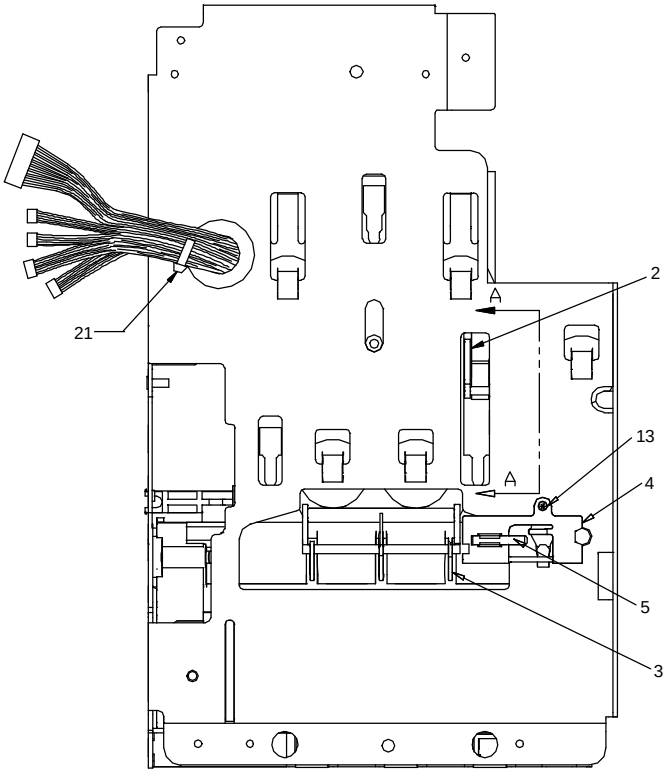
ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-6619	1	Cable – Keypad
2	90-7887*	1	Assembly – Print mechanism
3	90-9043	1	Assembly – Carrier/Cam Plate (standard)
3	90-9292	1	Assembly – Carrier/Cam Plate (3” paper)
4	90-6054	1	Mylar – Head cable
5	98-0611	4	Screw – M3x6mm PHPS PHD
6	90-01160	1	Base assembly
7	06-0579	1	Screw – Carriage
8	90-6580	1	PC board – Keypad
9	98-6612	1	Grommet
10	98-0941	1	Ty-wrap – 3 3/8” long

* Not available as a spare part

MECHANISM BASE ASSEMBLY - MODELS 93PLUS AND 94PLUS

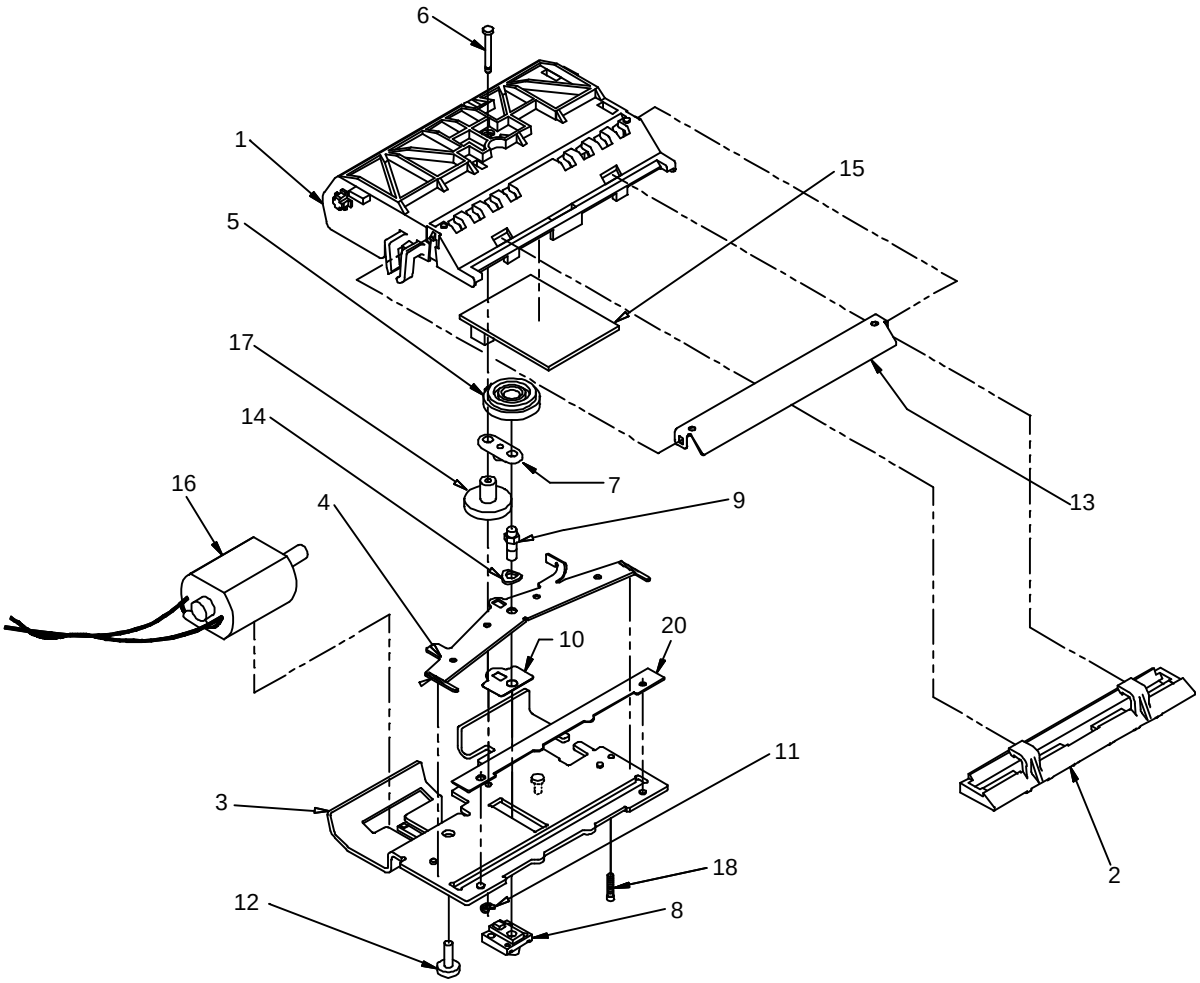


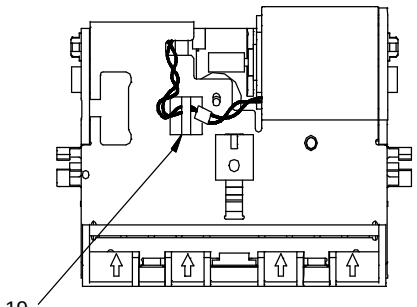
MECHANISM BASE ASSEMBLY - MODELS 93PLUS AND 94PLUS (CONTINUED)



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-6619	1	Harness – Keypad
2	90-6032*	1	Flag – Cam Sensor
3	90-01473*	1	Flag - Bank validation
3	90-9969*	1	Flag - Slip-stop sensor
4	90-9970*	1	Bracket - Magnet mounting
5	98-6498	1	Magnet
6	90-7433	1	Assembly – Print mechanism M93PLUS and M94 PLUS
8	90-6054	1	Mylar – Head cable
9	98-0621	1	Nut – M3 hex KEPS lock washer
10	50-1470	1	Gear – Stepper
11	06-0566	1	Motor – Line feed (slip)
12	98-7970	1	Clip – Retainer
13	98-0611	4	Screw – M3x6mm PHPS PHD
14	90-01160	1	Assembly – Base
15	06-0579	1	Screw – Carriage
16	90-6580	1	PC board – Keypad
17	98-6612	1	Grommet
18	90-9044	1	Assembly – Carrier/cam plate (standard)
18	90-9293	1	Assembly – Carrier/cam plate (3” paper)
21	98-0941	2	Ty-wrap – 3-3/8” long
22	98-0897	1	Screw – M3x8mm PHPS PHD

KNIFE ASSEMBLY



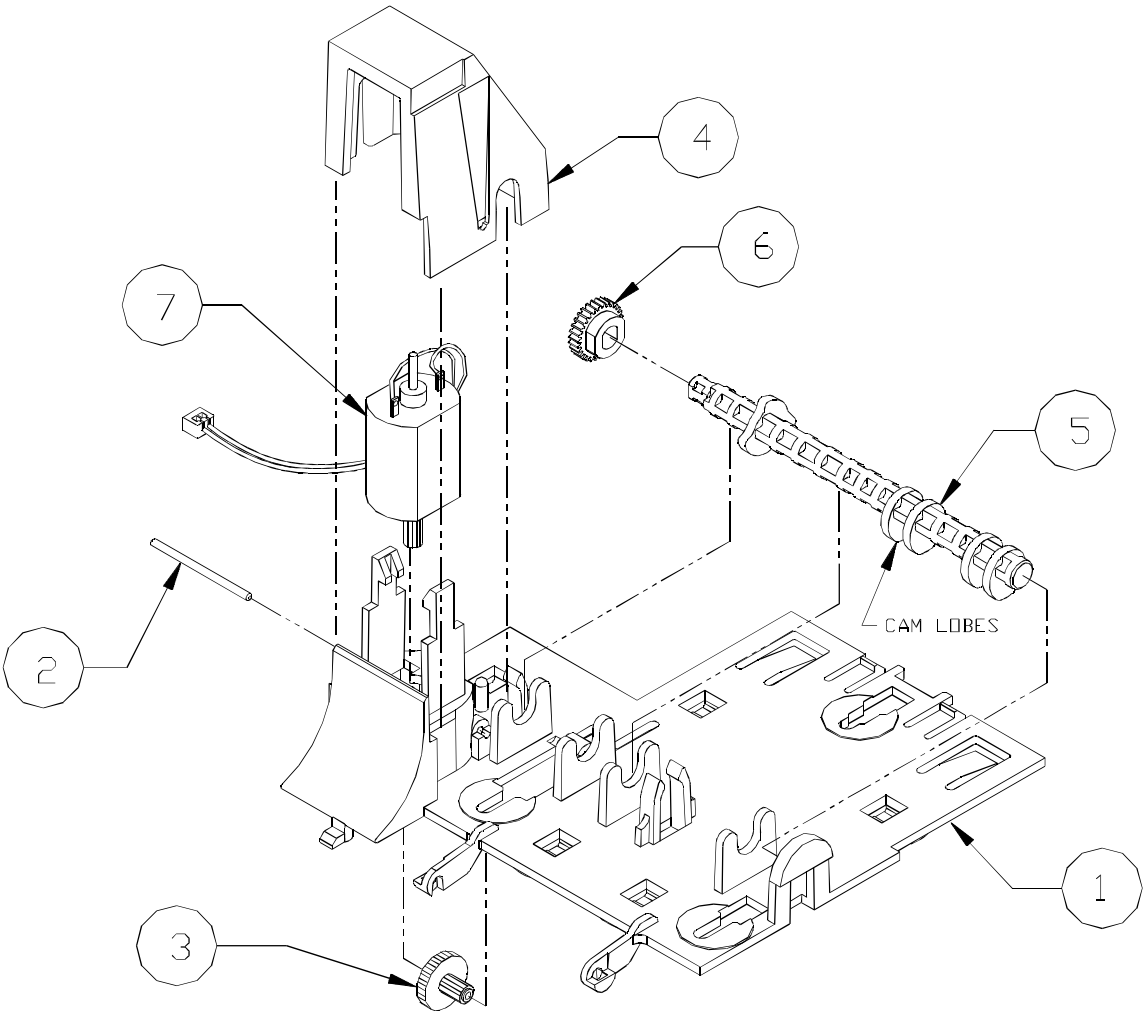


Detail A
Bottom view

ITEM NO.	PART NO.	QTY	DESCRIPTION
	90-01817	1	Assembly - Knife Module
1	90-01255*	1	Frame - Knife
2	90-6071*	1	Guide - Knife
3	15-01323*	1	Plate - Knife
4	15-01900*	1	Blade - Moving (Ground)
5	90-9673*	1	Gear - Knife, 36 Tooth
6	90-9742*	1	Pin - Knife
7	15-01872*	1	Rod - Connecting
8	15-01326*	1	Slider - Knife
9	90-6080*	1	Stud - Drive
10	15-01189*	1	Film - Teflon
11	98-6083*	1	E-ring
12	98-2052*	1	Screw
13	90-6076*	1	Tear-off - Knife
14	98-6084*	1	Washer - Spring
15	90-9061*	1	Assembly - PCB
16	15-9986*	1	Assembly - Knife Motor
17	90-9182*	1	Gear - Compound
18	98-0898*	1	Screw - #0, 80 x 5/16
19	98-9187*	1	Retainer - Wire
20	15-01899*	1	Blade - Shear (Ground)

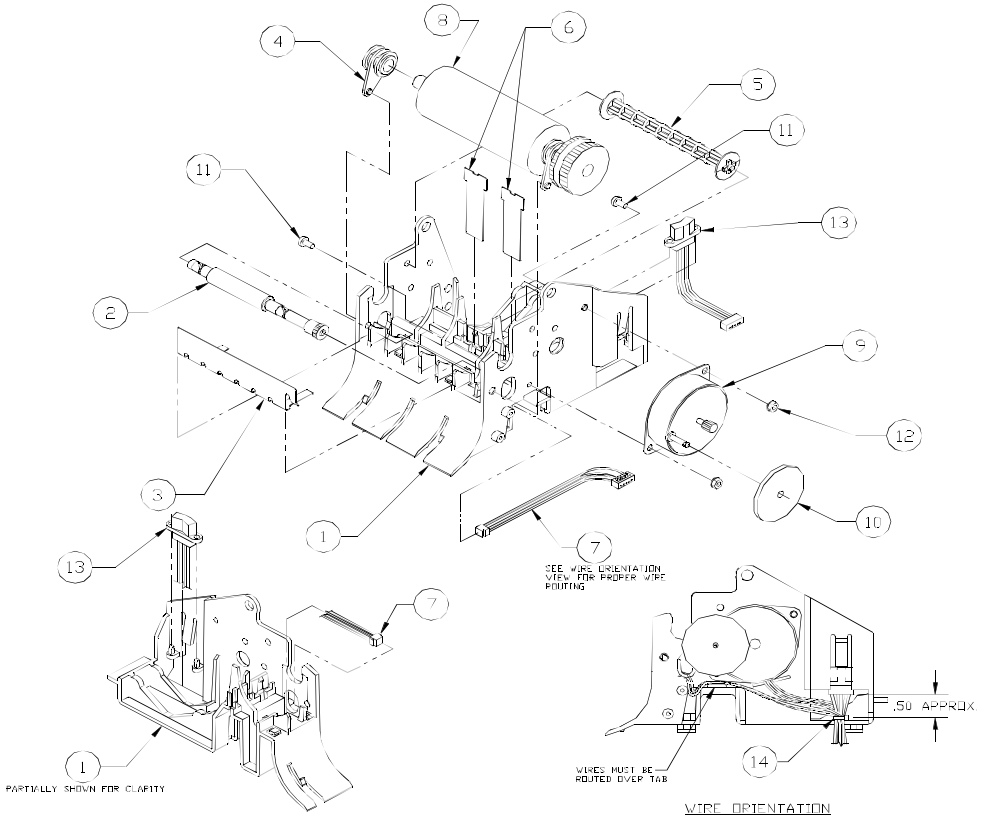
* Not available as a spare part

CAM PLATE ASSEMBLY



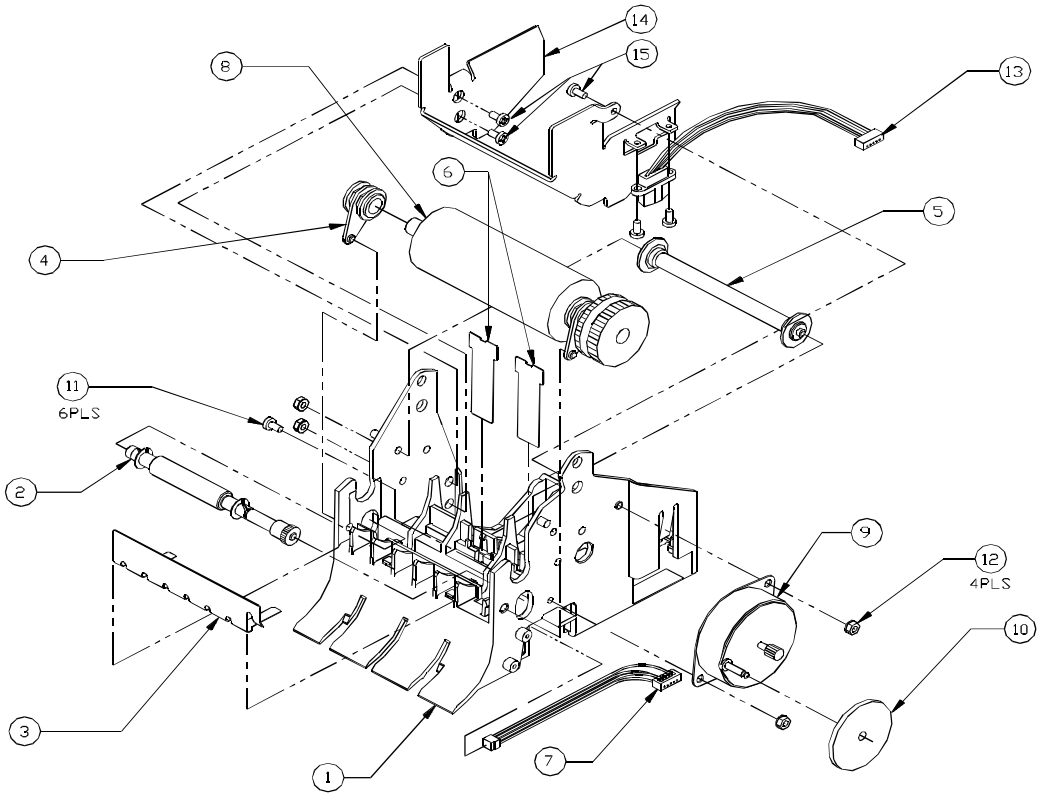
ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-01171	1	Plate – Cam
2	90-6031	1	Pin – 0.078 inch diameter
3	90-6035	1	Gear – Compound
4	90-01158	1	Shroud – Motor
5	90-01463	1	Shaft – Cam
6	90-6063	1	Gear – Cam shaft
7	90-7436	1	Assembly – Cam plate motor

CARRIER ASSEMBLY (STANDARD)



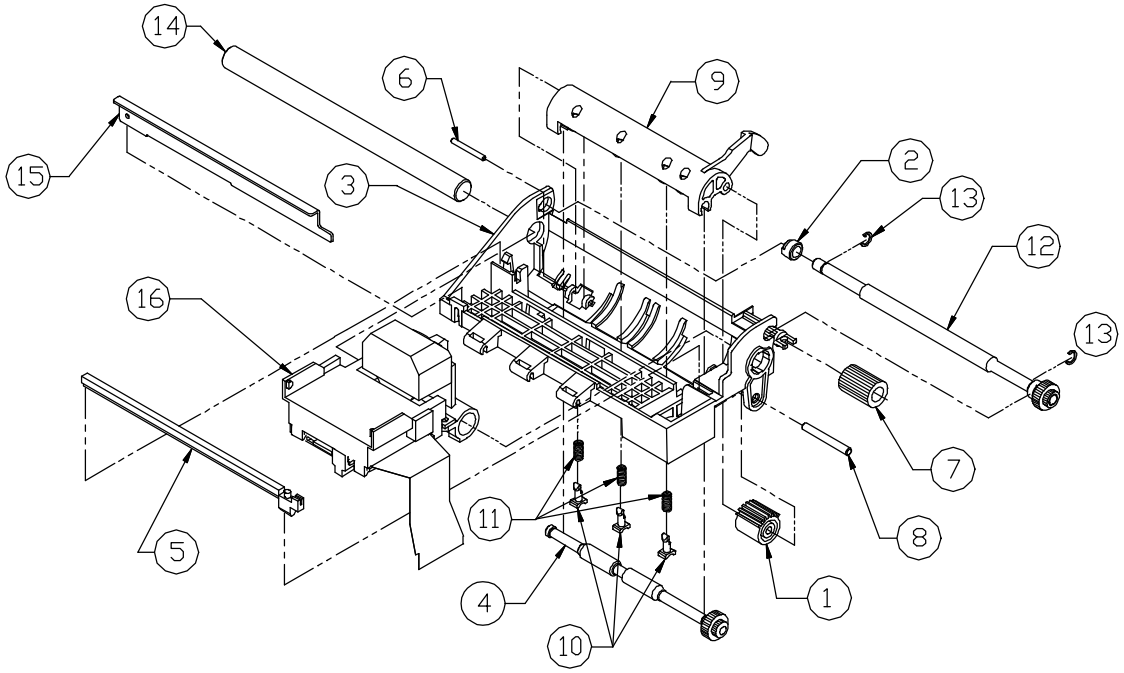
ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-01464	1	Carrier – Forms comp
2	90-9745	1	Shaft – Pressure
3	90-6018	1	Plate – Spring
4	90-6025	1	Bearing – Platen
5	90-6024	1	Roller – Receipt
6	90-6026	2	Springs – Forms comp
7	90-9092	1	Assembly – Forms-in sensor
8	90-9684	1	Assembly – Platen
9	R90-6010	1	Assembly – Line feed motor
10	R90-7346	1	Gear – Line feed motor
11	98-0611	2	Screw – M3x6mm PHPS PHP
12	98-0621	2	Nut – M3 hex KEPS lock washer
13	90-6626	1	Assembly – Paper-low sensor
14	98-0941	1	Ty-wrap – 3 3/8” long

CARRIER ASSEMBLY (3” PAPER OPTION)



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-01464	1	Carrier – Forms comp
2	90-9745	1	Shaft – Pressure roll
3	90-6018	1	Plate – Spring
4	90-6025	1	Bearing – Platen
5	90-6024	1	Roller – Receipt
6	90-6026	2	Springs – Forms comp
7	90-9092	1	Assembly – Forms-in sensor
8	90-9684	1	Assembly – Platen
9	R90-6010	1	Assembly – Line feed motor
10	R90-7346	1	Gear – Line feed motor
11	98-0611	6	Screw – M3x6mm PHPS PHP
12	98-0621	4	Nut – M3 hex KEPS lock washer
13	90-6626	1	Assembly – Paper-low sensor
14	90-6045	1	Bucket – 3” paper
15	98-0897	3	Screw – M3 x 8 mm PHPS PHP

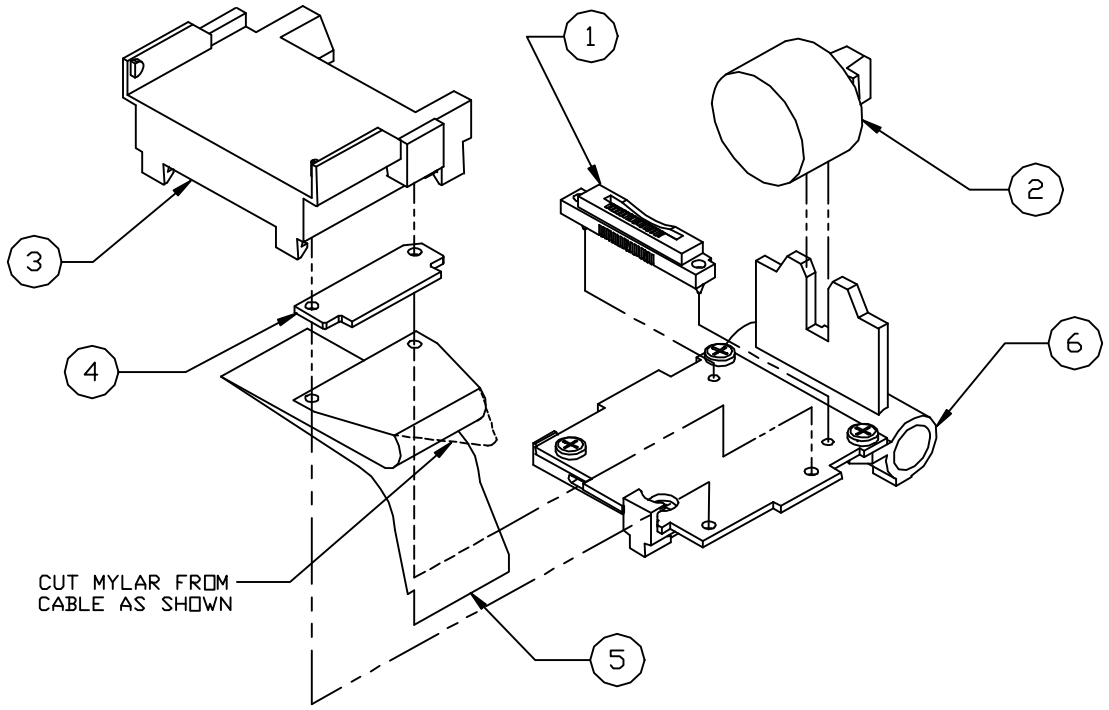
PRINT MECHANISM ASSEMBLY



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	06-0546	1	Gear – Idler
2	06-0682	1	Bearing – Feed roll
3	90-6050	1	Frame – Print mechanism
4	90-6052	1	Shaft – Slip drive
5	R90-6056	1	Rack – Space
6	90-6057	1	Pin – 0.098” diameter
7	90-6058	1	Gear – 18T/32P
8	90-6059	1	Pin – 0.156” diameter
9	90-6061	1	Actuator
10	90-01466	3	Bearing – Actuator
11	98-6064	3	Spring – Compression
12	90-9675	1	Assembly – Validation drive shaft
13	520-9800104	2	Retainer – C-ring 0.23” diameter
14	90-6000	1	Shaft – Carriage
15	90-6053	1	Rail – Carriage
16	90-7432*	1	Assembly – Carriage

* Not available as a spare part

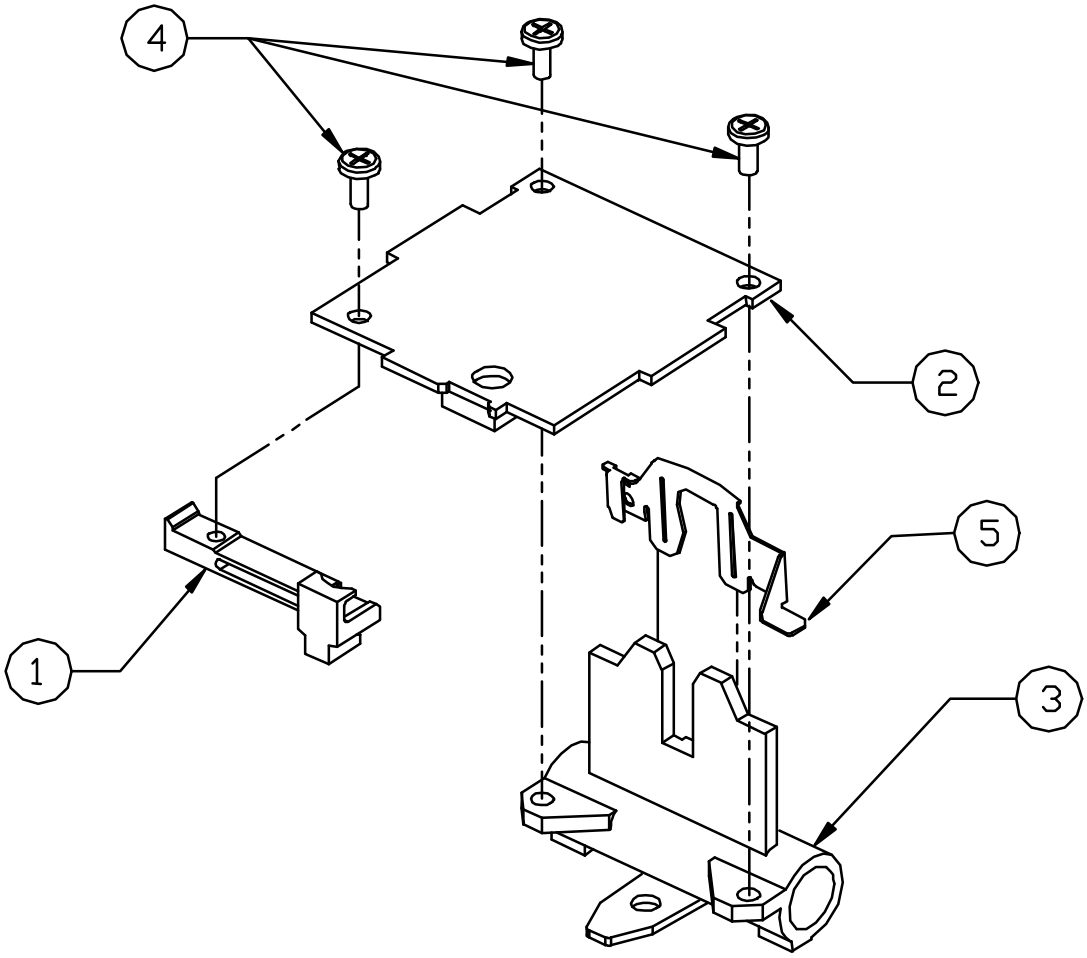
CARRIAGE ASSEMBLY



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	R06-0574	1	Connector – Print head
2	R90-7337	1	Print head
3	R90-7338	1	Assembly – Ribbon feed gear
4	R90-7339	1	Rubber – Contact pressure
5	R90-7340	1	Cable – Head
6	90-7431*	1	Assembly – Carriage motor

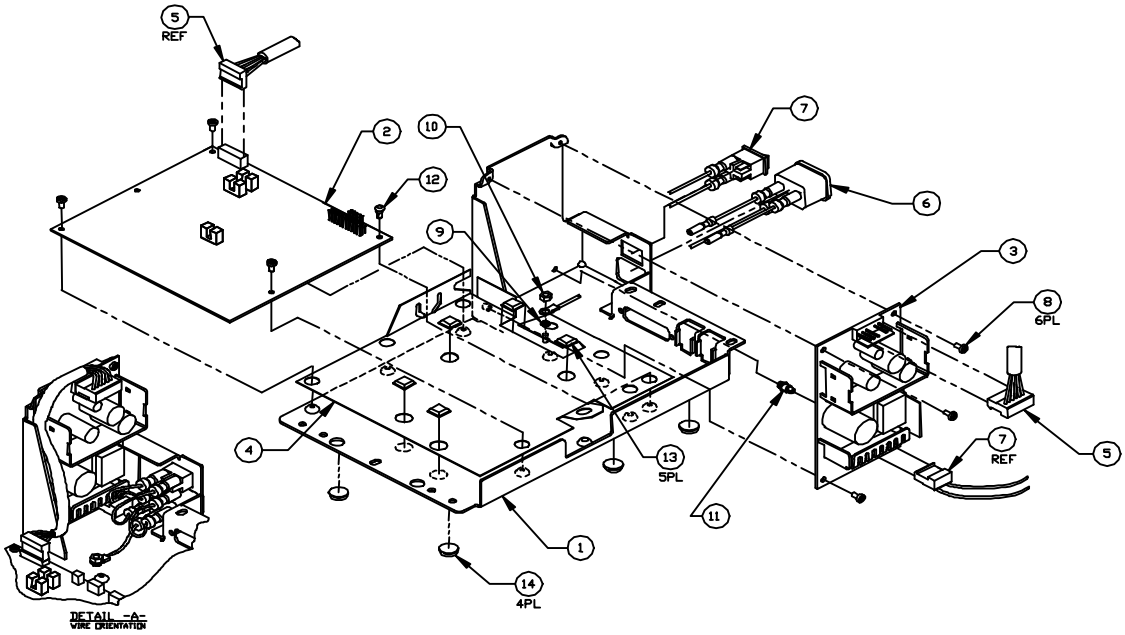
* Not available as a spare part

CARRIAGE MOTOR ASSEMBLY



ITEM NO.	PART NO.	QTY	DESCRIPTION
1	R06-0575	1	Slider – OKI
2	98-7280	1	Assembly – Space motor
3	R90-7341	1	Roller – Carriage
4	R90-7342	3	Screw – Carriage
5	R06-0571	1	Clamp – Print head

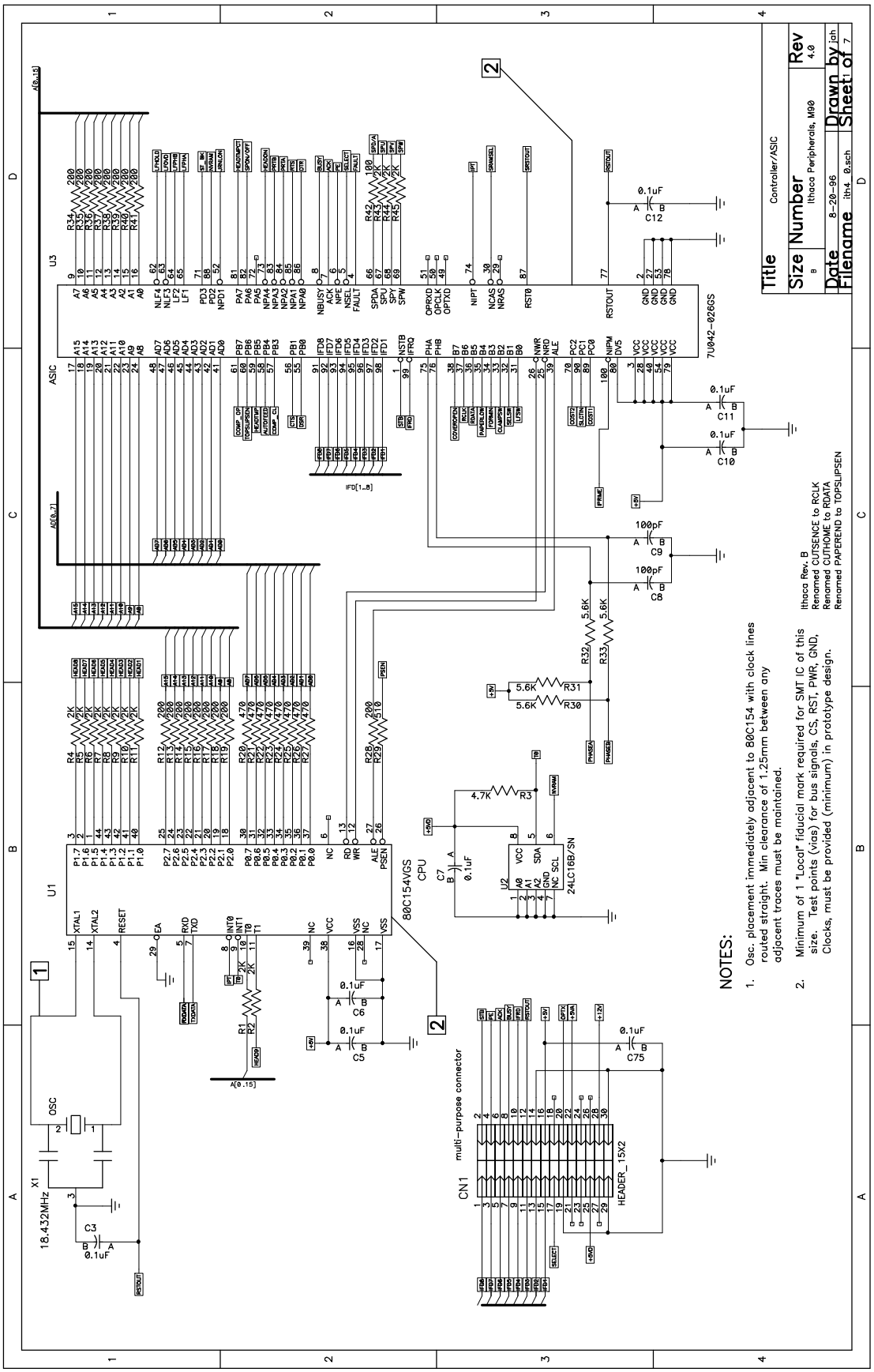
ELECTRONIC BASE ASSEMBLY

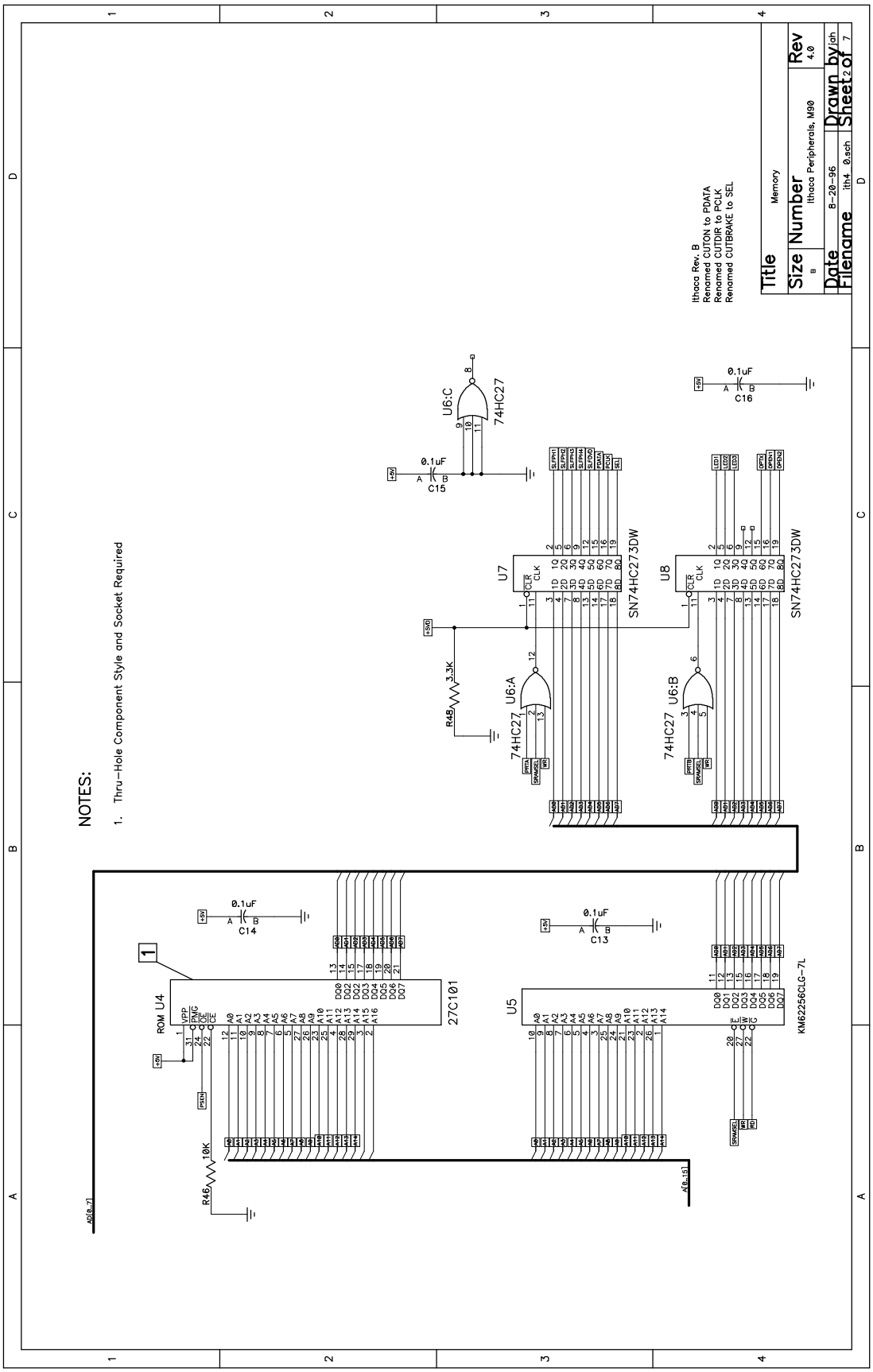


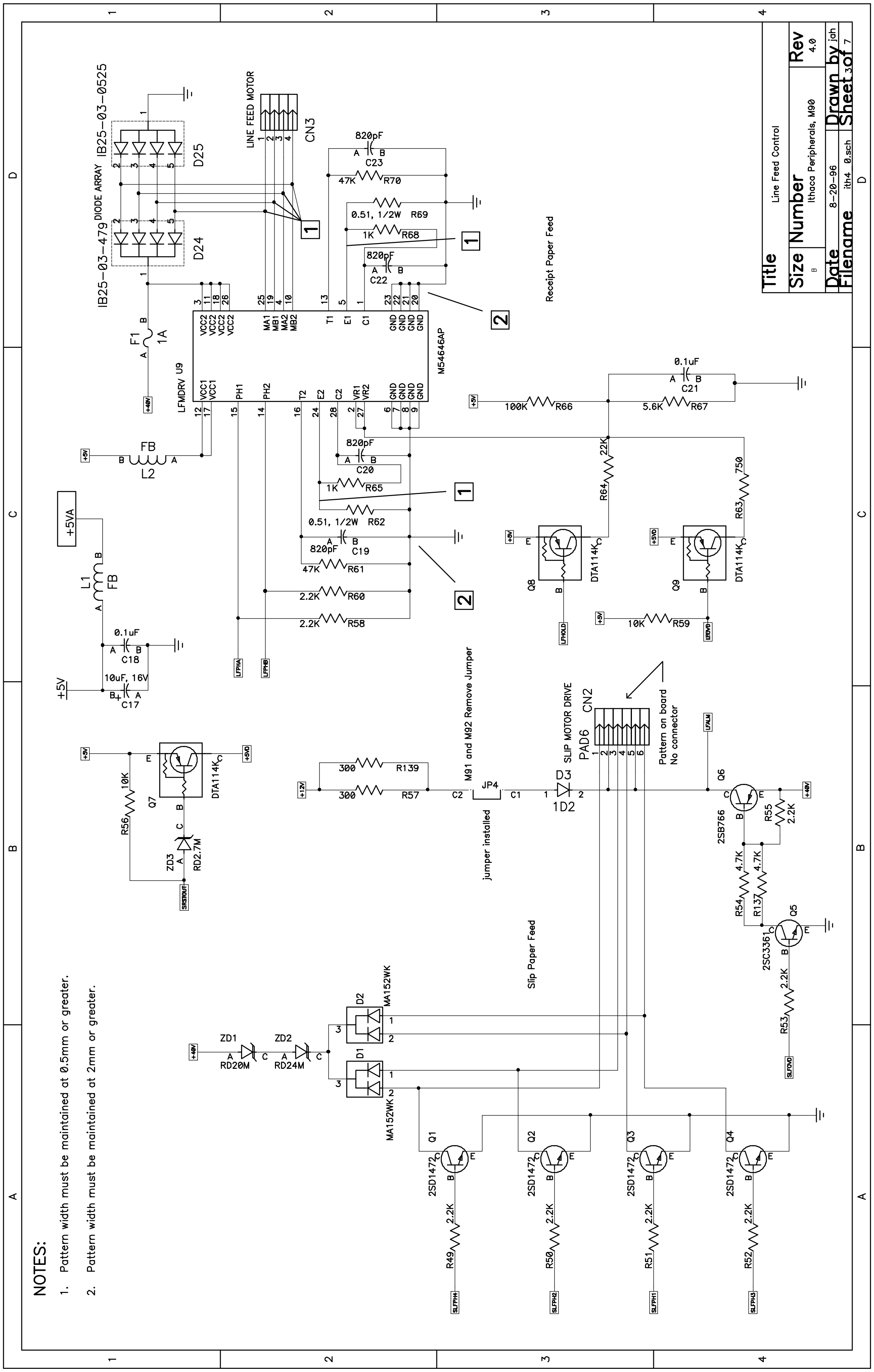
ITEM NO.	PART NO.	QTY	DESCRIPTION
1	90-6106	1	Base – Electronic
2	R90-7347	1	Assembly – Controller board
3	98-9796	1	Assembly – Power supply
4	90-9958*	1	Insulator
5	90-9046	1	Harness – DC power
6	90-7441	1	Assembly – AC inlet
7	90-7442	1	Assembly – Power switch
8	98-0611	6	Screw – M3x6mm PHPS PHD
9	98-0653	1	Lock washer – M3
10	98-1832	1	Nut – M3 hex jam
11	98-7476	1	Standoff – Power assembly
12	98-6122	1	Snap rivet
13	98-6614	5	Foot – Rubber (PCB mount)
14	06-0553	4	Foot – Rubber (Printer bottom)

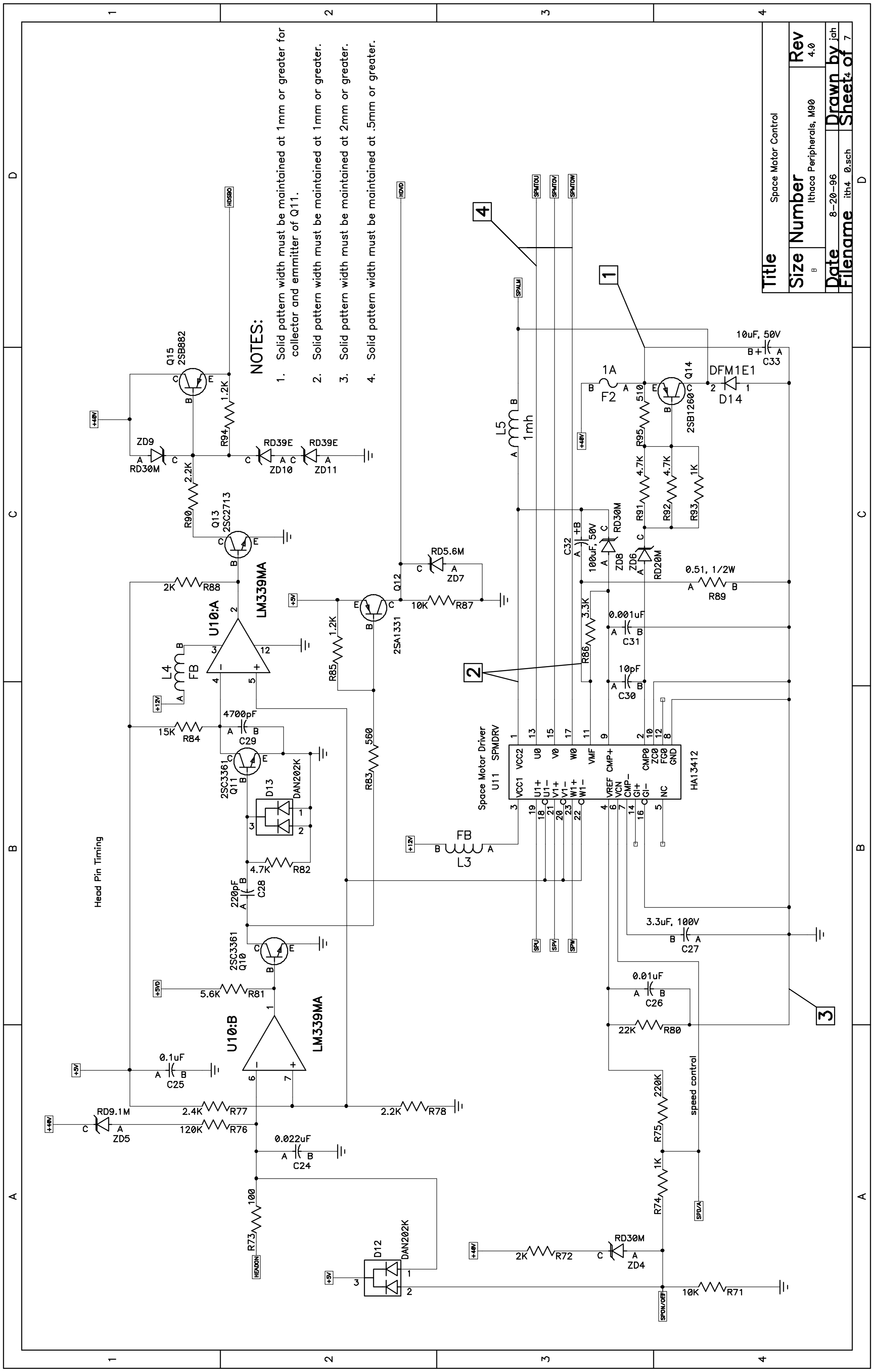
* Not available as a spare part

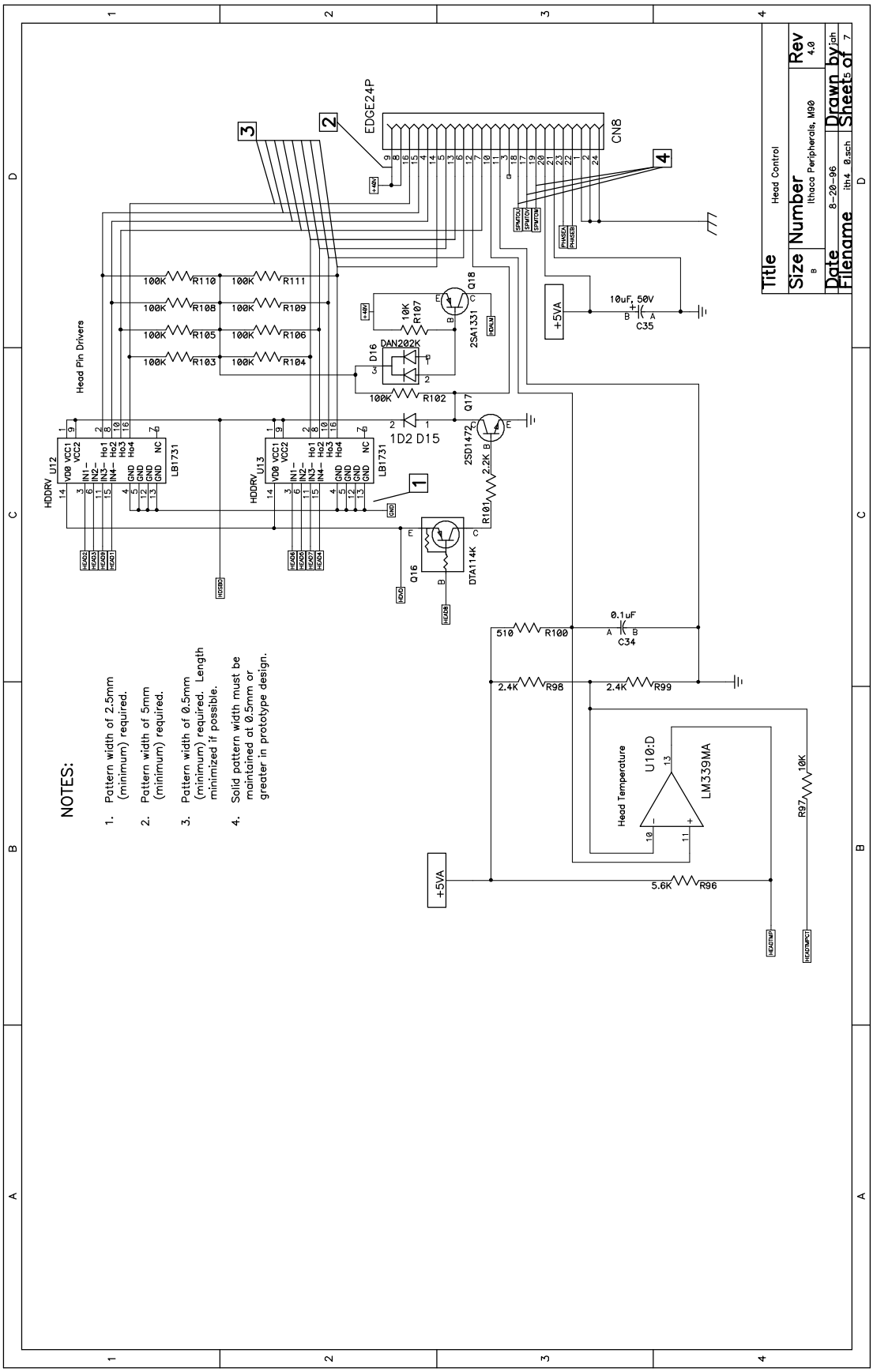
APPENDIX C: SCHEMATICS

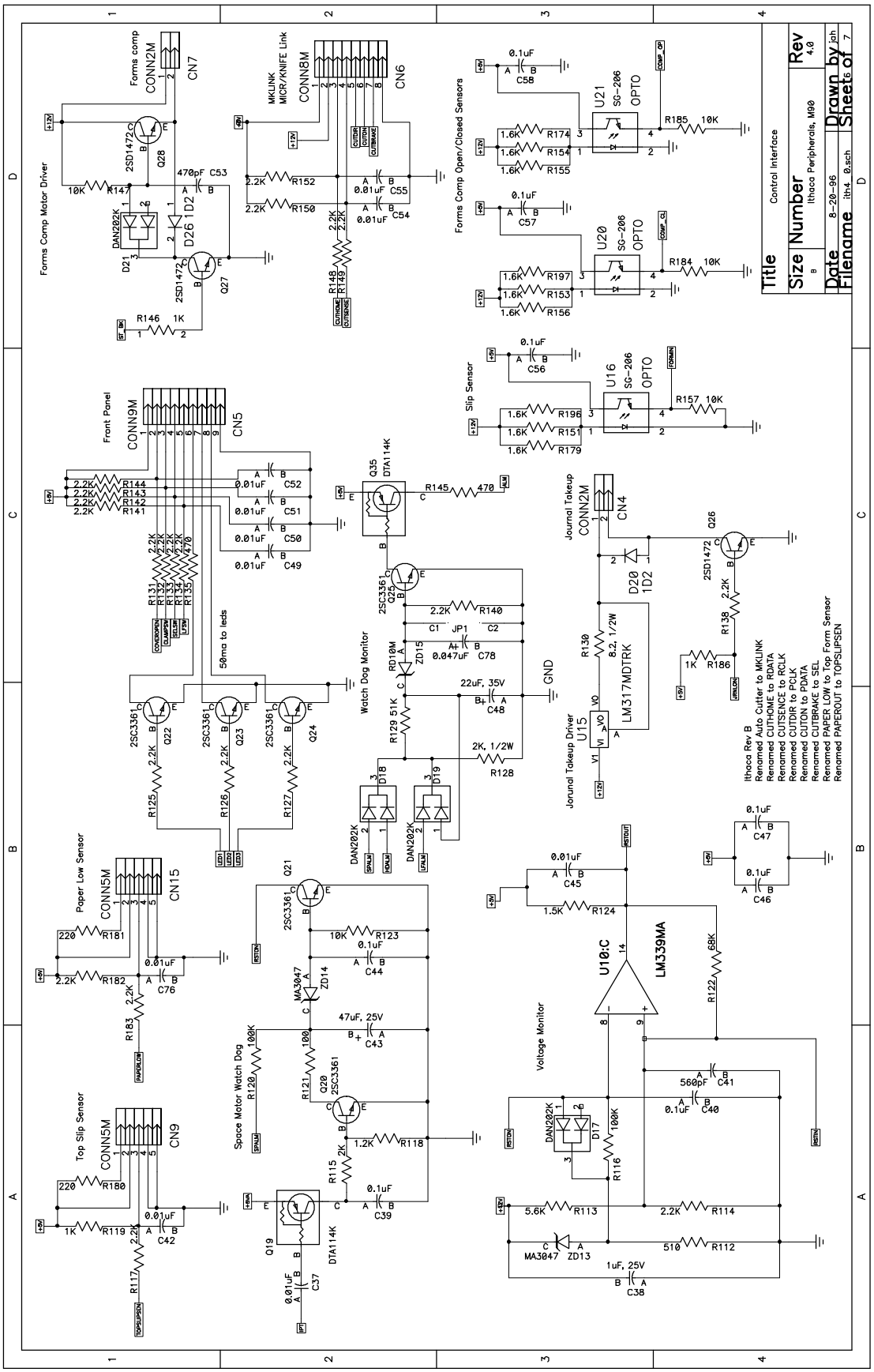

Title
Controller/ASIC
Size
B
Number
Ithaca Peripherals, M90
Rev
4.0
Date
8-20-96
Drawn by
jah
Filename
ith4_0.sch
Sheet of
7
NOTES:
1. Osc. placement immediately adjacent to 80C154 with clock lines routed straight. Min clearance of 1.25mm between any adjacent traces must be maintained.
2. Minimum of 1 "Local" fiducial mark required for SMT IC of this size. Test points (vias) for bus signals, CS, RST, PWR, GND, Clocks, must be provided (minimum) in prototype design.
Ithaca Rev. B
Renamed CUTSENCE to RCLK
Renamed CUTHOME to RDATA
Renamed PAPEREND to TOPSLIPSEN
U1
80C154VGS
CPU
ASIC
U3
7U042-026GS
U2
24LC16B/SN
X1
18.432MHz
OSC
CN1
multi-purpose connector
HEADER_15X2
IFD[1..8]
A[0..15]
A[0..7]

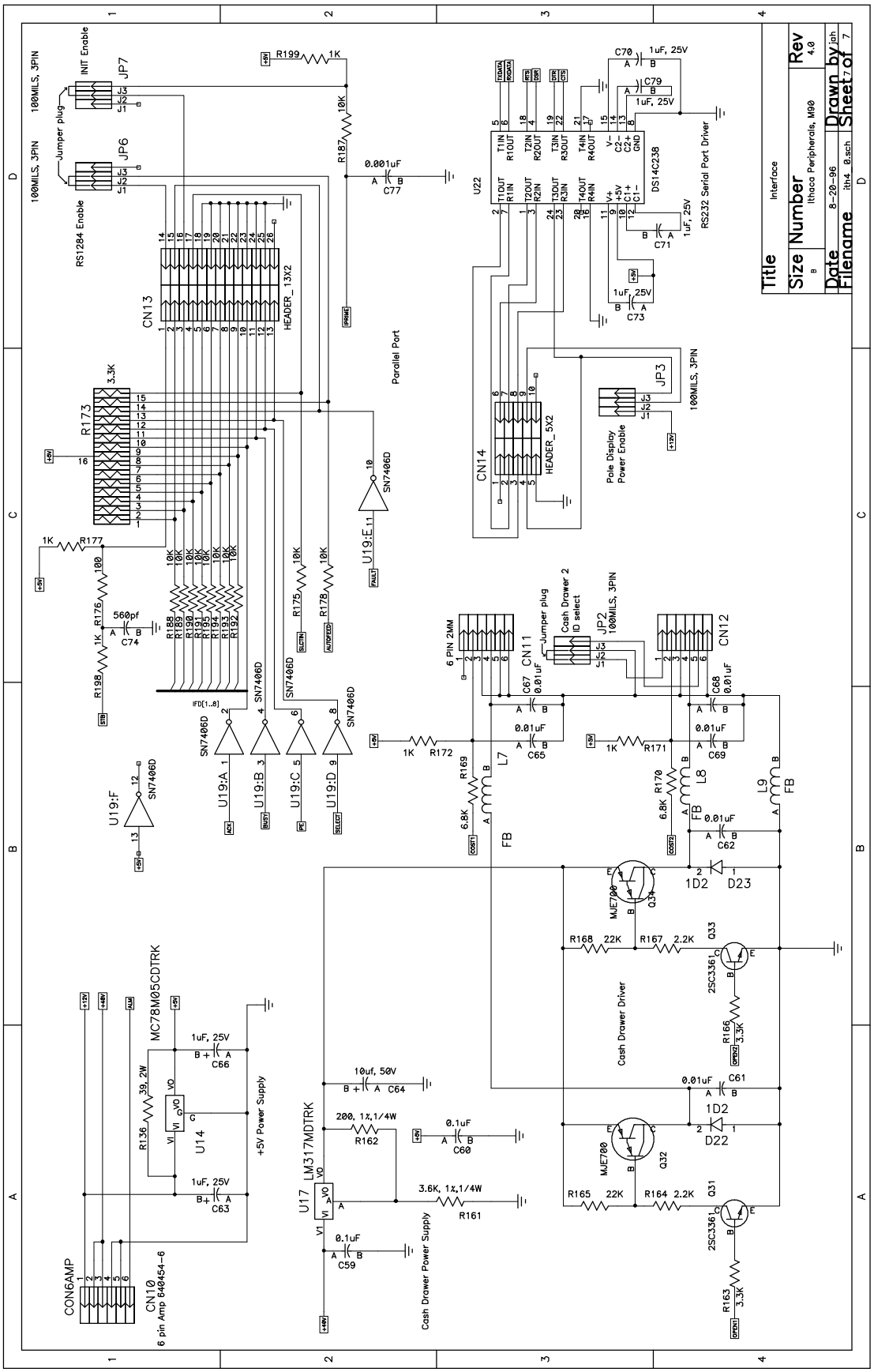

NOTES:
1. Thru-Hole Component Style and Socket Required
Ithaca Rev. B
Renamed CUTON to PDATA
Renamed CUTDIR to PCLK
Renamed CUTBRAKE to SEL
Title
Memory
Size
B
Number
Ithaca Peripherals, M90
Rev
4.0
Date
8-20-96
Drawn by
jdh
Filename
ith4_0.sch
Sheet 2 of 7
ROM U4
27C101
U5
KM622256CLG-7L
U6:A
U6:B
U6:C
74HC27
U7
U8
SN74HC273DW
R46
10K
R48
3.3K
C13
C14
C15
C16
0.1uF
+5V
A0[0..7]
A[0..16]


Title
Line Feed Control
Size Number
Ithaca Peripherals, M90
Rev
4.0
Date
8-20-96
Drawn by
jah
Filename
ith4_0.sch
Sheet 3 of 7
Receipt Paper Feed
Slip Paper Feed
LINE FEED MOTOR
SLIP MOTOR DRIVE
M91 and M92 Remove Jumper
jumper installed
Pattern on board
No connector
NOTES:
1. Pattern width must be maintained at 0.5mm or greater.
2. Pattern width must be maintained at 2mm or greater.


NOTES:
1. Solid pattern width must be maintained at 1mm or greater for collector and emmitter of Q11.
2. Solid pattern width must be maintained at 1mm or greater.
3. Solid pattern width must be maintained at 2mm or greater.
4. Solid pattern width must be maintained at .5mm or greater.
Head Pin Timing
Space Motor Driver
U11 SPMDRV
HA13412
speed control
Title Space Motor Control
Size B
Number Ithaca Peripherals, M90
Rev 4.0
Date 8-20-96
Drawn by jah
Filename ith4_0.sch
Sheet 4 of 7


Title
Head Control
Size
B
Number
Ithaca Peripherals, M90
Rev
4.0
Date
8-20-96
Drawn by
jch
Filename
ith4 0.sch
Sheet 5 of 7
EDGE24P
CN8
Head Pin Drivers
HDDRV U12
HDDRV U13
LB1731
100K R110
100K R111
100K R108
100K R109
100K R105
100K R106
100K R103
100K R104
10K R107
Q18
2SA1331
D16
DAN202K
100K R102
Q17
2SD1472
1D2 D15
2.2K R101
Q16
DTA114K
+5VA
10uF, 50V
C35
0.1uF
C34
510 R100
2.4K R98
2.4K R99
Head Temperature
U10:D
LM339MA
R97 10K
5.6K R96
NOTES:
1. Pattern width of 2.5mm (minimum) required.
2. Pattern width of 5mm (minimum) required.
3. Pattern width of 0.5mm (minimum) required. Length minimized if possible.
4. Solid pattern width must be maintained at 0.5mm or greater in prototype design.


Title
Control Interface
Size
B
Number
Ithaca Peripherals, M90
Rev
4.0
Date
8-20-96
Drawn by
jch
Filename
ith4_0.sch
Sheet
6
of
7
Forms comp
CONN2M
CN7
Forms Comp Motor Driver
MKLINK
MICR/KNIFE Link
CONN8M
CN6
Forms Comp Open/Closed Sensors
Front Panel
CONN9M
CN5
Slip Sensor
Journal Takeup
CONN2M
CN4
Journal Takeup Driver
U15
LM317MDTRK
Watch Dog Monitor
50ma to leds
Paper Low Sensor
CONN5M
CN15
Top Slip Sensor
CONN5M
CN9
Space Motor Watch Dog
Voltage Monitor
U10:C
LM339MA
Ithaca Rev B
Renamed Auto Cutter to MKLINK
Renamed CUTHOME to RDATA
Renamed CUTSENCE to RCLK
Renamed CUTDIR to PCLK
Renamed CUTON to PDATA
Renamed CUTBRAKE to SEL
Renamed PAPER LOW to Top Form Sensor
Renamed PAPEROUT to TOPSLIPSEN


Title
Interface
Size B
Number
Ithaca Peripherals, M90
Rev 4.0
Date 8-20-96
Drawn by jch
Filename ith4_0.sch
Sheet 7 of 7
INIT Enable
JP7
Jumper plug
JP6
RS1284 Enable
100MILS, 3PIN
R199 1K
R187 10K
0.001uF C77
CN13
HEADER_13X2
Parallel Port
R173 3.3K
U22
DS14C238
RS232 Serial Port Driver
C70 1uF, 25V
C79 1uF, 25V
C71 1uF, 25V
C73 1uF, 25V
CN14
HEADER_5X2
JP3
Pole Display Power Enable
U19:E
SN7406D
R177 1K
R176 100
R174 1K
C74 560pf
R188 10K
R189 10K
R190 10K
R191 10K
R195 10K
R194 10K
R193 10K
R192 10K
R175 10K
R178 10K
IFD[1..8]
U19:A
U19:B
U19:C
U19:D
U19:F
CN11
6 PIN 2MM
JP2
Cash Drawer 2 ID select
CN12
C67 0.01uF
C68 0.01uF
C65 0.01uF
C69 0.01uF
R172 1K
R171 1K
L7 FB
L8 FB
L9 FB
R169 6.8K
R170 6.8K
C62 0.01uF
1D2
D23
MJE700
Q34
R168 22K
R167 2.2K
Q33
2SC3361
Cash Drawer Driver
R166 3.3K
C61 0.01uF
1D2
D22
MJE700
Q32
R165 22K
R164 2.2K
Q31
2SC3361
R163 3.3K
MC78M05CDTRK
U14
C66 1uF, 25V
R136 39, 2W
C63 1uF, 25V
+5V Power Supply
CON6AMP
CN10
6 pin Amp 640454-6
C64 10uf, 50V
R162 200, 1%,1/4W
C60 0.1uF
U17 LM317MDTRK
R161 3.6K, 1%,1/4W
C59 0.1uF
Cash Drawer Power Supply