Section 7

Repair Analysis Procedures

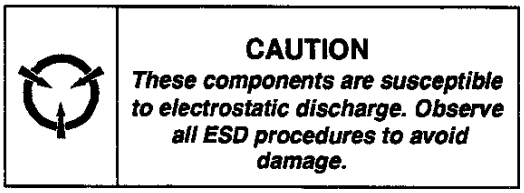
RAP 7.1 Using RAPs

In each of the following repair analysis procedures you are instructed to perform certain actions and make observations. The instruction is followed by a statement. If your response to the statement is yes, perform the action following the "Y". If your response to the question is no, perform the action following the "N."

In addition, keep the following points in mind while performing any RAP:

1 RAPs use the following notation when referring to printer connections:

- P/J XX – indicates Plug/Jack XX is connected to a component.
- CN XX – indicates connector XX is connected to a component.
- P XX – refers to the plug of P/J XX (except for connectors soldered directly to the board).
- J XX – refers to the jack of P/J XX (except for connectors soldered directly to the board).



CAUTION

These components are susceptible to electrostatic discharge. Observe all ESD procedures to avoid damage.

2 When you take a voltage reading at a P/J location, the notation "P/J3-5 and P/J 2-6" indicates that you should place the red probe (+) of the voltmeter on pin 5 of P/J 3, and place the black probe (-) of the voltmeter on pin 6 of P/J 2. In most cases the second P/J pin in the notation is a Return (RTN), Frame Ground (FG), or Signal Ground (SG).

3 When a RAP tells you to take a reading between P/J X and P/J Y, with no pin numbers given, refer to the Wiring and Connection Diagrams in Section 6 and take readings on ALL pins.

4 Unless otherwise instructed by a RAP, take all voltage readings with the Duplex Access Cover closed, the Safety Switch cheated, AC power applied, and the Paper Trays installed.

5 Voltage values stated in RAPs are approximate. Actual voltages you get may differ slightly. A small difference in voltage is acceptable.

6 Refer to the appropriate Repair Procedures if you must remove, replace or reinstall a component.

7 The term *replace* means the named part or parts could be the cause of the initial problem. Example: the phrase "replace the Fuser Assembly" means to remove the current Fuser Assembly and replace with a new Fuser Assembly.

Image Quality Problems

Use letter-size paper or A4 paper when troubleshooting an image quality problem. Use the Diagnostic Test Prints to determine whether an image quality problem is being caused by the printer or by the host. If the test prints are normal, but in the Online mode the prints have an image quality problem, the problem may be in the System Controller PWB, Serial or Network Option PWB, Interface Cable, or with the Host Computer.

RAP 7.2 Entry Level

If the display indicates a fault message, or there is an obvious failure or fault, go immediately to the appropriate Error Message Table (Table 7.1), Repair Procedure, or Repair Analysis Procedure. If you are not sure where to begin, continue troubleshooting using the following steps. If the printer exhibits intermittent operation and/or inconsistent failure symptoms, the problem may be due to electrical noise.

1 Perform the following:

— Disconnect the AC power
— Check the printer paper path for jammed paper or other obstacles
— Ensure that the paper trays have a good supply of fresh paper and are fully inserted in the printer
— Ensure the Developer Cartridge is properly installed
— Ensure the Photoconductor/Drum Cartridge is properly installed
— Ensure that all covers are properly closed.

2 Connect the AC power cord and switch on the AC power. The power supply fan runs.

Y **N**
| Go to RAP 7.3.

3 The four LEDs light for 1 second then go out.

Y **N**
| Go to RAP 7.4.

4 The Laser Assembly Motor spins up.

Y **N**
| Replace in order: Printer Controller PWB (PL 4), Laser Assembly (PL 4).

5 The LCD is displaying characters.

Y **N**
| Remove the Front Panel Assembly and check the keyboard harness from the Cassette PWB. If the harness is defective replace the Cassette PWB (PL 3). If the harness is OK, replace in order: Front Panel Assembly (PL 1), System Controller PWB (PL 7).

6 The Main Drive Motor runs.

Y **N**
| Go to RAP 7.5.

7 The Main Drive Motor stops.

Y **N**
| Replace the Printer Controller PWB (PL 4).

8 The LCD displays **"the selected emulation" "Size"/"Size."**

Y **N**
| Go to the Error Message Table (Table 7.1).

9 Using Printer Operation (5.8), set Duplex to On. Eject the lower Paper Cassette. Using Printer Operation (5.8), print a PCL 5e Demo Page. Paper is fed from the Upper Cassette.

Y **N**
| Remove Upper Paper Cassette and inspect all the cassette components for damage. Repair or replace as necessary. If the problem persists, go to RAP 7.6 .

10 Paper is delivered to the output tray.

Y N
| Go RAP 7.7.

11 Reinstall the Lower Paper Cassette. Using Printer Operation (5.8), print a PCL 5e Demo Page. Paper is fed from the Lower Cassette.

Y N
| Remove Lower Paper Cassette and inspect all the cassette components for damage. Repair or replace as necessary. If the problem persists, go to RAP 7.6 .

12 Paper is delivered to the output tray.

Y N
| Go RAP 7.7.

13 The print quality is acceptable.

Y N
| Go to RAP 7.8.

14 Insert a sheet of paper in the manual feed slot. The paper is fed in approximately 1/4 inch and stops.

Y N
| Clean and inspect the Register Roller, replace if necessary (PL 5). If problem persists, replace the Printer Controller PWB (PL 4), then the Registration Sensor (PL 2).

15 Press the Enter Key to run a PCL 5e Demo Page. The manually fed page is printed correctly.

Y N
| Replace the Printer Controller PWB (PL 4).

16 The LCD Display matches the paper loaded in both cassettes.

Y N
| Perform Sensor/detector Operation test (5.6.4.2). If the test passes, replace the appropriate cassette (PL 11). If the test fails, replace Size Detect Lever (PL 3) or the Cassette PWB (PL 3), as necessary.

17 Print a Config Sheet from the Printer Operations Test Print menu. The amount of memory listed on the Config Sheet matches the actual memory in the printer.

Y N
| Go to SIMM Check-Out Procedure (8.5).

18 Ask the customer to print a document from an application program. The document prints successfully.

Y N
| Have the customer validate the application and printer setup. Perform Communications Check-Out Procedure (8.6).

19 The printer appears to be functioning properly.

Table 7.1 Error Message Table

Message	Cause	Error Description	Action
COVER OPEN	Cover Open	1) Check that the drum cartridge is properly installed. 2) Check that the transport assembly is closed. 3) Check that the Duplex Access Cover is properly closed. 4) Defective Safety Switch, Duplex Access Cover Switch and/or Printer Contoller PWB.	1) Properly insert the drum cartridge. 2) Close the transport assembly. 3) Close the access cover. 4) Perform Rap 7.8, Power.
PAPER JAM	Paper Jam	1) Check the printer for jammed paper. 2) Paper Path Problem. 3) Check that the Registration Sensor actuator is not hung. 4) Check that the Paper Exit Sensor actuator is not hung. 5) Check sensor operation. 6) Paper Transportation problem. 7) Defective Printer Controller PWB.	1) Remove all paper and obstructions from the paper path. 2) Perform RAP 7.7. 3) Check/replace the Registration Sensor (REP 4.3.7). 4) Check/replace the Paper Exit Sensor and Sensor Actuator (PL 1). 5) Perform Sensor/Detector Operation Test (5.6.4.2). Repair or replace sensors as necessary. 6) Perform RAP 7.7. 7) Replace the Printer Controller PWB (REP 4.6.7).
PAPER OUT	Paper Out	1) Cassette not latched. 2) Check for paper in the paper cassette. 3) Check that the paper empty sensor actuator is not defective. 4) Check Sensor operation. 5) Defective Cassette PWB. 6) Defective Printer Controller PWB.	1) Ensure both cassettes are inserted and latched. 2) Add paper to the cassette. 3) Repair or replace the paper empty sensor actuator as necessary (REP 4.2.2). 4) Perform Sensor/Detector Operation Test (5.6.4.2). 5) Replace Cassette PWB (REP 4.6.5). 6) Replace the Printer Controller PWB (REP 4.6.7).
P1	Printer Controller PWB ROM Checksum error	1) Defective CPU on the Printer Controller PWB.	1) Replace the Printer Controller PWB (REP 4.6.7).
P2	Printer Controller PWB RAM Checksum error	1) Defective CPU on the Printer Controller PWB.	1) Replace the Printer Controller PWB (REP 4.6.7).
P3	NVRAM read error	1) Defective CPU on the Printer Controller PWB.	1) Replace the Printer Controller PWB (REP 4.6.7).
P4	Serial communication error	1) Defective Printer Controller PWB. 2) Defective System Controller PWB.	1) Replace the Printer Controller PWB (REP 4.6.7). 2) Replace the System Controller PWB (PL 7).

Message	Cause	Error Description	Action
C1	Optical system error	1) VIDEO signal not received correctly. 2) No SYNC signal.	1) Replace the Printer Controller PWB (REP 4.6.7). 2) Replace the Laser Assembly (REP 4.6.3).
C2	Main motor failure	1) Developer Cartridge binding. 2) Missing +24 VDC. 3) Main Drive Motor Failure. 4) Defective motor drive signals. 5) Defective motor drive control signals.	1) Replace the developer cartridge (PL 12). 2) Perform RAP 7.3. 3) Perform RAP 7.5. 4) Replace the Motor Driver PWB (REP 4.6.2). 5) Replace the Printer Controller PWB (REP 4.6.7).
C3	Polygonal motor failure	1) Check for +24 VDC. 2) Defective motor drive signal. 3) Defective polygon motor.	1) Perform RAP 7.3, Power. 2) Replace the Printer Controller PWB (REP 4.6.7). 3) Replace the Laser Assembly (REP 4.6.3).
C4	Irregularly high heater temperature	1) Check for 100K ohms resistance across the Thermistor at room temperature (25 C / 77 F). 2) Defective Printer Controller PWB. 3) Check if voltage is always applied to the Heater Lamp.	1) Replace the Thermistor (REP 4.4.4). 2) Replace the Printer Controller PWB (REP 4.6.7). 3) Replace the Low Voltage Power Supply (REP 4.6.1).
C5	Irregularly low heater temperature	1) Check for 100K ohms resistance across the Thermistor at room temperature (25 C / 77 F). 2) Check for less than 5 ohms resistance across the fuser AC connector (CN702). 3) Defective Printer Controller PWB. 4) Check that a voltage is applied to the heater (CN702).	1) Replace the Thermistor (REP 4.4.4). 2) Replace the Fuser Heater Lamp (REP 4.4.2)). 3) Replace the Printer Controller PWB (REP 4.6.7). 4) Replace the Low Voltage Power Supply (REP 4.6.1).
C6	Thermistor open	1) Check for 100K ohms resistance across the Thermistor at room temperature (25 C / 77 F). 2) Defective Fuser control.	1) Replace the Thermistor (REP 4.4.4). 2) Replace the Printer Controller PWB (REP 4.6.7).
E5	System Controller EE-PROM checksum error	1) When an abnormal value is read in the EEPROM reading.	1) Replace the System Controller PWB (PL 7).
ERR XXXX. YYY	Program trouble	1) When an abnormality occurs in the System Controller PWB. 2) When an abnormality occurs in the program. YYY: File name XXXX: Program line number	1) Replace the System Controller PWB (PL 7). 2) Replace the System Controller PWB (PL 7).

RAP 7.3 Power

1 The LCD displays information or one or more LEDs on the Front Panel are lit.

Y **N**
| Go to step 13.

2 Open the Front Panel Assembly and inspect the right latch for damage (the right latch also serves as the Safety Switch actuator). The right latch is free of damage.

Y **N**
| Replace the Fuser Cover (PL 8).

3 Open the Duplex Access Cover and inspect the actuator arm for damage. The arm is free of damage.

Y **N**
| Replace the Duplex Access Cover (PL 1).

4 Remove Upper Cover (REP 4.1.2). Close the Upper Transport Assembly. Reconnect the AC power cord and switch on the AC power. Measure the voltage between frame ground and each terminal of the Safety Switch. The voltage on each terminals is +24 +/- 2.0 VDC.

Y **N**
| Go to step 10.

5 Measure the voltage between CN108 pin 1 on the Printer Controller PWB and frame ground. The voltage is +24 +/- 2.0 VDC.

Y **N**
| Replace the Motor Driver PWB (PL 3). If problem persists, replace the Printer Controller PWB (PL 4).

6 Manually actuate the Duplex Access Cover Switch. Measure the voltage between CN108 pin 5 on the Printer Controller PWB and frame ground. The voltage is +24 +/- 2.0 VDC.

Y **N**
| Replace the Duplex Access Cover Switch (PL 9).

7 Switch off and disconnect the AC power. Remove the Power Supply (REP 4.6.1). Disconnect the Fan Motor from CN802 on the HVPS. Measure the resistance of the Fan Motor. The resistance is 2.2 +/- 0.3 Megohms.

Y **N**
| Replace the Fan Motor (PL 7).

8 Verify the connector between the Power Supply and the Motor Driver PWB, and all cables and connectors on the Printer Controller PWB. All cables and connectors are in good condition.

Y **N**
| Repair or replace as necessary.

9 Replace the following components in order until the problem is found: HVPS (PL 7), Motor Driver PWB (PL 3), LVPS (PL 7), or Printer Controller PWB (PL 4).

10 Both of the terminals measure 0.0 VDC.

Y **N**
| Verify the Drum Cartridge moves the Safety Switch into position and the Fuser Cover actuates the switch. If OK, replace the Safety Switch (PL 3).

11 Switch off and disconnect the AC power. Remove the Power Supply (REP 4.6.1). Verify the connector between the Power Supply and the Motor Driver PWB. The connector is in good condition.

Y **N**

| Repair or replace as necessary.

12 Replace the following components in order until the problem is found: Motor Driver PWB (PL 3), HVPS (PL 7), then the LVPS (PL 7).

13 Switch off the AC power and disconnect the AC power cord. Measure the voltage between the terminals on the power cord. Proper line voltage is measured.

Y **N**

| Check the voltage at the wall outlet. If the voltage is OK, replace the AC power Cord . If the voltage is incorrect, inform the customer of the power problem.

14 Replace the Low Voltage Power Supply Assembly (PL 7).

RAP 7.4 Keyboard

1 All the LEDs remained off.

Y **N**
| Replace the Front Panel Assembly (PL 1).

2 Switch off the AC power. Remove the Front Panel Assembly (REP 4.1.1), but do not disconnect CN401 from the Keyboard Assembly. Switch on the AC power and measure the voltage between CN401 pin 5 and frame ground. The voltage is +5.0 +/- 0.5 VDC.

Y **N**
| Go to step 7.

3 Switch off the AC power. Connect the meter between CN401 pin 4 and frame ground. Switch on the AC power. The voltage pulses to +5.0 +/- 0.5 VDC then returns to 0.0 VDC (you may need to switch the AC power on and off several times or use the Peak Hold feature on the DMM to see the pulse).

Y **N**
| Go to step 5.

4 Replace the Front Panel Assembly (PL 1).

5 Switch off the AC power. Disconnect CN401 and remove the Front Panel Assembly. Remove the Upper Cover (REP 4.1.2). Connect the meter between CN302 pin 4 on the Cassette PWB and frame ground (Figure 7.4a). Switch on the AC power. The voltage pulses to +5.0 +/- 0.5 VDC then returns to 0.0 VDC (you may need to switch the AC power on and off several times or use the Peak Hold feature on the DMM to see the pulse).

Y **N**
| Replace the Printer Controller PWB (PL 4).

6 Replace the Cassette PWB (PL 3).

7 Switch off the AC power. Disconnect CN401 and remove the Front Panel Assembly. Remove the Upper Cover (REP 4.1.2). Switch on the AC power and measure the voltage between CN302 pin 2 on the Cassette PWB and frame ground (Figure 7.4a). The voltage is +5.0 +/- 0.5 VDC.

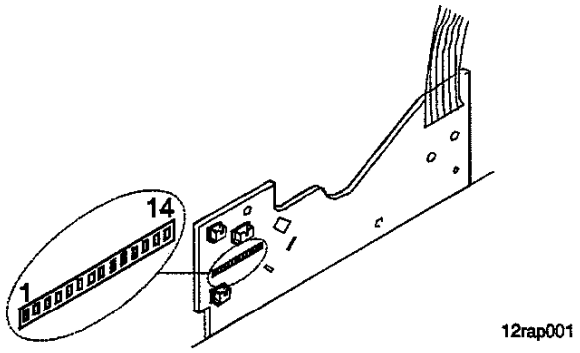
Y **N**
| Replace the Cassette PWB (PL 3).

8 Switch off the AC power. Disconnect CN401 and remove the Front Panel Assembly. Remove the Upper Cover (REP 4.1.2). Switch on the AC power and measure the voltage between CN302 pin 5 on the Cassette PWB and frame ground (Figure 7.4a). The voltage is +5.0 +/- 0.5 VDC.

Y **N**
| Go to step 10.

9 Replace the Cassette PWB (PL 3).

Figure 7.4a Cassette PWB.



10 Measure the voltage between CN102 pin 4 on the Printer Controller PWB and frame ground (Figure 7.4b). The voltage is +5.0 +/- 0.5 VDC.

Y **N**
| Go to step 12.

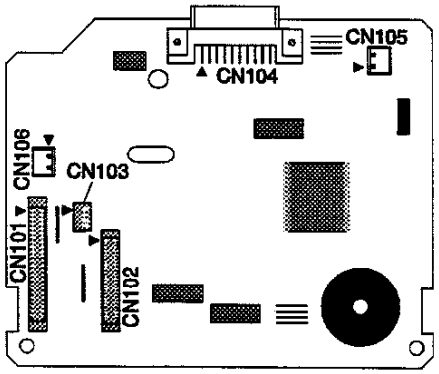
11 Replace the Cassette PWB (PL 3).

12 Measure the voltage between CN101 pin 2 on the Printer Controller PWB and frame ground (Figure 7.4b). The voltage is +5.0 +/- 0.5 VDC.

Y **N**
| Replace in order, the Low Voltage Power Supply Assembly (PL 7), Motor Driver PWB (PL 3).

13 Replace the Printer Controller PWB (PL 4).

Figure 7.4b Printer Engine PWB.



RAP 7.5 Main Drive Motor

1 Switch the AC power off. Remove the Developer Cartridge from the printer. Reinstall the Photoconductor/Drum Cartridge. Close the Front Panel Assembly. Switch the AC power on. The Main Drive Motor runs momentarily (ignore the error code that's displayed because the Developer Cartridge was removed).

Y **N**
| Go to step 3.

2 Replace the Developer Cartridge (PL 12).

3 Disconnect AC power. Remove the Upper Cover from the printer. Manually rotate the Mian Drive Motor brass gear counter-clockwise. The gear rotates freely.

Y **N**
| Check all printer drives for binding or damage. Repair or replace as necessary.

4 Disconnect the Main Drive Motor connector CN901 from CN206 on the Motor Driver PWB. Using Table 7.2, measure the resistance of the motor windings on CN901. All the resistance measurements are correct.

Table 7.2 Main Drive Motor Checkout.

Measure Between Pins:	Resistance Reading
1 and 2	4.5 ohms +/- 10%
1 and 3	4.5 ohms +/- 10%
2 and 3	9.0 ohms +/- 10%
4 and 5	4.5 ohms +/- 10%
4 and 6	4.5 ohms +/- 10%
5 and 6	9.0 ohms +/- 10%

Y **N**
| Replace the Main Drive Motor Assembly (PL 3).

5 Replace the Printer Controller PWB (PL 4). If the problem persists, replace the Motor Driver PWB (PL 3).

RAP 7.6 Paper Feed

1 Remove the Upper Cover (REP 4.1.2). Reinstall the Front Panel Assembly and the Duplex Access Cover. Reinstall the Developer and Photoconductor/Drum Cartridges. Connect the AC power cord and switch the AC power on. From the Printer Operation menu select Test Print then select Print PCL 5e Demo Page. The appropriate Paper Feed Solenoid momentarily energizes within ten seconds after the Main Drive Motor starts to run (refer to Figure 7.6.1 item A for upper solenoid, item B for lower solenoid).

Y **N**
| Go to step 4.

2 Paper feed shaft turns one revolution.

Y **N**
| Clean or replace the Upper/Lower Paper Feed Clutch or gear components as necessary (PL 2).

3 Clean or replace the Upper/Lower Feed Roller as necessary (PL 2).

4 Measure the voltage at CN301 pin 21 (upper), pin 20 (lower) on the Cassette PWB (Figure 7.6.1). The voltage is +24.0 +/- 2.0 VDC.

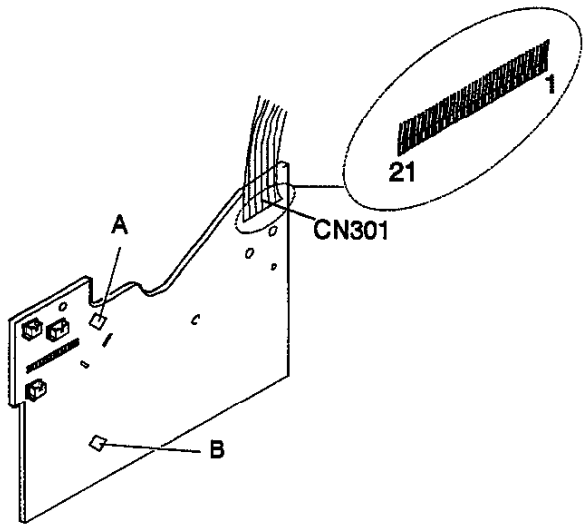
Y **N**
| Measure the voltage at CN301 pin 1 on the Cassette PWB. If the voltage is +24.0 +/- 2.0 VDC, replace the Cassette PWB (PL 3). If the voltage is 0.0 VDC check the cable connections between the Cassette PWB and the Printer Controller PWB. If the connections are OK, replace the Printer Controller PWB (PL 4).

5 Print PCL 5e Demo Page. The voltage on CN301 pin 21 (upper), pin 20 (lower) pulses low within ten seconds after the Main Drive Motor starts.

Y **N**
| Replace the Printer Controller PWB (PL 4).

6 Replace the Cassette PWB (PL 3).

Figure 7.6.1 Cassette PWB.



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RAP 7.7 Paper Transportation

1 Visually inspect the paper for folded corners, lead edge damage, rips, or tears. The paper is free of damage.

Y **N**
| Check paper path for obstructions, components out of place, damp or improperly installed paper.

2 Check paper path for obstructions. All items check OK.

Y **N**
| Repair or replace as necessary.

3 Paper is successfully transported to the Register Roller.

Y **N**
| Go to step 13.

4 Paper is successfully transported to the Fuser Assembly.

Y **N**
| Go to step 11.

5 Paper is successfully transported to the Exit Rollers.

Y **N**
| Go to step 9.

6 Remove the Front Panel Assembly (REP 4.1.1). Inspect the Duplex Drive Belts. The belts are in good condition.

Y **N**
| Replace the Duplex Drive Belt(s) (PL 9).

7 Remove the Upper Cover (REP 4.1.2). Disconnect CN107 from the Printer Controller PWB. Measure the resistances listed in Table 7.3. All readings are correct.

Y **N**
| Replace the Duplex Drive Motor (PL 9).

8 Replace the Printer Controller PWB (PL 4).

Table 7.3 Duplex Drive Motor..

Measure Between Pins:	Resistance Reading
1 and 2	15 ohms +/- 10%
1 and 3	15 ohms +/- 10%
1 and 4	15 ohms +/- 10%
1 and 5	15 ohms +/- 10%

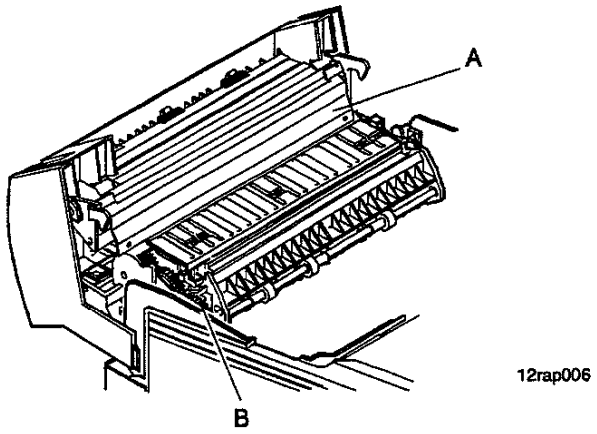
9 Open the Front Panel Assembly. Lift the Pressure Plate, Item A (Figure 7.7.1) to view the Fuser Heat Roller. Manually rotate the Fuser drive gears, Item B (Figure 7.7.1). The Heat Roller rotates freely.

Y **N**

| Inspect the Fuser drive Gear Arm assembly. Repair or replace as necessary (PL 9).

10 Remove the Fuser Assembly and inspect for damage or obstructions. Repair or replace as necessary (PL 10).

Figure 7.7.1 Upper Transport Assembly.



11 You will be making an observation of the Register Roller and the Photoconductor/Drum Cartridge. Open the Front Panel Assembly. Switch the AC power on. Manually hold the Safety Switch actuated. The Register Roller and the Photoconductor/Drum Cartridge both turn when the Main Drive Motor runs.

Y **N**

| If the Photoconductor/Drum Cartridge is defective, replace the cartridge (PL 12). If OK, remove the Cassette PWB (REP 4.6.5) and check all gears for damage. Repair or replace as necessary.

12 Remove the Upper Transport Assembly and inspect the Registration Pinch Rolls (PL 9), paper guides (PL 9), and Registration Sensor (PL 2). Inspect for wear/damage and contamination. Clean or replace as necessary.

13 Remove both paper cassettes. Switch the AC power on. Both upper and lower Transport Rollers turn when the Main Drive Motor runs.

Y **N**

| Remove the Cassette PWB and check all gears for damage. Repair or replace as necessary (PL 2).

14 Inspect, clean, or replace as necessary the Transport Rollers and Cassette Idler Rollers.

RAP 7.8 Image Quality Problems

This section contains image quality repair procedures to assist in correcting image quality defects. These procedures provide definitions, causes and solutions.

Throughout these procedures, the term "vertical" refers to the process direction (the direction paper travels through the printer); the term "horizontal" refers to the scanning direction (the direction the laser beam scans across the page).

Perform the Charge Corotron Cleaning Procedure (5.4) and the Transfer Corotron Cleaning Procedure (5.5).

Image Quality Defect Definitions, Causes and Solutions

Defect Definitions	Possible Causes	Solutions
NON-UNIFORM IMAGE QUALITY: The line darkness and solid area density image vary across the print.	1) Photoconductor/Drum Cartridge. 2) Toner low or unevenly distributed. 3) Transfer Corotron. 4) Unstable high voltage output. 5) Laser window contamination.	1) Replace the Photoconductor/Drum Cartridge (PL 12). 2) Carefully remove the Developer Cartridge and gently agitate it to distribute toner evenly. 3) Replace Transfer Corotron wire (PL 9). 4) Perform the High Voltage Unit Operation Test (5.6.4.4). 5) Remove the Laser assembly, clean or replace as necessary (REP 4.6.3).
STAINING/OFFSETTING: Areas of dirt and or background reoccurring at regular intervals.	1) Paper quality. 2) Paper feed surfaces or dirty guide. 3) Fusing assembly dirty. 4) Photoconductor/Drum Cartridge.	1) Replace paper stock. 2) Inspect and clean the paper path, as necessary. 3) Replace the Fuser Wiper and inspect the Fusing Assembly for contamination (PL 12). 4) If marks repeat at regular 95mm intervals, the Photoconductor/Drum Cartridge is damaged. Replace the Photoconductor/Drum Cartridge (PL 12).
BLACK PRINTS: the print is completely covered with toner and has no visible image.	1) Charge voltage out of specification. 2) Developer Cartridge defective. 3) Photoconductor/Drum Cartridge. 4) Laser Assembly.	1) Perform the High Voltage Unit Operation Test (5.6.4.4). 2) Replace the Developer Cartridge (PL 12). 3) Replace the Photoconductor/Drum Cartridge (PL 12). 4) Replace the Laser Assembly (PL 4).
HORIZONTAL DELETIONS: There are areas of the image that are extremely light or missing entirely. These missing areas form wide bands that run horizontally across the page in the direction of scanning.	1) Paper quality. 2) Toner low or unevenly distributed. 3) Photoconductor/Drum Cartridge unevenly worn.	1) Replace paper stock. 2) Carefully remove the Developer Cartridge and gently agitate it to distribute toner evenly. 3) Replace the Photoconductor/Drum Cartridge (PL 12).
SPOT DELETIONS: Solid areas are marked with irregular white areas.	1) Paper Stock. 2) Photoconductor/Drum Cartridge damage.	1) Replace paper stock. 2) Replace the Photoconductor/Drum Cartridge (PL 12).

Defect Definitions	Possible Causes	Solutions
VERTICAL DELETIONS: There are areas of the image that are extremely light or missing entirely. These missing areas form streaks or wide bands that run vertically along the page in the direction of paper feed.	1) Dirty corotron. 2) Developer Cartridge blockage/ damage. 3) Photoconductor/Drum Cartridge. 4) Intermittent electrical problem. 5) Laser Assembly.	1) Clean/replace Transfer corotron wire as necessary (PL 9). 2) Inspect for blockage. Repair/replace as required (PL 12). 3) Replace the Photoconductor/Drum Cartridge (PL 12). 4) Perform DIAG menu "TEST PRINT" and check for streaks. If the problem reoccurs, replace the Printer Controller PWB (PL 4). If the problem doesn't occur in diagnostics, replace the System Controller PWB (PL 7). 5) Inspect the LASER beam path for contamination. Clean/replace as necessary (PL 4).
LIGHT PRINTS:	1) Print density setting. 2) Paper quality. 3) Developer Cartridge empty or defective. 4) Defective Toner Motor. 5) Transfer corotron. 6) Developer bias voltage. 7) Photoconductor/Drum Cartridge defective. 8) Laser Assembly. 9) Dirty Seperator.	1) Turn the Print Density adjuster clockwise to increase the toner density. 2) Replace paper stock. 3) Replace the Developer Cartridge (PL 12). 4) Replace the Toner Motor (PL 6). 5) Replace corotron wire (PL 9). 6) If voltage checks OK., replace the High Voltage Power Supply (PL 7). If voltage reading is incorrect, replace the Printer Controller PWB (PL 4). 7) Replace the Photoconductor/Drum Cartridge (PL 12). 8) If the problem still persists after performing all of the above, replace the Laser Assembly (PL 4). 9) Clean with brush.
BLANK PRINTS: Prints with no visible image.	1) Toner/developer cartridge empty or defective. 2) Transfer corotron. 3) Laser Assembly.	1) Replace the Toner/developer cartridge (PL 12). 2) Replace corotron wire (PL 9). 3) If the problem still persists after performing all of the above, replace the Laser Assembly (PL 4).
BLACK LINES (VERTICAL): Prints with black streaks or lines appearing in the paper feed direction.	1) Transfer Corotron. 2) Dirty Paper Guide Sheet. 3) Printer exposed to direct sunlight. 4) Paper feed surfaces/guide dirty. 5) Fusing assembly dirty. 6) Photoconductor/Drum Cartridge damage. 7) Developer cartridge dirty. 8) Intermittent electrical problem. 9) High voltage problem.	1) Replace the corotron wire (PL 9). 2) Inspect/clean as necessary. 3) Relocate the printer. 4) Inspect/clean the paper path. 5) Replace the Fuser Wiper and inspect the Fusing assembly for contamination. 6) Inspect/replace as necessary (PL 12). 7) Clean/replace as necessary (PL 12). 8) Perform DIAG menu "TEST PRINT" and check for streaks. If the problem reoccurs, replace the Printer Controller PWB (PL 4). If the problem does not occur in diagnostics, replace the System Controller PWB (PL 7). 9) Replace the High Voltage Power Supply (PL 7). If the problem is not resolved, replace the Laser Assembly (PL 4).

Defect Definitions	Possible Causes	Solutions
BLACK LINES (HORIZONTAL): Prints with black streaks or lines appearing perpendicular to the paper feed direction.	1) Photoconductor/Drum Cartridge damage. 2) Developer cartridge dirty. 3) Intermittent electrical problem. 4) Bias voltage unstable.	1) Inspect/replace as necessary (PL 12). 2) Clean/replace as necessary (PL 12). 3) Perform DIAG menu "TEST PRINT" and check for streaks. If the problem recurs, replace the Printer Controller PWB(PL 4). If the problem does not occur in diagnostics, replace the System Controller PWB (PL 7). 4) Perform DIAG menu "VOL TEST BS" before checking the bias output. If the bias reading is stable, replace the Photoconductor/drum cartridge (PL 12). If the bias is not stable, replace the High Voltage Power Supply (PL 7).
DEVELOPER TRANSFER ONTO THE DRUM SURFACE: Printed image feels rough to the touch and toned image is easily wiped away.	1) Developer Bias Voltage. 2) Charge Grid is dirty. 3) Transfer Corotron. 4) Photoconductor/Drum Cartridge.	1) If the Developer Bias Voltage is incorrect, replace the Developer Cartridge (PL 12). If the problem continues, replace the Printer Controller PWB (PL 4). 2) Clean it. 3) Replace corotron wire (PL 9). 4) Replace Photoconductor/Drum Cartridge (PL 12). If the problem continues, replace the High Voltage Power Supply (PL 7).
CHARACTER VOIDS: Spots or other deletions in the characters.	1) Paper quality. 2) Toner/developer cartridge. 3) Photoconductor/Drum Cartridge defective.	1) Replace paper stock. 2) Replace the Developer Cartridge (PL 12). 3) Replace the Photoconductor/Drum Cartridge (PL 12).
SPOTS: There are spots of toner on the page.	1) Fuser Assembly dirty. 2) Photoconductor/Drum Cartridge. 3) Paper path components dirty.	1) Replace the Fuser Wiper (PL 12). 2) Replace the Photoconductor/Drum Cartridge (PL 12). 3) Clean paper path components.
UNFUSED IMAGE: part of or all of the image is unfused.	1) Damp paper. 2) Paper quality. 3) Pressure Roll / Hear Roller damage. 4) Low toner consentration. 5) Printer Controller PWB.	1) Replace paper from a fresh unopened ream. 2) Be sure that the paper is not extremely rough, heavily textured, or of a high rag content. 3) Clean or replace as necessary (PL 10). 4) Replace the Developer Cartridge . 5) Replace the Printer Controller PWB (PL 4). If the problem reoccurs, replace the Fuser Assembly (PL 10).
RESIDUAL/GHOST IMAGES: The image from a previous print, which was not removed during the cleaning process, has been developed on the current print.	1) Print Density. 2) Fuser Assembly dirty. 3) Toner unevenly distributed. 4) Photoconductor/Drum Cartridge damage.	1) Turn the print density adjuster dial counterclockwise to decrease the toner density. 2) Replace the Fuser Wiper (PL 12). 3) Remove the Developer Cartridge and gently agitate it to distribute the toner evenly. 4) Replace the Photoconductor/Drum Cartridge (PL 12).

Defect Definitions	Possible Causes	Solutions
BACKGROUND: Uniform toner contamination in part, or all of the non image areas.	1) Print Density. 2) Paper quality. 3) Dirty Transfer Corotron. 4) Developer Bias Voltage. 5) Developer Cartridge defective. 6) Photoconductor/Drum Cartridge.	1) Turn the print density adjuster dial counterclockwise to decrease the toner density. 2) Replace paper stock. 3) Clean/replace as required(PL 9). 4) If the Developer Bias Voltage is incorrect, replace the Printer Controller PWB (PL 4). If the problem continues, replace the High Voltage Power Supply (PL 7). 5) Replace the Developer Cartridge (PL 12). 6) Replace the Photoconductor/Drum Cartridge (PL 12).
DAMAGED PRINTS: Creases, wrinkles, excessive curl, cuts, folds or embossed marks.	1) Paper. 2) Paper source and transportation. 3) Fuser Assembly.	1) Properly install fresh paper into the paper tray. 2) Inspect paper transportation system for proper operation. Replace worn parts. 3) Inspect/clean/replace Fuser Assembly as necessary (PL 10).
SKIPS / SMEARS: Skips, loss, or stretching of the image in bands across the process direction. Smear-The distortion of the image in bands across the process direction that cause it to appear to be blurred or compressed.	1) Paper transportation. 2) Main Drive Motor Assembly. 3) Fuser Assembly. 4) Laser Assembly. 5) Printer on unstable surface.	1) Inspect paper transportation system for proper operation. Replace worn parts. 2) Inspect Main Drive Motor Assembly for damaged or worn gears. Replace as necessary(PL 3). 3) Inspect/clean/replace Fuser Assembly as necessary (PL 10). 4) Replace Laser Assembly(PL 4). 5) Relocate the printer.
Skewed Image: Angular displacement of the image from its intended position on the print. The printed image is not parallel with the sides of the page.	1) Paper/Paper Tray. 2) Paper transportation. 3) Fuser Assembly.	1) Inspect paper tray for damage. Replace as necessary (PL 11). Properly install fresh paper in the paper tray. 2) Inspect paper transportation system for proper operation. Replace worn parts. 3) Inspect/clean/replace Fuser Assembly as necessary (PL 10).
Misregistered Image: Displacement of the image from its intended position on the print. Image remains parallel to the sides of the page.	1) Register Roller. 2) Registration Clutch. 3) Registration Adjustment. 4) Paper Feed and Transportation components.	1) Clean/replace as necessary (PL 5). 2) Replace the Registration Clutch (PL 2). If the problem continues, replace the Registration Sensor (PL 2). 3) Perform the Registration Adjustment. 4) Clean/replace as necessary.