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Federal Communications Commission Radio Frequency Interference Statement

This equipment complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules which are designed to minimize radio frequency interference in the installation; however, there is no guarantee that radio or television interference will not occur in any particular installation. If this 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;
- Move the printer away from the receiver;
- Plug the printer into a different outlet so that the printer and the receiver are on different outlets.

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

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Order stock number 004-000-00345-4.

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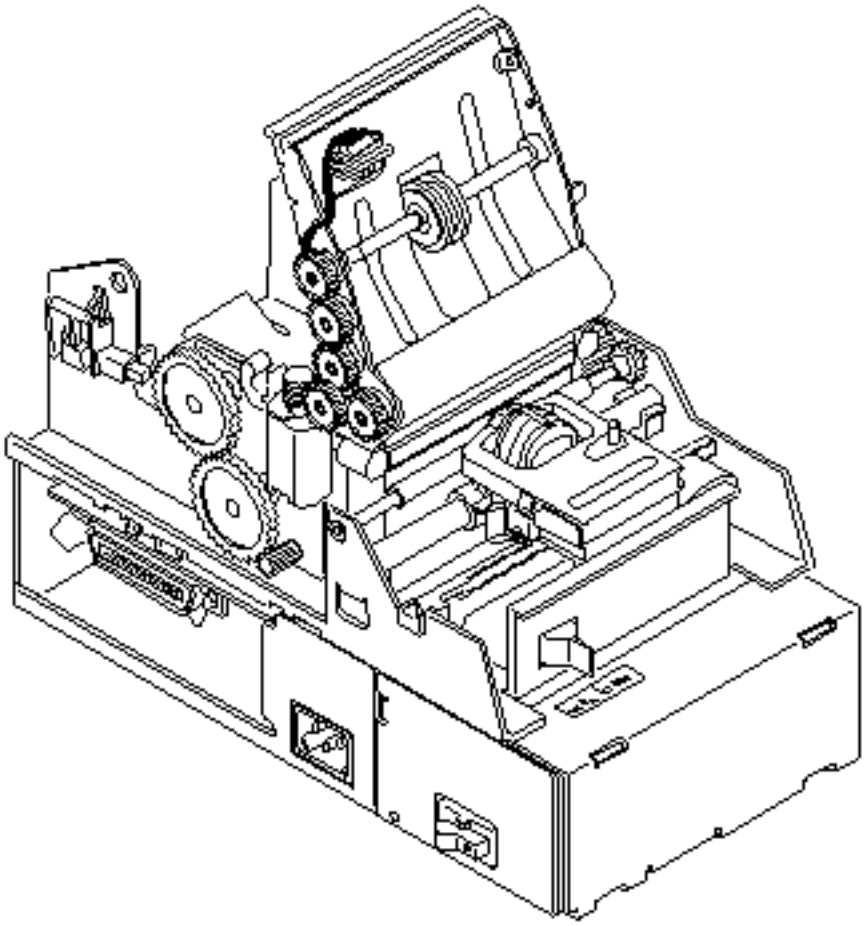


Figure 1: Series 70 Printer

The Series 70 Printer models are 40-column, high-speed, impact printers and are available in the following configurations.

Series 70 Models	Receipt Printing	Journal Printing	Paper Low Switch	Transport-Auto Cutter Option	Auto Cutter	6.0 Inch Receipt Roll Option
Model 75	√		√	√	√	√
Model 76	√	√	√	√	√	

COMMUNICATION INTERFACES

Parallel and serial communication interfaces are available.

PARALLEL INTERFACE

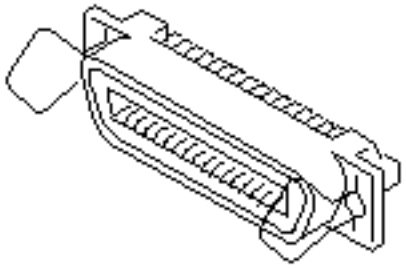


Figure 2: Connector for Parallel Interface

The parallel interface is standard on all models and is compatible with Centronics.

SERIAL INTERFACE

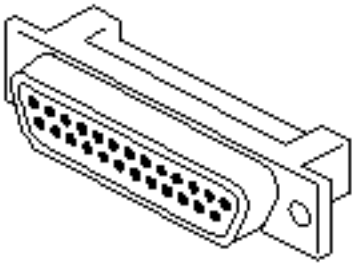


Figure 3: Connector for Serial Interface

The RS-232C serial interface is optional on all models.

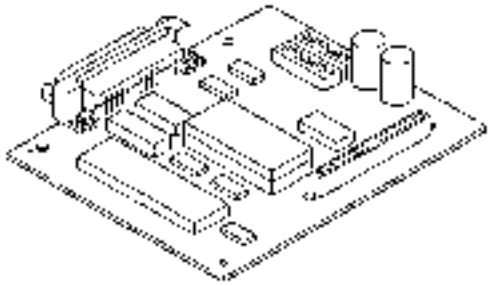


Figure 4: RS-232C Interface Board

RS-232C Specifications:

- 2k Buffer
- 19.2k Baud Maximum
- Read/Busy or XON/XOFF
- Diagnostic Mode

TECHNICAL SPECIFICATIONS

PERFORMANCE AND RELIABILITY

Performance	
Print Speed	**Line Feed Time**
196 Characters per Second	80 ms at Eight Lines per Inch

Reliability		
Mean Time Between Failure (MTBF)	**Mean Time To Repair (MTTR)**	**Print Head Life**
25,000 Hours	15 Minutes	200 Million Characters

PRINTING

Characters	
Character Matrix	**Characters Per Line**
7 x 7 Dot Utility Printing	40 at 17.1 Characters per Inch 24 at 10 Characters per Inch 28 at 12 Characters per Inch

Graphics	
All Points Addressable (H x V)	**Bi-Directional Bit Image Graphics**
60 x 72 Dots per Inch 120 x 144 Dots per Inch	8 Bit Double Density

PHYSICAL DIMENSIONS

Width	Depth	Height	Weight
6.06 Inches	10.75 Inches	6.75 Inches	13 Pounds

ENVIRONMENTAL OPERATING LIMITS

Temperature	Relative Humidity
40-105° F 5-40° C	20-90%

POWER REQUIREMENTS

Voltage	Frequency	Operating Power
120, or 220/240 +/- 10%	50/60 Hz +/- 2%	37 Watts

CONSUMABLE PRODUCTS

Paper	Number of Plies	Dimensions
Receipt, Journal Paper (3.5 Inch Diameter)	One or Two Ply	Width: 3.25 Inches Diameter: 3.50 Inches
Receipt Paper (6.0 Inch Diameter)	One Ply	Width: 3.25 inches Diameter: 6.0 inches

Ithaca Peripherals Part Number	Number of Plies	Rolls Per Carton	Length	Color
100-1667 (3.5 Inch Diameter)	One	50	240 Feet	White
98-0558 (3.5 Inch Diameter)	Two	50	125 Feet	White, Canary
100-2377 (6.0 Inch Diameter)	One	16	765 Feet	White

Ribbon Cassette (12 per Box)		
Ithaca Peripherals Part Number	**Type**	**Color**
06-0560	Re-Inking Cassette	Black
100-1823	Re-Inking Cassette	Purple

MAINTENANCE

NECESSARY TOOLS

Caution: Using the wrong tools may cause personal injury or damage the printer. Be sure to use the proper tools when maintaining or servicing the Series 70 Printer.

The following table provides the necessary tools needed to properly maintain the Series 70 Printer.

Nut Drivers	Screwdrivers	Ignition Wrenches	Miscellaneous
7/32 Inch	#0 Phillips	7/32 Inch	Thickness Gauge: .012 Inch
1/4 Inch	#1 Phillips	1/4 Inch	Allen™ Wrench: .050 Inch
9/32 Inch	#2 Phillips		Hobby Knife
5/16 Inch	Regular, Small		Small Needle-Nose Pliers
3/8 Inch	Regular, Large		Paper Clip
7 mm			

LUBRICATING THE PRINTER

No periodic lubrication is required under normal printer use. Some lubrication may be required with heavy printer use.

Caution: DO NOT use petroleum-based lubricants as they will damage the plastic parts. Use a silicone-based lubrication.

Caution: Lubricating any points other than described here, such as the Space Rack, will cause early and expensive failures to the printer.

LUBRICATING THE JOURNAL TAKE-UP GEARS AND PRESSURE ROLL BEARING

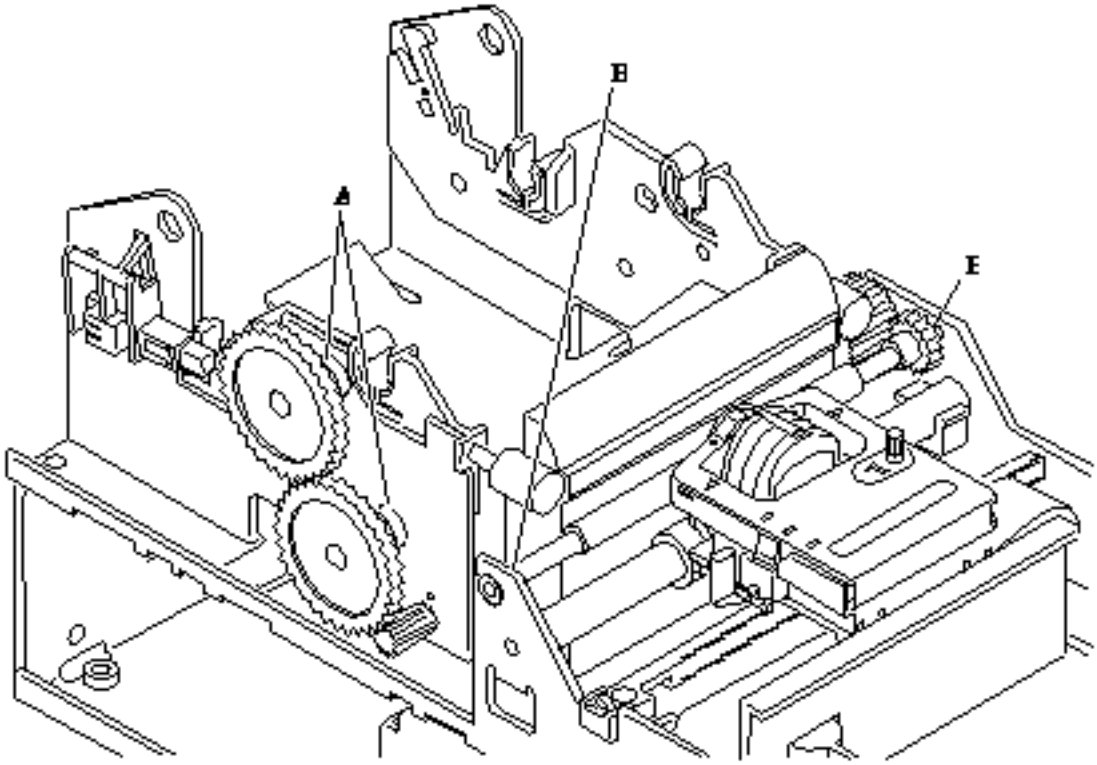


Figure 5: Lubricating the Journal Take-up Gears and Pressure Roll Bearing

A = Journal Take-up Gears **B = Pressure Roll Bearing**

Lubricate the following points only:

- Journal Take-up Gears
  When: as needed
- Pressure Roller Bearing
  When: as needed

LUBRICATING THE AUTO CUTTER ASSEMBLY

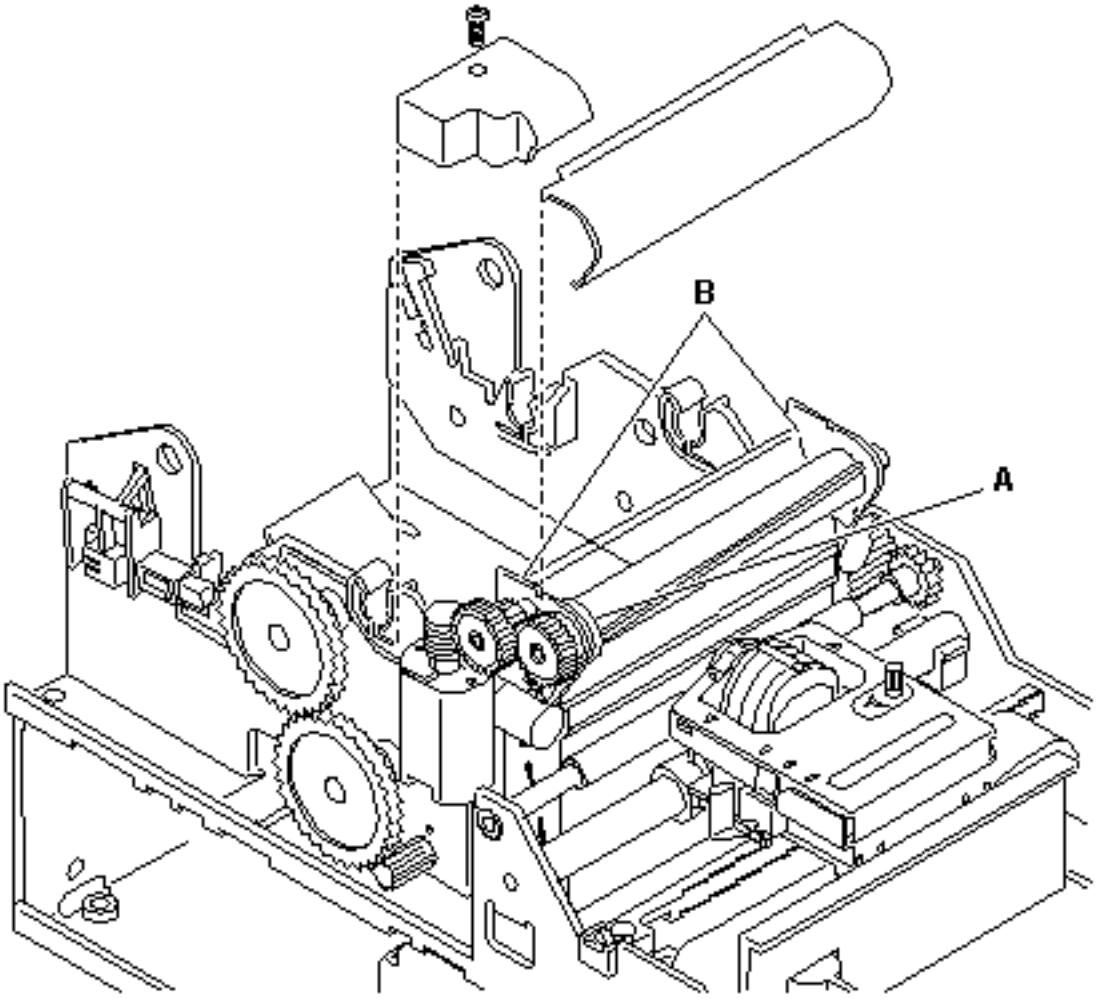


Figure 6: Lubricating the Auto Cutter Assembly

A = Guide Wheel **B = Pins for Shear Plate**

Lubricate the following points only:

- Guide Wheel
  When: every six months or 100,000 cycles
- Pins for Shear Plate
  When: every six months or 100,000 cycles

LUBRICATING THE TRANSPORT-AUTO CUTTER ASSEMBLY

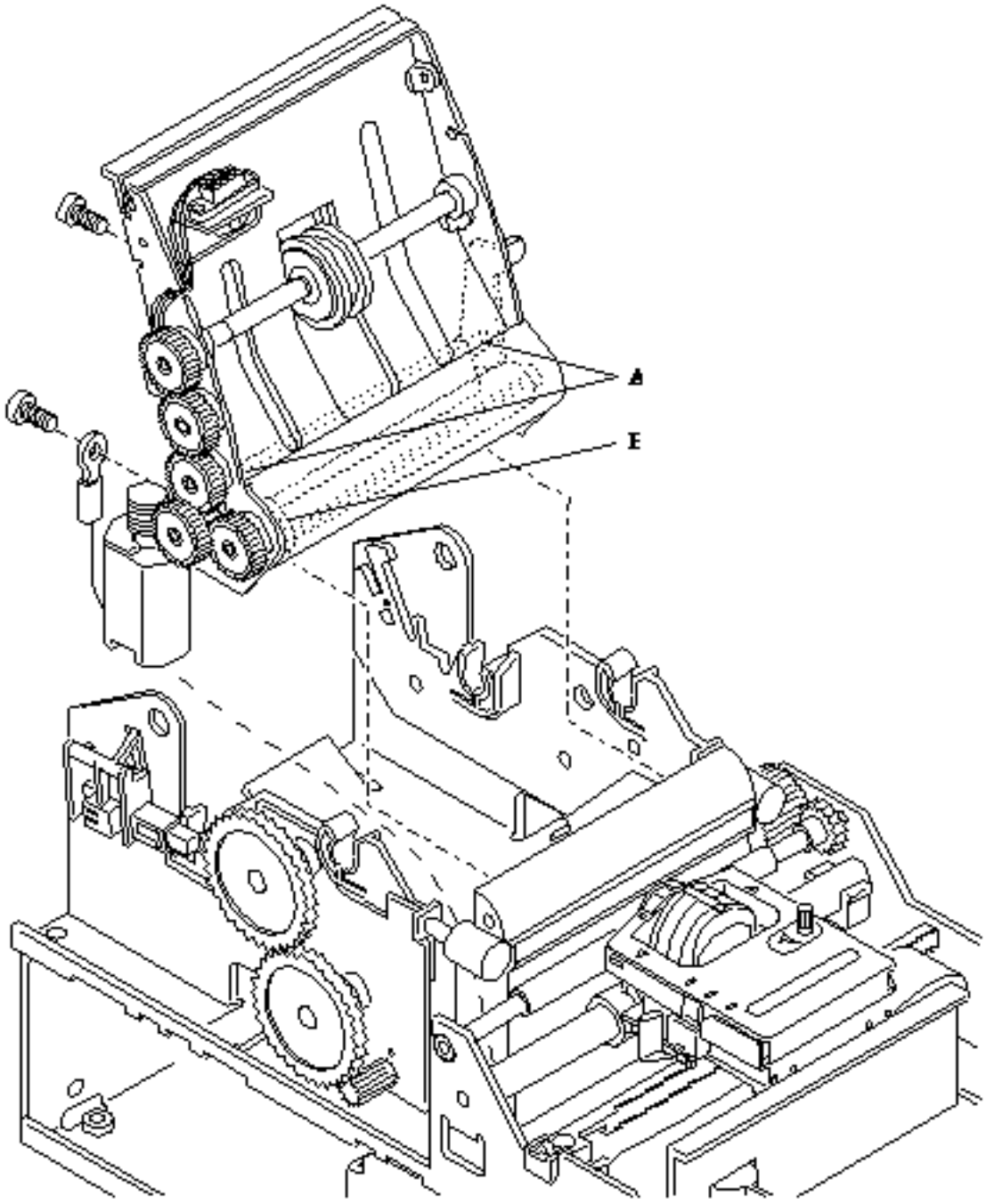


Figure 7: Lubricating the Transport-Auto Cutter Assembly

A = Guide Wheel **B = Pins for Shear Plate**

For ease in lubricating the Transport-Auto Cutter Assembly, remove it from the printer. See “Transport-Auto Cutter Assembly” in the “Disassembly” chapter. Lubricate the following points only:

- Guide Wheel

  When: every six months or 100,000 cycles

- Pins for Shear Plate

  When: every six months or 100,000 cycles

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.

MAKING ADJUSTMENTS

The adjustments described in this section are required only to correct Printhead drag or print quality flaws.

If the print density on a print sample is consistent from left to right and top to bottom, and the Printhead does not drag, no adjustment is necessary. If the Printhead drags, the gap may be too narrow. Increase the gap in order to get the proper air gap of .012 inch on both left and right sides.

After a period of use, the Feed Roll Shaft may wear down to a point where adjusting the gap will not correct the print problem. In this case, the Feed Roll Shaft needs to be replaced. The Feed Roll Shaft also needs to be replaced when it is cracked or “weather checked.” Refer to “Replacing the Feed Roll Shaft” later in this chapter.

Note: Any time the Feed Roll Shaft is replaced, the bearings on either end must also be replaced.

Check the Platen Air Gap and readjust it if necessary. See “Adjusting the Platen Parallel to the Printhead” and “Adjusting the Platen Air Gap” later in this chapter.

DIAGNOSING THE PRINT QUALITY

Use the flowchart on the following page to determine which procedure to use to correct the specified print problems.

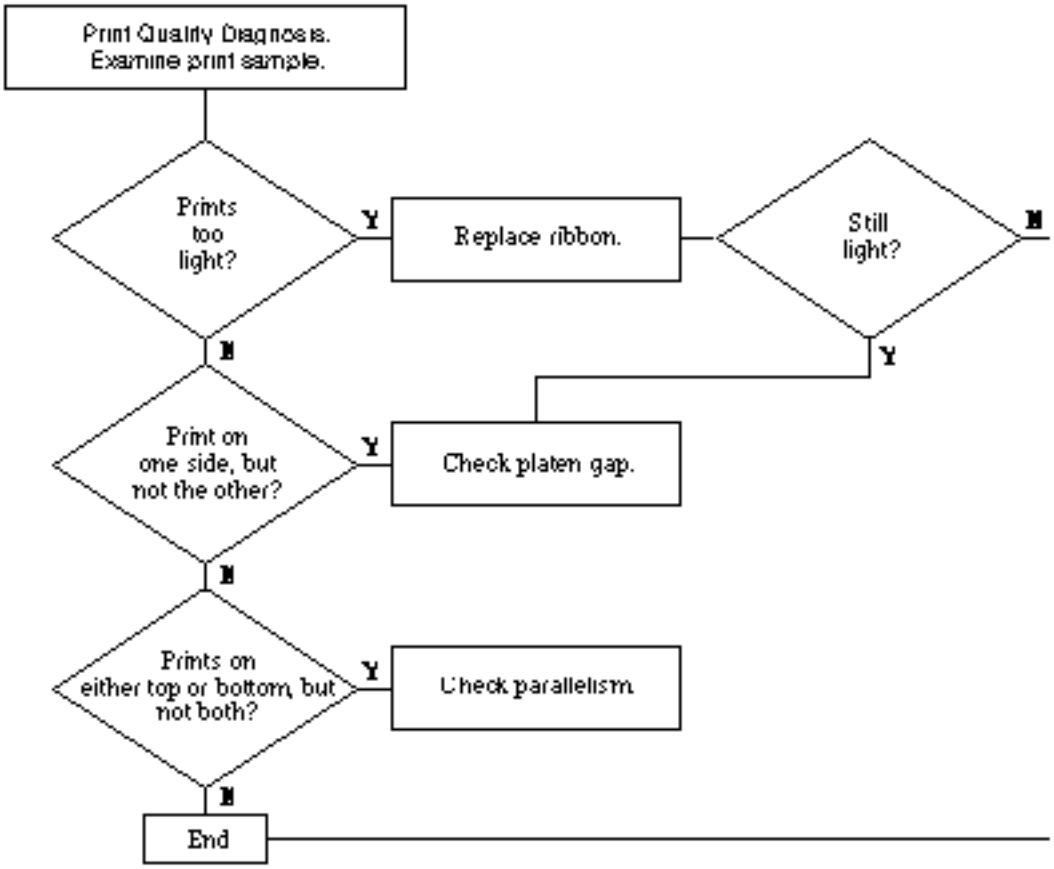


Figure 8: Flowchart for Print Quality Diagnosis

Note: If a print problem is not covered in this flowchart, refer to the troubleshooting chart on page 53.

ADJUSTING THE PLATEN PARALLEL TO THE PRINTHEAD

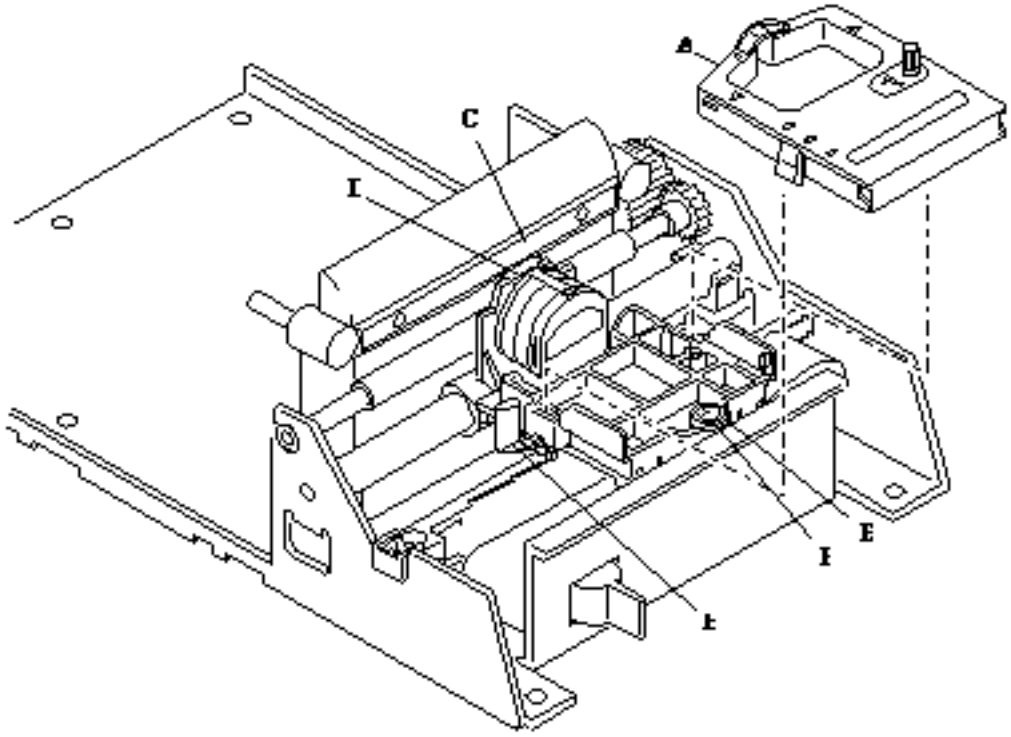


Figure 9: Platen and Printhead

A = Ribbon Cassette

B = Range Adjustment Lever

C = Platen

D = Printhead

E = Adjusting Screw

F = Adjusting Gear

1. Turn off the printer.
2. Remove all paper from the printer.
3. Remove the Ribbon Cassette (A).
4. Set the Range Adjustment Lever (B) to position 1 (towards the rear of the printer).

   The Range Adjustment Lever (B) is the blue lever on the Printhead (D).
5. Sight along the length of the Platen (C) from the side of the printer to observe the parallelism of the air gap between the Platen (C) and the Printhead (D).
6. Press down on the outer ring of the Adjusting Gear (F) with the straightened end of a paper clip and turn the Adjusting Screw (E) with a #1 Phillips screwdriver until the gap at the top of the Printhead (D) is the same as the gap at the bottom of the Printhead.

   This adjustment changes the Printhead-to-Platen air gap. See the next section, “Adjusting the Platen Air Gap.”

ADJUSTING THE PLATEN AIR GAP

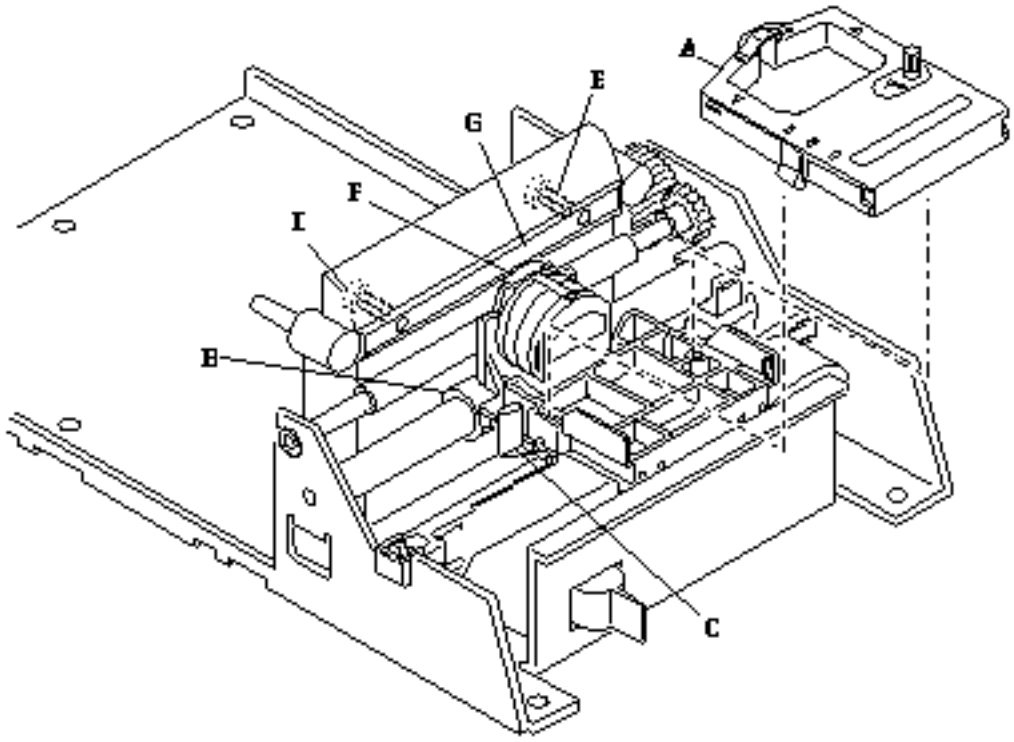


Figure 10: Platen Air Gap

A = Ribbon Cassette

B = Carriage

C = Range Adjustment Lever

D = Left Adjusting Screw

E = Right Adjusting Screw

F = Printhead

G = Platen

1. Turn off the printer.
2. Remove all paper from the printer.
3. Remove the Ribbon Cassette (A).
4. Set the Range Adjustment Lever (C) to position 1 (towards the rear of the printer).

   The Range Adjustment Lever is the blue lever on the Printhead (F).
5. Slide the Carriage (B) all the way to the left.
6. Adjust the Left Adjusting Screw (D) behind the Platen (G) with a 7/32 inch nut driver until the gap between the Printhead (F) and the Platen is .012 inch.
7. Slide the Carriage (B) all the way to the right.
8. Adjust the Right Adjusting Screw (E) behind the Platen (G) with a 7/32 inch nut driver until the gap between the Printhead (F) and the Platen is .012 inch.
9. Repeat steps five through eight until the gap is .012 all the way across the length of the Platen traveled by the Printhead.
10. Replace the Ribbon Cassette and paper.
11. Turn on the printer.

REPLACING THE FEED ROLL SHAFT

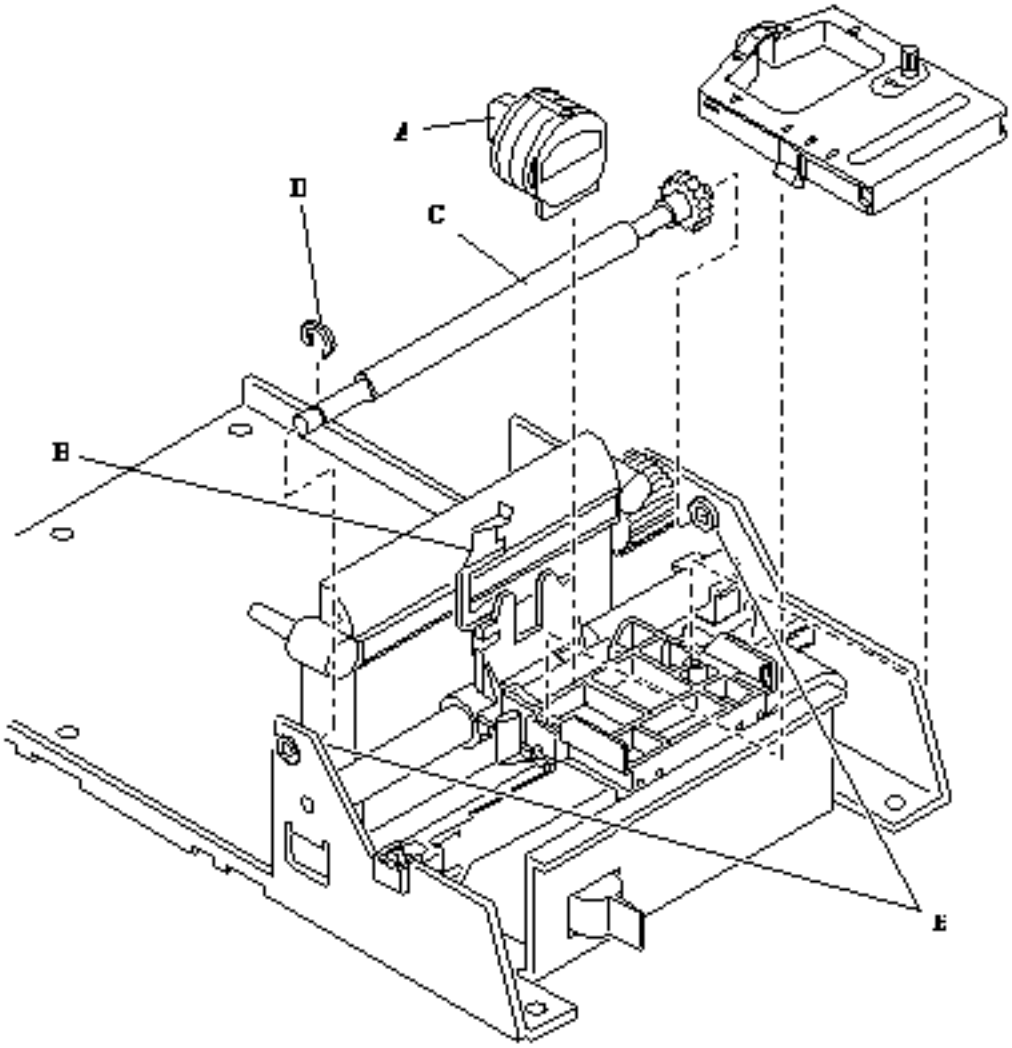


Figure 11: Feed Roll Shaft

A = Printhead

B = Print Head Clamp

C = Feed Roll Shaft

D = C-Clip

E = Feed Roll Bearings

Note: Any time the Feed Roll Shaft is replaced, the Feed Roll Bearings on either end must also be replaced.

1. Turn off the printer.
2. Remove the Ribbon Cassette.
3. Remove the Printhead (A) by lifting up on the Printhead Clamp (B) that is located on the right side of the Printhead.
4. Grasp the Printhead (A) and pull straight up while pushing back on the Forms Compensation Arm Assembly.

   The Forms Compensation Arm Assembly is the assembly directly behind the Printhead.
5. Remove the C-Clip (D) that is on the inside of the Feed Roll Bearing (E) on the left-hand side of the Feed Roll Shaft (C).

   Be careful not to lose the C-Clip. The tension is high and it will spring out if you do not have a good hold on it.
6. Remove and discard the Feed Roll Shaft (C) and Feed Roll Bearings (E).

   During the next four steps, you may need to push back on the Forms Compensation Arm Assembly to get the Feed Roll Shaft out.

   a. Slide the Feed Roll Shaft (C) to the left by pushing it through from the right side with a screwdriver or other tool.

   b. When the Feed Roll Shaft (C) comes out of the Right Side Frame, lift it up enough to clear the frame.

   c. Slide the Feed Roll Shaft (C) to the right until it clears the Left-Side Frame.

   d. Place the new Feed Roll Bearings (E) on the Feed Roll Shaft (C).

      When replacing the Feed Roll Shaft, be sure to line up the Feed Roll Bearings correctly. The two small notches should point toward the cutaway in the frame.
7. Install the new Feed Roll Shaft and the C-Clip by reversing the above steps.
8. Replace the Printhead (A).
9. Check and readjust the Platen Air Gap.

   See “Adjusting the Platen Air Gap” earlier in this chapter.
10. Replace the Ribbon Cassette.
11. Turn on the printer.

DISASSEMBLY

This chapter describes the disassembly procedures for the following items:

- Transport-Auto Cutter Assembly
- Base Assembly
- AC Switch Assembly and Power Transformer
- Serial Interface Board
- Control Board
- Interconnect Board
- Journal Bucket Assembly
- Carriage Assembly
- Feed Roll Shaft
- Linefeed Motor

NECESSARY TOOLS

Caution: Using the wrong tools may cause personal injury or damage the printer. Be sure to use the proper tools when maintaining or servicing the Series 70 Printer.

The following table provides the necessary tools needed to properly maintain the Series 70 Printer.

Nut Drivers	Screwdrivers	Ignition Wrenches	Miscellaneous
7/32 Inch	#0 Phillips	7/32 Inch	Thickness Gauge: .012 Inch
1/4 Inch	#1 Phillips	1/4 Inch	Allen™ Wrench: .050 Inch
9/32 Inch	#2 Phillips		Hobby Knife
5/16 Inch	Regular, Small		Small Needle-Nose Pliers
3/8 Inch	Regular, Large		Paper Clip
7 mm			

TRANSPORT-AUTO CUTTER ASSEMBLY

REMOVING THE TRANSPORT-AUTO CUTTER ASSEMBLY

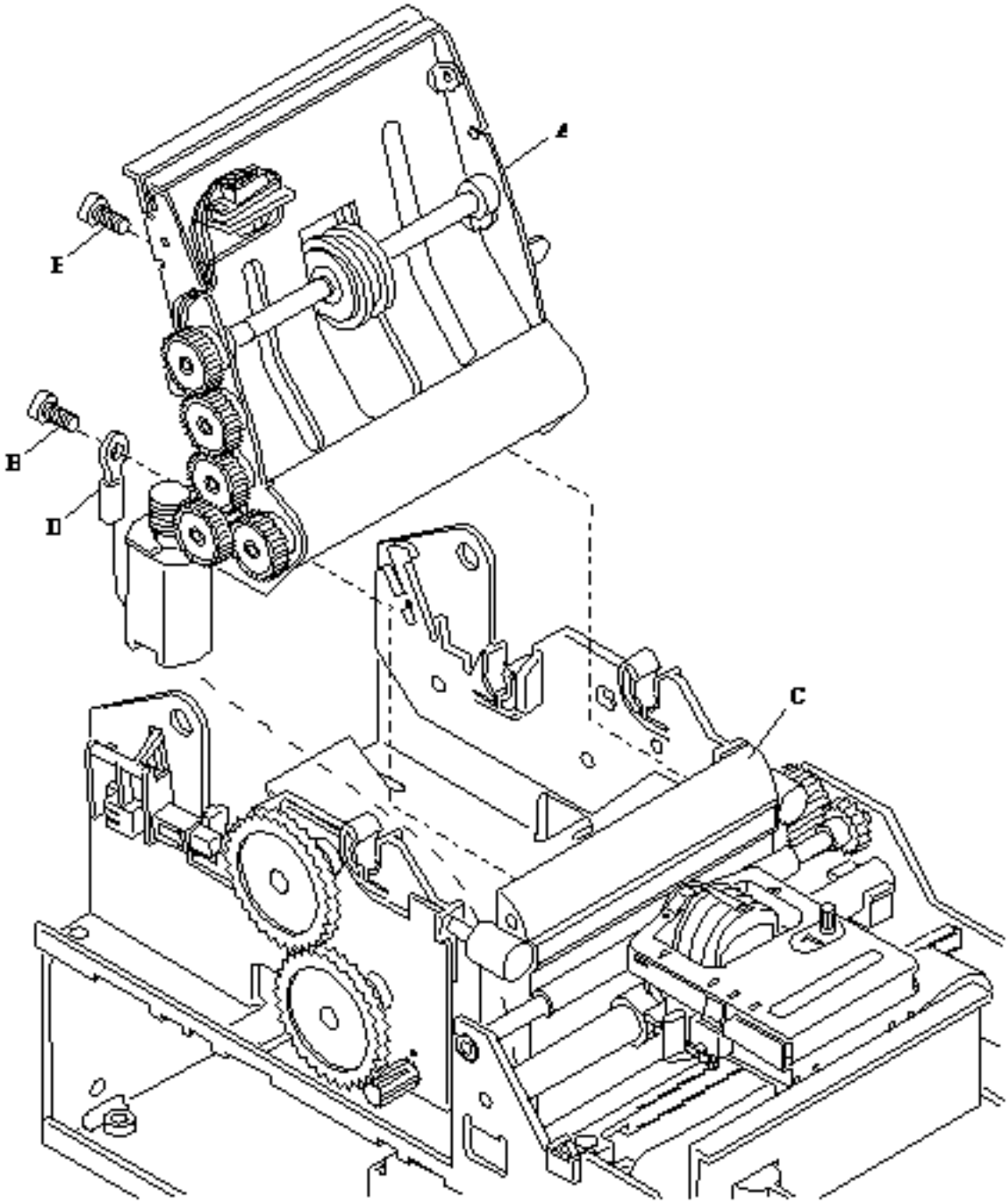


Figure 12: Transport-Auto Cutter Assembly

A = Transport-Auto Cutter Assembly

B = Screws

C = Forms Compensation Arm Assembly

D = Ground Wire

Note: This section describes removing the Transport-Auto Cutter Assembly from the printer. See page 26 for removing the Auto Cutter Assembly (without Transport).

1. Remove the Transport-Auto Cutter Assembly (A) from the Forms Compensation Arm Assembly (C) by unscrewing the two screws (B) with a #1 Phillips screwdriver.

   The Ground Wire (D) is attached to the Forms Compensation Arm Assembly (C) with one of the screws.

   Do not try to unscrew the two 7/32 inch hex-head screws on the Platen. They are for adjusting the Platen air gap.

2. Cut the tie wrap holding the cables to the frame.

3. Unplug the Transport Motor Cable and the Transport Sensor Cable from the Interconnect Board.

   Keep track of how the cables are routed.

Note: Reverse these procedures to reinstall the Transport-Auto Cutter Assembly. Be sure to use new tie wraps to route the cables next to the Base Assembly.

DISASSEMBLING THE TRANSPORT-AUTO CUTTER ASSEMBLY

Note: The folowing two sections describe disassembling the Transport-Auto Cutter Assembly, beginning with the Right-Side Frame followed by the Left-Side Frame (the side with the gears).

Right-Side Frame

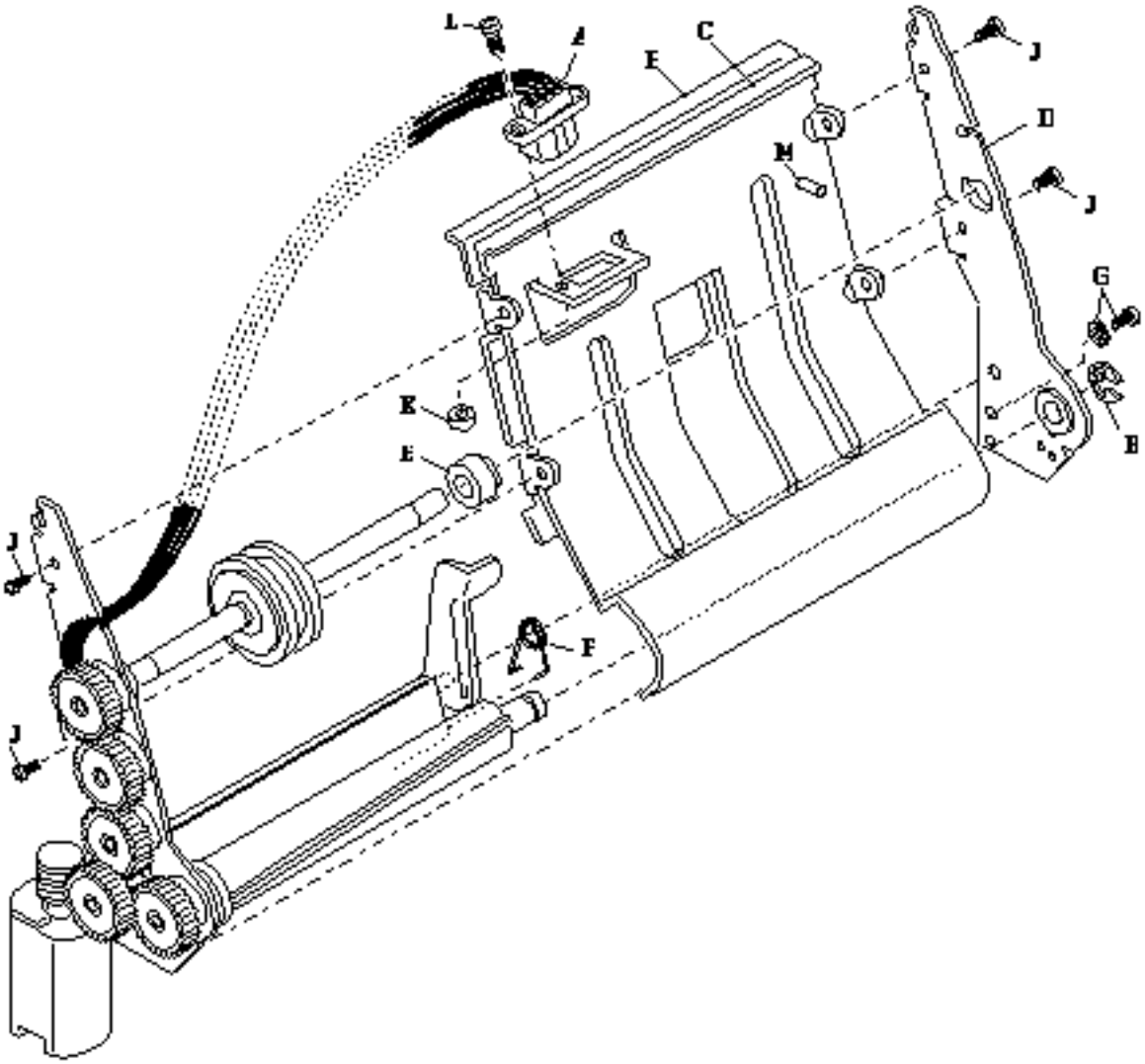


Figure 13: Transport-Auto Cutter Assembly (1 of 2)

A = Transport Sensor	**G = Hex-Head Screw & Lock Washer**
B = Lower Paper Chute	**H = E-Clip**
C = Upper Paper Guide	**J = Right-Side Frame Screws**
D = Right-Side Frame	**K = Nut (Sensor)**
E = Cutter Drive Wheel Bearings	**L = Screw (Sensor)**
F = Cutter Spring	**M = Paper Guide Pin**

Note: You may find it easier to remove the Transport Sensor and the Drive Wheel Assembly (see the parts in the list below) before separating the Right-Side Frame.

To remove the Transport Sensor (A) before separating the Right-Side Frame (D), remove the Worm Wheel Gear (H, figure 14) to free the Transport Sensor Cable. See the instructions under "Left-Side Frame."

The Drive Wheel Assembly consists of the following items shown best in figure 14:

Drive Wheel Roller (R, figure 14)

Drive Wheel Shaft (S, figure 14)

Drive Wheel Bearings (Q, figure 14)

Three E-Clips (B, figure 14)

Brass Pin (K, figure 14)

To remove the Drive Wheel Assembly before separating the Right-Side Frame (D), see the instructions under "Left-Side Frame."

Do the following steps to remove the Right-Side Frame (D) from the Transport-Auto Cutter Assembly. Refer to figure 13 on the facing page and figure 14 on the next page.

1. Remove the E-Clip (H) from the shaft of the Auto Cutter (A, figure 14).
2. Remove the two screws (J) holding the Right-Side Frame (D) to the Lower Paper Chute (B) with a #0 Phillips screwdriver.
3. Remove the hex-head screw and lock washer (G) holding the Right-Side Frame (D) to the Back Plate (D, figure 14) with a 7/32 inch nut driver.

   Be sure that the lock washer stays with the screw. Replacing the Back Plate (D, figure 14) without the lock washer may cause it to become loose and damage the printer.
4. Remove the Right-Side Frame (D) by pulling it straight out from the rest of the Transport-Auto Cutter Assembly.

   Be careful not to lose the Cutter Spring (F) from the Shear Plate (E, figure 14). When reinstalling the Right-Side Frame (D), be sure to line up the Drive Wheel Bearing (E) on the Drive Wheel Assembly (R, S, Q, B, K, figure 14) correctly. The two small notches should point toward the cutaway in the Right-Side Frame (D).
5. Remove the Shear Plate (E, figure 14).
6. Remove the Transport Sensor (A) by unscrewing the screw (L) holding it to the Upper Paper Guide (C) with a #1 Phillips screwdriver.

   Keep track of the cable routing for reinstalling the Transport Sensor (A). See the next illustration and instructions for freeing the Transport Sensor Cable.

Note: Reverse these procedures to reassemble the Right-Side Frame.

Left-Side Frame

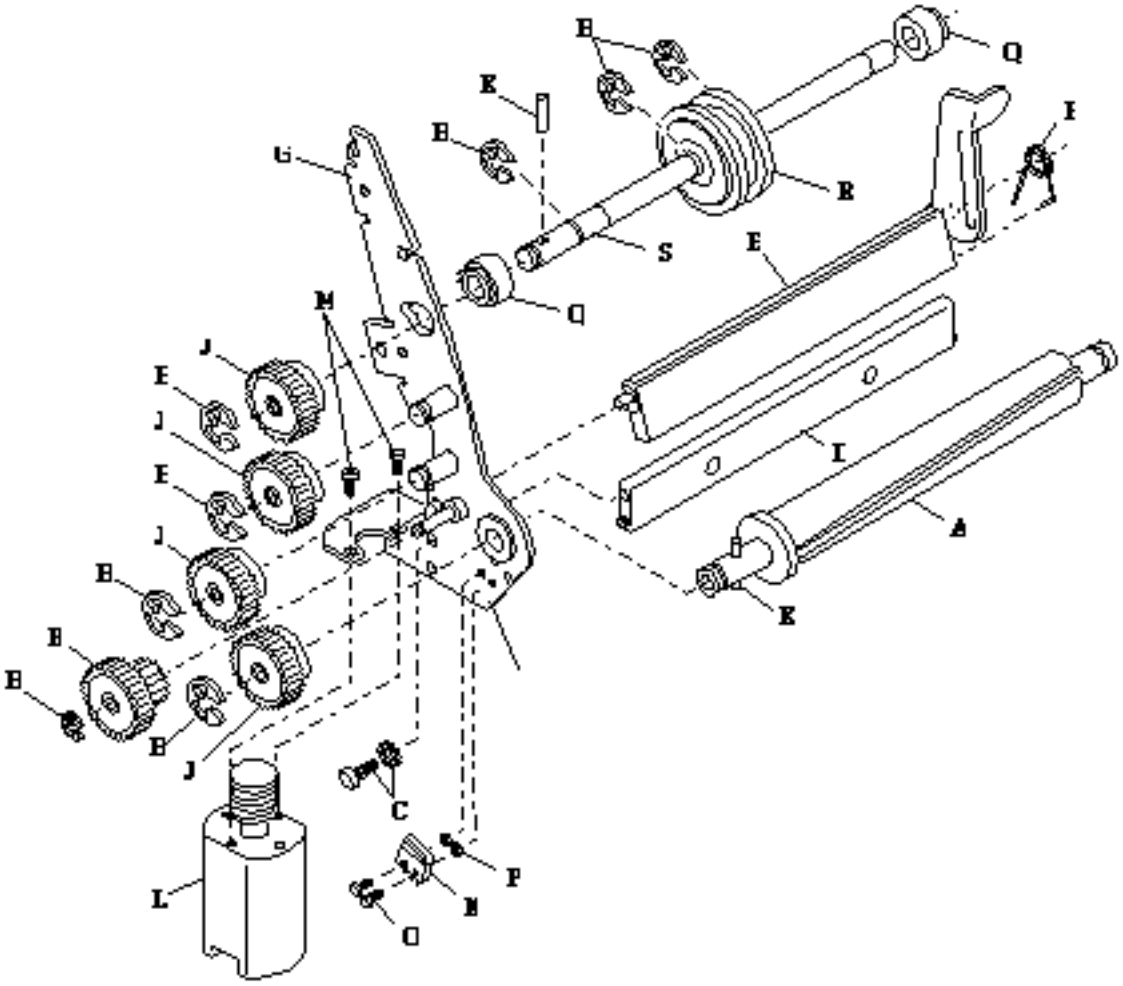


Figure 14: Transport-Auto Cutter Assembly (2 of 2)

A = Auto Cutter	**K = Brass Pin**
B = E-Clip	**L = Cutter Motor Assembly**
C = Hex-Head Screw & Lock Washer	**M = Cutter Motor Screws**
D = Back Plate	**N = Micro Switch**
E = Shear Plate	**O = Screws (Micro Switch)**
F = Cutter Spring	**P = Spacers (Micro Switch)**
G = Left-Side Frame	**Q = Drive Wheel Bearings**
H = Worm Wheel Gear	**R = Drive Wheel Roller**
J = Rotary Cam Gears	**S = Drive Wheel Shaft**

1. Remove the small E-Clip (B) and the Worm Wheel Gear (H).

2. Cut the two tie wraps holding the Transport Sensor Cable to the Transport-Auto Cutter Assembly and the other cables.

   You can now separate the Transport Sensor (A, figure 13) and cable from the Transport-Auto Cutter Assembly. Keep track of the cable routing for reinstalling the Transport Sensor.

3. Remove the outer E-Clip (B) and the Rotary Cam Gear (J) from the Drive Wheel Assembly (R, S, Q, B, K) and slide the Drive Wheel Assembly out.

   Don't lose the Brass Pin (K) or the Drive Wheel Bearings (Q) from the Drive Wheel Assembly. You do not need to remove the other E-Clips unless you are disassembling the Drive Wheel Assembly.

   When reinstalling the Drive Wheel Assembly, be sure to line up the Drive Wheel Bearings (Q) correctly. The two small notches should point toward the cutaway in the Left- and Right-Side Frames.

4. Remove the Upper Paper Guide (C, figure 13) by unsnapping it from the Left-Side Frame (G).

   Do not bend the Paper Guide Pin (M, figure 13) that connects the Upper Paper Guide to the Lower Paper Chute (C, B, figure 13). When reinstalling the Upper Paper Guide, hook it to the Left-Side Frame at both ends.

5. Remove the E-Clip (B) and the Rotary Cam Gear (J) from the Auto Cutter (A) and slide the Auto Cutter out.

   Don't lose the Brass Pin (K) from the Auto Cutter (A).

   When reinstalling the Auto Cutter (A), face the blade away from the Back Plate (D) and place the Brass Pin (K) in the Auto Cutter so it is perpendicular to the Auto Cutter blade. Place the Rotary Cam Gear (J) on the Auto Cutter with the flat side of the inside portion of the gear facing the Micro Switch (N). If the Auto Cutter is not installed correctly, it will not work. Do not put the Rotary Cam Gear (J) in upside-down.

6. Remove the remaining two E-Clips (B) and Rotary Cam Gears (J).

7. Remove the two screws (M) holding the Cutter Motor Assembly (L) to the Left-Side Frame with a #0 Phillips screwdriver.

8. Remove the Micro Switch (N) from the Left-Side Frame (G) by unscrewing the two screws (O) with a .050 inch Allen™ wrench.

   Be careful not to lose the Spacers (P) behind the Micro Switch (N).

9. Remove the Back Plate (D) from the Left-Side Frame (G) by unscrewing the hex head screw and lock washer (C) with a 7/32 inch nut driver.

   Be sure that the lock washer stays with the hex head screw. Replacing the Back Plate (D) without the lock washer may cause the Back Plate to become loose and damage the printer.

10. Remove the Lower Paper Chute (B, figure 13) from the Left-Side Frame (G) by unscrewing the two screws (J, figure 13) with a #0 Phillips screwdriver.

Note: Reverse these procedures to reassemble the Left-Side Frame.

AUTO CUTTER ASSEMBLY (WITHOUT TRANSPORT)

REMOVING THE AUTO CUTTER ASSEMBLY

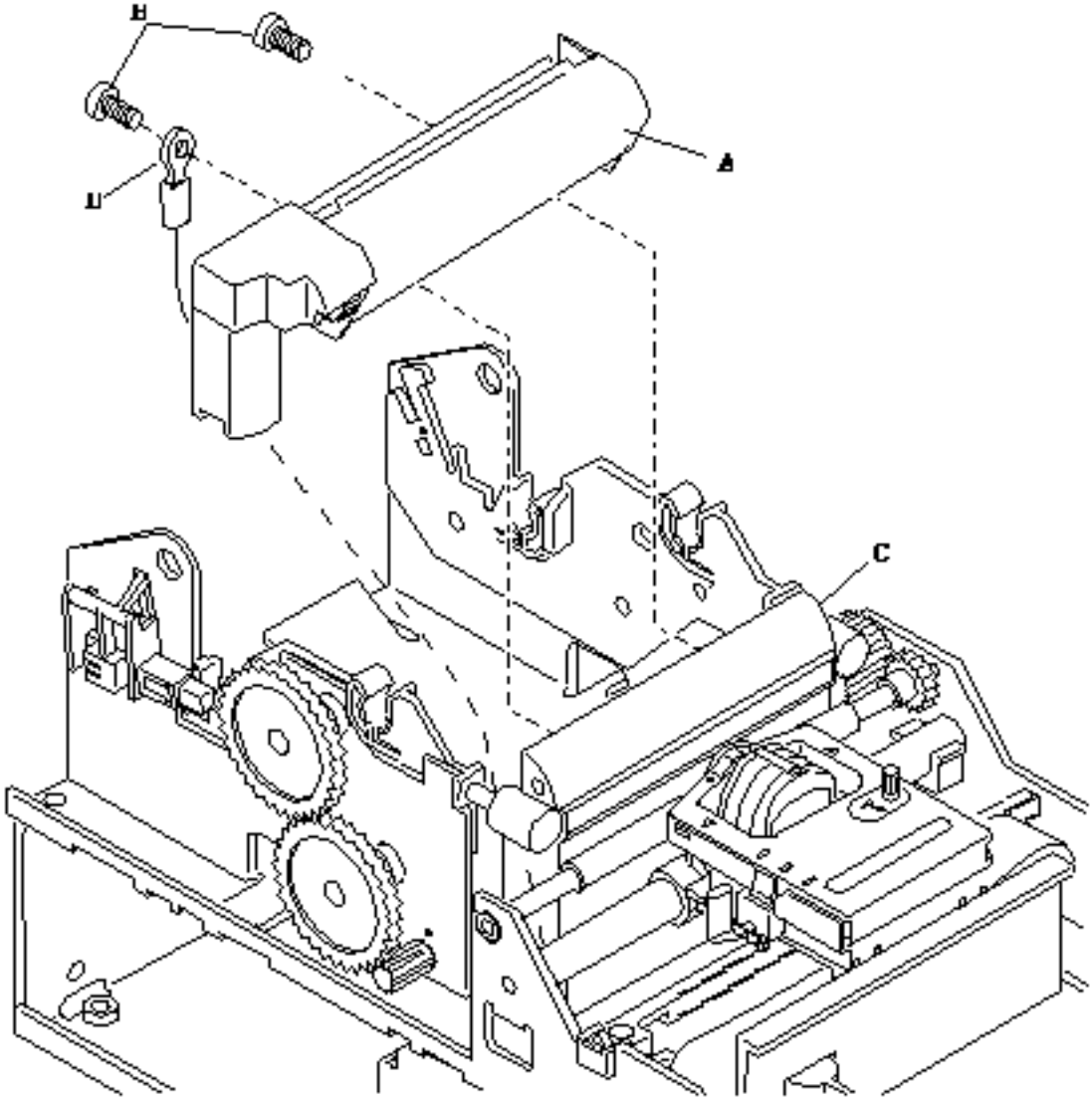


Figure 15: Auto Cutter Assembly (without Transport)

A = Auto Cutter Assembly

B = Screws

C = Forms Compensation Arm Assembly

D = Ground Wire

Note: This section describes removing the Auto Cutter Assembly from the printer. See page 20 for removing the Transport-Auto Cutter Assembly).

1. Remove the two screws (B) holding the Auto Cutter Assembly (A) to the Forms Compensation Arm Assembly (C) with a #1 Phillips screw driver.

   The Ground Wire (D) is attached to the Forms Compensation Arm Assembly with one of the screws.

   Do not try to unscrew the two 7/32 inch hex-head screws on the platen. They are for adjusting the Platen air gap.

2. Cut the tie wrap holding the Cutter Motor cables to the frame.

3. Unplug the Cutter Motor Cables from the Interconnect Board.

   Keep track of how the cables are routed.

Note: Reverse these procedures to reinstall the Auto Cutter Assembly. Be sure to use a new tie wrap to route the cables next to the frame.

DISASSEMBLING THE AUTO CUTTER ASSEMBLY

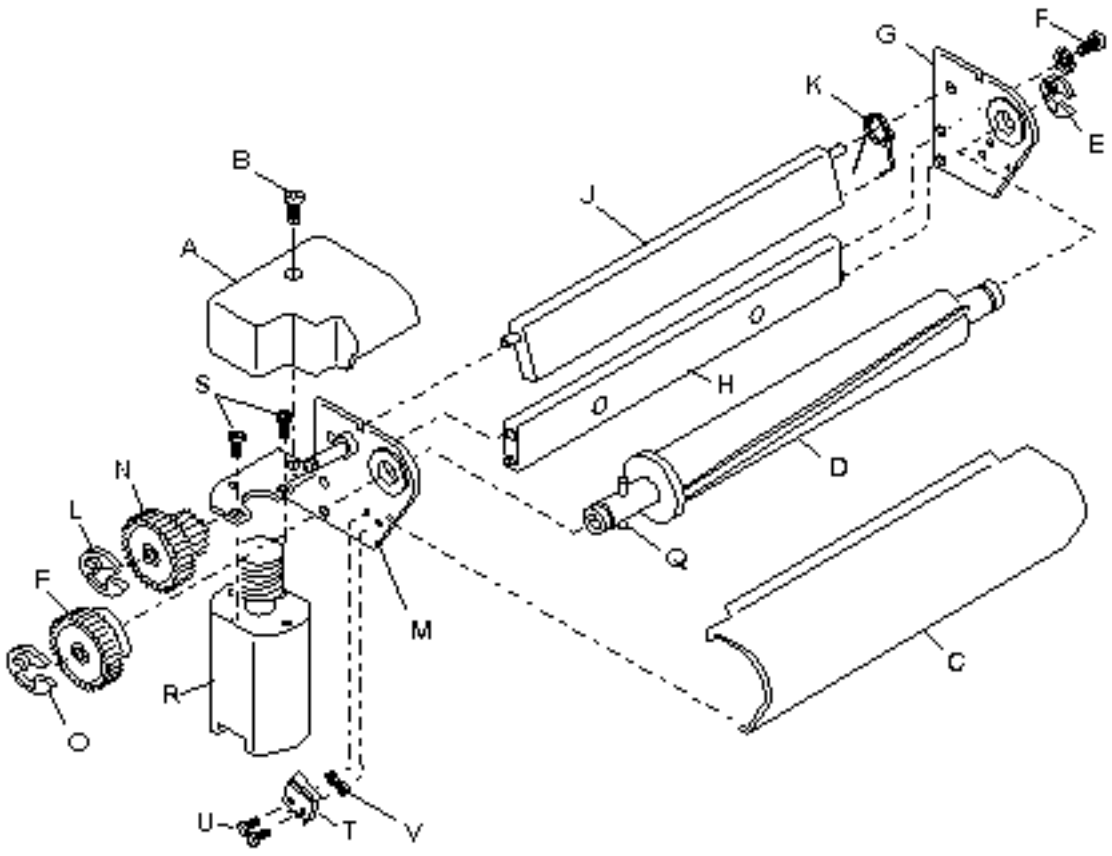


Figure 16: Auto Cutter Assembly

A = Auto Cutter Gear Shield
B = Screw
C = Rotary Shield
D = Auto Cutter
E = C-Clip
F = Hex-Head Screw & Lock Washer
G = Right-Side Frame
H = Back Plate
J = Shear Plate
K = Cutter Spring
L = C-Clip
M = Left-Side Frame
N = Worm Wheel Gear
O = C-Clip
P = Rotary Cam Gear
Q = Brass Pin
R = Cutter Motor Assembly
S = Screws (Cutter Motor)
T = Micro Switch
U = Screws (Micro Switch)
V = Spacers (Micro Switch)

1. Remove the Auto Cutter Gear Shield (A) by removing the Screw (B) holding the Auto Cutter Gear Shield to the Left-Side Frame (M) with a #1 Phillips screwdriver.
2. Remove the Rotary Shield (C) by lifting it out and down from the top.
3. Remove the E-Clip (E) on the right-hand side of the Auto Cutter (D).
4. Remove the Hex-Head Screw and Lock Washer (F) holding the Right-Side Frame (G) to the Back Plate (H) with a 7/32 inch nut driver.
5. Carefully remove the Right-Side Frame (G) while at the same time removing the Shear Plate (J) and Cutter Spring (K).
6. Remove the Worm Wheel Gear (N) by removing the E-Clip (L) holding the Worm Wheel Gear to the Left-Side Frame (M).
7. Remove the E-Clip (O) and the Rotary Cam Gear (P) from the Auto Cutter (D) and slide the Auto Cutter out.

   Be careful when removing the Rotary Cam Gear (P) that you do not damage the Micro Switch (T) underneath the gear.

   Be careful not to lose the Brass Pin (Q) from the Auto Cutter.

   When reinstalling the Auto Cutter (D), face the blade away from the Back Plate (H) and place the Brass Pin (Q) in the Auto Cutter so it is perpendicular to the Auto Cutter blade. Place the Rotary Cam Gear (P) on the Auto Cutter with the flat side of the inside portion of the gear facing the Micro Switch (T). If the Auto Cutter is not installed correctly, it will not work. Do not put the Rotary Cam Gear in upside-down.

8. Remove the two Screws (S) holding the Cutter Motor Assembly to the Left-Side Frame (M) with a #0 Phillips screwdriver.
9. Remove the two Screws (U) holding the Micro Switch (T) to the Left-Side Frame (M) with a .050 inch Allen™ wrench.

   Be careful not to lose the Spacers (V) behind the Micro Switch (T).

11. Remove the Hex Head Screw and Lock Washer (F) holding the Left-Side Frame (M) to the Back Plate (H) with a 7/32 inch nut driver.

Note: Reverse these procedures to reassemble the Auto Cutter Assembly.

BASE ASSEMBLY

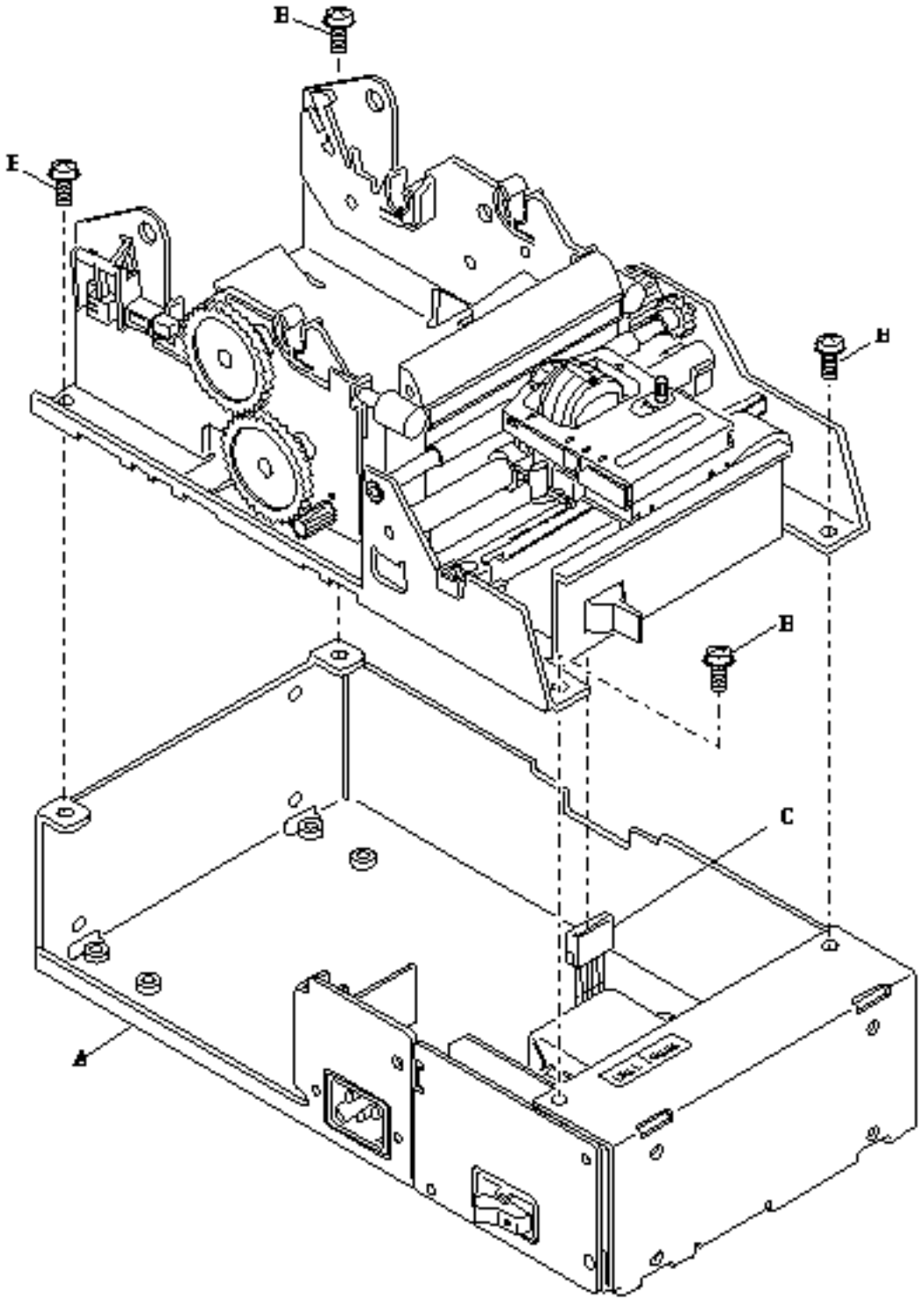


Figure 17: Base Assembly

A = Base Assembly

B = Sems Screws

C = AC Power Transformer Cable

Note: Remove the Base Assembly from the rest of the printer before disassembling the printer. After removing the Base Assembly, you can then remove the AC Switch Assembly and the AC Power Transformer from the Base Assembly.

1. Turn off the printer and unplug the Power Cord.
2. Disconnect the Communication Cable.
3. Remove all paper from the printer.
4. Remove the four Sems Screws and lock washers (B) from the top side of the Base Assembly (A) with a #2 Phillips screwdriver as shown in the illustration.
5. Lift the printer up from the right side an inch or two and disconnect the AC Power Transformer Cable (C) from the Control Board.
6. Separate the printer from the Base Assembly.
7. Turn the printer upside-down to avoid damaging the boards.

Note: Reverse these procedures to reattach the Base Assembly to the printer.

AC SWITCH ASSEMBLY AND POWER TRANSFORMER

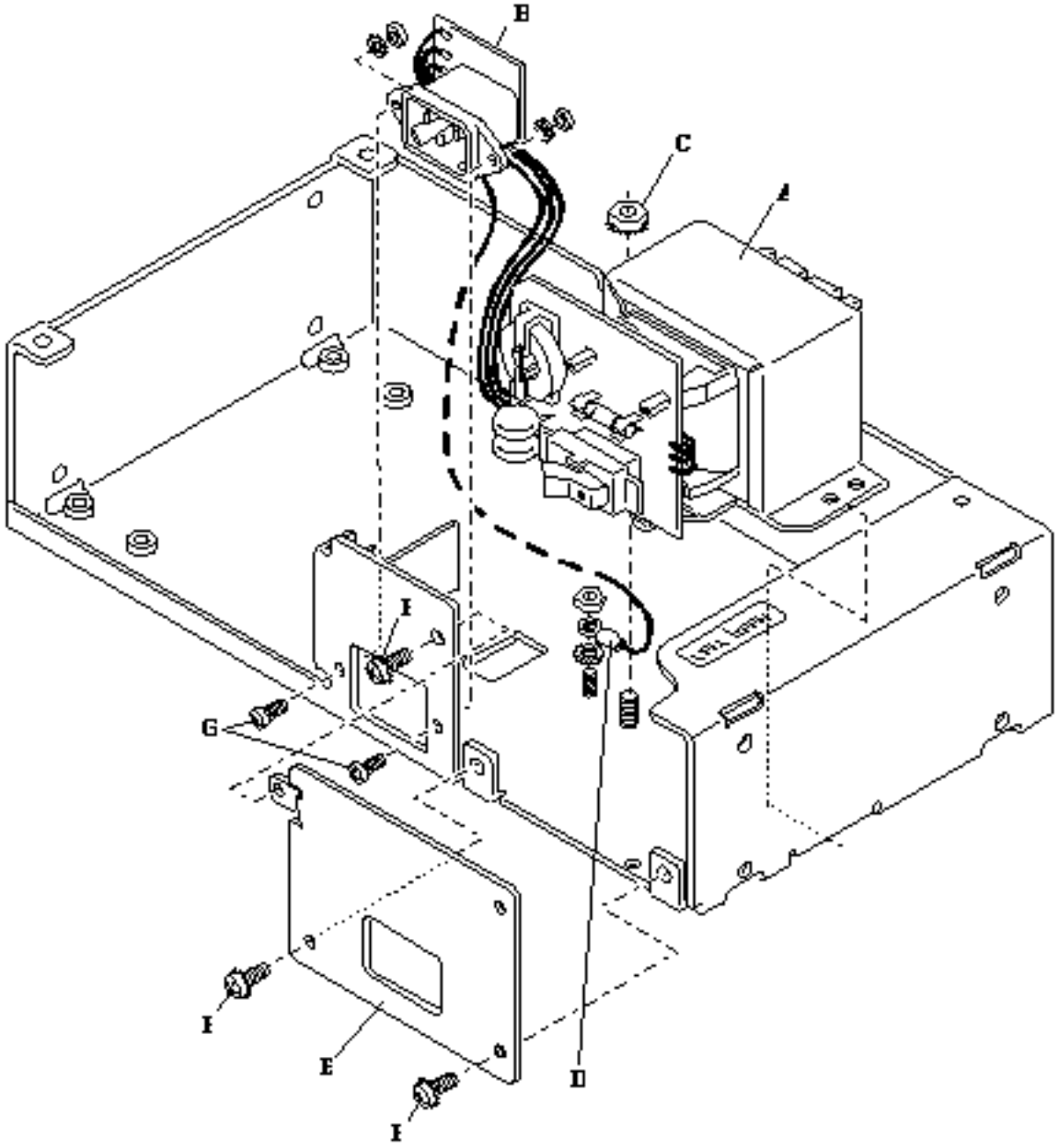


Figure 18: AC Switch Assembly and Power Transformer (1 of 2)

Note: This assembly may vary slightly depending on the model.

A = AC Power Transformer

B = AC Plug

C = Nut and Washer

D = Ground Wire, Nut, and Washer

E = AC Switch Cover Plate

F = AC Switch Cover Plate Screws

G = AC Plug Screws

Note: Before removing the AC Switch Assembly and Power Transformer, you must separate the Base Assembly from the printer. Refer to "Base Assembly" earlier in this chapter.

1. Remove the nut and washer (C) holding the AC Power Transformer (A) to the Base Assembly with a 3/8 inch nut driver.
2. Remove the AC Switch Cover Plate (E) from the Base Assembly by unscrewing the three screws (F) with a #2 Phillips screwdriver.
3. Remove the AC Plug (B) from the Base Assembly by unscrewing the two screws (G) with a #1 Phillips screwdriver.

   Use needle-nose pliers or a 7/32 inch end wrench to capture the nuts.
4. Remove the nut and washer holding the ground wire (D) to the Base Assembly with a 9/32 inch nut driver.
5. Pull up on the AC Power Transformer (A) until it clears the screw, then slide it out of the base.

   The screw is riveted to the bottom of the Base and cannot be removed.

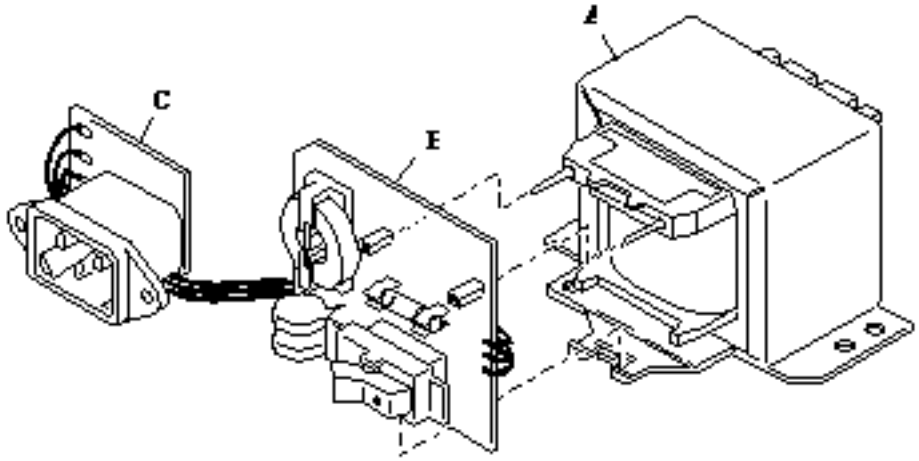


Figure 19: AC Switch Assembly and Power Transformer (2 of 2)

A = AC Power Transformer **C = AC Plug**

B = AC Switch Assembly

6. Unsolder the two leads from the AC Power Transformer (A) to separate the AC Switch Assembly (B) from the AC Power Transformer.

   Do not further disassemble the AC Switch Assembly. The AC Plug (C) is hard-wired to the AC Switch Assembly and should not be removed.

Note: Reverse these procedures to reinstall the AC Switch Assembly and AC Power Transformer.

SERIAL INTERFACE BOARD

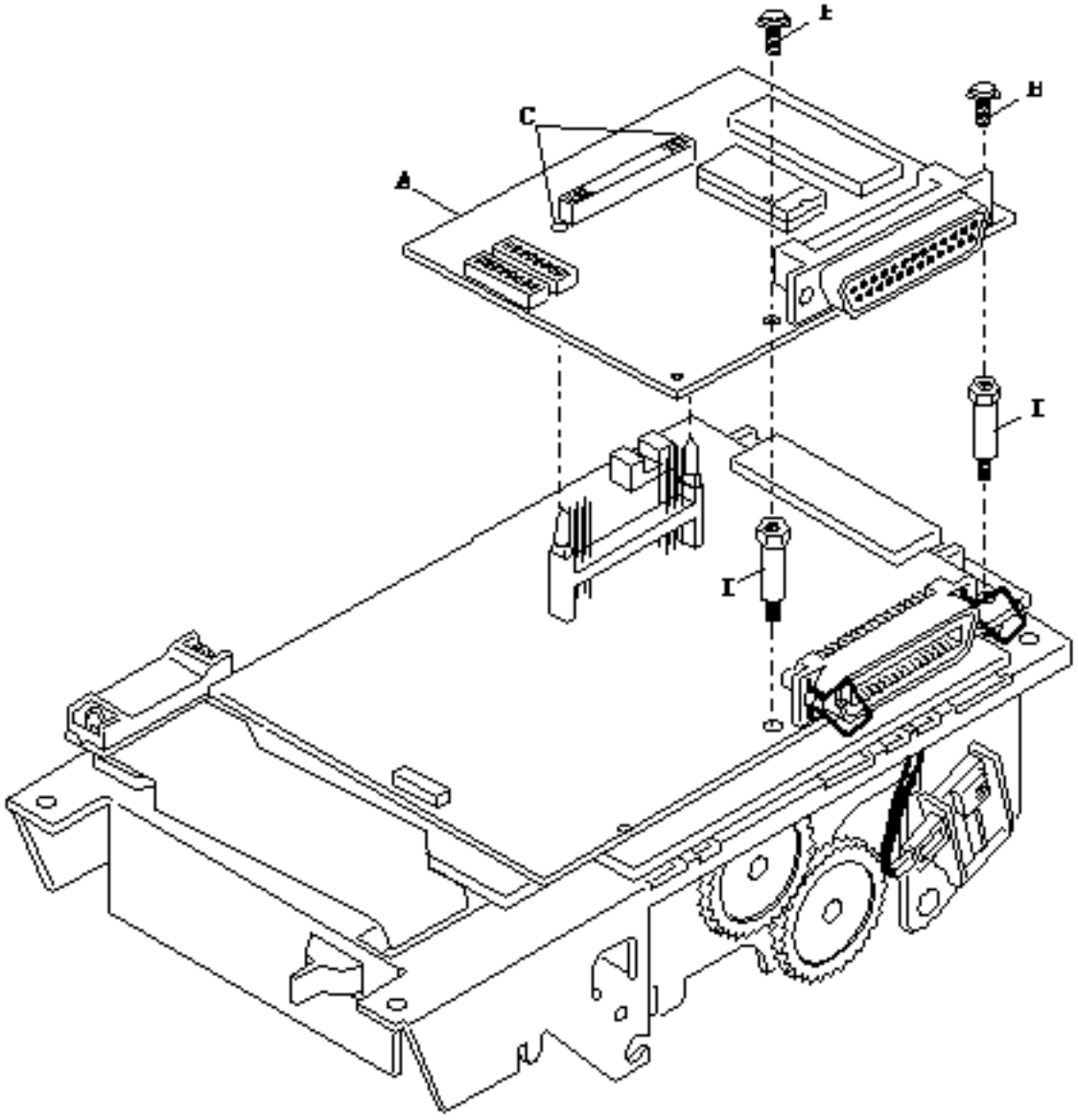


Figure 20: Serial Interface Board

A = Serial Interface Board

B = Screws

C = Glue

D = Standoffs

Note: Before removing the Serial Interface Board, you must separate the printer from the Base Assembly. Refer to “Base Assembly” earlier in this chapter. For ease in removing any of the boards, remove the Transport-Auto Cutter Assembly from the printer. Refer to “Transport-Auto Cutter Assembly” earlier in this chapter.

1. Turn the printer upside down.
2. Remove the two screws (B) on either side of the metal D-shell connector which holds the Serial Interface Board (A) to the Control Board with a 7/32 inch nut driver.
3. Remove the glue (C) holding the Serial Interface Board (A) to the Control Board with a small knife or a pair of small needle-nose pliers.
4. Remove the Serial Interface Board (A).

   Be careful not to bend the pins on the Control Board.

Note: Reverse these procedures to reinstall the Serial Interface Board.

CONTROL BOARD

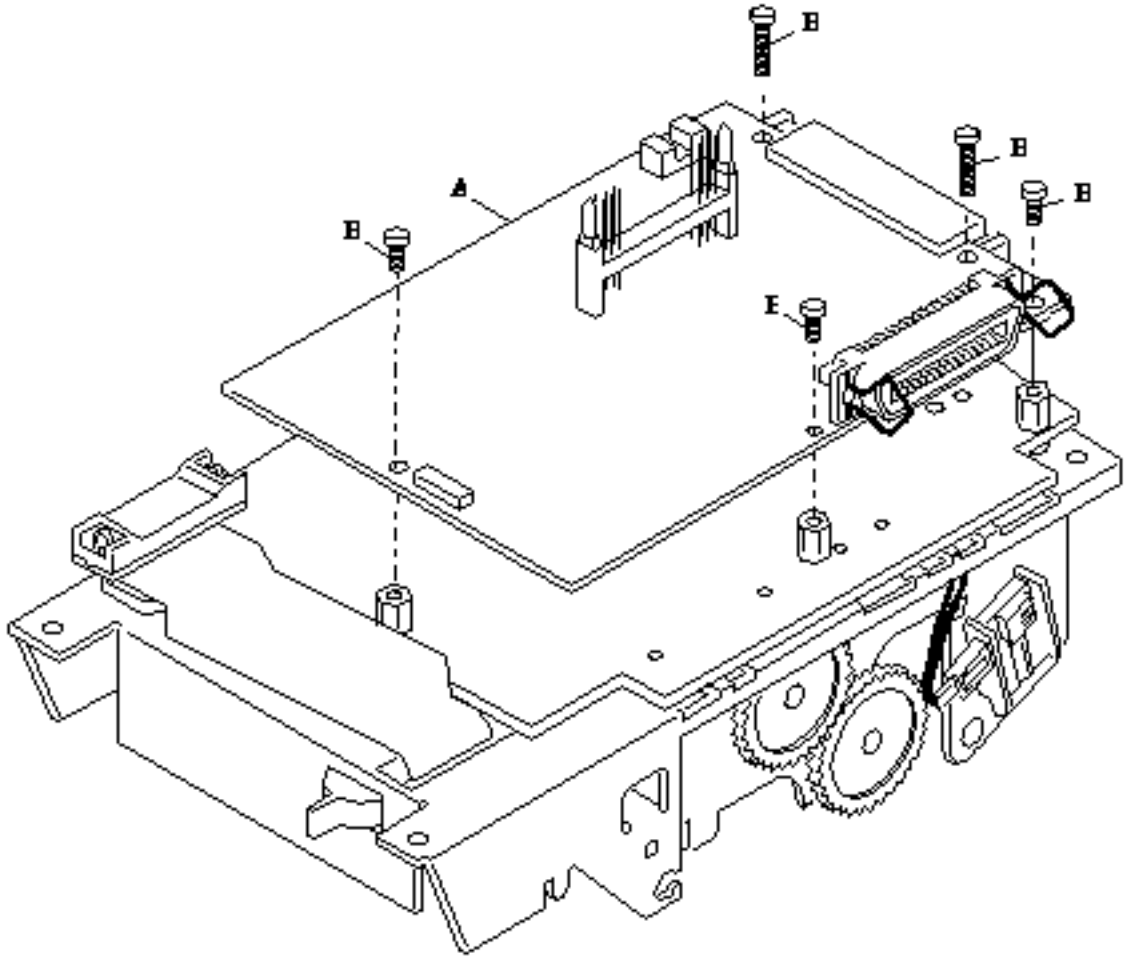


Figure 21: Control Board

A = Control Board **B = Screws**

Note: Before removing the Control Board, you must separate the printer from the Base Assembly and remove the Serial Interface Board, if present. Refer to “Base Assembly” and “Serial Interface Board” earlier in this chapter. For ease in removing any of the boards, remove the Transport-Auto Cutter Assembly from the printer. Refer to “Transport-Auto Cutter Assembly” earlier in this chapter.

1. Remove the five screws (B) holding the Control Board (A) to the printer with a 7/32 inch nut driver.

   Note the position of the two longer screws in the illustration.

Caution: Do not bend the posts protruding from the bottom of the board during the next step.

2. Gently pull the Control Board (A) straight out at the corner near the fuse.

Note: Reverse these procedures to reinstall the Control Board.

When reinstalling the Control Board, carefully insert the square posts protruding from the bottom of the Control Board into the proper holes on the Interconnect Board. If this is not done properly, the Transformer, Control Board, and Interconnect Board may be damaged.

INTERCONNECT BOARD

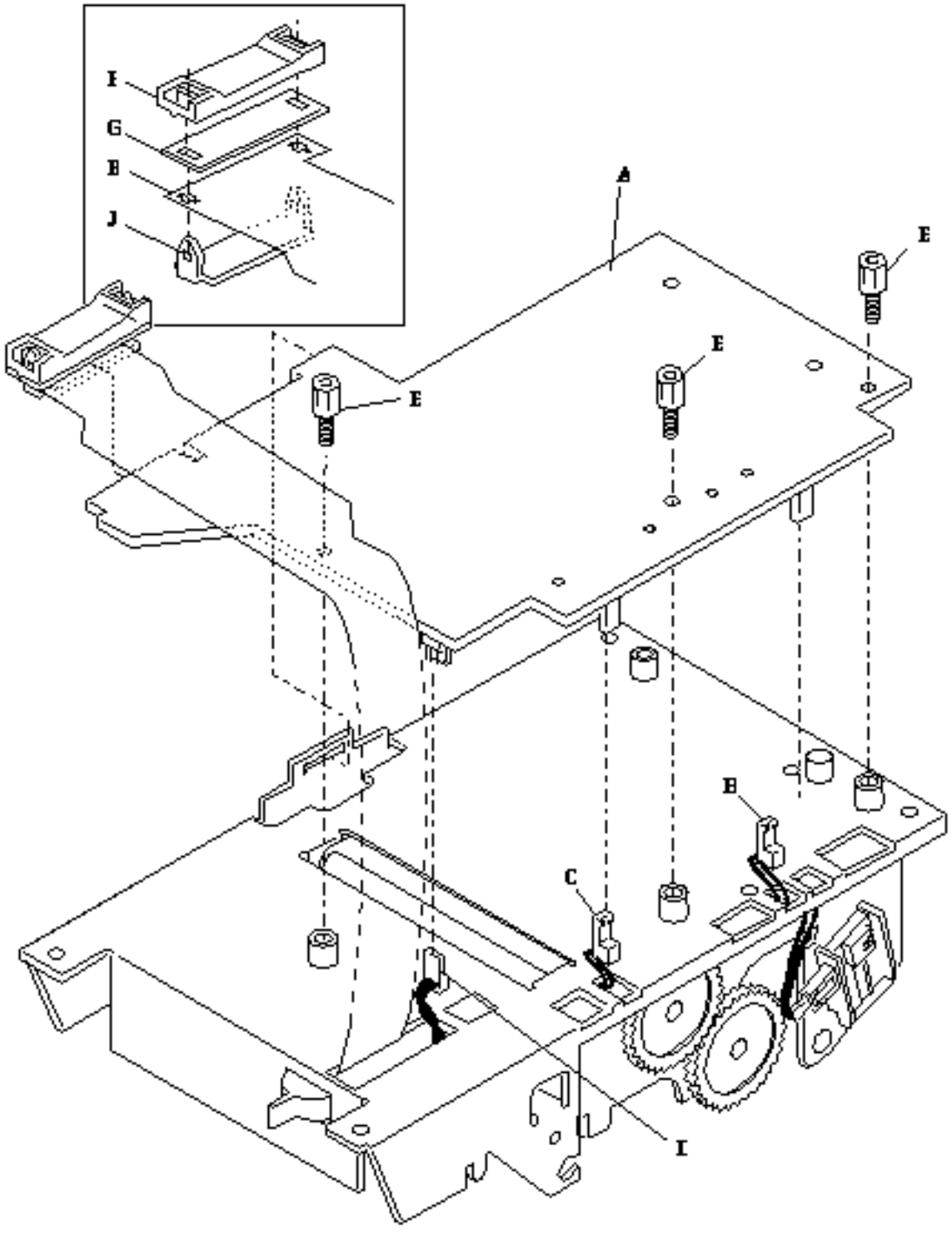


Figure 22: Interconnect Board

A = Interconnect Board
B = Paper Low Switch Cable
C = Journal Take-up Motor Cable
D = Test Switch Cable
E = Brass Standoffs
F = Cable Clamp
G = Contact Rubber
H = Carriage Ribbon Cable
J = Pressure Bar

Note: Before removing the Interconnect Board, you must separate the printer from the Base Assembly, remove the Serial Interface Board (if used), and the Control Board. Refer to "Base Assembly," "Serial Interface Board," and "Control Board" earlier in this chapter. For ease in removing any of the boards, remove the Transport-Auto Cutter Assembly from the printer.

1. Turn the printer right-side up.
2. Disconnect the following cables from the Interconnect Board:

- Paper Low Switch (routing of the cable differs depending on the model)
- Test Switch
- Journal Take-up Motor

3. Turn the printer upside-down.
4. Remove the Carriage Cable Assembly (F, G, H, J) from the Interconnect Board by sliding it off the board.

   When reinstalling, be sure that the cable contacts the board directly.

   You do not need to separate the Pressure Bar (J) from the Cable Clamp (F). If any of the pieces are broken, you can separate them in order to replace the broken parts.

   To separate the parts, carefully bend the metal tabs of the Cable Clamp (F) outward slightly with a pair of long needle-nose pliers. Don't bend the plastic tabs on the Pressure Bar (J) as they are easily broken. Be careful not to damage the Carriage Ribbon Cable (H).
5. Remove the three Brass Standoffs (E) holding the Interconnect Board (A) to the printer with a 1/4 inch nut driver.

Note: Reverse these procedures to reinstall the Interconnect Board.

JOURNAL BUCKET ASSEMBLY

REMOVING THE JOURNAL BUCKET ASSEMBLY

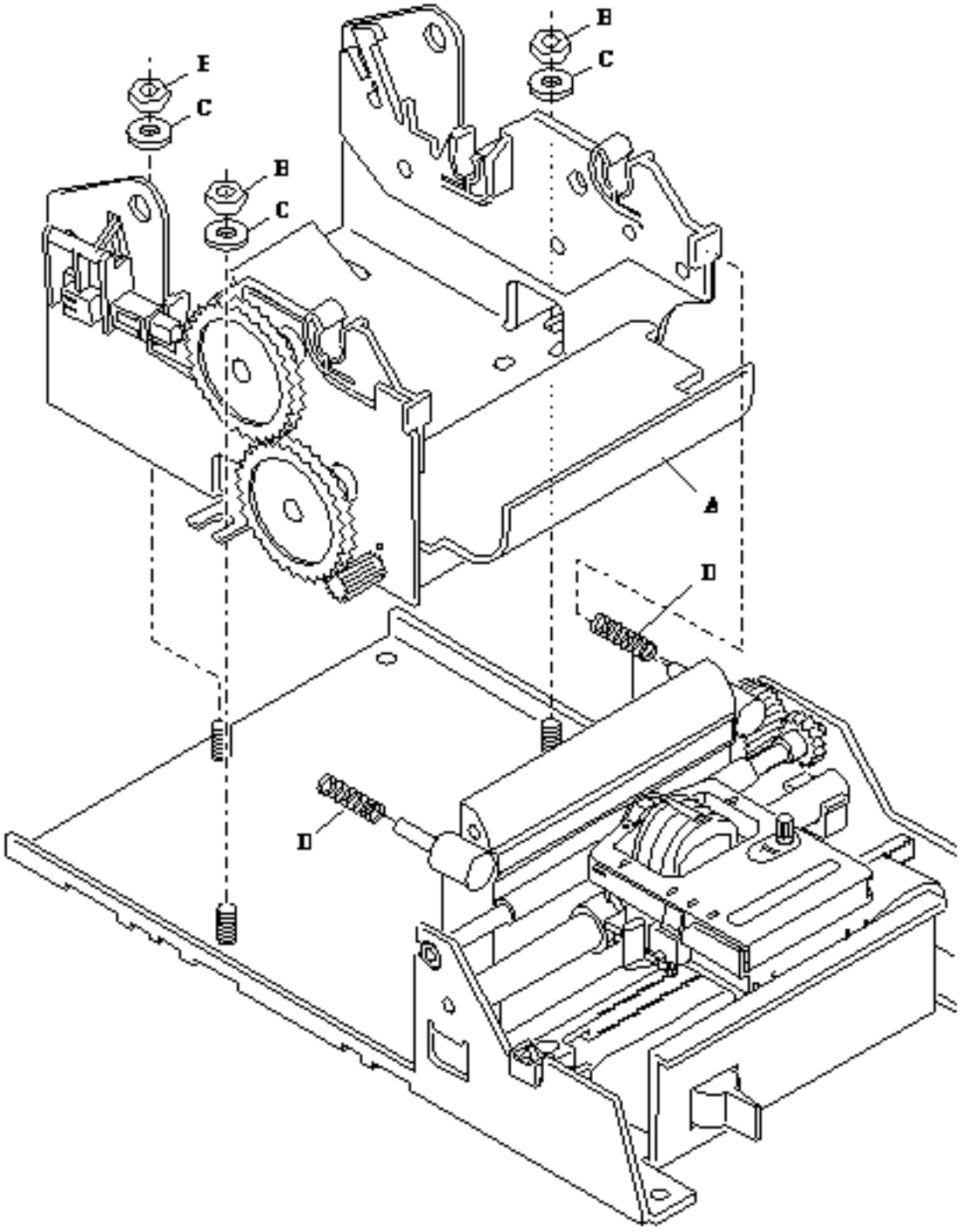


Figure 23: Journal Bucket Assembly (1 of 2)

A = Journal Bucket Assembly **C = Washers**

B = Nuts **D = Helper Springs**

Note: You do not need to separate the Printer from the Base Assembly, or remove any of the boards to remove the Journal Bucket Assembly. If you have already removed the Base Assembly and the boards, turn the printer right-side up, but be careful not to damage the Carriage Cable.

1. If you have not already done so, unplug the following cables:

- Paper Low Switch (routing of the cable differs depending on the model)
- Journal Take-up Motor

2. Remove the three nuts (B) and washers (C) holding the Journal Bucket Assembly (A) to the printer frame with a 9/32 inch nut driver.

   The screws are riveted to the frame and cannot be taken out.

3. Pull the Journal Bucket Assembly (A) up until it clears the screws, then out to remove it.

   Be careful not to lose the Helper Springs (D) on the Forms Compensation Arm.

Note: Reverse these procedures to reinstall the Journal Bucket Assembly.

DISASSEMBLING THE JOURNAL BUCKET ASSEMBLY

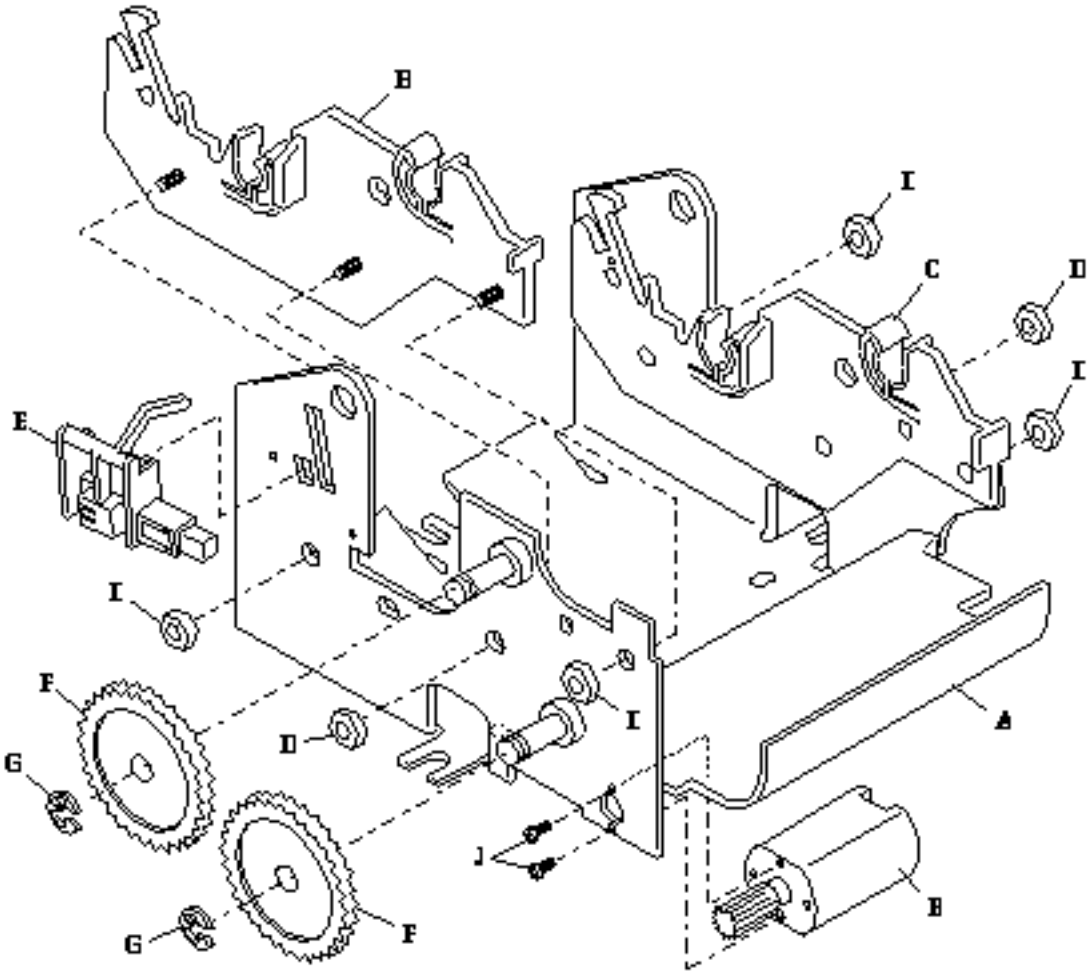


Figure 24: Journal Bucket Assembly (2 of 2)

Note: This assembly may vary slightly depending on the model.

A = Journal Bucket Assembly
B = Left Paper Supply Plate
C = Right Paper Supply Plate
D = Nuts
E = Paper Low Switch
F = Switch Gears
G = E-Clips
H = Journal Take-up Motor
J = Journal Take-up Motor Screws

Note: The following instructions describe disassembling the Journal Bucket Assembly with the Journal Take-up Motor and gears. Some models do not have the journal take-up option. On those models, you only need to remove the Paper Low Switch and the Paper Supply Plates (plastic pieces on the sides of the bucket) to disassemble the Journal Bucket Assembly.

1. Remove the E-Clips (G) and Switch Gears (F) from the Journal Bucket Assembly (A).
2. Remove the two screws (J) holding the Journal Take-up Motor (H) to the Journal Bucket Assembly (A) with a #0 Phillips screwdriver.
3. Remove the nuts (D) holding the Paper Supply Plates (B, C) to the sides of the Journal Bucket Assembly (A) with a 9/32 inch nut driver.
4. Gently pry out the Paper Low Switch (E) from the Journal Bucket Assembly (A).

   Squeeze the tabs on the Paper Low Switch (E) or insert a screwdriver under the switch to remove it.

Note: Reverse these procedures to reassemble the Journal Bucket Assembly.

CARRIAGE ASSEMBLY

SPACE MOTOR ASSEMBLY

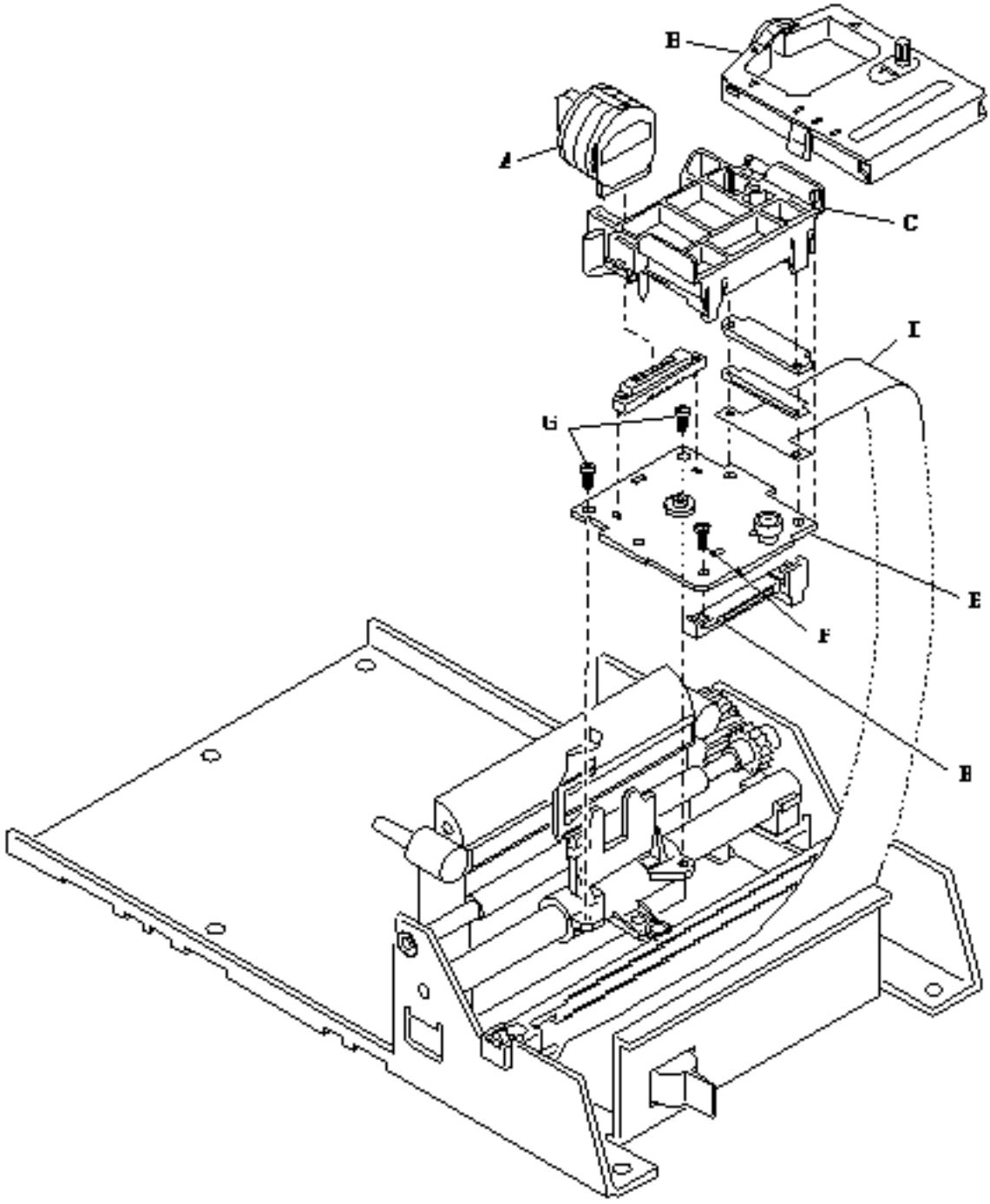


Figure 25: Space Motor Assembly

A = Printhead	**E = Space Motor**
B = Ribbon Cassette	**F = Screw**
C = Ribbon Feed Gear Assembly	**G = Screws**
D = Carriage Cable	**H = Slider Assembly**

Note: You do not need to separate the Printer from the Base Assembly or remove any of the boards to remove the Carriage Assembly. If you have already removed the Base Assembly and the boards, turn the printer right-side up, but be careful not to damage the Carriage Cable.

1. Remove the Ribbon Cassette (B).
2. Lift up on the printhead clamp located on the right side of the Printhead (A) and remove the Printhead.
3. Rotate the Slider Assembly (H) away from the Space Motor Assembly and printer frame by loosening the screw (F) with a #1 Phillips screwdriver.

   You do not need to remove this screw.
4. Remove the Space Motor Assembly by unscrewing the two screws (G) holding the Space Motor Assembly to the Carriage Assembly with a #1 Phillips screwdriver.

Caution: Do not separate the top and bottom halves of the Ribbon Feed Gear Assembly in the next step or gears will fall out of the assembly.

5. Remove the Ribbon Feed Gear Assembly (C) from the Space Motor (E) by pulling the four tabs outward.
   a. Pull the two tabs outward that are closest to the Carriage Cable (D).
   b. Next, pull the other two tabs outward.

Caution: Be careful when handling the ribbon cable. It will crease easily. Avoid touching any of the contact areas.

6. Carefully disconnect the Carriage Cable (D) by separating it from the Ribbon Feed Gear Assembly (C).

Note: Reverse these procedures to reinstall the Space Motor Assembly.

Note: After the Space Motor Assembly has been reinstalled, check the spacing between the Space Motor Assembly and the Space Rack (see F, Figure 26). Adjust the space to .012 inches with a Thickness Gauge. Loosen the two screws (G) as needed to make the adjustment.

Check the platen parallelism and air gap and readjust if necessary. See “Adjusting the Platen Parallel to the Printhead” and “Adjusting the Platen Air Gap” in the “Maintenance” chapter.

CARRIAGE SHAFT BEARING AND SPACE RACK

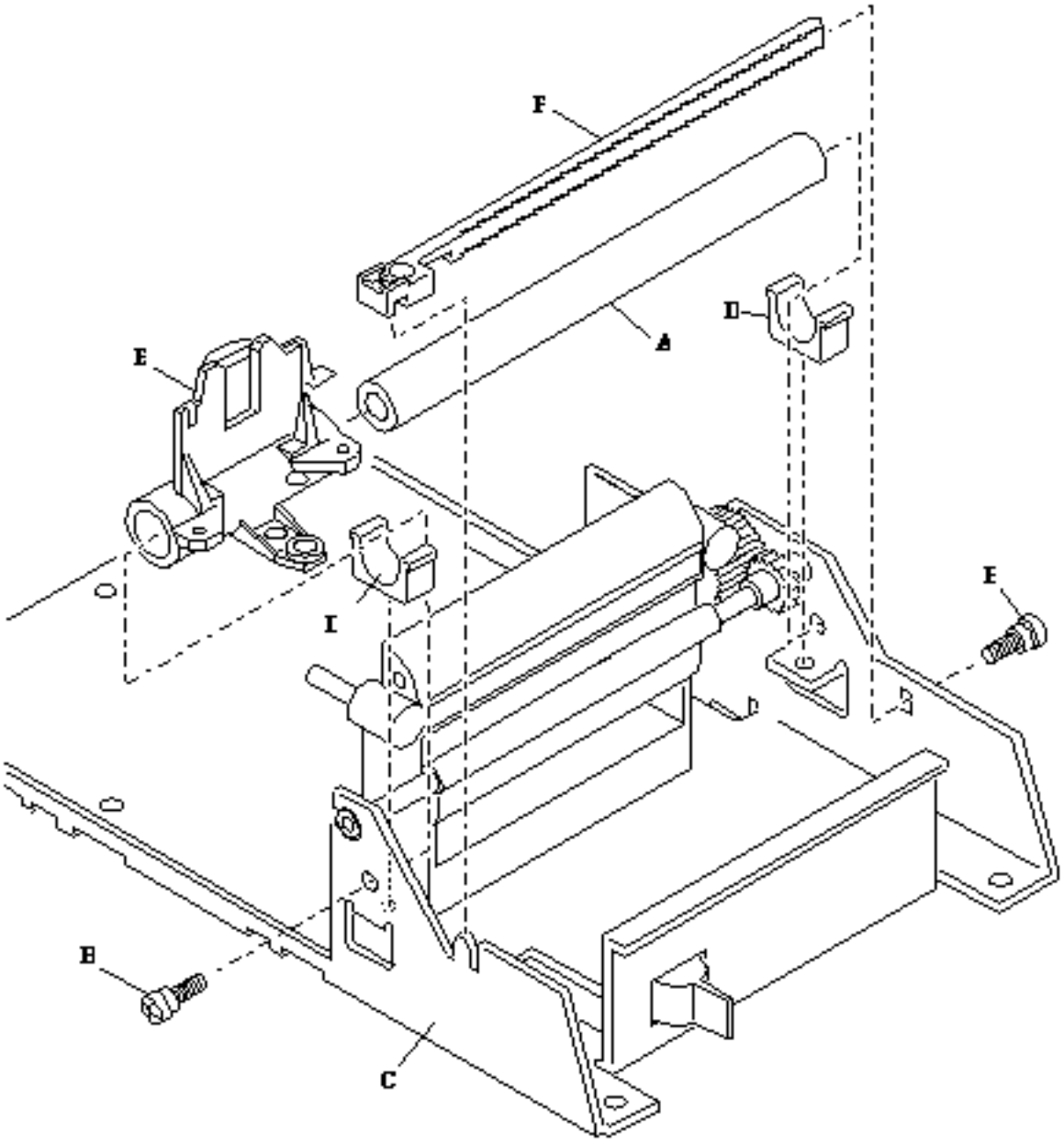


Figure 26: Carriage Shaft Bearing and Space Rack

A = Carriage Shaft

B = Screws

C = Base Plate

D = Carriage Shaft Stop Blocks

E = Carriage Assembly

F = Space Rack

Note: Before removing the Carriage Shaft Bearing and Space Rack, you must remove the Space Motor Assembly. Refer to the previous section, “Space Motor Assembly.”

1. Remove the screws (B) at each end of the Carriage Shaft (A) with a #1 Phillips screwdriver.
2. Gently pull the Carriage Assembly (E) and Carriage Shaft (A) from the Base Plate (C).
3. Remove the rubber U-shaped Carriage Shaft Stop Blocks (D) located at both ends of the Carriage Shaft (A).
4. Slide the Carriage Assembly (E) off the Carriage Shaft (A).
5. Remove the Space Rack (F) by gently pulling up on the left hand side.

Note: Reverse these procedures to reinstall the Carriage Shaft Bearing and Space Rack.

Remember to install the U-shaped Carriage Shaft Stop Blocks (D).

Note: After the Carriage Shaft Bearing and Space Rack have been reinstalled, check the Platen Air Gap and readjust it if necessary. See “Adjusting the Platen Parallel to the Printhead” and “Adjusting the Platen Air Gap” in the “Maintenance” chapter.

FEED ROLL SHAFT

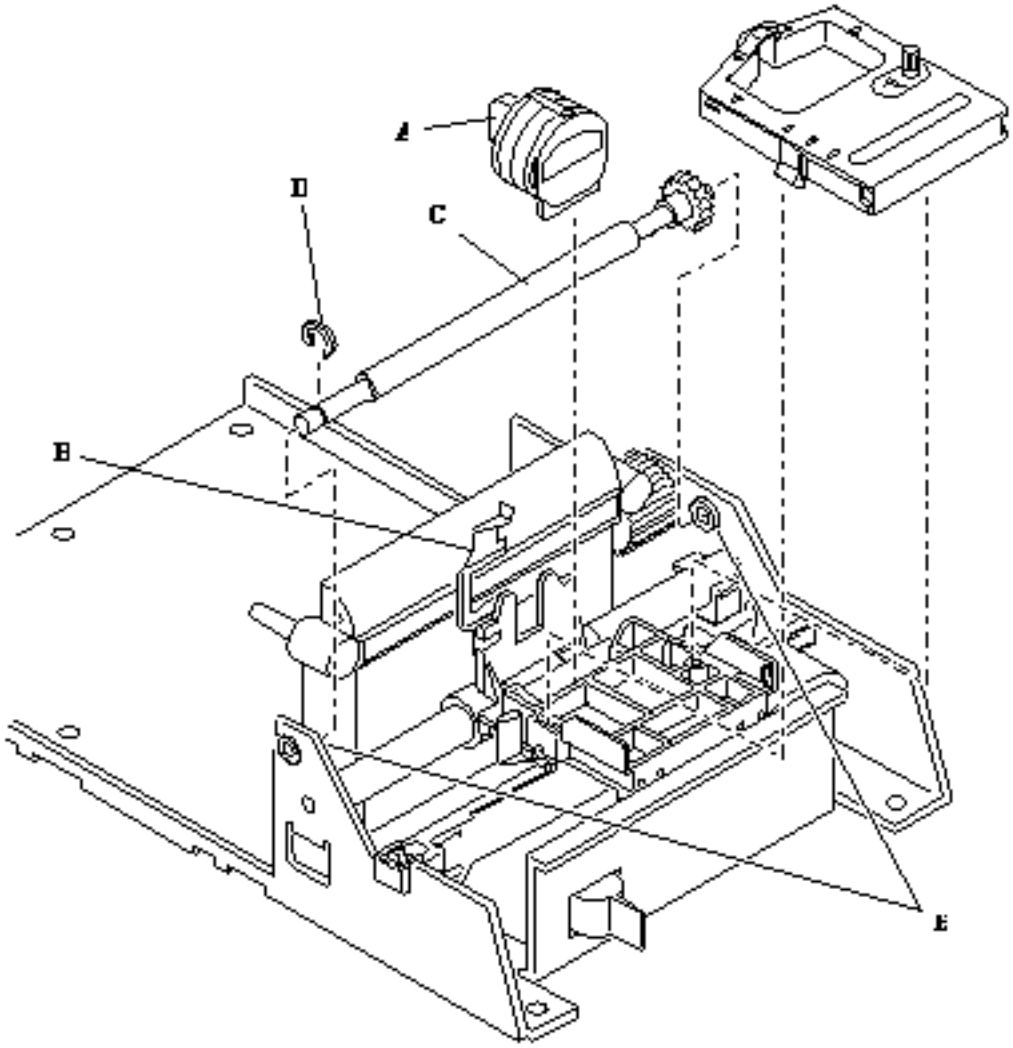


Figure 27: Feed Roll Shaft

A = Printhead

B = Printhead Clamp

C = Feed Roll Shaft

D = C-Clip

E = Feed Roll Bearings

Note: You do not need to remove any items from the printer to remove the Feed Roll Shaft, except for the Ribbon Cassette and the Printhead. Any time the Feed Roll Shaft is replaced, the Feed Roll Bearings on either end must also be replaced.

1. Remove the Ribbon Cassette.
2. Remove the Printhead (A) by lifting up on the Printhead Clamp (B) that is located on the right side of the Printhead.
3. Grasp the Printhead (A) and pull straight up while pushing back on the Forms Compensation Arm Assembly.

   The Forms Compensation Arm Assembly is the assembly directly behind the Printhead.
4. Remove the C-Clip (D) that is on the inside of the Feed Roll Bearing (E) on the left-hand side of the Feed Roll Shaft (C).

   Be careful not to lose the C-Clip. The tension is high and it will spring out if you do not have a good hold on it.

Note: During the next four steps, you may need to push back on the Forms Compensation Arm Assembly to get the Feed Roll Shaft out. If the Journal Bucket Assembly has been removed, you may find it easier to pivot the Forms Compensation Arm Assembly so that it is lying flat and out of your way.

5. Slide the Feed Roll Shaft (C) to the left by pushing it through from the right side with a screwdriver or other tool.
6. When the Feed Roll Shaft (C) comes out of the Right Side Frame, lift it up enough to clear the frame.
7. Slide the Feed Roll Shaft (C) to the right until it clears the Left-Side Frame.
8. Place the new Feed Roll Bearings (E) on the Feed Roll Shaft (C).

   When replacing the Feed Roll Shaft, be sure to line up the Feed Roll Bearings correctly. The two small notches should point toward the cutaway in the frame.

Note: Reverse these procedures to reinstall the Feed Roll Shaft.

Note: Check and readjust the Platen Air Gap. See “Adjusting the Platen Air Gap” in the “Maintenance” chapter.

LINEFEED MOTOR ASSEMBLY

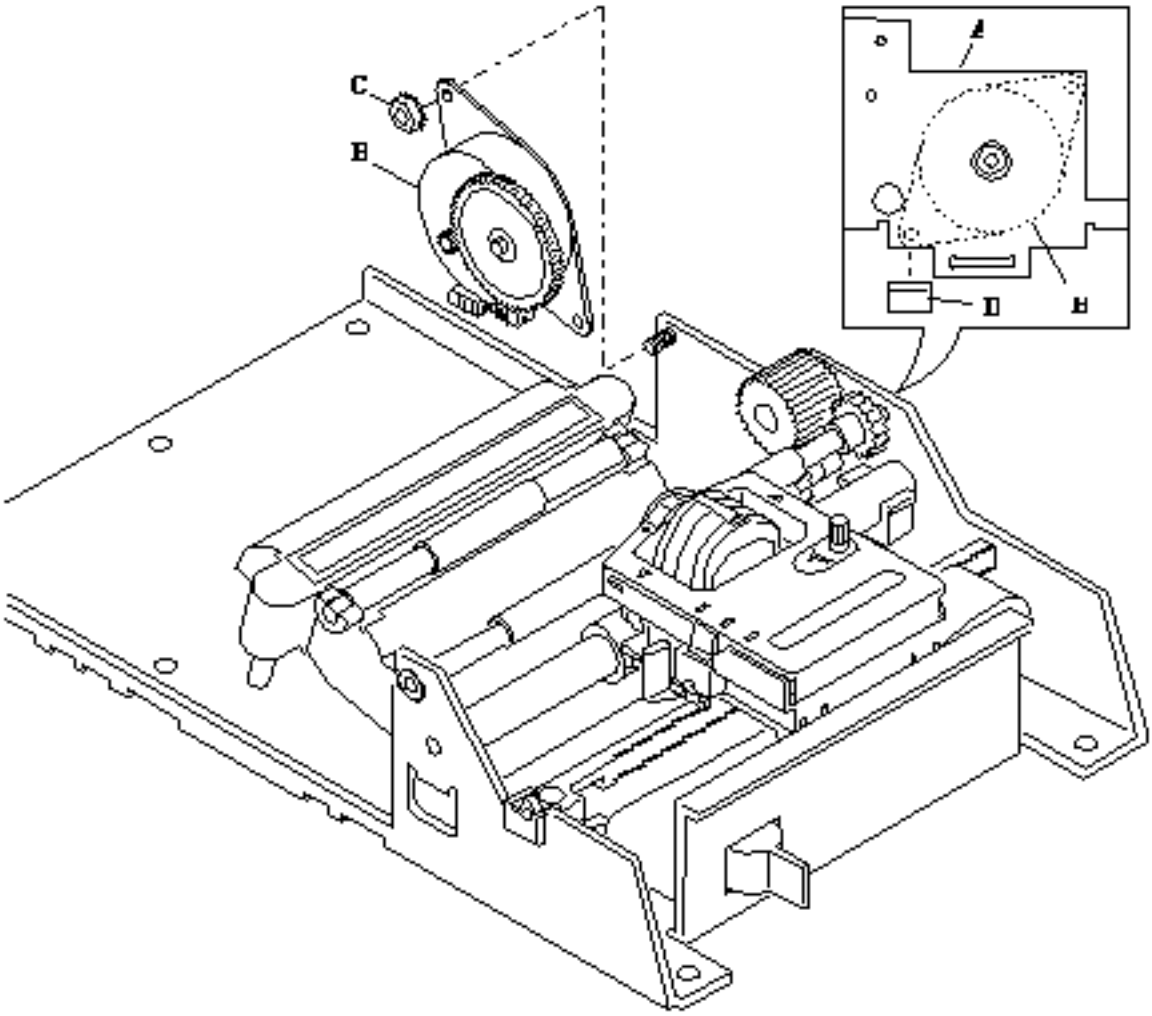


Figure 28: Linefeed Motor Assembly

A = Base Plate
B = Linefeed Motor Assembly
C = Nut
D = Clip

Note: Before removing the Linefeed Motor, you must separate the printer from the Base Assembly, remove the boards, and remove the Journal Bucket Assembly. See “Base Assembly,” the sections for the boards, and “Journal Bucket Assembly” earlier in this chapter.

1. Remove the nut (C) holding the Linefeed Motor Assembly (B) to the Base Plate (A).
2. Remove the clip (D) at the bottom of the Base Plate (A) holding the Linefeed Motor Assembly (B) to the Base Plate.
3. Remove the Linefeed Motor Assembly (B).

   There are two gears remaining. The bottom gear can be removed by removing the E-Clip. The top gear cannot be removed.

Note: Reverse these procedures to reinstall the Linefeed Motor Assembly.

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 flowchart that describes the corrective action for that problem. The flowcharts are on the following pages and are identified by the number referred to in the table.

Following the flowcharts is a section that describes checking the connection circuits and resistance for the Printhead, Space Motor, and Linefeed Motor.

DETERMINING THE PROBLEM

When Problem Occurs	Description of Problem	Refer to Flowchart
Trouble at Power On	Printer is dead; no voltages on control board	1
	The Carriage does not move	2
	Carriage does not operate normally: runaway, vibration, incomplete homing	3
	Carriage homes normally, but LED comes on (constant or flash)	4
	Fuse on the Power Supply blows at power-up	5
	Fuse on the Control Board blows (SLMR blows)	6
Trouble During Data Reception or Printing	Spacing or printing does not occur	7
	Spacing operates normally, but printer does not print	8
	Printer stops printing	9
	Wrong characters are printed or some characters are not printed	10
	Some dots do not print	11
	Print is not dark enough	12
	Printer does not line feed during printing	13
	Fuse on Power Supply Board blows during printing	14

FIXING THE PROBLEM

The troubleshooting flowcharts are identified by a circled number that corresponds with the problems listed in the table on the previous page. They are presented in the order listed in the table.

Flowchart Reference	Flowchart Reference	Flowchart Reference
1	5	11
2	6	12
2-1	7	13
2-2	8	14
3	9	
4	10	

Note: References to letters in the flowcharts refer to items called out in Figure 45 on page 71. Refer to the respective sections in the “Disassembly” chapter for information on replacing modules or assessemblies as instructed in the flowcharts. For example, if the flowchart tells you to replace the AC Switch Assembly, refer to the “AC Switch Assembly” section in the “Disassembly” chapter.

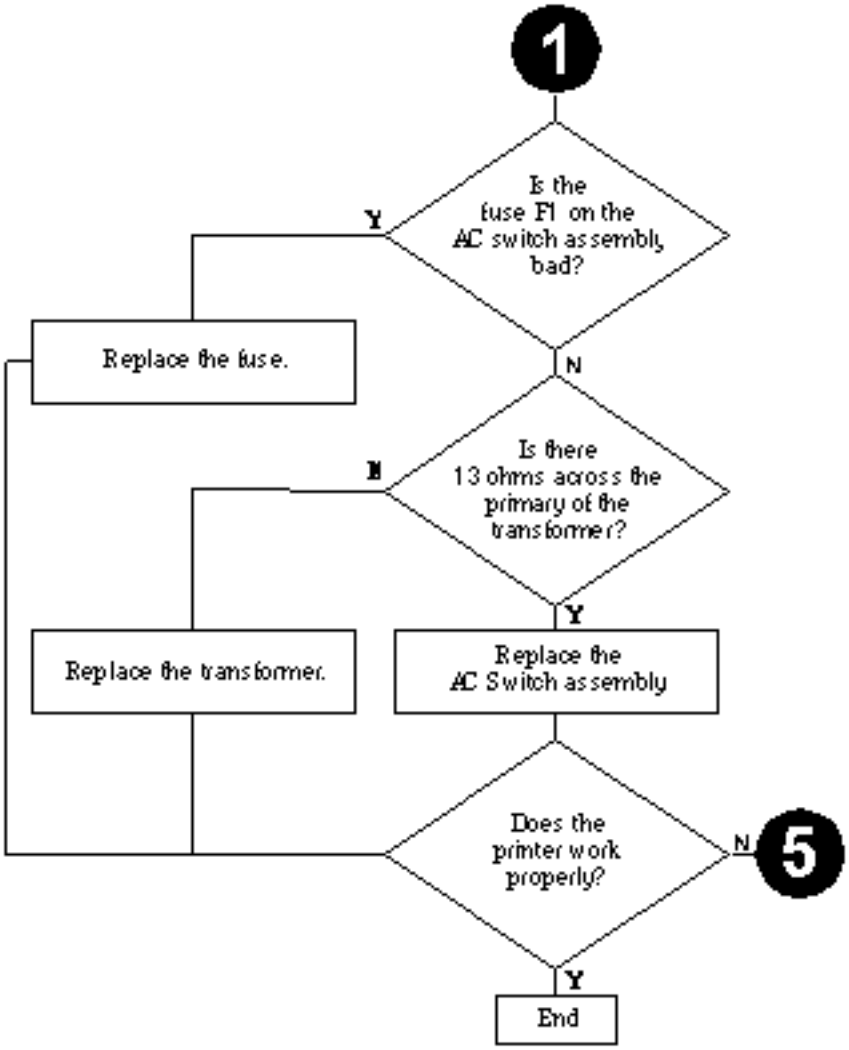


Figure 29: Flowchart 1

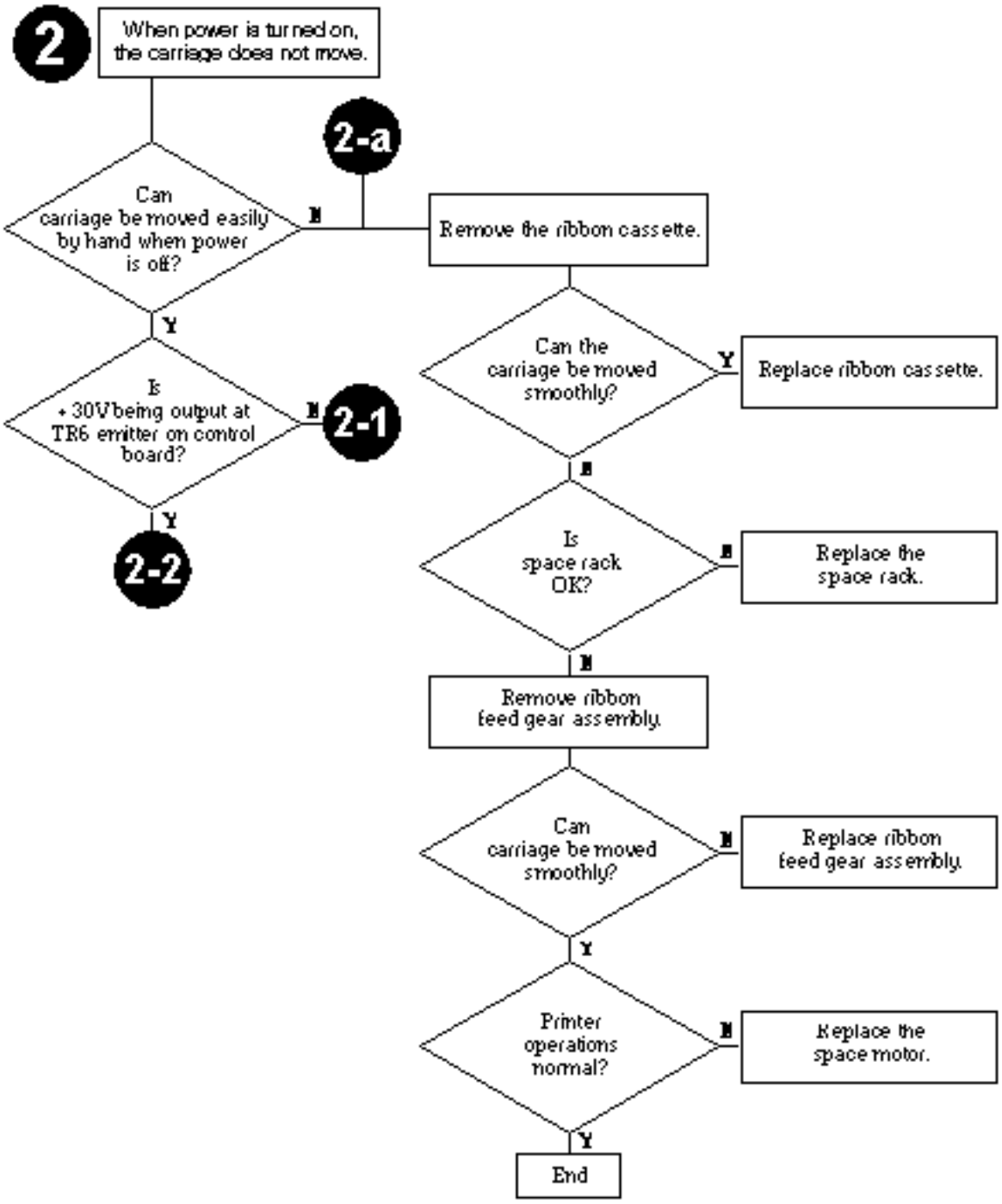


Figure 30: Flowchart 2

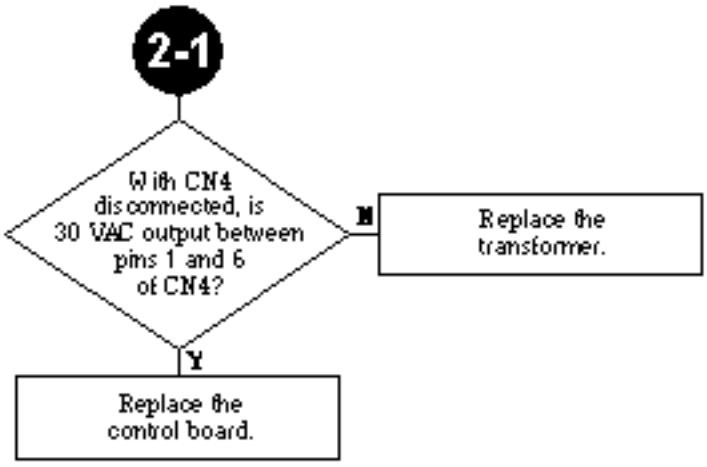


Figure 31: Flowchart 2-1

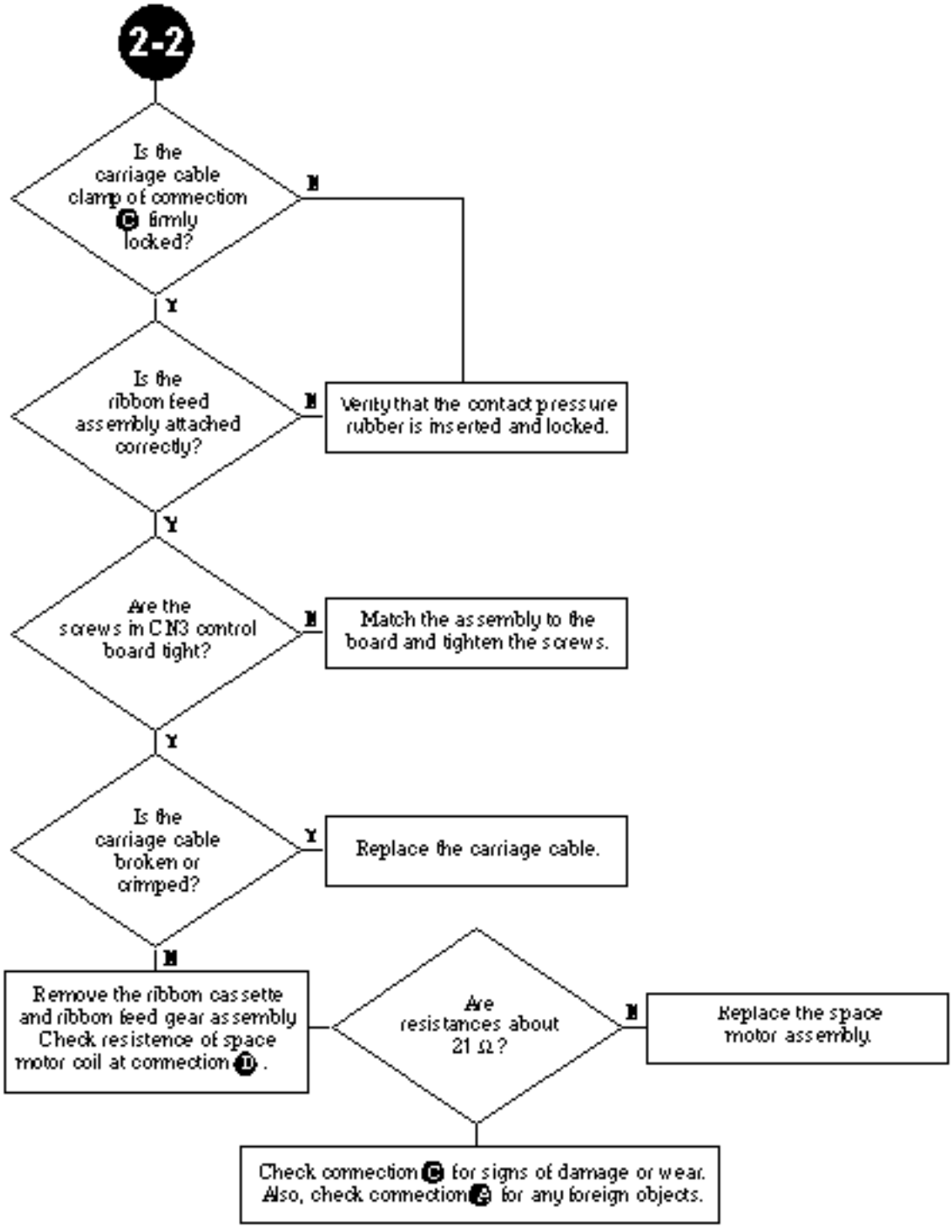


Figure 32: Flowchart 2-2

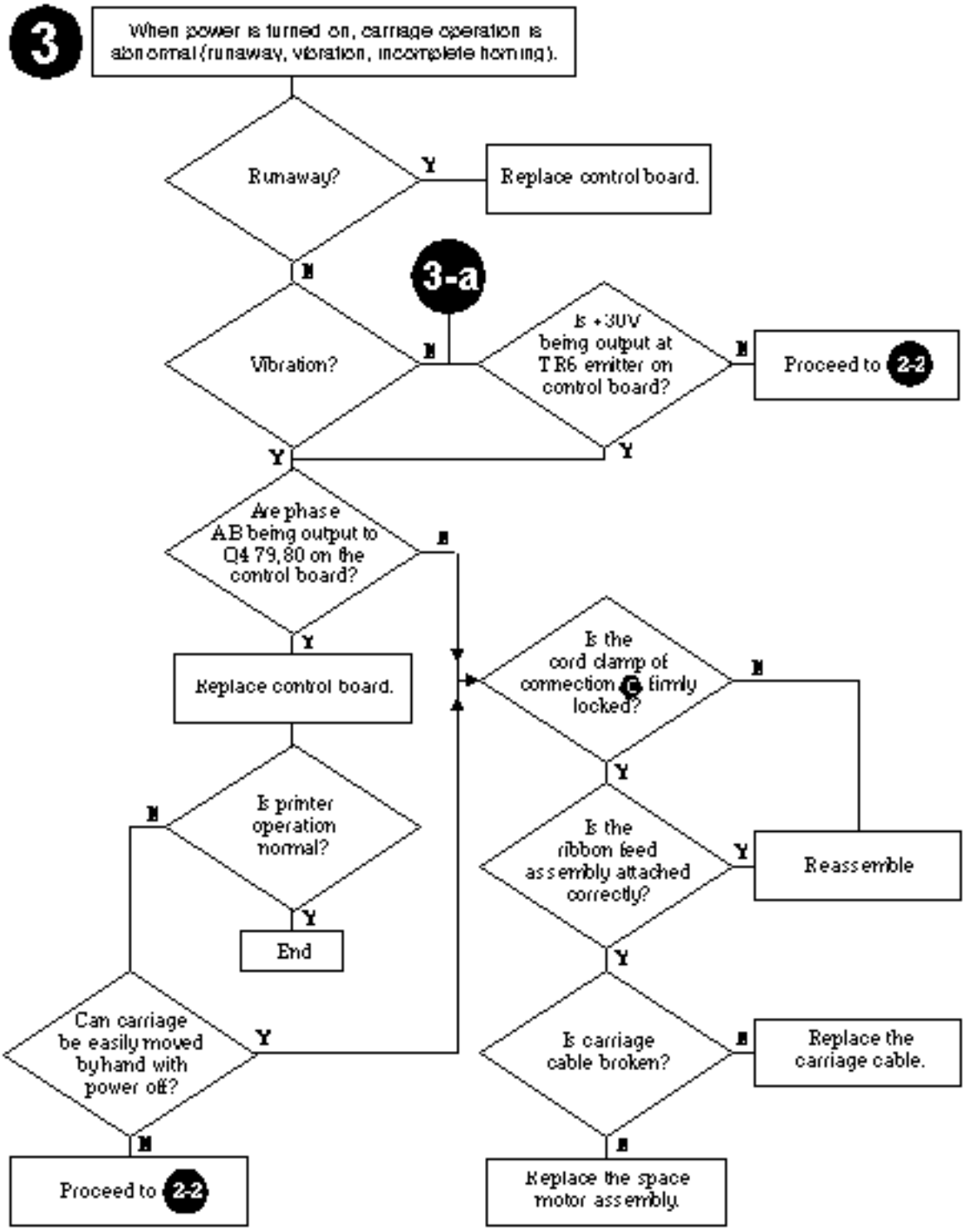


Figure 33: Flowchart 3

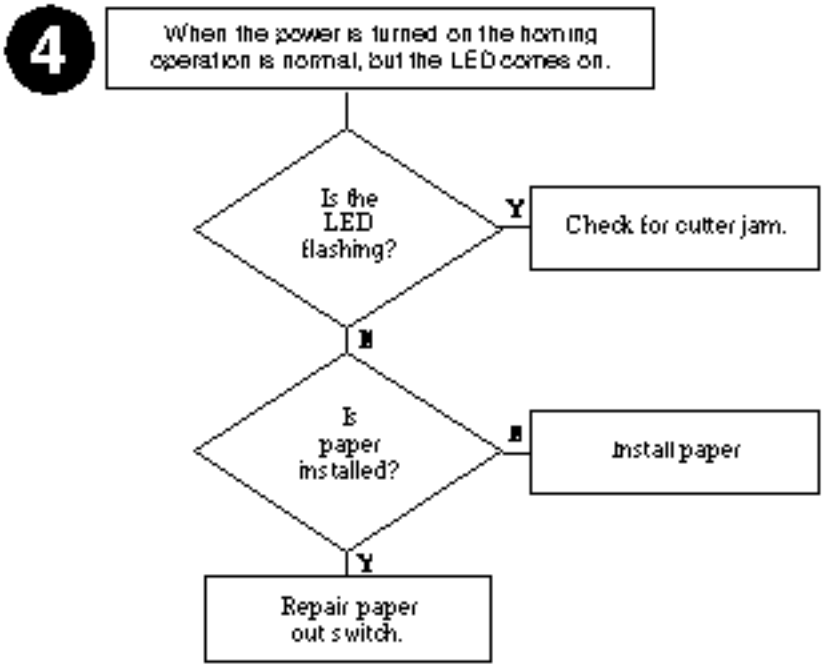


Figure 34: Flowchart 4

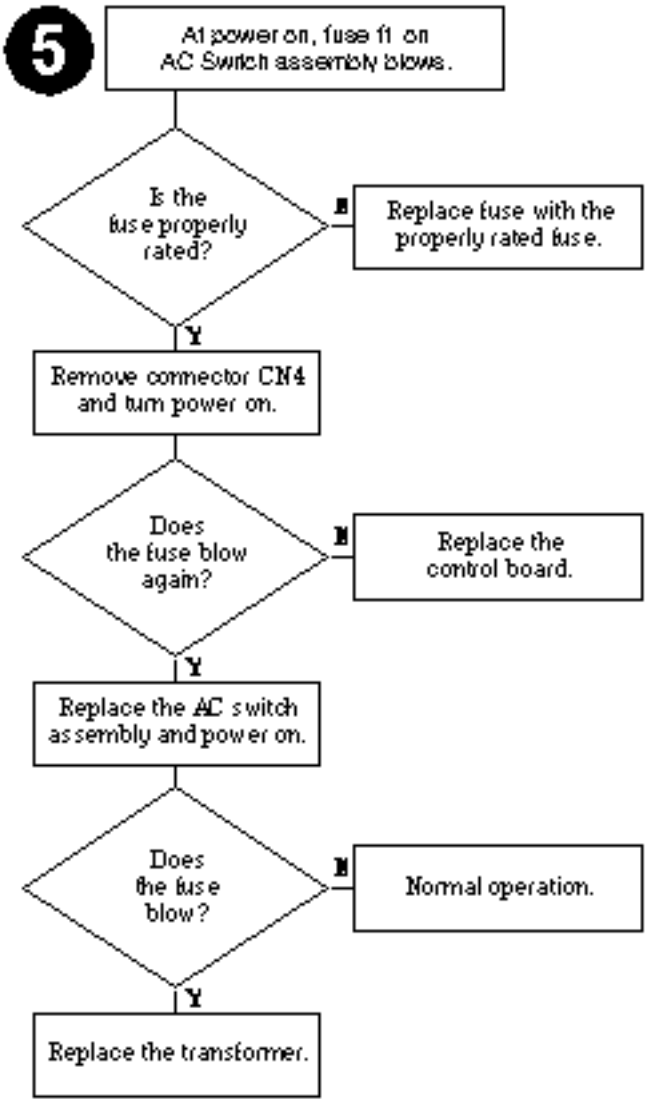


Figure 35: Flowchart 5

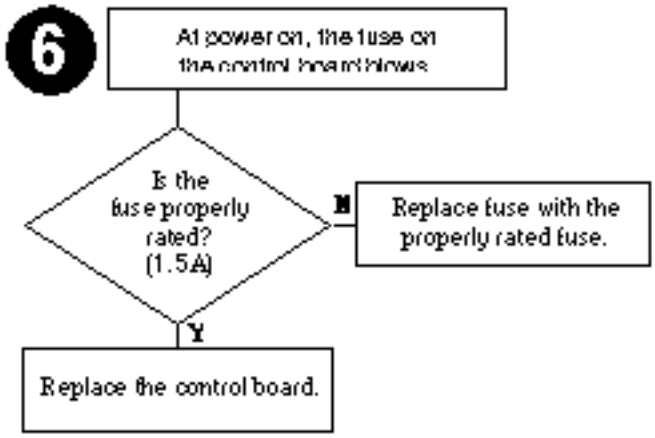


Figure 36: Flowchart 6

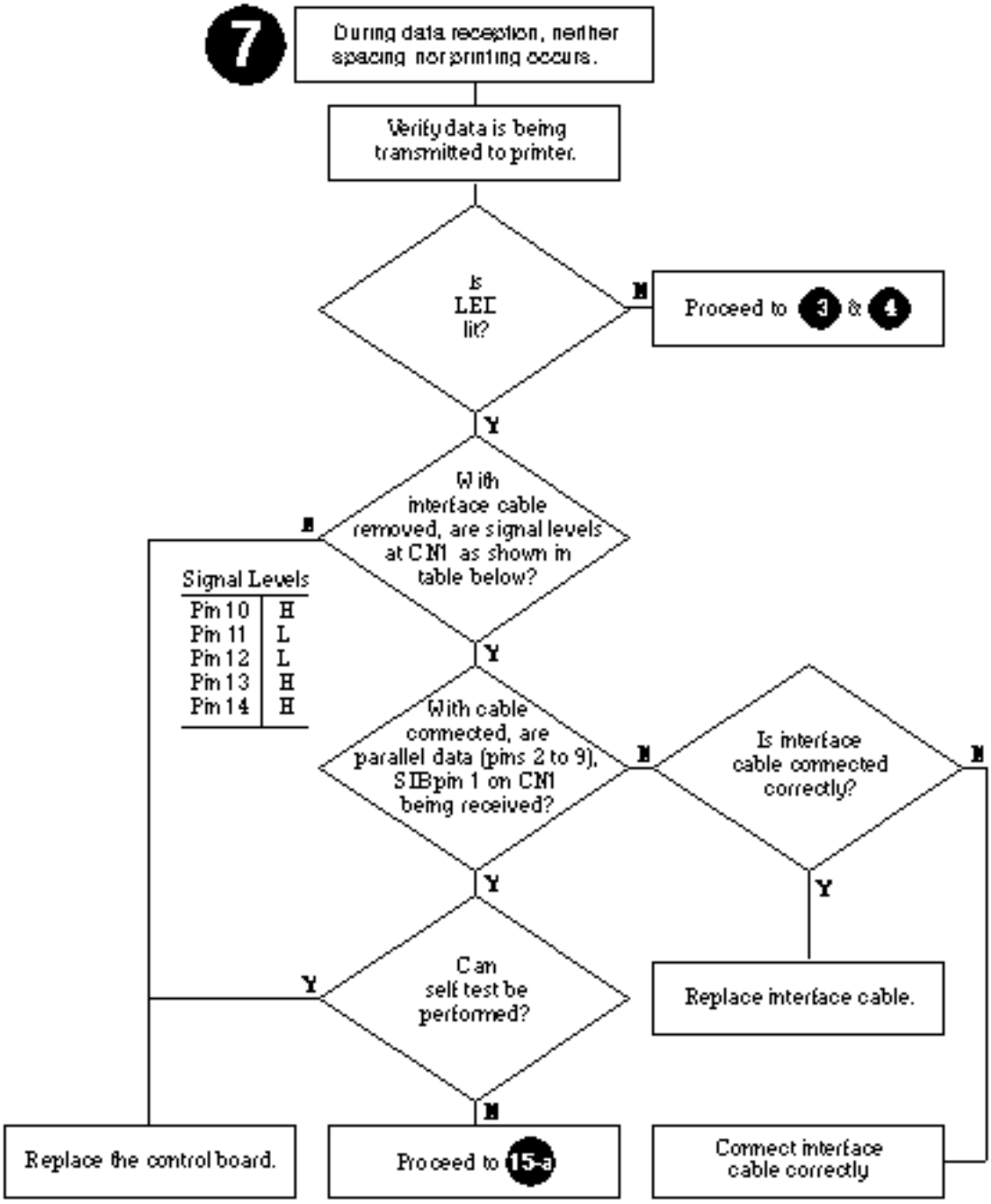


Figure 37: Flowchart 7

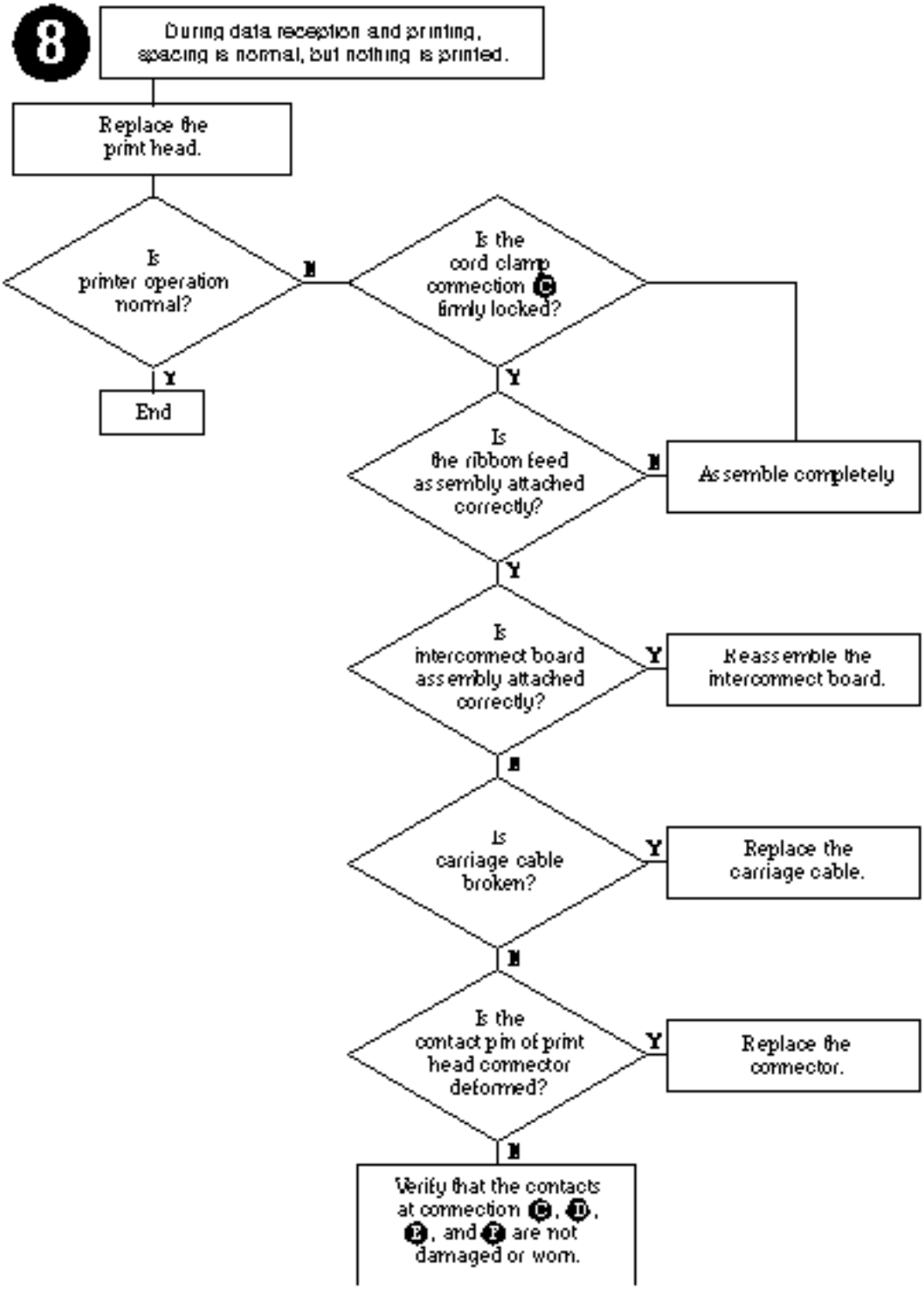


Figure 38: Flowchart 8

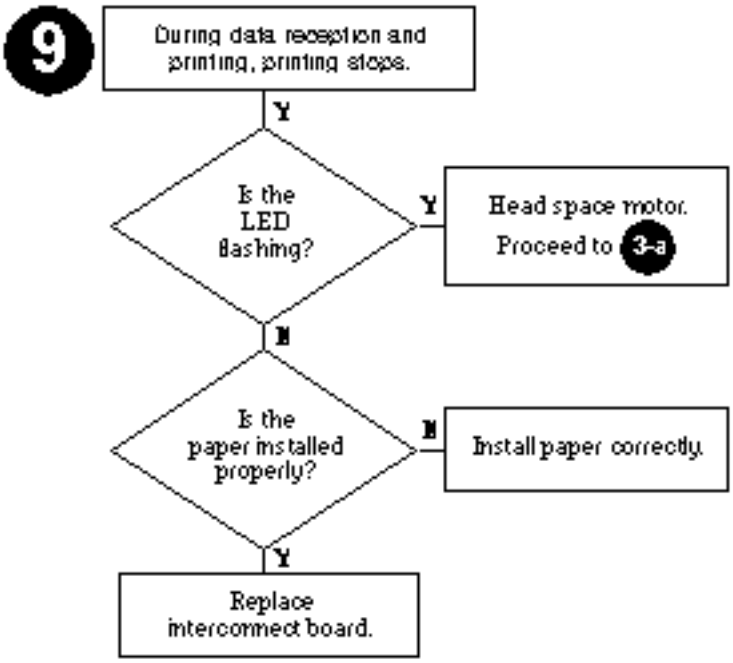


Figure 39: Flowchart 9

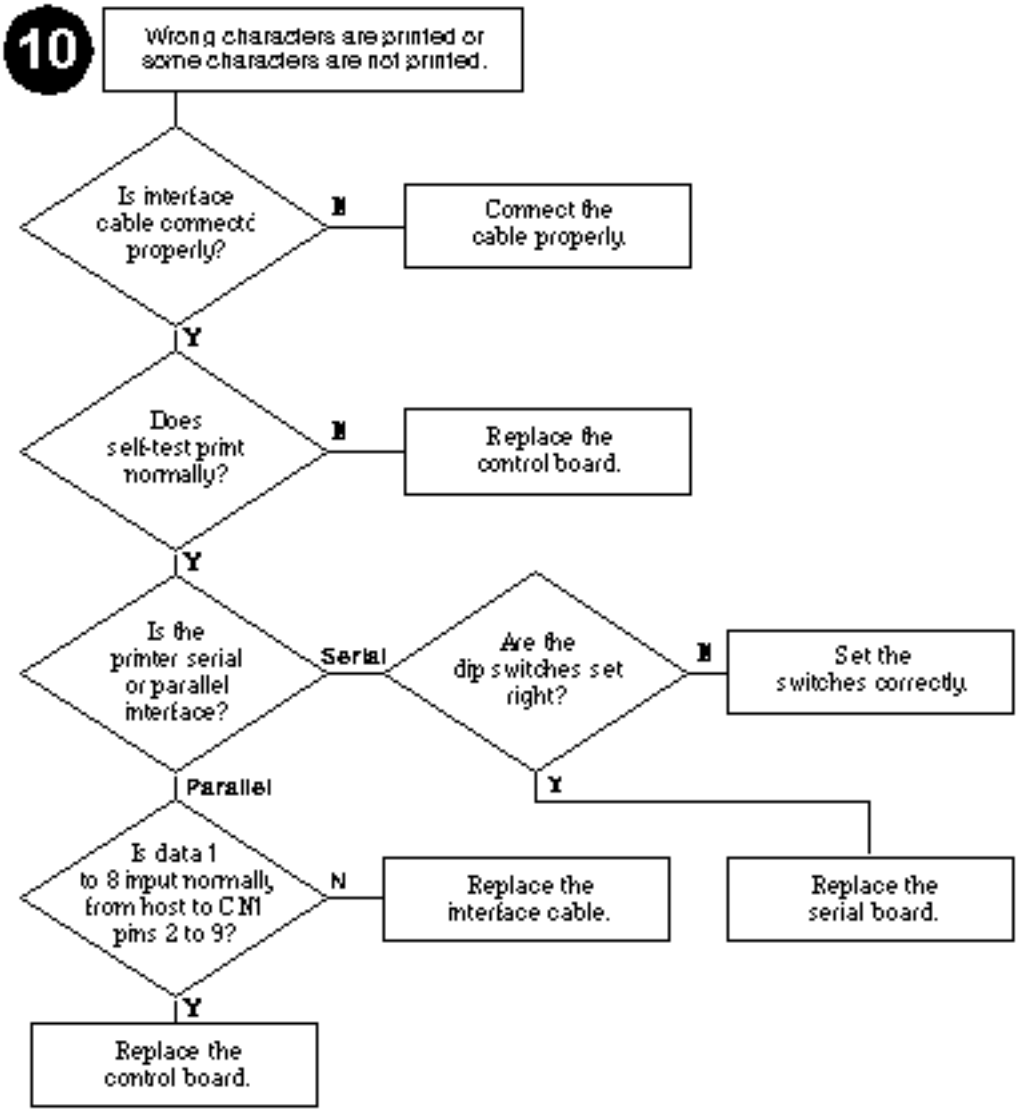


Figure 40: Flowchart 10

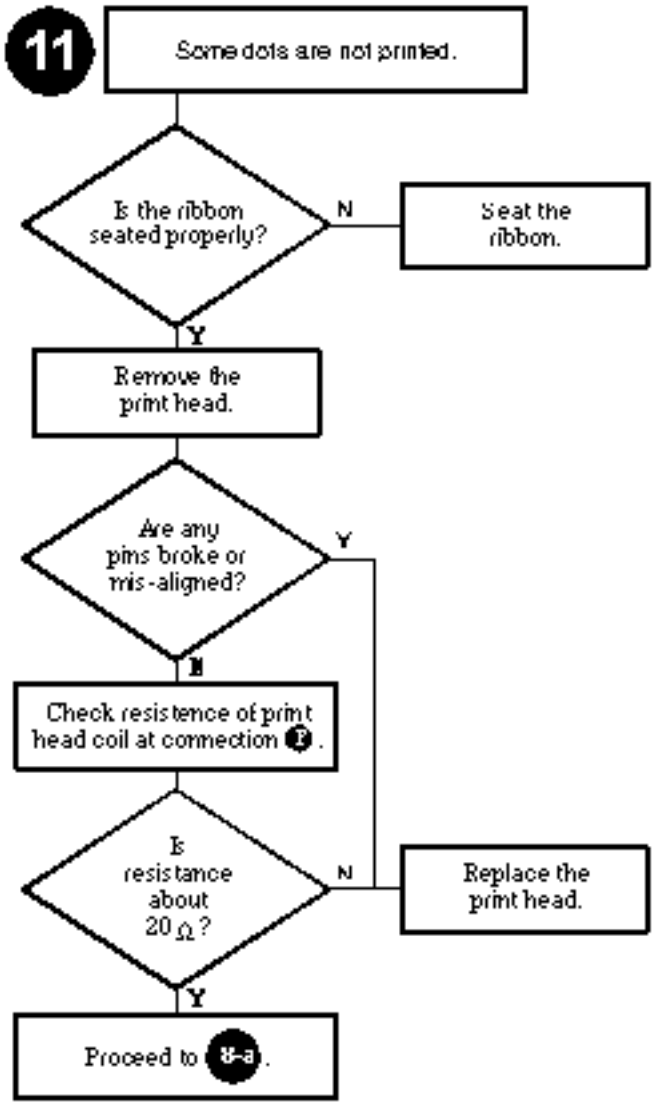


Figure 41: Flowchart 11

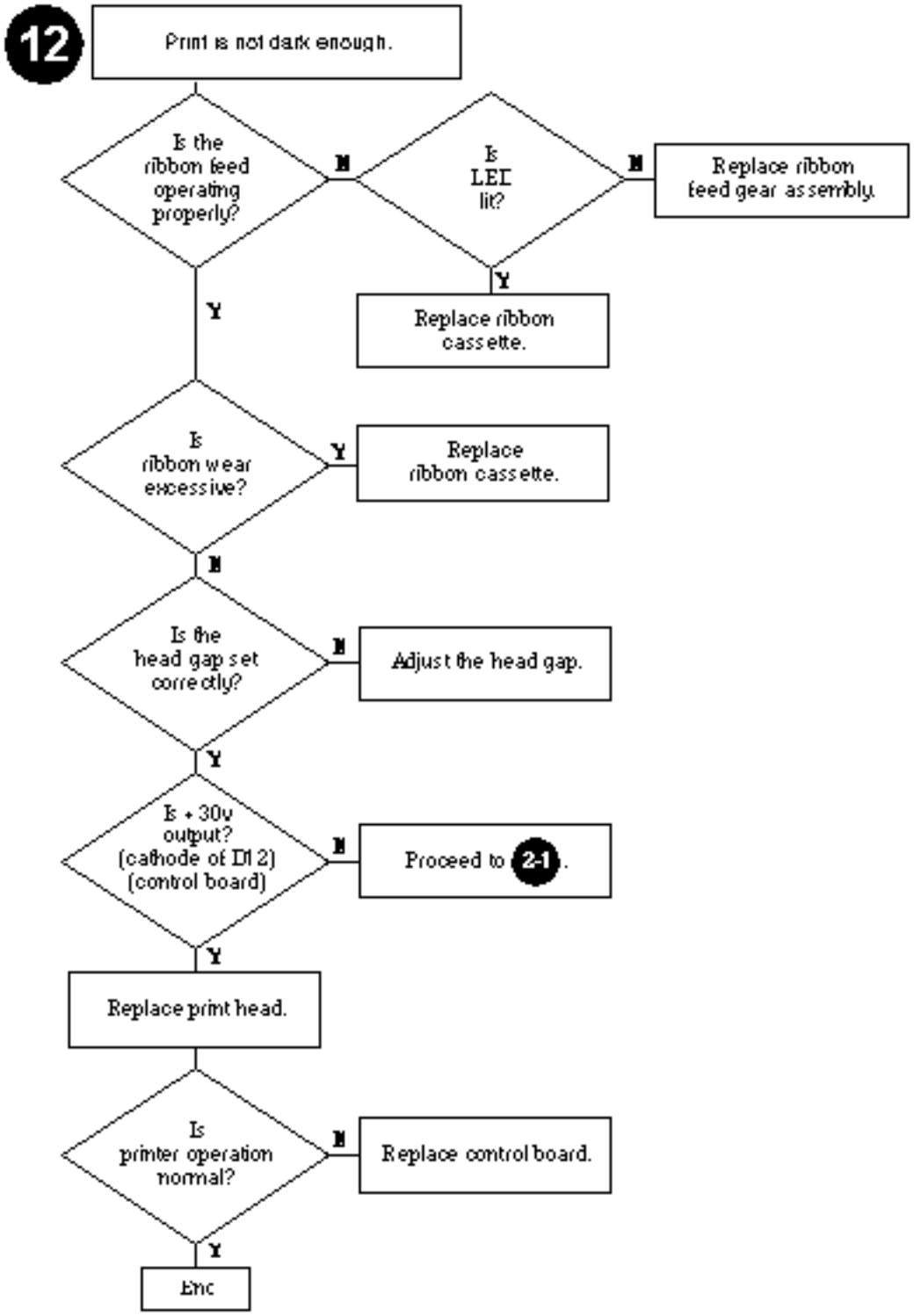


Figure 42: Flowchart 12

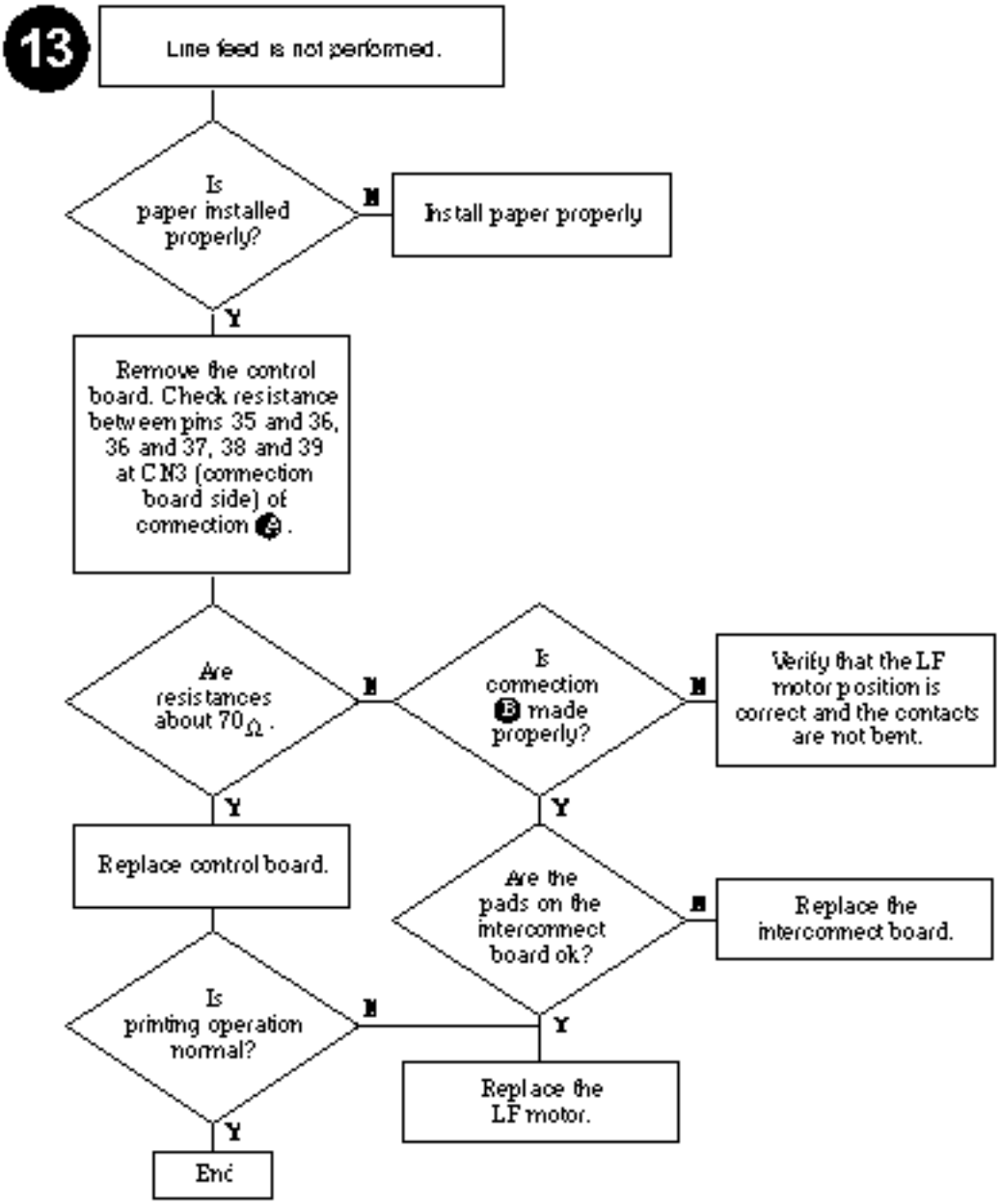


Figure 43: Flowchart 13

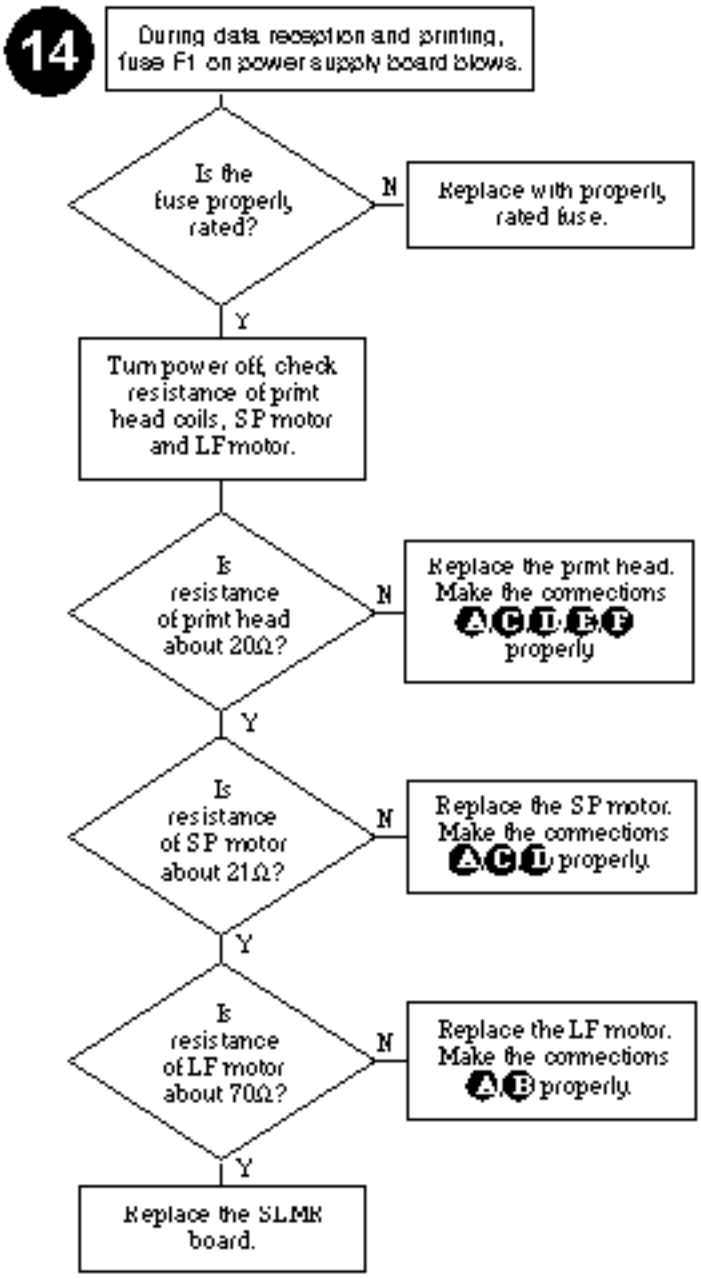


Figure 44: Flowchart 14

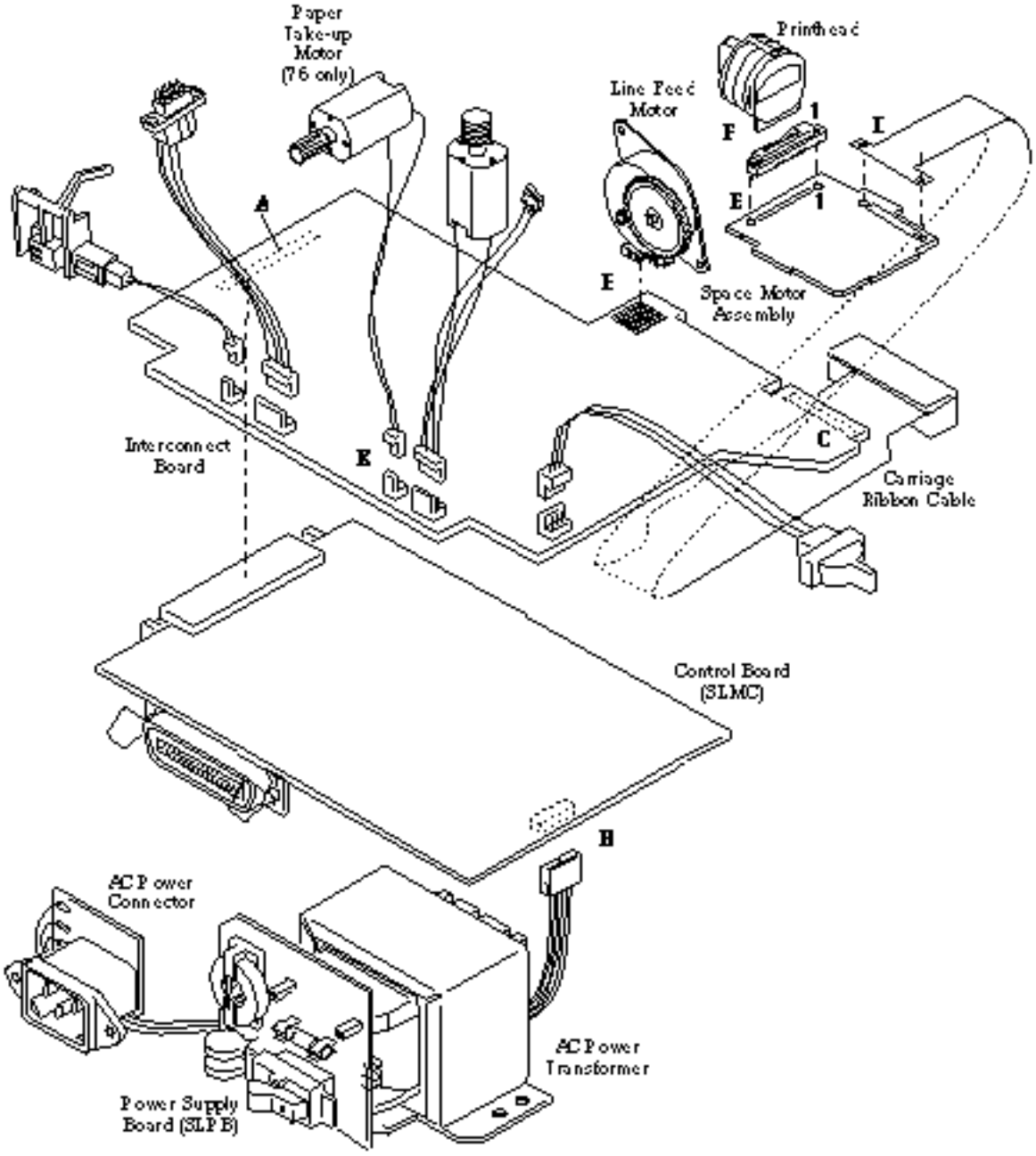


Figure 45: Connections

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

CHECKING CONNECTIONS AND RESISTANCE

PRINTHEAD

The following illustration shows the connection circuit for the Printhead and the rear of the Printhead. The resistance should be approximately 20 ohms.

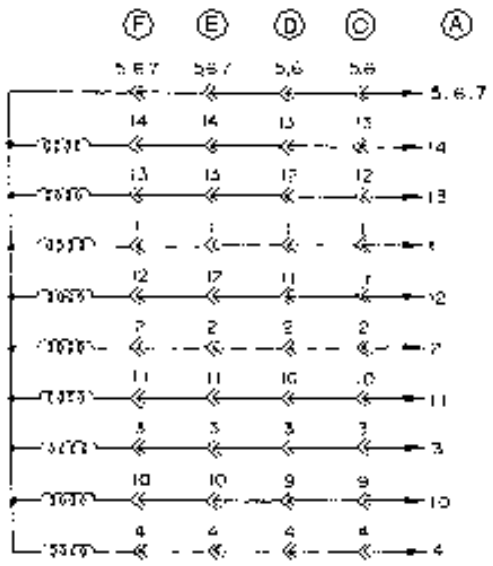
Pins at Connection	Signals	Pins on Printhead	Rear of Printhead
	Common	5, 6, 7	
	Wire #1	14	
	Wire #2	13	
	Wire #3	1	
	Wire #4	12	
	Wire #5	2	
	Wire #6	11	
	Wire #7	1	
	Wire #8	10	
	Wire #9	4	

Figure 46: Printhead Pin Assignments

Note: The circled letters refer to the respective locations marked in figure 45 on page 71.

The following example shows how to measure the resistance.

Use 5, 6, 7 on printhead and measure with a meter to pin 14 at location A. The resistance should read 20 ohms. This procedure checks the circuit of wire number one of the printhead. Refer to Figure 45 on page 71.

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.

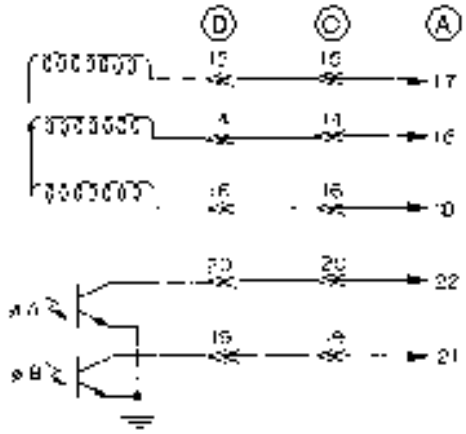
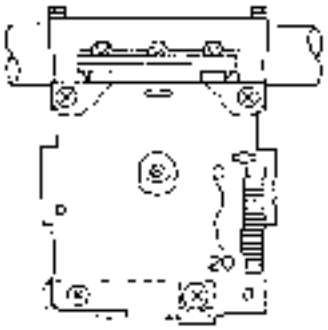
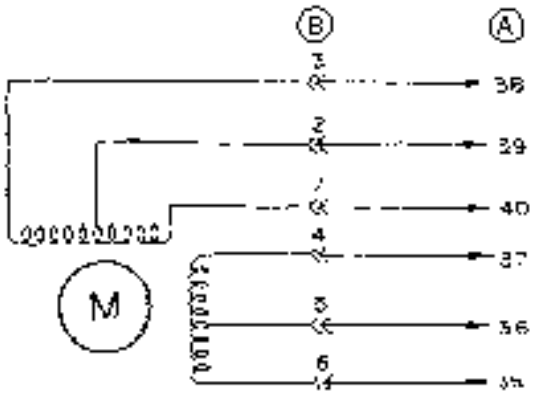
Pins at Connection	Signals	Pins on Space Motor	
	V U W A B	15 14 16	

Figure 47: Space Motor Pin Assignments

Note: The circled letters refer to the respective locations marked in figure 45 on page 71.

LINEFEED MOTOR

The following illustration shows the connection circuit for the Linefeed 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 Linefeed Motor.

Pins at Connection	Signals	Pins on Linefeed Motor
	Phase One	3
	Common	2
	Phase Three	1
	Phase Two	4
	Common	5
	Phase Four	6

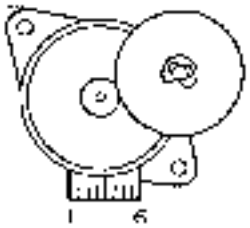


Figure 48: Linefeed Motor Pin Assignments

Note: The circled letters refer to the respective locations marked in figure 45 on page 71.

APPENDIX A: SPARE PARTS

STANDARD PRINTER PARTS

Description	Part Number
AC Switch Assembly	
A/C Switch Assembly (110 VAC)	98-2132
A/C Switch Assembly (220 VAC)	98-1828
Board Assembly	
Board Assembly, IPI Auto-Cut	09-2155
Board Assembly, Main Control, Parallel	98-2165
Board Assembly, Main Control, Serial	98-2164
Board, Serial Interface (without socket)	283-0600001
Board, Serial Interface (with socket)	09-2208
Carriage	
Carriage Cable	98-2512
Carriage Cable Contact Rubber, IPI Board	06-0568
Carriage Cable Cord Clamp, IPI Board	06-0569
Carriage Cable Mylar, Printhead End	06-0577
Carriage Cable Pressure Rubber, PH End	06-0576
Carriage Cable Tape	06-0710
Carriage Roller	06-0570
Carriage Shaft	06-0681
Ribbon Cassettes	
Black, Re-Inking Cassette	06-0560
Purple, Re-inking Cassette	100-1823

Description	Part Number
Feed Roll Assembly	
Feed Roll Assembly	06-2189
Feed Roll Bearing (Two Required)	06-0682
Feed Roll Keeper (C-Clip)	520-9800104
Forms Compensation	
Forms Compensation Assembly	09-1484
Forms Compensation Helper Springs	98-1579
Fuse	
Fuse 1.0 Amp, 125V	150-9810010
Fuse 1.5 Amp, 125V	150-9810015
Journal Take-Up	
Journal Take-Up Motor Assembly	09-1240
Journal Take-Up Spool Assembly	06-0993
Linefeed	
Line Feed Stepper Motor	06-1472
Line Feed Idler Gear	06-0542
Miscellaneous	
Power Cord, 110V	06-0561
Power Cord, 220V	06-0806
Paper Low Switch Assembly	09-1197
Toggle Switch & Harness Assembly (Long)	09-2488
Pressure Roll Shaft	09-1872
Paper Supply	
Paper Supply Core (Large)	09-1230
Paper Supply Core (Small)	09-1494
3.5 Inch Diameter One-Ply Paper Roll	100-1667
3.5 Inch Diameter Two-Ply Paper Roll	98-0558
6.0 Inch Diameter One-Ply Paper Roll	100-2377

Description	Part Number
Printhead	
Printhead, 9-Wire	06-0565
Printhead Clamp	06-0571
Ribbon Feed Mechanism	
Ribbon Feed Gearbox Assembly	98-2503
Space Motor Assembly and Space Rack	
Space Motor	06-0578
Space Rack	06-1773
Power Transformer	
Power Transformer, 110V	98-0857
Power Transformer, 220/240V	98-0858

OPTIONAL AUTO CUTTER PARTS

Description	Part Number
Cutter Assembly	09-1232
Cutter Gear-Intermediate	06-0893
Cutter Gear, Motor (Worm Gear)	06-0894
Cutter Gear, Rotary Knife	06-0892
Listed as above and as Transport, Gears (3 Required)	
Cutter Motor Assembly	09-1485
Cutter Shield Gear	06-1107
Cutter Shield (Rotary Knife)	09-1710
Cutter, Rotary Knife	09-1233
Cutter, Shear Plate	06-1109
Cutter, Shear Plate Spring	06-0875
Cutter/Transport Assembly	09-1570
Transport, Optical Sensor	09-1576
Transport, Upper Paper Guide (Pin)	09-1565

APPENDIX B: THEORY OF OPERATION

ELECTRICAL OPERATION

CIRCUIT OPERATION

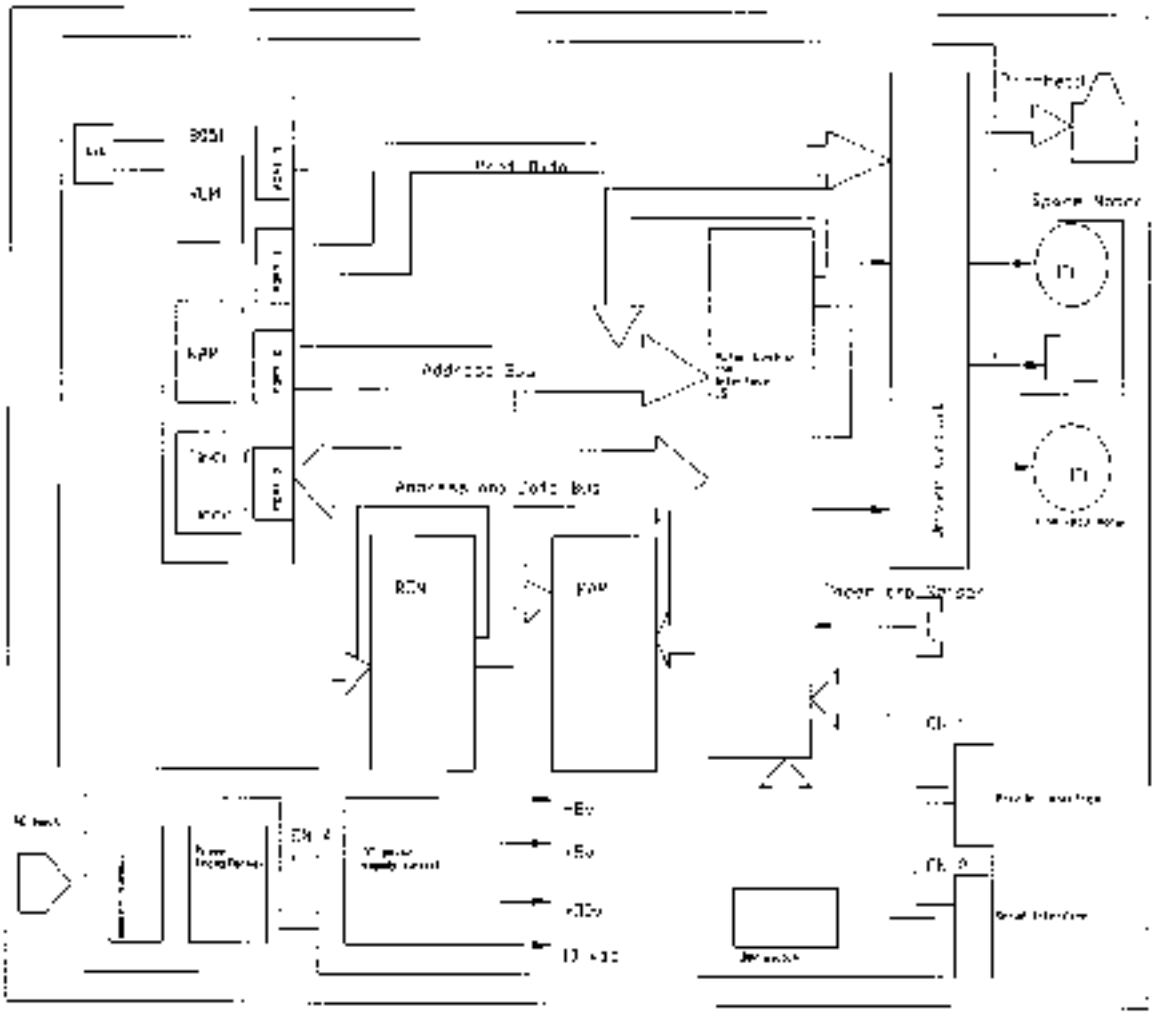


Figure 49: Electrical Circuits of Printer Components

The electrical section of the printer consists of the components shown in the illustration on the previous page.

The Control Board contains the Microprocessor and its peripheral circuits, the DC power circuit, and Printhead and Line Feed Motor drive circuits.

The Interconnect Board contains the Take-Up Motor and Cash Drawer Driver circuits. It connects the Keypad, Carriage, Line Feed Motor, and Validation Sensor to the Control Board.

The printer control signals from the host system (PC or termina) are brought directly to the Control Board from the rear panel on standard printers (parallel interface). On units with an optional serial interface, the host signals are brought from the rear panel to a board attached to the Control Board.

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 is started with the RSTOUT signal output from the reset circuit (Q7 pin 13) to reset Q12 (micro-processor), Q4 (interface LSI), and 5 (motor control LSI).

When resetting is completed, the program starts with mode setting of Q12, Q4, and Q5, memory (ROM and RAM) check, AM initialization, and then 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.

COMMUNICATION INTERFACE CONTROL

Parallel Interface

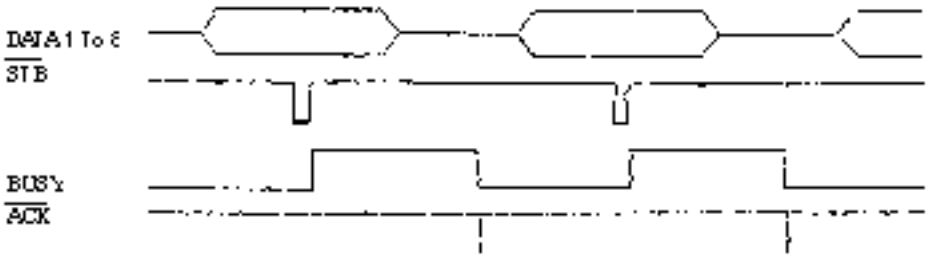


Figure 50: Parallel Communication Sequence

The data from the interface is input through the connector (CN1), and the interface LSI (Q4: M6990) latches this input data in sync with the /STB signal.

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

Serial Interface

Serial Option #1 has its own 8051 processor and memory and converts the serial input data stream to parallel form. This data is input to the main control board in the same manner as the parallel interface, except that the data enters through CN2 instead of CN1 on the Control Board.

With a Serial Option #2 board installed, the ISEL signal goes low, and the interface LSI changes the I/O port to the serial interface(CN2).

Serial data from the Serial Interface Board is input through pin 33 (NSTB) of the LSI (Q4). This data is output from pin 44 (NRXD) via the internal latch, and is sent to serial port pin 10 (RXD) of the microprocessor (Q12).

Serial output data is sent directly from pin 11 (TXD) of the microprocessor.

PRINTHEAD DRIVE CIRCUIT

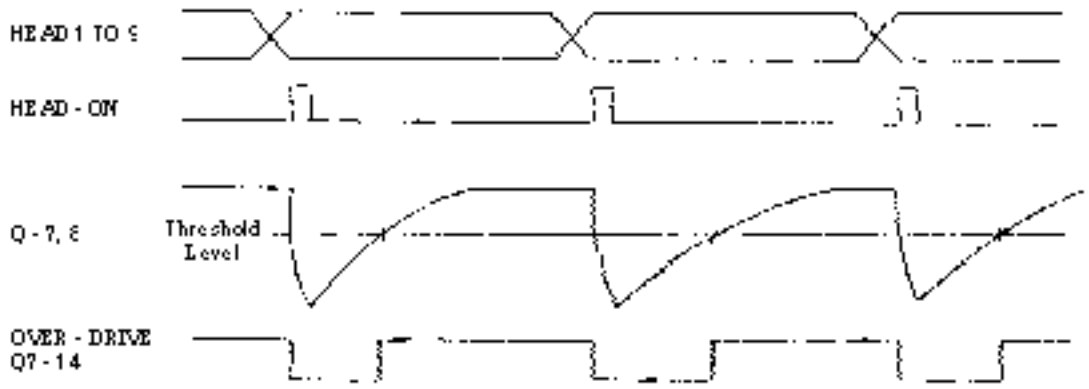


Figure 51: Communication Sequence of the Printhead Drive Circuit

This circuit drives the head magnets corresponding to the HEAD DATA1 to 9 signals in accordance with the HEAD-ON signal. This makes the print head print characters.

When the HEAD-ON signal goes high, the RC integrator (R157, and C158 or C55) determines the head drive time. The integrator lengthens the drive time if the drive voltage (+30) lowers, and shortens the drive time if the voltage rises. This maintains consistent print wire impact force.

CARRIAGE DRIVE

Space Motor Control

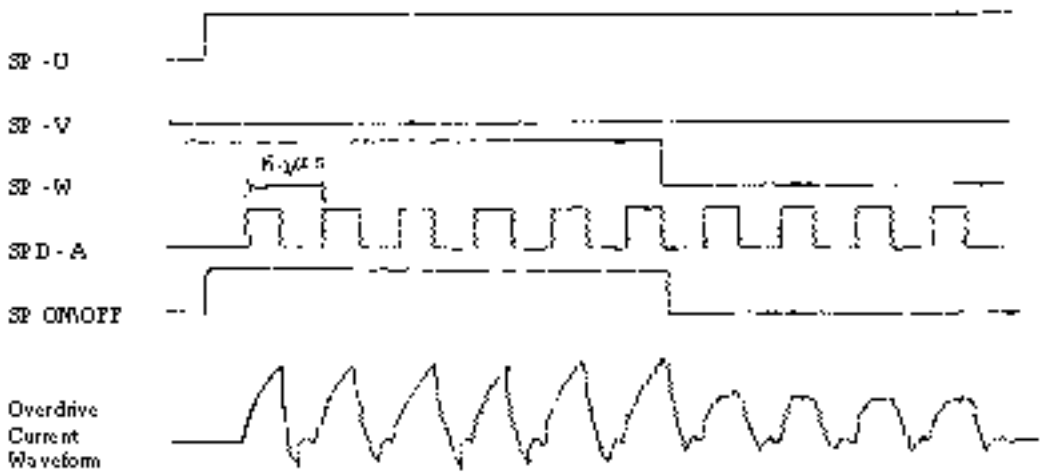


Figure 52: Communication Sequence for Space Motor Control

The motor control LSI (Q4) 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, and is 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) drive the space motor in accordance with these signals. Pins 9 and 11 of the MTDV are for the over-voltage (9) and over-current (11) protective circuits

.

Slit Encoder

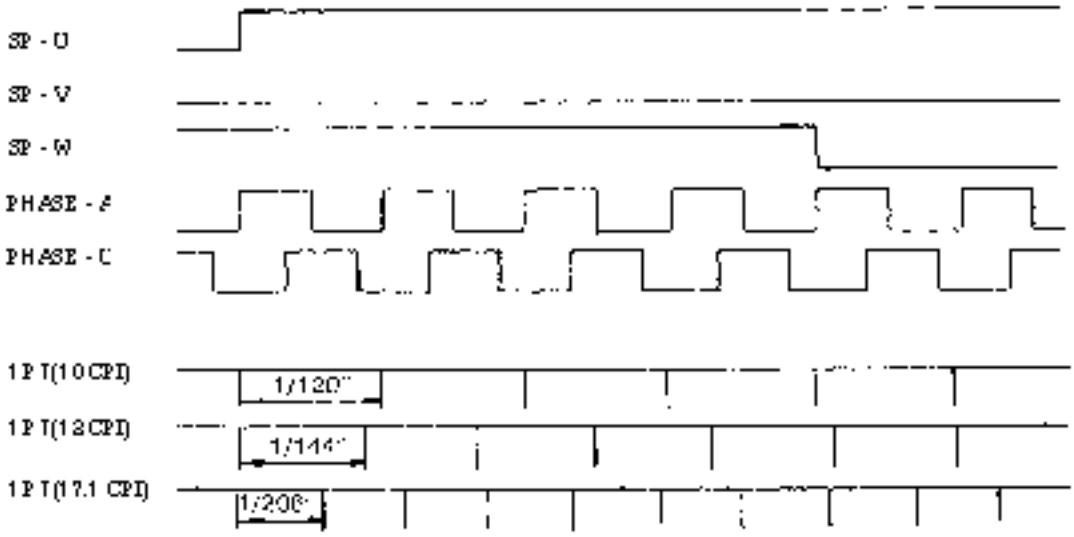


Figure 53: Communication Sequence for Slit Encoder

Space motor PHASE-A and PHASE-B signals are generated by a photo-sensor and a slit disk. The motor control LSI (Q4) 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.

LINEFEED

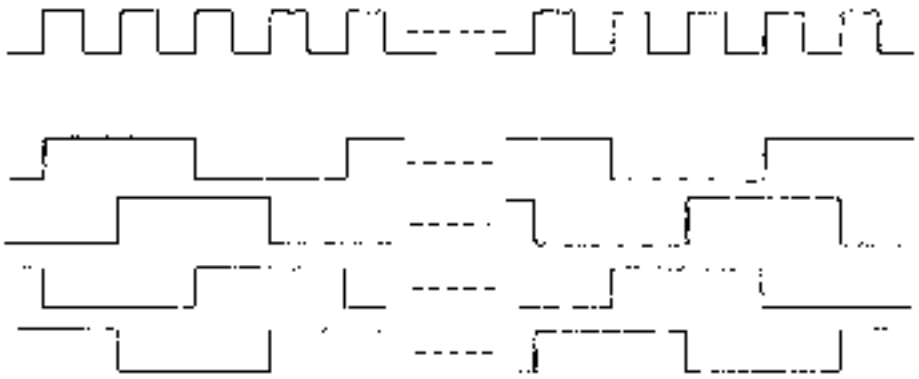


Figure 54: Communication Sequence for Linefeed

The Linefeed Motor is locked with the +8 voltage while it is stopped. When line feeding, the Linefeed motor is driven by the +30 supply in accordance with the LF OVD signal.

ALARM CIRCUITS

Drive Circuit Fault Alarm Circuit

This is a protective circuit that makes the AC fuse blow when a fault occurs in the Printhead Drive Circuit, Space Motor Drive Circuit, Line Feed Motor Drive Circuit, or their peripheral circuits.

The 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 drive circuit exceeds the specified time, the drive circuit fault alarm circuit outputs an ALM signal (high) to turn on the SCR.

This causes the secondary coil (30V) of the transformer to be short-circuited, causing an over-current to flow through the primary coil, which then makes the AC fuse blow.

Head Overheat Alarm Circuit

In order to protect the head coils, this circuit monitors the head temperature using the built-in thermistor of the printhead.

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

When the temperature of the Printhead rises during operation, the resistance of the thermistor lowers, and the potential of the comparator (Q7) negative input lowers to invert the comparator's output, causing the HEAD TEMP signal to be output to the motor control LSI.

With the turbo option installed, the print may stop completely. The printer will start back-up again as the temperature falls below the threshold.

Note: 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 consists of a Power Transformer, Power Supply Board, and a DC Power Supply Circuit.

The input AC voltage is transformed into 7.6 VAC, 24 VAC, and 10 VAC by the power transformer. These AC voltages are converted into +8 VDC, +5 VDC, and +30 VDC levels.

AC Switch Plate

The AC Switch Plate mounts the Power Switch, AC Fuse, and AC Noise Filter.

Power Transformer

If the Power Transformer temperature rises abnormally, the transformer's built-in temperature fuse blows to prevent adverse effects on other components.

MECHANICAL OPERATION

PRINTHEAD MECHANISM AND OPERATION

The Printhead is spring-loaded, using a permanent magnet, and can be easily removed or installed. The Printhead is mounted on a Carriage that runs parallel to the Platen and is connected with the control circuit via the Interconnect Board.

The Printhead consists of the following items:

- Wire Guide
- Wires
- Armature Assembly
- Yoke
- Springs
- Spacer
- Magnet Assembly
- Thermistor
- PC Board

Printhead Operation

When the Printhead is in the non-printing 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 Printhead 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
- Slit Disk

The Carriage, with the Printhead 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 0.8 inches (20.32 mm).

Motor rotation also rotates 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. The mechanism is driven by the Space Motor.

The Ribbon Feed Mechanism consists of the following items:

- Ribbon Feed Gear Assembly
- Ribbon Gear (Space Motor)
- Ribbon Cartridge

Ribbon Feed Operation

As the Space Motor rotates, the Ribbon Gear on the Space Motor Shaft rotates to drive the Drive Gear in the Ribbon Cartridge via the Ribbon Feed Gear Assembly. As a result, the Ribbon is fed.

In bi-directional 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. Ink is replenished by the built-in ink tank in the ribbon cartridge. This assures clear printing.

PAPER FEED MECHANISM AND OPERATION

The printer feeds paper by rotating the Feed Roller, which is driven by the Line Feed Stepper Motor through a speed reduction gear. The paper is pinched between the Feed Roller and the Pressure Shaft on the Forms Compensation Assembly. This maintains constant pressure regardless of the thickness of the paper or form.

The Paper Feed Mechanism consists of the following items:

- Stepper Motor with Gear
- Reduction Gear
- Feed Roller
- Pressure Roller Shaft

The Paper Feed Stepper Motor is mounted on the right side of the Base Plate, and its rotation is transmitted to the Feed Roller through the Reduction Gear. The Feed Mechanism is designed such that when the Stepper Motor rotates 48 steps (360 degrees), paper is fed 0.167 inches (4.32 mm).

PAPER-LOW DETECTION MECHANISM AND OPERATION

When paper is present in the printer, a small lever is prevented from interrupting the path of a sensor located on the Bucket Assembly. When the printer runs low of paper, the lever falls and interrupts the optical path of the sensor, causing a paper low condition. This indicates that there are ten to twelve feet of paper left.

APPENDIX C: SCHEMATICS

The following schematics are provided in this appendix:

- Control Board (Revision 10, Part Designator: SLMR)
- Serial Board (Revision 12, Part Designator: SLHI)
- Interconnect Board (Revision A, Part Designator: 09-1912)

All schematics are for the latest revisions of these boards.

CONTROL BOARD

SERIAL INTERFACE BOARD

INTERCONNECT BOARD

INDEX

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