

EK-LQP02-PS-001

# **LQP02 Printer**

## **Pocket Service Guide**

Prepared by Educational Services  
of  
Digital Equipment Corporation

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# INTRODUCTION

## The Guide

This guide describes the following topics on the LQP02 Printer.

- Testing and troubleshooting to the field replaceable unit (FRU)
- FRU removal and replacement
- Cleaning and lubrication
- Options

## Notes, Cautions, and Warnings

Notes, Cautions, and Warnings in this guide highlight specific information.

Note	Provides important additional information.
Caution	Provides information for preventing equipment damage.
Warning	Provides information for preventing personal injury.

### The Product

The LQP02 is a full character, daisy wheel printer that operates from 120 Vac (60 Hz) and 220 Vac to 240 Vac (50 Hz). It can print various character fonts with interchangeable print wheels.

The printer uses a ribbon drive system that accepts fabric and mylar ribbon in disposable operator-replaceable cartridges.

The printer has a friction paper feeder, but it also supports the optional tractor and automatic sheet feeders.

### Tool Requirements

Servicing the LQP02 printer and its options requires the following tools.

Tool	DIGITAL PN
Slotted screwdriver, 1/4 inch	29-10983-00
Slotted screwdriver, 3/16 inch	29-10988-00
Phillips screwdriver, No. 2	29-11005-00
Nut driver, 1/4 inch (optional)	29-10664-00
Nut driver, 3/16 inch (optional)	29-10637-00
Nut driver, 5/16 inch (optional)	29-10673-00
Driver handle	29-10562-00
Needlenose pliers	29-10311-00
Ignition wrench set	29-12577-00



# **1 TESTING AND TROUBLESHOOTING**

## **1.1 GENERAL**

This chapter contains self-test and troubleshooting information. The self-test troubleshooting table can help you determine most printer malfunctions. An additional general troubleshooting table lists the most common LQP02 failures, probable causes, and corrective action.

## **1.2 CHECK CONDITION**

During a self-test routine or normal operation, the printer can enter a CHECK condition. This condition is a built-in safety mechanism that disables the high current devices on the printer. The printer enters CHECK when:

- The print wheel or carriage motion is blocked,
- The power supply voltage drops, or
- The self-test fails.

To determine if the printer is in CHECK, turn the platen knob while the power is on. If the platen rotates freely, the printer is in CHECK. (The printer error indicator should be on.) If platen rotation is detented (normal when power is on), the printer is not in CHECK.

You can clear a CHECK condition caused by a temporary drop in the output voltage (often accompanied by a high-pitched whine) by turning off the power and then powering up the printer again. If the CHECK condition still exists, consult the troubleshooting tables.

## **1.3 SELF-TEST LEVELS**

The LQP02 supports three levels of self-test.

1. Logic self-test
2. Printing self-test
3. Loopback self-test

Use the configuration switch to place the printer in the self-test mode. To select the correct self-test, press the form feed switch on the front panel. Each time you press the form feed switch, the next level of self-test is entered.

### NOTE

The printer automatically executes the logic self-test when powered up.

## 1.4 SELF-TEST PREREQUISITES

Use the following procedure to prepare the printer for self-test operation.

1. With power off, insert one 8 1/2 inch × 11 inch sheet of paper. Make sure the 11 inch side is horizontal and the paper is as far to the left as possible.
2. Enable the self-test configuration switch (SP1, switch 12) by setting it to the down (0) position (Figure 1-1).

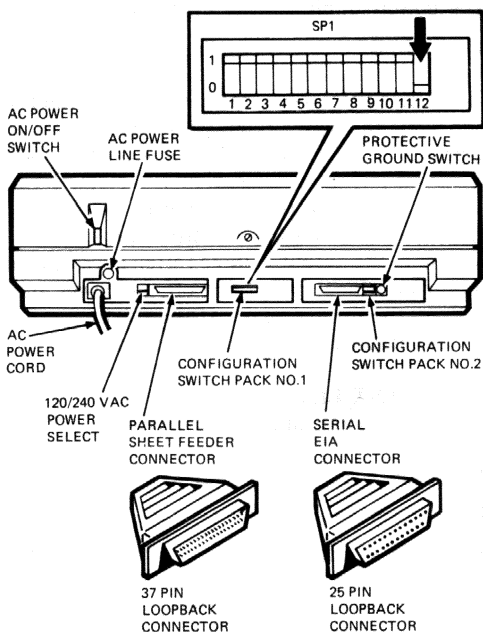


Figure 1-1 Self-Test Configuration Switch and Loopback Connectors

3. Remove all communication cables from rear of printer (Figure 1-1).
4. Install the 25-pin loopback connector to EIA serial connector at rear of printer (Figure 1-1).
5. Install the 37-pin loopback connector to parallel sheet feeder connector at rear of printer (Figure 1-1).
6. Set power switch to ON (Figure 1-1). Carriage should move to left margin.

## 1.5 TESTING

Use the following procedures to start the three levels of self-test in the order listed.

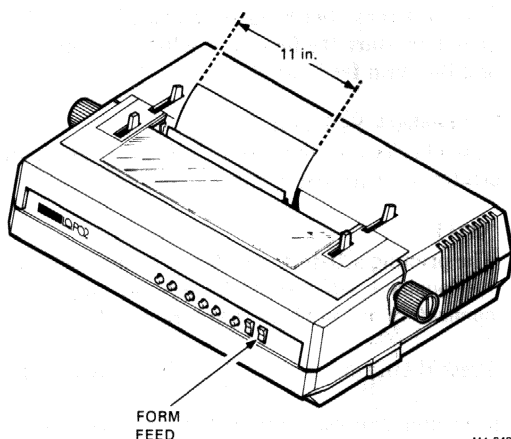
### 1.5.1 Logic Self-Test

This test checks the RAM, (P)ROM, and all loadable/readable registers on the processor bus for proper operation.

#### NOTE

Although the printer automatically executes the logic self-test upon power-up, you must perform the following procedure to run the printing and loopback self-tests.

1. Press the form feed switch once (Figure 1-2).



MA-8427

Figure 1-2 Form Feed Switch

If the test passes, the printer error, paper out, ribbon out, and pause indicators on the front panel flash twice.

If the test fails, the printer halts, enters CHECK, and the printing self-test cannot be performed. Refer to the self-test troubleshooting table for possible causes (Paragraph 1.9).

### 1.5.2 Printing Self-Test

This test exercises the platen, carriage, print wheel, hammer and audible alarm.

#### NOTE

**The logic self-test must be performed before the printing self-test.**

1. Press the form feed switch again (Figure 1-2).

If the test passes, the alarm sounds and the print wheel spins. After an approximate 7 second pause, the carriage moves back and forth to each character position within the margins. The printer vertically prints the words "SELF TEST" in the left margin. It then horizontally prints a self-test pattern including each character on the print wheel.

If the test fails, the printer halts, enters CHECK, and the loopback self-test cannot be performed. Refer to the self-test troubleshooting table for possible causes (Paragraph 1.9).

#### NOTE

**This test runs continuously. To halt it, turn off power or start the loopback self-test by pressing the form feed switch.**

### 1.5.3 Loopback Self-Test

This test checks the integrity of the serial and parallel line electronics with two loopback connectors.

#### NOTE

**The printing self-test must be performed before the loopback self-test. Make sure the loopback connectors are in place (Paragraph 1.4).**

1. Press the form feed switch again (Figure 1-2).

The printer pauses, prints the data remaining in the buffer, and then performs the loopback self-test.



If the test passes, the printer prints "I/O TEST PASSED." If the test fails, the printer prints "I/O TEST FAILED." Refer to the self-test troubleshooting table for possible causes (Paragraph 1.9).

When finished testing, set the self-test configuration switch (SP1, switch 12) to the up (1) position (Figure 1-1) and remove the paper. Remove the loopback connectors and reconnect the communications cables to their respective connectors (Figure 1-1).

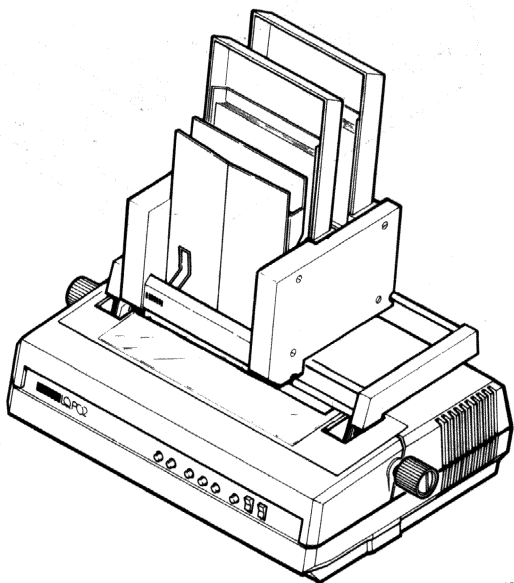
## 1.6 SELF-TEST WITH THE AUTOMATIC SHEET FEEDER (ASF)

The LQP02 can perform the logic and printing self-tests with the ASF connected. The printer cannot perform the loopback self-test with the ASF connected.

## 1.7 ASF SELF-TEST PREREQUISITES

Use the following procedure to prepare the printer for self-test operation with the ASF.

1. Make sure the front and rear trays are in place and loaded (Figure 1-3).

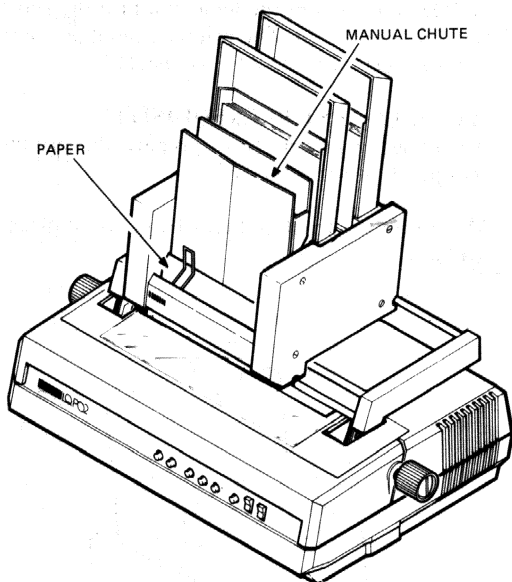


MA-8428

Figure 1-3 ASF with Loaded Trays

## 6 TESTING AND TROUBLESHOOTING

2. Insert one sheet of paper in the manual chute as far to the left as possible. Using the platen knob, advance the paper until it feeds through the pinch rollers in the ASF (Figure 1-4).
3. Enable the self-test configuration switch (SP1, switch 12) by setting it to the down (0) position (Figure 1-1).
4. Set the power switch to ON (Figure 1-1). The carriage should move to the left margin.



MA-6429

Figure 1-4 Feeding the Paper

## 1.8 TESTING WITH THE ASF

Use the following procedures to start the two levels of self-test in the order listed.

### 1.8.1 Logic Self-Test with the ASF

This test checks the RAM, (P)ROM, and all loadable/readable registers on the processor bus for proper operation.

1. Press the form feed switch once (Figure 1-2).

If the test passes, the printer error, paper out, ribbon out, and pause indicators on the front panel flash twice.

If the test fails, the printer halts, enters CHECK, and the printing self-test cannot be performed. Refer to the self-test troubleshooting table for possible causes (Paragraph 1.9).

### 1.8.2 Printing Self-Test with the ASF

This test exercises the platen, carriage, print wheel, hammer and audible alarm.

#### NOTE

**The logic self-test must be performed before the printing self-test.**

1. Press the form feed switch again (Figure 1-2).

If the test passes, the alarm sounds and the print wheel spins. After an approximate 7 second pause, the carriage moves back and forth to each character position within the margins. The printer vertically prints the words "SELF TEST" in the left margin. It then horizontally prints a self-test pattern including each character on the print wheel.

#### NOTE

**During the printing self-test, the last few characters in the line print off the page due to the 8 1/2 inch paper size.**

Next, the ASF feeds one sheet of paper from the front tray and prints each character on the print wheel. Then the ASF feeds one sheet of paper from the rear tray and prints each character on the print wheel continuously until the form feed switch is pressed again or the power is turned off.

2. Press the form feed switch again (Figure 1-2).

The printer pauses and then continues printing characters until the buffer is empty. The words "I/O TEST FAILED" print on the next line and the printer halts.

If the test fails, the printer halts and enters CHECK. Refer to the self-test troubleshooting table for possible causes (Paragraph 1.9).

When finished testing, set the self-test configuration switch (SP1, switch 12) to the up (1) position (Figure 1-1) and remove the paper.

## 1.9 SELF-TEST TROUBLESHOOTING TABLE

Table 1-1 is broken into three sections. Each section appears in order, according to self-test level.

1. Logic Self-Test Failure
2. Printer Self-Test Failure
3. Loopback Self-Test Failure

The table lists the failure symptoms and the FRUs causing the failure in order of probability. To replace the malfunctioning FRU(s), use the referenced procedures.

Table 1-1 Self-Test Troubleshooting Table

Symptom	Replace
<b>Logic Self-Test Failure</b>	
All indicators are off but carriage restores (returns to left margin).	Front panel PCB connector (Figure 2-17)
	Front panel PCB (Paragraph 2.10)
	SI controller PCB (Paragraph 2.5)
	Power supply PCB (Paragraph 2.4)
All indicators are off; carriage does not restore.	AC line fuse (Appendix A)
	Power supply PCB (Paragraph 2.4)
	Analog PCB (Paragraph 2.5)

Table 1-1 Self-Test Troubleshooting Table (Cont)

Symptom	Replace
	Digital PCB (Paragraph 2.5)
	SI controller PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)
Power indicator is on. Carriage restores. No indicators blink.	SI controller PCB (Paragraph 2.5)
	Power supply PCB (Paragraph 2.4)
Power indicator is on and front panel indicators blink, but carriage does not restore. Printer error indicator is on.	Fuse F1 on motherboard (Appendix A)
	Analog PCB (Paragraph 2.5)
	Digital PCB (Paragraph 2.5)
<b>Printing Self-Test Failure</b>	
Print wheel stops. Printer error indicator is on. Printer is in CHECK.	Analog PCB (Paragraph 2.5)
	Digital PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)
Print wheel does not operate.	Fuse F3 on analog PCB (Appendix A)
	Analog PCB (Paragraph 2.5)
	Digital PCB (Paragraph 2.5)
	SI controller PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)

**Table 1-1 Self-Test Troubleshooting Table (Cont)**

Symptom	Replace
<b>Printing Self-Test Failure (Cont)</b>	
Carriage motion stops; printer is in CHECK.	Analog PCB (Paragraph 2.5)
Carriage does not move.	Digital PCB (Paragraph 2.5)
	Fuse F1 on motherboard (Appendix A)
	Motherboard (Paragraph 2.7)
	Mechanical subassembly (Paragraph 2.6)
Paper moves erratically or not at all.	Fuses F3 and/or F4 on digital PCB (Appendix A)
	Digital PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)
	Motherboard (Paragraph 2.7)
Printer prints incorrect characters.	Fuse F3 on analog PCB (Appendix A)
	Analog PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)
Print wheel moves but does not print.	Fuse F1 on analog PCB (Appendix A)
	Analog PCB (Paragraph 2.5)
	Mechanical subassembly (Paragraph 2.6)
Print density is uneven.	Ribbon

Table 1-1 Self-Test Troubleshooting Table (Cont)

Symptom	Replace
	Print wheel
	Fuse F1 or F3 on digital PCB (Appendix A)
	Mechanical subassembly (Paragraph 2.6)
<b>Loopback Self-Test Failure</b>	
Printer prints "I/O TEST FAILED."	SI controller PCB (Paragraph 2.5)
	Power supply PCB (Paragraph 2.4)

## 1.10 GENERAL TROUBLESHOOTING TABLE

This table lists the most common problems that can occur during LQP02 operation. Not all of the problems are related to an FRU failure, in fact, most usually are operator- or accessory-related problems. A good visual inspection can solve many printer malfunctions. Always inspect the printer for loose belts, proper switch positions, broken sensors, foreign objects (paper clips, paper shreds), loose screws or ground cables, etc.

When troubleshooting a malfunction, be aware that the displayed symptoms can represent multiple failures. Always troubleshoot according to the current symptom.

### WARNING

**Turn off power before disconnecting or replacing an FRU.**

To correct the common malfunctions, refer to the appropriate section in Table 1-2. The sections are labeled according to the following types of malfunction.

- Power
- Paper feed
- Ribbon feed
- Carriage motion
- Print wheel motion
- Hammer fire

Table 1-2 General Troubleshooting Table

Symptom	Probable Cause	Corrective Action
<b>Power Malfunctions</b>		
No indication of power to printer. All indicators are off. Fan is not running.	No output from power supply	Set power switch to ON.
		Check for power at wall outlet.
		Check power cable connection.
	AC fuse is blown.	Replace ac fuse (Appendix A).
	AC input cable is disconnected.	Check connector J1 on power supply PCB (Figure 2-7).
Printing stops or does not start.	Power supply	Check power supply voltages (Paragraph 1.11).
		Replace power supply PCB (Paragraph 2.4).
	Access cover is open.	Close access cover.
	Paper is out.	Insert paper.
	Ribbon is out.	Replace ribbon cartridge.
	Defective cover interlock sensor	Check sensor cable connector J14 on motherboard.
		Replace front access cover (Paragraph 2.2).
	Print wheel is not firmly in place.	Reinstall print wheel.
Printer is in continuous or random CHECK.	Incorrect power supply voltages	Check power supply voltages (Paragraph 1.11).
		Replace power supply PCB (Paragraph 2.4).



Table 1-2 General Troubleshooting Table (Cont)

Symptom	Probable Cause	Corrective Action
<b>Paper Feed Malfunctions</b>		
Paper feeds erratically or not at all.	Fuses F3 and/or F4 on digital PCB are open.	Check for shorted components and replace fuse(s) (Appendix A).
	Paper feed driver transistors	Replace digital PCB (Paragraph 2.5).
	Open connection in paper feed motor circuit	Check paper feed motor cable connector J6 on motherboard.
	Defective paper feed motor	Replace mechanical sub-assembly (Paragraph 2.6).
	No paper feed command	Verify paper feed in self-test.
Poor paper registration	Defective form feed switch	Replace front panel PCB (Paragraph 2.10).
	Dirty platen	Clean platen.
	Paper feed idler gear is unadjusted.	Replace mechanical sub-assembly (Paragraph 2.6).
Paper out indicator is on, but paper supply is okay.	Bent card guide	Repair or replace card guide.
	Defective paper out sensor	Replace mechanical sub-assembly (Paragraph 2.6).
	Open circuit in digital PCB	Replace digital PCB (Paragraph 2.5).
Paper supply is empty but printing continues.	Defective paper out indicator	Replace front panel PCB (Paragraph 2.10).
	Switch 10 on SP1 is set to wrong position.	Set switch 10 on SP1 to down (0) position.
	Defective paper out sensor	Check sensor cable J13 on motherboard.
		Replace mechanical sub-assembly (Paragraph 2.6).
	Short circuit in digital PCB	Replace digital PCB (Paragraph 2.5).

Table 1-2 General Troubleshooting Table (Cont)

Symptom	Probable Cause	Corrective Action
<b>Ribbon Feed Malfunctions</b>		
Ribbon feeds erratically or not at all.	Defective ribbon cartridge	Replace ribbon cartridge.
	Fuses F1 and/or F2 on digital PCB are open.	Check for shorted components and replace fuse(s) (Appendix A).
	Ribbon feed driver transistors	Replace digital PCB (Paragraph 2.5).
	Open connection in ribbon feed circuit	Check connection J5 on motherboard.
	Analog PCB	Replace analog PCB (Paragraph 2.5).
Ribbon out indicator is on, but ribbon supply is okay.	Defective EOR sensor	Replace EOR sensor.
		Replace mechanical sub-assembly (Paragraph 2.6).
	Open circuit in digital PCB	Replace digital PCB (Paragraph 2.5).
Ribbon supply is empty but printing continues.	Defective EOR indicator	Replace front panel PCB (Paragraph 2.10).
	Defective EOR sensor	Check EOR connector J16 on motherboard.
		Replace EOR sensor.
		Replace mechanical sub-assembly (Paragraph 2.6).
	Short circuit in digital PCB	Replace digital PCB (Paragraph 2.5).
<b>Carriage Motion Malfunctions</b>		
Carriage fails to move to left margin upon power-up.	Disabled carriage servo	Check position of switch S1 on analog PCB (Figure A-3).
	Fuse F1 on motherboard is open.	Check for shorted components and replace fuse (Appendix A).

**Table 1-2 General Troubleshooting Table (Cont)**

Symptom	Probable Cause	Corrective Action
	Defective carriage motor/encoder or loose cable connections	Check connectors J7 and J15 on motherboard.  Replace mechanical sub-assembly (Paragraph 2.6).
	Carriage driver transistors	Replace motherboard (Paragraph 2.7).
	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
	Broken or loose drive belt or pulley	Tighten belt.  Replace mechanical sub-assembly (Paragraph 2.6).
Carriage crashes into side frame.	Carriage driver transistors	Replace motherboard (Paragraph 2.7).
	Defective carriage motor	Replace mechanical sub-assembly (Paragraph 2.6).
	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
Uneven margins or line spacing	Defective carriage motor/encoder or loose cable connections	Check connectors J7 and J15 on motherboard.  Replace mechanical sub-assembly (Paragraph 2.6).
	Broken or loose drive belt or pulley	Tighten belt.  Replace mechanical sub-assembly (Paragraph 2.6).
	SI controller, digital, or analog PCB	Replace defective circuit board (Paragraph 2.5).
	Incorrect host system commands	Run self-test. If self-test passes, check host system.

**Table 1-2 General Troubleshooting Table (Cont)**

Symptom	Probable Cause	Corrective Action
<b>Print Wheel Motion Malfunctions</b>		
Print wheel fails to move and index upon power-up.	Disabled print wheel servo	Check position of switch S3 on analog PCB (Figure A-3).
	Fuse F3 on analog PCB is open.	Check for shorted components and replace fuse (Appendix A).
	Print wheel driver transistors	Replace analog PCB (Paragraph 2.5).
	Defective print wheel servo or loose cable connections	Check connectors J5 and J16 on motherboard. Replace mechanical sub-assembly (Paragraph 2.6).
	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
Print wheel spins continuously upon power-up.	Print wheel driver transistors	Replace analog PCB (Paragraph 2.5).
Print wheel spins slowly after carriage restores.	Defective print wheel servo or loose cable connection	Check connector J5 on motherboard. Replace mechanical sub-assembly (Paragraph 2.6).
	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
<b>Hammer Fire Malfunctions</b>		
Hammer does not fire.	Disabled hammer circuit	Check position of switch S2 on analog PCB (Figure A-3).
	Fuse F1 on analog PCB is open.	Check for shorted components and replace fuse (Appendix A).
	Hammer driver transistor	Replace analog PCB (Paragraph 2.5).

Table 1-2 General Troubleshooting Table (Cont)

Symptom	Probable Cause	Corrective Action
Hammer fires but prints poorly.	Defective hammer coil or loose connection	Check connector J5 on motherboard. Replace mechanical sub-assembly (Paragraph 2.6).
	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
	Copy control lever is set incorrectly.	Reset copy control lever.
	Worn or dirty print wheel	Replace or clean print wheel.
	Defective ribbon	Replace ribbon cartridge.
	Print hammer mechanism is unadjusted.	Replace mechanical sub-assembly (Paragraph 2.6).
Hammer fires but does not retract.	Digital or analog PCB	Replace defective circuit board (Paragraph 2.5).
	Hammer binding	Replace mechanical sub-assembly (Paragraph 2.6).
	Analog PCB	Replace Analog PCB (Paragraph 2.5).

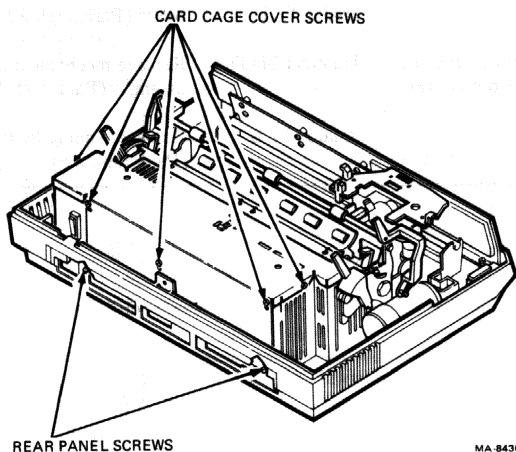
### 1.11 POWER SUPPLY VOLTAGE CHECK

Use the following procedure to check the power supply voltages.

1. Remove the front access cover (Paragraph 2.2).
2. Remove the rear access cover (Paragraph 2.3).
3. Remove the card cage cover to reach the power supply printed circuit board (PCB) (Figure 1-5).
4. Power up the printer. Using a digital multimeter, check the +5 Vdc, +15 Vdc, and -15 Vdc power supply outputs at the designated test points on the power supply PCB (Figure 1-6).

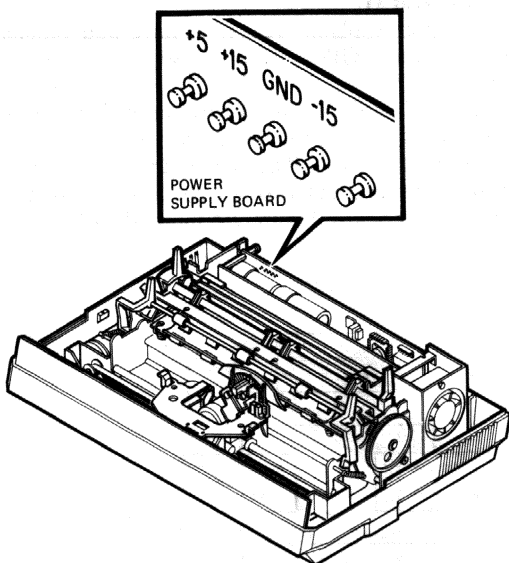
The optimum indications should read as follows. If the voltages are incorrect or not present, replace the power supply PCB (Paragraph 2.4).

- +5.1 Vdc at + 5 Vdc test point
- +15.5 Vdc at +15 Vdc test point
- -15.5 Vdc at -15 Vdc test point



MA-8430

Figure 1-5 Card Cage Cover Removal



MA 8431

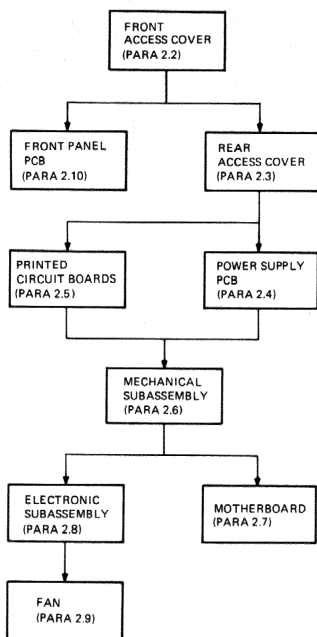
Figure 1-6 Power Supply PCB Voltage Test Points

# 2 FRU REMOVAL AND REPLACEMENT

## 2.1 GENERAL

This chapter explains how to remove and replace the FRUs in the LQP02. It also lists the recommended spares.

Figure 2-1 shows the procedures in performance order. Refer to Figure 2-1 for the correct sequence when removing or replacing FRUs. For example, you must first remove the front and rear access covers to remove the power supply board. Figure 2-2 shows the FRU locations on the printer.



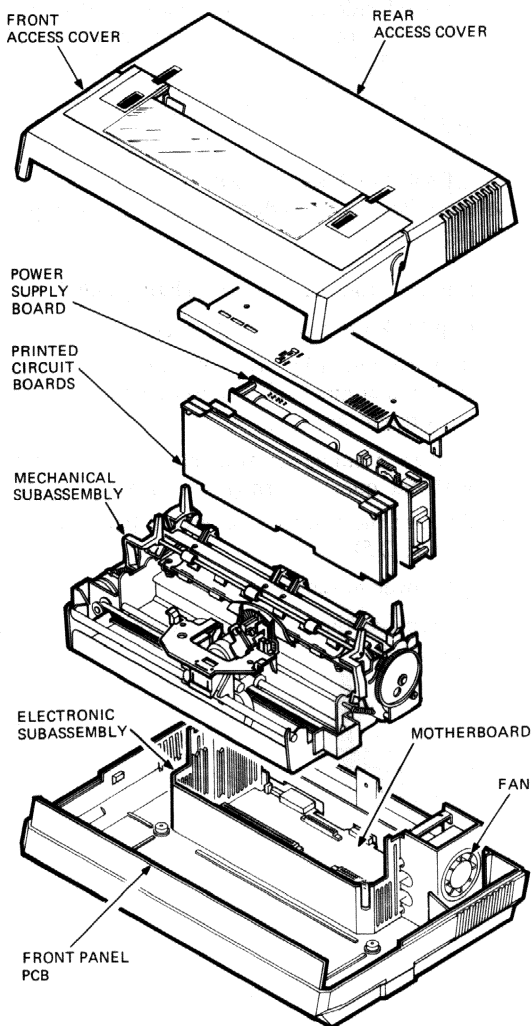
MA 8327

Figure 2-1 FRU Removal Sequence for the LQP02



**WARNING**

**Make sure the power is off and the ac line cord is disconnected before removing an FRU.**



MA 8432

**Figure 2-2 Printer FRUs**

## **2.2   FRONT ACCESS COVER**

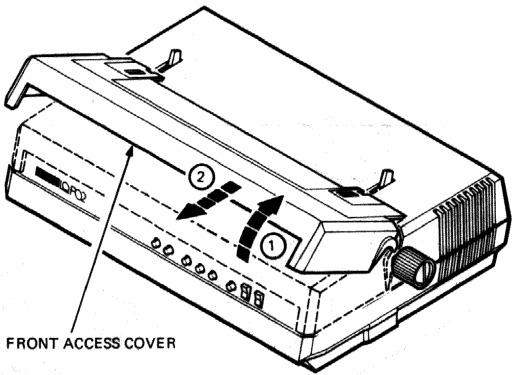
Use the following procedure to remove and replace the front access cover.

1. Turn power off.
2. Lift each side of cover to release the two front ball-and-socket fasteners. Then pull cover straight out (Figure 2-3).
3. To replace the front access cover, reverse steps 1 and 2.

## **2.3   REAR ACCESS COVER**

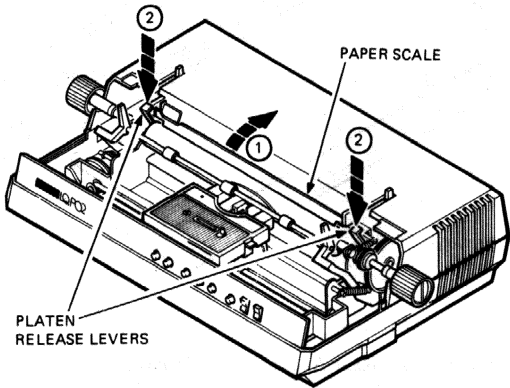
Use the following procedure to remove and replace the rear access cover.

1. Remove front access cover (Paragraph 2.2).
2. Flip back the paper scale (Figure 2-4).
3. Remove platen by pressing platen release levers at each end of mechanical subassembly and lifting platen straight out (Figure 2-4).
4. Loosen retaining screw on back of rear access cover with one quarter turn (Figure 2-5).
5. Remove the two front screws at each side of cover (Figure 2-5).
6. Lift cover to remove.
7. To replace the rear access cover, reverse steps 1 through 6.



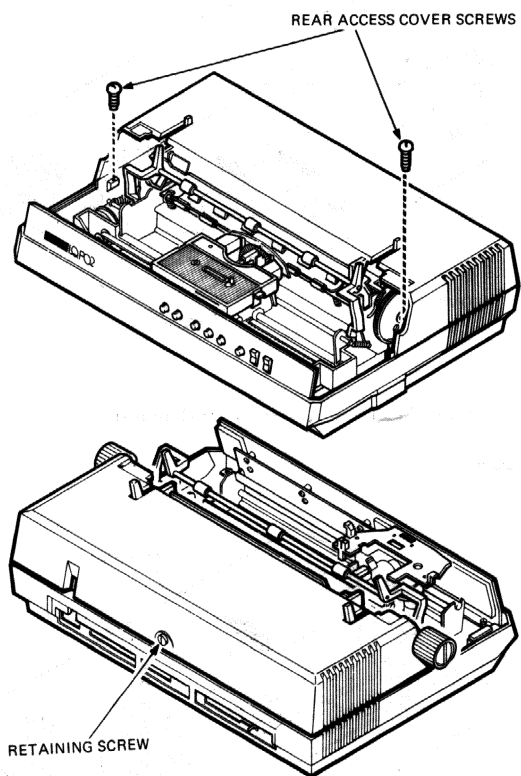
MA-8433

Figure 2-3 Front Access Cover Removal



MA-8434

Figure 2-4 Platen Removal



MA-8435

Figure 2-5 Rear Access Cover Removal

## 2.4 POWER SUPPLY PCB

Use the following procedure to remove and replace the power supply PCB.

1. Remove rear access cover (Paragraph 2.3).
2. Loosen the two rear panel screws and five card cage cover screws (Figure 2-6).
3. Remove card cage cover by lifting it up and out. Allow the large holes in the cover to clear the screw heads (Figure 2-6).
4. Disconnect the input power cable from connector J1 on power supply PCB (Figure 2-7).
5. Pull the power supply PCB straight up to remove.
6. To replace the power supply PCB, reverse steps 1 through 5.

### NOTE

When inserting the power supply PCB, line up the tabs on the PCB with the slots on the side of the card cage (Figure 2-7). The slots align the power supply PCB to its connector on the motherboard.

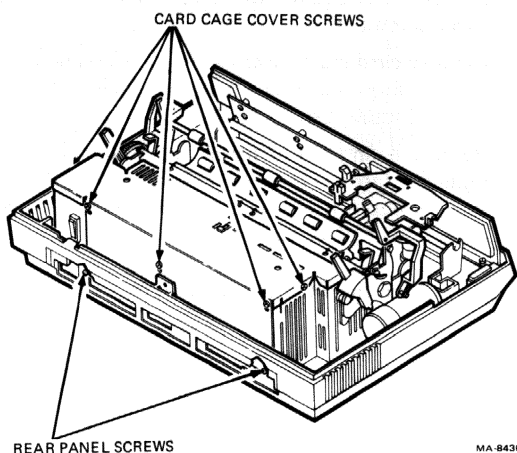
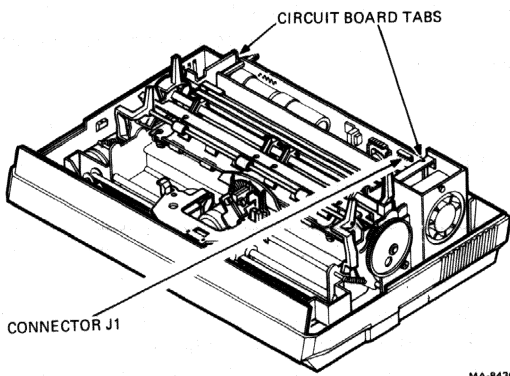


Figure 2-6 Card Cage Cover Removal



MA-8436

Figure 2-7 Power Supply PCB Removal

## 2.5 PRINTED CIRCUIT BOARDS

Use the following procedure to remove and replace the serial interface (SI) controller, digital, and analog PCBs.

1. Remove rear access cover (Paragraph 2.3).
2. Disconnect all cables from rear panel (Figure 2-8).
3. Loosen the two rear panel screws and five card cage cover screws (Figure 2-6).
4. Remove card cage cover by lifting it up and out. Allow the large holes in the cover to clear the screw heads (Figure 2-6).
5. Remove each PCB by lifting the inside edges of the removal tabs (Figure 2-9). Then lift the PCB straight out of its connector via the guides (slots) on each side of card cage.
6. To replace the PCBs, reverse steps 1 through 5.

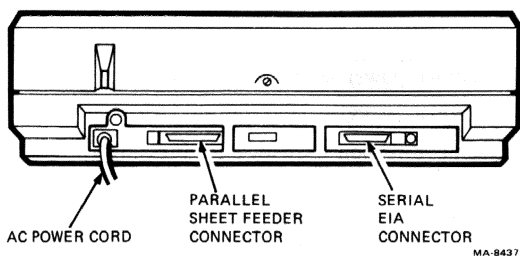


Figure 2-8 Power Cord and Connector Locations

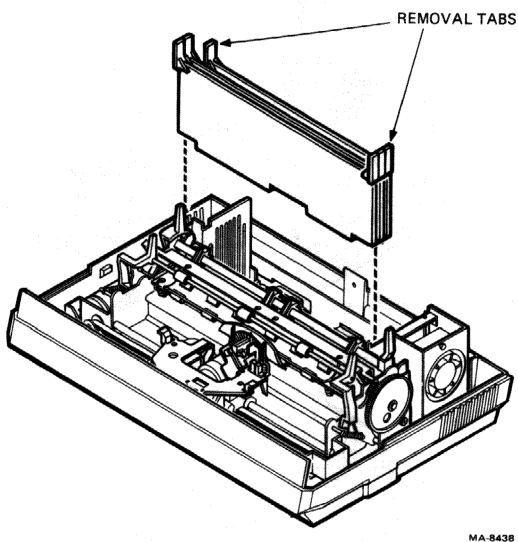
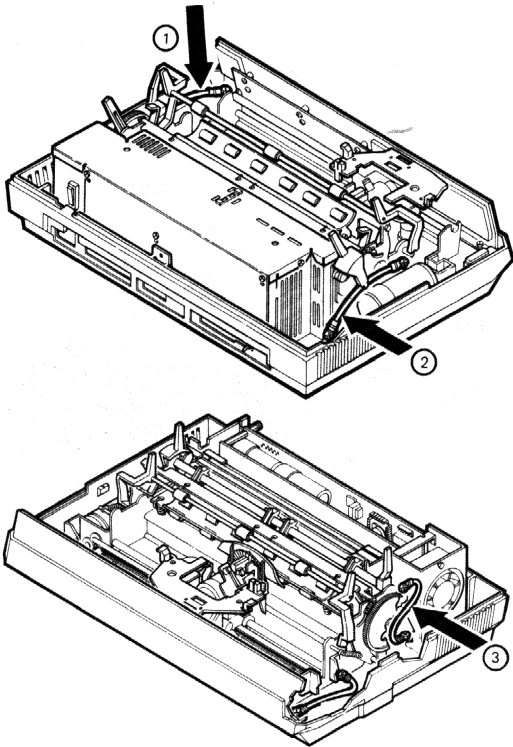


Figure 2-9 PCB Removal

## 2.6 MECHANICAL SUBASSEMBLY

Use the following procedure to remove and replace the mechanical subassembly.

1. Disconnect all cables from rear panel (Figure 2-8).
2. Remove power supply PCB (Paragraph 2.4).
3. Remove all PCBs (Paragraph 2.5).
4. Remove ribbon cartridge by pressing the red tabs on each side of cartridge and lifting it straight up.
5. Free the ground strap on right side of mechanical subassembly by loosening the screw holding the strap to front panel (Figure 2-10).



MA-8439

Figure 2-10 Ground Strap Locations

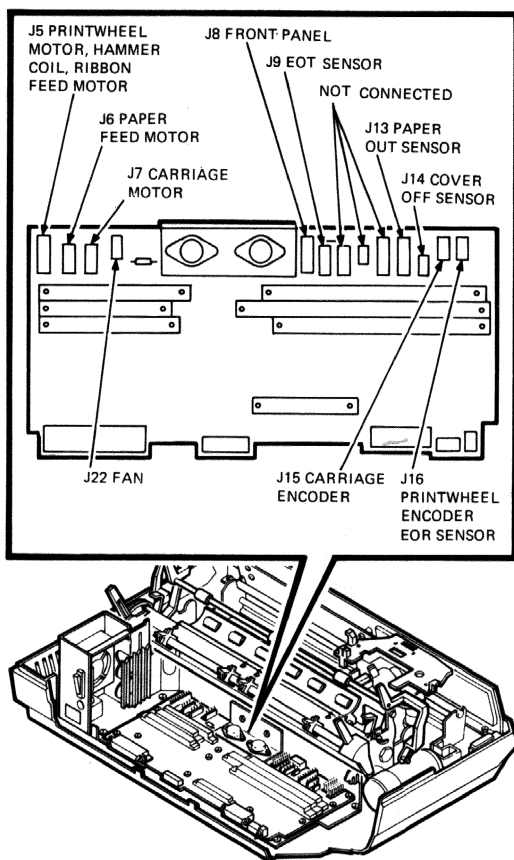


6. Disconnect the second ground strap next to the encoder motor by loosening the retaining screw securing the strap to the mechanical subassembly (Figure 2-10).
7. Disconnect the third ground strap just behind the paper feed idler gear by loosening the retaining screw securing the strap to the mechanical subassembly (Figure 2-10).
8. Disconnect the following cable connectors from motherboard (Figure 2-11).
  - a. J9 (end of travel [EOT] sensor)
  - b. J15 (carriage encoder)
  - c. J16 (print wheel encoder, end of ribbon [EOR] sensor)
  - d. J7 (carriage motor)
  - e. J6 (paper feed motor)
  - f. J5 (ribbon feed motor, print wheel motor, hammer coil)
9. Position the left side of printer about 5 inches beyond the edge of the desk or table. Remove the two mechanical subassembly screws from bottom of printer (Figure 2-12). Perform the same procedure for the right side of printer.
10. Grasp the square paper release shaft and round front carriage guide shaft (Figure 2-13). Lift the mechanical subassembly straight up and out of bottom cover.

#### **CAUTION**

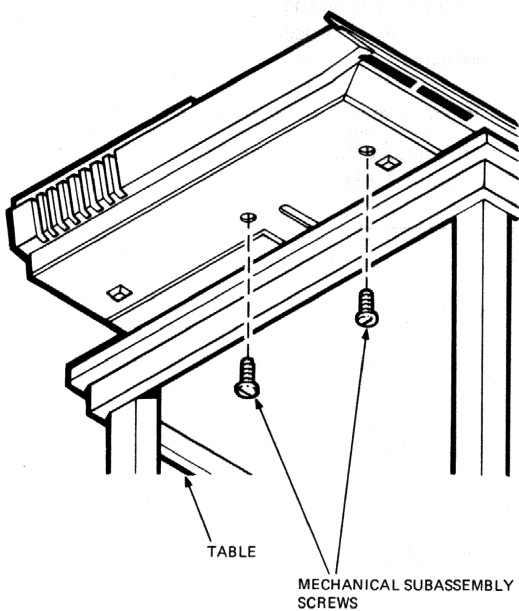
**Do not grasp the encoder motor to lift the mechanical subassembly.**

11. To replace the mechanical subassembly, reverse steps 1 through 10.



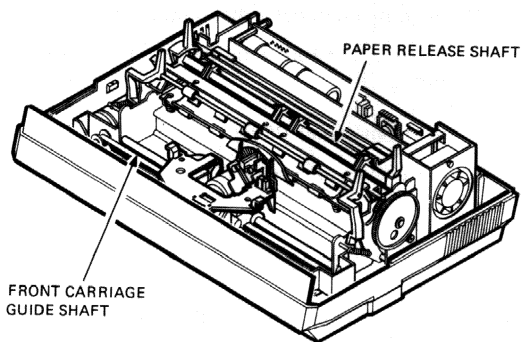
MA-8440

Figure 2-11 Motherboard Connector Locations



MA-8441

Figure 2-12 Mechanical Subassembly Screws



MA-8442

Figure 2-13 Mechanical Subassembly Removal

## 2.7 MOTHERBOARD

Use the following procedure to remove and replace the motherboard.

1. Remove mechanical subassembly (Paragraph 2.6).
2. Disconnect the remaining cables from motherboard (Figure 2-14).
  - a. J22 (fan)
  - b. J8 (front panel PCB)
  - c. J14 (cover off sensor)
3. Remove the two screws securing the heat sink to card cage (Figure 2-15).
4. Remove the 11 screws securing the motherboard to the bottom of card cage (Figure 2-15).
5. Lift the motherboard out of card cage.
6. To replace the motherboard, reverse steps 1 through 5.

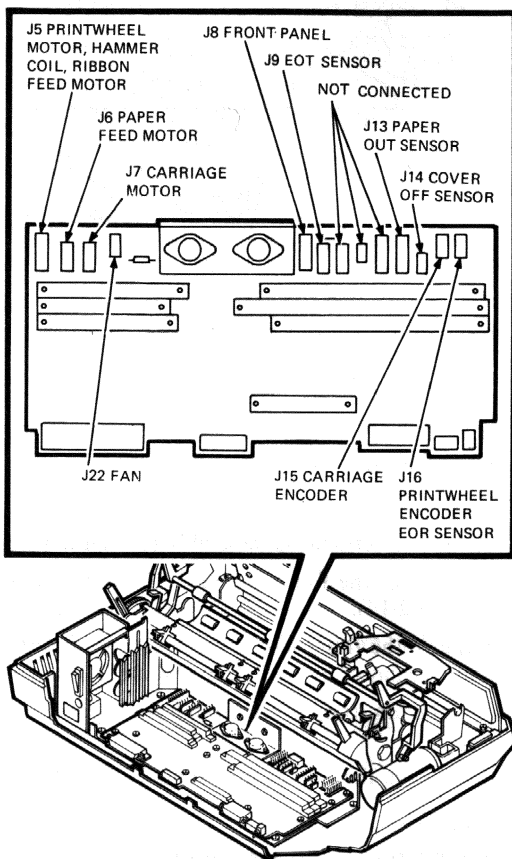
### CAUTION

**Do not overtighten motherboard screws.**

## 2.8 ELECTRONIC SUBASSEMBLY

Use the following procedure to remove and replace the electronic subassembly.

1. Remove mechanical subassembly (Paragraph 2.6).
2. Disconnect the following cables from motherboard (Figure 2-14).
  - a. J8 (front panel PCB)
  - b. J14 (cover off sensor)
3. Remove the four card cage screws securing card cage to bottom cover (Figure 2-15) and lift card cage out.
4. To replace the electronic subassembly, reverse steps 1 through 3.



MA-8440

Figure 2-14 Motherboard Connector Locations

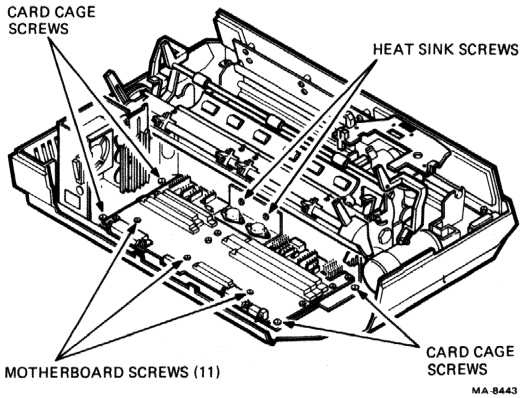


Figure 2-15 Motherboard and Card Cage Screw Locations

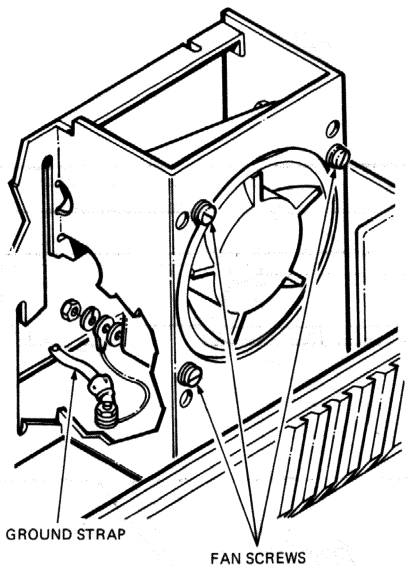
## 2.9 FAN

Use the following procedure to remove and replace the fan.

1. Remove electronic subassembly (Paragraph 2.8).
2. Disconnect the fan cable (J22) from motherboard (Figure 2-14).
3. Remove the three screws securing fan to card cage and disconnect ground strap (Figure 2-16).
3. Lift the fan straight up through the opening in card cage.
4. To replace the fan, reverse steps 1 through 3.

### CAUTION

**When installing the fan, face the label on the fan to the inside of the card cage for correct air flow direction.**



MA-8444

Figure 2-16 Fan Removal

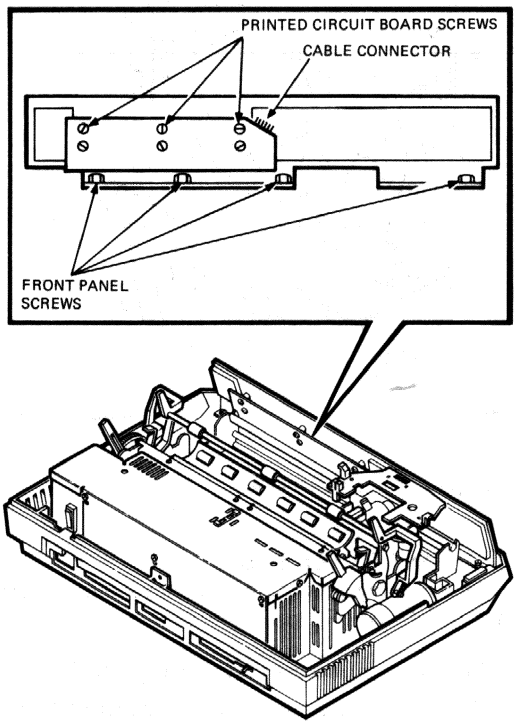
## 2.10 FRONT PANEL PCB

Use the following procedure to remove and replace the front panel PCB.

1. Remove front access cover (Paragraph 2.2).
2. Disconnect the cable from front panel PCB (Figure 2-17).
3. Remove the four screws securing the front panel to bottom cover (Figure 2-17). Note ground strap location.
4. Lift the front panel out of bottom cover and place the panel face down on a flat, protective surface.
5. Remove the six screws securing the PCB to front panel and remove board (Figure 2-17).
6. To replace the front panel PCB, reverse steps 1 through 5.

### CAUTION

**Do not overtighten PCB screws.**



MA-8445

Figure 2-17 Front Panel PCB Removal



## 2.11 RECOMMENDED SPARES LIST FOR THE LQP02

Table 2-1 lists the recommended spares and their part numbers for the LQP02.

**Table 2-1 Recommended Spares List for the LQP02**

Description	DIGITAL PN	Vendor PN
Mechanical subassembly	29-24028-00	.....
SI controller PCB	29-24029-00	90714-01
Digital PCB	29-24030-00	91162-02
Analog PCB	29-24031-00	91174-01
Power supply PCB	29-24032-00	91372-01
Platen	29-24033-00	.....
Motherboard	29-24034-00	90716-01
Front panel PCB	29-24035-00	90718-01
Inverter fan	29-24036-00	.....
Miscellaneous hardware kit*	29-24046-00	.....
Serial line loopback connector	12-15336-01	.....

\* Includes fuses.

# 3 CLEANING AND LUBRICATION

## 3.1 GENERAL

The operator is responsible for performing the cleaning and lubrication procedures regularly. *Installing and Using the LQP02 Full Character Printer (AA-L662A-TK)* describes these procedures.

When servicing the printer, you can check the two felt wipers on the front carriage guide for excessive contamination. The wipers should be oiled at least once a year. Oiling frequency depends on the operating environment (office, computer room, etc.), application (high or low usage), and supplies (type of paper used, etc.)

## 3.2 FELT WIPER LUBRICATION

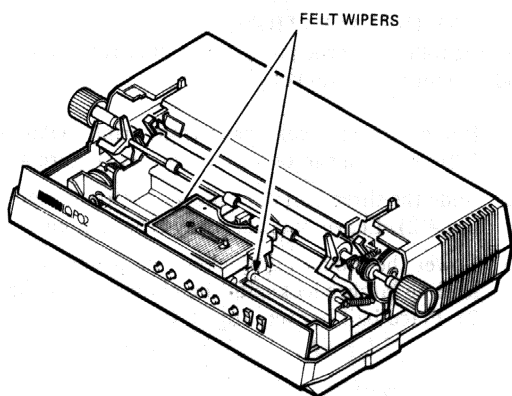
Use the following procedure to lubricate the felt wipers.

1. Remove front access cover (Paragraph 2.2).
2. Lubricate felt wipers on left and right side of rear carriage guide shaft with approximately 20 drops of lightweight electronic oil on each wiper (Figure 3-1). The wipers are kept next to the carriage by metal wiper brackets. You do not have to remove the wipers to lubricate them.

### NOTE

**If the wipers are excessively contaminated, they must be replaced. Return the entire mechanical subassembly to your depot for repair.**

3. Replace front access cover (Paragraph 2.2).



MA-8446

Figure 3-1 Felt Wiper Lubrication

# 4 OPTIONS

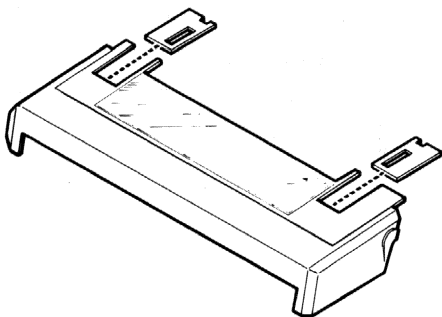
## 4.1 GENERAL

This chapter includes servicing information for the LQPX2-AC Automatic Sheet Feeder (ASF) and the LQPX2-AA Bidirectional Forms Tractor. For more information, see the related documentation (Appendix B).

## 4.2 ASF INSTALLATION

Use the following procedure to install or remove the ASF and its mounting bracket.

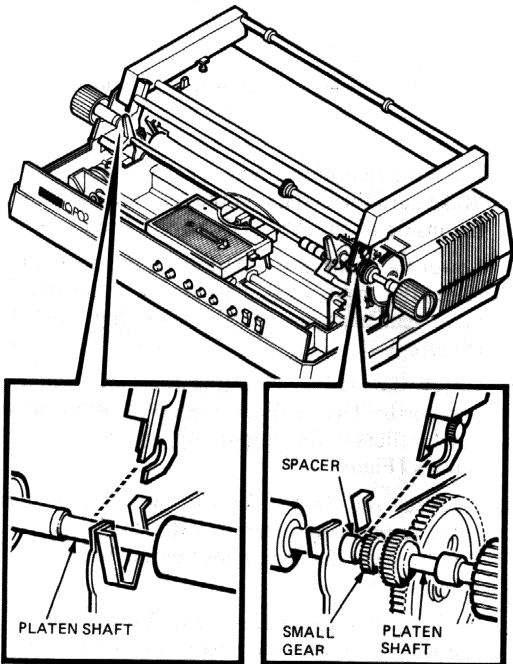
1. Remove front access cover from printer (Paragraph 2.2). Remove the two cover inserts (Figure 4-1).
2. Slide the three bail bar rollers to extreme right (Figure 4-2). Leave bail bar away from platen.
3. Lower the mounting bracket onto printer until self-loading latches lock onto the platen shaft (Figure 4-2). Place bail bar against platen.



MA-8447

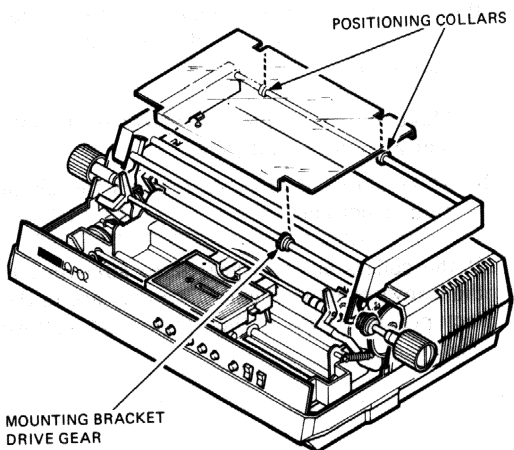
Figure 4-1 Front Access Cover Inserts

4. Position the alignment guide over front and rear bracket rails and against left side plate of bracket (Figure 4-3).
  - a. Make sure both positioning collars fit into the rear alignment guide slots.
  - b. Make sure the drive gear meets the alignment guide front notch.
5. If the collars or drive gear need adjusting, loosen the screws to move them. Once they are in the correct position, tighten the screws and remove the alignment guide.



MA-B448

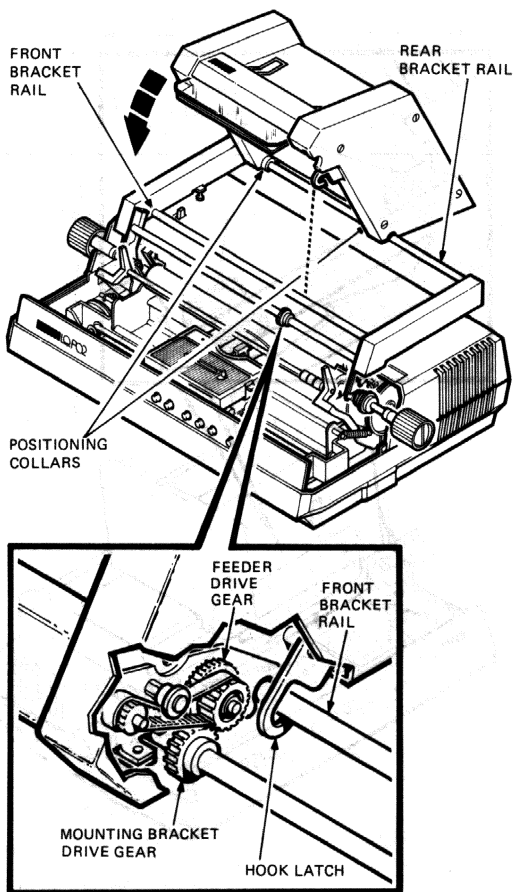
Figure 4-2 Mounting Bracket Installation



MA-8449

Figure 4-3    Positioning the Alignment Guide

6. Place the rear of the ASF on the mounting bracket. Make sure the collars on the rear bracket rail are to the inside of the ASF side covers (Figure 4-4).
7. Lower the front of the ASF until the hook latch engages the front bracket rail. Make sure the feeder drive gear engages with the mounting bracket gear (Figure 4-4).
8. Check the ASF by rotating the platen knob back and forth. The ASF is properly positioned if the pinch rollers in the output hopper turn as the platen rotates (Figure 4-5).
9. Connect the 25-pin female end of the interface cable to rear connector of ASF and the 37-pin male end to sheet feeder connector on back of printer (Figure 4-6).
10. Add paper to paper feed trays. Lower front tray all the way down into the first slot behind output hopper (Figure 4-7). Push back on top of the tray to lock into operating position. Load rear paper feed tray in the same manner.
11. Install front access cover.
12. To remove the ASF and mounting bracket, reverse steps 1 through 11.



MA-8450

Figure 4-4 ASF Installation

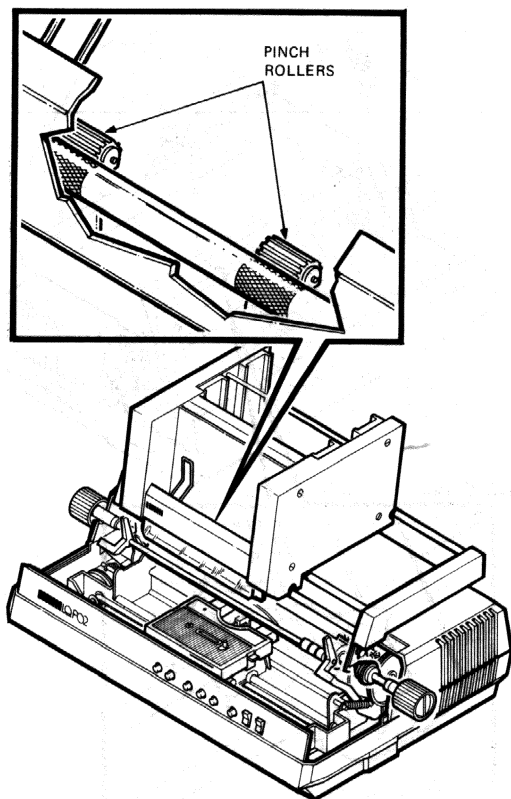
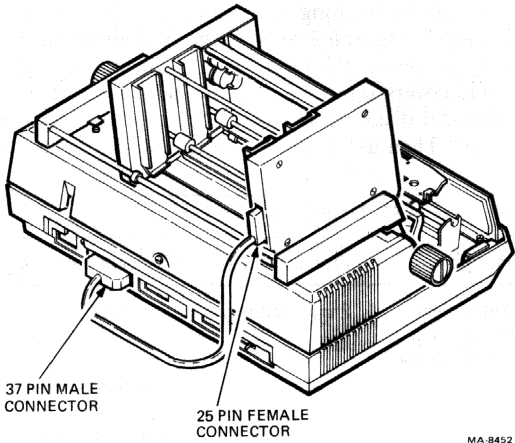


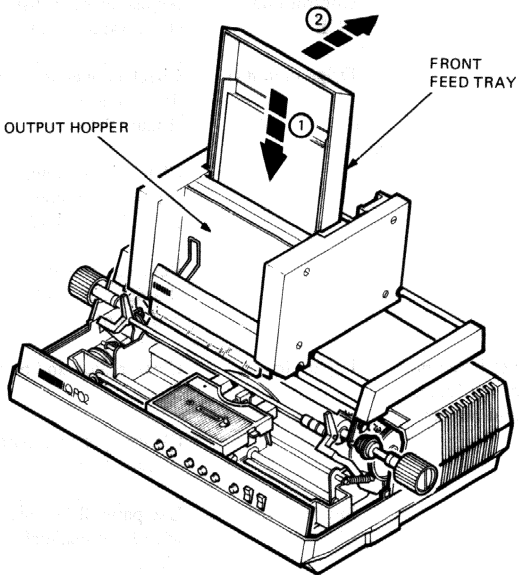
Figure 4-5    ASF Positioning Test





MA-8452

Figure 4-6 Interface Cable Connections



MA 8453

Figure 4-7 Paper Feed Tray Installations

### 4.3 ASF TROUBLESHOOTING TABLE

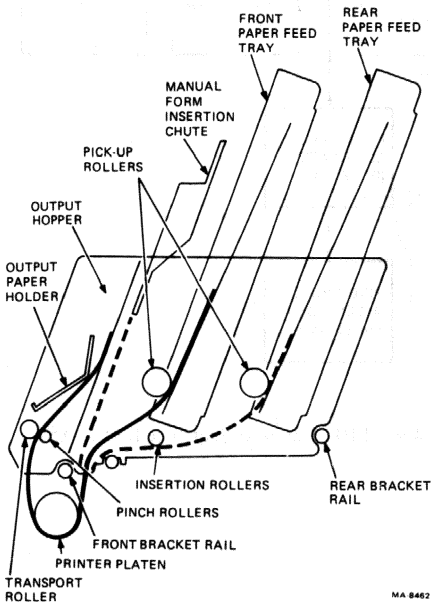
Before troubleshooting the ASF, perform the printer self-tests (Paragraph 1.5) with the ASF disconnected. If the printer passes the tests, visually check the ASF with the side covers removed. Are the belts loose or cut? Do the encoder disks rotate freely? Are all connectors firmly in place? Then use Table 4-1 to troubleshoot the ASF.

**Table 4-1    ASF Troubleshooting Table**

Symptom	Probable Cause	Corrective Action
Pickup rollers are turning but not feeding paper.	Paper feed tray	Place feed tray in operating position.  Load paper correctly.  Clear paper feed path (Figure 4-8).
	Drive mechanism	Adjust drive belts (Paragraph 4.5.1).
	Control unit PCB	Adjust encoder disks (Paragraph 4.5.2).
Pickup rollers are not turning and feeding paper.	Drive motor(s)	Check connections on drive motors (Figure 4.14).  Check drive motor connector on control unit PCB (Figure 4-13).  Replace drive motor(s) (Paragraphs 4.4.5 and 4.4.6).
	Paper jam	Clean platen and bail bar rollers.  Clear paper feed path (Figure 4-8).
	Incorrect paper size	Use paper 8-1/2 inches wide for nonadjustable trays.
	Bail bar	Position bail bar and bail bar rollers correctly.
Paper is fed but does not reach output hopper.	Loose mounting bracket gear	Engage gears properly and tighten (Paragraph 4.2).

**Table 4-1 ASF Troubleshooting Table (Cont)**

Symptom	Probable Cause	Corrective Action
	Pinch roller assembly	Replace pinch roller assembly (Paragraph 4.4.3).
	Pinch roller assembly belt	Replace belt.
Too much paper is fed to platen.	Encoder disk	Adjust encoder disk (Paragraph 4.5.2).
	Control unit PCB	Replace control unit PCB (Paragraph 4.4.4).
Noisy pinch rollers.	Bent front cover assembly	Straighten front cover assembly.
		Replace front cover assembly (Paragraph 4.4.2).



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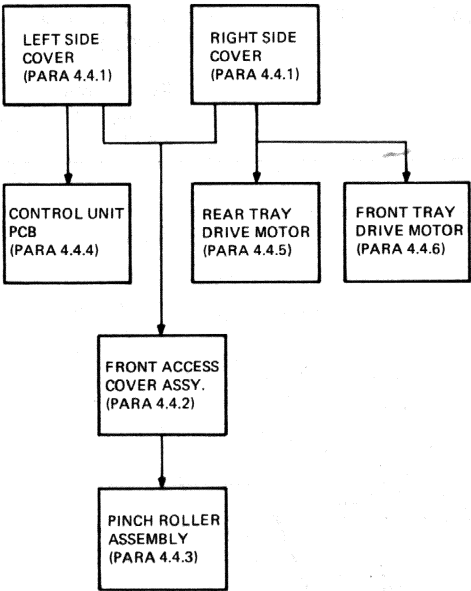
**Figure 4-8 Paper Feed Path**

**4.4 ASF REMOVAL AND REPLACEMENT PROCEDURES**

This section describes how to remove and replace the ASF. Figure 4-9 shows the FRUs on the ASF and the sequence in which to perform the removal and replacement procedures. For example, you must first remove the right side cover to remove the rear paper feed tray drive motor.

**NOTE**

**Before performing the following procedures, remove the ASF from the printer (Paragraph 4.2).**



MA-8328

**Figure 4-9    FRU Removal Sequence for the ASF**

#### 4.4.1 Left and Right Side Covers

Use the following procedure to remove and replace the right and left side covers.

1. Place the ASF on a table or flat surface in its normal upright position (Figure 4-10).
2. Remove the left or right side cover by loosening the four retaining screws and pulling the cover straight out (Figure 4-10).
3. To replace the side covers, reverse steps 1 and 2.

#### 4.4.2 Front Access Cover Assembly

Use the following procedure remove and replace the front access cover assembly.

1. Remove left and right side covers (Paragraph 4.4.1).
2. Remove the two front access cover mounting screws and washers. Lift off the cover and deflector plate (Figure 4-11).
3. To replace the front access cover assembly, reverse steps 1 and 2.

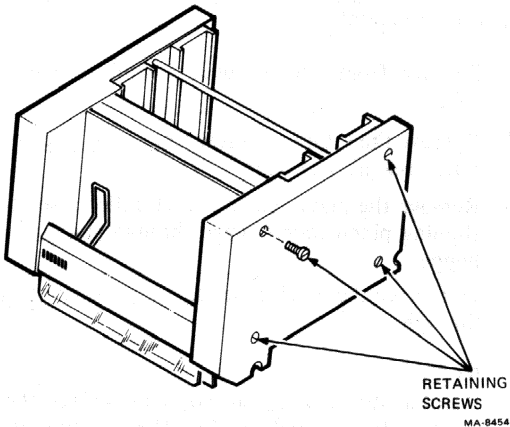


Figure 4-10 Side Cover Removal

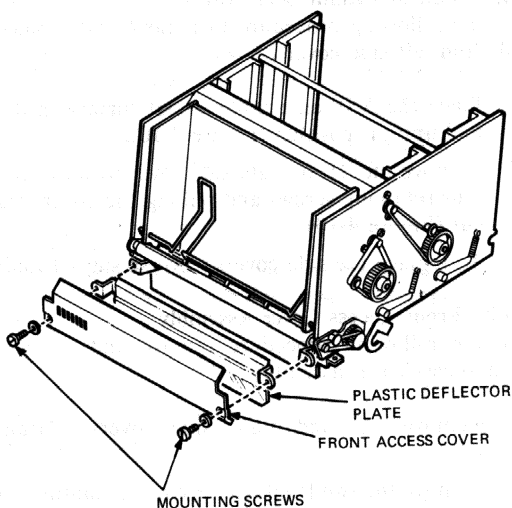


Figure 4-11 Front Access Cover Removal

#### 4.4.3 Pinch Roller Assembly

Use the following procedure to remove and replace the pinch roller assembly.

1. Remove front access cover assembly (Paragraph 4.4.2).
2. Remove the retaining screw from each side of pinch roller assembly (Figure 4-12).
3. Remove the plate and the pinch roller assembly by slipping pinch rollers down through slots in output hopper.
4. To replace the pinch roller assembly, reverse steps 1 through 3.

#### NOTE

Position the ASF upside down to replace the pinch roller assembly easily. This position allows you to align the pinch roller assembly (bottom) and paper guide plate (middle) with the support plates (top) (Figure 4-12).

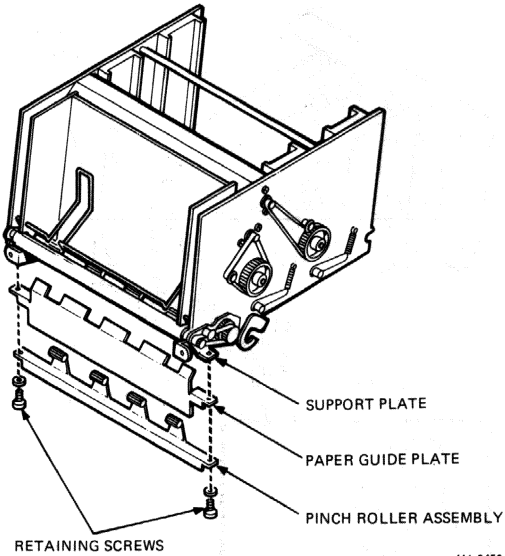


Figure 4-12 Pinch Roller Assembly Removal

#### 4.4.4 Control Unit PCB

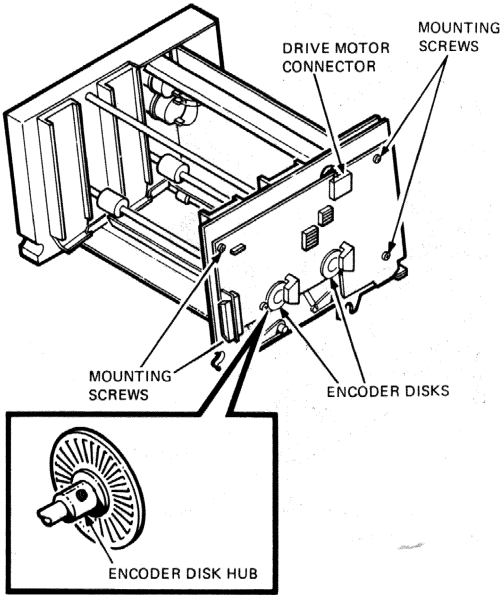
Use the following procedure to remove and replace the control unit PCB.

1. Remove left side cover (Paragraph 4.4.1).
2. Disconnect drive motor connector from PCB (Figure 4-13).
3. Remove the four mounting screws and washers from PCB (Figure 4-13).
4. Carefully lift the control unit PCB straight up to clear the two encoder disks.

#### CAUTION

The encoder disks are fragile and bend easily.

5. To replace the control unit PCB, reverse steps 1 through 4. Adjust the encoder disks if necessary (Paragraph 4.5.2).



MA-8457

Figure 4-13    Control Unit PCB Removal

#### 4.4.5    Rear Tray Drive Motor

Use the following procedure to remove and replace the rear tray drive motor.

1. Remove right side cover (Paragraph 4.4.1).
2. Remove the green (+) and brown (–) connectors from drive motor by pulling them straight out (Figure 4-14).
3. Remove the rear tray drive motor belt by loosening the idler screw and slipping the belt off the gears (Figure 4-15).
4. Remove the two rear tray drive motor mounting screws and flat washers. Lift motor from chassis (Figure 4-15).
5. To replace the rear tray drive motor, reverse steps 1 through 4.



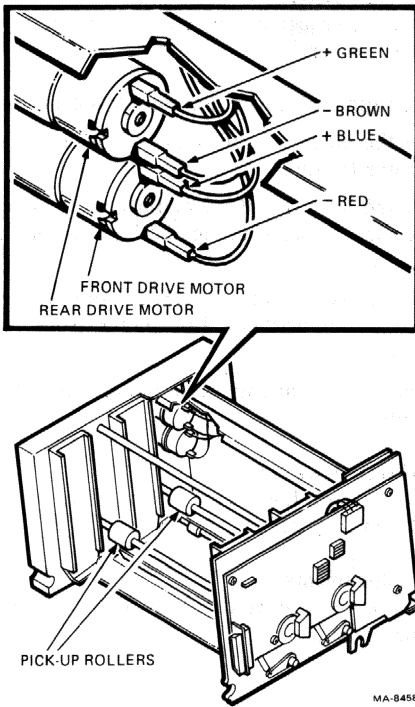


Figure 4-14 Drive Motor Connections

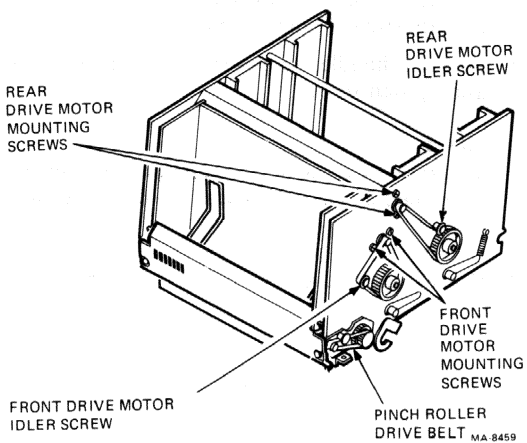


Figure 4-15 Drive Motor Removal

#### 4.4.6 Front Tray Drive Motor

Use the following procedure to remove and replace the front tray drive motor.

1. Remove right side cover (Paragraph 4.4.1).
2. Remove the blue (+) and red (−) connectors from drive motor (Figure 4-14).
3. Remove the front tray drive motor belt by loosening the idler screw and slipping the belt off the gears (Figure 4-15).
4. Remove the two front tray drive motor mounting screws and flat washers. Lift motor from chassis (Figure 4-15).
5. To replace the front tray drive motor, reverse steps 1 through 4.

#### 4.5 ASF ADJUSTMENTS

This section describes how to adjust the drive belts and encoder disks on the ASF.

##### 4.5.1 Belt Adjustments

Use the following procedure to adjust the front and rear tray drive motor belts.

##### **NOTE**

**The pinch roller drive belt is not adjustable.**

1. Remove right side cover (Paragraph 4.4.1).
2. Loosen the drive motor idler screw for the belt you are adjusting (Figure 4-15).
3. Position the idler screws so there is no slack in belt and tighten screw.

##### **NOTE**

**To prevent excessive wear and provide smooth operation, do not overtighten the drive belt tension.**

4. Replace side cover.

#### 4.5.2 Encoder Disk Adjustment

Use the following procedure to adjust the encoder disks.

##### CAUTION

**The encoder disks are fragile and bend easily.**

1. Remove left side cover (Paragraph 4.4.1).
2. Using a 1.5 mm Allen wrench, loosen the set screw on left encoder disk hub (Figure 4-13).
3. Set the gap between the encoder disk and pickup as small as possible and tighten the set screw.
4. Perform steps 2 and 3 for the right encoder disk.
5. Carefully rotate the encoder disks one complete revolution to be sure they do not touch the pickups. If they touch, perform steps 2 and 3 again.
6. Replace side cover.

#### 4.6 CONTROL UNIT PCB JUMPERS

The control unit PCB has 12 jumpers which are factory installed. **Never change these jumpers.** However, some of the jumpers are spring-loaded and can accidentally be changed. Figure 4-16 shows the jumper locations and Table 4-2 lists the factory configuration.

#### 4.7 RECOMMENDED SPARES LIST FOR THE ASF

Table 4-3 lists the recommended spares and their part numbers for the ASF.

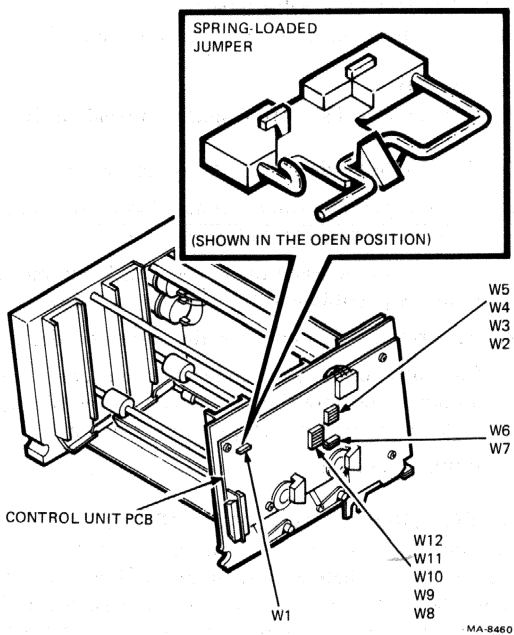


Figure 4-16    Control Unit PCB Jumper Locations

Table 4-2    Control Unit PCB Jumper Configuration

Jumper	Configuration	Jumper	Configuration
W1	See note	W7	Installed
W2	Installed	W8	Installed
W3	Installed	W9	Removed
W4	Removed	W10	Removed
W5	Removed	W11	Removed
W6	Removed	W12	Removed

**NOTE**

W1 can either be installed or removed depending on the version of the control unit PCB. If W1 is installed, it is soldered in place. If W1 is removed, it is a spring-loaded jumper (open).

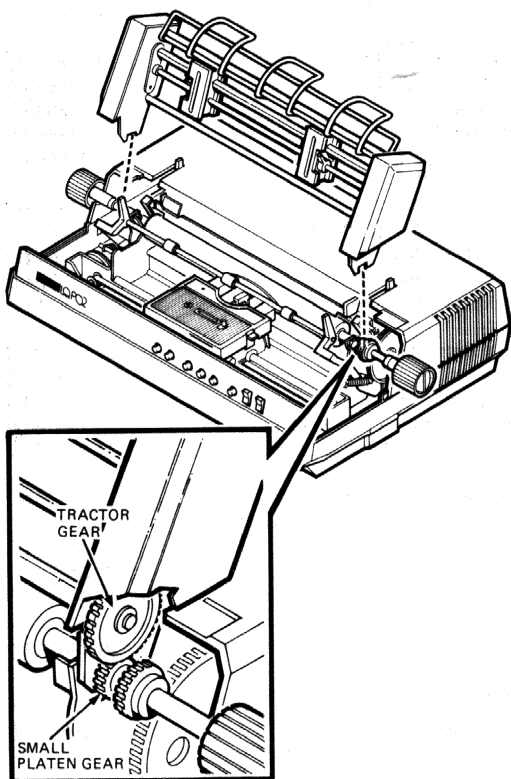
**Table 4-3 Recommended Spares List for the ASF**

<b>Description</b>	<b>DIGITAL PN</b>
Sheet feeder swap unit	29-23846-00
Front cover assembly	29-23848-00
Paper holder	29-23849-00
Feed tray support, left side	29-23850-00
Cable assembly	29-23851-00
15 Vdc motor assembly with gear	29-23852-00
Gear wheel, transport roller shaft	29-23853-00
Pinch (eject) roller assembly	29-23854-00
Control unit PCB	29-23855-00
Timing disk	29-23856-00
Feed tray support, right side	29-23857-00
Idle pulley, timing belt Pos. 10	29-23858-00
Gear wheel assembly, one way clutch	29-23859-00
Arbor, one way clutch	29-23860-00
Timing belt (t = 114)	29-23861-00
Timing belt (t = 80)	29-23862-00
Timing belt (t = 48)	29-23863-00
Gear wheel	29-23864-00
Gear wheel	29-23865-00
Idler pulley	29-23866-00
Gear wheel	29-23867-00
Gear wheel, straight fluted	29-23868-00
Gear wheel, drive shaft	29-23869-00
Notch arm right	29-23872-00
Notch arm left	29-23873-00
Kit of metric hardware	29-23870-00
Kit of springs	29-23871-00
Mounting bracket	29-24072-00
Paper feed tray, 8.5 in × 11 in	29-23874-00
Paper feed tray, DIN A4 size (Europe)	29-23875-00
Paper feed tray, 8.5 in × 14 in	29-23876-00
Paper chute, DIN A4 size (Europe)	29-23877-00
Paper chute, 8.5 in	29-23878-00
Output stacker plate	29-23879-00
Interface cable	29-24073-00
Alignment guide	29-24074-00
<b>Special Tool</b>	
1.5 mm hex key	29-19895-00

## 4.8 BIDIRECTIONAL FORMS TRACTOR INSTALLATION

Use the following procedure to install or remove the bidirectional forms tractor.

1. Remove front access cover from printer (Paragraph 2.2). Remove the two cover inserts (Figure 4-1).
2. Lower the tractor into position on printer and align the slots in tractor arms with the platen shaft (Figure 4-17).
3. Rotate the platen knob back and forth to check for free up-and-down movement of the tractor pins. The tractor gear should engage smoothly with the small platen gear (Figure 4-17).
4. To remove the forms tractor, reverse steps 1 through 3.



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Figure 4-17 Forms Tractor Installation

## 4.9 FORMS TRACTOR TROUBLESHOOTING TABLE

Use Table 4-4 to troubleshoot the forms tractor. Since the forms tractor has no FRUs, the table lists adjustments only. Replace the entire tractor if it is defective.

**Table 4-4 Forms Tractor Troubleshooting Table**

Symptom	Probable Cause	Corrective Action
Poor line spacing	Tractor is installed improperly.	Reinstall tractor. Make sure tractor gear engages properly with platen gear.
Printed lines slant.	Paper is installed improperly.	Reinstall paper.
Paper buckles diagonally or pulls off tractor pins.	Paper gates are positioned incorrectly.	Reposition paper gates and lock in place.
Paper is too loose or too tight in vertical direction (holes out of round).	Tension lever is set incorrectly.	Reset paper tension lever.

# A FUSE LOCATIONS

Figure A-1 shows how to remove the ac power fuses. Figures A-2 through A-4 show the fuse locations on the PCBs. Remove and insert the pico fuses with a pair of needlenose pliers. **Do not solder a fuse in place.**

## NOTE

All fuses are in the miscellaneous hardware kit (DIGITAL PN 29-24046-00).

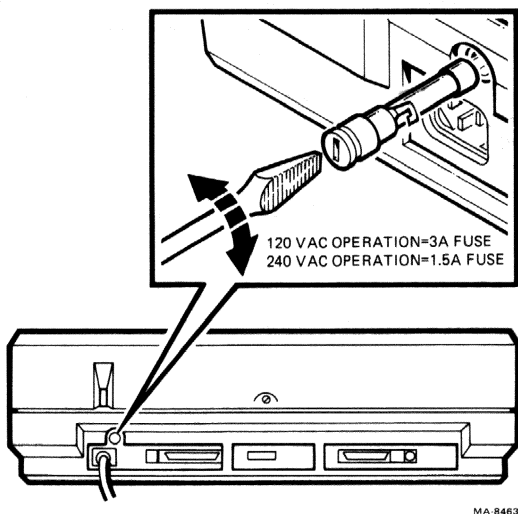


Figure A-1 AC Power Fuse Removal



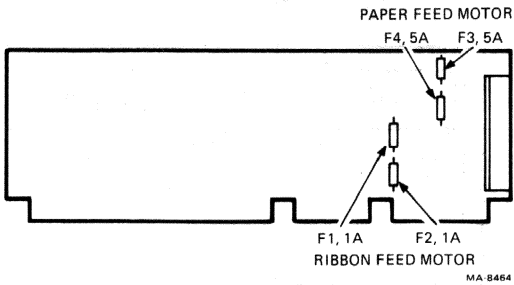


Figure A-2 Digital PCB Fuse Locations

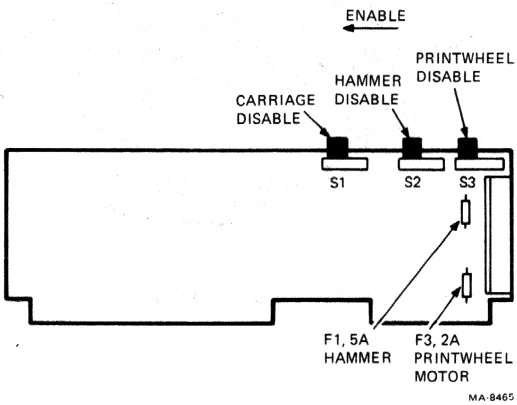


Figure A-3 Analog PCB Fuse and Enable Switch Locations

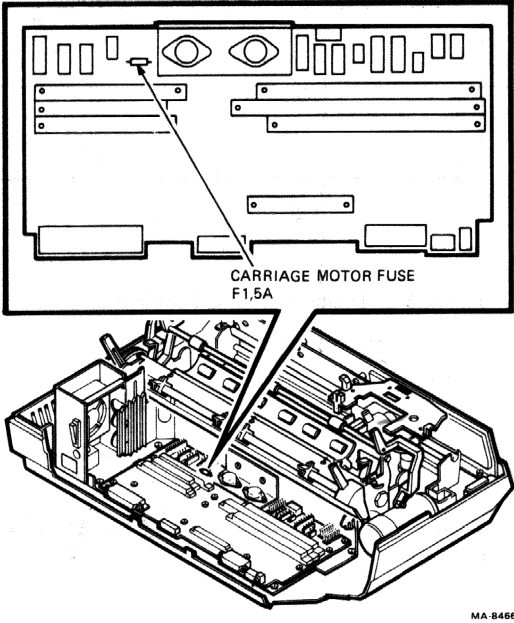


Figure A-4    Motherboard Fuse Location

# **B** RELATED DOCUMENTATION

This appendix lists documents related to the LQP02 printer.

The *LQP02 Technical Manual* (ER-LQP02-TM-001) describes the LQP02 to a detailed block level. It includes schematics, troubleshooting information, and adjustments for depot-level repair.

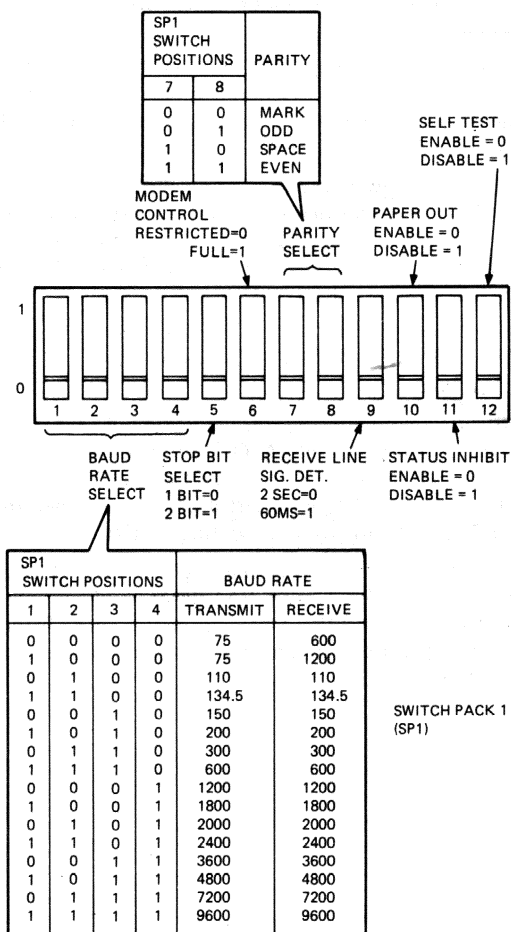
*Installing and Using the LQP02 Full Character Printer* (AA-L662-TK) describes how to install and operate the LQP02. It includes operator troubleshooting and maintenance procedures, and a section on the system configuration switches.

*Replacing LQP02 Print Wheels and Ribbon Cartridges* (AV-L661A-TK) describes how to install the paper, ribbon cartridge, and print wheel.

*Installing and Using the LQPX2-AA Bidirectional Forms Tractor* (AA-663A-TK) describes how to install and remove the LQPX2-AA bidirectional forms tractor. It also describes how to insert and remove paper and includes an operator troubleshooting section.

*Installing and Using the LQPX2-AC Automatic Sheet Feeder* (AA-L882A-PA) describes how to install and remove the LQPX2-AC automatic sheet feeder. It includes operation, maintenance, and troubleshooting information.

# C CONFIGURATION SWITCH PACKS

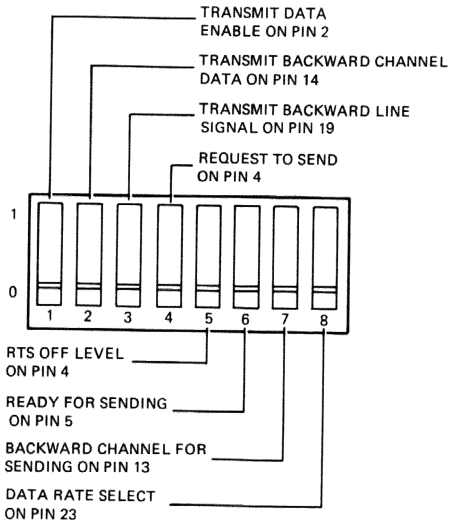


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Figure C-1 Configuration Switch Pack 1

POSITION 1 = DISABLE FUNCTION  
 POSITION 0 = ENABLE FUNCTION

SWITCH PACK 2 (SP2)



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Figure C-2 Configuration Switch Pack 2



D PHYSICAL/FUNCTIONAL  
DIAGRAM

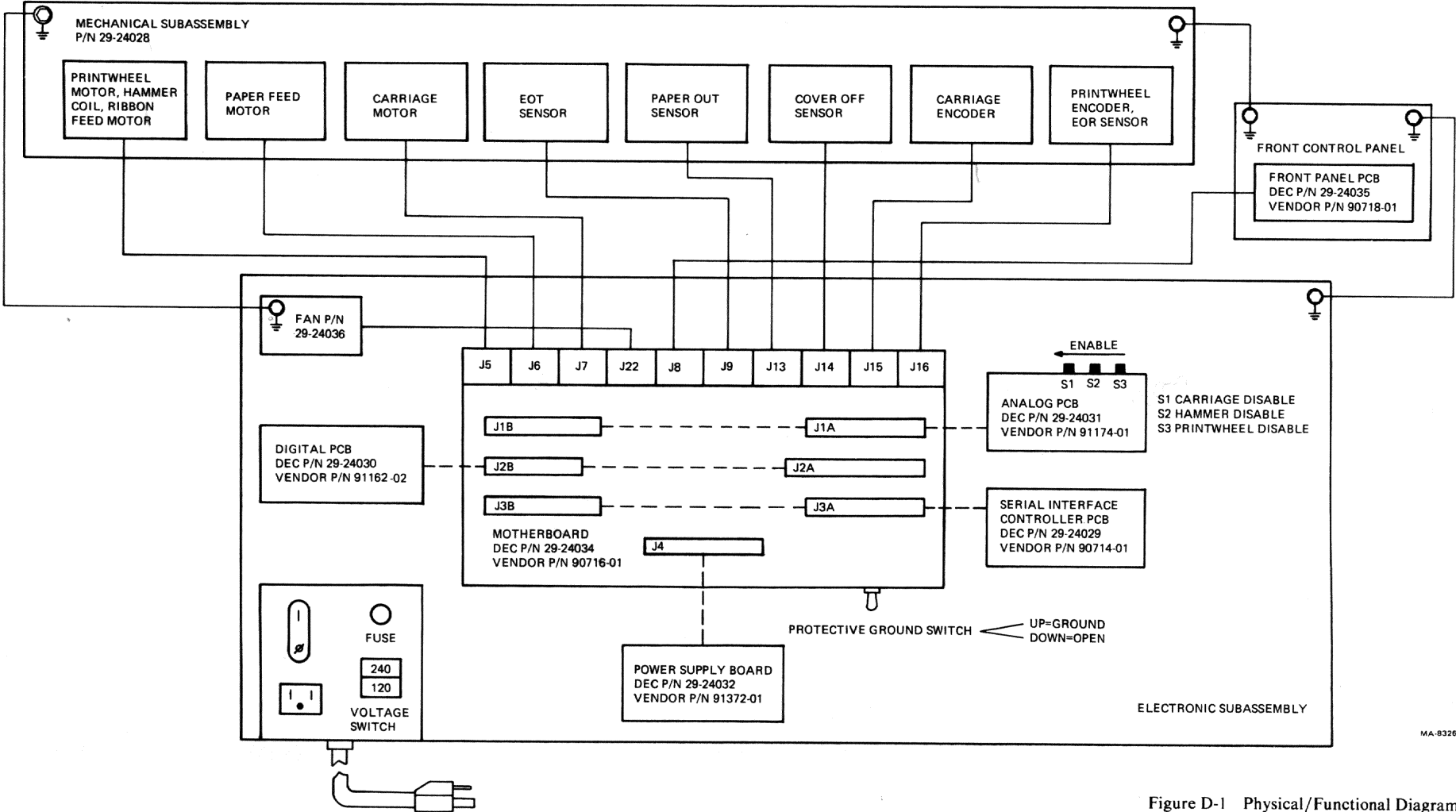


Figure D-1 Physical/Functional Diagram

