



LaserWriter Printers
Volume I

Service Guide

LaserWriter/LaserWriter Plus,
LaserWriter II SC/NT/NTX/IIx/IIg,
Personal LaserWriter SC/NT/LS

This Apple Service Guide is the property of:

Phone: _____

To Apple's On-Site Technicians:

You can help ensure that the *Apple Service Guide for LaserWriter Printers* meets all of your on-site technical information needs by sending us your comments and recommendations. Just use the AppleLink® address below. We will consider all recommendations for the next release of the guide and, whenever possible, reply personally to your recommendations.

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Introduction

The *Apple Service Guide for LaserWriter Printers* is the second in a series of booklets being developed to help Apple-certified technicians troubleshoot and repair Apple products at their customers' sites. Future releases will cover Macintosh peripherals and networking and communications.

The *Apple Service Guide for LaserWriter Printers* takes information found in the *Technical Procedures* and other Service publications, and presents this information in a booklet format that is easy to use and easy to carry. The guide includes *only* information that experienced technicians need to quickly and reliably service LaserWriter printers at the customer's site.

The January 1992 update to the Apple Service Guide for LaserWriter Printers replaces the original version of the guide (released in May 1991). For this update we made the following additions and revisions:

- Relocated on-site hardware and software troubleshooting information to a new tab (On-Site Troubleshooting) at the front of the guide.
- Added information covering Apple's two new laser printers—the LaserWriter IIx and the LaserWriter IIg.
- Revised information in the LaserWriter II and Personal LaserWriter tab sections to improve the technical accuracy of the guide.

Key Features

- **Portability**—At 5-1/2 by 8 inches, the guide is easy to handle and carry. Just slip the guide into your toolbox or briefcase.
- **Ease of use**—The plastic spiral binding is tough and enables you to lay the guide open on any available surface. The paper is durable, and its matte finish prevents glare from overhead lighting. The booklet uses tabs, subject/product icons, and color highlighting to help you locate information quickly.
- **Presentation of information**—Information has been condensed to the extent possible, while type size has been kept easily readable. Extensive charts, tables, and graphics present information clearly and concisely.
- **No updating required**—**This guide will be updated only as required by product changes or new product introductions. Updated versions of the guide will replace previous versions.**
- **Professional appearance**—The guide is a high-quality Apple publication that represents the new Apple Service design and uses color to emphasize important information. The cover has a protective coating to resist stains, and the high-resolution printing process enhances the guide's professional appearance and readability.



Apple Service Guide

LaserWriter Printers—Introduction

Guide Contents

The Apple Service Guide for LaserWriter Printers has an introductory section (devoted to safety practices and procedures) and six tab sections:

- Tab 1: On-Site Troubleshooting
- Tab 2: LaserWriter/LaserWriter Plus
- Tab 3: LaserWriter II
- Tab 4: Personal LaserWriter
- Tab 5: General Information
- Tab 6: Ports and Cables

Using the Guide

IMPORTANT: When ordering a replacement module or spare part, be sure to check the part number given in the guide against the current price pages in the Apple Service Programs manual. Remember that the Apple Service Guide is not updated on a regular basis.

Safety Procedures and Practices: You should be completely familiar with all safety procedures and practices before using this guide. Please read this section.

Tab 1 – On-Site Troubleshooting: This tab section contains generic troubleshooting information that you might find immediately helpful when you encounter a problem at your customer's site. This information includes:

- Information gathering and problem identification
- Generic hardware and software troubleshooting guide

Tabs 2-4: The three LaserWriter printer tab sections contain information specific to particular LaserWriter printer models. The types of information included are:

- Exploded-view drawings of the LaserWriter printers
- Alphabetical parts lists with part numbers
- System specifications, adjustments, and upgrade procedures
- Troubleshooting flowcharts and tables
- Preventive maintenance procedures

Tab 5 – General Information: This tab section contains information that applies to more than one of the LaserWriter printers. The types of information included are:

- How to connect a LaserWriter printer to a Macintosh computer
- How to connect a LaserWriter printer to an MS-DOS computer
- How to connect hard disks to a LaserWriter II NTX

Tab 6 – Ports and Cables: This tab section includes a table of peripheral cables, LaserWriter external connectors, peripheral cable pin-outs, and LaserWriter switch settings.

Safety

Warnings



WARNING: The LaserWriter printers operate at high voltages. To prevent serious injury, always switch off the printer and unplug the AC power cord before servicing the printer.



WARNING: Never disconnect the optical fiber cable or open the laser access hatch when the printer is switched on. The reflected laser beam, though invisible, can permanently damage your eyes.



WARNING: The fuser assembly rollers become very hot during printer operation. Before servicing the fuser assembly, switch off the printer for at least five minutes to allow the fuser assembly rollers to cool.



WARNING: Electrostatic discharge (ESD) can cause severe damage to sensitive microcircuits. LaserWriter I/O boards contain CMOS components, among the most sensitive chips in use today. CMOS chips, ROMs, and SIMMs are very susceptible to ESD and skin acid damage. To prevent damage to these components, handle them only by the edges.



WARNING: Make sure that you are not grounded when:

- You are working on plugged-in equipment
- You are performing live adjustments



WARNING: The LaserWriter printers are heavy—from 32 to 60 pounds each. When lifting or moving the printer, be careful not to strain your back.



Safety

Safety Precautions

LaserWriter Safety Rules

1. **Remove all jewelry before performing repairs on a LaserWriter printer.** Removing these conductors reduces the possibility of electric shock.
2. **Before servicing a LaserWriter, turn off the power and disconnect the AC power cord.** Certain parts of the printer are hot (electrified) when the printer is under power. Never work on a LaserWriter printer under power except when making live adjustments.
3. **Do not disconnect the optical fiber cable when the LaserWriter is powered on.** The optical fiber carries the infrared laser beam, which you cannot see but which can permanently damage your eyes.
4. **Do not touch the following modules when the LaserWriter is powered on and the covers are removed:**
 - The high-voltage power supply
 - The DC power supply
 - The power supply block (LaserWriter II)
 - The high-voltage contact assembly (Personal LaserWriter)
 - The power supply unit (Personal LaserWriter)

Toner Safety

Toner is a nontoxic substance composed of plastic, iron, and a small amount of pigment. Skin and clothing are best cleaned by removing as much toner as possible with a dry tissue, then washing with cold water. Hot water causes toner to jell and permanently fuse into clothing. Toner attacks vinyl materials, so avoid contact with vinyl.

Laser Safety

When servicing or adjusting the optical system of the LaserWriter, be careful not to place screwdrivers or other shiny objects in the path of the laser beam. The reflected laser beam, though invisible, can permanently damage your eyes.

Because the laser beam is invisible, the following labels (**see Figure**) are attached to the insides of covers where there is danger of exposure to laser radiation:



DANGER - INVISIBLE LASER RADIATION WHEN OPEN.
AVOID DIRECT EXPOSURE TO BEAM.

ATTENTION - RAYONNEMENT LASER INVISIBLE SI OUVERT.
DANGEREUX DE REGARDER À L'INTÉRIEUR.

VORSICHT - UNSICHTBARE LASERSTRAHLEN WENN GEÖFFNET.
NICHT HINEINSEHEN.



Laserstrahl

Figure: LaserWriter Laser Safety Label

DANGER - INVISIBLE LASER RADIATION WHEN OPEN.
AVOID DIRECT EXPOSURE TO BEAM.

ATTENTION - RAYONNEMENT LASER INVISIBLE SI OUVERT.
DANGEREUX DE REGARDER À L'INTÉRIEUR.

VORSICHT - UNSICHTBARE LASERSTRAHLEN WENN GEÖFFNET.
NICHT HINEINSEHEN.



Laserstrahl

CAUTION - INVISIBLE LASER RADIATION WHEN OPEN.
AVOID EXPOSURE TO BEAM.

Figure: LaserWriter II Laser Safety Label

DANGER - INVISIBLE LASER RADIATION WHEN OPEN.
AVOID DIRECT EXPOSURE TO BEAM.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN
ABDECKUNG GEÖFFNET UND
SICHERHEITVERRIEGELUNG ÜBERBRÜCKT
NICHT DEM STRAHL AUSSETZEN

CAUTION - INVISIBLE LASER RADIATION WHEN OPEN.
AVOID EXPOSURE TO BEAM.

ATTENTION - RAYONNEMENT LASER IN CAS
D'OUVERTURE EXPOSITION DANGEREUSE
AU FAISCEAU.

VARO! - AVATTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE
LASERSÄTEILYLLE ÄLÄ KATSO SÄTEESEEN.

注 意 - ここを開くとレーザー光がでます。
レーザー光を直接見たり、触れたりしないでください。

(K) K-6

RS1-8854

Figure: Personal LaserWriter Laser Safety Label



Safety

ESD Prevention

ESD Prevention Rules

1. **Before working on any device containing a printed circuit, ground yourself and your equipment.** Use a grounded conductive workbench mat and a grounding wriststrap, and ground your equipment to the mat.



WARNING: Make sure that you are not grounded when:

- You are working on plugged-in equipment
- You are performing live adjustments

2. **Do not touch anybody who is working on integrated circuits.** You could "zap" the equipment through the technician—even if the technician is grounded.
3. **Use static-shielding bags for boards and chips during storage, transportation, and handling.** Leave all Apple service exchange components in their ESD-safe packaging until you need them.
4. **Handle all ICs by the body, not the leads.** Also, do not touch the edge connectors or exposed circuitry on boards or cards.
5. **Do not wear polyester clothing or bring plastic, vinyl, or styrofoam into the work environment.** The electrostatic field around these nonconductors cannot be removed.
6. **Never place components on any metal surface.** Use antistatic, conductive, or foam rubber mats.
7. **If possible, keep the humidity in the service area between 70% and 90%, and use an ion generator.** Charge levels are reduced (but not eliminated) in high-humidity environments and in areas with ion generators.
8. **If an ESD pad/workstation (see below) is not available, touch bare metal on the power supply to discharge electrostatic charges.**

Setting Up an ESD-Safe Workstation

Materials Required

Conductive workbench mat with ground cord
Wriststrap with built-in 1-megohm resistor and ground cord
Equipment ground cord with alligator clips
Ground/polarity tester

Setup and Procedure

1. **Remove all ESD hazards from the area.** Nonconductive materials (see rule #5 above) cannot be grounded. Such materials retain charges for hours and even days.
2. **Use a ground/polarity tester to verify proper grounding of the power outlet.** If the outlet is wired incorrectly, most testers show a light pattern that matches a code given on the tester. If the tester does not verify proper grounding, move to another outlet that is safe.
3. **Connect the ground cord of the workbench mat to ground.**
4. **Use a wriststrap ground cord. Fasten it to the workbench mat and to the wriststrap.** The wriststrap should touch your skin.
5. **Finally, ground the equipment you are working on.** Use alligator clips and a grounding cord to attach any metal part of the device you are working on to the grounded workbench mat.

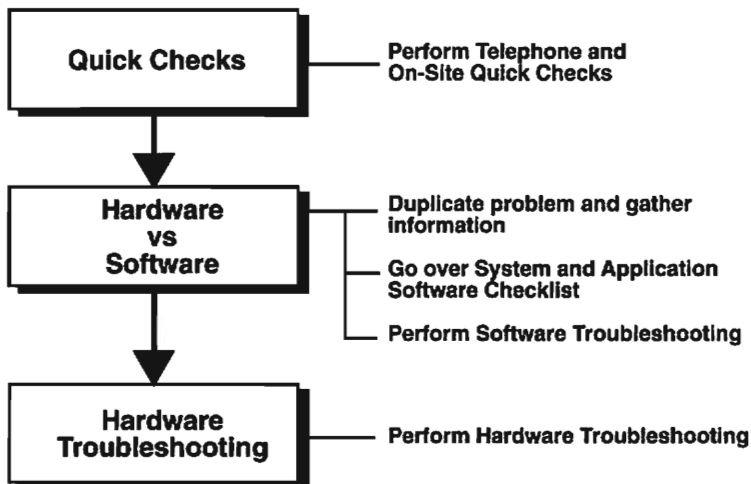
On-Site Troubleshooting

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On-Site Troubleshooting—Overall Approach



Telephone and On-Site Quick Checks

- ✓ Check the power source and power connection.
- ✓ Check all cables and cable connections.
- ✓ Check that the toner cartridge is installed and has toner.
- ✓ Check that the paper cassette is installed and has paper.
- ✓ Check that the LaserWriter access door is closed.
- ✓ Check the status lights.
- ✓ Check the print density adjustment.
- ✓ Check the switch settings.
- ✓ Check whether the printer can produce a user test print. (The LaserWriter, LaserWriter II NT, NTX, IIx, IIg and Personal LaserWriter NT produce a user test print each time the printer is switched on unless the function has been turned off with PostScript software. The LaserWriter II SC and Personal LaserWriter SC produce a user test print only if the SCSI ID switch is set to "7." The Personal LaserWriter LS does not produce a user test print.)



On-Site Troubleshooting

On-Site Troubleshooting

Information Gathering

When quick checks do not identify the problem, try duplicating the problem (or have your customer duplicate the problem) and gather as much information about the problem as possible.

Obtain the following information:

- What is the operating condition and environment when the problem occurs (model of computer and LaserWriter; whether printer is networked; LaserWriter Driver and Laser Prep versions; system software and version; application software and version)
- What your customer is doing, *exactly*, when the problem occurs
- Description of the problem (no power, unable to print from the computer, print quality bad, paper jam)
- If the problem appeared recently, what has been changed or added to the system
- What the customer has done to fix the problem and the results
- If the problem is continuous or intermittent
- If the LaserWriter can print both a user test print and a service test print

Problem Identification

Using the information obtained from the customer or from on-site observation, identify whether the problem resides in one of the following functional areas—software, hardware, or network.

Network

The problem is most likely a network problem when:

- Two or more users on the network experience the same symptoms
- The printer successfully prints both a user test print and a service test print, and the computer and software are known-good
- Users experience "poor performance" symptoms (for example, the printer takes longer to print than before)
- The printer or other network devices have been moved from one location to another

Note: To troubleshoot and repair network problems, refer to the *Networks* tab in the *Apple Service Technical Procedures*.

Software

The problem is most likely a software problem when:

- The printer successfully prints both a user test print and a service test print, but will not print when connected to a computer (provided the computer and network hardware components are known-good)
- The user is attempting to print using prerelease, public-domain, or untested software (applications, fonts, drivers)
- The same problem occurs when using the software with other known-good LaserWriter printers

Hardware

The problem is most likely a hardware problem when:

- The printer is unable to print a user or service test print
- The printer shows obvious, physical signs of damage
- The printer emits unusual noises or smells
- The printer indicates a paper jam or paper-out condition
- The print quality of the test print is not acceptable
- The printer has no power

Software Troubleshooting

If you suspect the problem is a software problem, check the following:

1. Check the LaserWriter switch settings.
2. Check the cables and cable connections.
3. Verify that the LaserWriter driver software is installed in the System Folder using the Installer, and that the version number is current.
4. Open the Apple menu and select the Chooser.
5. Click on the LaserWriter icon and verify that the printer is selected.
6. Open the File menu and select **Print Directory** or **Print Window**.
7. If a printout of the directory is produced, the printer and network are functioning properly. Perform software checks as directed in the following System and Application Software Checklist.
8. If a printout of the directory is *not* produced, perform software checks as directed in the following System and Application Software Checklist. If this approach does not fix the problem, your customer probably has a hardware problem (**refer to Hardware Troubleshooting later in this section**).

System and Application Software Checklist

- ✓ Check whether the problem is peculiar to one application (try replicating the problem using another application). If the application is at fault, try the following:

Problem	Solutions
The message "Application is busy or missing" displays	1. Make sure application is installed on drive. 2. Launch application rather than document. If application launches, it is not corrupted.
Program incompatible with system software	1. Contact vendor about program update. 2. Install older version of system software. 3. Remove program from system.
Program corrupted	1. System crashes can corrupt the program and the system software. Trash the program. 2. Reinstall the program and system software from original, locked disks.



On-Site Troubleshooting

On-Site Troubleshooting

- ✓ Check whether the problem is with system software (try booting from a floppy) or with multiple System Folders (use Find File under the Apple menu).

Problem

Solutions

Multiple system folders

- Remove all system folders except folder with the Macintosh icon on it.

Corrupted system software

- Trash the old system software. Use Installer on original, locked system software disks to install new system software.

Important: When replacing corrupted system software, avoid introducing new problems—always use the Installer on the original system software disks. If you remove the System file before running the Installer, you will need to replace the fonts and desk accessories on your customer's system. Make copies of your customer's fonts and desk accessories before running the Installer.

Hardware Troubleshooting

This section does not apply to the Personal LaserWriter LS. To troubleshoot the Personal LaserWriter LS, use the Troubleshooting Flowcharts/Tables in the Personal LaserWriter tab section.

If you suspect the problem is a hardware problem, check the following:

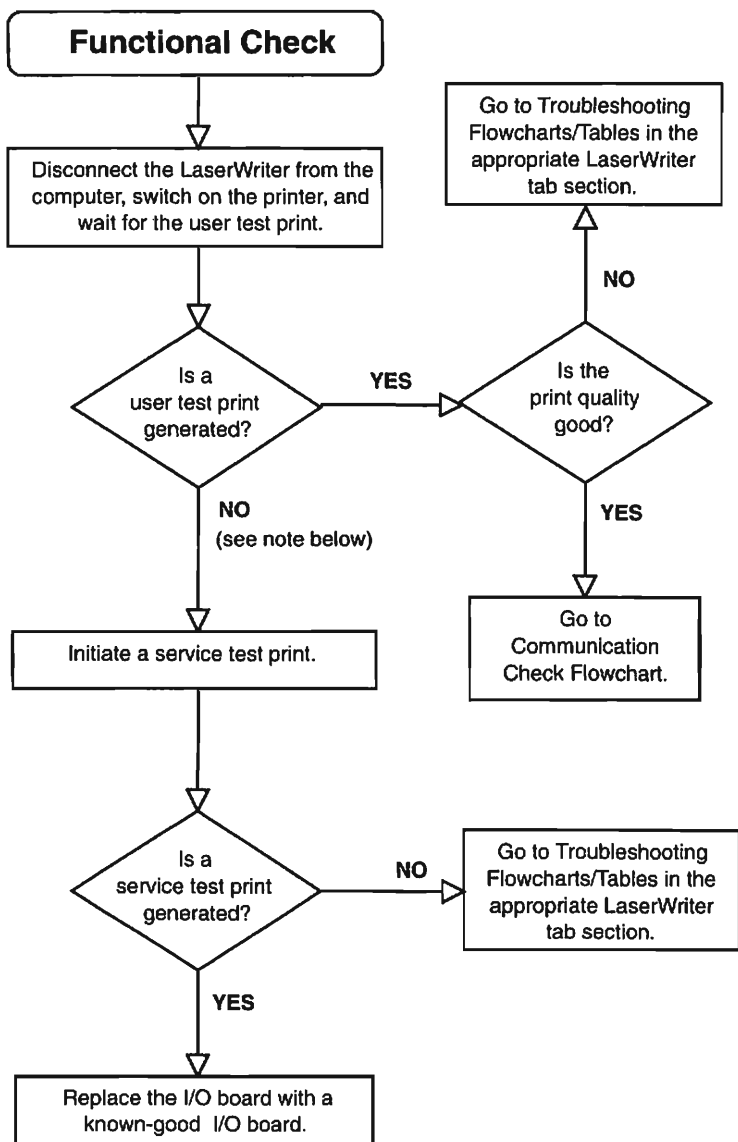
1. **Setup Checklist**—Check the following setup conditions:
 - ✓ Check the power source and power connection.
 - ✓ Check all cables and cable connections.
 - ✓ Check that the toner cartridge is installed and has toner.
 - ✓ Check that the paper cassette is installed and has paper.
 - ✓ Check that the print density adjustment is set correctly.
 - ✓ Check that the LaserWriter access door is closed.
2. **User Test Print Check**—Disconnect the LaserWriter from the Macintosh computer, switch on the printer, and wait for the user test print. If the printer is a LaserWriter II SC or Personal LaserWriter SC, set the SCSI ID switch to "7," then switch on the printer, and wait for the user test print (**see Functional Check Flowchart in this section**).
 - If the user test print is produced, connect the printer to a single Macintosh computer and try to print from the computer (**see Communication Check Flowchart in this section**).
 - If the user test print is produced, but the print quality is not acceptable, refer to **Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab section.

- If the user test print is *not* produced, verify that the test print has not been disabled with software. Proceed to the **Service Test Print Check**.
 - If the user test print jams inside the printer, **refer to Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab section.
3. **Service Test Print Check**—Initiate a service test print (see **Functional Check Flowchart** in this section).
- If the service test print is *not* produced, the LaserWriter print engine is defective. **Refer to Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab section.
 - If the service test print jams inside the printer, **refer to Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab section.
 - If the service test print is produced but the user test print has been disabled, connect the printer to a single Macintosh computer and try to print from the computer (see **Communication Check Flowchart** in this section.)
 - If the service test print is produced but the user test print will not print, the problem is most likely with the LaserWriter I/O board. Switch off the printer and recheck the cable connections. Switch on the printer and wait for the user test print. **If the user test print is not produced, replace the I/O board with a known-good I/O board.**



On-Site Troubleshooting

On-Site Troubleshooting Flowcharts



Note: The LaserWriter, LaserWriter II NT, NTX, IIx, IIg, and Personal LaserWriter NT produce a user test print each time the printer is switched on (unless the function has been turned off with PostScript software). The LaserWriter II SC and Personal LaserWriter SC produce a user test print only if the SCSI ID switch is set to "7." The Personal LaserWriter LS does not produce a user test print.

On-Site Troubleshooting

On-Site Troubleshooting Flowcharts



Communication Check

1. Connect the LaserWriter to a Macintosh computer.
2. Verify that the switch settings are correct.
3. Verify that the appropriate and most current LaserWriter driver is installed in the System Folder.
4. Open the Chooser and verify that the LaserWriter is selected.
5. Open the File menu and select Print Directory or Print Window.

Was a
printout of the
directory produced?

YES

The LaserWriter is
fully functional.

NO

1. Check cables and cable connections.
2. Check the switch settings.
3. Open the Chooser and verify that the LaserWriter is selected.
4. Open the File menu and select Print Directory or Print Window.

Was a
printout of the
directory produced?

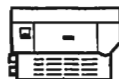
YES

The LaserWriter is
fully functional.

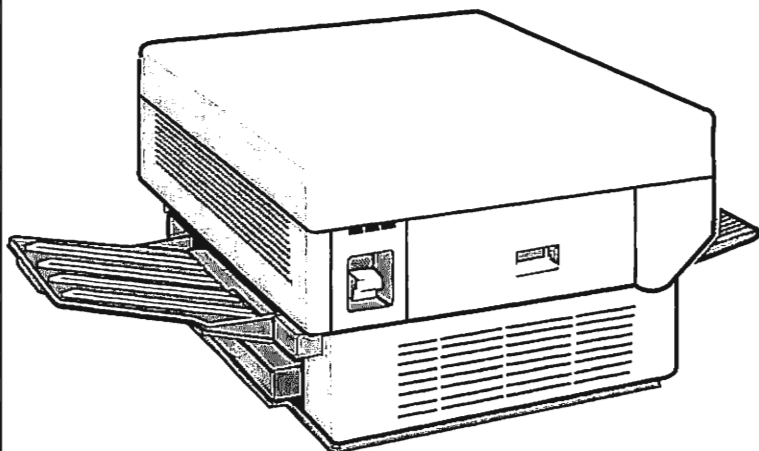
NO

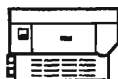
Refer to Software Troubleshooting earlier
in this section. If problem persists, refer
to the Networks tab in the Apple Service
Technical Procedures.





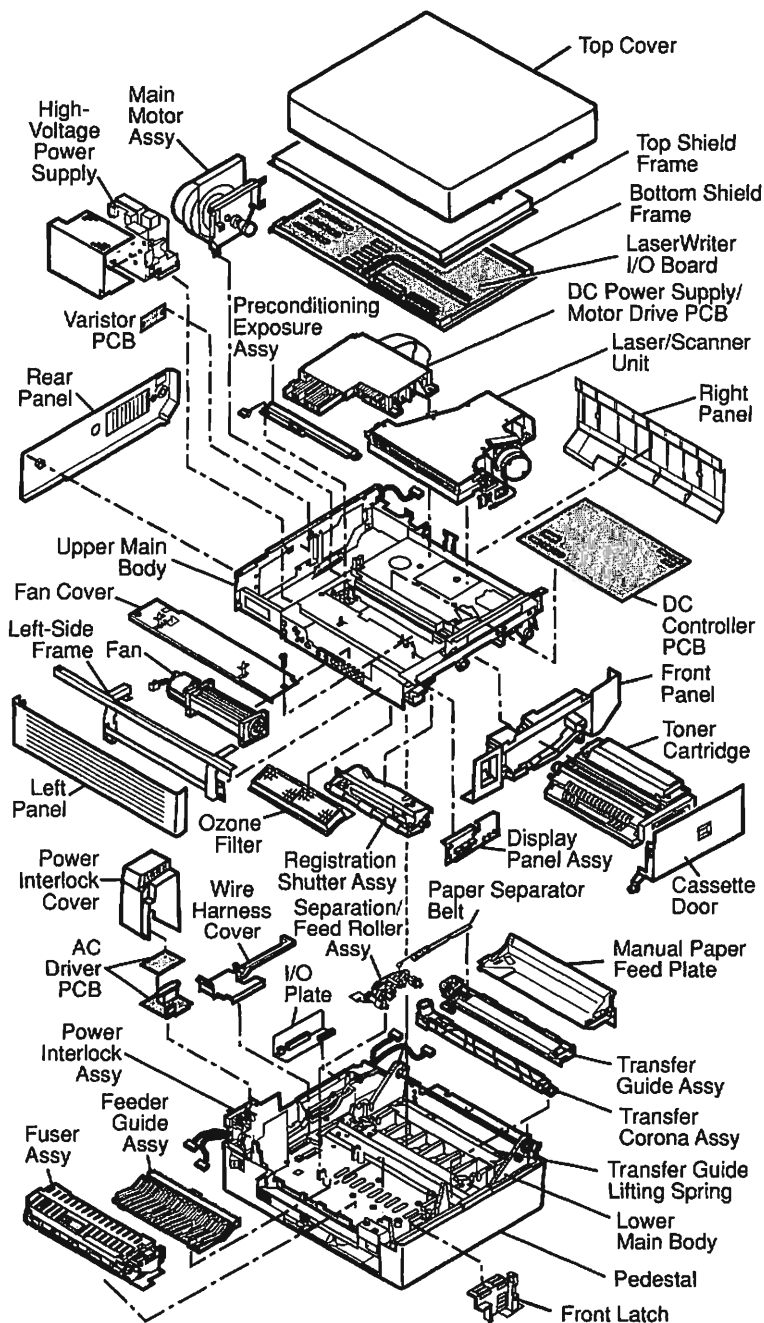
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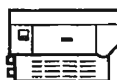




LaserWriter and LaserWriter Plus

Exploded View





The following parts list is not comprehensive. Only selected service modules and replacement parts are listed. When ordering a replacement module or spare part, be sure to check the part number in the guide against the current price pages in the *Apple Service Programs* manual. Remember that this Apple Service Guide is not updated regularly.

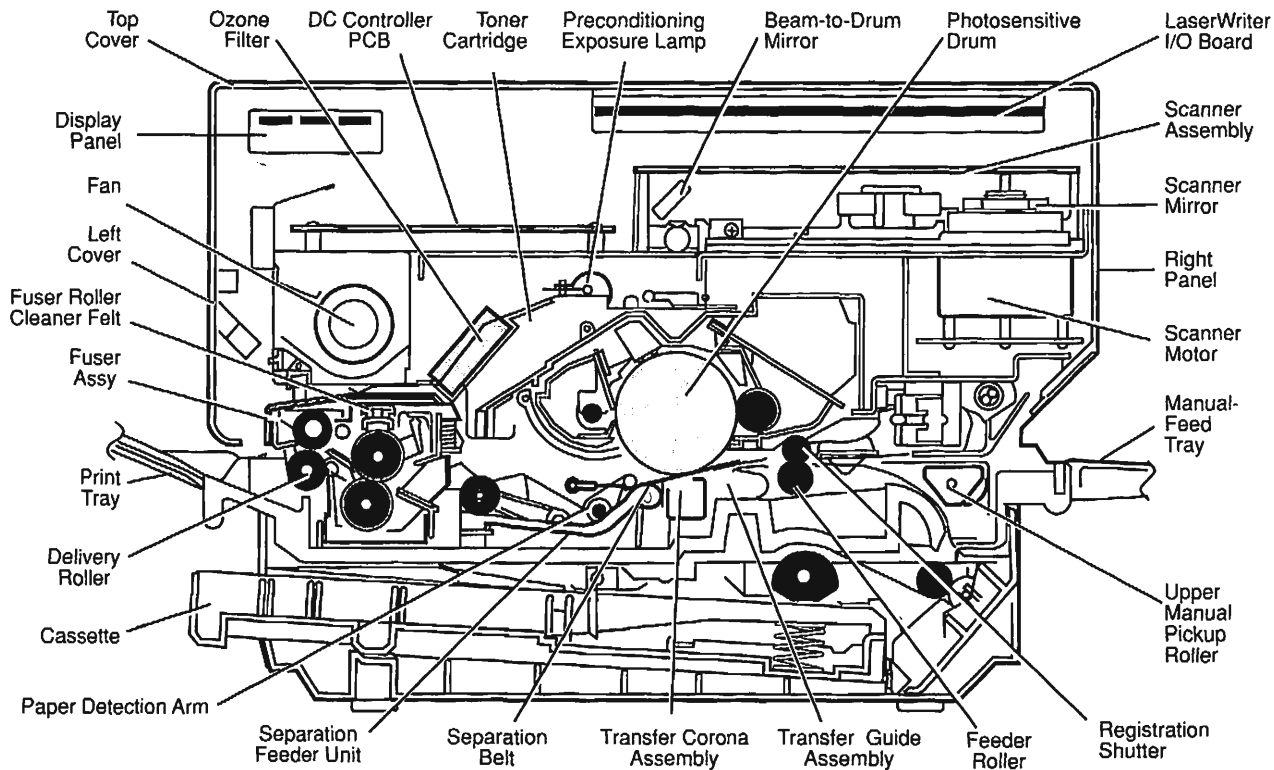
Bottom Shield Frame	970-1183
DC Controller PCB	661-0267
DC Power Supply/Motor Drive PCB, 110 V	661-0273
DC Power Supply/Motor Drive PCB, 220 V	661-0274
Display Panel Assembly	970-1109
Feeder Guide Assembly	971-0037
Fuser Assembly, 115 V	661-0450
Fuser Assembly, 220 V	699-0318
High-Voltage Power Supply	661-0266
Laser/Scanner Unit	
Laser Unit	661-0277
Scanner Unit 300 DPI	661-0278
LaserWriter I/O PCB	661-0436
IC, ROM, LaserWriter Rev 2, H0	342-0082
IC, ROM, LaserWriter Rev 2, L0	342-0081
IC, ROM, LaserWriter Rev 2, H1	342-0084
IC, ROM, LaserWriter Rev 2, L1	342-0083
IC, ROM, LaserWriter Rev 2, H2	342-0086
IC, ROM, LaserWriter Rev 2, L2	342-0085
IC, ROM, LaserWriter Rev 2, H3	342-0088
IC, ROM, LaserWriter Rev 2, L3	342-0087
IC Socket, 16-Pin	511-1603
LaserWriter Configuration Block	750-0102
LaserWriter Plus I/O PCB	661-0437
IC, ROM, LaserWriter Plus, H0	342-0090
IC, ROM, LaserWriter Plus, L0	342-0089
IC, ROM, LaserWriter Plus, H1	342-0092
IC, ROM, LaserWriter Plus, L1	342-0091
IC, ROM, LaserWriter Plus, H2	342-0094
IC, ROM, LaserWriter Plus, L2	342-0093
IC, ROM, LaserWriter Plus, H3	342-0096
IC, ROM, LaserWriter Plus, L3	342-0095
IC, ROM, LaserWriter Plus, H4	342-0098
IC, ROM, LaserWriter Plus, L4	342-0097
IC, ROM, LaserWriter Plus, H5	342-0100
IC, ROM, LaserWriter Plus, L5	342-0099
IC, ROM, LaserWriter Plus, H6	342-0102
IC, ROM, LaserWriter Plus, L6	342-0101
IC, ROM, LaserWriter Plus, H7	342-0104
IC, ROM, LaserWriter Plus, L7	342-0103
IC Socket, 16-Pin	511-1603
LaserWriter Configuration Block	750-0102
Lower Main Body	
Front Latch	970-1267
Manual Paper Feed Plate	970-1272



LaserWriter and LaserWriter Plus

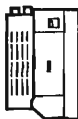
Parts List

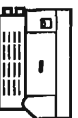
Paper Separator Belt	970-1005
Transfer Guide Lifting Spring	076-8137
Wire Harness Cover	970-1069
Main Motor Assembly	
Main Drive Motor	970-1009
Main Motor Gear, 24-tooth	970-1010
Panels and Covers	
Cassette Door	970-1142
Front Panel	970-1113
Left Panel	970-1110
Rear Panel	970-1111
Right Panel	970-1112
Top Cover	810-0608
Power Interlock Assembly, 110 V	699-0324
AC Driver PCB 110 V	661-0268
Power Interlock Assembly, 220 V	699-0325
AC Driver PCB 220 V	661-0269
Power Interlock Assembly Cover	970-1143
Preconditioning Exposure Assembly	
Preconditioner Exposure PCB	970-1020
Reflector Shield	970-1146
Registration Shutter Assembly	699-0323
Top Shield Frame	970-1182
Separation/Feed Roller Assembly	970-1019
Transfer Corona Assembly	970-1021
Transfer Guide Assembly	970-1149
Upper Main Body	
Fan, 110 V, 60 Hz	720-0502
Fan, 220 V, 50 Hz	970-1074
Ozone Filter	970-1001
Varistor PCB	970-1035



LaserWriter and LaserWriter Plus

Major Assemblies





LaserWriter and LaserWriter Plus I/O Board Identification

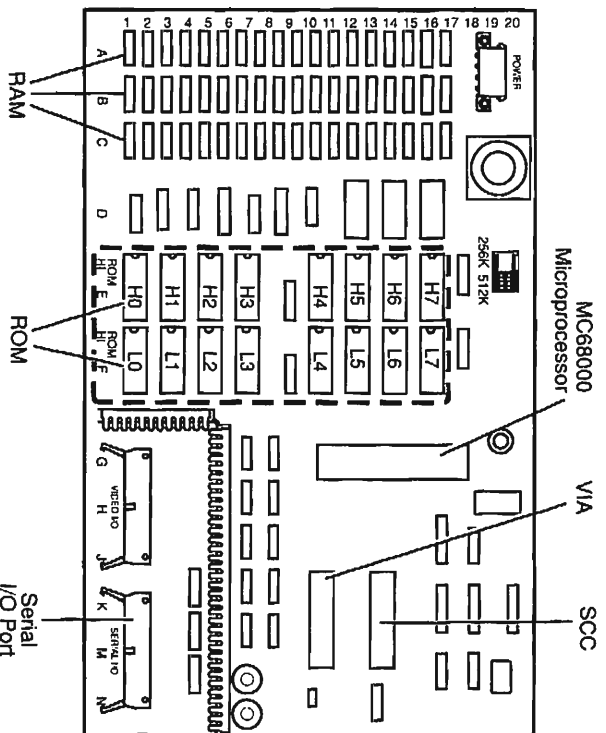


Figure: LaserWriter I/O Board

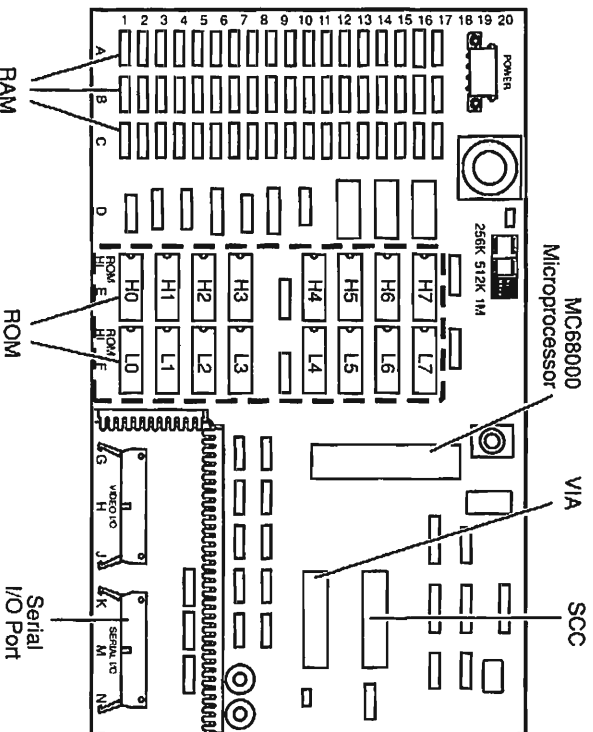
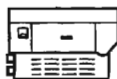
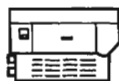


Figure: LaserWriter Plus I/O Board



Print Engine Specifications

Marking engine	Canon LBP-CX laser xerographic
LaserWriter I/O board	12 MHz 68000 microprocessor; 1.5 MB RAM; 512K ROM (LaserWriter) and 1 MB ROM (LaserWriter Plus); AppleTalk and RS-232-C interfaces
Print resolution	300 dots per inch (DPI)
Speed	8 pages per minute
Paper feed	Automatic from paper input cassette Manual single-sheet feed
Print materials	Best results with 16-20 lb, single-sheet photocopy bond. Can use most letterhead and colored stock from 8 to 34 lb. Can also use standard medium-weight overhead transparency material. Envelopes and labels supported via manual feed.
Paper capacities	Supports Letter, Legal, A4, and B5 sizes. Input paper cassette holds 100 sheets; output tray holds 20 sheets.
Printable surface	Letter size: 8.0 by 10.92 inches Legal size: 6.75 by 13.0 inches A4: 7.41 by 10.86 inches B5: 7.69 by 10.16 inches
Physical dimensions	Height: 11.5 inches Width: 18.5 inches Depth (body only): 16.2 inches Depth (with trays): 28.2 inches Weight: 77 lbs
Operating environment	Temperature: 50 to 90.5° F (10 to 34° C) Humidity: 20 to 80 percent
Power requirements	100 to 115 volts AC, 60 Hz—Domestic Version 220 to 240 volts AC, 50 Hz—International Version



LaserWriter and LaserWriter Plus

Status Lights

LaserWriter Status Lights

The LaserWriter has four status lights, three on the display panel at the front of the printer (see Figure) and one on the rear I/O connector plate (see Figure).

- **Ready/Wait** – The green Ready/Wait light flashes during printer warmup and stays on continuously when the printer is ready to print.
- **Paper-Out** – The yellow Paper-Out light is on and steady when the printer is out of paper or the paper cassette is not installed. The light flashes when the printer is preparing to print a page. In manual feed mode, the light remains on steadily if there is no paper on the manual feed tray.
- **Paper Jam** – The red Paper Jam light comes on when paper jams inside the printer. The light remains on until the paper jam is clear.
- **Test** – The Test light on the rear I/O connector plate comes on (either steady or flashing) if an error condition exists with the LaserWriter I/O board. If the I/O board is functioning correctly, the Test light flashes once and then turns off when the printer is switched on.

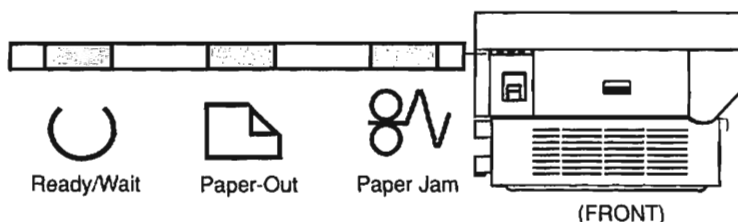


Figure: LaserWriter/LaserWriter Plus Status Lights

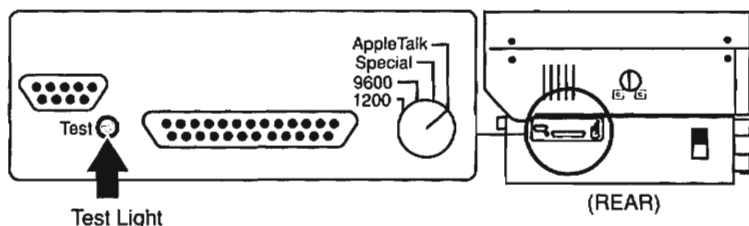
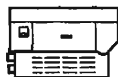


Figure: LaserWriter/LaserWriter Plus Test Light



Service Test Print

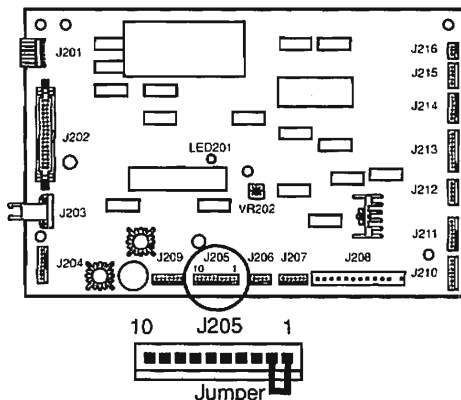
The LaserWriter/LaserWriter Plus produces a service test print (see Figure) when a jumper is placed between pins J205-1 and J205-2 on the DC controller PCB. The service test print confirms the operation of the print engine. It is useful in service situations when you need to isolate printer failures from I/O board failures.

User Test Print

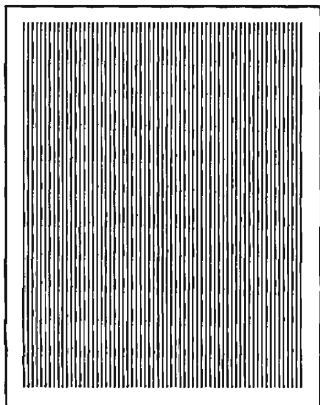
The LaserWriter/LaserWriter Plus generates a user test print (see Figure) each time the printer is switched on (unless the protocol switch is set to "Special" or the function has been turned off with PostScript software). The user test print confirms the operation of the I/O board and provides the following information about the LaserWriter:

- The revision number of the installed PostScript ROMs
- The selected operating mode—PostScript or Diablo 630 emulation
- The number of pages the I/O board has produced

DC Controller PCB



Service Test Print



User Test Print

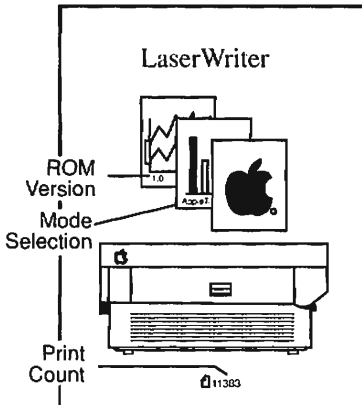
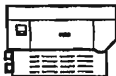


Figure: DC Controller PCB and Test Prints



LaserWriter and LaserWriter Plus

Troubleshooting the LaserWriter

Three types of checks help you troubleshoot and repair LaserWriter printer failures: a generic **Pre-Power-On Checklist**; **LaserWriter and Print Engine Functional Checks**; and follow-on **Troubleshooting Tables**. These checks should be performed in the order shown. When the printer is repaired, perform necessary **Preventive Maintenance** before returning the customer's LaserWriter. Make sure you are familiar with all procedures in the **Safety** section of this guide before performing live electrical checks.

Pre-Power-On Checklist

This is a checklist of important items that you should verify, before you proceed with the troubleshooting functional checks.

- ✓ Line voltage is OK (115 VAC $\pm$ 10%)
- ✓ Printer is installed on solid, level surface
- ✓ Room temperature is between 50–90° F (10–32.5° C)
- ✓ Humidity is between 20% and 80%
- ✓ Printer is not located in an excessively hot or humid area, near open flames, or in a dusty location
- ✓ Printer is not exposed to ammonia gas (produced by diazo copiers or cleaning solutions)
- ✓ Printer is not exposed to direct sunlight
- ✓ Printer is installed in a well-ventilated area
- ✓ Cables and connectors are OK
- ✓ Toner cartridge is installed and OK (replace if indicator is red)
- ✓ Fuser roller cleaner felt is in place and not dirty
- ✓ Print density adjustment dial is set correctly
- ✓ Protocol selector switch (on back of printer) is set to AppleTalk
- ✓ Paper cassette is properly loaded with paper (not more than 10 mm high)
- ✓ Paper is 16-21 lb. standard photocopier paper
- ✓ Transfer corona wire is clean and unbroken
- ✓ Separation belt is OK (check for nicks or broken belt)

LaserWriter Functional Check

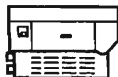
The LaserWriter Functional Check is a comprehensive check of the LaserWriter print engine and I/O board. If the problem is in the print engine, this check will refer you to the Print Engine Check.

LaserWriter Print Engine Check

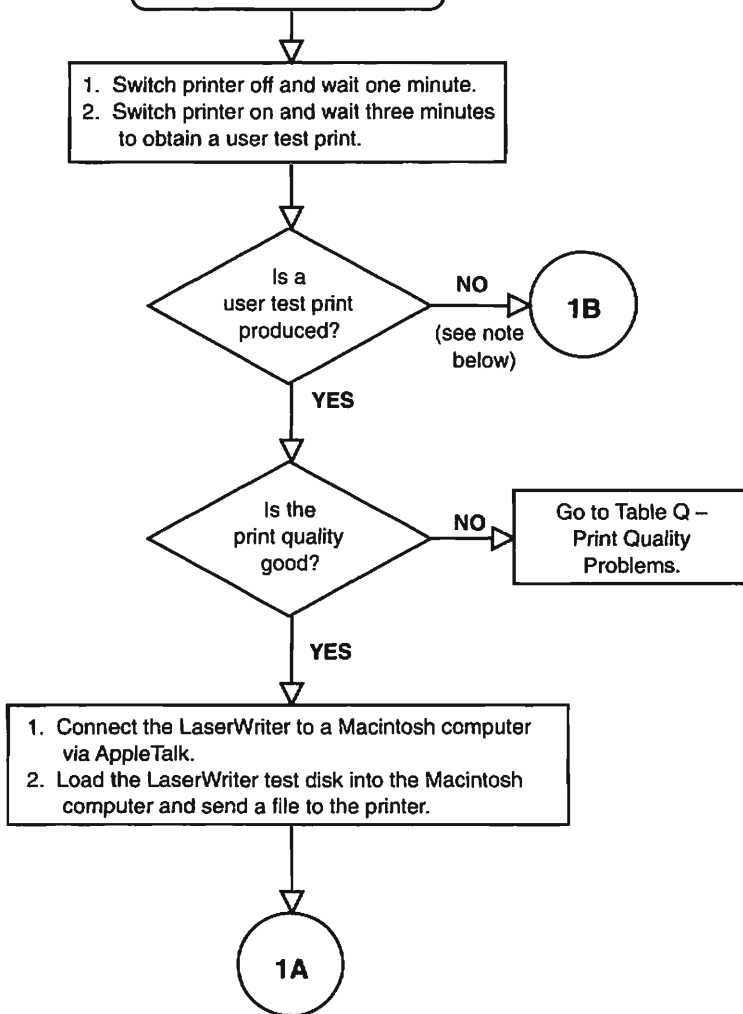
The LaserWriter Print Engine Check provides a step-by-step functional check of the entire print engine. When you locate the malfunction, the procedure will refer you to the appropriate troubleshooting table.

LaserWriter and LaserWriter Plus

Troubleshooting—Functional Check



Flowchart 1

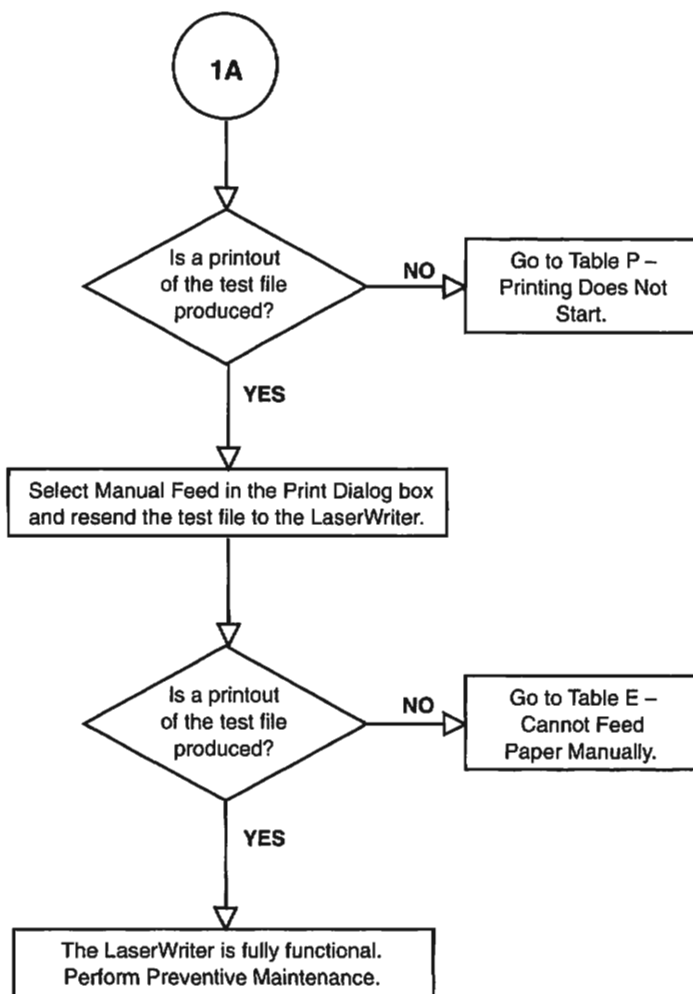


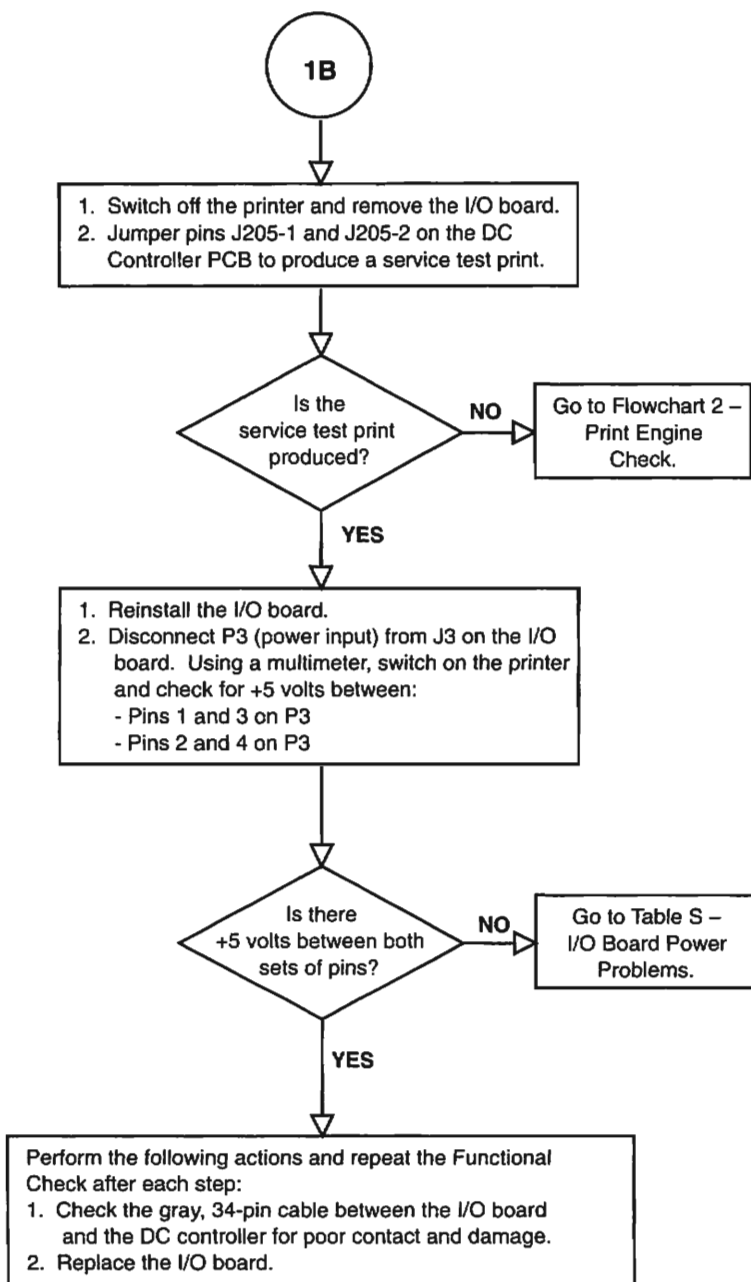
Note: The user test print is produced each time the printer is switched on (unless the protocol switch is set to "Special" or the function has been turned off with PostScript software).



LaserWriter and LaserWriter Plus

Troubleshooting – Functional Check



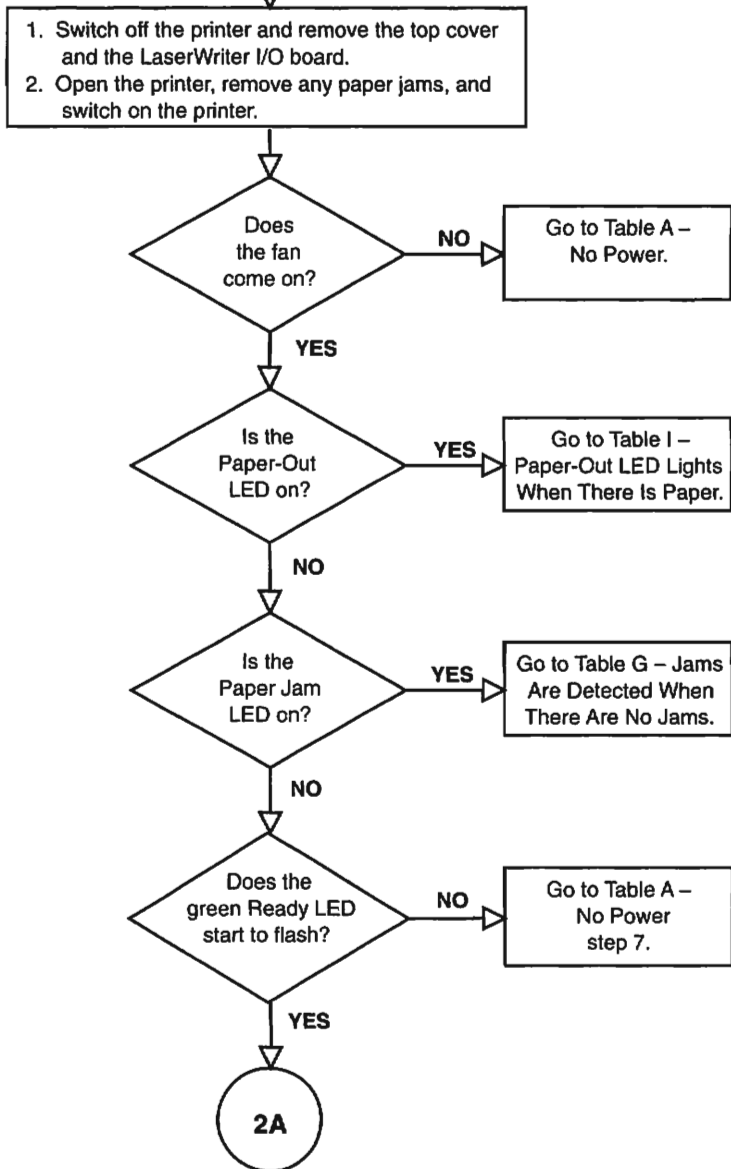


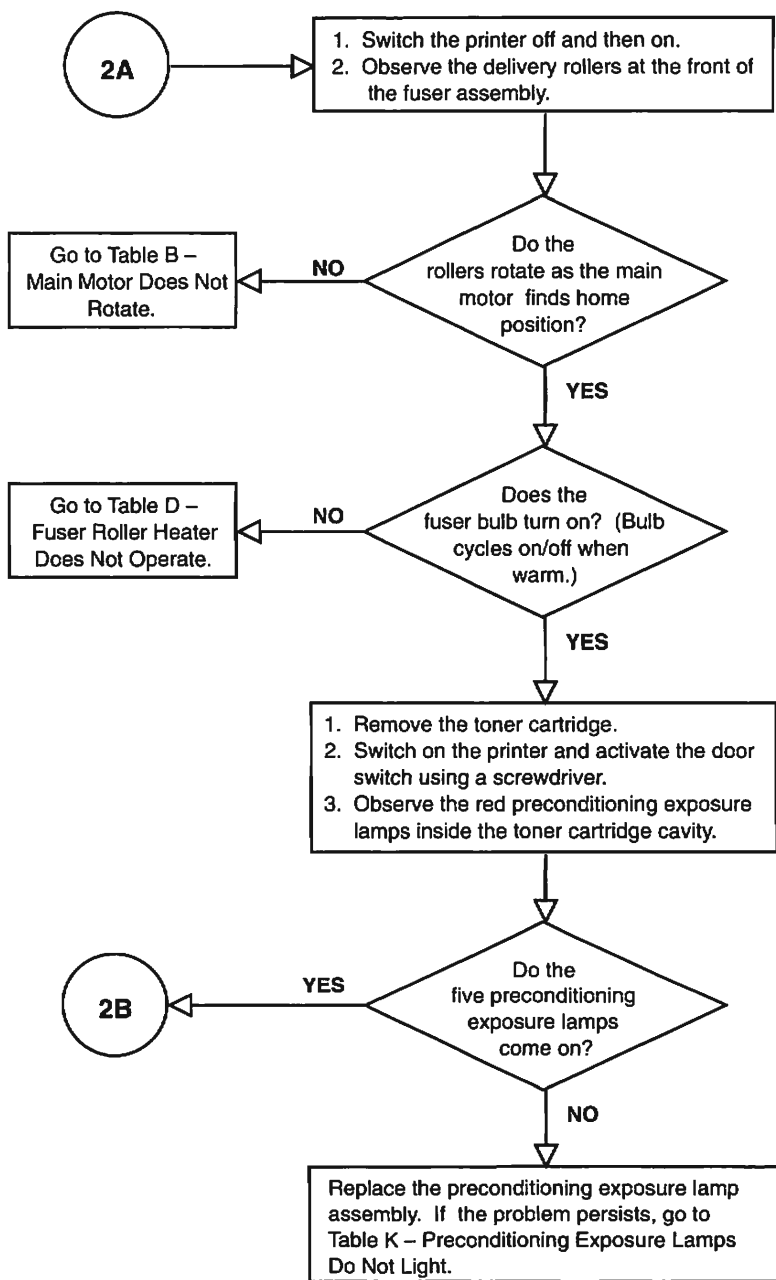


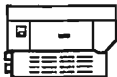
LaserWriter and LaserWriter Plus

Troubleshooting – Print Engine Check

Flowchart 2

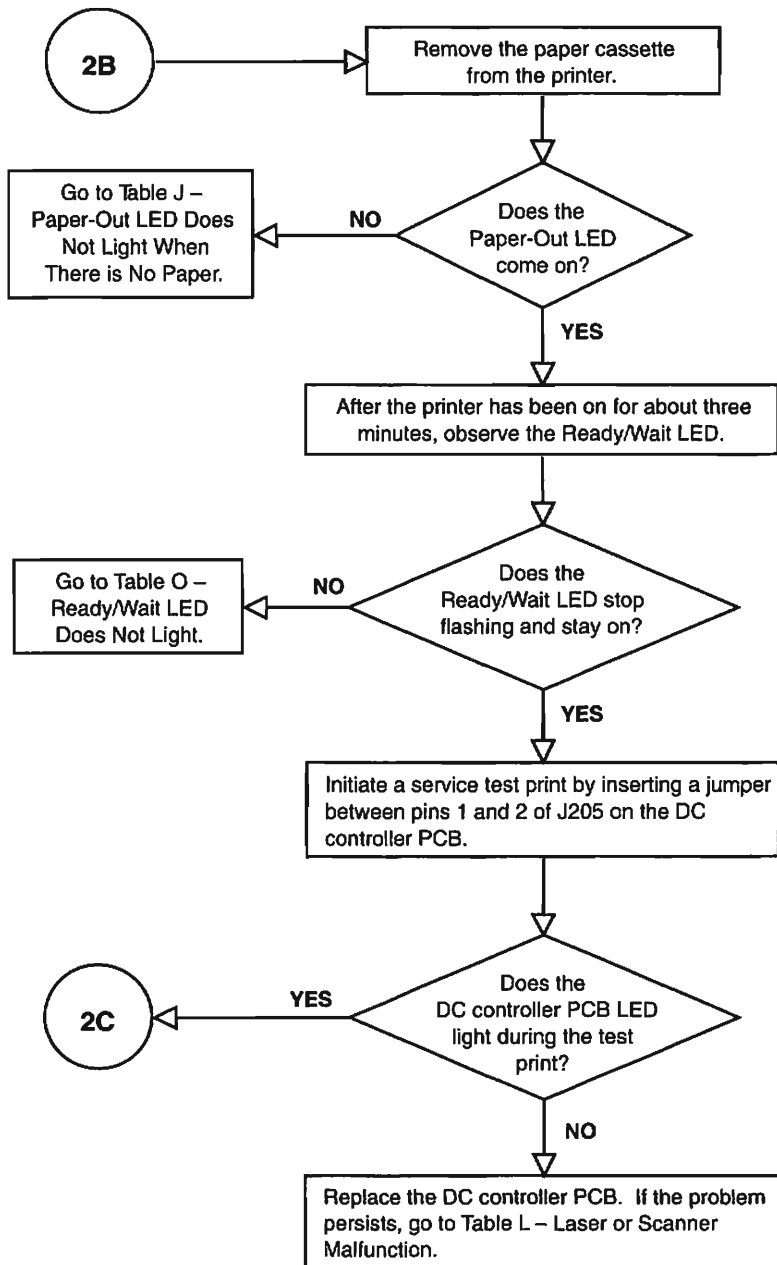






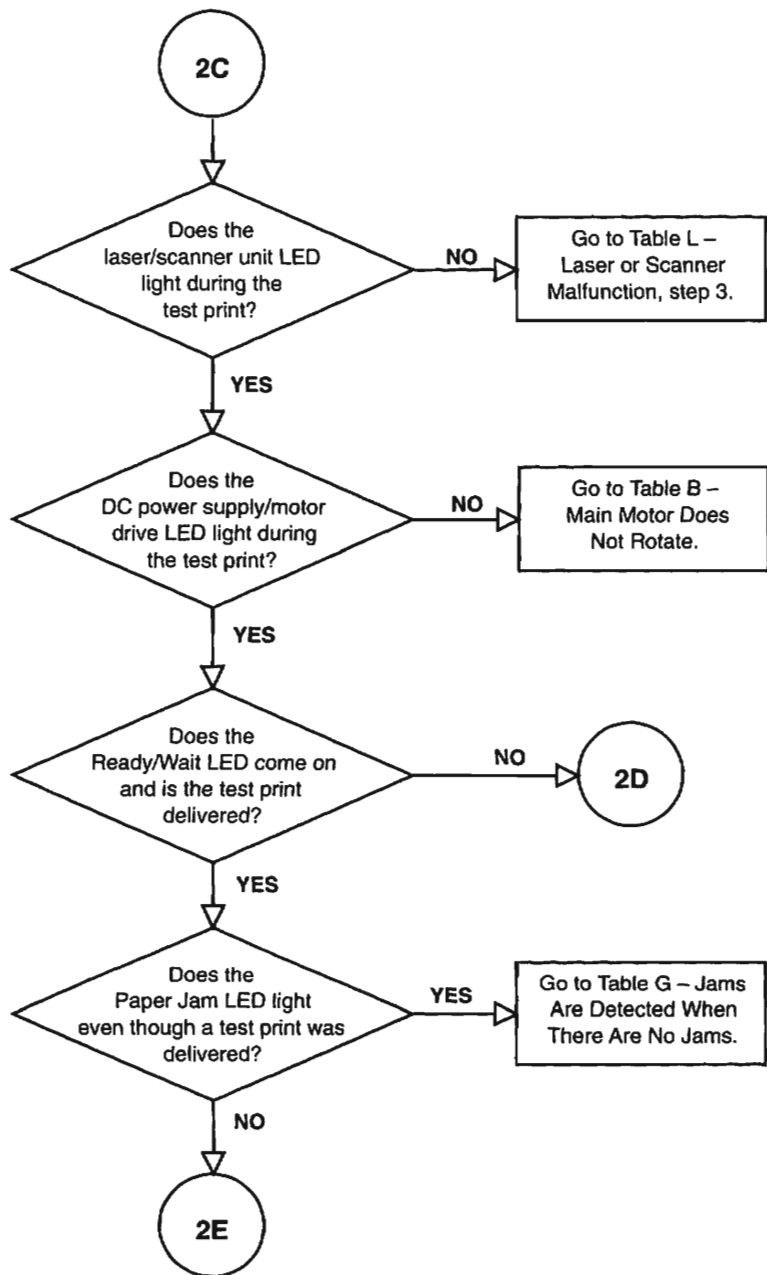
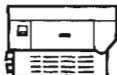
LaserWriter and LaserWriter Plus

Troubleshooting – Print Engine Check



LaserWriter and LaserWriter Plus

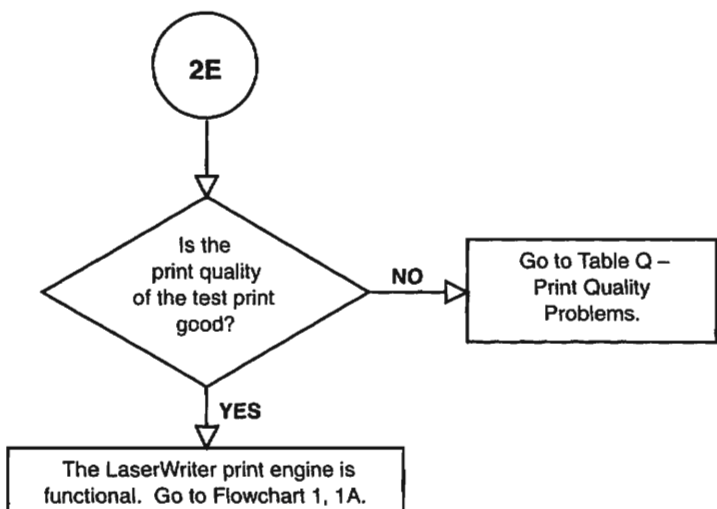
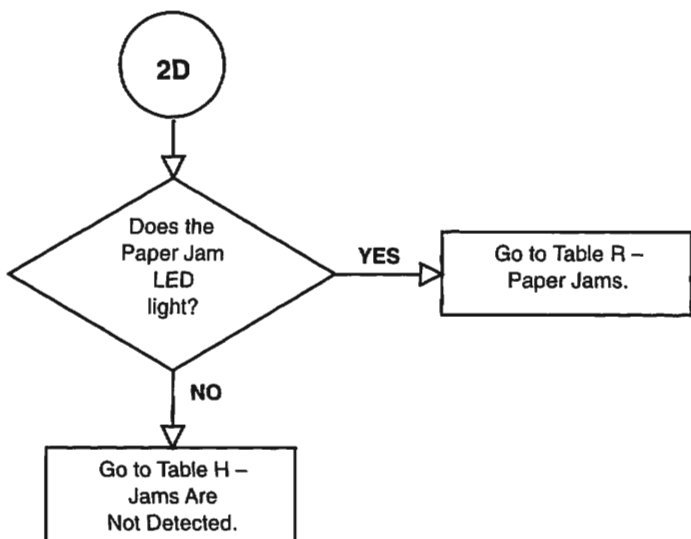
Troubleshooting – Print Engine Check





LaserWriter and LaserWriter Plus

Troubleshooting – Print Engine Check





WARNING: The LaserWriter/LaserWriter Plus operates at high voltages. When performing the following multimeter checks, be careful not to touch the power interlock assembly, the AC switch, the high-voltage power supply, or the DC power supply.

Table A – No Power - 110/115 Volt (1 of 5)

1.	Is the printer plugged in?	No	Plug in the printer.
2.	Is the printer firmly closed?	No	Close the printer.
3.	Is the required voltage supplied at the AC outlet?	No	Nothing is wrong with the printer. Try another AC outlet.
4.	Is circuit breaker CB1 open?	Yes	Reset the circuit breaker. If the breaker trips as soon as it is reset, there is a short that you will have to locate.
		No	Switch off the power and unplug the printer. Open the printer and disconnect J105 on the AC driver PCB. Reset circuit breaker CB1 and check for continuity. If circuit breaker CB1 is defective, replace it.

CAUTION: Be sure to set the multimeter to 200 Volts AC for the following step, or the multimeter may be destroyed.

5.	Disconnect J105 on the AC driver PCB. Connect the multimeter across terminal blocks TB101-1 and TB102-1. (TB101 and TB102 are located above noise filter NF1 in the power interlock assembly. TB101 is located toward the back of the printer, and TB102 is next to the on/off switch.) Plug in the printer and switch on the power. Is AC voltage supplied between TB101 and TB102?	No	Replace the AC power cord and plug, noise filter NF1, and main switch SW1 as required.
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Table A – No Power - 110/115 Volt (2 of 5)

6.	Switch off the power and unplug the printer. Reconnect J105 on the AC driver PCB. Plug in the printer and switch on the power. Is AC voltage supplied between J105-1 and J105-2 when you activate the door interlock switch with a screwdriver?	No	Replace MS1 and/or MS2 (the door switch interlocks in the power interlock assembly).
7.	Is AC voltage supplied between J103-1 and J103-2 when you activate the door interlock switch with a screwdriver?	No	Replace the AC driver PCB.
8.	Are the DC voltages listed below supplied between the J502 pins on the DC power supply/motor drive PCB? J502-4 & J502-8 (GND) +24-35 VDC J502-9 & J502-8 (GND) +24 VDC J502-7 & J502-6 (GND) +5 VDC J502-5 & J502-6 (GND) -5 VDC J502-2 & J502-3 (GND) +20-30 VDC	Yes	Go to step 21.

CAUTION: In the following step, be sure to set the multimeter to measure AC or the meter may be damaged.

9.	Switch off the printer and disconnect P501 (the plug connected to J501 on the DC power supply/motor drive PCB). Switch on the printer. Are the AC voltages listed below supplied between the following pins on P501? P501-1 & P501-2 + 29-37 VAC P501-3 & P501-4 +10-14 VAC P501-4 & P501-5 +10-14 VAC P501-6 & P501-7 +18-24 VAC	No	Transformer PT1 is probably faulty. Remove the printer from its pedestal and replace transformer PT1. If the problem remains, recheck TB102.
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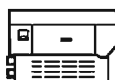


Table A – No Power - 110/115 Volt (3 of 5)

10.	Switch off the printer. Disconnect J502 on the DC power supply/motor drive PCB and reconnect P501. Switch on the printer. Are the DC voltages shown below supplied at J502 on the DC power supply/motor drive PCB? J502-4 & J502-8 (GND) +24-35 VDC J502-9 & J502-8 (GND) +24 VDC J502-7 & J502-6 (GND) +5 VDC J502-5 & J502-6 (GND) -5 VDC J502-2 & J502-3 (GND) +20-30 VDC	No	Replace the DC power supply/motor drive PCB.
CAUTION: Disconnect all power from the printer for steps 11 through 20. These steps are resistance checks. If power is applied to the printer during these checks, the ohmmeter could be damaged.			
11.	Switch off the printer. Make sure that J502 is connected to the DC power supply/motor drive PCB. Disconnect all connectors on the DC controller PCB except J208. Are any of the J502 pins listed below shorted to ground? (Measure resistance on J502 pins connected to the DC power supply/motor drive PCB.) J502-4 (+30 V) & J502-8 (GND) J502-9 (+24 V) & J502-8 (GND) J502-7 (+5 V) & J502-8 (GND) J502-5 (-5 V) & J502-6 (GND) J502-2 (+24 V) & J502-3 (GND)	Yes	Check the wiring between J502 on the DC power supply/motor drive PCB and J208 on the DC controller PCB for a short. If the wiring is OK, replace the DC controller PCB.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table A – No Power - 110/115 Volt (4 of 5)

12.	Reconnect all connectors on the DC controller PCB. Are any of the J502 pins on the DC power supply/motor drive PCB shorted to ground? J502-4 & J502-8 (GND) J502-9 & J502-8 (GND) J502-7 & J502-6 (GND) J502-5 & J502-6 (GND) J502-2 & J502-3 (GND)	No	Go to step 21.
13.	Were J502-4 (+30 V) and J502-8 shorted to ground?	Yes	Check the wiring between J207 and TB5 on the preconditioning assembly for a short. If the wiring is good, replace the preconditioning exposure assembly.
14.	Were J502-9 and J502-8 shorted to ground?	No	Go to step 17.
15.	Disconnect connectors J215, J212, J210, J216, J213, J211, J208, J204, and J206. Reconnect them in the sequence below. After you replace each connector, check for shorts between the pins. Are any of the following pins shorted to ground? J215-3 & J215-1 (GND) J215-5 & J215-1 (GND) J210-1 & J210-5 (GND) J210-3 & J210-5 (GND) J210-7 & J210-5 (GND) J216-3 & J216-1 (GND) J211-6 & J211-1 (GND) J206-1 & J206-2 (GND) J204-1 & J208-3 (GND)	Yes	Replace the load attached to the shorted connector.
16.	Reconnect J212. Are J212-2 and J212-3 shorted?	Yes	Disconnect J104 on the fuser safety PCB (upper board of the AC driver PCB). Check the wiring from pins 2 and 3 of J104 to pins 2 and 3 of J212 on the DC controller PCB for a short. If the wiring is good, replace the AC driver PCB.

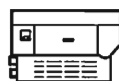


Table A – No Power - 110/115 Volt (5 of 5)

17.	Are J502-7 and J502-6 shorted?	No	Go to step 19.
18.	Disconnect J201 and J204 on the DC controller PCB. Are J201-1 and J208-8 shorted, or are J204-4 and J204-5 shorted?	Yes	If the circuit between J201-1 and J208-8 is shorted, check for a short in the wiring between J201 and TB18 on the display PCB. If OK, replace the display PCB. If the circuit between J204-4 and J204-5 is shorted, check the wiring between J204 and TB3 and TB4 on the laser unit for a short. If the wiring is good, replace the laser unit.
19.	Are J502-2 and J502-3 shorted?	No	Go to step 21.
20.	Disconnect J204 on the DC controller PCB. Are J204-1 and J208-8, or J204-1 and J204-4 of the connector on the cable shorted?	Yes	Check the wiring between J204 and TB3 and TB4 for a short. If the wiring is good, replace the laser unit.
21.	Make sure that all the connectors on the DC power supply/motor drive PCB and the DC controller PCB are connected. Check that circuit breaker CB1 has been reset and the printer is closed. Switch on the printer. Are the DC voltages shown below supplied at J208 on the DC controller PCB? J208-4 & J208-8 (GND) +24-35 VDC J208-9 & J208-8 (GND) +24 VDC J208-7 & J208-6 (GND) +5 VDC J208-5 & J208-6 (GND) -5 VDC J208-2 & J208-8 (GND) +20-30 VDC	No Yes	Check the wiring between J502 (on the DC power supply/motor drive PCB) and J208 (on the DC controller PCB) for poor contact or wiring damage. Replace the DC controller PCB.



Table B – Main Motor Does Not Rotate

1.	Open the printer, remove the toner cartridge, defeat the cover open interlock (MS1 and MS2) with a screwdriver, and switch on the printer. Does the main motor start to rotate when you switch the printer on?	No	Check that all gears mesh correctly. Check the connection between J503 on the DC power supply/motor drive PCB and the main motor. Check cabling between the DC power supply/motor drive PCB and the DC controller (J502 – J208). If the cabling is OK, replace the DC controller PCB.
2.	Disconnect J503 from the DC power supply/motor drive PCB and check the voltage between pins 5 and 6 while you initiate a service test print. Is the voltage +24 VDC between pins 5 and 6 of J503 while the printer is performing a test print?	Yes	Replace the main motor.
3.	Remove the DC power supply/motor drive PCB. Check fuse FU504. Is FU504 blown?	No Yes	Replace the DC power supply/motor drive PCB. Replace FU504 and reinstall the DC power supply/motor drive PCB. If the fuse blows again, replace the main motor. If the problem remains, go to step 14 of Table A – No Power.

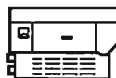


**Table C – High-Voltage Power Supply
Does Not Provide Power**

1.	Initiate a service test print and check the following voltages on the high-voltage power supply: a) Does the voltage between J601-8 and J601-1 drop from about +18 VDC to +1 VDC immediately after initiating the test print? b) Does the voltage between J601-2 and J601-1 and between J601-4 and J601-1 drop from about +20 VDC to 0 VDC a few seconds after initiating the test print? c) Does the voltage between J601-5 and J601-1 drop from about +17 VDC to 0 VDC about six seconds after initiating the test print?	Yes	Visually inspect J601 and J3, J4, and J5 on the high-voltage power supply for good contact. Repair any poor contact. If the problem remains, replace the high-voltage power supply.
2.	Initiate a service test print and check the following voltages on the DC controller PCB: a) Does the voltage between J211-8 and J211-1 drop from about +18 VDC to +1 VDC immediately after initiating the test print? b) Does the voltage between J211-2 and J211-1 and between J211-4 and J211-1 drop from about +20 VDC to 0 VDC a few seconds after initiating the test print? c) Does the voltage between J211-5 and J211-1 drop from about +17 VDC to 0 VDC a few seconds after initiating the test print?	No Yes	Replace the DC controller PCB Visually inspect J1 (shown as J601 on the LaserWriter Wiring Diagram), J3, J4, and J5 on the high-voltage power supply for good contact. Repair any poor contact. If the problem remains, replace the high-voltage power supply.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table D – Fuser Roller Heater Does Not Operate (1 of 2)

WARNING: In the following procedure, you must depress cover interlocks MS1 and MS2 in order to produce the electrical signals to be checked. To avoid electrical shock, do not touch any of the power interlock assembly components that carry line current.

1.	Turn the printer off. Disconnect J101 from the AC driver PCB. Measure the resistance on the connector (not the AC driver PCB) between J101-1 and J101-2. Is the resistance between 1 and 5 ohms?	No	Check for continuity at both ends of thermoprotector TP1, by connecting the multimeter to the spade connectors on each side of the fuser assembly. If TP1 does not have continuity, replace TP1. If TP1 has continuity, replace the fuser heater bulb H1 and the 47-ohm resistor assembly at J107 on the fuser heater safety PCB (upper board of the AC driver PCB). Wait 15 minutes, until all capacitors discharge, and go to step 3.
2.	Measure the resistance of the 47-ohm resistor assembly at J107 on the fuser safety PCB. Does the resistance measure between 46.5 and 47.5 ohms?	No	Replace the resistor assembly. If the problem remains, replace the AC driver PCB.
3.	Disconnect J212 from the DC controller PCB. Measure the thermistor resistance between J212-5 and J212-4 of the connector. Is it in the range of 100-400 kilohms at room temperature?	No	Check the wiring between thermistor TH1 on the fuser assembly and the DC controller PCB. Clean the thermistor if it is dirty. If the problem remains, replace the thermistor.
4.	Does the voltage between J212-1 and J212-3 on the DC controller PCB vary from +22– +24 VDC to +20– +22 VDC approximately one second after power is switched on and then again every time the heater in the fuser assembly is switched on?	No	Check the wiring between J212 on the DC controller PCB and J104 on the AC driver PCB. If the problem still exists, replace the DC controller PCB.

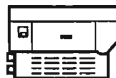
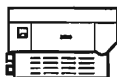


Table D – Fuser Roller Heater Does Not Operate (2 of 2)

5.	Perform the three checks listed below. Do the voltages change one second after the power is switched on and then again every time the heater in the fuser assembly is activated? AC CHECK: between J105-7 and J105-3. The voltage should vary from line voltage to 0 VAC. DC CHECK: between J104-3 and J105-5. The voltage should vary from about .03 VDC to .1 VDC. AC CHECK: between J101-1 and J101-2. The voltage should vary from 0 VAC to line voltage.	No	Replace triac Q1 (located on the power interlock assembly). If the problem still exists, replace the AC driver PCB and reinstall the original triac, Q1.
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Table E – Cannot Feed Paper Manually (1 of 2)

1.	Insert paper into the manual-feed entrance far enough to trip pickup sensor PS1. Turn on the printer and wait until it is ready. Does the voltage between J210-4 and J210-5 (GND) on the DC controller PCB go from about +24 VDC to about 0 VDC approximately eight seconds after the main motor starts to rotate, and does it remain at 0 VDC for about one second?	No	Replace the DC controller PCB.
2.	Does the upper manual-pickup roller (shown below) descend and feed the paper about eight seconds after the main motor begins to rotate?	Yes	Check the lower roller for wear and rotation. Check that the upper roller presses against the paper firmly. If the lower roller is worn, replace the manual-feed assembly.
3.	Does the voltage between J210-6 and J210-5 (GND) on the DC controller PCB vary from about 0 VDC to +5 VDC when paper is inserted into the manual-feed entrance?	No	Check J4 of the pickup sensor PS1 and J210 on the DC controller PCB for poor contact. If no problems are found, replace the registration shutter assembly.



LaserWriter and LaserWriter Plus Troubleshooting Tables

Table E – Cannot Feed Paper Manually (2 of 2)

4.	Disconnect J210 on the DC controller PCB. Is there continuity between J210-4 and J210-3 on the connector attached to the cable?	No	Check the wiring and connectors for the manual-pickup roller solenoid SL2 on the registration shutter assembly. If the problem still exists, replace the registration shutter assembly.
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Table F – Paper Pickup Rollers Do Not Rotate

1.	Are the following wiring connections secure? J502 – DC power supply/ motor drive PCB J208 – DC controller PCB J215 – DC controller PCB J10 and J100 – the lower main body, near the hinges (black and white cables)	No	Secure the connections.
2.	Disconnect J214 from the DC controller PCB. Remove the paper cassette and manually actuate the cassette size microswitches MS5 (upper), MS6 (middle), and MS7 (lower), in that order, while checking the resistance between the cable connector pins listed below. Does the resistance drop from infinity to 0 ohms? J214-1 to J214-2 (MS5) J214-3 to J214-4 (MS6) J214-5 to J214-6 (MS7)	No	Check for wiring or connector problems between the DC controller PCB and the microswitches. If you see no problem, replace the appropriate microswitches.
		Yes	Replace the DC controller PCB.
3.	Initiate a service test print. Does the voltage between J215-4 and J215-1 (GND) on the DC controller PCB drop from +24 VDC to 0 VDC when a test print is executed from the READY state?	No	Replace the DC controller PCB. If replacement has no effect, remove the printer from its pedestal and replace the cassette pickup assembly.
		Yes	The fault is probably in the cassette pickup assembly. Replace the appropriate part of the cassette pickup assembly.



Table G – Jams Are Detected When There Are No Jams

1.	Does the Paper Jam LED on the display unit immediately light when the printer is switched on?	Yes	Check the wiring between J201 on the DC controller PCB and TB18 on the display unit. Then check J10 and J11 (inside the printer toward the hinges, with black and white cable connections). If the cabling is OK, replace the DC controller PCB.
2.	Is some object caught in the delivery unit?	Yes	Remove the obstruction.
3.	Does the voltage between J210-6 and J210-5 (GND) on the DC controller PCB go from about 0 VDC to +5 VDC when a piece of paper is inserted far enough into the manual-feed entrance to trip pickup sensor PS1.	No	Check J4 of the pickup sensor PS1 and J210 on the DC controller PCB for poor contact. Also check that the paper detection arm functions smoothly. If you find no problems, replace the registration shutter assembly.
4.	Open the printer and activate the door switch with a screwdriver. Insert paper into delivery sensor PS3 on the upper body (below fan) to block light transfer. Does the voltage between J216-2 and J216-1 (GND) on the DC controller PCB vary from about 0 VDC to +5 VDC?	No	Check J5 of the delivery sensor PS3 and J216 on the DC controller PCB for poor contact. Also check that the paper delivery sensor arm functions smoothly. If there are no problems, replace delivery sensor PS3.

Table H – Jams Are Not Detected (1 of 2)

1.	Does the Paper Jam LED on the display unit light when you short the circuit between J201-4 and J208-6 (GND) on the DC controller PCB?	No	Check J201 on the DC controller PCB and TB18 on the display unit for good contact. Check whether +5 VDC is supplied between J201-4 and J208-6 (GND) on the DC controller PCB. If +5 VDC is supplied, replace the display unit. If +5 VDC is not supplied, go to step 17 of Table A – No Power.
		Yes	Replace the DC controller PCB.



Table H – Jams Are Not Detected (2 of 2)

2.	Insert paper into the manual feed entrance to trip pickup sensor PS1. Does the voltage between J210-6 and J201-5 (GND) on the DC controller vary from about 0 V to +5 VDC when pickup sensor PS1 is tripped?	No	Check J4 of the pickup sensor PS1 and J210 on the DC controller PCB for poor contact. Check that the paper detection arm functions smoothly. If you find no problems, replace the registration shutter assembly.
3.	Open the upper half of the printer and activate the door switch with a screwdriver. Block the light transition in the deliver sensor PS3 (below fan) with paper. Does the voltage between J216-2 and J216-1 (GND) on the DC controller PCB vary from about 0 VDC to +5 VDC?	No	Check J6 of delivery sensor PS3 and J216 on the DC controller PCB for poor contact. Also check that the paper delivery sensor arm (on the top cover of the fuser assembly) functions smoothly. If there are no problems, replace the paper delivery sensor.

Table I – Paper-Out LED Lights When There Is Paper

1.	Insert and remove the paper cassette a few times while you measure the voltage between J215-1 (GND) and J215-2 on the DC controller PCB. Does the voltage vary from about +5 VDC to 0 VDC when the paper cassette is inserted?	No	Check that the paper detection sensor arm moves freely. Check the wiring from J10 in the lower main body, near the rear hinges (black & white cables) to J215 on the DC controller PCB. If the problem remains, replace the paper-out sensor.
2.	Disconnect J214 from the DC controller and remove the paper cassette. While pressing cassette size microswitches MS5 (upper), MS6 (middle), and MS7 (lower), check the resistance between the connector pins listed below. Does the resistance drop from infinity to 0 ohms? J214-1 to J214-2 (MS5) J214-3 to J214-4 (MS6) J214-5 to J214-6 (MS7)	No	Check the wiring from J11 on the lower main body of the printer, near the rear hinges (black & white cables), to J215 on the DC controller PCB. If the problem remains, remove the printer from its pedestal and replace the appropriate cassette size microswitch.
3.	Does the Paper Out LED turn off when a cassette with paper is installed?	No	Replace the DC controller PCB.

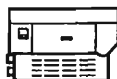


Table J – Paper-Out LED Does Not Light When There Is No Paper

1.	Does the Paper-Out LED light when you short the circuit between J201-3 and J208-6 (GND) on the DC controller PCB?	No	Check J201 on the DC controller PCB and TB18 on the display unit for good contact. If the contact is good, check whether +5 VDC is supplied between J201-1 and J208-6 (GND) on the DC controller PCB. If +5 VDC is present, replace the display unit. If it is not, go to step 17 of Table A – No Power.
2.	Insert and remove the paper cassette a few times while you measure the voltage between J215-2 and J215-1 (GND) on the DC controller PCB. Does the voltage vary from about +5 VDC to 0 VDC when the paper detection arm lifts?	No	Check that the paper detection sensor arm moves freely. Check the wiring from J10 on the lower main body of the printer, by the hinges (black & white cables), to J215 on the DC controller PCB. If the problem remains, replace the paper-out sensor in the pedestal.
3.	Disconnect J214 from the DC controller PCB and remove the paper cassette. While pressing the cassette size microswitches MS5 (upper), MS6 (middle), and MS7 (lower), check the resistance between the connector pins listed below. Does the resistance drop from infinity to 0 ohms? J214-1 to J214-2 (MS5) J214-3 to J214-4 (MS6) J214-5 to J214-6 (MS7)	No	Check the wiring from J11 on the lower main body of the printer, by the hinges (black & white cables), to J215 on the DC controller PCB. If the problem persists, remove the printer from its pedestal and replace the appropriate cassette size microswitch.
4.	Does the Paper Out LED light when you remove a cassette filled with paper?	No	Replace the DC controller PCB.

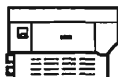


Table K – Preconditioning Exposure Lamps Do Not Light

1.	Execute a test print from the ready state. Does the voltage between J207-1 (+24 to +30 VDC) and J207-2 on the DC controller PCB vary from 0 VDC to between +24 and +35 VDC? (Attach common lead to J207-2.)	Yes	Check J207 on the DC controller PCB for good contact.
2.	Does the voltage between J207-1 and J208-6 (GND) on the DC controller PCB vary from +24 to +30 VDC? Does the voltage between J208-7 and J208-8 (GND) on the DC controller PCB measure at +5 VDC?	Yes No	Replace the DC controller PCB. Check J502 on the DC power supply/motor drive PCB and J208 on the DC controller PCB for good contact. If OK, replace the DC power supply/motor drive PCB. If the problem persists, replace the DC controller PCB.

Table L – Laser or Scanner Malfunction (1 of 2)

1.	Are the connections between J204 on the DC controller and TB3&4 of the laser/scanner unit secure? Are the connections between J206 on the DC controller and J401 on the laser unit secure?	No	Make the connections secure.
2.	Perform the Laser Power Adjustment procedures described in this tab section. Is the laser power set properly?	No	Adjust the laser power to the proper level. If this can't be done, replace the laser unit. If the problem persists, replace the DC controller PCB.
3.	Is +24 VDC supplied between J401-1 and J401-2 (GND) on the scanner driver PCB?	No	Check J502 on the DC power supply and J208 on the DC controller PCB for secure contact. If contact is good, replace the DC power supply/motor drive PCB.
4.	Initiate a service test print. Does the voltage between J206-4 and J206-2 (GND) vary from about +7 VDC to about 0 VDC?	No	Replace the DC controller PCB.



Table L – Laser or Scanner Malfunction (2 of 2)

5.	Initiate a service test print. Does the voltage between J401-3 and J401-2 (GND) on the scanner driver PCB vary from about +3 VDC to about 0 VDC?	Yes	Replace the DC controller PCB.
		No	Replace the scanner unit.

Table M – Laser or Fuser Heater Malfunction

1.	Switch on the printer and wait one minute. Open the printer and lift the cover of the fuser assembly. Has the temperature of the upper roller increased?	No	Go to Table D – Fuser Roller Heater Does Not Operate.
2.	Is the voltage between J204-1 and J204-4 (GND) in the range of +20 to 30 VDC and is the voltage between J204-5 and J204-4 (GND) in the laser unit +5 VDC?	No	Check that the voltage between J208-2 and J208-3 (GND) is +20-30 VDC, and +5 VDC between J208-7 and J208-6 (GND). If not, check for poor contact in the wiring between J502 on the DC power supply/motor drive PCB and J208. If contact is good, replace the DC power supply/motor drive PCB.
3.	Switch the printer off. Disconnect J204 on the DC controller PCB. Measure the resistance between J204-1 and J204-2 of the connector on the cable. Is the resistance 40-55 ohms?	No	Replace the laser unit.
4.	Measure the resistance between J204-3 and J204-4 of the connector on the cable. Is the resistance 5 to 15 kilohms when the laser is at room temperature?	Yes	Replace the DC controller PCB.
		No	Replace the laser unit.

Table N – Ready/Wait LED Does Not Stop Flashing

–	Does the rear (I/O) connector plate test light blink continuously or stay on?	Yes	Replace the I/O board.
		No	Replace the DC controller PCB.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table O – The Ready/Wait LED Does Not Light

1.	Install a toner cartridge and switch the printer off and on. Is the problem solved?	Yes	Finished.
2.	Are the wiring connections between J502 on the DC power supply/motor drive PCB and J208 on the DC controller PCB secure?	No	Make the connections secure.
3.	Is +5 VDC supplied between J201-1 and J208-6 (GND) on the DC controller PCB?	No	Go to Table A – No Power.
4.	Does the Ready/Wait LED light steadily when you short the circuit between J201-2 and J208-6 (GND) on the DC controller PCB?	Yes No	Replace the DC controller PCB. Check J201 on the DC controller PCB and TB18 on the display PCB for good contact. If contact is good, is +5 VDC supplied between TB18 and J208-6 (GND) on the DC controller PCB? If yes, replace the display PCB. If no, go to Table A – No Power.

Table P – Printing Does Not Start

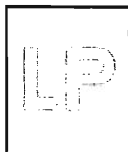
1.	Is the printer's protocol selector switch set correctly?	No	Set the switch to the correct position.
2.	Is appropriate network and printer software installed on the application disk?	No	Install the correct software.
3.	Have you tried a different computer?	No	Try a different computer.
4.	Is there a network problem?	Yes	Refer to the Networks tab in the Apple Service Technical Procedures.
5.	Does the test light on the rear (I/O) connector plate blink continuously or stay on?	Yes	Turn the printer off and then on again. If the problem remains, replace the I/O board.



Table Q-Print Quality Problems.

Compare the printout to the images shown below, and then refer to the appropriate troubleshooting table.

Light Image



Go to Table Q1
Stained
Separation Strip

Dark Image



Go to Table Q2
Scrambled
Image

Blank Print



Go to Table Q3
Stains on
Back of Paper

Black Image



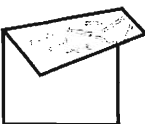
Go to Table Q4
Dark
Vertical Lines



Go to Table Q5
Sharp Horizontal
Black Lines



Go to Table Q6
Vertical Fogged
Stripes



Go to Table Q7
Horizontal
Fogged Stripes



Go to Table Q8
White Horizontal
Lines



Go to Table Q9
Thin Vertical
White Lines



Go to Table Q10
Faulty
Registration



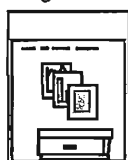
Go to Table Q11
Image Smears
Easily



Go to Table Q12
Distortion



Go to Table Q13
Waviness



Go to Table Q14
Uneven Print
Density



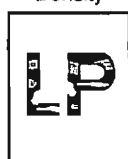
Go to Table Q15
Gray Images



Go to Table Q16
Smearing
from Left Edge



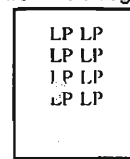
Go to Table Q17



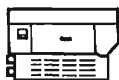
Go to Table Q18



Go to Table Q19



Go to Table Q20



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q1 – Light Image (1 of 2)

1.	Is the print density adjustment dial set with its dot at the top?	No	Set the dial so that its dot is at the top.
2.	Is the toner cartridge indicator red?	Yes	Replace the toner cartridge.
3.	Is this a new toner cartridge?	Yes	Hold the toner cartridge horizontally by its ends and slowly rock it from side to side.
4.	Do prints improve when new paper is used?	Yes	Replace the paper with approved paper (16-21 lb. standard photocopier paper).
5.	Is the transfer corona wire broken?	Yes	Replace the transfer corona wire.
6.	Is connector J211 on the DC controller PCB securely connected?	Yes	Replace the DC controller PCB.
7.	Does the voltage between J209-1 and J209-2 (GND) on the DC controller PCB vary from +5 VDC to 0 VDC when microswitch MS3 (the middle one) is pressed? Does the voltage between J209-3 and J209-4 (GND) on the DC controller PCB vary from +5 VDC to 0 VDC when microswitch MS4 (the lower one) is pressed? Do microswitches actuate normally when a toner cartridge is inserted?	No	Replace the faulty microswitch. Reposition the microswitch holder if the microswitches do not actuate normally when a toner cartridge is inserted.
8.	Insert a toner cartridge in the printer. Does the voltage between J209-1 and J209-2 (GND) on the DC controller PCB measure at +5 VDC? Does the voltage between J209-3 and J209-4 (GND) measure at 0 VDC?	No	Replace the microswitch holder.
9.	Is the print quality still light?	Yes	Replace the high-voltage power supply.

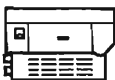


Table Q1 – Light Image (2 of 2)

10.	Perform the Laser Power Adjustment procedure described in this tab section. Is the laser output out of adjustment and not adjustable?	Yes	Replace the DC controller PCB. Perform the Laser Power Adjustment procedure again. If the laser is still out of adjustment, replace the laser unit.
		No	Replace the varistor PCB.

Table Q2 – Dark Image

1.	Is the print density adjustment dial set with its dot at the top?	No	Set the dial so that its dot is at the top.
2.	With the toner cartridge removed, check continuity between the grounding spring in the middle of the drum drive gear and the frame of the upper main body. Is there continuity?	No	Check whether the grounding spring is broken or out of place. Reseat or replace the spring.
3.	Does the voltage between J209-1 and J209-2 (GND) on the DC controller PCB vary from +5 VDC to 0 VDC when microswitch MS3 (the middle one) is pressed? Does the voltage between J209-3 and J209-4 (GND) on the DC controller PCB vary from +5 VDC to 0 VDC when microswitch MS4 (the lower one) is pressed? Do microswitches actuate normally when a toner cartridge is inserted?	No	Replace the faulty microswitch. Reposition the microswitch holder if the microswitches do not actuate normally when you insert a toner cartridge.
4.	Perform the Laser Power Adjustment procedure described in this tab section. Is the laser power out of adjustment and not adjustable?	Yes	Replace the DC controller PCB. Perform the Laser Power Adjustment procedure again. If the laser is still out of adjustment, replace the laser unit.
		No	Replace the varistor PCB.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q3 – Blank Print

1.	Is the toner cartridge indicator red?	Yes	Replace the toner cartridge.
2.	Has the sealing tape been removed?	No	Remove the sealing tape.
3.	Do the toner cartridge protective shield and the light-blocking shutters open when a toner cartridge is inserted in the printer? Does the laser beam-blocking shutter open?	No	Locate the cause of the trouble and repair. If the problem is the toner cartridge, replace the toner cartridge.
4.	Does the green test light on the rear (I/O) connector plate blink continuously or stay on when you switch on the printer?	Yes	Replace the LaserWriter I/O board.
5.	Is connector J211 on the DC controller PCB securely connected?	Yes	Replace the DC controller PCB.
6.	Perform the Laser Power Adjustment procedure described in this tab section. Is the laser out of adjustment and not adjustable?	Yes	Replace the DC controller PCB. Perform the Laser Power Adjustment procedure again. If the laser is still out of adjustment, replace the laser unit.
7.	Initiate a service test print. Does laser/scanner LED 401 light during the test print?	No	Replace the scanner unit.
8.	Is the print still blank?	Yes	Replace the high-voltage power supply. If the problem remains, replace the varistor PCB.

**Table Q4 – Black Image**

1.	Is the primary corona wire inside the toner cartridge broken?	Yes	Replace the toner cartridge.
2.	Is connector J211 on the DC controller board securely connected?	Yes	Replace the DC controller PCB.
3.	Is the print still black?	Yes	Replace the high-voltage power supply.
4.	Does the green test light on the rear (I/O) connector plate blink continuously or stay on when you switch on the printer?	Yes	Replace the LaserWriter I/O board.
		No	Replace the laser unit.

Table Q5 – Stained Separation Strip

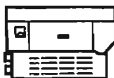
–	Is the separation belt, separation roller, or pinch roller (near the separation belt) dirty?	Yes	Clean any part that is dirty.
		No	Replace the toner cartridge.

Table Q6 – Scrambled User Test Print Image

–	Switch the printer off and then on again. Does the green test light on the rear (I/O) connector plate blink continuously or stay on and/or is the self-test print scrambled?	Yes	Replace the LaserWriter I/O board.
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Table Q7 – Stains on Back of Paper (1 of 2)

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the fuser roller cleaner felt.
2.	Does the leading-edge blank area on printed pages measure about 5 mm?	No	Replace the DC controller PCB.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q7 – Stains on Back of Paper (2 of 2)

3.	Is there any toner on the underside of the toner cartridge?	Yes	Clean with a damp cloth, then with a dry cloth.
	Is there toner on the transfer guides or are the guides dirty?	Yes	Clean with a damp cloth, then with a dry cloth.
	Is there any toner on the transfer corona assembly feeder guide?	Yes	Clean with a damp cloth, then with a dry cloth.
	Is there any toner on the separation belt, separation roller, or pinch roller?	Yes	Clean with a damp cloth, then with a dry cloth.
	Is the manual paper feed guide dirty or not grounded?	Yes	Clean with a damp cloth, then with a dry cloth. Ground the manual-feed guide if it is not correctly grounded.
4.	Are the transfer guides correctly grounded via 15 megohms resistance when you close the printer upper unit?	No	Ground the transfer guides correctly.
5.	Is the fuser assembly correctly grounded?	No	Ground the fuser assembly correctly.

Table Q8 – Dark Vertical Lines

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the fuser roller cleaner felt.
2.	Switch off the printer in the middle of printing and open the upper half of the printer. Open the protective shield on the toner cartridge. Can you see a vertical line on the drum? (Make this check as quickly as possible and in dim light to prevent light from damaging the drum.)	Yes	Clean the surface of the photosensitive drum as described in the Preventive Maintenance procedures located in this tab section. Then print about fifteen test prints. If the problem persists, replace the toner cartridge.

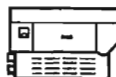


Table Q9 – Sharp Horizontal Black Lines

1.	Perform the Laser Power Adjustment procedure described in this tab section. Was the laser out of adjustment and not adjustable?	Yes	Replace the DC controller PCB. Perform the Laser Power Adjustment procedure again. If the laser is still out of adjustment, replace the laser unit.
2.	Initiate a test print by inserting a jumper between pins J205-1 and J205-2 on the DC controller PCB. Does the scanner motor start and LED 401 on the scanner driver PCB light continuously during the print process?	Yes	Go to step 6.
3.	Are J401 on the scanner driver PCB and J206 on the DC controller PCB securely connected?	No	Secure the connections.
4.	Is +24 VDC supplied between J401-1 and J401-2 (GND) on the scanner driver PCB?	No	Check J502 on the DC power supply and J208 on the DC controller PCB for secure contact. If contact is good, replace the DC power supply/motor drive PCB.
5.	Does the voltage between J206-4 and J206-2 (GND) vary from about +7 VDC to about 0 VDC when you initiate a test print?	No	Replace the DC controller PCB.
6.	Initiate a test print. Does the voltage between J401-2 and J402-2 (GND) on the scanner driver PCB vary from about 0 VDC to +3 VDC and then three minutes later back to 0 VDC?	Yes No	Replace the DC controller PCB. If the problem remains, replace the scanner unit. Replace the following the modules and check for the problem after each replacement to see if the next replacement is necessary: DC controller PCB Scanner unit Laser unit High-voltage power supply Varistor PCB



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q10 – Vertical Fogged Stripes

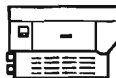
1.	Clean the primary corona wire. Does the print image improve?	Yes	Finished.
2.	Replace the toner cartridge. Does the print image improve?	Yes	Finished.
3.	Is the feeder guide warped?	Yes	Tighten the feeder guide screws fully and then loosen each screw from 1/8 to 1/4 turn. If warping remains, replace the feeder guide.

Table Q11 – Horizontal Fogged Stripes

–	Measure the distance of the stripes from the leading edge of the page. Are the stripes about 188 mm or 66 mm from the leading edge of the print? (The circumference of the drum is 188.5 mm, and that of the developing cylinder is 66 mm.)	Yes	Replace the toner cartridge.
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Table Q12 – White Horizontal Lines or Other Shapes on a Black Image

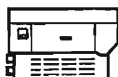
1.	Is approved paper being used?	No	Replace with approved paper (16-21 lb. standard photocopier paper). Explain to user that use of nonapproved paper may cause poor-quality prints.
2.	Is the paper damp?	Yes	Replace the paper. Instruct the user to store paper in its package in a dry place and not to open the packages before they are needed.

**Table Q13 – Thin Vertical Lines or Stripes**

1.	Do white stripes appear on the page?	Yes	If the toner cartridge indicator is green, rock the cartridge to spread the toner evenly. If the toner cartridge indicator is red, replace the toner cartridge.
2.	Is the fuser roller cleaner felt dirty?	Yes	Replace the fuser roller cleaner felt.
3.	Clean the transfer corona wire. Does the printed image improve?	Yes No	Finished. Replace the toner cartridge. If the problem persists, replace the original toner cartridge and go to step 4.
4.	Remove the toner cartridge and manually open the laser beam-blocking shutter in the printer (above the toner cartridge). Are there any obstructions or blockages in the area?	Yes	Remove the obstructions or clean the area with a fine brush.
5.	Remove the laser/scanner unit. Examine the dustproofing glass on the bottom of the laser/scanner unit. Is the glass cracked or dirty?	Yes No	If the glass is cracked, replace the scanner unit. If the glass is dirty, clean the glass with lint-free cloth. Replace the scanner unit.

Table Q14 – Faulty Registration (1 of 2)

1.	Is the paper cassette loaded with too much paper (more than 10 mm high)?	Yes	Remove excess paper.
2.	Has either of the shutter loading springs (located at the ends of the feed roller shaft on the registration shutter assembly) come loose?	Yes	Reinstall the shutter-loading springs.
3.	Is the leading edge of the paper showing excessive curl?	Yes	Straighten the edges of the paper or replace the paper.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q14 – Faulty Registration (2 of 2)

4.	Is approved paper being used?	No	Replace with approved paper (16-21 lb. standard photocopier paper).
5.	Is the paper cassette deformed in any manner?	Yes	Replace the paper cassette.
6.	Are the feed rollers on the cassette pickup assembly dirty?	Yes	Clean with a damp cloth, then with a dry cloth. (You can turn the rollers as you are cleaning them by opening the printer and rotating the gears in the bottom of the printer.)
7.	Disconnect J214 from the DC controller PCB. Actuate the cassette size microswitches MS5 (upper), MS6 (middle), and MS7 (lower) manually while checking the resistance between the following pairs of connector pins: a) J214-1 to J214-2 (MS5) b) J214-3 to J214-4 (MS6) c) J214-5 to J214-6 (MS7) Does the resistance drop from infinity to 0 ohms?	No	Check for wiring or connector problems between the DC controller PCB and the microswitches. If you find no wiring problem, remove the printer from its pedestal and replace any microswitch that didn't drop to 0 ohms on activation.

Table Q15 – Image Smears Easily

1.	Is approved paper being used?	No	Replace paper with approved paper (16-21 lb. standard photocopier paper).
2.	Are the upper and lower fuser rollers worn?	Yes	Replace the rollers as necessary.
		No	Replace the fuser assembly.



Table Q16 – Distortion

–	Perform a test print by jumpering J205-1 and J205-2 on the DC controller PCB. Does LED 501 on the DC power supply/motor drive PCB stay on steadily without flashing or going out during the print process?	No	After performing each of the following actions, generate a test print to see if the problem is resolved: a) Check all parts of the drive mechanism. b) Replace the DC power supply/motor drive PCB. c) Replace the main motor.
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Table Q17 – Waviness

–	Perform a test print by jumpering J205-1 and J205-2 on the DC controller PCB. Does LED 401 on the scanner driver PCB stay on continuously?	No	Replace the scanner unit. If the problem remains, replace the DC controller PCB.
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Table Q18 – Uneven Print Density

1.	Rock the toner cartridge to distribute the toner evenly and initiate several service test prints. Does the print quality improve?	Yes	Finished.
2.	Is the transfer guide bent?	Yes	Replace the transfer guide.

Table Q19 – Gray Image

1.	Replace the toner cartridge. Does the print quality improve?	Yes	Finished.
2.	Clean the transfer corona. Does the print quality improve?	Yes No	Finished. Go to Table C – High-Voltage Power Supply Does Not Provide Power.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table Q20 – Smearing 80-90 mm From Left Edge of Page

1.	Is the feeder guide warped?	Yes	Tighten the feeder guide screws fully and then loosen each screw from 1/8 to 1/4 turn. If warping remains, replace the feeder guide, carefully following directions for tightening and loosening screws.
2.	Locate the thermoprotector in the fuser assembly. Is the thermoprotector properly seated?	No	Clean the thermoprotector with MEK (methyl ethyl ketone) and seat it properly, or install a new thermoprotector.

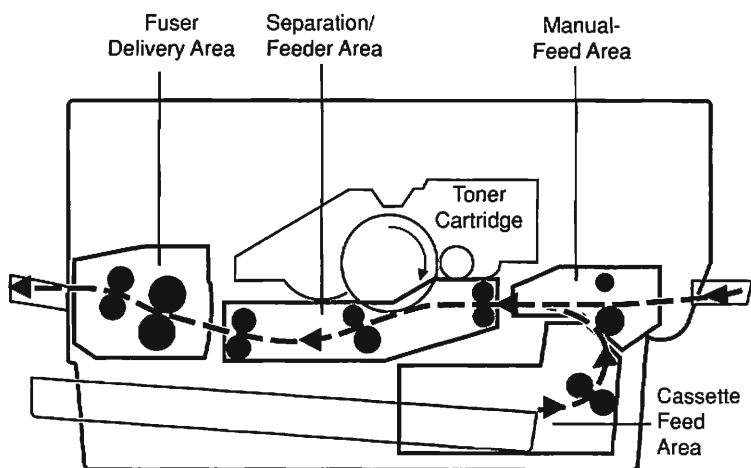


Figure: Paper Path



Table R – Paper Jams

1.	Switch off the printer and replace the DC controller PCB. Switch on the printer and initiate a service test print. Does the paper jam still occur?	No	Finished.
2.	Initiate a test print by inserting a jumper between pins J205-1 and J205-2 on the DC controller PCB. When the paper jam occurs, open the printer to observe the location of the paper (see Figure on previous page). 1. Did the paper make it up from the cassette feed area to the printer's upper body? 2. Are there any sheets of paper stuck together in the paper path? 3. Is the paper jam in the fuser/delivery area? 4. Is the paper jam in the separation/feeder area?	No Yes Yes Yes	Go to step 3. Go to Table R5 – Incomplete Feed—Sheets Stuck Together. Go to Table R4 – Fuser/Delivery Area. Go to Table R3 – Separation/Feeder Unit.
3.	Lower the door beneath the manual-feed tray to shed light into the paper cassette area. Then look into the cassette paper pickup area as you initiate a test print. (It is normal for the Paper Jam LED to come on for this step.) Do the pickup rollers rotate once at the beginning of the test print?	No	Go to Table F – Paper Pickup Rollers Do Not Rotate.
4.	Did a paper jam occur in the cassette paper guide/feed roller area even though the pickup rollers rotated?	Yes	Go to Table R2 – Cassette Pickup Assembly.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table R1 – Manual-Feed Unit

1.	Is approved paper being used?	No	Use approved paper (16-21 lb. standard photocopier paper).
2.	Is paper wrinkled or curled?	Yes	Replace the paper. Instruct the user in proper storage procedures for paper.
3.	Does the paper detection arm on the registration shutter assembly move smoothly?	No	Adjust the arm motion until it is smooth.
4.	Are the paper guides deformed?	Yes	Replace the deformed paper guides.
5.	Open the printer and switch on the power. Actuate the door switch with a screwdriver. Short together J210-2 and J210-5 on the DC controller PCB. Does registration shutter solenoid SL1 activate?	No	Check the connectors and the wiring between J210 on the DC controller PCB and the registration shutter solenoid SL1 for continuity. If you find no problems, replace the registration shutter assembly.
		Yes	Go to Table E – Cannot Feed Paper Manually.

Table R2 – Cassette Pickup Assembly (1 of 2)

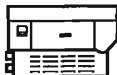
1.	Is the paper cassette loaded with more than 10 mm of paper?	Yes	Remove the excess paper.
2.	Is approved paper being used?	No	Use approved paper (16-21 lb. standard photocopier paper).
3.	Is the paper wrinkled or curled?	Yes	Replace the paper. Instruct the user in proper storage procedures for paper.
4.	Is the paper cassette installed properly in the printer?	No	Install the paper cassette properly.
5.	Is the cassette spring lifting force OK?	No	Check the movement of the cassette plate. If it is OK, replace the paper cassette.

**Table R2 – Cassette Pickup Assembly (2 of 2)**

6.	Is the right or left cassette hold-down tab deformed?	Yes	Repair the hold-down tab or replace the paper cassette.
7.	Does the door beneath the manual-feed tray (lower paper feed guide) close firmly?	No	Replace the paper cassette.
8.	Open the door beneath the manual feed tray (lower paper feed guide) and examine the feed rollers. Are any of the rollers dirty?	Yes	Clean the rollers with a damp cloth, then with a dry cloth. (You can turn the rollers by rotating a gear in the lower half of the printer.)
9.	Are any pickup rollers dirty, deformed, or worn?	Yes	Clean the rollers with alcohol. If the rollers are worn, replace them as necessary.

Table R3 – Separation/Feeder Unit (1 of 2)

1.	Is the separation belt damaged or twisted?	Yes	Replace the separation belt.
2.	Is the separation belt inside out?	Yes	Reinstall correctly. The notched side of the belt should be facing away from the I/O connector plate.
3.	Are the separation/feeder unit rollers dirty or worn?	Yes	Clean dirty rollers as necessary. Replace the separation/feeder unit if rollers are badly worn. (You can turn the rollers by rotating a gear in the lower half of the printer.)
4.	Do pinch rollers press firmly against separation and feeder rollers?	No	Replace the separation/feeder unit.
5.	Are the feeder rollers dirty or worn?	Yes	Clean dirty rollers with alcohol. If the rollers are worn, replace the separation/feeder unit.
6.	Are the transfer guides deformed in any way?	Yes	Replace the transfer guides.



LaserWriter and LaserWriter Plus

Troubleshooting Tables

Table R3 – Separation/Feeder Unit (2 of 2)

7.	Is the guide wire on the transfer corona assembly broken?	Yes	Restraining the guide wire.
8.	Are the two strips of mylar tape located on the transfer corona wire termination covers loose or missing?	Yes	Replace the transfer corona assembly wire termination covers as necessary.
9.	Does the paper jam problem persist?	Yes	Replace the registration shutter assembly.

Table R4 – Fuser/Delivery Area

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the fuser roller cleaner felt.
2.	Are the entrance guides dirty?	Yes	Clean the entrance guides.
3.	Are the separation claws worn?	Yes	Replace the separation claws as necessary.
4.	Are the lower delivery guides dirty?	Yes	Clean the lower delivery guides.
5.	Are the upper delivery guides dirty?	Yes	Clean the upper delivery guides.
6.	Does the paper delivery sensor arm PS3 move freely?	No	Repair the paper delivery sensor arm to restore free motion.

Table R5 – Incomplete Feed—Sheets Stuck Together

1.	Is approved paper being used?	No	Use approved paper (16-21 lb. standard photocopier paper).
2.	Is the cassette spring lifting force OK?	No	Check the movement of the cassette plate. If it is OK, replace the cassette springs.
3.	Are the cassette side plates worn?	Yes	Replace the paper cassette.

Table S – I/O Board Power Problems

Page 51

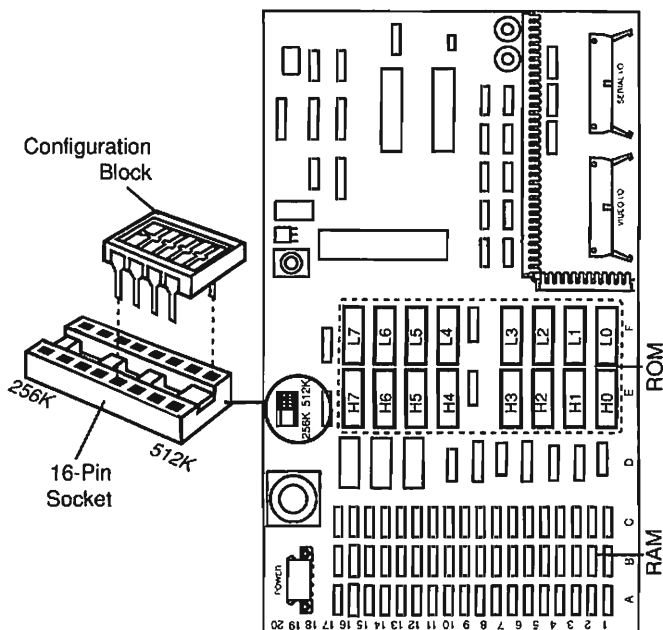
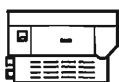
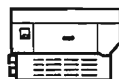


Figure: LaserWriter 256K/512K I/O Board

ROM Upgrade Procedure

1. Switch off the power, place the LaserWriter on the grounded workbench pad, and put on your grounding wriststrap.
2. Remove the top cover and the LaserWriter I/O board. Place the I/O board on the grounded workbench pad.
3. Using the IC extractor, carefully remove all ROMs from rows E and F on the I/O board (see Figure). (There may be four, eight, or sixteen ROMs installed on the I/O board—remove them all.)
4. If the I/O board does not have a 16-pin socket installed at location E-20 (see Figure), install the 16-pin socket as follows:
 - a. Desolder and discard the four jumper wires at the socket location.
 - b. Desolder all 16 holes at the socket location.
 - c. Install the socket (on the component side of the board) so that the 16 pins of the socket match the 16 holes on the board. Solder all pins.
5. If the board is a 256K/512K I/O board, install the configuration block at the socket labeled "512K" (see Figure).



6. If the board is a **512K/1M I/O board**, install the configuration block at the socket labeled "1M" (see Figure).
7. If you are upgrading an I/O board with the 512K/1M jumper (see Figure), install the jumper at the set of pins marked "512K."
8. Install the upgrade ROMs, matching the markings on each ROM chip with the ROM socket locations on the I/O board. The notch along the edge should face the three rows of RAM on the board (see Figure).
9. Replace the I/O board and switch on the printer. The LaserWriter should produce a user test print within two to three minutes.
10. Locate the PostScript ROM revision number printed on the user test print. **The ROM upgrade is successful if the test print displays the Rev 3.0 ROM version number.**
11. **If a user test print is not produced**, verify that the ROMs are properly installed. If the ROMs are properly installed and the user test print is still not produced, replace the ROMs with known-good ROMs from a LaserWriter Plus Kit, or run the LaserWriter/LaserWriter Plus Built-in Diagnostics.

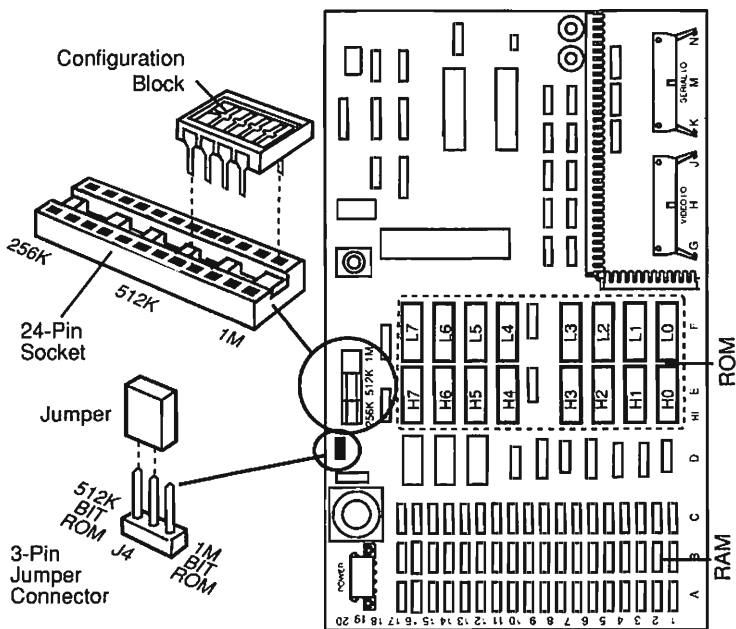
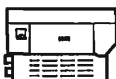


Figure: LaserWriter 512K/1M I/O Board



LaserWriter and LaserWriter Plus

Laser Power Adjustment

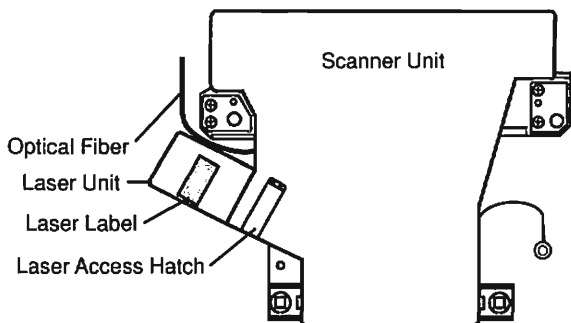


Figure: Laser/Scanner Unit

Laser Power Adjustment Procedure

1. Place the LaserWriter on the grounded workbench pad and remove the top cover, the I/O board, and the card cage.
2. With the printer power switched off, open the laser access hatch on the laser/scanner unit (**see Figure**). Insert the laser power checker into the laser access hatch with the detector facing the laser diode.



WARNING: Make sure the laser power checker is fully inserted so that none of the laser light can escape from the access hatch.

3. Connect the laser power checker to the digital voltmeter as follows:
 - a. Connect the black lead from the laser power checker to the multimeter socket labeled "Common."
 - b. Connect the red lead from the checker to the multimeter socket marked "Volts" or "V."
 - c. Set the multimeter to Volts, set the range to 200 mV, and switch on the multimeter.
4. Disconnect J209 from the DC controller board (**see Figure next page**) and connect a jumper between connector pins J209-5 and J209-6.
5. Locate VR202 on the DC controller board (**see Figure next page**) and turn VR202 to the lowest setting (full counterclockwise) using a jeweler's screwdriver.
6. Switch on the printer and wait until the green Ready/Wait light stops flashing.
7. Briefly connect a jumper between pins J209-6 and J209-7 on the DC controller board. Remove the jumper and record the multimeter reading. Repeat this step two more times.
8. Calculate the average of the three multimeter readings and compare the average to the reading shown on the laser label.



- If the laser power output is within the range indicated on the laser label (the voltage indicated next to the figure "300", ± 1 millivolt), no further adjustment is necessary.
- If the laser power output is lower than the range indicated on the laser label, remove the jumper between J209-6 and J209-7. Then, turn VR202 slightly clockwise and repeat steps 6 through 8 until the adjustment is within the indicated range.
- If the laser power output is higher than the range indicated on the laser label, remove the jumper between J209-6 and J209-7. Then, turn VR202 slightly counterclockwise and repeat steps 6 through 8 until the adjustment is within the indicated range.

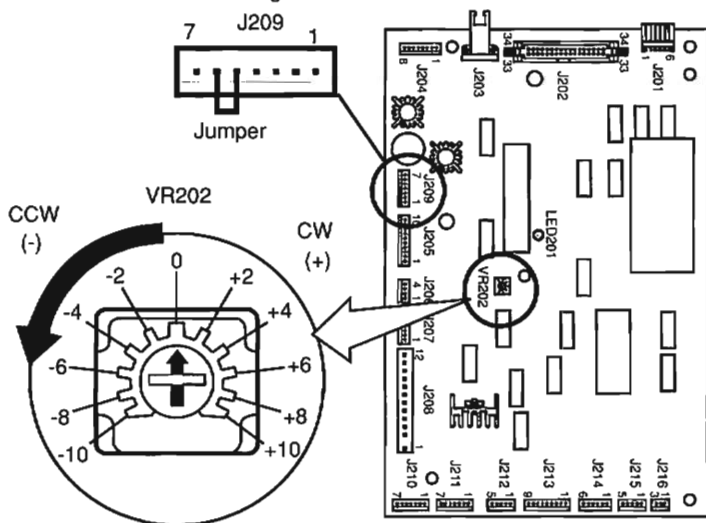


Figure: DC Controller PCB

Image Skew Adjustment Procedure – Check Print Alignment

Switch on the printer to produce a user test print. Measure the distance from the top left and right corners of the test pattern to the top edge of the paper (see Figure). The difference between the left and right measurements should be no more than 1 millimeter.

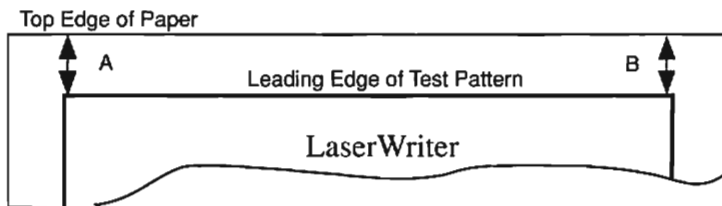


Figure: User Test Print

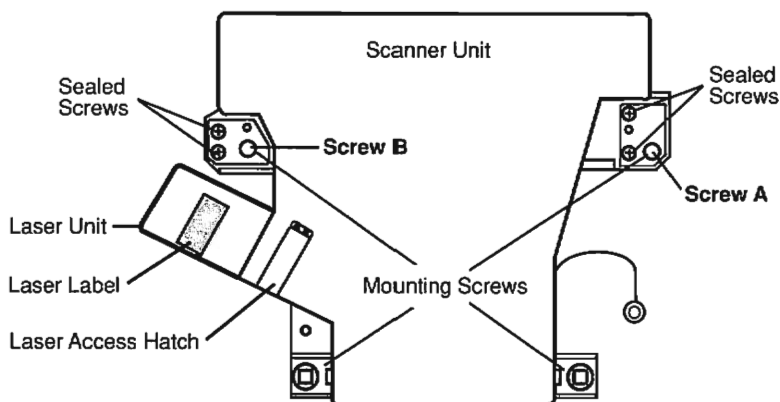
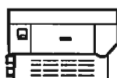


Figure: Laser/Scanner Unit

Image Skew Adjustment Procedure – Adjust Image

1. Place the LaserWriter on a grounded workbench pad and remove the top cover and the I/O board.
2. Switch on the printer and wait until the green Ready/Wait light stops flashing.
3. Generate a service test print by briefly connecting a jumper between the J205-1 and J205-2 connector pins on the DC controller board.
4. Locate the scanner unit (**see Figure**). Loosen the four large mounting screws and the two sealed screws closest to the laser unit.
5. Rotate the scanner unit around **Screw A**. Rotate the scanner unit clockwise to make the horizontal line incline counterclockwise; rotate the scanner unit counterclockwise to make the horizontal line incline clockwise.
6. Generate a service test print and measure the distance from the top-left and top-right corners of the test pattern to the top edge of the paper. Repeat this procedure until the difference between the two measurements (left and right) is no more than 1 millimeter.
7. **If the image adjustment is still not correct** and you are unable to rotate the scanner unit any further, tighten the two sealed screws closest to the laser unit.
8. Loosen the two sealed screws on the other side of the scanner unit (**see Figure**) and rotate the scanner unit around **Screw B**.
9. Generate a service test print and measure the distance from the top-left and -right corners of the test pattern to the top edge of the paper. Repeat this procedure until the difference between the two measurements (left and right) is no more than 1 millimeter.



Setting Up for Preventive Maintenance

Before performing any preventive maintenance, be sure to do the following:

1. Power off and unplug the LaserWriter.
2. Allow the fuser assembly rollers to cool.
3. Prepare your work area for electrostatic discharge prevention.
4. Spread a drop cloth under the work area to protect the floor from grease and spilled toner.

Verifying the Page Count

1. Switch on the LaserWriter and wait for the user test print. At the bottom of the user test print is the number of pages printed since the installation of the I/O board. This number will be accurate if the I/O board has never been repaired or upgraded.
2. If the I/O board has been repaired or upgraded, verify the page count as follows:
 - a. Remove the top cover, the LaserWriter I/O board, and the DC controller board.
 - b. Locate the preconditioning exposure assembly (just below the DC controller board).
 - c. Locate the page counter in the middle of the preconditioning exposure assembly—the counter looks like a small thermometer (see Figure).
 - d. Determine the page count. Each mark on the counter represents approximately 10,000 pages.

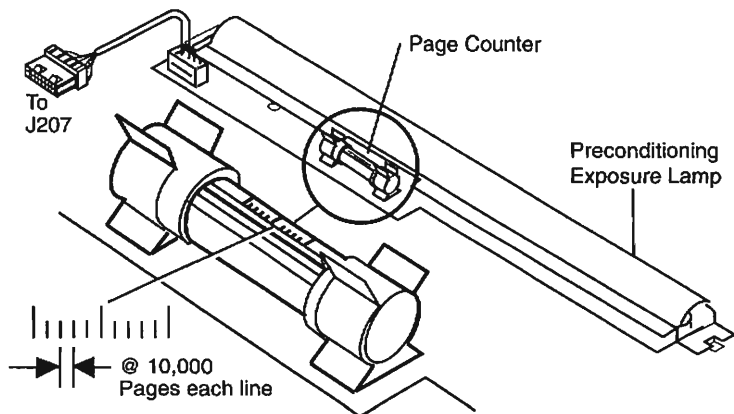


Figure: Page Counter



LaserWriter and LaserWriter Plus

Preventive Maintenance

Preventive Maintenance Schedule

Verify the LaserWriter page count and perform the following procedures:

Number of Pages

Maintenance Procedure

Zero to 50,000

- Perform Standard Maintenance

50,000 to 100,000

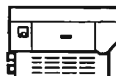
- Perform Standard Maintenance
- Replace the ozone filter

100,000 to 150,000

- Perform 100,000-Page Service
- Replace the separation belt

Standard Maintenance Checkpoints

Toner Cartridge – Light-Blocking Shutters	Open and close to make sure the shutters are not jammed or broken.
Toner Cartridge – Primary Corona Wire	Clean using the wire cleaning brush supplied with the printer.
Toner Cartridge – Protective Shield	Clean with damp cloth.
Toner Cartridge – Photosensitive Drum	Do not clean the surface of the photosensitive drum unless it is absolutely necessary. If necessary, use a soft cloth saturated with toner powder to clean the drum surface.
Fuser Assembly – Fuser Roller Cleaner Felt	If the fuser roller cleaner felt is dirty, replace it.
Fuser Assembly – Separation Claws, Delivery Guide, Separation Guide, and Paper Guide	Clean with a cloth dampened with isopropyl alcohol.
Transfer Corona Assembly and Separation Belt	Clean with a cotton swab.
Feeder Rollers, Separation Rollers, Transfer Guides, and Feeder Guide	Clean with a cloth dampened with isopropyl alcohol.
Ozone Filter	Replace every 50,000 pages.

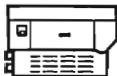


100,000-Page Service Checkpoints

Fan	Clean using a small brush.
Registration Shutter Rollers	Clean with a cloth dampened with isopropyl alcohol.
Preconditioning Exposure Assembly	Replace at 100,000 pages.
Grounding Spring	Replace at 100,000 pages.
Paper pickup rollers, paper feed rollers, and the lower paper feed guide.	Replace at 100,000 pages.
Fuser Assembly	Replace at 100,000 pages.
Ozone Filter	Replace at 100,000 pages.
Separation Belt	Replace at 100,000 pages.

Replacing the Separation Belt

1. Open the printer and remove the old separation belt (see **Figure on next page**).
2. With a screwdriver, open Loop A on the new separation belt.
3. Hang Loop A from the tab on the upper transfer guide (see **Figure on next page**). Be sure the indentation on the separation belt is on the right side.
4. Pass the separation belt over the transfer roller and under the separation pinch roller (see **Figure on next page**).
5. Hook Loop B to the spring suspender (see **Figure on next page**).
6. Check the following after installing the separation belt:
 - a. Is the separation belt twisted or cut?
 - b. Is the indentation on the right side?
 - c. Is Loop A securely hung from the upper transfer guide?
 - d. Does the belt pass over the transfer roller?
 - e. Does the belt pass between the separation roller and the separation pinch roller?
 - f. Is the separation belt spring hooked securely to the underside of the spring suspension side of the spring suspender?



LaserWriter and LaserWriter Plus

Preventive Maintenance

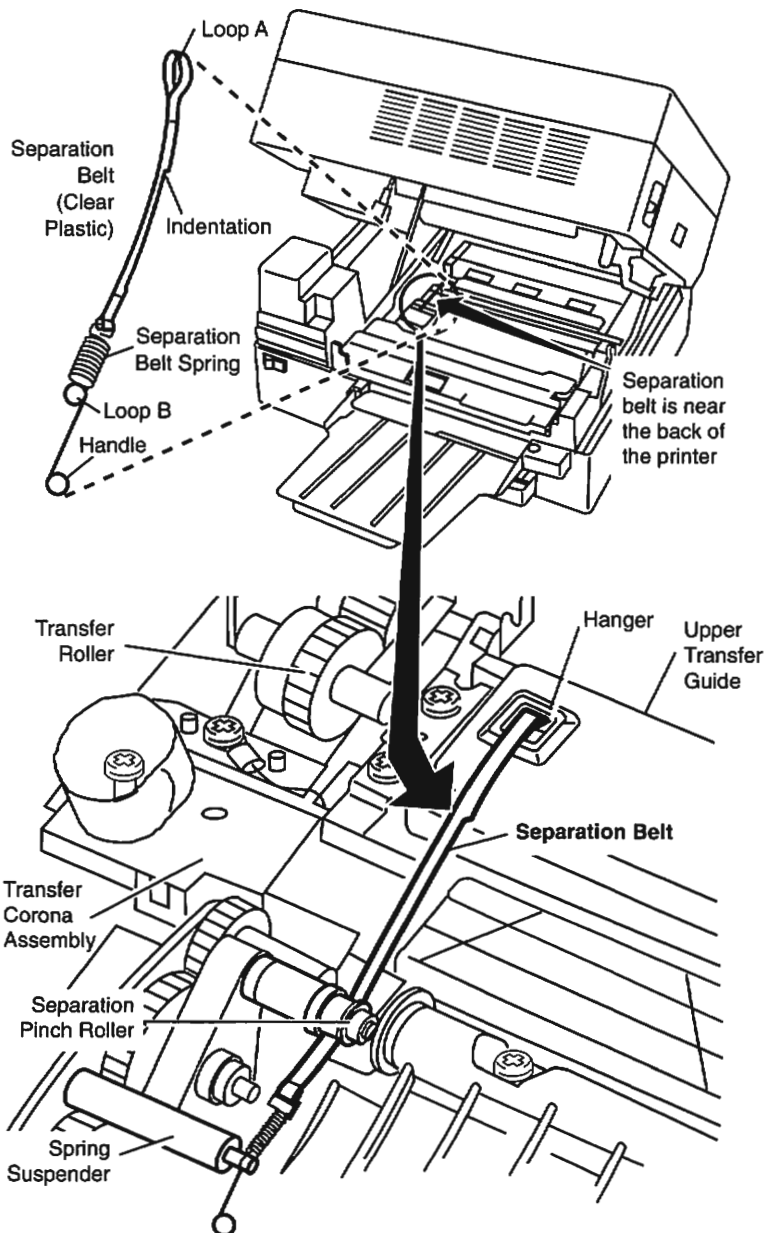


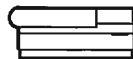
Figure: Installing the Separation Belt



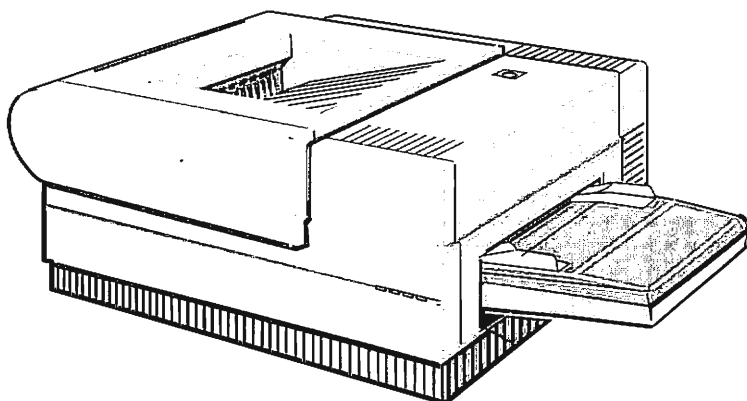


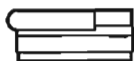
LaserWriter II

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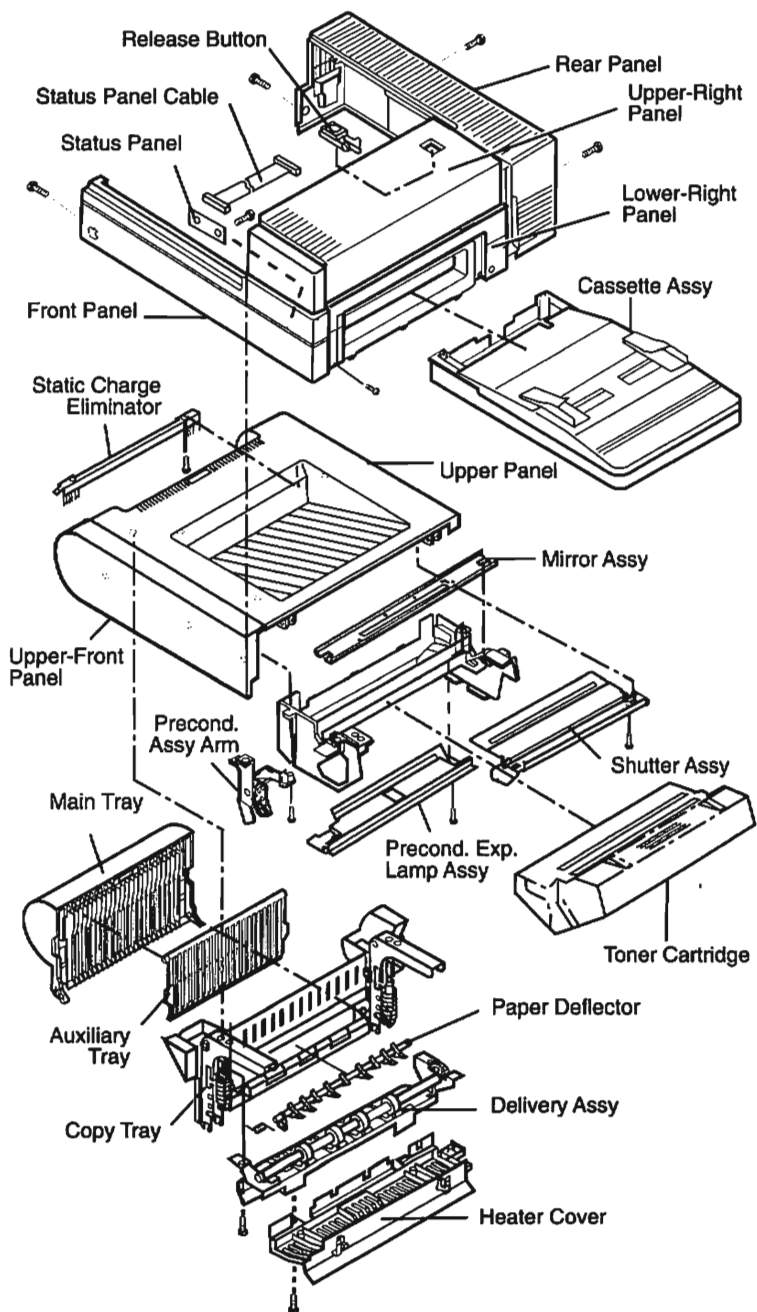
Contents	Page
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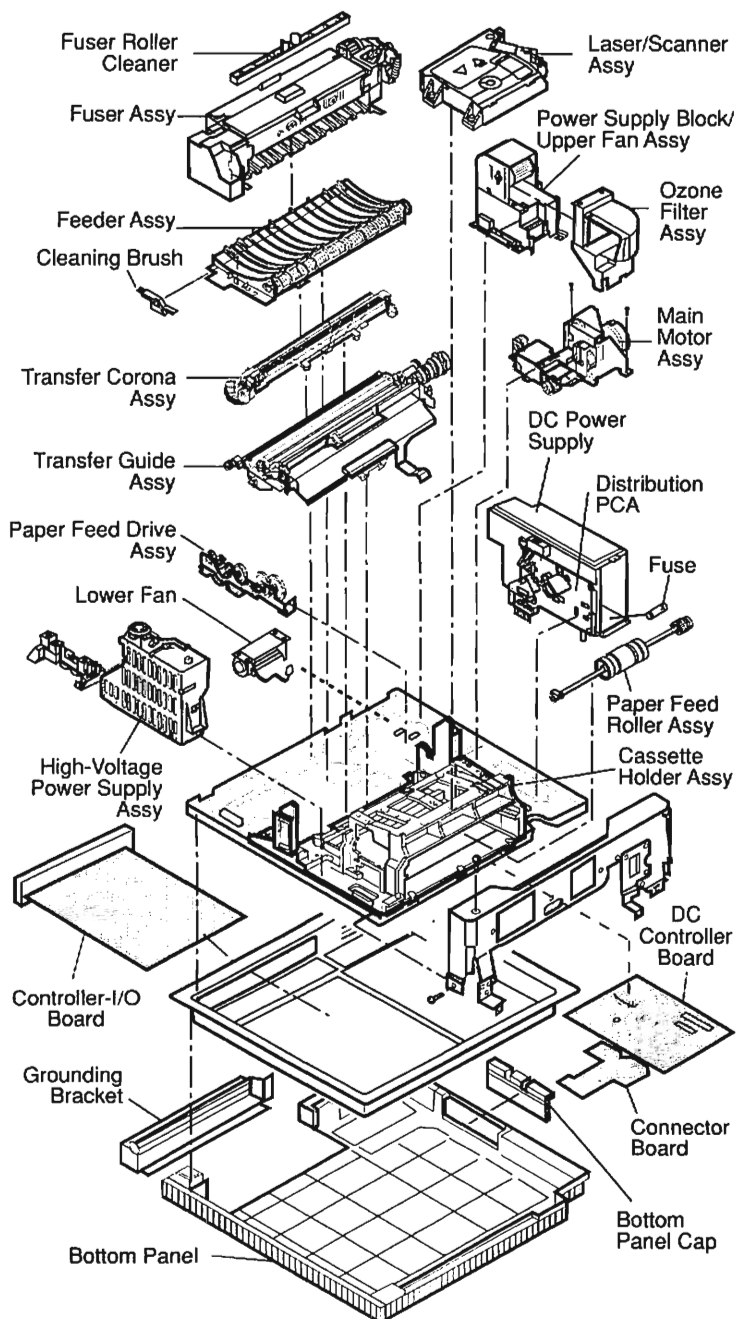
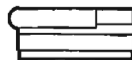
LaserWriter II

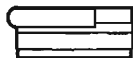
Exploded View



LaserWriter II

Exploded View





LaserWriter II

Parts List

The following parts list is not comprehensive. Only selected service modules and replacement parts are listed. When ordering a replacement module or spare part, be sure to check the part number in the guide against the current price pages in the *Apple Service Programs* manual. Remember that this Apple Service Guide is not updated regularly.

Bottom Case

Bottom Panel	949-0152
Bottom Panel Cap	949-0154
Grounding Bracke	948-0132

Cassette Holder Assembly

Auxiliary Guide	949-0165
Left Hook	949-0159
Left Lifter	949-0163
Main Body Block	949-0247
Paper Pickup Gear, 19-tooth	939-0023
Paper Pickup Gear, 57-tooth	939-0024
Paper Sensing Arm	949-0166
Right Hook	949-0160
Right Hook Guide	949-0162
Right Lifter	949-0164

Cleaning Brush

Connector PCA	970-0047
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Controller-I/O Board, LWII NTX

IC, ROM, LL0, LWII NTX	661-0429
IC, ROM, LL1, LWII NTX	342-0560
IC, ROM, LM0, LWII NTX	342-0562
IC, ROM, LM1, LWII NTX	342-0564
IC, ROM, HM1, LWII NTX	342-0566
IC, ROM, HM0, LWII NTX	342-0567
IC, ROM, HH1, LW II NTX	342-0565
IC, ROM, HH0, LW II NTX	342-0563
IC, ROM, HH0, LW II NTX	342-0561

Controller-I/O Board, LW II NTX (rev 3)

IC, ROM, LL0, LWII NTX	661-1605
IC, ROM, LL1, LW II NTX	342-0711
IC, ROM, LM0, LW II NTX	342-0713
IC, ROM, LM1, LW II NTX	342-0715
IC, ROM, HM1, LW II NTX	342-0717
IC, ROM, HM0, LW II NTX	342-0718
IC, ROM, HH1, LW II NTX	342-0716
IC, ROM, HH0, LW II NTX	342-0714
IC, ROM, HH0, LW II NTX	342-0712

Controller-I/O Board, LW II NT

IC, ROM, L0, LW II NT	661-0438
IC, ROM, L1, LW II NT	342-0545
IC, ROM, L2, LW II NT	342-0547
IC, ROM, L3, LW II NT	342-0549
IC, ROM, H0, LW II NT	342-0551
IC, ROM, H1, LW II NT	342-0546
IC, ROM, H2, LW II NT	342-0548
IC, ROM, H3, LW II NT	342-0550
IC, ROM, H3, LW II NT	342-0552

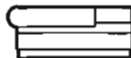
Controller-I/O Board, LW IIf

Assy, LW IIf Controller-I/O Board Bracket	661-0662
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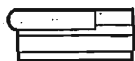
076-0418

LaserWriter II

Parts List



IC, ROM, UU (341-0863), LW II and IIg	076-0863
IC, ROM, UM (341-0862), LW II and IIg	076-0862
IC, ROM, LM (341-0861), LW II and IIg	076-0861
IC, ROM, LL (341-0860), LW II and IIg	076-0860
SIMM, 256K, 80ns	661-0519
Controller-I/O Board, LW IIg	661-0661
Assy, LW IIg Controller-I/O Board Bracket	076-0417
IC, ROM, UU (341-0863), LW II and IIg	076-0863
IC, ROM, UM (341-0862), LW II and IIg	076-0862
IC, ROM, LM (341-0861), LW II and IIg	076-0861
IC, ROM, LL (341-0860), LW II and IIg	076-0860
SIMM, 1 MB, 80 ns	661-0520
SIMM, 256K, 80 ns	661-0519
DC Controller PCA	661-0426
DC Power Supply, 110/115 V	661-0424
DC Power Supply, 220/240 V	661-0442
Fuse, 125 V 6.3	941-0005
Fuse, Medium Time Lag 3.15 A, 250 V	740-0061
Delivery Assembly	971-0023
Distribution PCA	971-0028
External Panels	
Front Panel	949-0219
Lower-Right Panel	949-0003
Rear Panel	949-0218
Status Panel	971-0005
Upper Panel	949-0144
Upper-Front Panel	949-0148
Upper-Right Panel	949-0004
Fan, Lower	959-0021
Fan, Upper	959-0022
Feeder Assembly	971-0018
Fuser Assembly, 110/115 V	661-0440
Fuser Assembly, 220/240 V	661-0444
Delivery Sensing Lever	949-0186
Fuser Heater, 100 V, 620 W	938-0003
Fuser Heater, 220 V, 570 W	938-0004
Fuser Roller Cleaner	970-0049
High-Voltage Power Supply	661-0425
Laser/Scanner Assembly	661-0423
Main Motor Assembly	971-0014
Ozone Filter	961-0003
Ozone Filter (for Case with Door)	961-0007
Ozone Filter Case with Door	971-0038
Paper Feed Drive Assembly	971-0015
Paper Feed Roller Assembly	971-0017
Power Supply Block, 110/115 V	661-0427
Power Supply Block, 220/240 V	661-0443
Release Button	949-0142
Shutter Assembly	971-0016
Status Panel Cable	936-0041
Transfer Corona Assembly	971-0026
Transfer Guide Assembly	971-0019

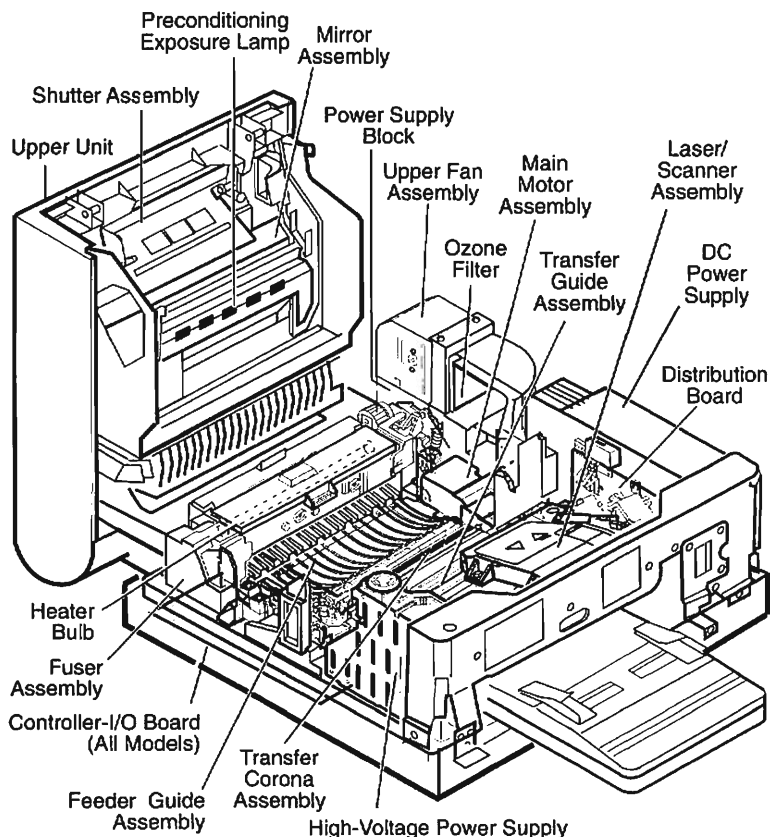


LaserWriter II

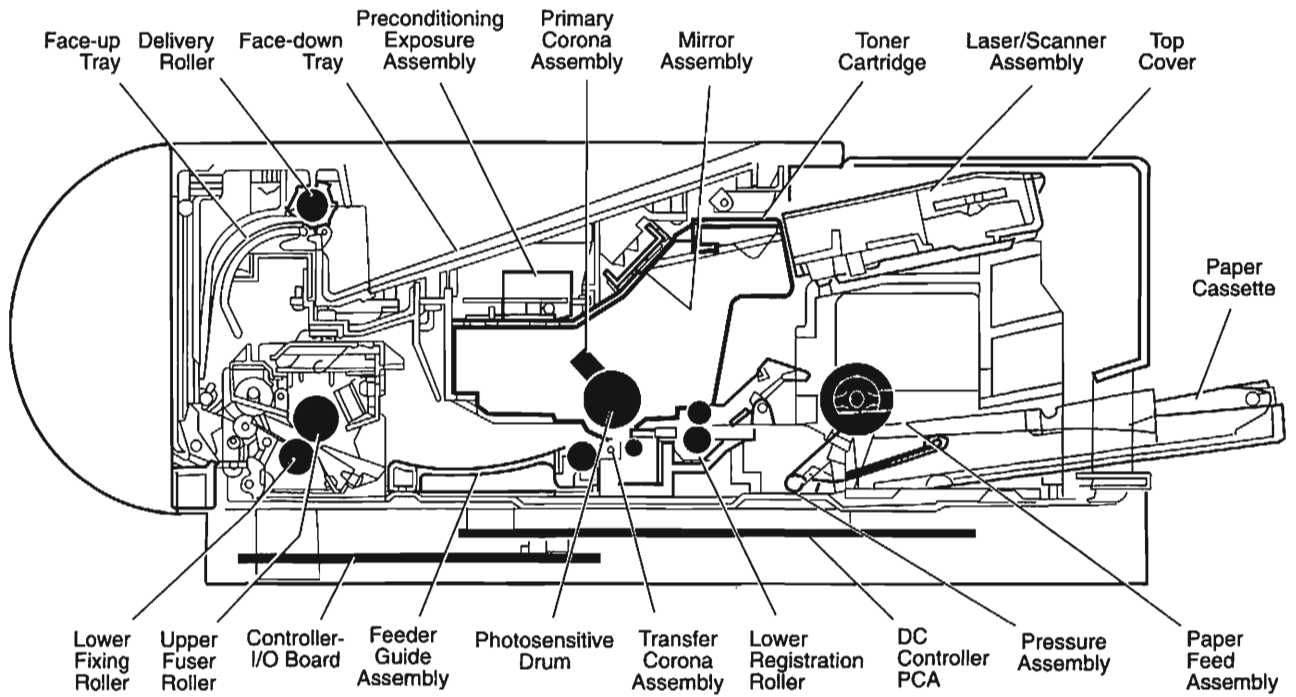
Parts List/Major Assemblies

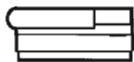
Upper Main Body

Auxiliary Tray	949-0146
Copy Tray	949-0147
Delivery Assembly (Fuser)	971-0023
Heater Cover	949-0143
Main Tray	949-0145
Mirror Assembly	971-0007
Upper Panel	949-0144
Upper Front Panel	949-0148
Paper Deflector	971-0006
Preconditioning Assembly Arm	949-0184
Preconditioning Exposure Lamp Assembly	971-0025
Static Charge Eliminator	970-0046



LaserWriter II Major Assemblies





LaserWriter II

Controller-I/O Board Identification

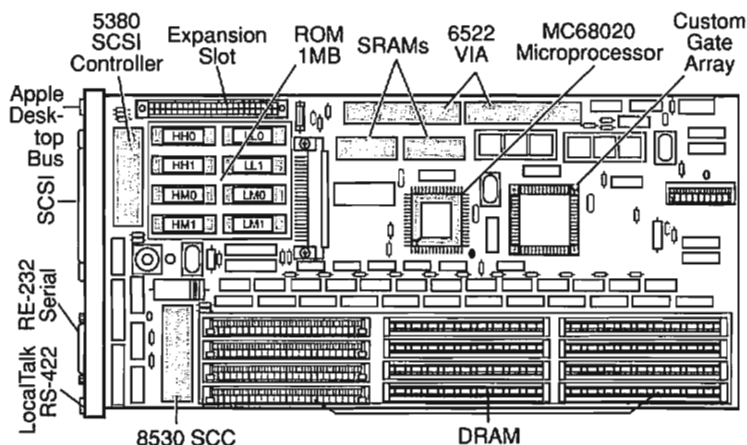


Figure: NTX Controller-I/O Board

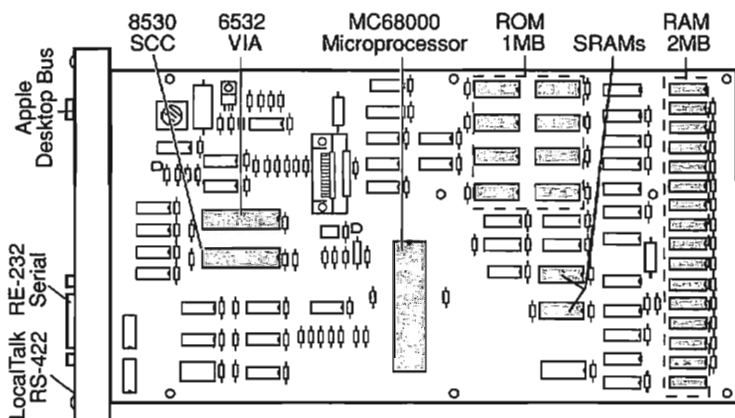


Figure: NT Controller-I/O Board

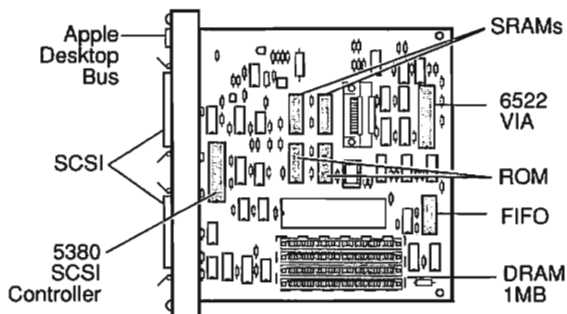


Figure: SC Controller-I/O Board

LaserWriter II

Controller-I/O Board Identification

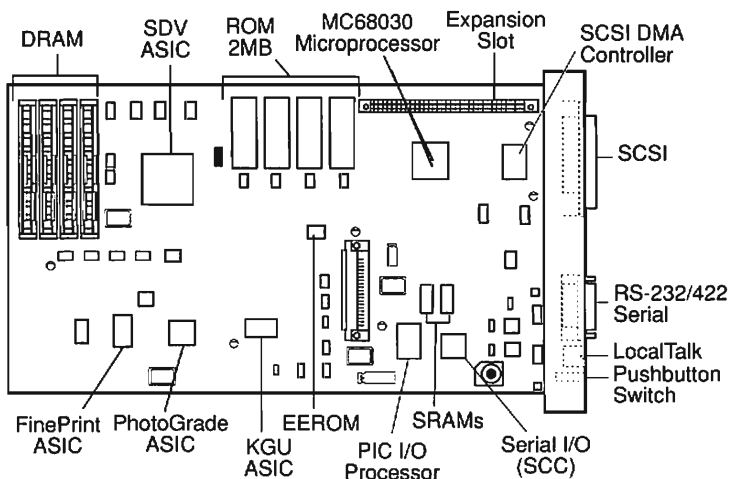
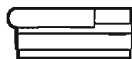


Figure: Ilg Controller-I/O Board

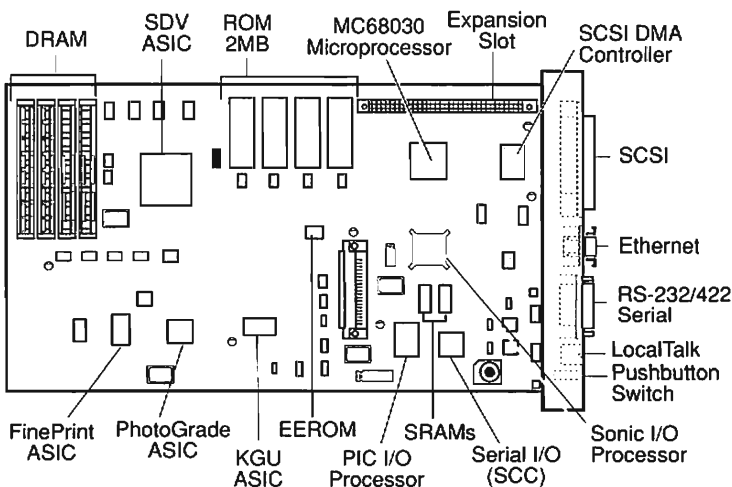


Figure: Ilf Controller-I/O Board

LaserWriter II

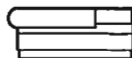
Specifications

Controller-I/O Board Specifications

	SC	NT	NTX	IIi	IIg
CPU	68000 (7.45 MHz)	68000 (11.16 MHz)	68020 (16.67 MHz)	68030 (20.0 MHz)	68030 (25.0 MHz)
ROM	16 KB	1.0 MB	1.0 MB	2.0 MB	2.0 MB
RAM	1.0 MB	2.0 MB	2.0 MB; expandable to 12 MB	2.0 MB; expandable to 32 MB	5.0 MB; expandable to 32 MB
I/O	SCSI	LocalTalk RS-232 RS-422	LocalTalk RS-232 RS-422 SCSI	LocalTalk RS-232 RS-422 SCSI	LocalTalk RS-232 RS-422 SCSI Ethernet
Printer Imaging Languages	QuickDraw	PostScript Diablo 630	PostScript Diablo 630 HP-LaserJet	PostScript Level 1 & 2; HP-LaserJet IIP	PostScript Level 1 & 2; HP LaserJet IIP
Built-in fonts	Times Helvetica Courier Symbol	Times, Courier, Symbol, Palatino, Helvetica, Helvetica Narrow, ITC Bookman, ITC Avant Garde, ITC Zapf Chancery, New Century Schoolbook, and ITC Zapf Dingbats	Times, Courier, Symbol, Palatino, Helvetica, Helvetica Narrow, ITC Bookman, ITC Avant Garde, ITC Zapf Chancery, New Century Schoolbook, and ITC Zapf Dingbats	Times, Courier, Symbol, Palatino, Helvetica, Helvetica Narrow, ITC Bookman, ITC Avant Garde, ITC Zapf Chancery, New Century Schoolbook, and ITC Zapf Dingbats	Times, Courier, Symbol, Palatino, Helvetica, Helvetica Narrow, ITC Bookman, ITC Avant Garde, ITC Zapf Chancery, New Century Schoolbook, and ITC Zapf Dingbats

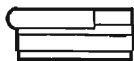
LaserWriter II

Specifications



LaserWriter II Print Engine Specifications

Marking engine	Canon LBP-SX laser xerographic
Print resolution	300 dots per inch (DPI)
Speed	8 pages per minute
Print materials	Letter, legal, A4, and B5 sizes use 16 -to 20-pound single-sheet photocopy bond, 8 -to 34-pound letterhead and colored stock, or transparency overhead film. Envelopes, labels, and paper (up to 36-pound) supported via manual feed. Envelopes also supported via optional envelope tray.
Print capacities	Paper cassettes hold 200 sheets of 20-pound paper. Envelope cassette holds 15 envelopes.
Printable surface	Letter size: 8.0 by 10.5 inches Legal size: 8.0 by 13.0 inches A4: 7.41 by 10.86 inches B5: 7.69 by 10.16 inches Printable area may vary depending upon applications.
Physical dimensions	Height: 8.6 in. (21.8 cm) Width: 20 in. (50.8 cm) Depth: 18.5 in. (47 cm) Weight: 45 lb (20.25 kg)
Operating environment	Temperature: 50° to 90° F (10° to 32.5° C) Humidity: 20% to 80%
Power requirements	90 to 126 volts AC; 50 to 60 Hz



LaserWriter II

Status LEDs

LaserWriter II Status LEDs

The LaserWriter II has four status LEDs (see Figure) located on the front panel:

- **Ready** – The green Ready light flashes during printer warmup and when the printer is operating. The light is steady when the printer is warmed up and ready to print. The light is off when the printer is not ready, an error condition exists, or the top cover is open.
- **Low-Toner** – The orange Low-Toner light is on and steady when the toner cartridge needs replacement. The light flashes when the toner cartridge is installed incorrectly.
- **Paper-Out** – The red Paper-Out light is on and steady when the printer is out of paper or the paper tray is missing. The light flashes when the printer is ready to accept manually fed paper.
- **Paper Jam** – The red Paper Jam light comes on when paper jams inside the printer. The light remains on until the jam is cleared.
- **Paper-Out and Paper Jam** – When both the red Paper-Out and Paper Jam lights flash, the controller-I/O board or the LaserWriter print engine has an error condition. Refer to Troubleshooting the LaserWriter II for diagnosis and repair.

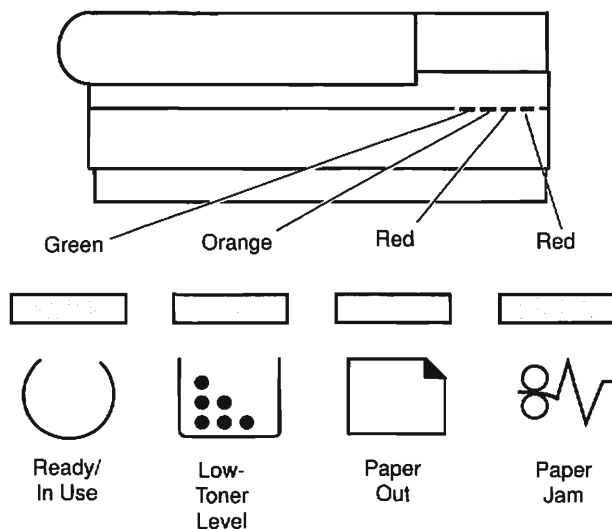
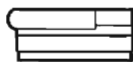


Figure: LaserWriter II Status LEDs

LaserWriter II

Test Pages



Engine Self-Test Page

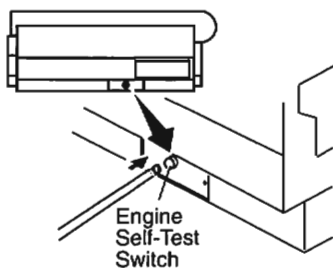
To print an engine self-test page, press the engine self-test switch (see Figure) which is located on the side of the printer behind the access cover. The engine self-test page (see Figure) confirms the operation of the print engine. It is useful in service situations where you need to isolate print engine failures from controller-I/O board failures.

SC Startup Test Page

The LaserWriter II SC generates a startup test page whenever the SCSI ID number is set to "7." The SC startup test page confirms the operation of the SC controller-I/O board.

NT, NTX, IIx, and IIg Startup Test Pages

The LaserWriter II NT, NTX, IIx, and IIg generate a startup test page (see Figure) each time they are switched on (unless the user switches the function off with PostScript software or the *LaserWriter Utility* program on the *LaserWriter II Installation* disk). The startup test page confirms the operation of the NT, NTX, IIx, or IIg controller-I/O board.



Engine Self-Test Page

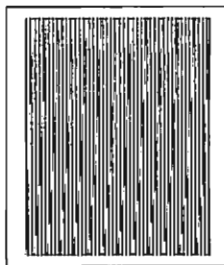


Figure: Engine Self-Test Switch and Engine Self-Test Page

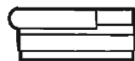
IIg Startup Test Page



IIx Startup Test Page



Figure: IIx/IIg Startup Test Page



LaserWriter II

Troubleshooting the LaserWriter II

Troubleshooting Procedure

1. Before you begin troubleshooting, check the printer setup and operating conditions described in the "Pre-Power-On Checklist."
2. Make sure you are familiar with all procedures described in the **Safety** section of this guide before performing any live electrical checks.
3. To troubleshoot a LaserWriter II SC or NT/NTX, begin with **Troubleshooting Flowchart 1** and proceed sequentially, function by function, until you verify all the printer's main functions. To troubleshoot a LaserWriter IIi or IIg, begin with the **IIi/g Diagnostic Chart** and observe the printer's status LEDs.

In the event of a printer problem, the Troubleshooting Flowcharts will refer you to the appropriate troubleshooting table for resolution of the failure. The IIi/g Diagnostic Chart will indicate the printer part that you must replace to correct the problem.

4. If you replace a module and find that the problem remains, reinstall the original module or component before proceeding.
5. When the printer is repaired, perform the necessary **Preventive Maintenance** before returning the customer's printer.

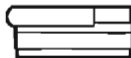
Pre-Power-On Checklist

Check the following items before proceeding with the troubleshooting flowcharts.

- ✓ Line voltage is OK (115 volts AC $\pm$ 10%)
- ✓ Printer is installed on a solid level surface
- ✓ Room temperature is between 50 and 90° F (10 to 32.5 ° C)
- ✓ Humidity is between 20% and 80%
- ✓ Printer is not located in a hot or humid area, near open flames, or in a dusty location
- ✓ Printer is not exposed to ammonia gas
- ✓ Printer is not exposed to direct sunlight
- ✓ Printer is installed in a well-ventilated area
- ✓ Cables and connectors are OK
- ✓ Toner cartridge is installed and has toner
- ✓ Fuser roller cleaner felt is in place and not dirty
- ✓ Print density adjustment dial is set correctly
- ✓ Paper cassette is properly loaded with paper
- ✓ Paper used is within specification
- ✓ Transfer corona wire is clean and unbroken
- ✓ I/O PCA DIP switches are set correctly

LaserWriter II

II/f/g Diagnostic Chart



To use the LaserWriter II/f or II/g status LEDs for diagnostic purposes, set the rotary switch on the back of the printer to 4 and connect the LaserWriter II Test Connector to the DB-25 serial port. Switch on the printer and observe the status LEDs. If an error condition exists, replace the component indicated.

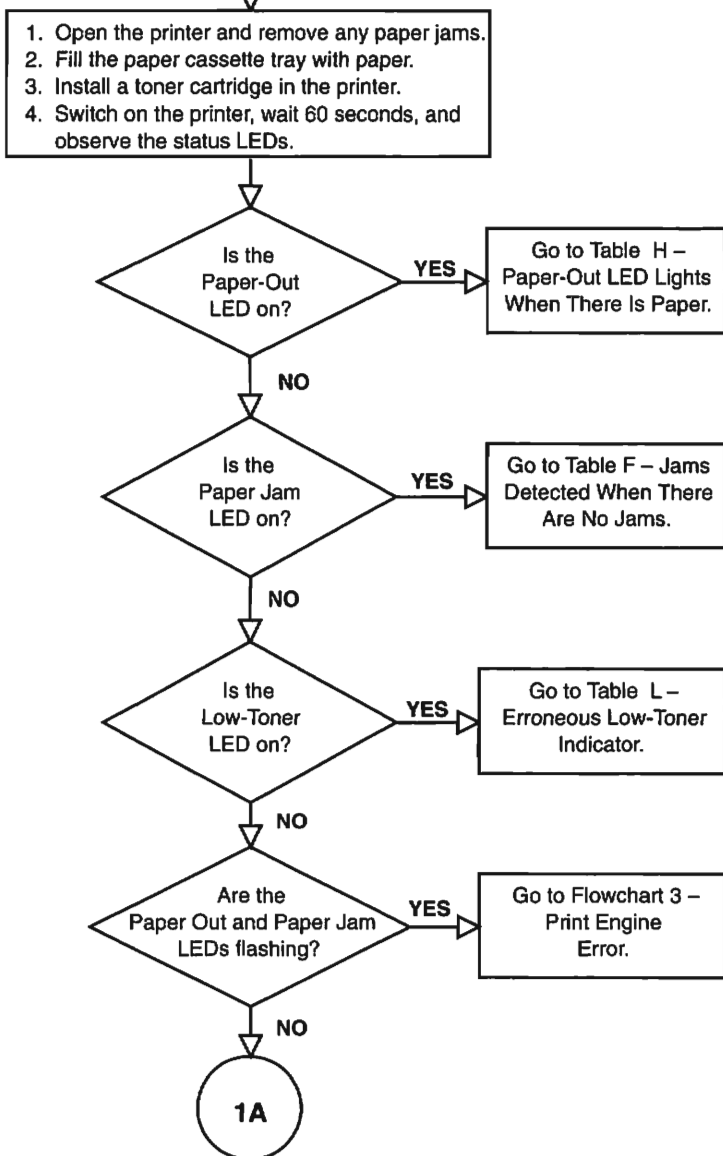
STATUS LEDs				ERROR CONDITION	ACTION
flash	flash	flash	flash	No error	-
on	on	flash	flash	Fuser Assy	Refer to Table D.
on	off	flash	flash	Laser Assy	Refer to Table K.
off	on	flash	flash	Scanner Assy	Refer to Table K.
off	off	flash	flash	Controller-I/O board	Refer to Table C.
off	on	off	off	ROM #1	Replace ROM #1.
off	on	off	on	ROM #2	Replace ROM #2.
off	on	on	off	ROM #3	Replace ROM #3.
off	on	on	on	ROM #4	Replace ROM #4.
on	off	off	off	SIMM #1	Replace SIMM #1.
on	off	off	on	SIMM #2	Replace SIMM #2.
on	off	on	off	SIMM #3	Replace SIMM #3.
on	off	on	on	SIMM #4	Replace SIMM #4.
on	on	off	off	SIMM #5	Replace SIMM #5.
on	on	off	on	SIMM #6	Replace SIMM #6.
on	on	on	off	SIMM #7	Replace SIMM #7.
on	on	on	on	SIMM #8	Replace SIMM #8.

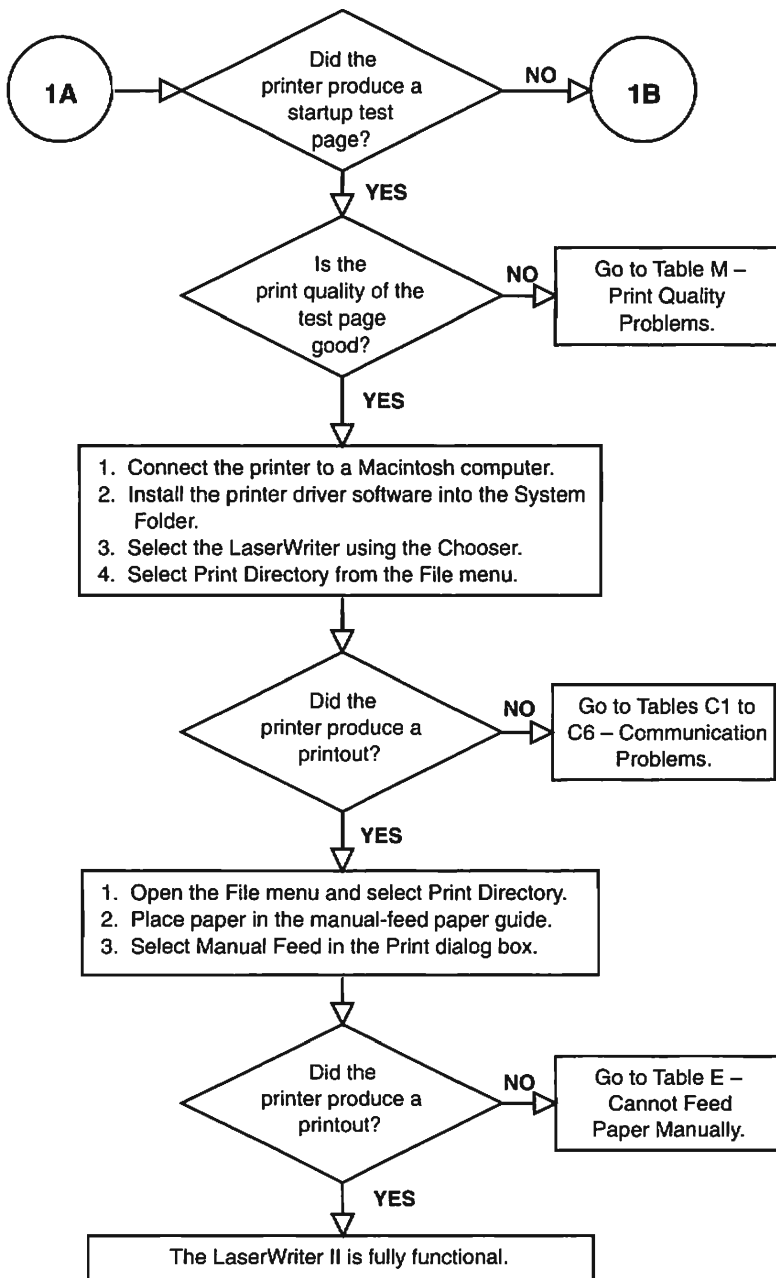
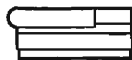


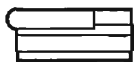
LaserWriter II

Troubleshooting – Functional Check

Flowchart 1

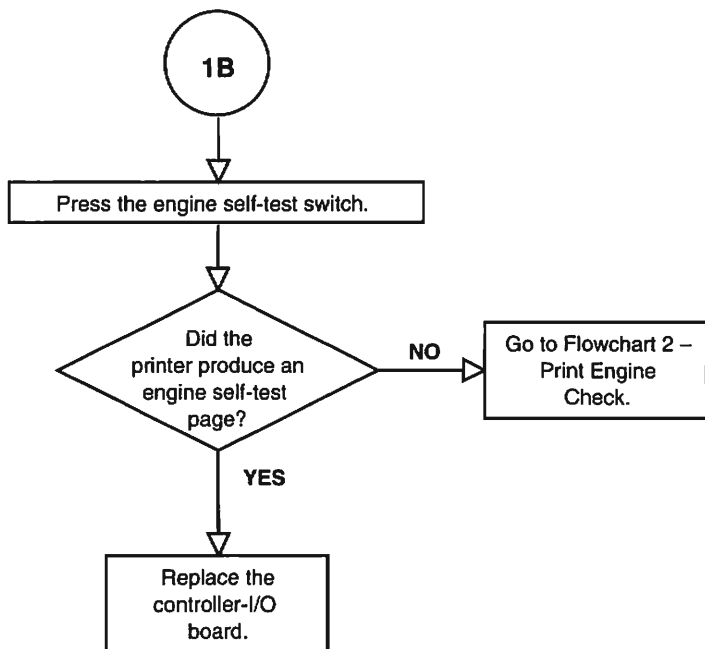


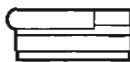




LaserWriter II

Troubleshooting – Functional Check





Flowchart 2

1. Switch off the printer, and remove the paper cassette and the cover set.
2. Open the top cover and remove any paper jams.
3. Replace the paper cassette.
4. Close the top cover and switch on the printer.

Does the lower fan come on?

NO

Go to Table A – No Power.

YES

Do the delivery rollers rotate after power on?

NO

Go to Table B – Delivery Rollers Do Not Rotate.

YES

Open the face-up tray and observe the light of the fuser heater bulb.

Does the fuser lamp turn on and off?

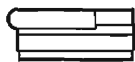
NO

Go to Table D – Heater Bulb Does Not Operate.

YES

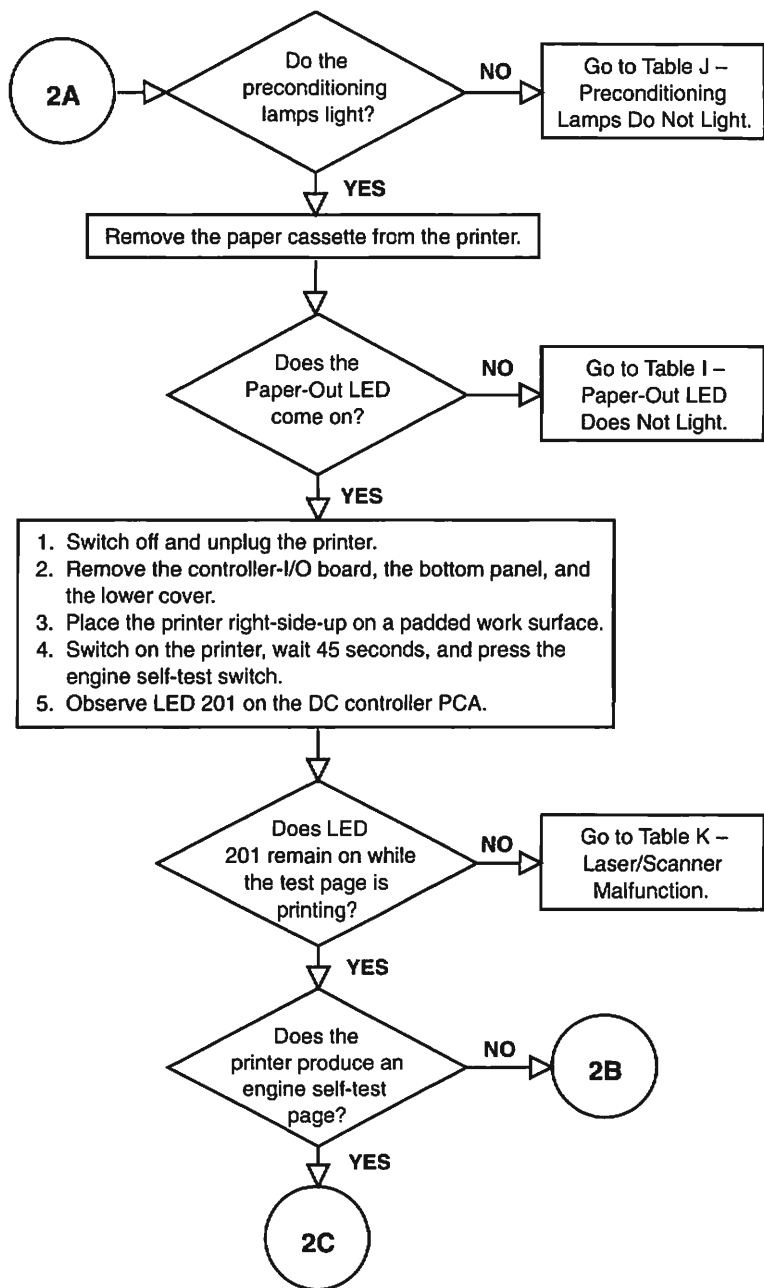
Check the preconditioning exposure lamps.

2A



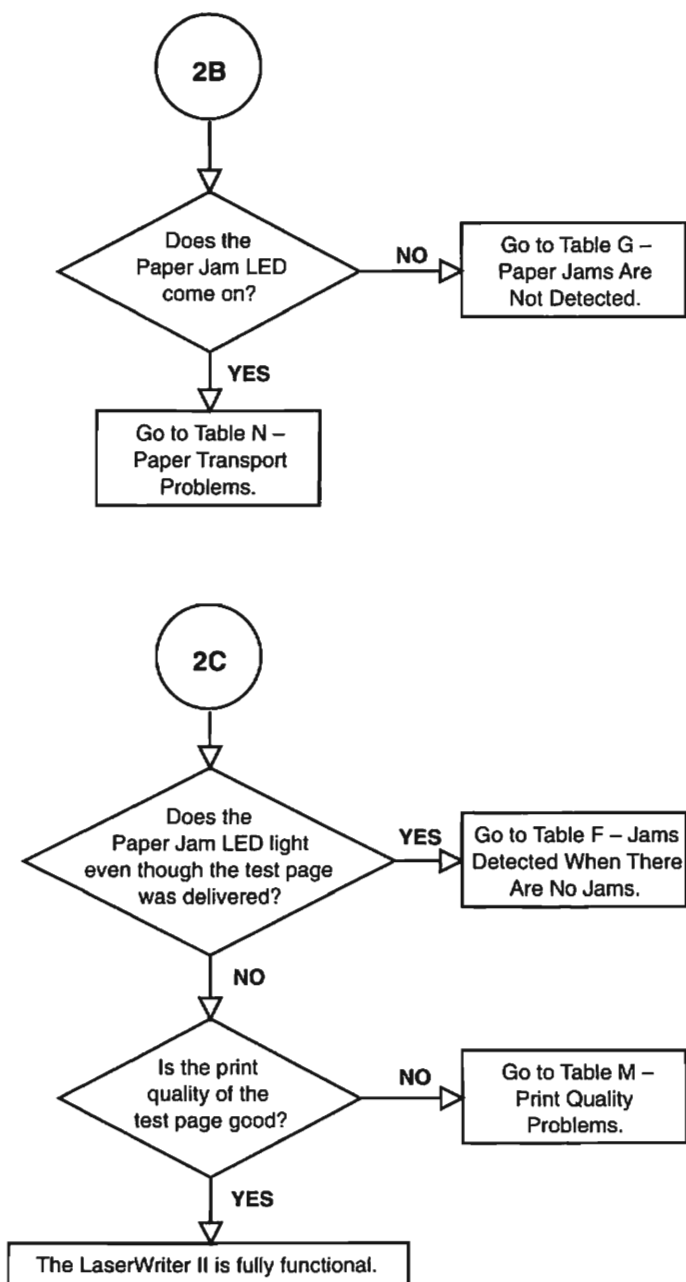
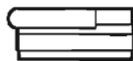
LaserWriter II

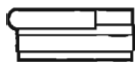
Troubleshooting – Print Engine Check



LaserWriter II

Troubleshooting – Print Engine Check

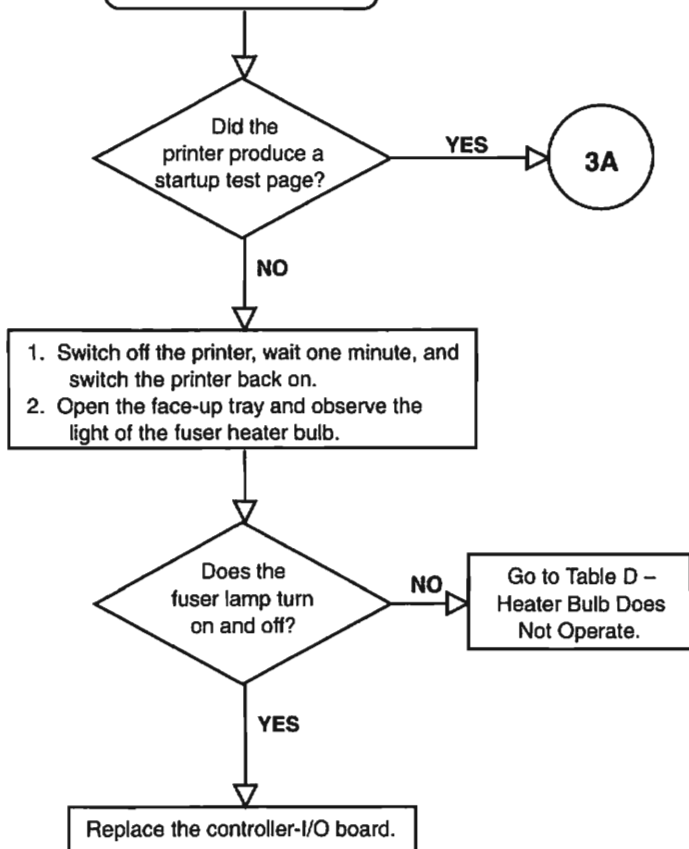




LaserWriter II

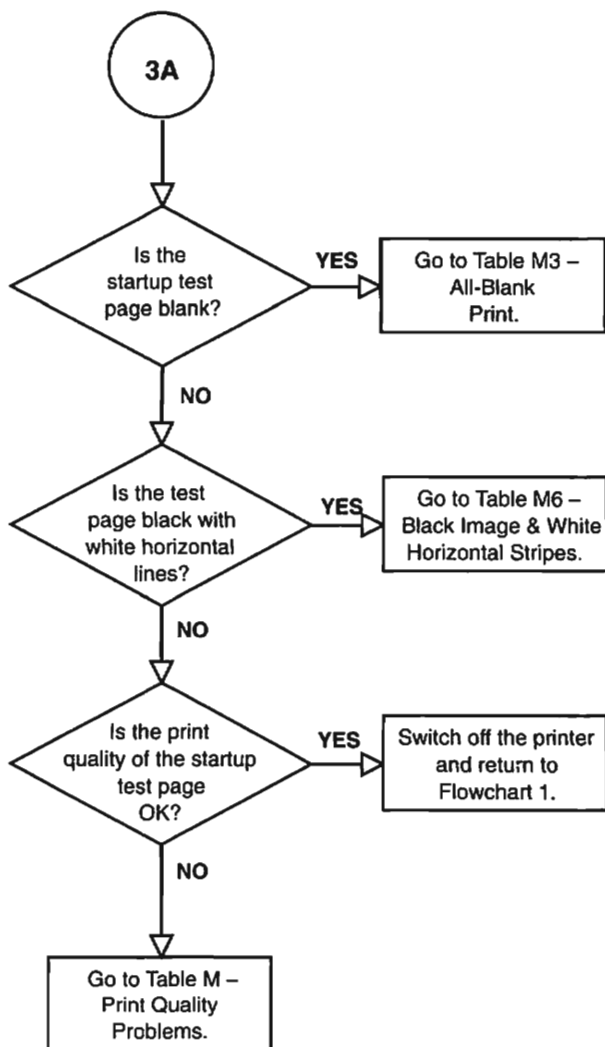
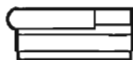
Troubleshooting – Print Engine Error

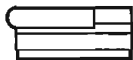
Flowchart 3



LaserWriter II

Troubleshooting – Print Engine Error





LaserWriter II

Troubleshooting Tables

Table A – No Power

1.	Is the printer plugged in and switched on?	No	Plug in and switch on the printer.
2.	Is the required voltage supplied at the AC outlet?	No	Try another AC outlet.
3.	Is the top cover open?	Yes	Close the top cover.
4.	Is the top cover interlock lever damaged or broken?	Yes	Replace the top cover interlock lever.
5.	Is circuit breaker CB1 open?	Yes	Reset CB1. If CB1 trips again after the printer is switched on, there is a short that you will have to locate.
6.	Locate fuse FS1 in the DC power supply. Is fuse F1 open?	Yes	Replace fuse FS1. Use a 125-volt, 6.3-amp replacement.
7.	Unplug the printer and remove the DC power supply. Plug in the printer, close the top cover, and switch on the printer. Measure the voltage across the outer two pins of connector J502. Is voltage present across J502?	Yes	Replace the DC power supply.
		No	Replace the power supply block.
8.	Measure the voltage across DC controller PCA connector pins J212-4 (+5 VDC) and J212-1 (GND). Does the DC power supply generate +5 VDC?	No	Replace the DC power supply.
9.	Measure the voltage across DC controller PCA connector pins J212-7 (REMOTE*) and 212-1 (GND). Does the voltage drop from about +4.5 VDC to 0 VDC when you switch on the power?	Yes	Replace the DC power supply.
		No	Replace the DC controller PCA.

LaserWriter II

Troubleshooting Tables

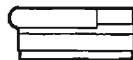
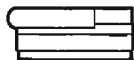


Table B – Delivery Rollers Do Not Rotate

1.	Switch off the printer. Open the top cover, depress the top cover interlock and drum-sensitivity switches, and switch the power back on. Does the main motor rotate to home position about one second after you switch on the power?	Yes	Check for obstructions in the delivery coupler assembly and delivery roller areas.
		No	Check for foreign objects in the drive gear or paper feed drive assemblies.
2.	Is the main motor cable securely connected to DC power supply connector J3?	No	Connect the cable to connector J3. Return to step 1.
3.	Switch off the printer. Disconnect the main motor cable from DC power supply connector J3. Measure the voltage between the following pairs of pins while printing an engine self-test page: J3-1 and J3-5 (GND) J3-2 and J3-5 (GND) J3-3 and J3-5 (GND) J3-4 and J3-5 (GND) Does the voltage reach about +1.4 VDC one second after you switch on the power?	Yes	Replace the main motor.
4.	Measure the voltage between the following pairs of pins on the DC controller PCA: J212-8 and J212-1 (GND) J212-9 and J212-1 (GND) J212-10 and J212-1 (GND) J212-11 and J212-1 (GND) Switch the printer off and then back on for each set of measurements. Does the voltage of each pair of pins reach about +1 VDC one second after you switch on the power?	Yes	Replace the DC power supply.
		No	Replace the DC controller PCA.



LaserWriter II

Troubleshooting Tables

Tables C1 to C6 – Communication Problems

Use the table appropriate for the controller-I/O board and communication mode(s) being used.

Table C1 – SC Controller-I/O Board

1.	Are the SCSI cable connections and terminators correct and secure?	No	Make any necessary adjustments.
2.	Are the SCSI cables and terminators good?	No	Replace the defective cable(s) or terminator(s).
3.	Is the SCSI device address set to the same address as another device on the daisy chain?	Yes	Change the SCSI device address to a different address.
4.	Is the LaserWriter SC device driver installed in the System Folder and the correct printer selected using the Chooser?	No	Copy the LaserWriter SC driver to the System Folder and select the printer using the Chooser.
5.	Have you tried a different computer?	No	Try a different computer.
6.	Have you tried a different SC controller-I/O board?	No	Replace the SC controller-I/O board with a known-good board.
7.	Can the computer now print?	Yes No	Finished. Reseat the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.

LaserWriter II

Troubleshooting Tables

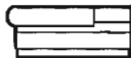
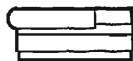


Table C2 – NT/NTX Controller-I/O Board: LocalTalk

1.	Are the LocalTalk cable connections correct and secure?	No	Tighten the cable connections or refer to the Owner's Guide for proper cabling information.
2.	Are the DIP switches on the controller-I/O board set correctly?	No	Set the DIP switches as shown in the Ports & Cables tab section.
3.	Is the appropriate software installed on the application disk?	No	Install the correct software.
4.	Are the LocalTalk cables and connectors good?	No	Replace defective cables and connectors.
5.	Have you tried a different computer?	No	Try a different computer.
6.	Have you tried a different NT/NTX controller-I/O board?	No	Replace the NT/NTX controller-I/O board with a known-good board.
7.	Can the computer now print?	Yes No	Finished. Reset the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.

**Table C3 – NT/NTX Controller-I/O Board: RS-232 Serial
(1 of 2)**

1.	Are the RS-232 serial cable connections correct and secure?	No	Tighten the cable connections or refer to the Owner's Guide for proper cabling information.
2.	Are the DIP switches on the controller-I/O board set correctly?	No	Set the DIP switches as shown in the Ports & Cables tab section.
3.	Are the RS-232 cables and connectors good?	No	Replace defective cables and connectors.



LaserWriter II

Troubleshooting Tables

**Table C3 – NT/NTX Controller-I/O Board: RS-232 Serial
(2 of 2)**

4.	Have you tried a different computer?	No	Try a different computer.
5.	Have you tried a different NT/NTX controller-I/O board?	No	Replace the NT/NTX controller-I/O board with a known-good board.
6.	Can the computer now print?	Yes	Finished.
		No	Reseat the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.

Table C4 – IIf/g Controller-I/O Board: LocalTalk (1 of 2)

1.	Are the LocalTalk cable connections correct and secure?	No	Tighten the cable connections or refer to the Owner's Guide for proper cabling information.
2.	Is a second cable plugged into the printer's LocalTalk connector box but not attached to a computer (i.e., a cable left dangling)?	Yes	Disconnect the second cable from the printer's LocalTalk connector box.
3.	Are the switch settings on the controller-I/O board set correctly?	No	Set the switch settings as shown in the Ports & Cables tab section.
4.	Is the appropriate software installed on the application disk?	No	Install the correct software.
5.	Are the LocalTalk cables and connectors good?	No	Replace defective cables and connectors.
6.	Have you tried a different computer?	No	Try a different computer.
7.	Have you tried a different IIf or Iig controller-I/O board?	No	Replace the IIf or Iig controller-I/O board with a known-good board.

LaserWriter II

Troubleshooting Tables

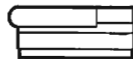
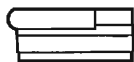


Table C4 – If/g Controller-I/O Board: LocalTalk (2 of 2)

8.	Can the computer now print?	Yes	Finished.
		No	Reseat the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.

Table C5 – If/g Controller-I/O Board: RS-232 Serial

1.	Are the RS-232 serial cable connections correct and secure?	No	Tighten the cable connections or refer to the Owner's Guide for proper cabling information.
2.	Are the switch settings on the controller-I/O board set correctly?	No	Set the switch settings as shown in the Ports & Cables tab section.
3.	Are the RS-232 cables and connectors good?	No	Replace defective cables and connectors.
4.	Is the printer connected to a Macintosh computer via an RS-232 serial cable?	Yes	Try connecting the printer to the computer via a LocalTalk cable.
5.	Have you tried a different computer?	No	Try a different computer.
6.	Have you tried a different If or Ig controller-I/O board?	No	Replace the If or Ig controller-I/O board with a known-good board.
7.	Can the computer now print?	Yes	Finished.
		No	Reseat the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.



LaserWriter II

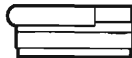
Troubleshooting Tables

Table C6 – IIg Controller-I/O Board: Ethernet

1.	Are the Ethernet cable connections correct and secure?	No	Tighten the cable connections or refer to the Owner's Guide for proper cabling information.
2.	Is a second cable plugged into the printer's Ethernet connector but not attached to a computer (i.e., a cable left dangling)?	Yes	Disconnect the second cable from the printer's Ethernet connector.
3.	Does the printer appear in the Chooser?	No	If you are using a third-party cabling system, make sure the cabling system is properly terminated.
4.	Are the switch settings on the controller-I/O board set correctly?	No	Set the switch settings as shown in the Ports & Cables tab section.
5.	Are the Ethernet cables and connectors good?	No	Replace defective cables and connectors.
6.	Is the appropriate printer driver software installed?	No	Install the correct printer driver.
7.	Is the correct network software installed?	No	If you connect the printer to an Ethernet network, the network software must support AppleTalk Phase 2.
8.	Have you tried a different computer?	No	Try a different computer.
9.	Have you tried a different IIg controller-I/O board?	No	Replace the controller-I/O board with a known-good board.
10.	Can the computer now print?	Yes	Finished.
		No	Reseat the interconnect PCA and DC controller PCA. If the problem persists, first replace the interconnect PCA and then the DC controller PCA.

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Troubleshooting Tables



When the fusing system malfunctions, capacitor C211 on the DC controller PCA charges, and puts the printer in an error state. The printer remains in the error state until C211 discharges (20 to 30 minutes). If the fusing system fails, replace the failed module and manually discharge C211, or switch the power off for 20 to 30 minutes.

If the interlock switch SW205 on the DC controller PCA is not properly installed, AC power to the fuser heater bulb may be cut off. If the lower cover is removed, make sure the interlock switch lever can depress SW205.

Table D – Heater Bulb Does Not Operate

1.	Remove the fuser assembly and measure the resistance through the thermoprotector (TP1). Is there continuity through the thermoprotector?	No	Replace the fuser assembly.
2.	Measure the resistance across the thermistor by connecting the multimeter to fuser PCA connector pins J331-4 (FSRTH) and J331-5 (GND). Is the resistance at room temperature between 1 and 1.6 megohms?	No	Replace the fuser assembly. If the problem persists, check the cable connections between the fuser PCA (J331) and the DC controller PCA (J206). If the connections are secure, replace the DC-controller-to-fuser cable.
3.	Measure the resistance across fuser assembly connector J103. Is there continuity through the heater bulb?	No	Replace the heater bulb.
Remove the controller-I/O board, cover set, bottom panel, and lower cover. Install a toner cartridge.			
4.	Reinstall the fuser assembly and close the top cover. Connect the multimeter across DC controller pins J208-2 (FSRD) and J208-3 (GND). Does the voltage change from about +5 VDC to 0 VDC when you switch on the power?	Yes	Replace the power supply block, and discharge capacitor C211 on the DC controller PCA. If the problem persists, check the cable connections between the power supply block (J101) and the DC controller PCA (J208). If the connections are secure, replace the cable that connects the DC controller to the power supply block.
		No	Replace the DC controller PCA.



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Troubleshooting Tables

Table E – Cannot Feed Paper Manually

–	Connect the multimeter across DC controller PCA connector pins J213-9 (MPFS*) and J213-6 (GND). Place a sheet of paper on the top of the paper cassette and slide it into the printer far enough to trigger manual feed paper sensor PS302. Does the voltage change from about +5 VDC to 0 VDC as the paper is inserted?	No	Replace the distribution PCA.
		Yes	Replace the DC controller PCA.

Table F – Jams Detected When There Are No Jams

1.	Does the Paper Jam LED immediately light when you switch on the printer?	Yes	Check that no paper fragments or other objects are caught in the printer.
2.	Is the paper delivery-sensing lever in the fuser assembly damaged or broken?	Yes	Replace the delivery-sensing lever.
3.	Is the old version of the delivery-sensing lever installed?	Yes	Replace the delivery-sensing lever.
4.	Remove the left contact cap from the fuser assembly. Switch on the printer. Connect the multimeter across fuser PCA connector pins J331-6 and J331-7. Does the voltage change from +5 VDC to 0 VDC as you move the delivery sensing lever back and forth?	No	Replace the fuser assembly.
		Yes	Verify that the cabling is intact. If it is, replace the DC controller PCA.

Table G – Paper Jams Are Not Detected (1 of 2)

1.	Is the delivery-sensing lever in the fuser assembly damaged or unable to move smoothly? (Due to wear, some levers do not return to normal operating position after a page clears the fuser assembly).	Yes	Replace the delivery-sensing lever or remove the obstruction.
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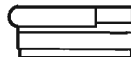
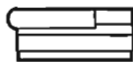


Table G – Paper Jams Are Not Detected (2 of 2)

2.	Remove the left contact cap from the fuser assembly. Switch on the printer. Connect the multimeter across fuser PCA connector pins J331-6 and J331-7. Does the voltage change from +5 VDC to 0 VDC as you move the delivery-sensing lever back and forth?	No	Replace the fuser assembly.
		Yes	Replace the cable that connects the DC controller to the fuser. If the problem persists, replace the DC controller PCA.

Table H – Paper-Out LED Lights When There Is Paper

1.	Does the paper cassette contain paper and is the cassette properly installed in the printer?	No	Fill the paper cassette with paper and install the cassette in the printer, making sure it is seated properly.
2.	Is the paper cassette damaged?	Yes	Replace the paper cassette.
3.	Does the paper-sensing arm move freely?	No	Locate and correct the cause of the blockage or replace the paper-sensing arm.
4.	Are the paper cassette microswitch actuator levers bent or broken?	Yes	Unbend the levers or replace them.
5.	Are the paper cassette microswitches (SW201, SW202, or SW203) on the DC controller PCA damaged?	Yes	Replace the DC controller PCA.
6.	When you remove and insert the paper cassette, does the voltage between DC controller J213-8 (PEMP*) and J213-6 (GND) toggle from +5 VDC (inserted) to 0 VDC (removed)?	No	Replace the distribution PCA.
		Yes	Replace the DC controller PCA.



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Troubleshooting Tables

Table I – Paper-Out LED Doesn't Light With No Paper

1.	Is the paper cassette seated properly?	No	Remove and reseal the paper cassette.
2.	Is the paper cassette damaged?	Yes	Replace the paper cassette.
3.	Does the paper-sensing arm move freely?	No	Locate and correct the cause of the blockage or replace the paper-sensing arm.
4.	Are the paper cassette microswitch actuator levers bent or broken?	Yes	Unbend the levers or replace them.
5.	Are the paper cassette microswitches (SW201, SW202, or SW203) on the DC controller PCA damaged?	Yes	Replace the DC controller PCA.
6.	When you remove and insert the paper cassette, does the voltage between DC controller J213-8 (PEMP*) and J213-6 (GND) toggle from +5 VDC (inserted) to 0 VDC (removed)?	No Yes	Replace the distribution PCA. Replace the DC controller PCA.

Table J – Preconditioning Lamps Do Not Light

1.	Switch off the printer. Open the top cover and depress the top cover interlock switch. Connect the multimeter to fuser PCA contacts J333 (+24 VDC) and J334 (GND). Switch on the printer. Does the voltage rise from 0 VDC to +24 VDC?	Yes	Replace the preconditioning exposure assembly.
2.	Switch off the printer. Connect the multimeter to DC controller PCA connector pins J206-3 (PEXP) and J206-5 (GND). Switch on the printer. Does the voltage change from 0 VDC to +5 VDC?	Yes No	Replace the fuser assembly. Replace the DC controller PCA.

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Troubleshooting Tables

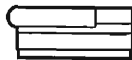


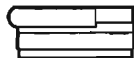
Table K – Laser/Scanner Malfunction

1.	Are connectors J401 on the scanner motor PCA and J203 on the DC controller PCA properly seated?	No	Ensure that the connectors are properly seated.
2.	Are connectors J451 on the laser driver PCA and J202 on the DC controller PCA properly seated?	No	Ensure that the connectors are properly seated.
3.	Is the optical fiber cable between the laser/scanner assembly and J201 of the DC controller PCA correctly seated into each assembly?	No	Visually inspect the cable for damage and ensure that it is seated properly. Replace the cable if damaged.
4.	Perform the Laser Power Output Check procedure described in this tab section. Is the laser power output 17.6 mV (± 1.6 mV)?	No Yes	Replace the laser/scanner assembly. If the problem remains, replace the laser harness cable. Replace the DC controller PCA.

When a new toner cartridge is installed in the LaserWriter II NT, the Low-Toner LED remains on until the printer generates a printout or you switch the printer off and on.

Table L – Erroneous Low-Toner Indicator (1 of 2)

1.	Does the toner cartridge have a drum-sensitivity cam?	No	Replace the toner cartridge.
2.	Are the drum-sensitivity switches (SW301 and SW302) actuated when you install the toner cartridge and close the top cover?	No	Replace the distribution PCA.



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Troubleshooting Tables

Table L – Erroneous Low-Toner Indicator (2 of 2)

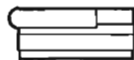
3.	Connect the multimeter across DC controller pins J213-1 and J213-6. Open the top cover, depress the top cover interlock switch, and switch on the power. Does the voltage change from +5 VDC to 0 VDC when you depress switch SW301?	No	Verify that the distribution PCA is securely connected to DC controller PCA connector J213. If it is, replace the distribution PCA.
4.	Connect the multimeter across DC controller pins J213-2 and J213-6. Open the top cover, depress the top cover interlock switch, and switch on the power. Does the voltage change from +5 VDC to 0 VDC when you depress switch SW302?	No	Verify that the distribution PCA is securely connected to DC controller PCA connector J213. If it is, replace the distribution PCA.
5.	Are the high-voltage power supply connector contacts clean?	No	Clean the high-voltage power supply contacts.
6.	Are the high-voltage power supply contacts damaged?	Yes	Replace the high-voltage power supply.
		No	Replace the DC controller PCA.

Table M – Print Quality Problems

1.	Is the quality of the printout acceptable?	No	Compare the printout to the images shown in the figure on the following page, and then refer to the appropriate troubleshooting table.
2.	Is the printout problem the result of a LaserWriter IIg (or LaserWriter IIx with 5 MB or more of RAM) that is unable to print in grayscale?	Yes	Refer to Table M23 in this tab section.

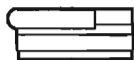
LaserWriter II

Troubleshooting Tables



Light Image Go to Table M1	Faded Print Go to Table M2	Dark Image Go to Table M2	All-Blank Print Go to Table M3	Black Image Go to Table M4
Stained Print Go to Table M5	Repetitive Defects Go to Table M5	Black Image with Horizontal White Stripes Go to Table M6	Stains on Back of Paper Go to Table M7	Dark Vertical Lines Go to Table M8
Sharp Horizontal Black Lines Go to Table M9	Vertical Fogged Stripes Go to Table M10	Horizontal Fogged Stripes Go to Table M11	Blank Spots Go to Table M12	Thin Vertical White Lines/Stripes Go to Table M13
Faulty Registration Go to Table M14	Poor Fusing Go to Table M15	Distortion Go to Table M16	Waviness Go to Table M17	Uneven Print Density Go to Table M18
Foggy Print Go to Table M19	Horizontal Bonding Go to Table M20	Wavy Print on Gray Go to Table M21	Blotchy Printing Go to Table M22	Ghosting Go to Table M22

Figure: Print Quality Problems



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Troubleshooting Tables

Table M1 – Light Image/Faded Print: Whole Print (1 of 2)

1.	Turn the print-density adjustment dial up one number. Does the print quality improve?	Yes	Finished.
2.	Is the low-toner LED on the status panel on?	Yes	Install a new Apple toner cartridge.
3.	Is the toner cartridge new?	Yes	Hold the toner cartridge lengthwise and rock it from side to side several times.
4.	Has the installed toner cartridge been refilled?	Yes	Replace the toner cartridge with a new toner cartridge.
5.	Do prints improve when new paper is used?	Yes	Replace with type of paper recommended for the particular print job.
6.	Is the transfer corona wire dirty or broken?	Yes	Clean or replace the transfer corona wire.
Remove the controller-I/O board, cover set, bottom panel, and lower cover. Install a toner cartridge.			
7.	To verify the operation of the drum-sensitivity switches, connect the multimeter across DC controller pins J213-1 (CSENS1) and J213-6 (GND). Open the top cover, depress the interlock switch, and turn the power on. Does the voltage change from +5 VDC to 0 VDC when you depress drum-sensitivity switch SW301?	No	Verify that the distribution PCA is securely connected to DC controller connector J213. If it is, replace the distribution PCA.
8.	To verify the operation of the drum-sensitivity switches, connect the multimeter across DC controller pins J213-2 (CSENS2) and J213-6 (GND). Open the top cover, depress the interlock switch, and turn the power on. Does the voltage change from +5 VDC to 0 VDC when you depress drum sensitivity switch SW302?	No	Verify that the distribution PCA is securely connected to DC controller connector J213. If it is, replace the distribution PCA.

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Troubleshooting Tables

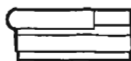
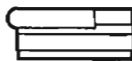


Table M1 – Light Image/Faded Print: Whole Print (2 of 2)

9.	Connect the multimeter across high-voltage power supply pins J601-1 (HVTON) and J601-7 (GND). Press the engine self-test switch. Does the voltage drop from 20-24 VDC to 0 VDC one second after the print cycle begins?	No	Verify that the high-voltage power supply cable is securely attached to DC controller PCA connector J211. If it is, replace the DC controller PCA.
10.	Connect the multimeter across high-voltage power supply pins J601-6 (DVDC) and J601-7 (GND). Press the engine self-test switch. Does the voltage drop from 16-20 VDC to 0 VDC one second after the print cycle begins?	No	Verify that the high-voltage power supply cable is securely attached to DC controller PCA connector J211. If it is, replace the DC controller PCA.
11.	Connect the multimeter across high-voltage power supply pins J601-4 (DBAC) and J601-7 (GND). Press the engine self-test switch. Does the voltage drop from 16-20 VDC to 0 VDC one second after the print cycle	No	Verify that the high-voltage power supply cable is securely attached to DC controller PCA connector J211. If it is, replace the DC controller PCA.
12.	Try printing again. Has the print quality improved?	Yes No	Finished. Replace the high-voltage power supply.
13.	Try printing again. Has the print quality improved?	Yes No	Finished. Replace the laser/scanner assembly.



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Troubleshooting Tables

Table M2 – Dark Image: Whole Print

1.	Turn the print-density adjustment dial down one number. Does the print quality improve?	Yes	Finished.
2.	To verify the operation of the drum-sensitivity switches, connect the multimeter across DC controller connector pins J213-1 (CSENS1*) and J213-6 (GND). Open the top cover, depress the top cover interlock switch, and switch on the printer. Does the voltage change from +5 VDC to 0 VDC when you depress drum-sensitivity switch SW301?	No	Verify that the distribution PCA is securely connected to DC controller PCA connector J213. If it is, replace the distribution PCA.
3.	To verify the operation of the drum-sensitivity switches, connect the multimeter across DC controller connector pins J213-2 (CSENS2*) and J213-6 (GND). Open the top cover, depress the top cover interlock switch, and switch on the printer. Does the voltage change from +5 VDC to 0 VDC when you depress drum-sensitivity switch SW302?	No	Verify that the distribution PCA is securely connected to DC controller PCA connector J213. If it is, replace the distribution PCA.
4.	Is the toner cartridge grounding spring TB602 on the high-voltage power supply making good contact with the toner cartridge, and is the spring clean?	No	If the grounding spring is dirty, clean it. If the grounding spring is damaged, replace the high-voltage power supply.
5.	Replace the laser/scanner assembly. Does the print quality improve?	Yes No	Finished. Replace the laser harness cable. If the problem remains, replace the DC controller PCA.

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Troubleshooting Tables

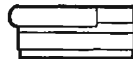
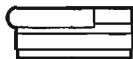


Table M3 – All-Blank Print (1 of 2)

1.	Is the Low-Toner LED on the status panel on?	Yes	Replace the toner cartridge.
2.	Are the Paper-Out and Paper Jam LEDs flashing?	Yes	Replace the laser/scanner assembly.
3.	Have you removed the toner cartridge sealing tape?	No	Remove the sealing tape.
4.	Can the toner cartridge protective shield and laser-blocking shutters be opened and closed smoothly? Are all the above parts undamaged?	No	Replace the toner cartridge.
5.	Temporarily remove the shutter assembly that covers the mirror assembly and press the engine self-test switch. Is the print quality good?	Yes	Install a new shutter assembly.
6.	Is the transfer corona wire broken?	Yes	Replace the transfer corona wire.
7.	Are connectors J401 on the scanner motor PCA and J203 on the DC controller PCA properly seated?	No	Ensure that the connectors are properly seated.
8.	Are connectors J451 on the laser driver PCA and J202 on the DC controller PCA properly seated?	No	Ensure that the connectors are properly seated.
9.	Perform the Laser Power Output Check procedure. Does the laser power output measure 17.6 mV (± 1.6 mV)?	No	Replace the laser/scanner assembly. If the problem remains, replace the laser harness cable.
		Yes	Replace the DC controller PCA.



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Troubleshooting Tables

Table M3 – All-Blank Print (2 of 2)

For steps 10 and 11, remove the controller-I/O board, cover set, bottom panel, and lower cover. Install a toner cartridge and close the top cover.

10.	Connect the multimeter across high-voltage power supply connector pins J601-6 (DBDC*) and J601-7 (GND). Press the engine self-test switch. Does the voltage change from +16 VDC to 0 VDC one second after the main motor starts to rotate?	No	Verify that the high-voltage power supply cable is securely attached to the DC controller PCA connector J211. If it is, replace the DC controller PCA.
11.	Connect the multimeter across high-voltage power supply connector pins J601-4 (DBAC*) and J601-7 (GND). Initiate a service test print. Does the voltage change from +16 VDC to 0 VDC one second after the print cycle begins?	No	Verify that the high-voltage power supply cable is securely attached to DC controller PCA connector J211. If it is, replace the DC controller PCA.
12.	Try printing again. Has the print quality improved?	Yes No	Finished. Replace the high-voltage power supply. If the problem persists, replace the laser/scanner assembly.

Table M4 – Black Image

1.	Is the primary corona wire inside the toner cartridge broken?	Yes	Replace the toner cartridge.
2.	Remove the high-voltage power supply, install a toner cartridge, and close the top cover. Connect the multimeter across high-voltage power supply connector pins J601-3 (HV10N) and J601-7 (GND). Switch on the printer. Does the voltage drop from +16 VDC to 0 VDC one second after the main motor starts to rotate?	Yes No	Verify that high-voltage connector pin TB603-2 is making good contact with the toner cartridge primary corona. If it is, replace the high-voltage power supply. Verify that the high-voltage power supply cable is securely attached to DC controller connector J211. If it is, replace the DC controller PCA.

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Troubleshooting Tables

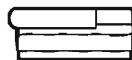
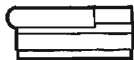


Table M5 – Stained Print/Repetitive Defects

1.	Do prints improve when you use new paper?	Yes	Replace with the type of paper recommended for the particular print job.
2.	Is the wrong side of the paper being used?	Yes	Turn the paper over in order to print on the correct side.
3.	Is the fuser roller cleaner felt dirty?	Yes	Replace the cleaner felt.
4.	Visually inspect the transfer guide assembly. Is the collar at the end of the roller shaft pointing away from the transfer corona?	No	Install the transfer guide so that the collar at the end of the roller shaft points away from the transfer corona.
5.	Are the pickup rollers dirty?	Yes	Clean the pickup rollers.
6.	Is the toner cartridge damaged?	Yes	Replace the toner cartridge.
7.	Is the high-voltage power supply connection to the discharging pins clean and undamaged?	No	Clean the contact or replace the high-voltage power supply.

Table M6 – Black Image & Horizontal White Stripes

1.	Is the optical fiber damaged or broken?	Yes	Replace the optical fiber.
2.	Replace the laser/scanner assembly. Does the print quality improve?	Yes No	Finished. Replace the laser harness cable. If the problem remains, replace the DC controller PCA.



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Table M7 – Stains on Back of Paper

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the fuser roller cleaner felt.
2.	Are any of the following components dirty? a) Paper cassette or cover b) Transfer guide assembly c) Transfer corona assembly d) Fuser assembly e) Feeder assembly	Yes	Clean with a damp cloth, then with a dry cloth.
3.	Visually inspect the transfer guide assembly. Is the collar at the end of the roller shaft pointing away from the transfer corona? Does the print image improve?	No Yes	Install the transfer guide so that the collar at the end of the roller shaft points away from the transfer corona. Finished.

Table M8 – Dark Vertical Lines

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the cleaner felt.
2.	Clean the primary corona wire inside the toner cartridge. Does the print image improve?	Yes	Finished.
3.	Do the dark vertical lines appear on the print engine test page?	No	Replace the controller-I/O board.
4.	Clean the transfer corona wire. Does the print image improve?	Yes	Finished.
5.	Replace the toner cartridge. Does the print image improve?	Yes	Finished.

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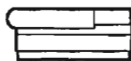


Table M9 – Sharp Horizontal Black Lines

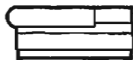
–	Replace the laser/scanner assembly. Does the print image improve?	Yes	Finished.
		No	Replace the laser harness cable. If the problem remains, replace the DC controller PCA.

Table M10 – Vertical Fogged Stripes

1.	Remove the shutter assembly and clean the mirror located beneath the shutter assembly. Does the print image improve?	Yes	Finished.
2.	Clean the primary corona wire inside the toner cartridge. Does the print image improve?	Yes	Finished.
3.	Replace the toner cartridge with a new Apple toner cartridge. Does the print image improve?	Yes	Finished.
4.	Visually inspect the high-voltage power supply. Are all four of the Phillips screws installed?	No	Install the four Phillips screws that secure the high-voltage power supply to the printer.
5.	Visually inspect the transfer guide assembly. Is the collar at the end of the roller shaft pointing away from the transfer corona? Does the print image improve?	No	Install the transfer guide so that the collar at the end of the roller shaft is pointing away from the transfer corona.
		Yes	Finished.

Table M11 – Horizontal Fogged Stripes (1 of 2)

1.	Do the horizontal fogged stripes appear on the bottom third of the page.	Yes	Replace the paper fuser guide.
2.	Replace the toner cartridge. Does the print image improve?	Yes	Finished.



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Table M11 – Horizontal Fogged Stripes (2 of 2)

3.	Replace the fuser roller cleaner felt. Does the print image improve?	Yes	Finished.
		No	Replace the fuser assembly.

Table M12 – Blank Spots

1.	Is recommended paper being used?	No	Replace paper in cassette with recommended paper for type of printing being done.
2.	Is the paper damp?	Yes	Replace the paper. Instruct the user to store paper in its package in a dry place.
3.	Is the wrong side of the paper being used?	Yes	Turn the paper over in order to print on the correct side.
4.	Is the low toner LED on the status panel on?	Yes	Install a new Apple toner cartridge.
5.	Has the installed toner cartridge been refilled?	Yes	Install a new Apple toner cartridge.
6.	Turn the print-density adjustment dial up one number. Does the print quality improve?	Yes	Finished.

Table M13 – Thin Vertical White Lines or Stripes

1.	Hold the toner cartridge lengthwise and rock it from side to side three or four times. Does the print image improve?	Yes	Finished.
2.	Remove the shutter assembly and inspect the mirror assembly. Is the mirror dirty?	Yes	Clean the mirror assembly.
3.	Is the transfer corona wire or assembly dirty?	Yes	Clean the transfer corona wire and assembly.

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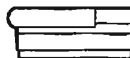
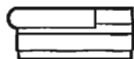


Table M14 – Faulty Registration

1.	Is the paper cassette loaded with too much paper (200 sheets maximum)?	Yes	Remove excess paper.
2.	Is recommended paper being used?	No	Replace the paper in the cassette with paper recommended for type of printing being done.
3.	Are the pickup rollers dirty, worn, or damaged?	Yes	Clean or replace the pickup rollers.
4.	Is the registration roller clutch spring deformed or broken?	Yes	Replace the transfer guide assembly.
5.	Are the paper cassette microswitches (SW201, SW202, and SW203) bent or damaged? (To locate the microswitches, you must remove the paper cassette.)	Yes	Replace the DC controller PCA. (The microswitches are wired to the DC controller PCA.)
Remove the I/O PCA, cover set, bottom panel, and the lower cover. Install a toner cartridge and close the top cover.			
6.	Connect the multimeter across DC controller PCA connector pins J213-3 (REGD) and J213-6 (GND). Initiate a service test print. Does the voltage rise from 0 VDC to +5 VDC three seconds after the main motor starts to rotate?	Yes	Replace the distribution PCA.
		No	Replace the DC controller PCA.



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Troubleshooting Tables

Table M15 – Poor Fusing: Image Smears Easily

1.	Do you have the recommended paper for the print job?	No	Replace paper in cassette with recommended paper for type of printing being done.
2.	Are the upper or lower fuser rollers worn?	Yes	Replace the fuser assembly.
3.	Is the fuser assembly warm?	No	Refer to Table D – Heater Bulb Does Not Operate.

Table M16 – Distortion

–	Perform a service test print and observe LED201 on the DC controller. Does LED201 stay on steadily without flashing during the print process?	No	Replace the laser/scanner assembly. If the problem remains, replace the DC controller PCA.
---	---	----	--

Table M17 – Waviness

1.	Perform an engine self-test and observe LED 201 on the DC controller PCA. Does LED 201 stay on steadily without flashing or without going out during the print process?	No	Replace the laser/scanner assembly. If the problem remains, reinstall the original laser/scanner assembly and replace the DC controller PCA.
2.	Initiate another engine self-test page. Does the print quality improve?	Yes No	Finished. Reinstall the original laser/scanner assembly and replace the laser harness cable. If the problem remains, replace the DC controller PCA.

LaserWriter II

Troubleshooting Tables

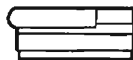


Table M18 – Uneven Print Density

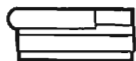
1.	Hold the toner cartridge lengthwise and rock it from side to side three or four times to distribute the toner evenly. Does the print quality improve?	Yes	Finished.
2.	Is the upper transfer guide or transfer guide assembly bent?	Yes	Replace the upper transfer guide or transfer guide assembly.

Table M19 – Foggy Print

1.	Do prints improve when you use new paper?	Yes	Replace with paper recommended for type of printing being done.
2.	Has the installed toner cartridge been refilled?	Yes	Install a new Apple toner cartridge.
3.	Is the fuser roller cleaner felt dirty?	Yes	Replace the cleaner felt.
4.	Are the pickup rollers dirty?	Yes	Clean the pickup rollers.
5.	Adjust the print-density slide. Does the print quality improve?	Yes	Finished.

Table M20 – Horizontal Banding

1.	Is the low toner LED on the status panel on?	Yes	Install a new Apple toner cartridge.
2.	Has the installed toner cartridge been refilled?	Yes	Install a new Apple toner cartridge.
3.	Is the fuser roller cleaner felt dirty?	Yes	Replace the cleaner felt.
4.	Are the pickup rollers dirty?	Yes	Clean the pickup rollers.
5.	Adjust the print-density slide. Does the print quality improve?	Yes	Finished.



LaserWriter II

Troubleshooting Tables

Table M21 – Wavy Print On Gray

1.	Is the Low-Toner LED on the status panel on?	Yes	Install a new Apple toner cartridge.
2.	Is the toner cartridge new?	Yes	Hold the toner cartridge lengthwise and rock it from side to side three or four times.
3.	Has the installed toner cartridge been refilled?	Yes	Replace the toner cartridge with a new Apple toner cartridge.

Table M22 – Blotchy or Ghosting Printing

-	Did the problem occur on the first drum rotation of the photodrum?	Yes	Move your printed image below the 94 mm mark from the top of the page and reprint the page.
---	--	-----	---

Table M23 – Image Does Not Print In Grayscale (Ilf/g only)

1.	Have you selected the Color/Grayscale option in the Print dialog box?	No	Open the Print dialog box and select the Color/Grayscale option.
2.	Does the printer have at least 5 MB of RAM on the controller-I/O board?	No	Install additional RAM on the controller-I/O board.
3.	Was the toner cartridge refilled?	Yes	Install a new Apple toner cartridge.
4.	Is the controller-I/O board defective?	Yes	Replace the controller-I/O board.

LaserWriter II

Troubleshooting Tables

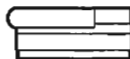


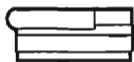
Table N – Paper Transport Problems

Perform an engine self-test. If a paper jam occurs, open the printer and observe the location of the paper.

1.	Did the printer take paper from the paper cassette?	No	Go to "Table N1 – No Paper Pickup."
2.	Is the paper jam in the paper pickup or transfer guide area?	Yes	Go to "Table N2 – Jams in Pickup/ Transfer Area."
3.	Is the paper jam in the separation or feeder guide area?	Yes	Go to "Table N3 – Jams in Separation/ Feeder Guide Area."
4.	Is the paper jam in the fuser or delivery area?	Yes	Go to "Table N4 – Jams in Fuser/ Delivery Area."
5.	Are there any sheets of paper stuck together in the paper path?	Yes	Go to "Table N5 – Sheets Stuck Together."
6.	Is the paper wrinkled?	Yes	Go to "Table N6 – Wrinkles."

Table N1 – No Paper Pickup

1.	Open the top cover. Is a piece of paper stuck in the printer?	Yes	Remove the paper.
2.	Switch on the printer and observe the delivery rollers in the top unit. Do the rollers rotate for a few seconds as the main motor finds home position?	No	Go to "Table B – Delivery Rollers Do Not Rotate."
3.	Connect the multimeter across DC controller PCA connector pins J213-4 (CPUD) and J213-6 (GND). Perform an engine self-test. Does the voltage change from 0 VDC to about +5 VDC two seconds after the main motor starts to rotate?	Yes No	Replace the distribution PCA. Replace the DC controller PCA.



LaserWriter II

Troubleshooting Tables

Table N2 – Jams in Pickup/Transfer Area

1.	Are you using the type of paper recommended for the print job?	No	Replace paper in the cassette with recommended paper for type of printing being done.
2.	Is the paper wrinkled or curled?	Yes	Use fresh paper.
3.	Is the paper cassette loaded with too much paper (200 sheets maximum)?	Yes	Remove excess paper.
4.	Is the paper cassette installed properly in the printer?	No	Reinstall the paper cassette properly.
5.	Are the paper cassette springs damaged?	Yes	Replace the paper cassette.
6.	Is the pick-up roller dirty, worn, or damaged?	Yes	Clean the rollers with alcohol. If the rollers are worn or dirty, replace as necessary.
7.	Is the registration roller clutch spring deformed or broken?	Yes	Replace the transfer guide assembly.
8.	Is the upper transfer guide bent?	Yes	Replace the upper transfer guide.
9.	Connect the multimeter to DC controller PCA pins J213-4 (CPUD) and J213-6 (GND). Perform an engine self-test. Does the voltage change from 0 VDC to about +5 VDC two seconds after the main motor starts to rotate?	Yes	Replace the distribution PCA.
		No	Replace the DC controller PCA.
10.	Connect the multimeter to DC controller PCA pins J213-3 (REGD) and J213-6 (GND). Perform an engine self-test. Does the voltage change from 0 VDC to about +5 VDC two seconds after the main motor starts to rotate?	Yes	Replace the distribution PCA.
		No	Replace the DC controller PCA.

LaserWriter II

Troubleshooting Tables

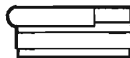
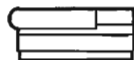


Table N3 – Jams in Separation/Feeder Guide Area

–	Clean the connection between the discharging pins and the high-voltage power supply. Do the paper jams continue?	No	Finished.
		Yes	Replace the high-voltage power supply.

Table N4 – Jams in Fuser/Delivery Area

1.	Is the fuser roller cleaner felt dirty?	Yes	Replace the cleaner felt.
2.	Are the upper or lower paper guides dirty?	Yes	Clean the guides. Refer to LaserWriter II, Preventive Maintenance.
3.	Are any of the separation claws dirty, worn, or damaged?	Yes	Clean the separation claws as described in Preventive Maintenance, or replace the claws as necessary.
4.	Is the delivery-sensing lever in the fuser assembly damaged or broken?	Yes	Replace the delivery-sensing lever.
5.	Is the new version of the delivery-sensing lever installed?	No	Replace the delivery-sensing lever.
6.	Is the fuser assembly defective?	Yes	Replace the fuser assembly.
7.	Are the delivery rollers worn or damaged?	Yes	Replace the delivery rollers, or replace the fuser assembly.



LaserWriter II

Troubleshooting Tables

Table N5 – Sheets Stuck Together

1.	Are you using the type of paper recommended for the print job?	No	Replace paper in the cassette with recommended paper for type of printing being done.
2.	Are the paper cassette springs damaged?	Yes	Replace the paper cassette.
		No	Replace the separation pad.

Table N6 – Wrinkles

1.	Are you using the type of paper recommended for the print job?	No	Replace paper in the cassette with recommended paper for type of printing being done.
2.	Install fresh paper in the paper cassette. Does the wrinkling stop?	Yes	Finished.
		No	Replace the cassette tray.
3.	Perform an engine self-test and open the top cover while the paper is passing over the feeder guide (about five seconds after paper pickup). Is the paper wrinkled?	Yes	Check that the pickup and registration rollers are clean and undamaged. If they cannot be cleaned or are damaged, replace the pickup roller(s) or transfer guide assembly, respectively.
		No	Clean the fuser assembly. Refer to LaserWriter II, Preventive Maintenance.

LaserWriter II

Laser Power Output Check

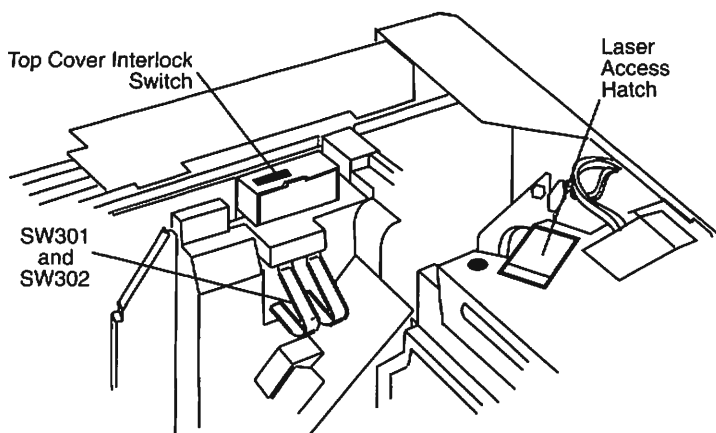
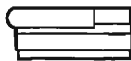
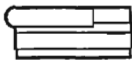


Figure: Laser Power Output Check Controls

Laser Power Output Check Procedure

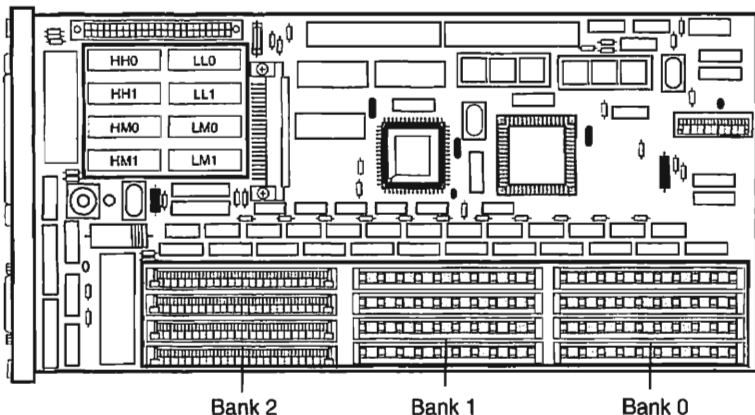
1. Place the LaserWriter II on the grounded workbench pad and remove the controller-I/O board and the cover set.
2. With the printer power off, open the laser access hatch on the laser/scanner assembly (see Figure).
3. Insert the laser power checker into the laser access hatch with the detector facing the laser diode.
4. Connect the laser power checker to the digital voltmeter as follows:
 - a. Connect the **black** lead from the laser power checker to the multimeter socket labeled "**Common**."
 - b. Connect the **red** lead from the checker to the multimeter socket marked "**Volts**" or "**V**."
 - c. Set the multimeter to volts, set the range to **200 mV**, and turn on the multimeter.
5. Defeat the top cover interlock switch by inserting a nonmetallic tool into the opening (see Figure). Switch on the printer, and wait one minute for the printer to warm up.
6. Depress drum-sensitivity switches SW301 and SW302 located below the top cover interlock switch (see Figure) and press the service test print button.
7. Verify that the laser power output reading on the multimeter is $17.6 \text{ mV} \pm 1.6 \text{ mV}$.
 - a. If you cannot measure the laser power, replace the laser/scanner assembly and repeat steps 2 through 7.
 - b. If you still cannot measure the laser power, replace the DC controller PCA.



LaserWriter II

NTX Memory Upgrade

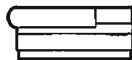
Use 120 ns (or faster) 256K and 1 MB SIMMs on the LaserWriter II NTX controller-I/O board. The 150 ns SIMMs will cause serious timing problems. All SIMMs in each bank must be the same memory size. Do not use Macintosh Plus, SE, or II SIMMs in the LaserWriter II NTX.



Size	Bank 0	Bank 1	Bank 2
2 MB	4 – 256K SIMMs	4 – 256K SIMMs	None
3 MB	4 – 256K SIMMs	4 – 256K SIMMs	4 – 256K SIMMs
4 MB	4 – 1 MB SIMMs	None	None
5 MB	4 – 1 MB SIMMs	4 – 256K SIMMs	None
8 MB	4 – 1 MB SIMMs	4 – 1MB SIMMs	None
9 MB	4 – 1MB SIMMs	4 – 1 MB SIMMs	4 – 256K SIMMs
12 MB	4 – 1 MB SIMMs	4 – 1 MB SIMMs	4 – 1 MB SIMMs

LaserWriter II

NTX ROM Upgrade



ROM Upgrade Procedure

1. Place the LaserWriter II on the grounded workbench pad and put on your grounding wriststrap.
2. Remove the I/O PCA and place it on the grounded workbench pad.
3. Using the IC extractor, carefully remove the eight ROMs at locations **HH0, HH1, HM0, HM1, LL0, LL1, LM0, and LM1** on the I/O PCA (see Figure).
4. Install the eight upgrade ROMs by matching the markings on each ROM chip with the ROM socket locations on the I/O PCA. The notch at the end of each ROM should face the connector panel on the I/O PCA.
5. Replace the I/O PCA.

Checking the Upgrade Procedure

1. Switch on the printer and wait for the user test print. Locate the copyright information printed on the right side of the test print. The PostScript ROM version number is printed at the end of the first line of print. **If the test print displays the rev 3.0 ROM version number (see Figure), the ROM upgrade is successful.**
2. **If the user test print is not produced**, first verify that the ROMs are properly installed. Then, run the *NT/NTX ROM and SIMM Test* or replace the ROMs with known-good ROMs from a new LaserWriter II NTX ROM Upgrade Kit.

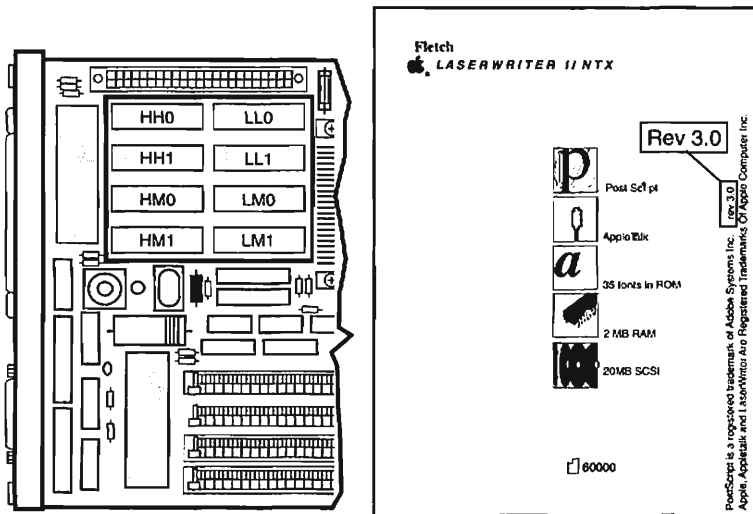
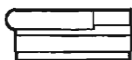


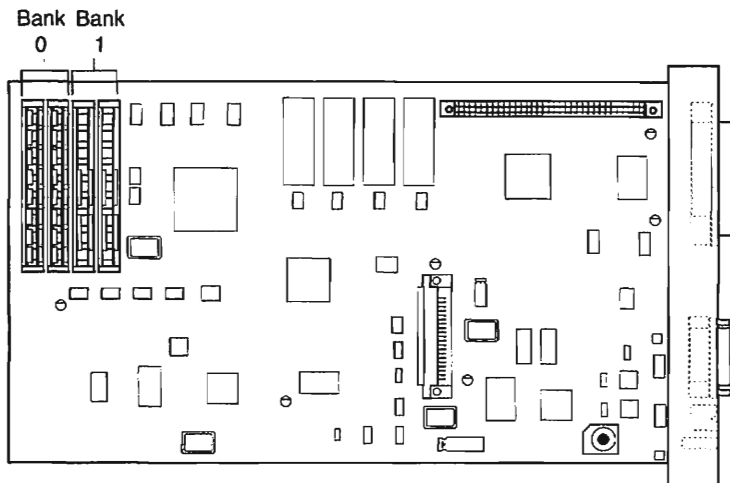
Figure: NTX I/O PCA and User Test Print



LaserWriter II

IIx and IIg Memory Upgrade

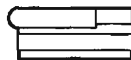
You must use 80 ns 256K and 1 MB SIMMS on the IIx and IIg controller-I/O boards. The 120 ns and 150 ns SIMMS will cause serious timing problems. All SIMMs in each bank must be the same memory size. Do not use LaserWriter SC or NTX SIMMs on the IIx or IIg boards.



Size	Bank 0	Bank 1
2 MB*	4 – 256K SIMMs	4 – 256K SIMMs
4 MB*	4 – 1 MB SIMMs	None
5 MB	4 – 1 MB SIMMs	4 – 256K SIMMs
8 MB	4 – 1 MB SIMMs	4 – 1MB SIMMs
16MB	4 – 4 MB SIMMs	None
17 MB	4 – 4 MB SIMMs	4 – 256K SIMMs
32 MB	4 – 4 MB SIMMs	4 – 4 MB SIMMs
* LaserWriter IIx only.		

LaserWriter II

Preventive Maintenance



Setting Up for Preventive Maintenance

Before performing any preventive maintenance, be sure to do the following:

1. Power off and unplug the LaserWriter II.
2. Allow the fuser assembly rollers to cool.
3. Prepare your work area for electrostatic discharge prevention.
4. Spread a drop cloth under the work area to protect the floor from grease and spilled toner.

Checking the Page Count

1. Switch on the LaserWriter II and wait for the startup test page. At the bottom of the test page is the number of pages printed since the installation of the controller-I/O board. This number will be accurate if the I/O board has never been repaired or upgraded.
2. If the controller-I/O board has been replaced or upgraded, check the Repair Log Label affixed to the bottom of the printer and consult with the customer to determine the number of copies printed.

Parts Replacement Schedule

Replace the ozone filter and check the fan every time the LaserWriter II produces 50,000 prints.

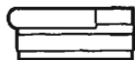
Replace the following parts every time the LaserWriter II produces 100,000 prints:

- Fuser Assembly
- Transfer Guide Assembly
- Preconditioning Exposure Assembly
- Paper Feed Roller Assembly
- Transfer Corona Assembly

User Preventive Maintenance

The customer should clean the following items on an as-needed basis:

Service Point	Tool/Solvent
Primary corona wire	Cleaning brush supplied with printer
Transfer corona wire	Cotton swab and isopropyl alcohol
Transfer guide	Cloth dampened with water
Fuser rollers	Fuser cleaning pad
Exterior case	Cloth dampened with water



LaserWriter II

Preventive Maintenance

Standard Preventive Maintenance

The dealer should clean the following items every 12 months or during each service call.

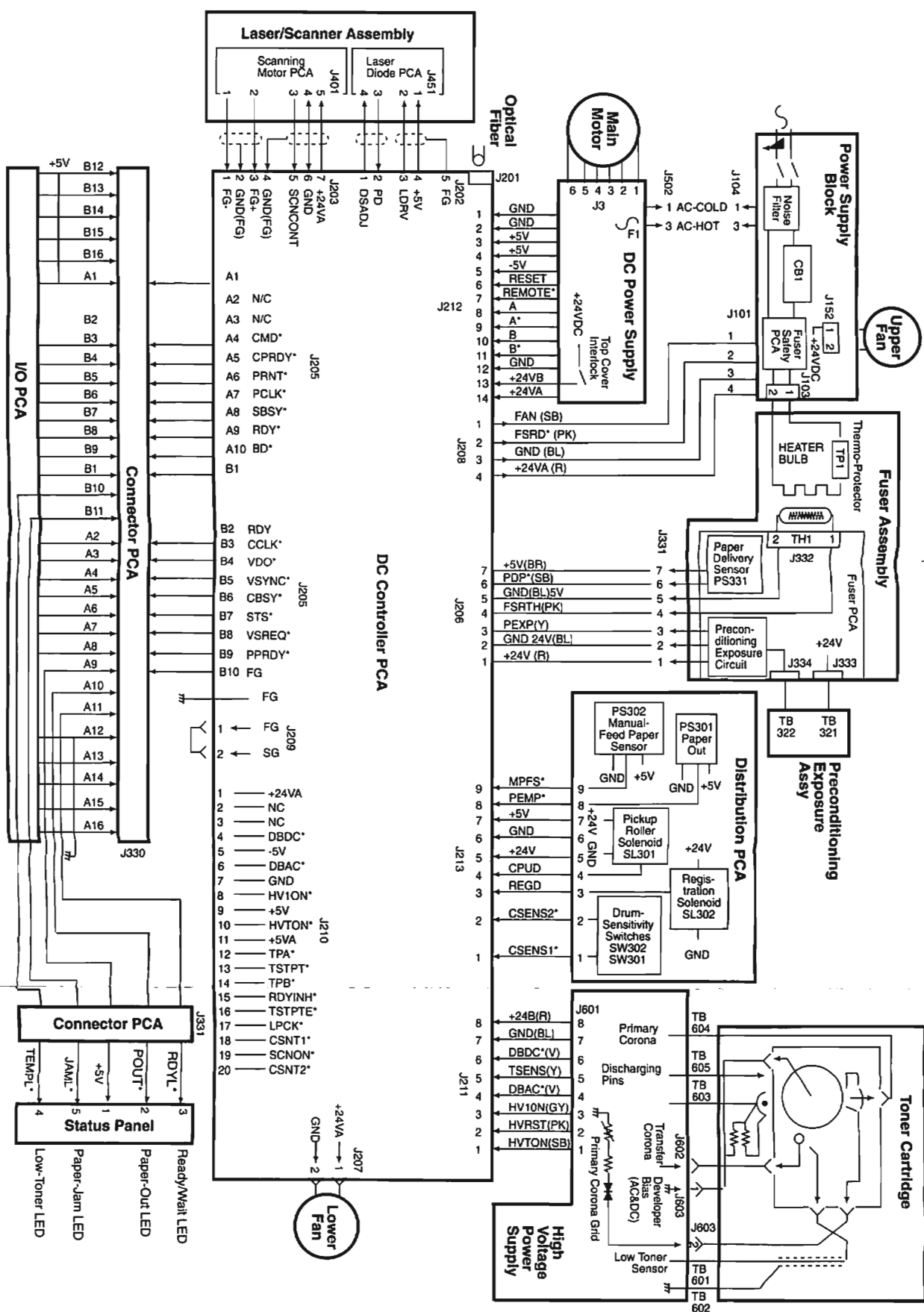
Service Point	Tool/Solvent
Primary corona wire	Cleaning brush supplied with printer
Transfer corona wire	Cotton swab
Transfer guide	Cloth dampened with water
Fuser rollers	Fuser cleaning pad
Exterior case	Cloth dampened with water
Separation claws	Cloth dampened with alcohol
Paper guide	Cloth dampened with alcohol
Lower delivery guide	Cloth dampened with alcohol
Feeder guide	Cloth dampened with water
Registration rollers	Cloth dampened with water



CAUTION: Never use an ammonia-based cleaner on the LaserWriter II. These cleaners can discolor the plastic.



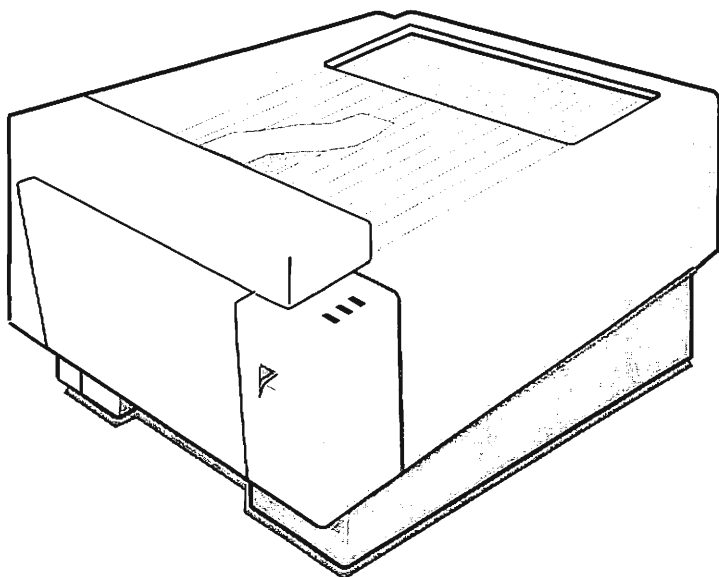
CAUTION: Before servicing the fuser rollers, make sure that the LaserWriter II has been off at least five minutes to allow the fuser assembly to cool.







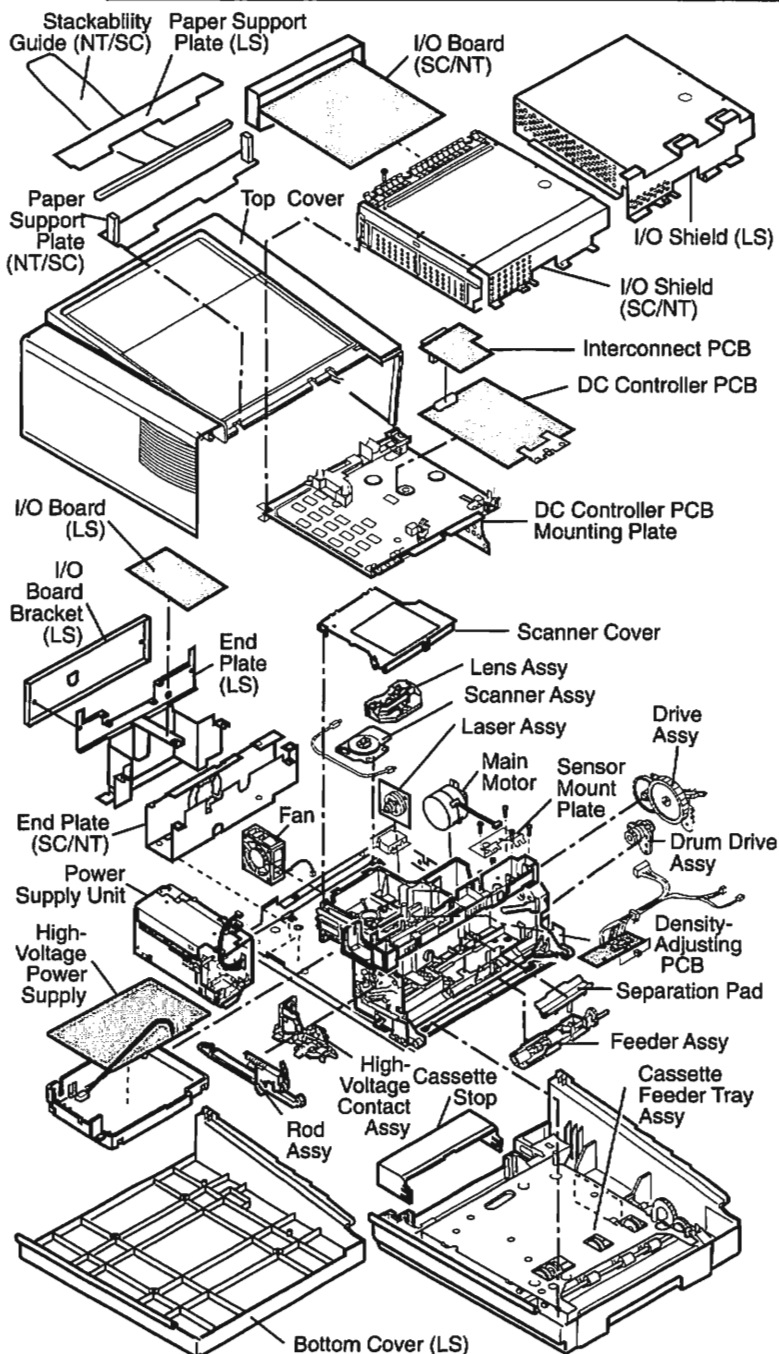
Contents	Page
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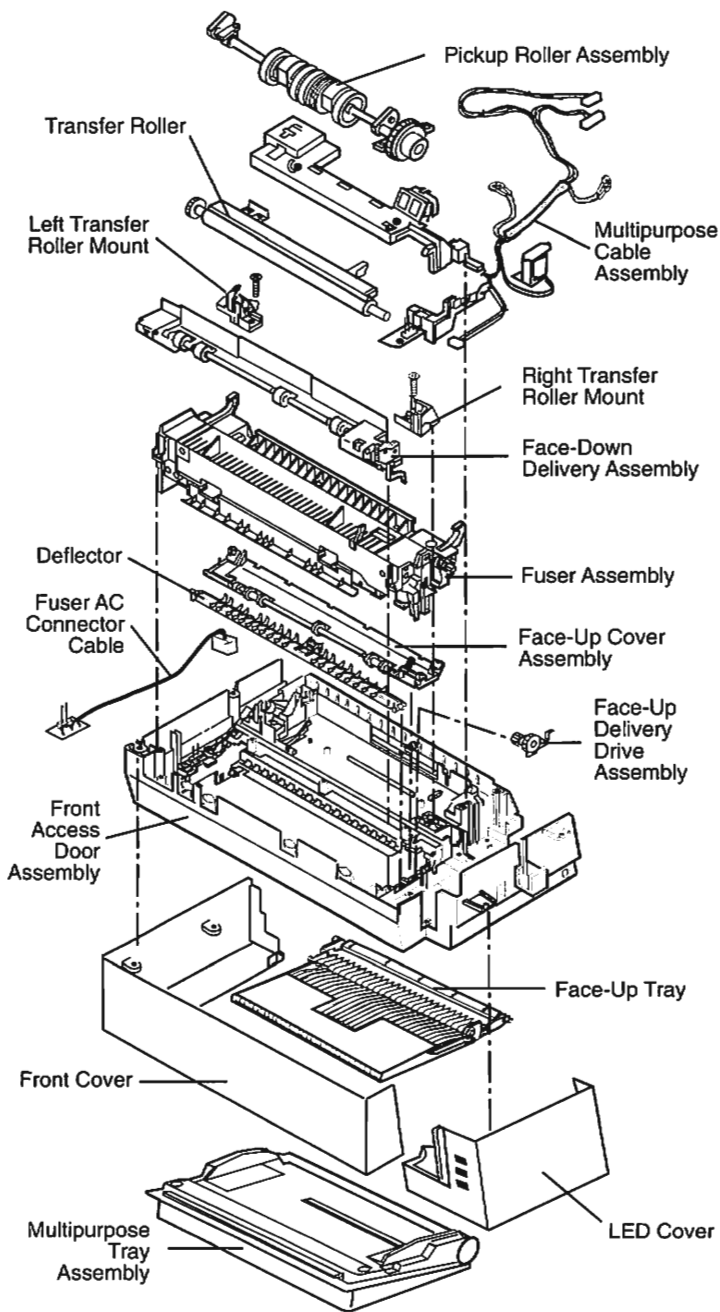
Personal LaserWriter

Exploded View



Personal LaserWriter

Exploded View





Personal LaserWriter

Parts List

The following parts list is not comprehensive. Only selected service modules and replacement parts are listed. When ordering a replacement module or spare part, be sure to check the part number given in this guide against the current price pages in the *Apple Service Programs* manual. Remember that this Apple Service Guide is not updated on a regular basis.

Cassette Feeder Assembly	
Bottom Left Cover	949-0284
Bottom Right Cover	949-0285
Cassette Feeder PCB Assembly	982-0035
Cassette Stop	949-0274
Covers	
Bottom Cover, Platinum, LS	*949-0313
Front Cover	949-0293
LED Cover	949-0294
Left Cover	949-0281
Rear Cover	949-0280
Top Cover	949-0283
DC Controller PCB, LS	661-0650
DC Controller PCB, NT and SC	661-0567
DC Controller PCB Mounting Plate, LS	949-0327
DC Controller PCB Mounting Plate, NT and SC	948-0138
Deflector	971-0048
Density-Adjusting PCB Assembly	982-0039
Drive Assembly	890-0608
Drum Drive Assembly	890-0609
End Plate, LS	949-0328
End Plate, NT and SC	949-0272
Face-Down Delivery Assembly	971-0043
Face-Up Cover Assembly	949-0276
Face-Up Delivery Drive Assembly	971-0049
Face-Up Tray Assembly	
Face-Up Tray (A)	949-0289
Face-Up Tray (B)	949-0288
Face-Up Tray (C)	949-0287
Left Tray Lock	949-0265
Right Tray Lock	949-0266
Fan	720-0513
Feeder Assembly	971-0044
Front Access Door Assembly	949-0295
Fuser Assembly, 110/115 V	661-0568
Fuser Assembly, 220/240 V	661-0575
Fuser AC Connector Cable	569-0049
High-Voltage Contact Assembly	890-8608
High-Voltage Power Supply PCB	661-0573
I/O Board Bracket, LS	949-0314
I/O Board, LS	661-0631
DRAM, 256K x 4, 80 ns	334-0114
I/O Board, NT	661-0565
RAM SIMM, 1 MB	661-0520

Personal LaserWriter

Parts List

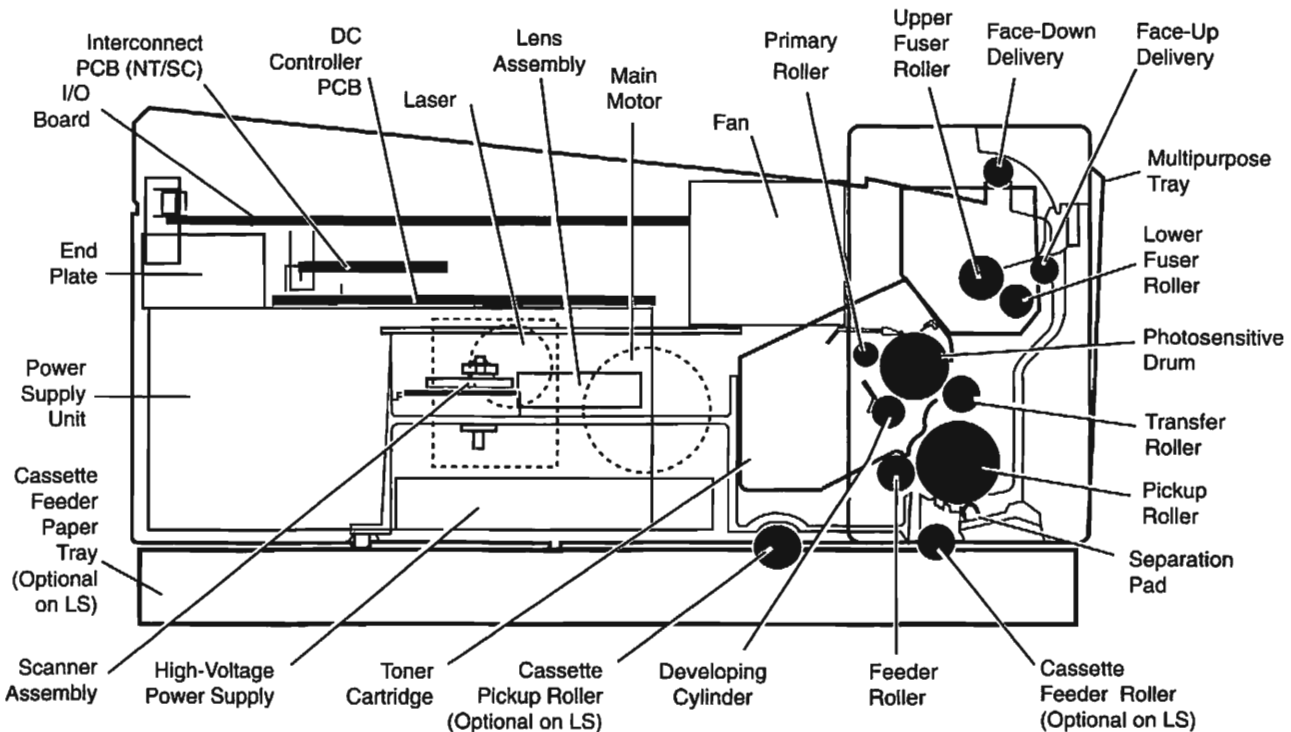


ROM SIMM, 1 MB (location J2)	661-0570
ROM SIMM, 256K (location J3)	661-0602
I/O Board, SC	661-0566
SIMM, 256K	661-0402
I/O Shield, LS	949-0326
I/O Shield, NT and SC	
I/O Board Rail	949-0292
Lower I/O Shield	949-0268
Upper I/O Shield	949-0267
Interconnect PCB, NT and SC	982-0048
Laser Assembly	661-0571
Lens Assembly	971-0041
Main Motor (Stepping DC Motor)	890-0426
Multipurpose Cable Assembly	890-8605
Multipurpose Tray, 50 sheet	949-0279
Multipurpose Tray, 70 sheet	949-0341
Paper Support Plate, NT and SC	949-0273
Paper Support Plate, LS	949-0332
Pickup Roller Assembly	971-0045
Power Supply Unit, NT and SC, 110/115 V	661-0569
Power Supply Unit, NT and SC, 220/240 V	661-0574
Power Supply Unit, LS, 110/115 V	661-0636
Power Supply Unit, LS, 220/240 V	661-0637
Rod Assembly	971-0046
Scanner Assembly	661-0572
Scanner Cover	971-0040
Sensing Arm	982-0045
Sensor Mounting Plate	890-1200
Separation Pad	870-0295
Stackability Guide, NT and SC	949-0261
Transfer Roller	870-0103
Transfer Roller Mount Assembly, Left Side	890-8603
Transfer Roller Mount Assembly, Right Side	890-0607

- * Some Personal LaserWriter LS printers have a solid bottom cover and some have a hollow center or "picture frame" bottom cover. Use the solid bottom cover, part number 949-0313, to replace either version of the bottom cover. The solid bottom cover fits all Personal LaserWriter LS printers; the "picture frame" version does not.



Personal LaserWriter Major Assemblies



Personal LaserWriter

Major Assemblies

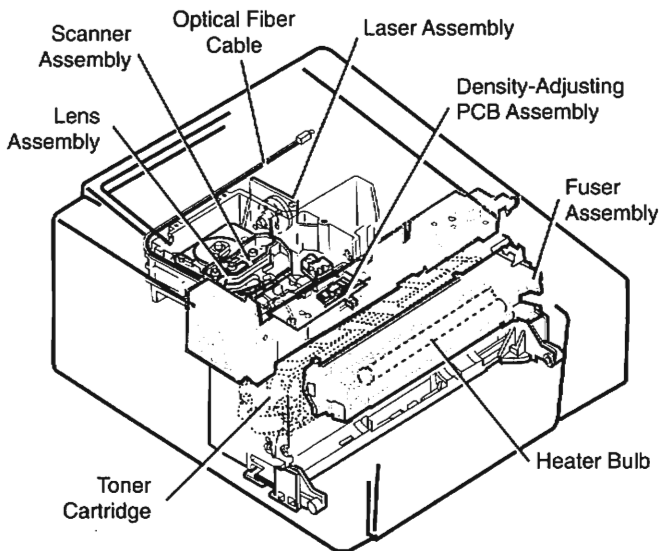


Figure: Internal Assembly Locations

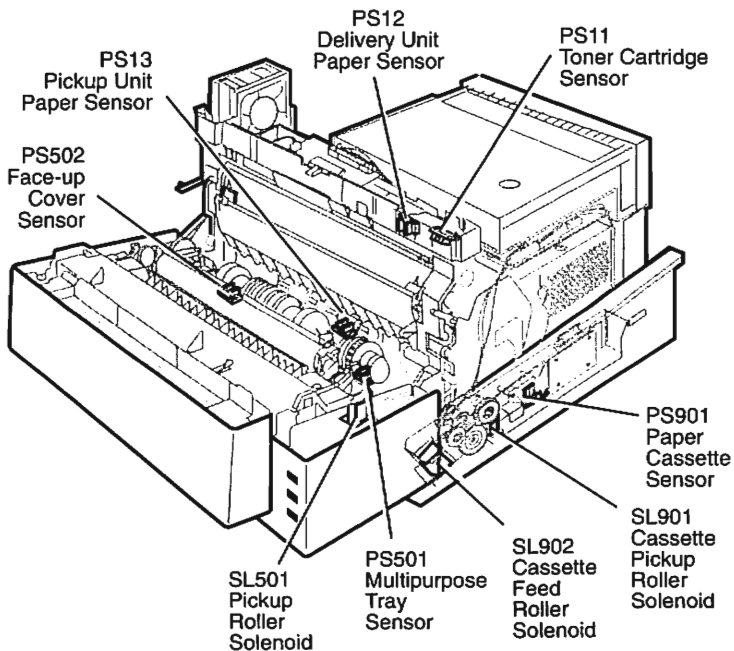


Figure: Sensors and Solenoids



Personal LaserWriter

I/O Board Identification

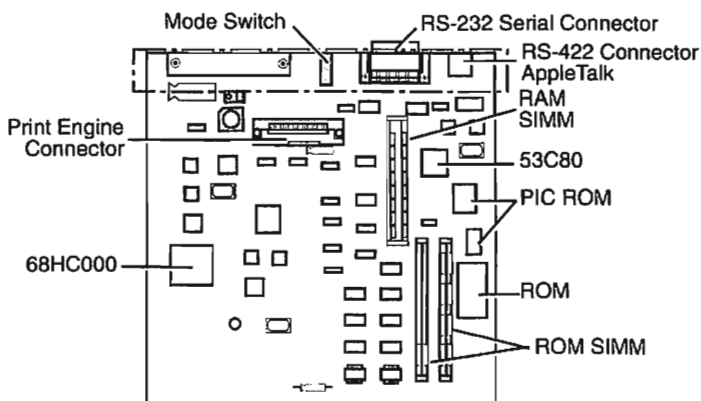


Figure: NT I/O Board

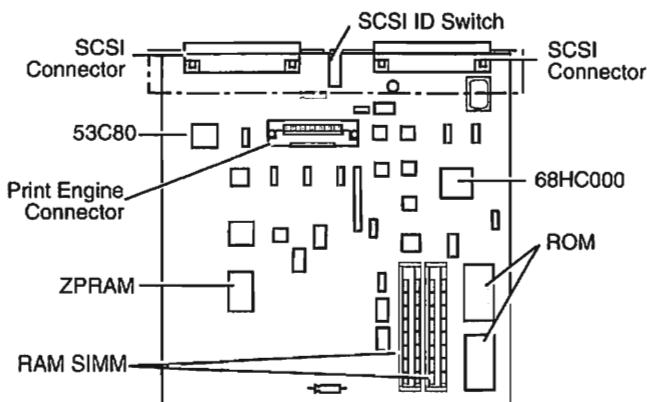


Figure: SC I/O Board

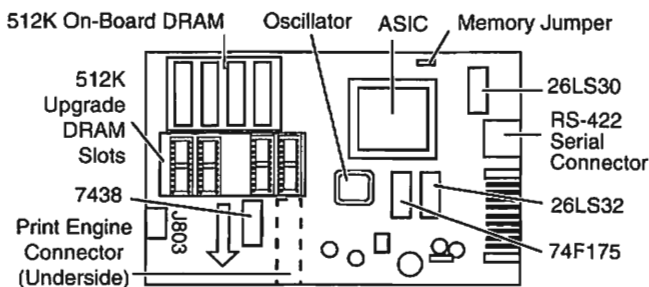


Figure: LS I/O Board

**I/O Board Specifications**

	LS	SC	NT
Processor	N/A	MC68000; 7.275 MHz	MC68000; 12 MHz
ROM	N/A	32K	1.25 MB, expandable to 2.0 MB
RAM	512K, expandable to 1.0 MB	1.0 MB	2.0 MB
Interfaces	RS-422	SCSI	AppleTalk RS-232 RS-422
Printing protocols	QuickDraw	QuickDraw	PostScript Diablo 630 HP LaserJet
Built-in fonts	N/A	N/A	ITC Avant Garde, ITC Bookman, Courier, Helvetica, Helvetica Narrow, New Century Schoolbook, Palatino, Symbol, Times, ITC Zapf Chancery, ITC Zapf Dingbats, and IBM PC Graphics Extended Character Set (ECS)



Personal LaserWriter

Specifications

Print Engine Specifications

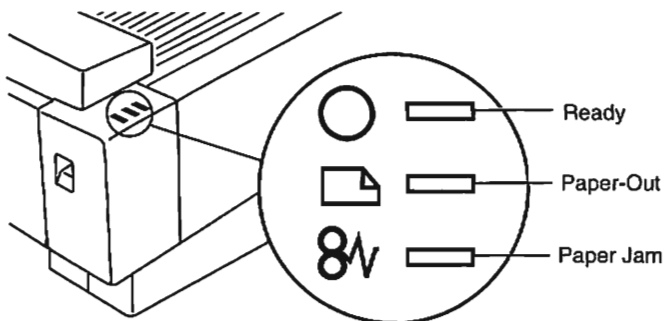
Marking engine	Canon LBP-LX laser xerographic
Print resolution	300 dots per inch (DPI)
Speed	4 pages per minute
Paper feed	Input: Automatic with paper cassette; automatic or manual with multipurpose tray Output: Face-down or face-up options
Print materials	Sizes: Letter, legal, A4, and B5 Envelopes: 3.5 x 7 inches Media: Apple recommends 20-lb. photocopy or typewriter bond, though the printer also accepts 16- to 28-lb paper. For best results, use envelopes that are recommended for laser printers.
Paper capacities	Paper cassette: 250 sheets of 20-lb. paper Envelope cassette: 15 envelopes Multipurpose tray: 50 sheets of paper or 5 envelopes
Printable surface	Letter size: 8.0 by 10.5 inches Legal size: 8.0 by 13.0 inches A4: 7.41 by 10.86 inches B5: 7.69 by 10.16 inches Printable area may vary depending upon applications.
Physical dimensions	NT & SC: Height: 9.8 in. (24.8 cm) Width: 15 in. (38 cm) Weight: 32 lb. (15 kg) LS: Height: 8 in (20.3 cm) Width: 15 in. (39 cm) Weight: 31 lbs (14.5 kg)
Operating environment	Temperature: 50° to 90° F (10° to 32.5°C) Humidity: 20 to 80 percent
Power requirements	100 to 115 volts AC, 50 to 60 Hz 220 to 240 volts AC, 50 Hz

Personal LaserWriter

Status Lights



The Personal LaserWriter has three status lights located on the front access door of the printer. When the Personal LaserWriter SC or NT is switched on, the I/O board executes a self-test diagnostic. At the conclusion of this test, the status lights indicate the printer status. The Personal LaserWriter LS status lights indicate a paper jam or paper-out condition only when the printer is connected to a Macintosh computer using the LS software driver.



Personal LaserWriter SC and NT Status Lights

Ready	Paper-Out	Paper Jam	Printer Status
On	Off	Off	Ready
Off	On	Off	Paper cassette not installed or paper out
Off	Off	On	Paper jam
Off	Off	Off	Front access door open, toner cartridge not installed, or face-up cover assy open
Flashing	Off	Off	Test print or engine warmup
Off	Flashing (Sync)	Flashing (Sync)	Laser assy malfunction, scanner assy malfunction, or fuser assembly error
Off	Flashing (Toggle)	Flashing (Toggle)	I/O board failure
On	On	On	I/O board failure



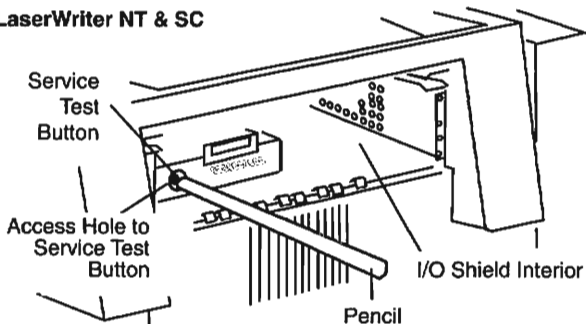
Personal LaserWriter

Test Prints

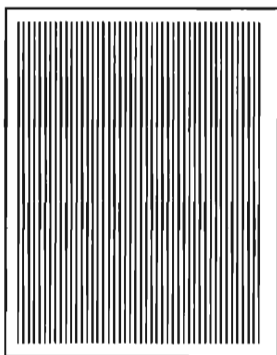
Service Test Print

All versions of the Personal LaserWriter produce a service test print when you press the service test print button (see Figure) on the DC controller PCB. The service test print checks the registration adjustment and confirms the operation of the print engine.

LaserWriter NT & SC



Service Test Print



LaserWriter LS

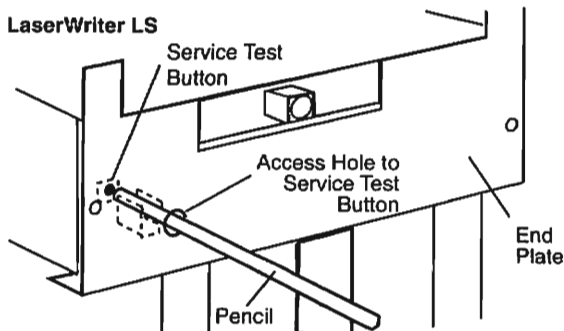


Figure: Service Test Button and Service Test Print



SC User Test Print

The Personal LaserWriter SC produces a user test print (see Figure) only if the SCSI ID switch is set to "7." When the printer is switched on, the SC user test print will print repeatedly until the printer is out of paper. This test print confirms the operation of the SC I/O board.

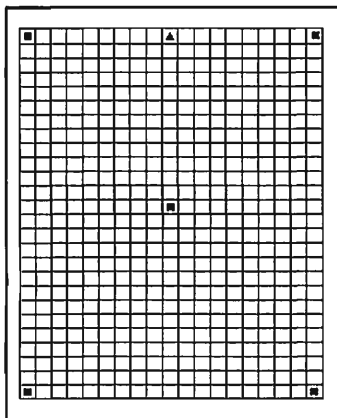
NT User Test Print

The Personal LaserWriter NT produces a user test print (see Figure) each time the printer is switched on. This test print confirms the operation of the NT I/O board and provides the following information about the Personal LaserWriter NT:

- The selected operating mode—PostScript, Diablo 630, or HP LaserJet Plus
- Whether RS-232 serial or AppleTalk communication is selected
- How many fonts are stored in ROM
- The amount of RAM installed
- The number of pages the I/O board has produced

Note: The LaserWriter LS does not produce a user test print.

LaserWriter SC



LaserWriter NT

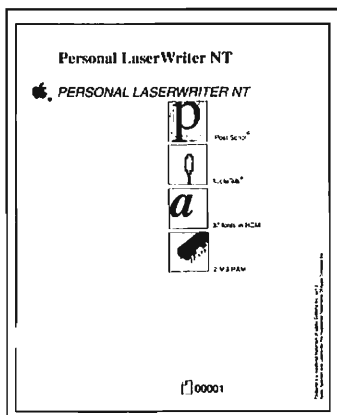


Figure: User Test Prints



Personal LaserWriter

Troubleshooting the Personal LaserWriter

Troubleshooting Procedure

1. Before you begin troubleshooting, check the printer setup and operating conditions described in the **"Pre-Power-On Checklist."**
2. Make sure you are familiar with all procedures described in the **Safety** section of this guide before performing any live electrical checks.
3. To troubleshoot the Personal LaserWriter NT or SC, begin with **Flowchart 1** and proceed sequentially, function by function, until you verify all the printer's main functions. If you encounter a problem, the flowchart will refer you to another flowchart or a troubleshooting table for resolution of the failure.

To troubleshoot the Personal LaserWriter LS, begin with **Flowchart 4** and proceed step-by-step. Then continue with Flowcharts 5 and 6. If you encounter a problem, the flowchart will refer you to another flowchart or troubleshooting table for problem resolution.

4. If you replace a module and find that the problem remains, reinstall the original module or component before proceeding.
5. After you repair the printer, perform the necessary **Preventive Maintenance** before returning the customer's printer.

Pre-Power-On Checklist

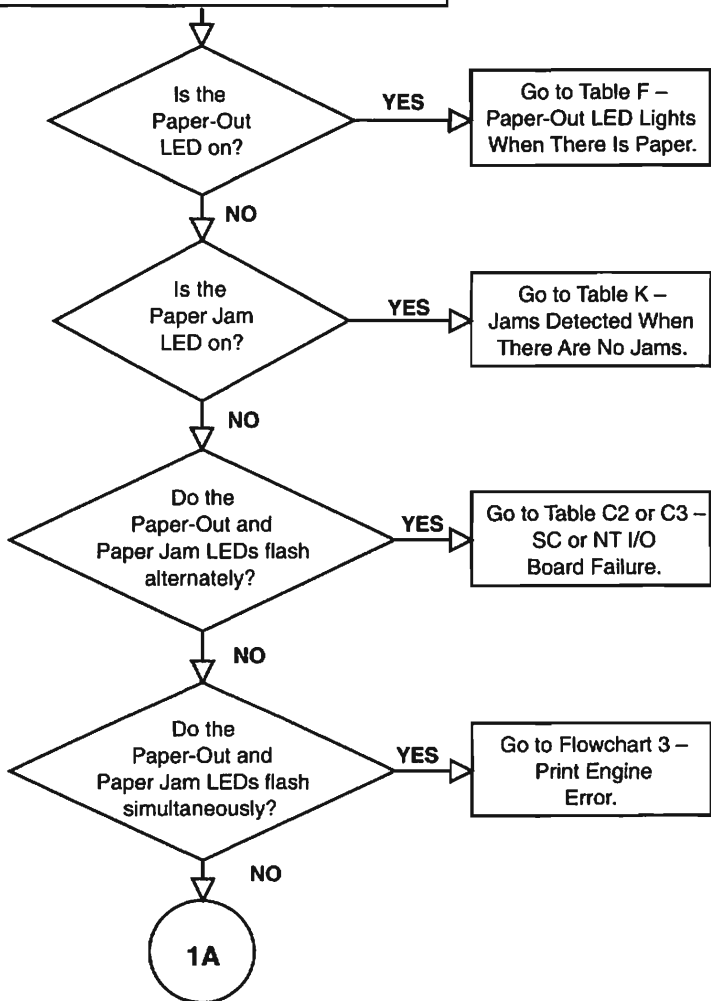
Check the following items before proceeding with the troubleshooting flowcharts.

- ✓ Line voltage is OK (115 volts AC $\pm$ 10%)
- ✓ Printer is installed on a solid level surface
- ✓ Room temperature is between 50 and 90° F (10 to 32.5° C)
- ✓ Humidity is between 20% and 80%
- ✓ Printer is not located in a hot or humid area, near open flames, or in a dusty location
- ✓ Printer is not exposed to ammonia gas
- ✓ Printer is not exposed to direct sunlight
- ✓ Printer is installed in a well-ventilated area
- ✓ Cables and connectors are OK
- ✓ Toner cartridge is installed and has toner
- ✓ Print density adjustment dial is set correctly
- ✓ Paper cassette (optional on the LaserWriter LS) is properly loaded with paper
- ✓ Paper used is within specification
- ✓ Front access door is closed



Flowchart 1

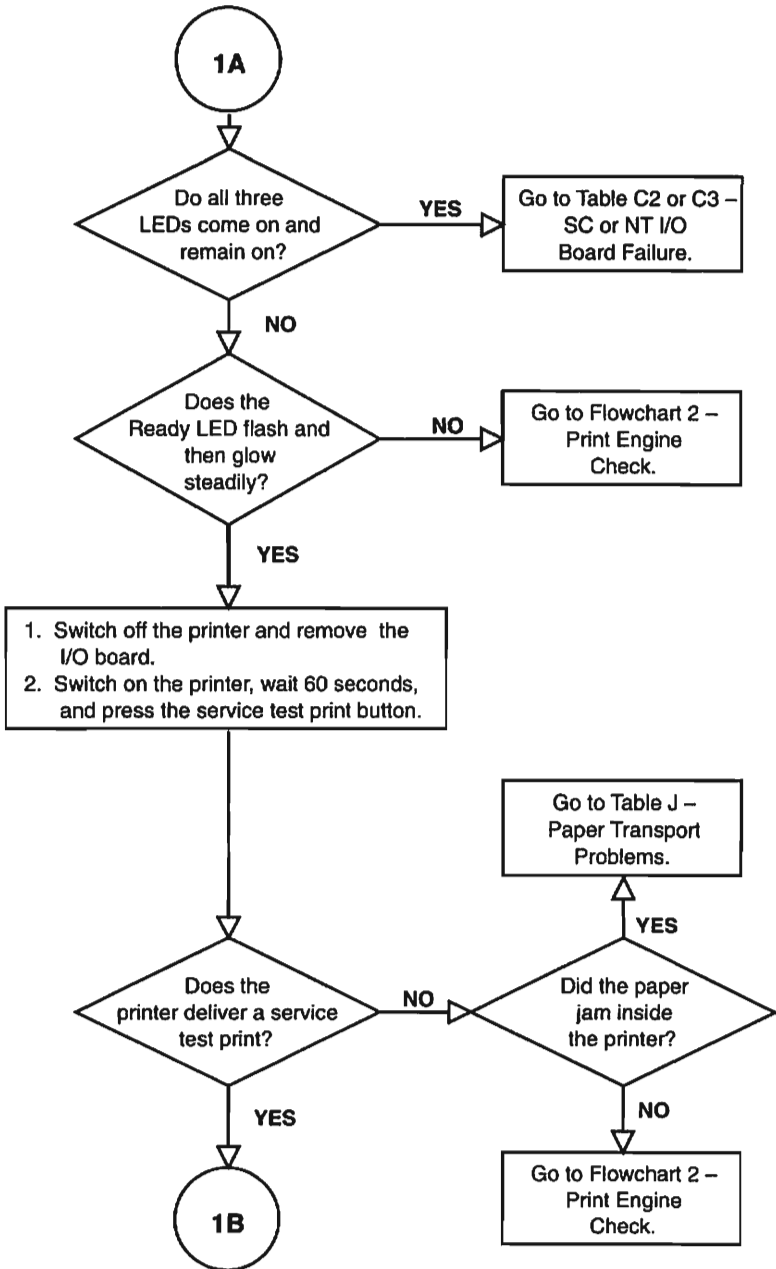
1. Open the printer and remove any paper jams.
2. Install a toner cartridge in the printer.
3. Fill the paper cassette tray with paper.
4. Close the front access door.
5. Switch on the printer, wait 60 seconds, and observe the status LEDs.





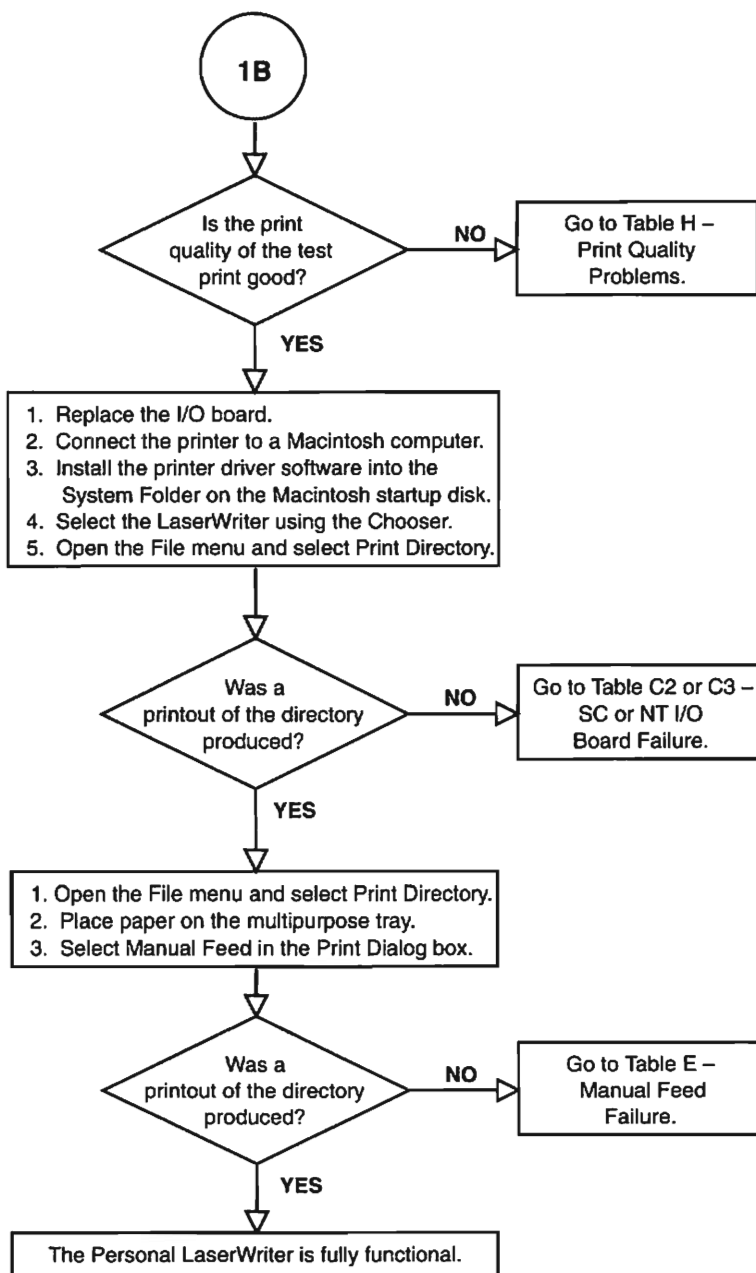
Personal LaserWriter

Functional Check – LaserWriter SC/NT



Personal LaserWriter

Functional Check – LaserWriter SC/NT





Personal LaserWriter

Print Engine Check – LaserWriter SC/NT

Flowchart 2

1. Switch off and unplug the printer.
2. Remove the top cover and I/O board.
3. Plug in and switch on the printer.

Is the fan connected and operational?

NO

Go to Table A –
No Power.

YES

Does the main motor rotate after power on?

NO

Go to Table D –
Main Motor
Failure.

YES

Press the service test print button.

Did the printer deliver a service test print?

NO

2A

YES

Is the print quality good?

NO

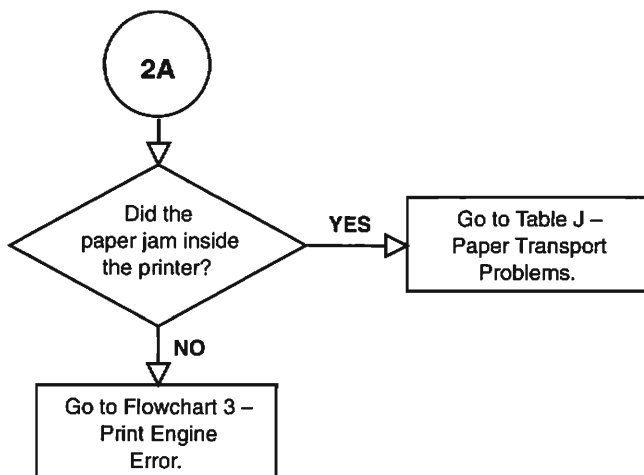
Go to Table H –
Print Quality
Problems.

YES

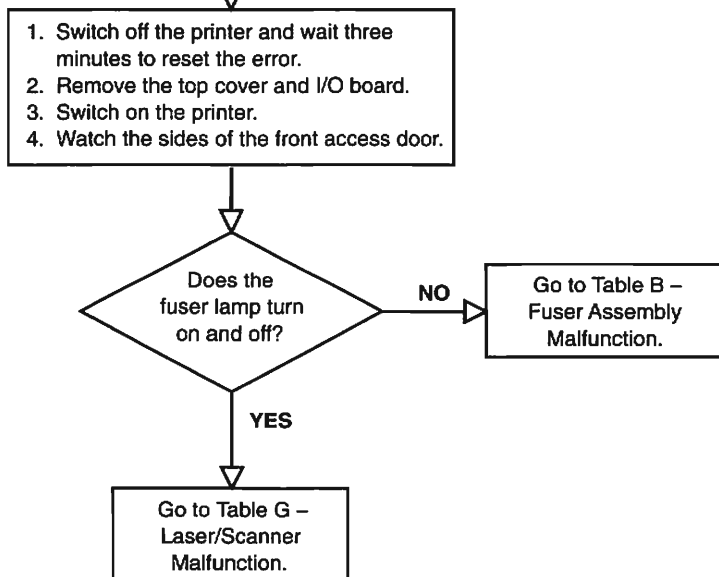
The LaserWriter is fully functional.

Personal LaserWriter

Print Engine Error – LaserWriter SC/NT



Flowchart 3



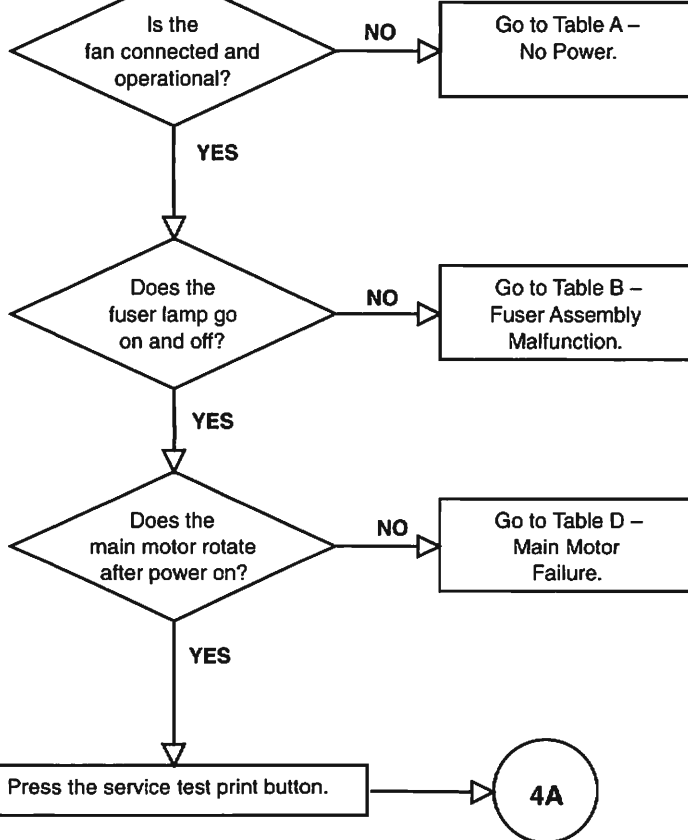


Personal LaserWriter

Functional Check – LaserWriter LS

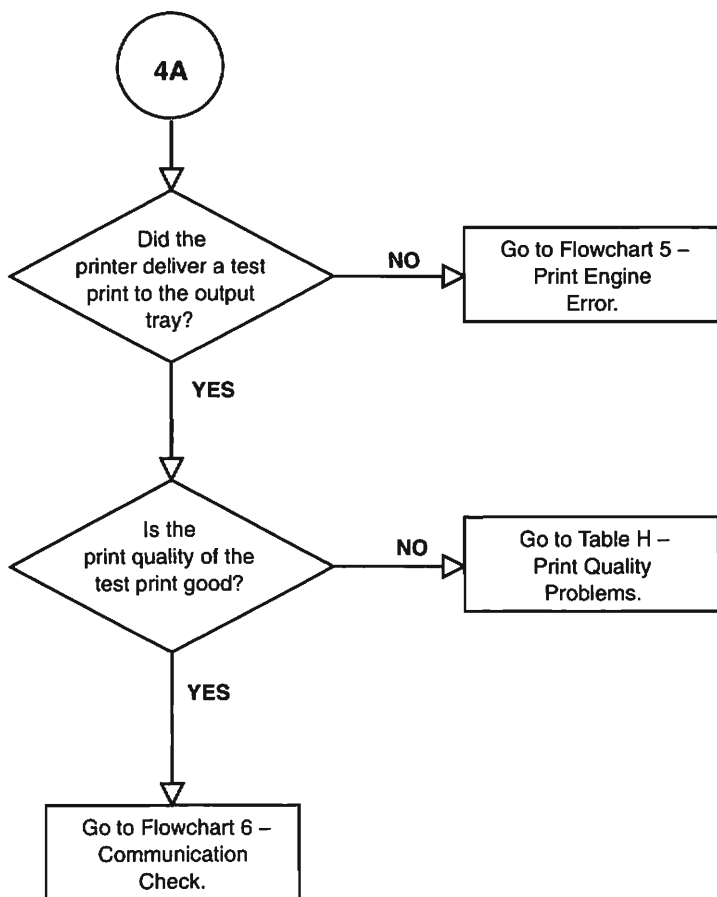
Flowchart 4

1. Remove the top cover and the I/O board.
2. Install a toner cartridge in the printer.
3. Close the front access door.
4. Place paper on the multipurpose tray.
5. Plug in and switch on the printer.



Personal LaserWriter

Functional Check – LaserWriter LS

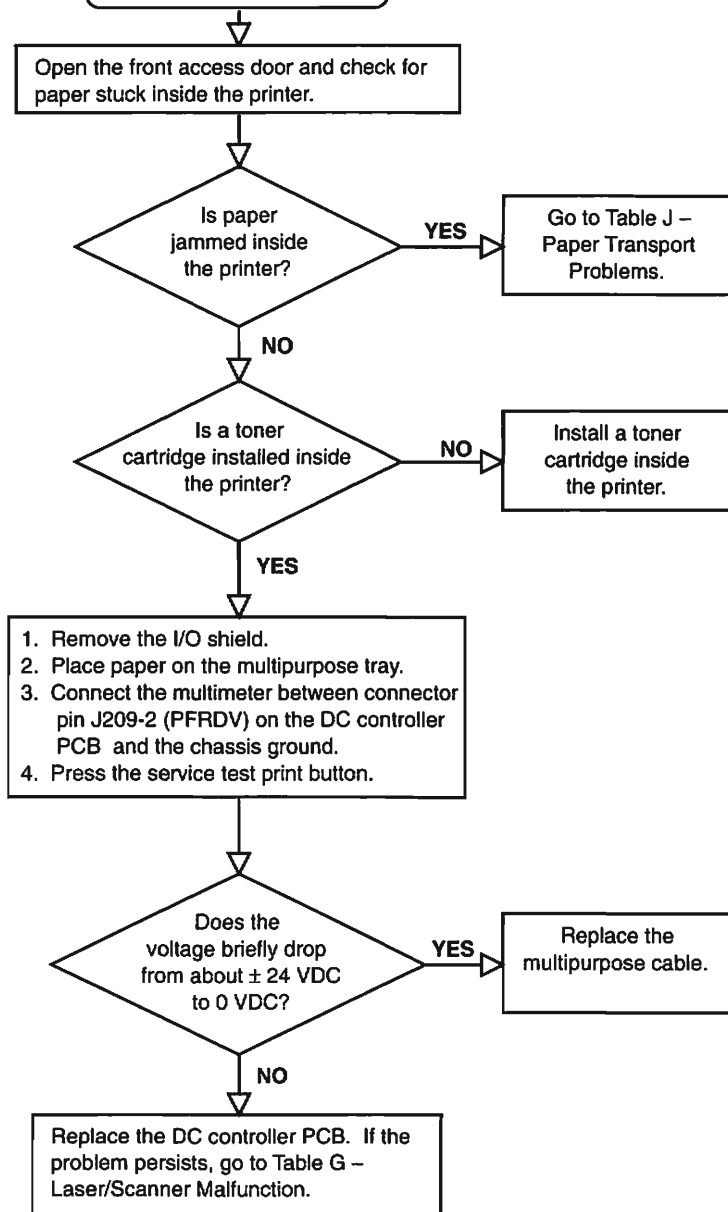




Personal LaserWriter

Print Engine Error – LaserWriter LS

Flowchart 5





Flowchart 6

1. Replace the I/O board.
2. Connect the printer to a Macintosh computer.

Was a printout
of the directory
produced?

NO

Go to Table C1 –
LS I/O Board
Failure.

YES

Is the
print quality
good?

NO

Go to Table H –
Print Quality
Problems.

YES

The printer is fully functional.



Personal LaserWriter

Troubleshooting Tables

Table A – No Power (1 of 2)

1.	Is the required voltage supplied at the AC outlet?	No	Try another AC outlet.
2.	Locate CB1 at the rear of the power supply unit. Does the plastic shaft extend out of the power supply unit?	Yes	Reset the circuit breaker. If the circuit breaker trips again when the printer is powered on, there is a short that will have to be located.
3.	Remove the AC power cord and disconnect the power switch, SW11. First, measure the resistance between the top two terminals at SW11. Then, measure the resistance between the bottom two terminals at SW11. Does the resistance measure 0 ohms when the power switch is turned on and infinity ohms when the power switch is turned off?	No	Replace the power switch SW11.
4.	Connect the multimeter across pins J101-1 and J101-2 on the power supply unit. Is the voltage 110/115 volts (or 220/240 volts) when the power is turned on?	No	Replace the power supply unit.
For steps 5 through 12, remove the I/O shield and install a toner cartridge.			
5.	Connect the multimeter between pin J212-3 on the DC controller PCB and chassis ground. Is the voltage about +24 VDC?	No	Replace the power supply unit.
6.	Connect the multimeter between pin J212-6 on the DC controller PCB and chassis ground. Is the voltage about +12 VDC?	No	Replace the power supply unit.

Personal LaserWriter

Troubleshooting Tables

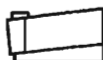


Table A – No Power (2 of 2)

7.	Connect the multimeter between pin J212-8 on the DC controller PCB and the chassis ground. Power on the printer. Is the voltage about +5 VDC?	No	Replace the power supply unit.
8.	Is connector J701 properly connected to the density-adjusting PCB?	No	Reconnect J701 to the density-adjusting PCB.
9.	Connect the multimeter between J701-1 on the density-adjusting PCB and the chassis ground. Switch on the printer. Is the voltage approximately +12 VDC?	Yes	Replace the fan.
10.	Connect the multimeter between J701-3 on the density-adjusting PCB and the chassis ground. Switch on the printer. Is the voltage about +4 VDC?	Yes	Replace the fan.
11.	Connect the multimeter between J701-3 on the density-adjusting PCB and the chassis ground. Press the service test print button. Is the voltage about +2 VDC when the main motor starts to rotate?	Yes	Replace the fan.
12.	Connect the multimeter between connector J213-1 on the DC controller PCB and the chassis ground. Switch on the printer. Is the voltage approximately +12 VDC?	Yes No	Replace the density-adjusting PCB. Replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

When the fusing system malfunctions, the microprocessor on the DC controller PCB shuts off current to the fuser and charges capacitor C212 to prevent overheating. If the fusing system fails, switch the power off for three minutes or manually discharge capacitor C212 after replacing any failed module.

Table B – Fuser Assembly Malfunction

1.	Disconnect J101 from the power supply unit. Measure the resistance at the top of the cable connector between J101-1 and J101-2. Is the resistance less than 10 ohms?	No	Check the cable connection. If the cable is securely connected, replace the fuser heater bulb.
2.	Is connector J209 on the DC controller PCB making good contact?	No	Reconnect J209 to the DC controller PCB.
3.	Allow the fuser to cool and remove the fuser assembly from the printer. Measure the resistance between J502-1 and J502-3 on the fuser assembly. Is the resistance between 180K and 290K ohms at room temperature?	No	Replace the fuser assembly. If the problem persists, check the cable connections between the fuser assembly (J502) and the DC controller PCB (J209). If the connections are secure, replace the cable.
4.	Reinstall the fuser assembly and close the front access door. Remove the I/O shield. Connect a multimeter between connector J212-9 (FSRDRV) on the DC controller PCB and the chassis ground. Switch on the power. Does the voltage change from +5 VDC to 0 VDC as the fuser heater bulb turns on and off?	No	Replace the DC controller PCB.
5.	Turn off the printer and wait three minutes for the printer to cool. Connect a multimeter between connector J101-1 and J101-2 on the power supply unit. Switch on the power. Is the voltage 110/115 volts (or 220/240 volts) when the power is turned on?	No	Replace the power supply unit.
		Yes	Replace the fuser assembly.

Personal LaserWriter

Troubleshooting Tables



Table C1 – LS I/O Board Failure

1.	Is the printer connected to a Macintosh computer and is the serial cable connection secure?	No	Connect the printer to a Macintosh computer and tighten the cable connections.
2.	Is the Personal LaserWriter LS driver installed in the System Folder?	No	Copy the LaserWriter LS driver to the System Folder.
3.	Are the Personal LaserWriter LS driver and the correct serial port selected?	No	Use the Chooser to select the LS driver and the port icon for the port (printer or modem) to which the printer is connected.
4.	Is the printer connected to the printer port on the Macintosh computer?	Yes	Make sure that AppleTalk is inactive.
5.	Is Background Printing disabled?	No	Disable Background Printing (so error messages display on the screen). Switch the printer off and on again.
6.	Install a new LS I/O board. Can the computer now print?	Yes	Finished.

Table C2 – SC I/O Board Failure

1.	Are the SCSI cable connections and terminators correct and secure?	No	Tighten cable connections.
2.	Are the SCSI cables and terminators good?	No	Replace the defective cable(s) or terminator(s).
3.	Is the SCSI device address set to the same address as another device?	Yes	Change the SCSI device address to a different address.
4.	Is the LaserWriter SC driver installed in the System Folder and is the printer selected using the Chooser?	No	Copy the LaserWriter SC driver to the System Folder and select the printer using the Chooser.
5.	Try a different SC I/O board. Can the computer now print?	Yes	Finished.



Personal LaserWriter

Troubleshooting Tables

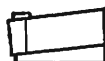
Table C3 – NT I/O Board Failure

1.	Is the rotary switch on the I/O board set to "0?"	No	Set the rotary switch to "0."
2.	Are the LaserWriter and LaserPrep files installed in the System Folder, and is the printer selected using the Chooser?	No	Copy the LaserWriter and LaserPrep files to the System Folder and use the Chooser to select the printer.
3.	Are the LocalTalk or RS-232 cables and connections correct and secure?	No	Tighten the connections.
4.	To identify the problem on the NT I/O board, perform the following actions: a) Switch off the printer. b) Install the LaserWriter II Test Connector on the 25-pin serial port. c) Switch on the printer. d) Observe the status lights and use the NT I/O Board Status Lights table to troubleshoot the I/O board.		

NT I/O BOARD STATUS LIGHTS

Ready	Paper-Out	Paper Jam	Action
On	Flashing	On	Replace SIMM 2.
Off	Flashing	On	Replace SIMM 2.
On	Flashing	Off	Replace SIMM 1.
Off	Flashing	Off	Replace SIMM 1.
On	Off	Flashing	Replace the ROM SIMM. If two ROM SIMMs are installed and the problem still exists, replace the other ROM SIMM.
Off	Off	Flashing	Replace the ROM SIMM. If two ROM SIMMs are installed and the problem still exists, replace the other ROM SIMM.

1.	Is a toner cartridge installed in the printer?	No	Install a toner cartridge in the printer.
2.	Are connectors J209 and J210 on the DC controller PCB making good contact?	No	Reconnect J209 and J210 to the DC controller PCB.
3.	Open the multipurpose tray, pull out the face-up tray, and open and close the face-up cover assembly. Is the problem fixed?	Yes	The lever on the face-up cover assembly is now making contact with the arm of the face-up cover sensor (PS502).
4.	Are there any obstructions in the drive assembly or paper feeder assembly gear train?	Yes	Remove the obstructions.
5.	Remove the I/O shield, close the front access door, and install a toner cartridge. Connect the multimeter between J213-4 on the DC controller PCB and chassis ground. Switch on the printer. Is the voltage about +3.4 VDC?	No	Check the wiring from J213 on the DC controller to J12 on the mounting plate sensor. If the wiring is correct, replace the toner cartridge sensor (PS11).
6.	Connect the multimeter between J209-8 on the DC controller PCB and chassis ground. Switch on the printer. Is the voltage about +3.4 VDC?	No	Check the wiring from J208 on the DC controller to the face-up cover sensor (PS502). If the wiring is faulty, replace the multipurpose cable assembly. If the wiring is correct, replace the face-up cover sensor (PS502).
7.	Disconnect connector J210 from the DC controller PCB. Measure the resistance on the connector (not the DC controller PCB) between the following pairs of pins: a) J210-1 and J210-2 b) J210-1 and J210-3 c) J210-4 and J210-5 d) J210-4 and J210-6 Is the resistance about 13 ohms?	No Yes	Replace the main motor. Replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

Table E – Manual-Feed Failure

Remove the top cover and the I/O shield, and install a toner cartridge.

1.	Is connector J209 on the DC controller PCB making good contact?	No	Reconnect connector J209 to the DC controller PCB.
2.	Place a sheet of paper on the multipurpose tray. Connect a multimeter between connectors J209-2 (PFRDV) on the DC controller PCB and the chassis ground. Switch on the printer and press the service test print button. Does the voltage change from about +24 VDC to 0 VDC?	No Yes	Replace the DC controller PCB. Open the front access door and replace the multipurpose cable assembly.

Table F – Paper-Out LED Lights When There Is Paper

1.	Is the paper cassette installed and does it contain paper?	No	Fill the paper cassette with paper and install the paper cassette.
2.	Is the paper cassette seated properly?	No	Remove and reseat the paper cassette.
3.	Remove the paper cassette tray. Visually inspect the paper-out sensor arm. Does the paper-out sensor arm move freely and is it undamaged?	Yes	Replace the paper-out sensor arm.
4.	Remove the top cover, the I/O board, and the I/O shield. Install a toner cartridge. Connect a multimeter between connector J205-6 (OPPOUT) on the DC controller PCB and the chassis ground. While removing and inserting the paper cassette tray containing paper, does the voltage toggle from +5 VDC (inserted) to 0 VDC (removed)?	No Yes	Replace the cassette paper sensor (PS901) located on the cassette feeder assembly. Replace the DC controller PCB.

Personal LaserWriter

Troubleshooting Tables



Table G – Laser/Scanner Malfunction

Before performing the following steps, remove the I/O shield and install a toner cartridge.

1.	Is the optical fiber cable J204 disconnected from the DC controller PCB?	Yes	Reconnect connector J204 to the DC controller PCB.
2.	Jumper J207-6 (LPC) on the DC controller PCB to the chassis ground. Measure the voltage between J202-4 (LSRPWR) and J202-2 (GND) on the DC controller PCB. Is the voltage between 1.5 VDC and 2 VDC after one second?	No	Replace the DC controller PCB.
3.	Jumper J207-6 (LPC) on the DC controller PCB to the chassis ground. Measure the voltage between J202-3 (APCIN) and J202-2 (GND) on the DC controller PCB. Does the voltage drop to +1.5 VDC in five seconds?	No	Replace the laser assembly.
4.	Is the connection between J301 on the scanner assembly and J203 on the DC controller PCB good?	No	Reconnect connector J301 to the scanner assembly and J203 to the DC controller PCB.
5.	Remove the jumper from J207-6 (LPC). Measure the voltage between J203-2 (+12 VDC) and J203-6 (GND) on the DC controller PCB. Is the voltage between +11 VDC and +12 VDC?	No	Check whether +12 VDC is present between connector J202-6 (+12 VDC) and J212-5 (GND) on the DC controller PCB. If the voltage is not between +11 VDC and +12 VDC, replace the power supply unit.
6.	Measure the voltage between connector J203-3 (SCNON) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage change from approximately +4 VDC to 0 VDC?	Yes No	Replace the scanner assembly. Check the cable connection between the DC controller PCB (J203) and the scanner motor PCB (J301), and replace the cable if necessary. If the problem persists, replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

Table H – Print Quality Problems

Compare the printout to the images shown below,
and refer to the appropriate troubleshooting table.

Light Image



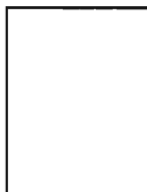
Go to Table H1

Dark Image



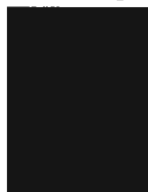
Go to Table H2

All-Blank Print



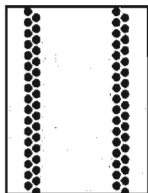
Go to Table H3

Black Image



Go to Table H4

Large Dots
Vertically in Line



Go to Table H5

Stains on Back
of Paper



Go to Table H6

Dark Vertical
Lines



Go to Table H7

Smudged
Vertical Bands



Go to Table H8

Smudged
Horizontal
Bands



Go to Table H9

Blank Spots



Go to Table H10

Solid White
Vertical Lines



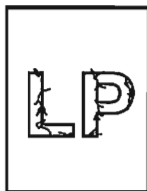
Go to Table H11

Faulty
Registration



Go to Table H12

Poor Fusing



Go to Table H13

Personal LaserWriter

Troubleshooting Tables



Table H1 – Light Image: Whole Print (1 of 2)

1.	Adjust the print-density lever to darken the image. Does the print quality improve?	Yes	Finished.
2.	Hold the toner cartridge lengthwise and rock it from side to side several times. Does the print quality improve?	No	Replace the toner cartridge.
3.	Do prints improve when new paper is used?	Yes	Replace with recommended paper.
4.	Replace the transfer roller. Does the print quality improve?	Yes	Finished.
5.	Locate the transfer roller spring on the left transfer roller mount assembly. Does the spring make contact with the high-voltage contact as the front access door closes?	No	Replace the left transfer roller mount assembly.
6.	Is connector FT101 making good contact at the high-voltage contact assembly?	No	Reconnect FT101 to the high-voltage contact assembly.
For steps 7 and 8, remove the top cover, the I/O board, and the I/O shield. Install a toner cartridge inside the printer.			
7.	Place paper on the multipurpose tray. Connect the multimeter at connector pin J206-7 (HVT1) on the DC controller PCB and chassis ground. Press the service test print button. Is the voltage 0 VDC within five seconds after the pickup roller starts to rotate?	No	Replace the DC controller PCB.
8.	Connect the multimeter at connector pin J206-9 (HVT2) on the DC controller PCB and chassis ground. Press the service test print button. Is the voltage about +3.2 VDC within five seconds after the pickup roller starts to rotate?	No	Replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

Table H1 – Light Image: Whole Print (2 of 2)

9.	Connect the multimeter at connector pin J206-10 (HVT3) on the DC controller PCB and chassis ground. Press the service test print button. Is the voltage about 0 VDC within five seconds after the pickup roller starts to rotate?	No	Replace the DC controller PCB.
10.	Connect the multimeter at connector pin J206-8 (HVD) on the DC controller PCB and chassis ground. Initiate a service test print. Does the voltage drop from about 7 VDC to about 0 VDC two seconds after the pickup roller starts to rotate?	Yes No	Replace the high-voltage power supply. Replace the DC controller PCB.

Table H2 – Dark Image: Whole Print

1.	Adjust the print density-adjustment lever to lighten the image. Does the print quality improve?	Yes	Finished.
2.	Clean the contact between the grounding plate of the high-voltage contact assembly and the toner cartridge. Press the service test print button. Does the print quality improve?	Yes	Finished.
3.	Are the high-voltage contacts making good contact with the toner cartridge?	No	Clean the contacts or replace the high-voltage contact assembly.
4.	Connect the multimeter between connector pin J206-3 (HVAC) on the DC controller PCB and chassis ground. Press the service test print button. Does the voltage drop from about +4.5 VDC to 0 VDC when the main motor starts rotating?	Yes No	Replace the high-voltage power supply. Replace the DC controller PCB.

Personal LaserWriter

Troubleshooting Tables

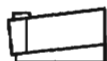


Table H3 – All-Blank Print

1.	Has the toner cartridge sealing tape been removed?	No	Remove the sealing tape.
2.	Replace the toner cartridge. Does the print quality improve?	Yes	Finished.
3.	Are the high-voltage contacts making good contact with the toner cartridge?	No	Clean the contacts or replace the high-voltage contact assembly.
4.	Connect the multimeter between pins J206-3 (HVAC) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage drop from +4.5 VDC to 0 VDC when the main motor starts to rotate?	No	Replace the DC controller PCB.
5.	Place paper on the multipurpose tray and connect the multimeter between pin J206-8 (HVD) on the DC controller PCB and chassis ground. Press the service test print button. Does the voltage drop from +7 VDC to 0 VDC two seconds after the pickup roller starts to rotate?	Yes	Replace the high-voltage power supply.
		No	Replace the DC controller PCB.

Table H4 – Black Image

1.	Replace the toner cartridge. Does the print quality improve?	Yes	Finished.
2.	Connect the multimeter across connector pin J206-6 (HVDC) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage drop from about +8.2 VDC to 0 VDC when the main motor starts to rotate?	Yes	Replace the high-voltage power supply.
		No	Replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

Table H5 – Large Dots Vertically in Line

1.	Locate the static charge eliminator on the fuser assembly. Is the static charge eliminator dirty?	Yes	Clean the static charge eliminator. If the problem persists, replace the static charge eliminator.
2.	Use the Cleaning Page to remove excess toner from rollers inside the printer. Does the print quality improve?	Yes	Finished.
3.	Is the transfer roller dirty?	Yes	Clean the transfer roller using a dry, lint-free cloth. If the transfer roller cannot be cleaned, replace the transfer roller.

Table H6 – Stains on Back of Paper

1.	Is the transfer roller dirty?	Yes	Clean the transfer roller with a dry, lint-free cloth. If the transfer roller cannot be cleaned, replace the transfer roller.
2.	Is the paper cassette entrance guide dirty?	Yes	Clean the paper cassette entrance guide with a clean, lint-free cloth.
3.	Are the feeder rollers dirty?	Yes	Clean the feeder rollers with a clean, lint-free cloth dampened slightly with water.
4.	Are the upper and lower fuser rollers dirty?	Yes	Use the Cleaning Page to remove excess toner from the fuser rollers.



Table H7 – Dark Vertical Lines

1.	Press the service test print button. Open the front access door while a print is being made. Open the protective shield of the toner cartridge. Can you see vertical black lines on the drum?	Yes	Replace the toner cartridge.
2.	Are the fuser rollers dirty?	Yes	Use the Cleaning Page to remove excess toner from the fuser rollers.
3.	Is the fuser assembly damaged?	Yes	Replace the fuser assembly.

Table H8 – Smudged Vertical Bands

1.	Replace the toner cartridge. Does the print image improve?	Yes	Finished.
2.	Are the fuser rollers dirty?	Yes	Use the Cleaning Page to remove excess toner from the fuser rollers.
3.	Locate the static charge eliminator on the fuser assembly. Is the static charge eliminator dirty?	Yes	Clean the static charge eliminator. If the problem persists, replace the static charge eliminator.

Table H9 – Smudged Horizontal Bands

1.	Are the fuser rollers dirty?	Yes	Use the Cleaning Page to remove excess toner from the fuser rollers.
2.	Press the service test print button. Do the horizontal bands appear at regular intervals on the test print?	Yes	Replace the toner cartridge.
		No	Replace the fuser assembly.



Personal LaserWriter

Troubleshooting Tables

Table H10 – Blank Spots

1.	Is the paper in the cassette tray damp?	Yes	Replace the paper.
2.	Replace the toner cartridge. Does the print quality improve?	Yes	Finished.
3.	Is the transfer roller dirty?	Yes	Clean the transfer roller using a dry, lint-free cloth. If the transfer roller cannot be cleaned, replace the transfer roller.

Table H11 – Solid White Vertical Lines

1.	Remove the toner cartridge from the printer and rock it back and forth to distribute toner evenly. Does the print quality improve?	Yes	Finished.
2.	Remove the toner cartridge from the printer and open the toner cartridge protective shield. Can you see vertical white streaks on the surface of the drum?	Yes	Replace the toner cartridge.
3.	Remove the toner cartridge from the printer. Is any foreign material adhering to the laser beam outlet on the inside of the printer chassis? Is any foreign material adhering to the laser beam access slot on the toner cartridge?	Yes	Remove the foreign material.
4.	Remove the lens assembly from the printer. Is any foreign material adhering to the lens?	Yes	Replace the lens assembly.

Personal LaserWriter

Troubleshooting Tables

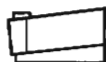


Table H12 – Faulty Registration

1.	Is the paper cassette or the multipurpose tray overloaded with paper?	Yes	Remove excess paper.
2.	Is recommended paper being used?	No	Replace with recommended paper.
3.	Perform the Registration Adjustment Procedure located in this section. Does the print image improve?	Yes	Finished.
4.	Is the pickup unit paper sensor arm/spring damaged?	Yes	Replace the pickup unit paper sensor arm.
5.	Connect the multimeter between J208-1 (PFSNS) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the pickup unit paper sensor arm (PS13)?	No	Replace the pickup unit paper sensor (PS13).
		Yes	Replace the DC controller PCB.

Table H13 – Poor Fusing

1.	Clean the transfer roller with a dry, lint-free cloth. Does the print image improve?	Yes	Finished.
2.	Initiate 10 service test prints. Is the last test print lighter than the first test print?	Yes	Replace the fuser assembly.
3.	Is the lower fuser roller dirty?	Yes	Use the Cleaning Page to remove excess toner from the roller.
4.	Try paper recommended for the type of printing being done. See "Specifications," in this tab section. Does the print quality improve?	Yes	Finished.
		No	Replace the fuser assembly.



Personal LaserWriter

Troubleshooting Tables

Table J – Paper Transport Problems

Open the front access door to observe the location of the paper jam.

1.	Was any paper picked up from the paper cassette?	No	Go to Table J1 – No Paper Pickup from Cassette.
2.	Was any paper picked up from the multipurpose tray?	No	Go to Table J2 – No Paper Pickup from Multipurpose Tray.
3.	Is the paper jam in the paper pickup area?	Yes	Go to Table J3 – Jams in Paper Pickup Area.
4.	Is the paper jam in the fuser or delivery area?	Yes	Go to Table J4 – Jams in Fuser/Delivery Area.
5.	Are any sheets of paper stuck together in the paper path?	Yes	Go to Table J5 – Sheets Stuck Together.
6.	Is the paper wrinkled?	Yes	Go to Table J6 – Wrinkles.

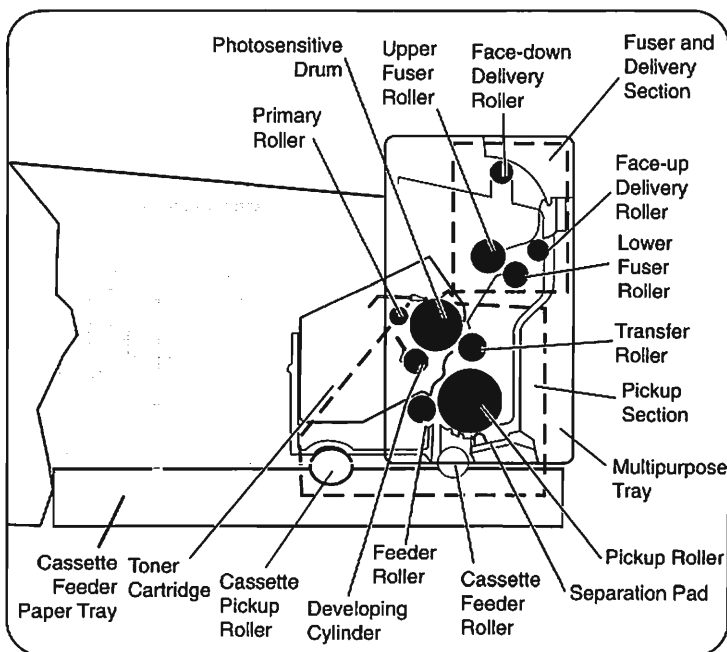


Figure: Personal LaserWriter Paper Path



Table J1 – No Paper Pickup From Cassette (1 of 2)

1.	Is connector J205 on the DC controller PCB making good contact?	No	Reconnect J205 to the DC controller PCB.
2.	With connector J208 connected to the DC controller PCB, connect one lead of the multimeter to connector pin J208-1 (PFSNS) and the other lead to the chassis ground. Switch on the printer. Is the voltage +5 VDC?	No	Replace PS13, the pickup unit paper sensor, located on the feeder assembly.
3.	Connect the multimeter to TB703-1 on the density-adjusting PCB and the chassis ground. Switch on the printer. Is the voltage +5 VDC?	No	Replace PS12, the delivery unit paper sensor, located on the mounting plate sensor.
4.	Remove the paper cassette from the printer. Did the leading edge of the paper feed as far as the cassette feed rollers?	No	Go to step 7 of this procedure.
5.	Install paper in the paper cassette and place the cassette in the printer. Connect one lead of the multimeter to connector pin J205-7 (OPMD) on the DC controller PCB and the other lead to the chassis ground. Switch on the printer, wait one minute, and press the service test print button. Does the voltage briefly change from 0 VDC to 1.4 VDC?	No	Replace the DC controller PCB.
6.	Disconnect connector J902 from the cassette feeder PCB assembly. Measure the resistance between J902-4 and J902-5 on the cassette feeder roller clutch solenoid side. Is the reading approximately 0 ohms (actually 0.22 ohms)?	No Yes	Replace SL902, the cassette feed roller clutch solenoid, located on the cassette sensor cable. Replace the cassette feeder PCB assembly.



Personal LaserWriter

Troubleshooting Tables

Table J1 – No Paper Pickup From Cassette (2 of 2)

7.	Connect one lead of the multimeter to connector pin J205-8 (OPCD) and the other lead to the chassis ground. Press the service test print button. Does the voltage briefly change from 0 VDC to 1.4 VDC?	No	Replace the DC controller PCB.
8.	Disconnect connector J902 from the cassette feeder PCB assembly. Measure the resistance between J902-6 and J902-7. Is the reading approximately 0 ohms (actually 0.124 ohms)?	No Yes	Replace SL901, the cassette pickup roller clutch solenoid, located on the cassette sensor cable. Replace the cassette feeder PCB assembly.

Table J2 – No Paper Pickup From Multipurpose Tray

1.	Is connector J209 on the DC controller PCB making good contact?	No	Reconnect connector J209 to the DC controller PCB.
2.	With connector J208 connected to the DC controller PCB, connect the multimeter to connector pin J208-1 (PFSNS) and the chassis ground. Switch on the printer. Is the voltage +5 VDC?	No	Replace PS13, the pickup unit paper sensor, located on the feeder assembly.
3.	Connect the multimeter to TB703-1 on the density-adjusting PCB and the chassis ground. Switch on the printer. Is the voltage +5 VDC?	No	Replace PS12, the delivery unit paper sensor, located on the mounting plate sensor.
4.	Place paper on the multipurpose tray. Connect the multimeter between pin J209-2 (PFRDV) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage briefly drop from about +24 VDC to 0 VDC?	Yes No	Replace the multipurpose cable assembly. Replace the DC controller PCB.

**Table J3 – Jams in Paper Pickup Area (1 of 2)**

1.	Is recommended paper being used?	No	Replace with recommended paper.
2.	Is the paper wrinkled or curled?	Yes	Use fresh paper.
3.	Does the jam occur when using the paper cassette?	Yes	Go to step 9 of this procedure.
4.	Is the multipurpose tray loaded with too much paper?	Yes	Remove excess paper.
5.	Open the front access door and observe the rollers on the pickup roller assembly. Are the pickup rollers worn or deformed?	Yes	Replace the pickup roller assembly.
6.	Rotate the large black gear on the pickup roller assembly. Does the pickup roller rotate without binding?	No	Replace the pickup roller assembly.
7.	Is connector J209 on the DC controller PCB making good contact?	No	Reconnect connector J209 to the DC controller PCB.
8.	Place paper on the multipurpose tray. Connect the multimeter between connector pin J209-2 (PFRDV) on the DC controller PCB and the chassis ground. Press the service test print button. Does the voltage change from +24 VDC to 0 VDC?	Yes	Replace the multipurpose cable assembly.
		No	Replace the DC controller PCB.
9.	Is the paper cassette installed properly in the printer?	No	Reinstall the paper cassette properly.
10.	Is the paper cassette loaded with too much paper?	Yes	Remove excess paper.
11.	Are the cassette pickup rollers deformed or worn?	Yes	Replace the cassette pickup rollers.



Personal LaserWriter Troubleshooting Tables

Table J3 – Jams in Paper Pickup Area (2 of 2)

12.	Are the cassette feed rollers deformed or worn?	Yes	Replace the cassette feed rollers.
13.	Does the paper move from the paper cassette to the printer feeder rollers?	No	Check cassette tray for damage or missing pressure plate springs. Check for obstruction in the printer inlet to the feeder roller area. Check the cassette feeder tray for proper alignment.
14.	Is connector J208 on the DC controller PCB making good contact?	No	Reconnect J208 to the DC controller PCB.
15.	Locate the pickup unit paper sensor arm between the feeder rollers and the separation pad. Is the pickup unit paper sensor arm/spring damaged or broken?	Yes	Replace the pickup unit paper sensor arm.
16.	Connect the multimeter across pins J208-1 (PFSNS) and J208-2 (GND) on the DC controller PCB. Press the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the pickup unit paper sensor?	No	Replace PS13, the pickup unit paper sensor, located on the feeder assembly.
		Yes	Replace the DC controller PCB.

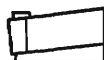
Table J4 – Jams in Fuser/Delivery Area (1 of 2)

1.	Open the front access door and locate the delivery unit paper sensor arm on the fuser assembly. Is the delivery unit paper sensor arm broken?	Yes	Replace the delivery unit paper sensor arm.
2.	Allow the fuser rollers to cool and then remove the fuser assembly. Is the lower fuser roller dirty?	Yes	Use the Cleaning Page to remove excess toner from the lower fuser roller.
3.	Do the fuser rollers rotate without binding?	No	Use the Cleaning Page to remove excess toner from the fuser rollers. If the problem persists, replace the fuser assembly.



Table J4 – Jams in Fuser/Delivery Area (2 of 2)

4.	Locate the three white gears next to connector J502 on the front access door. Rotate the largest of the three gears. Do the face-down delivery rollers and the face-up cover delivery rollers rotate freely?	No	Replace the face-down delivery assembly or the face-up cover assembly, as required.
5.	Is the paper deflector correctly set to send paper to either the face-down or the face-up tray?	No	Set the paper deflector to the correct face-up or face-down position.
6.	Locate the delivery rollers on the face-down delivery assembly. Are the face-down delivery rollers worn or deformed?	Yes	Replace the face-down delivery assembly.
7.	Locate the delivery rollers on the face-up cover assembly. Are the face-up delivery rollers worn or deformed?	Yes	Replace the face-up cover assembly.
8.	Locate the pickup unit paper sensor arm between the feed rollers and the separation pad. Is the pickup unit paper sensor arm/spring damaged?	Yes	Replace the pickup unit paper sensor arm.
9.	Connect the multimeter across connector pins J208-1 (PFSNS) and J208-2 (GND) on the DC controller PCB. Press the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the pickup unit paper sensor?	No	Replace the pickup unit paper sensor (PS13).
10.	Connect the multimeter across connector pins J213-5 (POSNS) and J213-9 (GND) on the DC controller PCB. Press the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the delivery unit paper sensor?	No Yes	Check the wiring from J213 to J13 on the mounting plate sensor. If the wiring is faulty, replace the density-adjusting PCB. If the wiring is correct, replace the delivery unit paper sensor (PS12). Replace the DC controller PCB.



Personal LaserWriter

Troubleshooting Tables

Table J5 – Sheets Stuck Together

1.	Is recommended paper being used?	No	Replace with recommended paper.
2.	Is the surface of the separation pad worn?	Yes	Replace the separation pad.
3.	Remove the paper cassette. Is the paper positioned correctly under the paper cassette hold-down brackets?	No	Replace the paper in the paper cassette.
4.	Are the paper cassette hold-down brackets damaged or deformed?	Yes	Replace the paper cassette hold-down brackets.

Table J6 – Wrinkles

1.	Is recommended paper being used?	No	Replace with recommended paper.
2.	Do the wrinkles disappear when fresh paper is used?	Yes	Finished.
3.	Press the service test print button. Open the front access door while the paper is passing through the feeder assembly. Is the paper wrinkled?	Yes	Check that the cassette pickup rollers and the cassette feed rollers are clean and undamaged. If the rollers are damaged, replace the cassette pickup and the cassette feed rollers.
4.	Remove the fuser assembly and inspect the lower fuser roller. Is the lower fuser roller dirty?	Yes	Use the Cleaning Page to remove excess toner from the lower fuser roller.
		No	Replace the fuser assembly.

Personal LaserWriter

Troubleshooting Tables



Table K – Jams Detected When There Are No Jams

1.	Does the Paper Jam LED immediately light when you switch the printer on?	Yes	Check that no paper fragments or other obstructions are in the fuser/delivery area or paper pickup area.
2.	Open the front access door and locate the delivery unit paper sensor arm on the fuser assembly. Is the delivery unit paper sensor arm damaged or broken?	Yes	Replace the delivery unit paper sensor arm.
3.	Locate the pickup unit paper sensor arm between the feed rollers and the separation pad. Is the pickup unit paper sensor arm/spring damaged or broken?	Yes	Replace the pickup unit paper sensor arm.
4.	Connect the multimeter across connector pins J208-1 (PFSNS) and J202-2 (GND) on the DC controller PCB. Depress the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the pickup unit paper sensor?	No	Replace PS13, the pickup unit paper sensor, located on the feeder assembly.
5.	Connect the multimeter across connector pins J213-5 (POSNS) and J213-9 (GND) on the DC controller PCB. Press the service test print button. Does the voltage change from +5 VDC to 0 VDC when the paper passes the delivery unit paper sensor?	No No	Check the wiring from J213 on the DC controller to J13 on the mounting plate sensor. If the wiring is faulty, replace the density-adjusting PCB. If the wiring is correct, replace the delivery unit paper sensor (PS12). Replace the DC controller PCB.



Personal LaserWriter

LS Memory Upgrade

Use the following procedure to upgrade the memory on the LaserWriter LS I/O board from 512K to 1 MB. The LaserWriter LS requires 150 nanosecond (or faster) DRAM chips.

Upgrade Procedure

1. Place the Personal LaserWriter LS on a grounded workbench pad and put on your grounding wriststrap.
2. Remove the top cover and the I/O shield.
3. Place the four 256K x 4, 150 ns (or faster) DRAM chips in position on the I/O board (see Figure).
4. Position jumper JP801 over the two pins nearest the 1M marking on the I/O board (see Figure).
5. Replace the I/O shield and the top cover.

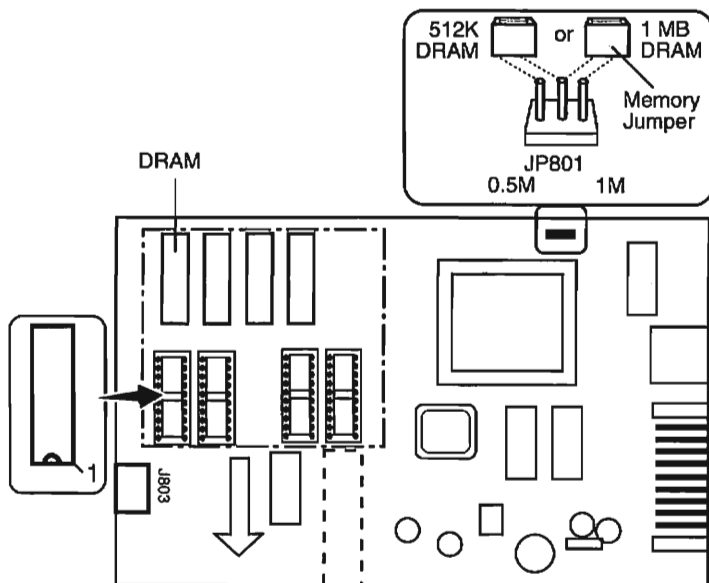


Figure: LaserWriter LS Memory Upgrade

Personal LaserWriter

Registration Adjustment



Registration Adjustment Procedure

1. Place the Personal LaserWriter on a grounded workbench pad and remove the top cover, the I/O board, and the I/O shield.
2. Using a jeweler's screwdriver, reset VR201 on the DC controller PCB (**see Figure**) to "0."
3. Connect an AC power cord to the printer and switch on the printer.
4. Press the service test print button on the DC controller PCB three times to make three service test prints.
5. Using a metric ruler, measure the distance from the top edge of each page to the service test print pattern (**see Figure**). Calculate the average distance by adding the three measurements and dividing by three.
6. Subtract the average distance from 3.6 mm to determine the correct adjustment distance.

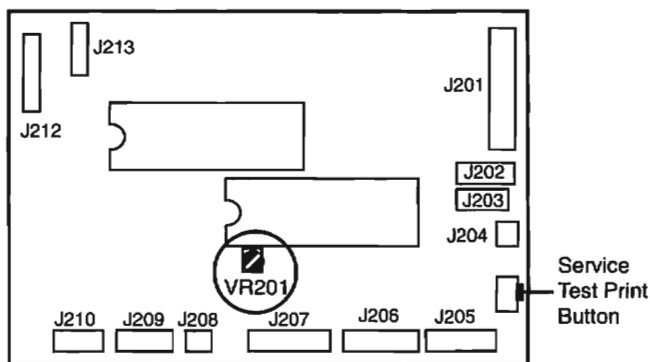


Figure: DC Controller PCB

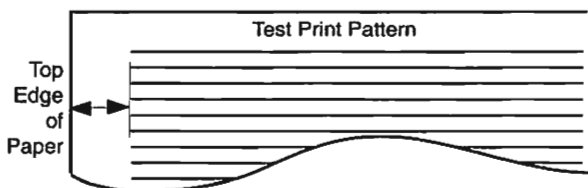


Figure: Service Test Print



Personal LaserWriter

Registration Adjustment

7. Use Table 1 to identify the adjustment required to return the registration adjustment to 3.6 mm. (For example, if the average value obtained in step 5 is 2.4 mm, subtract 2.4 mm from 3.6 mm to arrive at the 1.2 mm adjustment required. Set VR201 at approximately +5 by turning it clockwise.)
8. Using a jeweler's screwdriver, adjust VR201 to the value indicated in Table 1. If the adjustment measurement is less than 3.6 mm, turn VR201 **clockwise** to the value indicated in Table 1. If the measurement is greater than 3.6 mm, turn VR201 **counterclockwise** to the value indicated in Table 1.
9. Check that the registration adjustment is correct by making three more service test prints.
10. Measure the distance from the top edge of each page, calculate the average distance, and confirm that the registration adjustment is 3.6 mm. **If the adjustment is not 3.6 mm, repeat steps 8 and 9.**
11. Replace the I/O shield, the I/O board, and the top cover.

(-) Counterclockwise

Correction Distance (mm)	VR201 Setting
-0.24	-1
-0.48	-2
-0.72	-3
-0.96	-4
-1.20	-5
-1.44	-6
-1.68	-7
-1.92	-8
-2.16	-9
-2.40	-10

(+) Clockwise

Correction Distance (mm)	VR201 Setting
+2.40	+10
+2.16	+9
+1.92	+8
+1.68	+7
+1.44	+6
+1.20	+5
+0.96	+4
+0.72	+3
+0.48	+2
+0.24	+1

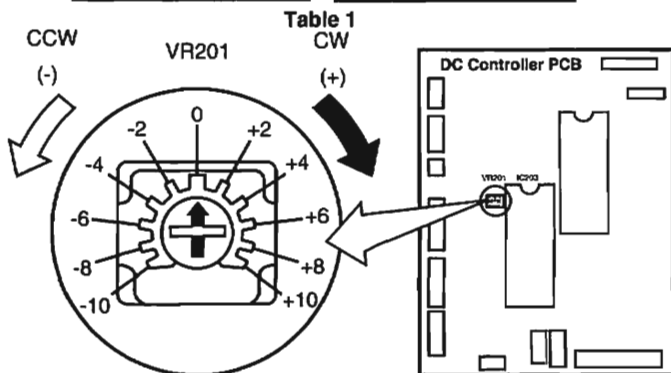


Figure: VR201 Adjustment Settings



The Personal LaserWriter requires very little routine maintenance. Use the Cleaning Page to remove excess toner from rollers inside the printer, and clean the inside and outside of the printer.

Setting Up for Preventive Maintenance

Before performing any preventive maintenance, be sure to do the following:

- Power off and unplug the Personal LaserWriter.
- Allow the fuser assembly rollers to cool.
- Prepare your work area for electrostatic discharge prevention.

Using the Cleaning Page

Use the Cleaning Page if frequent paper jams occur in the fuser area or whenever you replace the toner cartridge. The Cleaning Page removes excess toner from the fuser rollers and other rollers inside the printer.

1. Place several sheets of letter-size paper on the multipurpose tray.
2. Open the Cleaning Page file located on the Personal LaserWriter Installation Disk.
3. Select **Print** from the File menu, select **Manual Feed** in the print dialog box, and click **OK**. The printer will produce a Cleaning Page print.
4. Place the Cleaning Page print face-up on the multipurpose tray (see Figure).
5. Reselect the Cleaning Page file, choose **Print** from the File menu, select **Manual Feed** in the Print dialog box, and click **OK**.

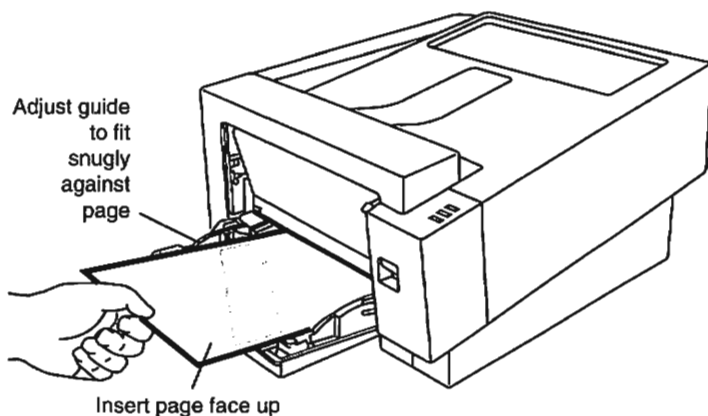


Figure: Cleaning Page



Personal LaserWriter

Preventive Maintenance

Cleaning the Printer

The service provider should clean the following items during each service call:

Service Point	Cleaning Tool
Separation Pad	Dry, lint-free cloth, or replace pad if worn
Transfer Roller	Dry, lint-free cloth
Pickup Roller	Clean cloth dampened with water
Feeder Assembly	Clean cloth dampened with water
Cassette Rollers	Clean, slightly damp cloth
Fuser Assembly	Cleaning Page
Exterior case	Cloth dampened with water



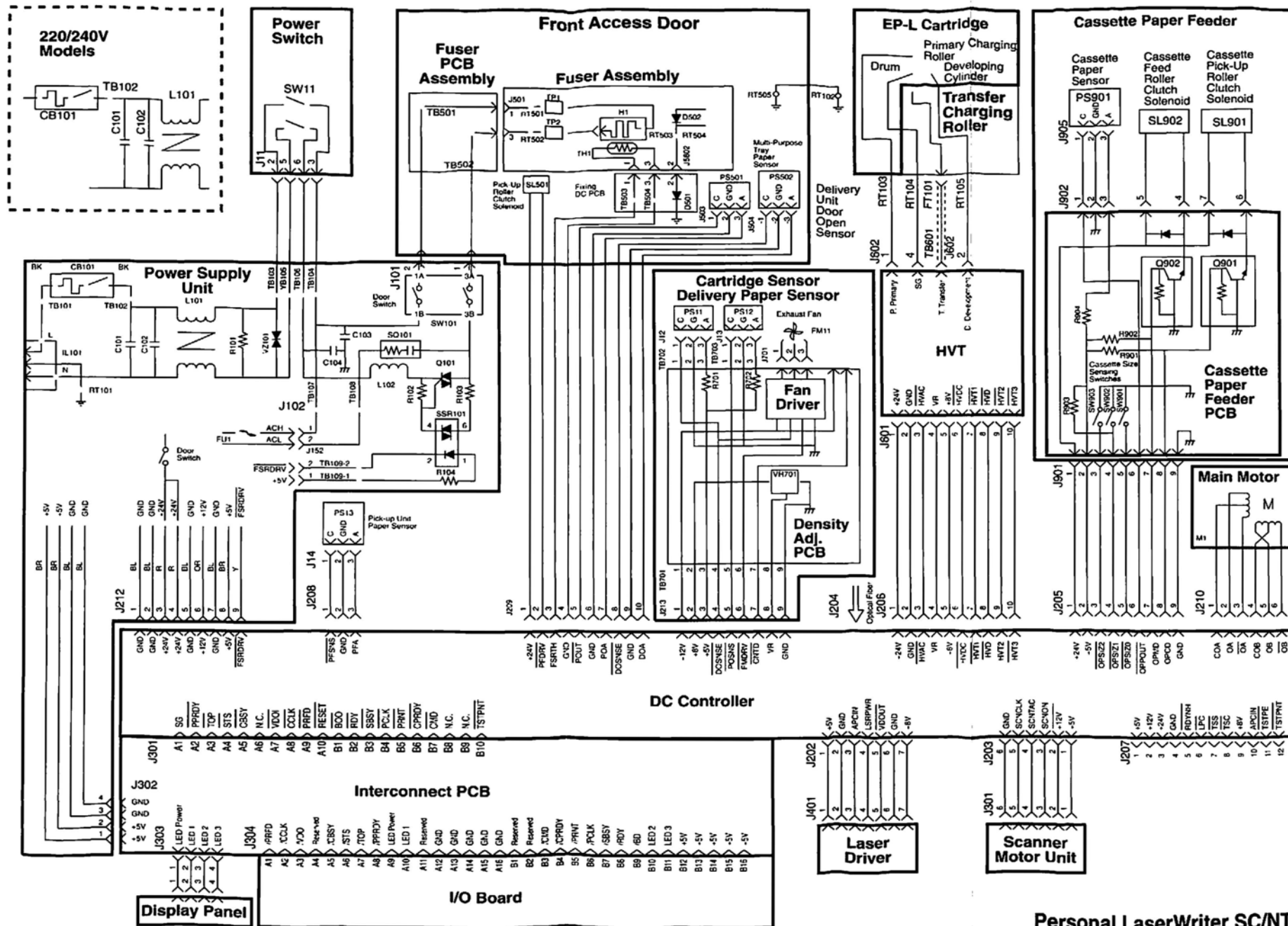
WARNING: To prevent serious injury, always unplug the power cord from the AC power outlet before cleaning the printer.



CAUTION: Do not touch the transfer roller with your fingers during cleaning. Oil from your fingers can damage the roller.



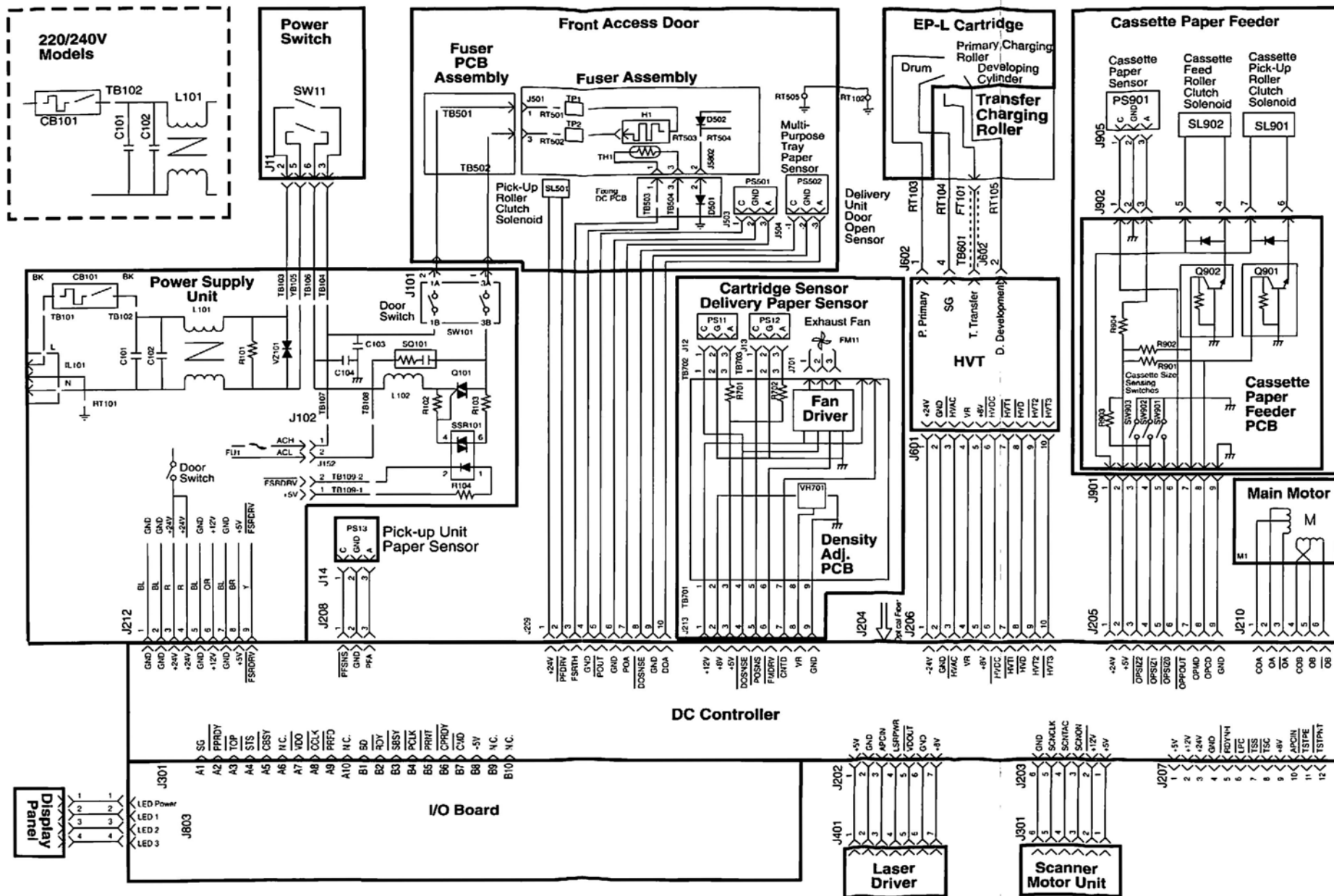
CAUTION: Never use an ammonia-based cleaner or any other chemical-based cleaning solution on the Personal LaserWriter. These cleaners can discolor the printer's plastic covers.



Personal LaserWriter SC/NT
Wiring Diagram



1



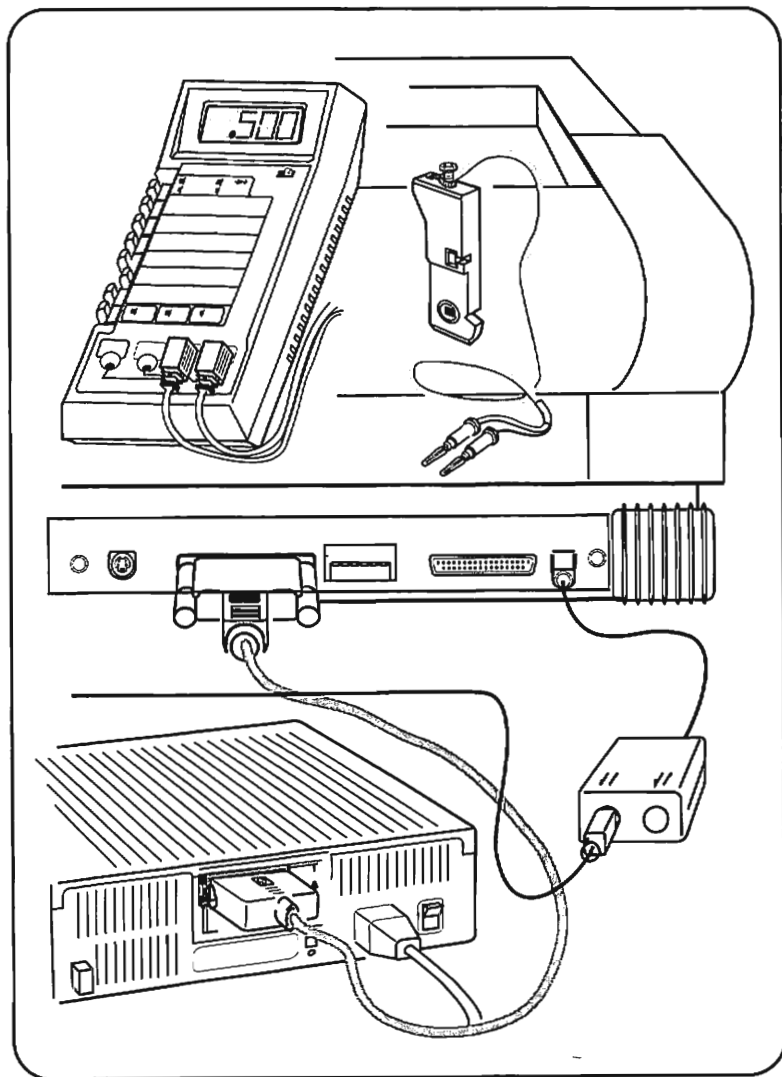
Personal LaserWriter LS
Wiring Diagram



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General Information

Connecting to a Macintosh Computer

LaserWriter printers connect to Macintosh computers in three ways: via an AppleTalk network, a SCSI port, or a serial port. LaserWriters that connect via an AppleTalk network are the LaserWriter/LaserWriter Plus, LaserWriter II NT/NTX, and Personal LaserWriter NT. LaserWriters that communicate via the SCSI port are the LaserWriter II SC and Personal LaserWriter SC. The only LaserWriter that connects via the serial port is the Personal LaserWriter LS.

AppleTalk Connection

1. Switch off the LaserWriter and the Macintosh computer.
2. Connect a LocalTalk connector box to the LocalTalk port on the LaserWriter (see Figure).
3. Connect a LocalTalk connector box to the printer port on the Macintosh (see Figure).
4. Connect the two connector boxes with a LocalTalk cable (see Figure).
5. Switch on the LaserWriter and wait for the user test print.
6. Insert the *LaserWriter Installation Disk* into the computer's internal disk drive and switch on the Macintosh computer.
7. Copy the LaserWriter driver software into the computer's System Folder, open the Apple menu, and select the Chooser.
8. Click on the LaserWriter icon to select the device type and select the LaserWriter name when it appears.
9. Open the File menu and select **Print Directory**.
 - If a printout of the directory is produced, the printer and network are functioning properly.
 - If a printout of the directory is *not* produced, refer to **Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab section.

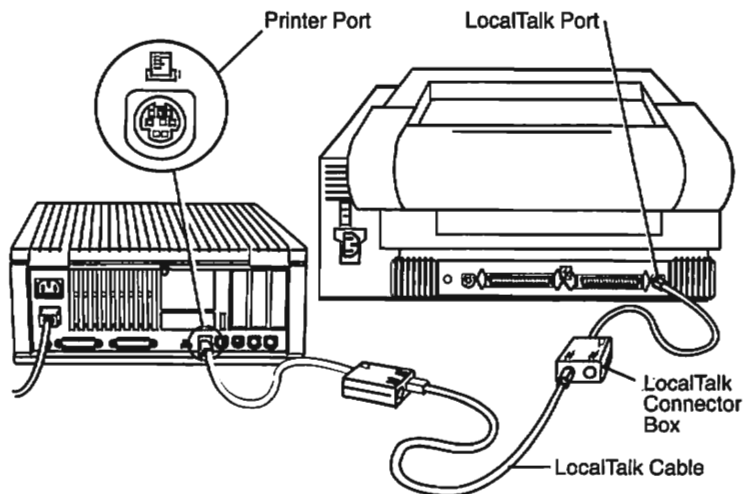


Figure: AppleTalk Connection



SCSI Connection

1. Switch off the LaserWriter and the Macintosh computer.
2. Connect the 25-pin end of the SCSI system cable to the SCSI port on the Macintosh (**see Figure**).
3. Connect the 50-pin end of the SCSI system cable to either SCSI port on the LaserWriter (**see Figure**).
4. Connect a SCSI cable terminator to the other SCSI port on the LaserWriter (**see Figure**).
5. Set the LaserWriter's SCSI ID number switch to a number that has not been assigned to another device and switch on the LaserWriter.
6. Insert the *LaserWriter Installation Disk* into the computer's internal disk drive and switch on the Macintosh computer.
7. Copy the current LaserWriter driver software into the computer's System Folder, open the Apple menu, and select the Chooser.
8. Click on the LaserWriter icon to select the device type and select the LaserWriter name when it appears.
9. Open the File menu and select **Print Directory**.
 - If a printout of the directory is produced, the SCSI connection is functioning properly.
 - If a printout of the directory is *not* produced, refer to **Troubleshooting Flowcharts/Tables** in the appropriate LaserWriter tab sections.

Macintosh SE & SE/30

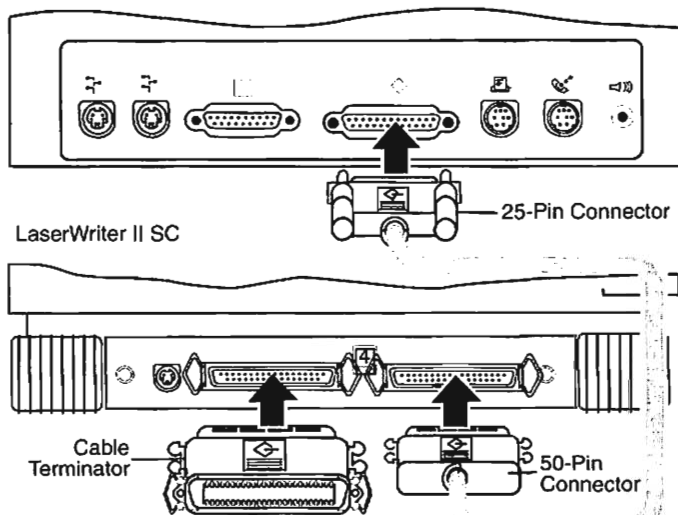


Figure: SCSI Connection



General Information

Connecting to an MS-DOS Computer

There are two ways to connect a LaserWriter printer to an MS-DOS computer:

- Install a LocalTalk peripheral card in one of the computer's expansion slots and connect the computer and the printer to an AppleTalk network.
- Connect the serial port on the MS-DOS computer to the 25-pin serial port on the printer.

LocalTalk Connection

Use the following procedure to connect the LaserWriter II NT/NTX or the Personal LaserWriter NT to an MS-DOS computer.

Materials Required

MS-DOS or IBM-compatible computer

LocalTalk PC Card

LocalTalk Locking Connector Kit, DIN-8 version

LocalTalk Locking Connector Kit, DB-9

Installing the LocalTalk Card and Connecting the Cables

1. Switch off the LaserWriter and the MS-DOS computer.
2. If a serial cable is connected to the printer, disconnect it.
3. Install a LocalTalk PC Card in the computer.
4. Connect a LocalTalk connector box to the LocalTalk port on the computer.
5. Connect another LocalTalk connector box to the 8-pin LocalTalk port on the back of the LaserWriter printer.
6. Connect the two connector boxes with a LocalTalk cable.
7. Activate the AppleTalk software on the printer by configuring the printer switch settings. (Refer to Ports & Cables tab section for switch settings.)

Serial Port Connection

Use the following procedure to connect the LaserWriter/LaserWriter Plus, the LaserWriter II NT/NTX, or the Personal LaserWriter NT to an MS-DOS computer.

Materials Required

MS-DOS computer with a serial port

Modem Eliminator Cable

RS-232-C serial cable (DB-9 or DB-25)

RS-232-C serial adapter cable, DB-9 to DB-25 (optional)

Female-to-male or male-to-female adapters (optional)

Step 1: Connect the Cables

1. Switch off the LaserWriter and the MS-DOS computer.
2. If a LocalTalk cable is connected to the printer, disconnect it.
3. Connect one end of a serial cable to the 9-pin or 25-pin serial port on the computer.
4. Connect the other end of the serial cable to the LaserWriter's 25-pin serial port. If the computer has a 9-pin serial port, use a DB-9 to DB-25 serial adapter cable.



Step 2: Select an Operating Mode

To select the printer's operating mode, configure the printer's switch settings as described below:

- **LaserWriter/LaserWriter Plus**—Set the mode switch to 9600 to select PostScript mode.
- **Personal LaserWriter NT**—Use the pushwheel switch to select PostScript mode (batch or binary), Diablo 630 emulation, or HP LaserJet Plus emulation. (Refer to Ports & Cables tab section for switch settings.)
- **LaserWriter II NT**—Use the DIP switches to select PostScript mode or Diablo 630 emulation. (Refer to Ports & Cables tab section for switch settings.)
- **LaserWriter II NTX**—Use software switching (available only on LaserWriter II NTX printers that use revision 3.0 or later ROMs) or DIP switches to select PostScript mode, Diablo 630 emulation, or HP LaserJet Plus emulation. (Refer to Ports & Cables tab section for switch settings.)

Step 3: Configure the Computer's Serial Port

1. Switch on the printer. The printer will print a test page indicating the mode—PostScript, Diablo 630, or LaserJet Plus—that you have selected. If the mode setting is not the one you want, switch off the printer, reset the switches, and switch on the printer again.
2. Switch on the MS-DOS computer.
3. Type the following two MS-DOS commands:

```
MODE          COM1:96,N,8,1,P
MODE          LPT1:=COM1:
```

The first command sets the data transfer rate to 9600 BPS with no parity check, with eight data bits and one stop bit. The second command directs output from the LPT1 port to the COM1 port.

Step 4: Match the Communication Parameters

1. To match the settings on the computer's application software to the settings on the printer, refer to the documentation provided with the application software.
2. If you are using an MS-DOS application program that produces PostScript files, be sure to install the printer's PostScript printer driver.



General Information

Adding Hard Disks – LaserWriter II NTX

Connecting a Single Hard Disk

1. Make sure the LaserWriter and the hard disk are switched off.
2. Connect one end of the SCSI peripheral cable to the SCSI port on the LaserWriter II NTX.
3. Connect the other end of the SCSI peripheral cable to either SCSI port on the hard disk.
4. Connect a SCSI cable terminator to the other SCSI port on the hard disk.
5. Set the hard disk's SCSI ID number to a number from 1 to 6 that is not assigned to another device.
6. Connect a power cable to the hard disk and switch on the hard disk.
7. Connect a power cable to the LaserWriter II NTX and switch on the printer.

Connecting Multiple Hard Disks

1. Make sure the LaserWriter and all hard disks are switched off.
2. Connect one end of the SCSI peripheral cable to the SCSI port on the LaserWriter II NTX.
3. Connect the other end of the SCSI peripheral cable to the clip end of a SCSI cable terminator.
4. Connect the other end of the SCSI cable terminator to either SCSI port on the first hard disk.
5. Connect a second SCSI peripheral cable to the other SCSI port on the first hard disk.
6. Connect the other end of the second SCSI peripheral cable to either SCSI port on the next hard disk. Repeat steps 5 and 6 for each additional hard disk.
7. Connect a SCSI cable terminator to the unused SCSI port on the last hard disk. Set the SCSI ID number on each hard disk to a number from 1 to 6 that has not been assigned to another device.
8. Connect power cables to the printer and each hard disk.
9. Switch on each hard disk and switch on the LaserWriter II NTX.

Note: In order for the LaserWriter II NTX to recognize the attached hard disks, the hard disks must be switched on at least 10 seconds before the LaserWriter is switched on.

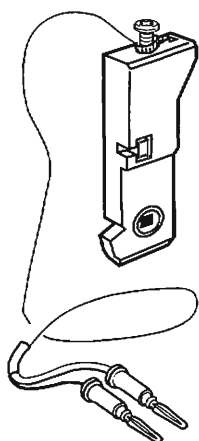
Initializing Hard Disks

To initialize a hard disk connected to a LaserWriter II NTX, open the LaserWriter Font Utility application on the *LaserWriter II Installation Disk*, and choose **Initialize Printer's Disk** from the File menu.

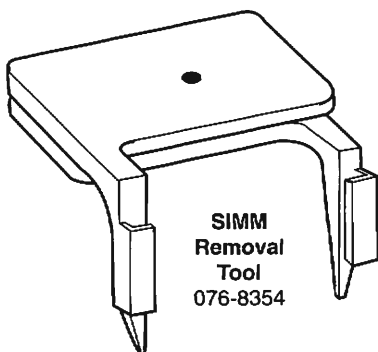
Note: Use LaserWriter Font Utility version 2.0 or later with LaserWriter II NTX revision 3.0 ROMs.

Downloading Fonts

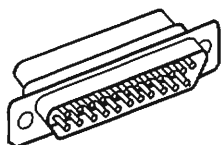
To download fonts to a hard disk, open the LaserWriter Font Utility application on the *LaserWriter II Installation Disk* and choose **Download Fonts** from the File menu.



**Laser Power
Checker**
076-0121

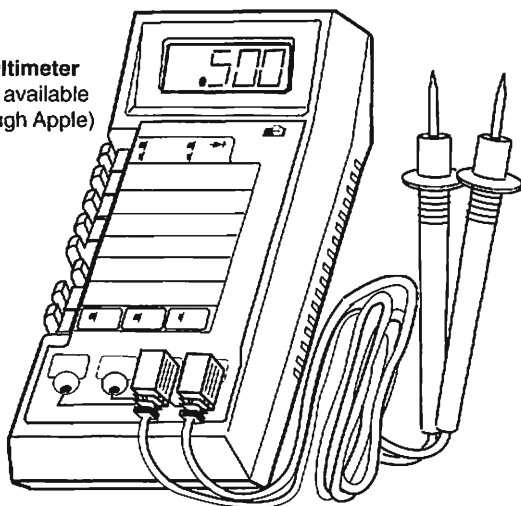


**SIMM
Removal
Tool**
076-8354



**LaserWriter II
Test Connector**
077-8319

Multimeter
(not available
through Apple)



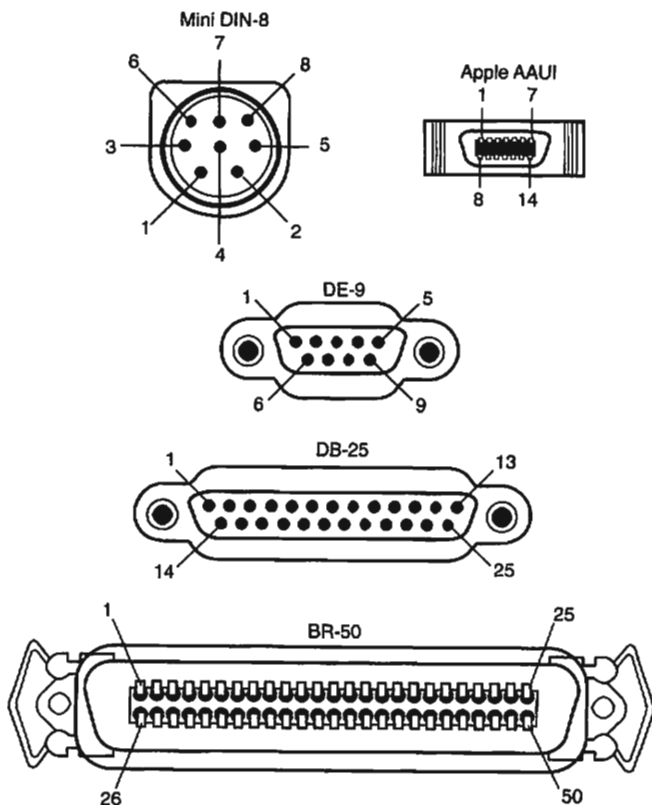




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Cable Connectors	1
Table of Peripheral Cables	2
External Connectors	3
External Connectors—Pin-Outs	4-8
Switch Configurations	9-11

Cable Connectors

The pin numbers shown below are for the connectors attached to the ends of the LaserWriter peripheral cables, as viewed from the front of the connector.





Ports and Cables

Table of Peripheral Cables

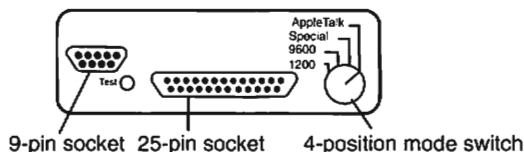
	Service Part #		Cable Information	
	Cable Description	Macintosh Plus and Later	Model #	Type
LaserWriter, LaserWriter Plus	LocalTalk Connector Kit, DB-9	590-0254* or 630-8272	M2065	DB-9 Male
LaserWriter II NT, NTX, IIx, IIg Personal LW NT	LocalTalk Connector Kit, DIN-8	590-0338* or 630-8275	M2068	Mini DIN-8 Male
LaserWriter IIg	Ethernet Twisted Pair Tranceiver	630-8504	M0437LL/A	AAUI
LaserWriter IIg	Ethernet Thin Coax Tranceiver	630-8503	M0329LL/A	AAUI
LaserWriter IIg	Ethernet AUI Adapter	630-8505	M0432LL/A	AAUI
LaserWriter II SC, Personal LW SC	SCSI System Cable	658-8031 or 590-0305*	M0206	BR-50 to DB-25 Male to Male
LaserWriter II SC, Personal LW SC	SCSI Terminator	658-8032 or 590-0304*	M0209	BR-50 Male to Female
LaserWriter II SC, Personal LW SC	SCSI Cable Extender	658-8033 or 590-0307*	M0208	BR-50 Male to Female
LaserWriter II SC, Personal LW SC	SCSI Peripheral Cable	658-8034 or 590-0306*	M0207	BR-50 Male to Male
Personal LW LS	System Peripheral-8 Cable	590-0552	M0197	Mini DIN-8 to Mini DIN-8 Male to Male
* These part numbers are no longer available.				

Ports and Cables

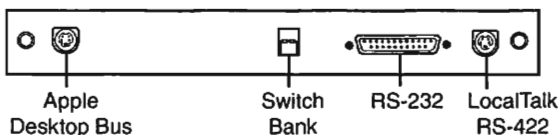
External Connectors



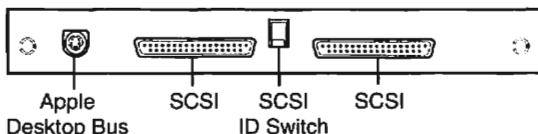
**LaserWriter/
LaserWriter
Plus**



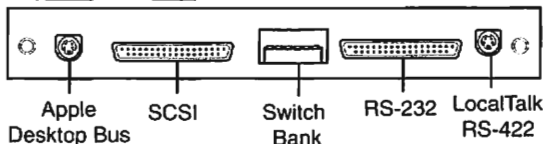
**LaserWriter
II NT**



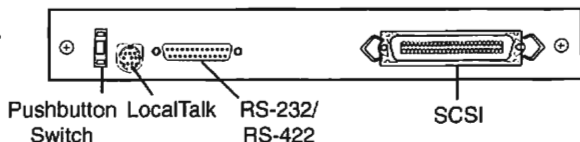
**LaserWriter
II SC**



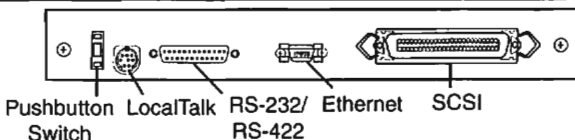
**LaserWriter
II NTX**



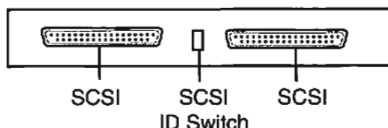
**LaserWriter
IIx**



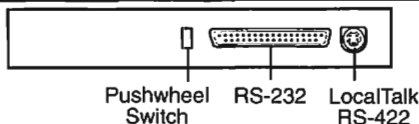
**LaserWriter
IIg**



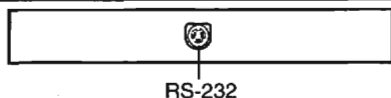
**Personal
LaserWriter
SC**



**Personal
LaserWriter
NT**



**Personal
LaserWriter
LS**





Ports and Cables

External Connectors—Pin-Outs

LaserWriter/LaserWriter Plus – AppleTalk

Pin	Signal Name	Signal Description
3	SG	Signal Ground
4	TXD+	Transmit Data +
5	TXD-	Transmit Data -
8	RXD+	Receive Data +
9	RXD-	Receive Data -

Connector type: DB-9 male

Mode switch set to "AppleTalk" selects this port.

LaserWriter/LaserWriter Plus – RS-232

Pin	Signal Name	Signal Description
2	TD	Transmit Data
3	RD	Receive Data
4	RTS	Request To Send
7	SG	Signal Ground
20	DTR	Data Terminal Ready

Connector type: DB-25 male

Mode switch set to "1200" or "9600" selects this port.



Personal LaserWriter NT, LaserWriter II NT, NTX, IIf, and IIg – RS-422

Pin	Signal Name	Signal Description
1	HSKo	Handshake out
2	HSKi	Handshake in
3	TxD-	Transmit Data -
4	SG	Signal Ground
5	RxD-	Receive Data -
6	TxD+	Transmit Data +
7	GPI	General-Purpose input
8	RxD+	Receive Data +

Connector type: Mini DIN-8 male

Personal LaserWriter NT, LaserWriter II NT, NTX, IIf, and IIg – RS-232

Pin	Signal Name	Signal Description
1	SGND	Signal Ground
2	TxD	Transmitted Data
3	RxD	Received Data
4	RTS	Request To Send
5	CTS	Clear To Send
6	DSR	Data Set Ready
7	SG	Signal Ground
8	DCD	Data Carrier Detect
20	DTR	Data Terminal Ready
22	RI	Ring Indicator

Connector type: DB-25 male



Ports and Cables

External Connectors—Pin-Outs

Personal LaserWriter SC, LaserWriter II SC, NTX, IIx, and IIg – SCSI Port

Pin	Signal Name	Signal Description
1-12	GND	Signal Ground
13	NC	No Connection
14-25	GND	Signal Ground
26	DB0/	Data Bit 0
27	DB1/	Data Bit 1
28	DB2/	Data Bit 2
29	DB3/	Data Bit 3
30	DB4/	Data Bit 4
31	DB5/	Data Bit 5
32	DB6/	Data Bit 6
33	DB7/	Data Bit 7
34	DBP/	Data Parity
35-37	GND	Signal Ground
38	+5V	+5 Volts
39	GND	Signal Ground
40	GND	Signal Ground
41	ATN/	Attention
42	GND	Signal Ground
43	BSY/	Busy
44	ACK/	Acknowledge
45	RST/	Reset
46	MSG/	Message
47	SEL/	Select
48	C/D/	Control/Data
49	REQ/	Request
50	I/O/	Input/Output

Connector type: BR-50 male

Ports and Cables

External Connectors—Pin-Outs



LaserWriter IIg – Ethernet

Pin	Signal Name	Signal Description
1	FN Pwr	+12 volts @ 175 mA or +5 volts @ 420 mA
2	DI-A	Data In circuit A
3	DI-B	Data In circuit B
4	VCC	Voltage common
5	CI-A	Control In circuit A
6	CI-B	Control In circuit B
7	+5V	+5 volts (from hose)
8	+5V	Secondary +5 volts (from host)
9	DO-A	Data Out circuit A
10	DO-B	Data Out circuit B
11	VCC	Secondary voltage common
12	NC	Reserved
13	NC	Reserved
14	FN Pwr	Secondary +12 volts or +5 volts
Shell	Protective Gnd	Protective Ground

Connector type: Custom 14-pin .05-inch spaced ribbon



Ports and Cables

External Connectors—Pin-Outs

Personal LaserWriter LS – RS-422

Pin	Signal Name	Signal Description
1	CLK	Receive/transmit clock output
2	NC	No Connection
3	TxD-	Transmit Data -
4	SG	Signal Ground
5	RxD-	Receive Data -
6	TxD+	Transmit Data +
7	NC	No Connection
8	RxD+	Receive Data +

Connector type: Mini DIN-8 male

Ports and Cables

Switch Configurations



LaserWriter II NT – Switch Configurations

Communication and Command Mode	1	2
LocalTalk	Up	Up
Diablo 630 emulation	Down	Up
9600 Baud RS-232 & RS-422	Up	Down
1200 Baud RS-232 & RS-422	Down	Down

LaserWriter II NTX – Switch Configurations

Communication mode	1	2	3	4	5	6
LocalTalk*	Up	Up				
1200 baud RS-232 & RS-422	Down	Up				
9600 baud RS-232 & RS-422	Up	Down				
9600 baud RS-232	Down	Down				
Command mode	1	2	3	4	5	6
PostScript batch			Up	Up		
Diablo 630			Down	Up		
PostScript interactive			Up	Down		
HP LaserJet			Down	Down		
Handshaking	1	2	3	4	5	6
X-On/X-Off					Down	Down
X-On/X-Off					Up	Up
ETX/ACK					Down	Up
Data Set Ready					Up	Down

* If LocalTalk is selected, switches 3 through 6 are not used.



Ports and Cables

Switch Configurations

LaserWriter IIx and IIg – Pushbutton Switch

Port	Switch Setting	Connection Type	Communication
8-pin serial	0-4 5 6-9	LocalTalk 9600 baud serial User configurable	PostScript PostScript User configurable
25-pin serial	0 1 2 3 4-5 6-9	9600 baud serial 9600 baud serial 9600 baud serial 9600 baud serial 9600 baud serial User configurable	PostScript HP LaserJet emulation Diablo emulation Nonprinting input PostScript User configurable
Ethernet*	0-5 6-9	EtherTalk EtherTalk	PostScript User configurable
SCSI	0-9	SCSI	Not affected by switch

* Ethernet port is available on the LaserWriter IIg only.

Ports and Cables

Switch Configurations



Personal LaserWriter NT – Thumbwheel Switch

Switch Position	Port	Meaning
0	8-pin 25-pin	AppleTalk, PostScript batch mode Serial, no input
1	8-pin 25-pin	Serial (9600, N, std, 1, XON), Postscript batch mode Serial (9600, N, std, 1, XON), Postscript batch mode
2	8-pin 25-pin	Serial (9600, N), 8, (1, XON), HP emulation Serial (9600, N), 8, (1, XON), HP emulation
3	8-pin 25-pin	Serial (9600, N), 8, (1, XON), Diablo emulation Serial (9600, N), 8, (1, XON), Diablo emulation
4*	8-pin 25-pin	Serial 1200, N, std, 1, XON, PostScript batch mode Serial 1200, N, std, 1, XON, PostScript batch mode
5	8-pin 25-pin	Serial (9600, N), 8, (1, None), Postscript batch mode Serial (9600, N), 8, (1, DTR), Postscript batch mode
6	8-pin 25-pin	Serial (9600, N), 8, (1, XON), Postscript binary mode Serial (9600, N), 8, (1, XON), Postscript binary mode
7	8-pin 25-pin	AppleTalk, PostScript batch Serial, no input

For switch positions 1 through 6, the parameters are listed in the following order: data transfer rate, parity check, number of data bits, stop bits, handshake, and mode. The parentheses indicate that the parameter can be changed via software.

* When the switch is set to position 4 and the printer is switched on, a diagnostic page will be printed instead of the normal startup page.



Phone/Address Directory

[illegible]



Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, California 95014

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