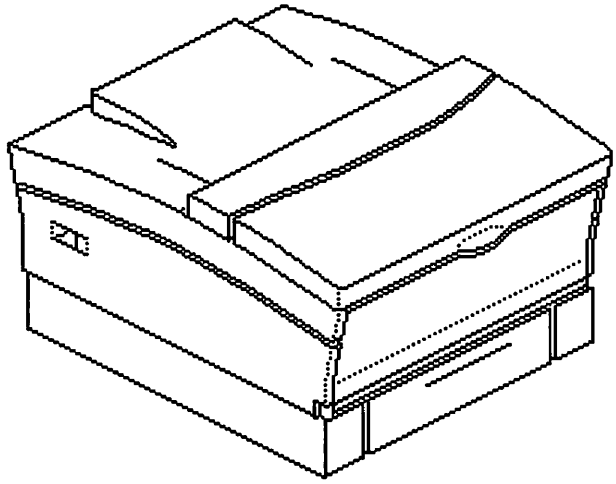
LaserWriter Select
Service Course

Service Training

Participant Manual

Version 1.1

LaserWriter Select Service Course



Apple Service Training Development

Table of Contents

Table of Contents

Getting Started

Welcome to the *LaserWriter Select Service Course*!

This course helps you learn to service the Apple® LaserWriter® Select family of printers. To provide quality customer service, you must know how to identify printer components and functions; take apart and reassemble the printer; and diagnose problems. The course covers these topics in three main modules:

- LaserWriter Select Parts and Functions
- LaserWriter Select Take-Apart
- LaserWriter Select Troubleshooting

Each module includes activities that help you achieve the module objectives. To get the most from this course, follow these five steps:

1. Begin with the first module, "LaserWriter Select Parts and Functions."

2. Read through the module and complete all the module activities. You'll be asked to use other resources, such as *Apple Service Source*, and to perform various service procedures throughout the module.

3. Complete the module test (if present) after you finish the module activities.

4. Repeat steps 2–3 as applicable for each remaining module. (The second module "LaserWriter Select Take-Apart" does not have a separate module test. However, you should meet the module objectives by correctly and efficiently taking apart and reassemblying the printer.)

When you are ready, read the "Overview" section of "LaserWriter Select Parts and Functions."

Overview

This module identifies LaserWriter Select printer components and describes their function.

Objectives

By the end of this module, you should be able to

- Locate the components and major parts of the LaserWriter Select
- Match a list of LaserWriter Select components with their functions

Required Materials

This module requires the following materials and equipment:

- LaserWriter Select printer with the covers and panels, I/O shield, I/O mount, DC controller mount, and base removed
- *LaserWriter Select Service Training* videotape
- *Apple Service Source* CD, version 2.0 (February 1996 or later)

Module Organization

This module consists of the following sections:

- Overview
- Printer Introduction
- Print Cycle Initiation
- Practice Exercise 1
- Practice Exercise 2
- Print Cycle Completion
- Practice Exercise 3
- Practice Exercise 4
- Module Test

This "Overview" provides basic information about this module. The "Print Cycle Initiation" and "Print Cycle Completion" sections describe the functions of the printer components that operate during the print initiation phase and the print completion phase.

The "Practice Exercise" sections help you hone your knowledge of printer components and functions in preparation for the module test.

The "Module Test" section explains how to proceed with the test.

Printer Introduction

Basic Features

The Apple LaserWriter Select family of high-quality laser printers can print up to five or ten pages per minute at 300 to 600 dpi, depending on the model. The printer's manual feed tray and paper cassette support a wide range of media sizes and types, including paper, envelopes, adhesive labels, and transparency film. Both 250- and 500-sheet feeders are available, as well as an optional multipurpose tray. The LaserWriter Select manual on *Apple Service Source* describes features, specifications, and options in more detail.

Printer Orientation

Figure 1-1 orients you to the LaserWriter Select printer.

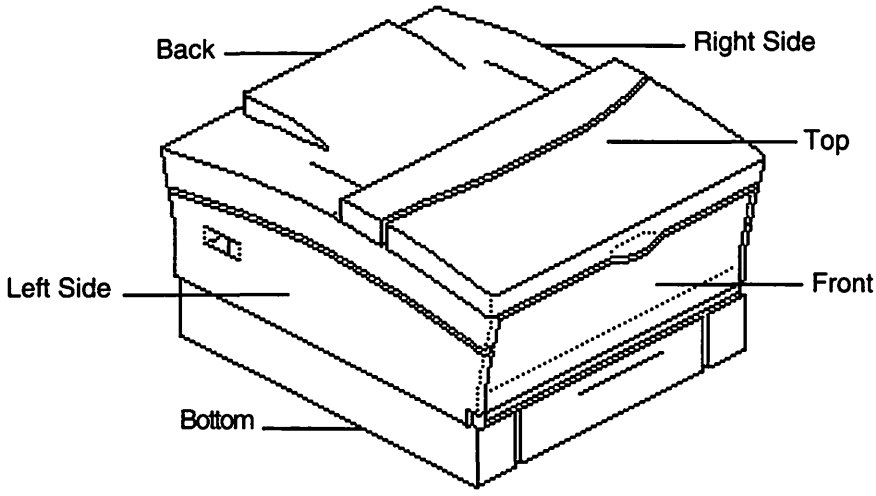


Figure 1-1
LaserWriter Select Orientation

Printer Introduction

Paper Path

This module presents LaserWriter Select printer components generally in the sequence in which they function during a print cycle. In a print cycle, paper is picked up and moved through the printer following a "c-shaped" path. Figure 1-2 illustrates the LaserWriter Select paper path with an optional sheet feeder installed.

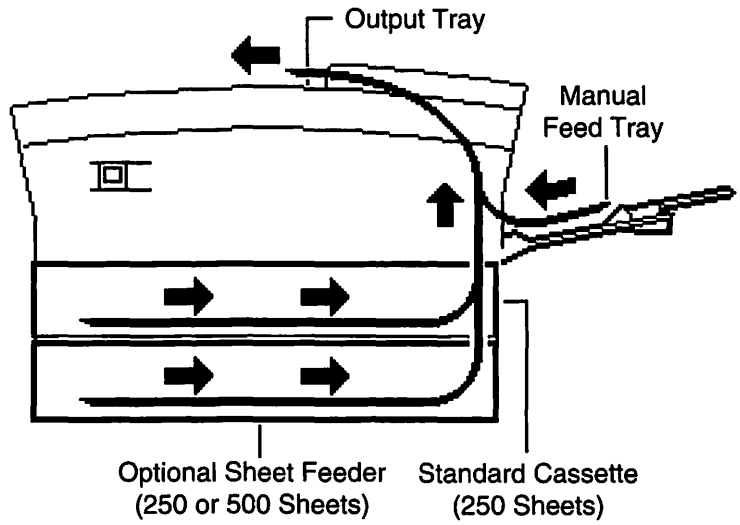


Figure 1-2
The LaserWriter Select Paper Path With Optional Sheet Feeder

Note: Although most LaserWriter Select printer components are similar in function to those in other laser printers you may have trained on and serviced, many differ in location and physical design. Figures presented in this module are used only to identify the location of these components. Detailed illustrations of each component and overall printer operation are presented in the "Basics," "Specifications," and "Parts" chapters of the LaserWriter Select manual on *Apple Service Source*. Carefully review these chapters before you begin the next section of the module.

When you are ready, continue with "Print Cycle Initiation."

Print Cycle Initiation

Print cycle initiation begins when the printer is switched on and ends when a sheet of paper is picked up and moved toward the toner cartridge. This section discusses the locations and functions of the components that operate during the print initiation phase of the print cycle.

Components

The following components function during the initiation phase of the print cycle:

- Power supply
- I/O controller board and mount
- DC controller board, mount, and service test print connector P32
- Drive assembly
- Cassette tray
- Cassette feeder PCB
- Paper cassette sizing switches SW1, SW2, SW3,and SW4 and actuator
- Paper-out sensor PS601 and sensing arm
- Cassette pickup rollers and solenoid
- Cassette feed rollers and solenoid
- Manual feed tray
- Manual feed pickup solenoid
- Manual feed sensor PS701 assembly
- Pickup roller assembly
- Paper feed rollers
- Paper charge deflector
- Paper registration sensor PS602 and sensor arm

View Videotape

View "Part 1, Parts and Functions—Print Cycle Initiation" of the *LaserWriter Select Service Training* videotape. Part 1 identifies the above components and their functions. Stop, rewind, and/or restart the tape any time you need to review a segment of the tape. Each part of the tape is numbered in the upper right corner of the screen.

Functions

This section describes the functions of the print cycle initiation components.

- The power supply (see Figure 1-3) contains the AC power cord connector and the printer on/off power switch. The power supply also contains the cover interlock switch, which cuts power to the fuser assembly when the front access door is open. This component supplies AC power to the fuser assembly and DC power to the DC controller.

Print Cycle Initiation

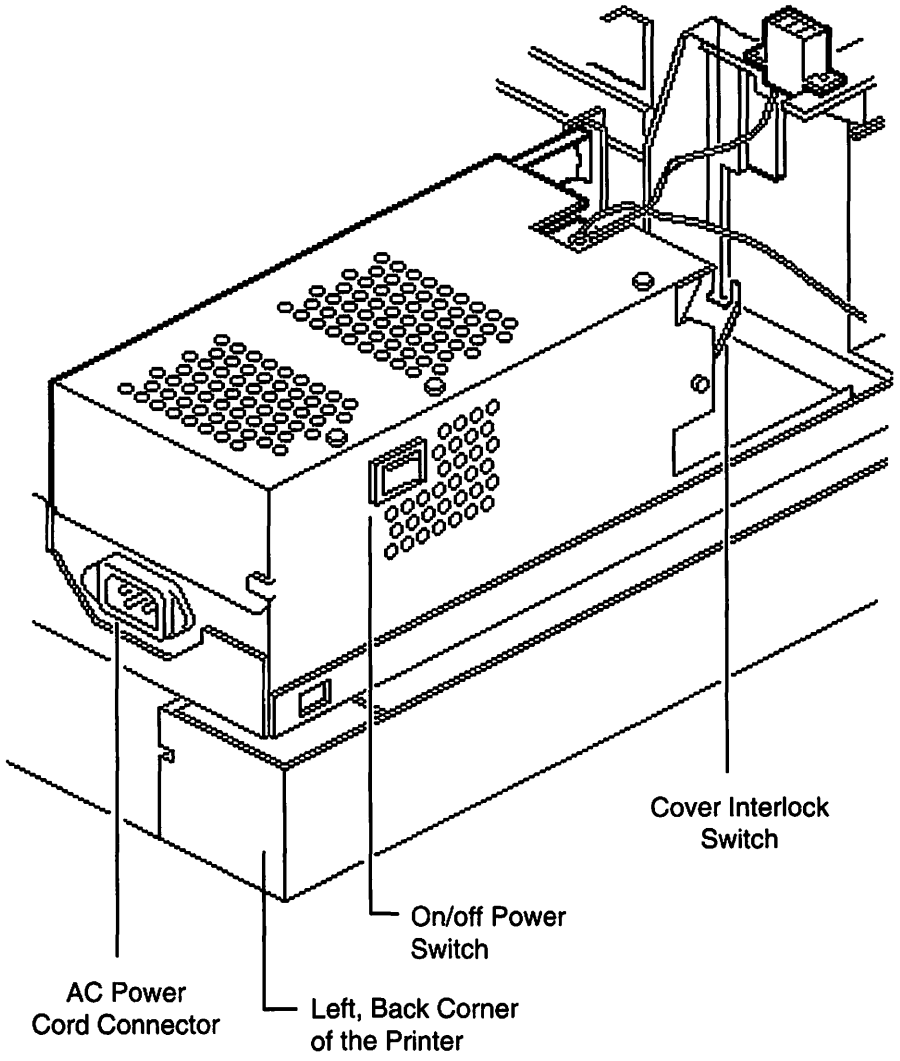


Figure 1-3
LaserWriter Select Power Supply

Print Cycle Initiation

- The I/O controller shield (see Figure 1-4) covers the I/O controller board and controller mount. The I/O controller shield must be removed to see the I/O controller board.

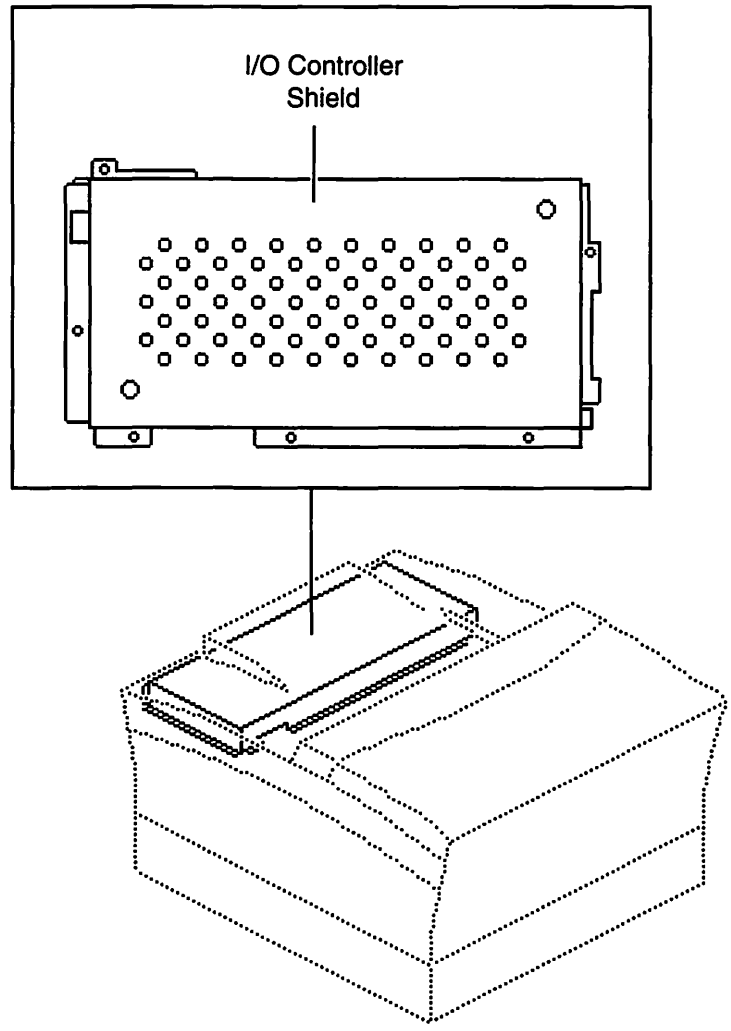


Figure 1-4
LaserWriter Select I/O Controller Shield

- The I/O controller board (see Figure 1-5) controls communication between the printer and external devices, and prints the user test page. The I/O controller board contains the external device cable connectors (not shown), paper delivery sensor (discussed later), ROM, and RAM. The I/O controller board is mounted on the I/O

Print Cycle Initiation

controller mount. For a detailed list of the cable connectors, refer to **Circuit Board Diagrams** section of the "Troubleshooting" chapter in the LaserWriter Select manual on *Apple Service Source*.

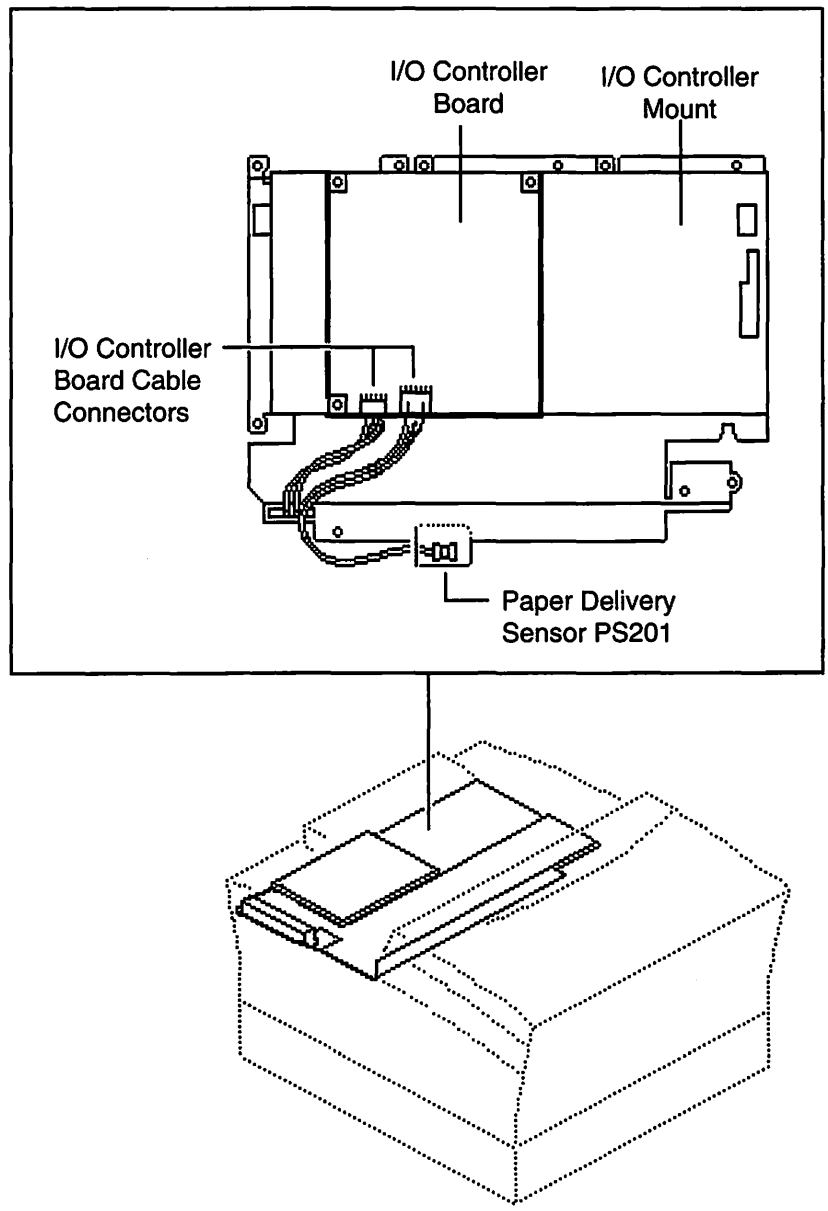


Figure 1-5
LaserWriter Select 300 I/O Controller Board and I/O Controller Mount

Print Cycle Initiation

- The DC controller board (see Figure 1-6) is the interface between the I/O controller board and the print engine. The I/O controller shield and mount must be removed to see the DC controller board and mount. The DC controller board controls the printer, distributes DC power, and prints the service test page when connector P32 pins 1 and 2 are jumpered. An access hole in the I/O controller mount directly in front of connector P32 allows the pins to be jumpered without removing the I/O controller shield or mount. The DC controller board is mounted to the DC controller mount. For a detailed list of the cable connectors, refer to the **Circuit Board Diagrams** section of the "Troubleshooting" chapter in the LaserWriter Select manual on *Apple Service Source*.

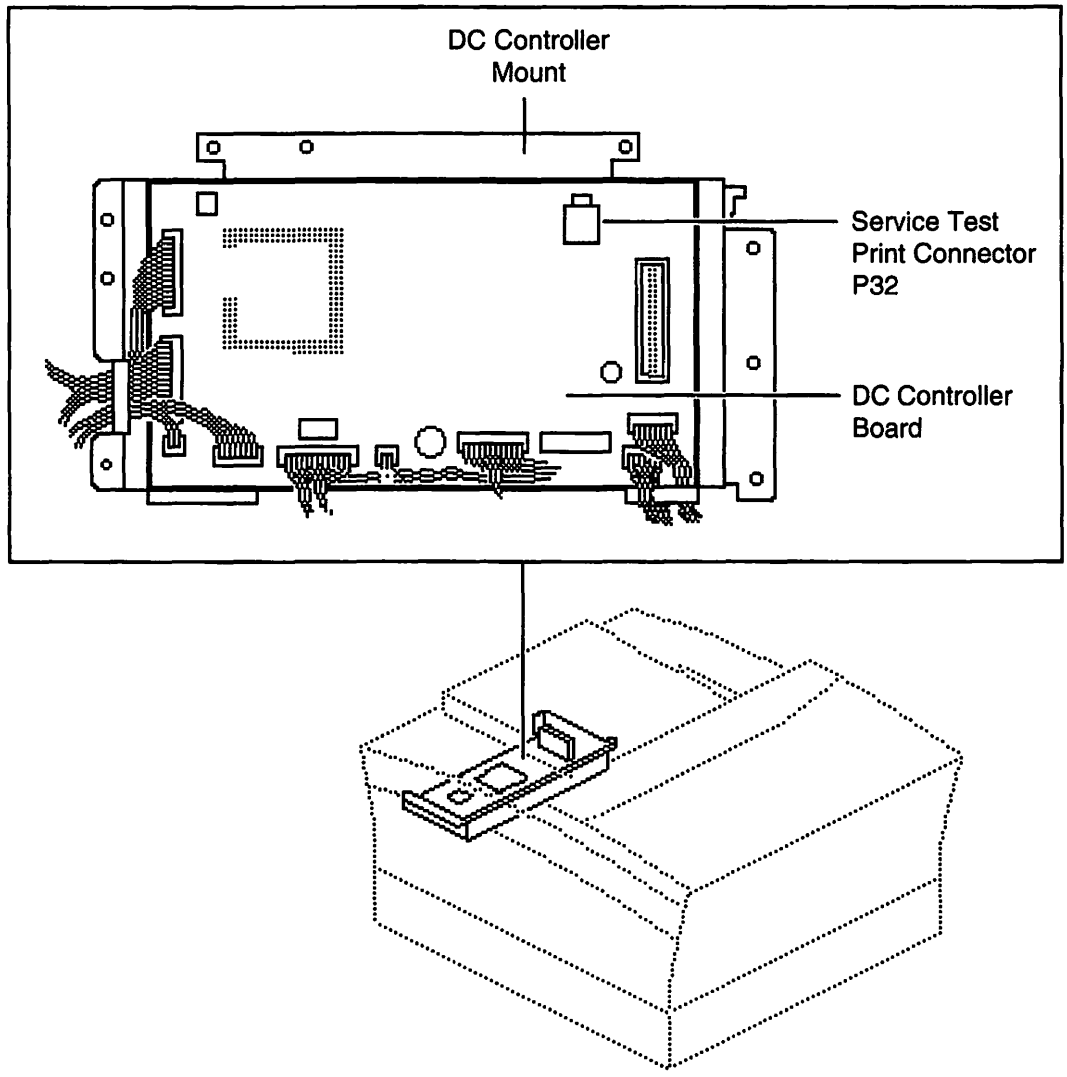


Figure 1-6
LaserWriter Select DC Controller Board and DC Controller Mount

Print Cycle Initiation

- The drive assembly transfers main motor operation to the rest of the printer (see Figure 1-7). The drive assembly includes the main motor and the drive transfer gears.

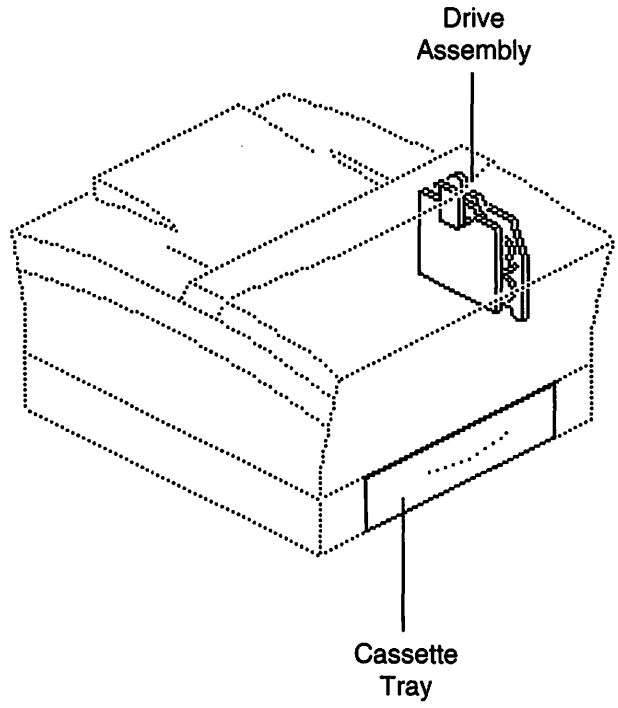


Figure 1-7
LaserWriter Select Drive Assembly and Cassette Tray, Front and Left View

- The cassette tray holds up to 250 sheets of paper for automatic paper feed (see Figure 1-7).

- Figures 1-8 and 1-9 (on the following pages) illustrate the components which make up the cassette feeder assembly. These components pick up and feed paper from the cassette tray and move it toward the toner cartridge.

Print Cycle Initiation

- The cassette feeder PCB (see Figure 1-8) contains the paper-out sensor PS601 and the paper size switches SW1, SW2, SW3, and SW4.

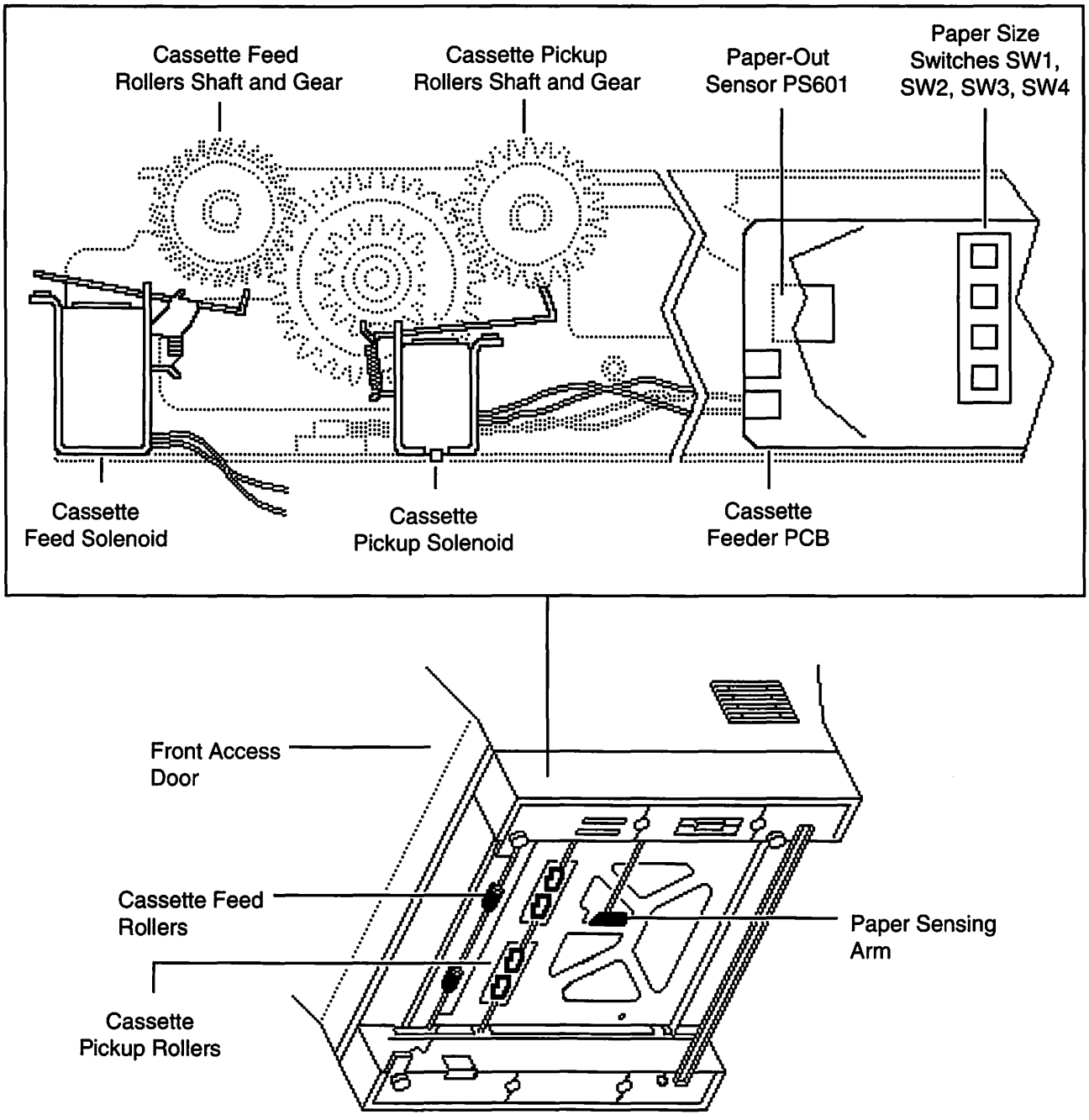


Figure 1-8
LaserWriter Select Cassette Feeder Assembly, Bottom View

Print Cycle Initiation

- The paper cassette sizing switches SW1, SW2, SW3, and SW4 (see Figure 1-8) and actuator (see Figures 1-9) are activated by plastic cams on the side of the cassette tray as the tray is installed in the printer. The paper cassette sizing switches detect the size of the cassette tray and whether the cassette tray is installed.

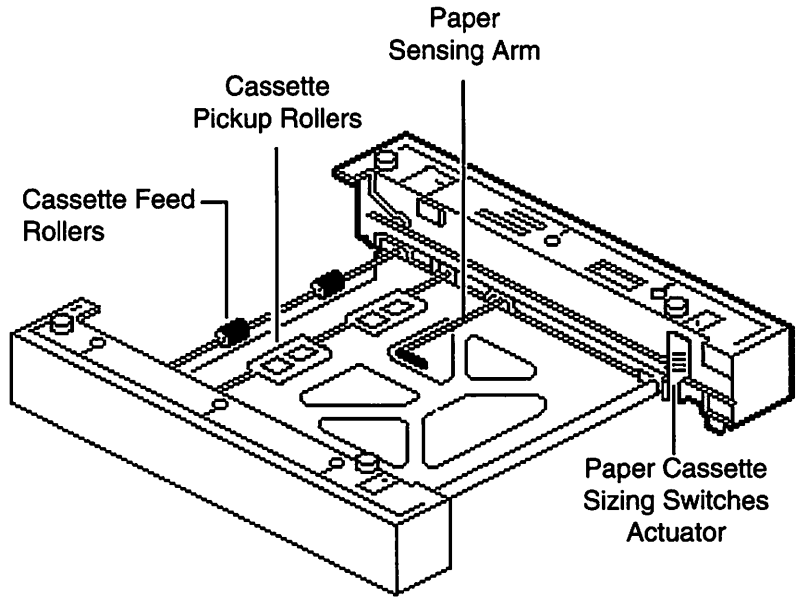


Figure 1-9
LaserWriter Select Cassette Feeder Assembly, Bottom View

- The paper-out sensor PS601, located on the cassette feeder PCB (see Figure 1-8), is activated by the paper sensing arm (see Figures 1-8 and 1-9) when the cassette tray is out of paper.

- The cassette pickup rollers (see Figures 1-8 and 1-9), activated by the cassette pickup solenoid (see Figure 1-8), feed one sheet of paper at a time into the cassette feed rollers.

- The cassette feed rollers (see Figures 1-8 and 1-9), activated by the cassette feed solenoid (see Figures 1-8), move the sheet of paper from the cassette pickup rollers toward the paper feed rollers (discussed later in this section).

Print Cycle Initiation

- The manual feed tray (see Figure 1-10) is used to feed paper into the printer during manual feed. Paper is loaded onto the tray one sheet at a time.

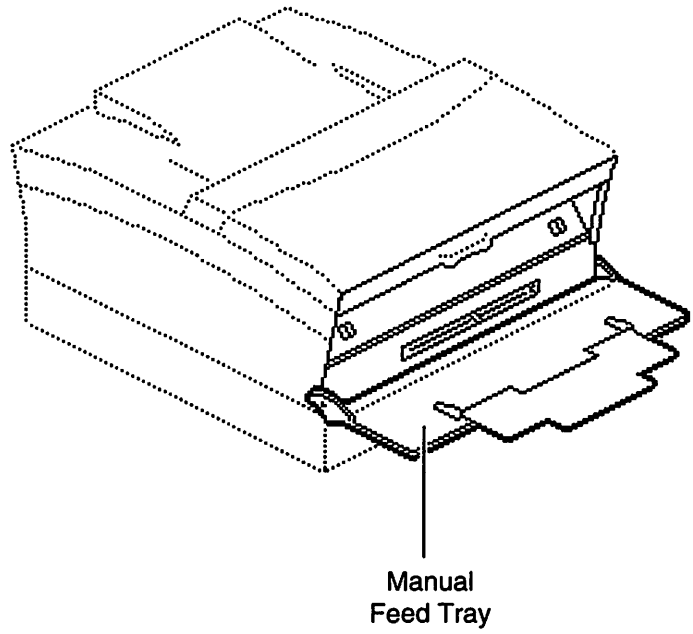


Figure 1-10
LaserWriter Select Manual Feed Tray, Front View

- The manual feed sensor PS701 (see Figure 1-11), when activated by the manual feed sensor arm, detects the presence of paper on the manual feed tray. The manual feed sensor assembly, which contains the manual feed sensor PS701 and the manual feed sensor arm, is located above the manual feed pickup plate which guides the sheet of paper picked up from the manual feed tray into the printer.

Print Cycle Initiation

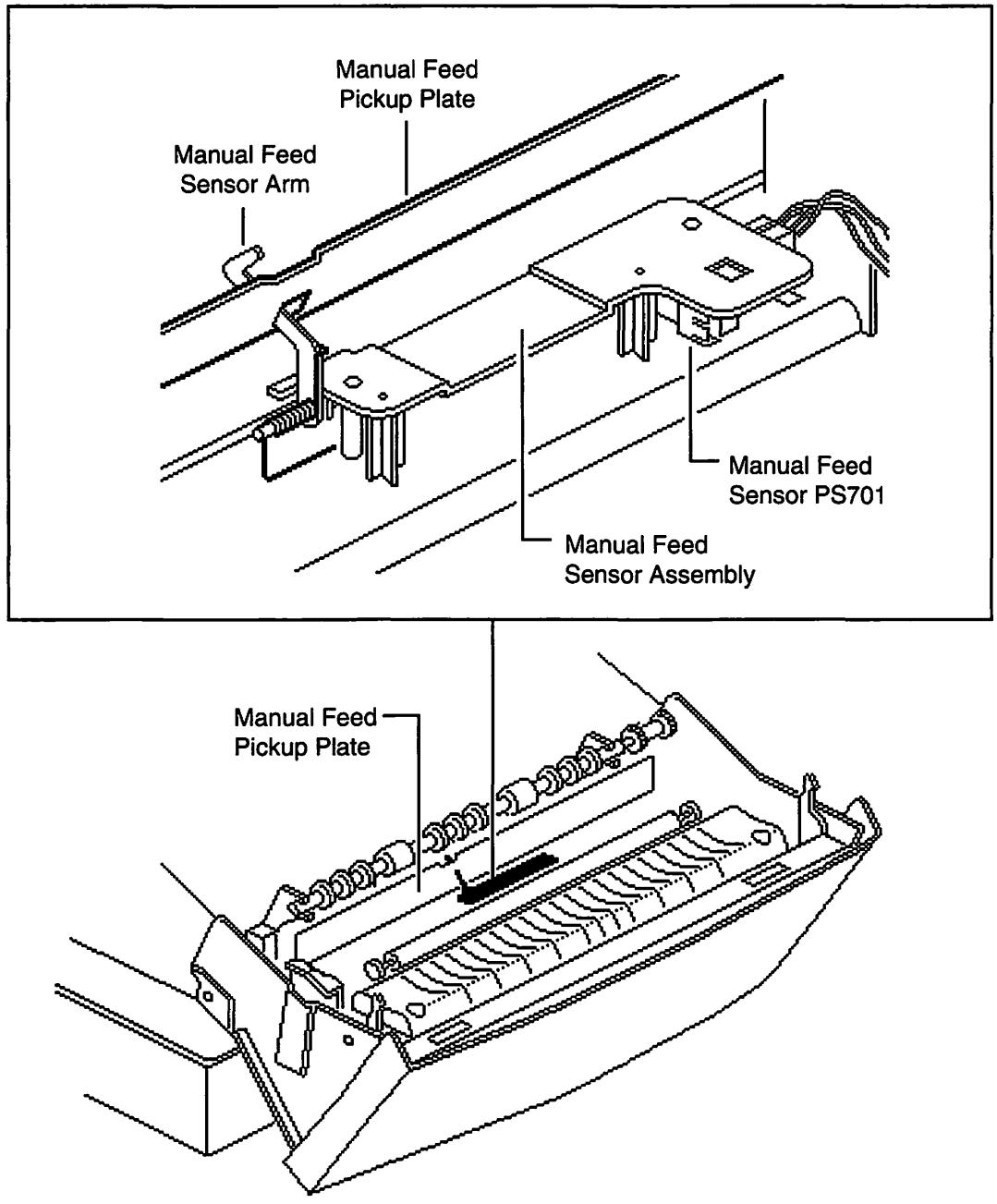


Figure 1-11
LaserWriter Select Manual Feed Sensor Assembly

Print Cycle Initiation

- The pickup roller assembly (see Figure 1-12), activated by the manual feed pickup solenoid, picks up and moves the sheet of paper from the manual feed tray toward the paper feed rollers.

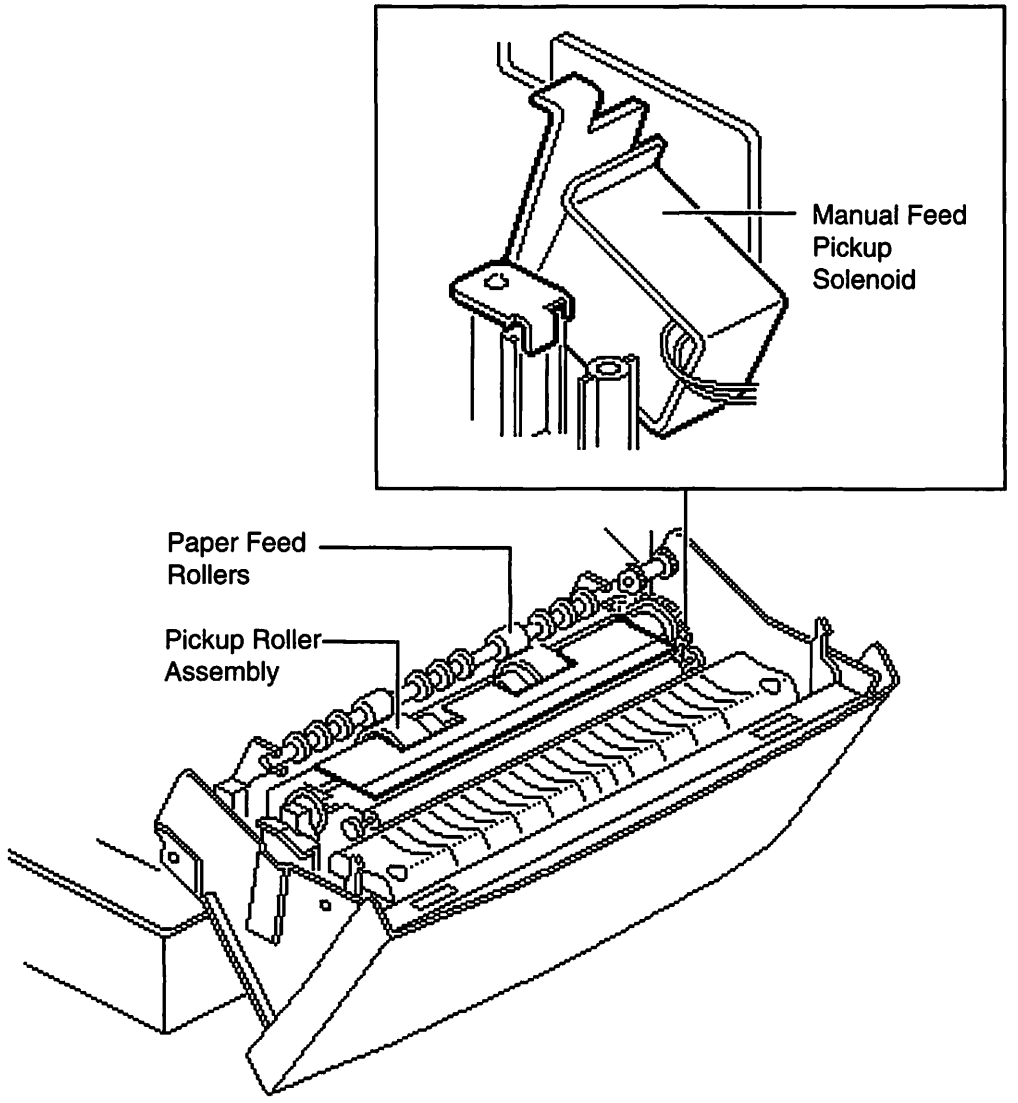


Figure 1-12
LaserWriter Select Front Access Door

- The paper feed rollers (see Figure 1-12) move the sheet of paper from the pickup roller assembly or the cassette feed rollers toward the toner cartridge and the photosensitive drum.

Print Cycle Initiation

- The paper charge deflector (see Figure 1-13) guides the paper and removes any charge on the page before it passes the toner cartridge and the transfer roller.

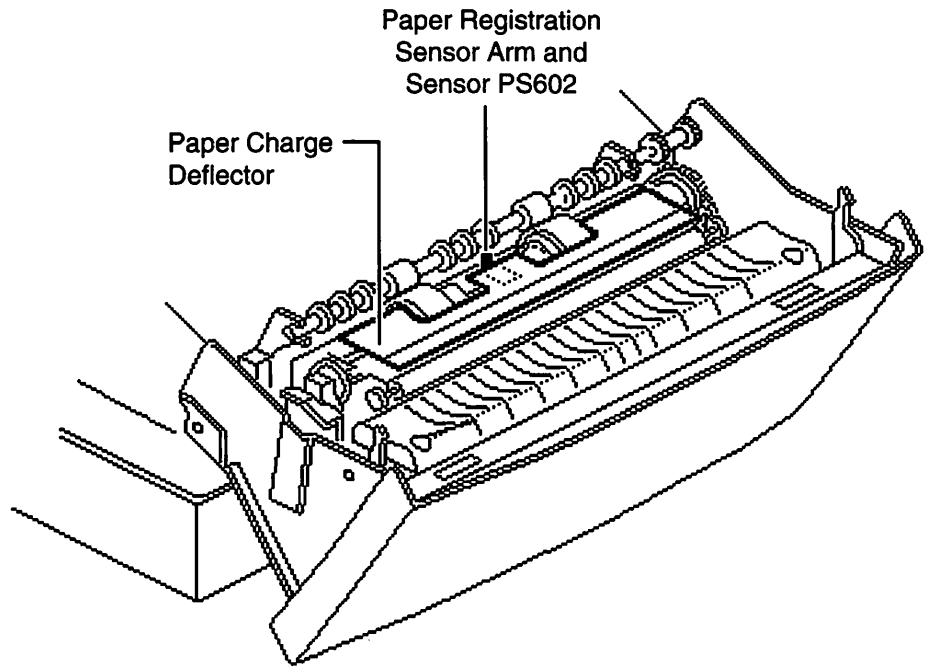


Figure 1-13
LaserWriter Select Laser Front Access Door

- The paper registration sensor PS602 and sensor arm (see Figure 1-13) detect the front edge of the paper. When activated, they cause the DC controller to align the paper with the image on the photosensitive drum in the toner cartridge.

Continue with "Practice Exercise 1."

Practice Exercise 1

In this exercise you practice locating LaserWriter Select print components that function during the initiation phase of the print cycle.

Warning: The LaserWriter Select contains potentially dangerous voltage. To eliminate the risk of injury due to shock, make sure that the power cable is disconnected from the printer before beginning this exercise.

Using appropriate reference documents, practice locating, on a LaserWriter Select, each component from the following list until you can locate all components from memory. You may want to ask a colleague to name each item in the list so you can point to it.

- Power supply
- I/O controller board and mount
- DC controller board, mount, and service test print connector P32
- Drive assembly
- Cassette tray
- Cassette feeder PCB
- Paper cassette sizing switches SW1, SW2, SW3,and SW4 and actuator
- Paper-out sensor PS601 and sensing arm
- Cassette pickup rollers and solenoid
- Cassette feed rollers and solenoid
- Manual feed tray
- Manual feed pickup solenoid
- Manual feed sensor PS701 assembly
- Pickup roller assembly
- Paper feed rollers
- Paper charge deflector
- Paper registration sensor PS602 and sensor arm

If you were unable to locate some components, review the videotape or the "Parts" chapter in the LaserWriter Select manual on *Apple Service Source*.

When you are ready, begin "Practice Exercise 2."

Practice Exercise 2

Match the components with their functions by writing the letter of the function next to the appropriate component. (Note: Write your answers on a separate sheet of paper if this manual will be used later by other technicians.)

___ Power supply

___ I/O controller board

___ DC controller board

___ Drive assembly

___ Cassette feeder PCB

___ Paper cassette sizing switches SW1, SW2, SW3, SW4 and actuator

___ Paper-out sensor PS601 and sensing arm

___ Cassette pickup rollers

___ Paper charge deflector

___ Cassette feed rollers

___ Manual feed sensor PS701 assembly

___ Paper registration sensor PS602 and sensor arm

___ Pickup roller assembly

___ Paper feed rollers

A. Contains the paper cassette sizing switches SW1, SW2, SW3, and SW4, and the paper-out sensor PS601.
B. Move the paper from the cassette pickup rollers toward the paper feed rollers.
C. Detect the front edge of the paper and signals the DC controller.
D. Distributes DC power to the printer and prints the service test page.
E. Transfers main motor operation to the rest of the printer.
F. Provides AC and DC power to the printer.
G. Move the paper from the cassette feed rollers and pickup roller assembly toward the toner cartridge.
H. Feed paper from the cassette tray to the cassette feed rollers.
I. Removes any charge from the paper before it reaches the photosensitive drum and the transfer roller.
J. Detect the size of the cassette tray and if it is installed.
K. Detect whether there is paper in the cassette tray.
L. Controls communications between the printer and external devices, and prints the user test page.
M. Detects whether paper is in the manual feed tray.
N. Feeds paper into the printer from the manual feed tray.

When you are finished, compare your answers to those on the following page.

Practice Exercise 2

Compare your answers with those given below.

F Power supply	A. Contains the paper size switch and the paper-out sensor.
L I/O controller board	B. Move the paper from the cassette pickup rollers toward the paper feed rollers.
D DC controller board	C. Detect the front edge of the paper and signals the DC controller.
E Drive assembly	D. Distributes DC power to the printer and prints the service test page.
A Cassette feeder PCB	E. Transfers main motor operation to the rest of the printer.
J Paper size switch and actuator	F. Provides AC and DC power to the printer.
K Paper-out sensor and sensing arm	G. Move the paper from the cassette feed rollers and pickup roller assembly toward the toner cartridge.
H Cassette pickup rollers	H. Feed paper from the cassette tray to the cassette feed rollers.
I Paper charge deflector	I. Removes any charge from the paper before it reaches the photosensitive drum and the transfer roller.
B Cassette feed rollers	J. Detect the size of the cassette tray and if it is installed.
M Manual feed sensor assembly	K. Detect whether there is paper in the cassette tray.
C Paper registration sensor and sensor arm	L. Controls communications between the printer and external devices, and prints the user test page.
N Pickup roller assembly	M. Detects whether paper is in the manual feed tray.
G Paper feed rollers	N. Feeds paper into the printer from the manual feed tray.

If you missed more than two practice items, review this section before continuing.

When you are ready, continue with "Print Cycle Completion."

Print Cycle Completion

The completion phase begins when paper moves toward the toner cartridge and ends when the printed page exits the printer. This section shows the locations and describes the functions of the components that operate during the completion phase.

Components

The following components function during the completion phase of the print cycle.

- High-voltage power supply
- High-voltage contact assembly
- Laser/optic assembly
- Power switch lever
- Toner cartridge
- Toner cartridge sensor assembly S101 and S100
- Transfer roller
- Paper delivery guide (Transfer guide)
- Fuser assembly
- Exit roller assembly
- Paper delivery sensor PS201 and sensor arm

View Videotape

View "Part 2, Parts and Functions—Print Cycle Completion" of the *LaserWriter Select Service Training* videotape. Part 2 identifies the above components and their functions.

Continue with the next section of the module when you are ready.

Print Cycle Completion

Functions

This section describes the functions of the print cycle completion components.

- The high-voltage power supply (see Figure 1-14) supplies high voltage to the toner cartridge and to the transfer roller. The high-voltage power supply is located next to the DC controller board and DC controller mount. The I/O shield and mount must be removed to see the high-voltage power supply. For a detailed list of the cable connectors, refer to the **Circuit Board Diagrams** section of the "Troubleshooting" chapter in the LaserWriter Select manual on *Apple Service Source*.

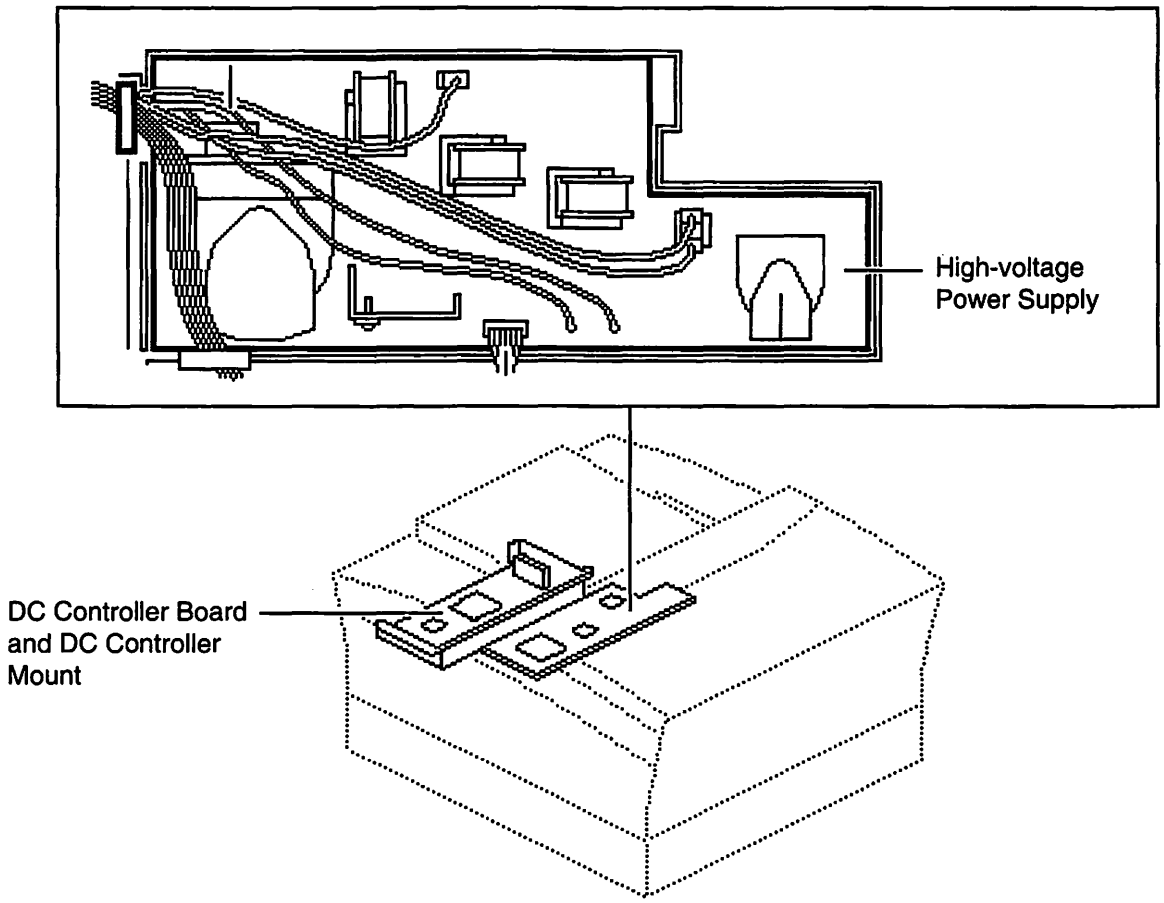


Figure 1-14
LaserWriter Select High-Voltage Power Supply

Print Cycle Completion

- The laser/optic assembly (see Figure 1-15) generates, focuses, and scans the laser beam on to the photosensitive drum in the toner cartridge. At the end of each scan line, the laser beam is reflected onto the start-of-scan PCB, located in the laser/optic assembly, creating an electrical signal which is sent to the DC controller. This signal alerts the DC controller that the next scan line can be generated.

  The laser/optic assembly is located under the DC controller mount and the high-voltage power supply. The laser/optic assembly cannot be removed and, when faulty, must be returned to Apple with the printer chassis, as described in the "Take Apart" chapter in the LaserWriter Select manual on *Apple Service Source*.

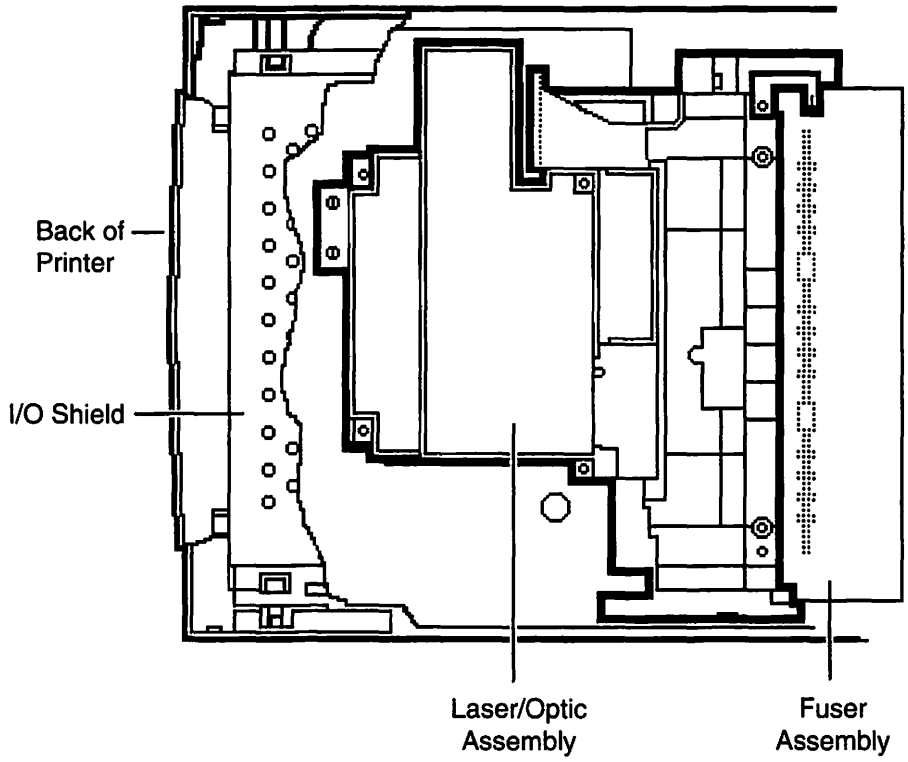


Figure 1-15
LaserWriter Select Laser/Optic Assembly, Top View

Print Cycle Completion

- The high-voltage contact assembly (see Figure 1-16) connects the high-voltage power supply to the toner cartridge and the transfer roller.

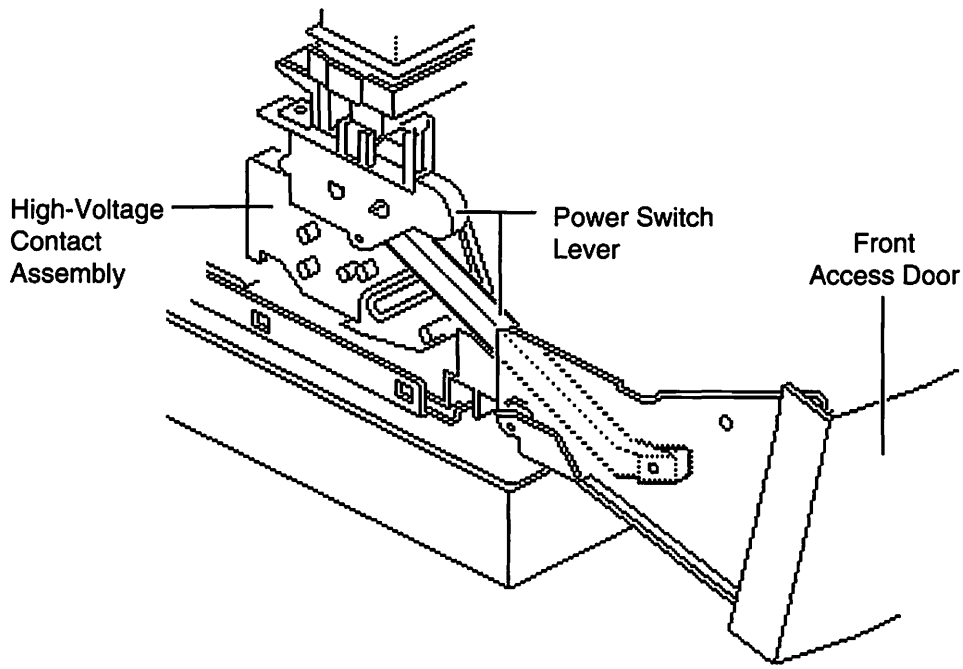


Figure 1-16
LaserWriter Select, Left Front View With Front Access Door Open

- When the front access door is opened, the power switch lever (see Figure 1-16) trips the cover interlock switch on the power supply, which cuts power to the fuser assembly and opens the shutter on the toner cartridge uncovering the photosensitive drum. Opening the front access door will stop the print cycle.

- The toner cartridge (identified in the videotape) develops the image created on the photosensitive drum by the laser beam.

Print Cycle Completion

- The toner cartridge sensor assembly (see Figure 1-17) trips switches S100 and S101 when the toner cartridge is removed, cutting power to the printer and signalling the DC controller that the toner cartridge is removed.

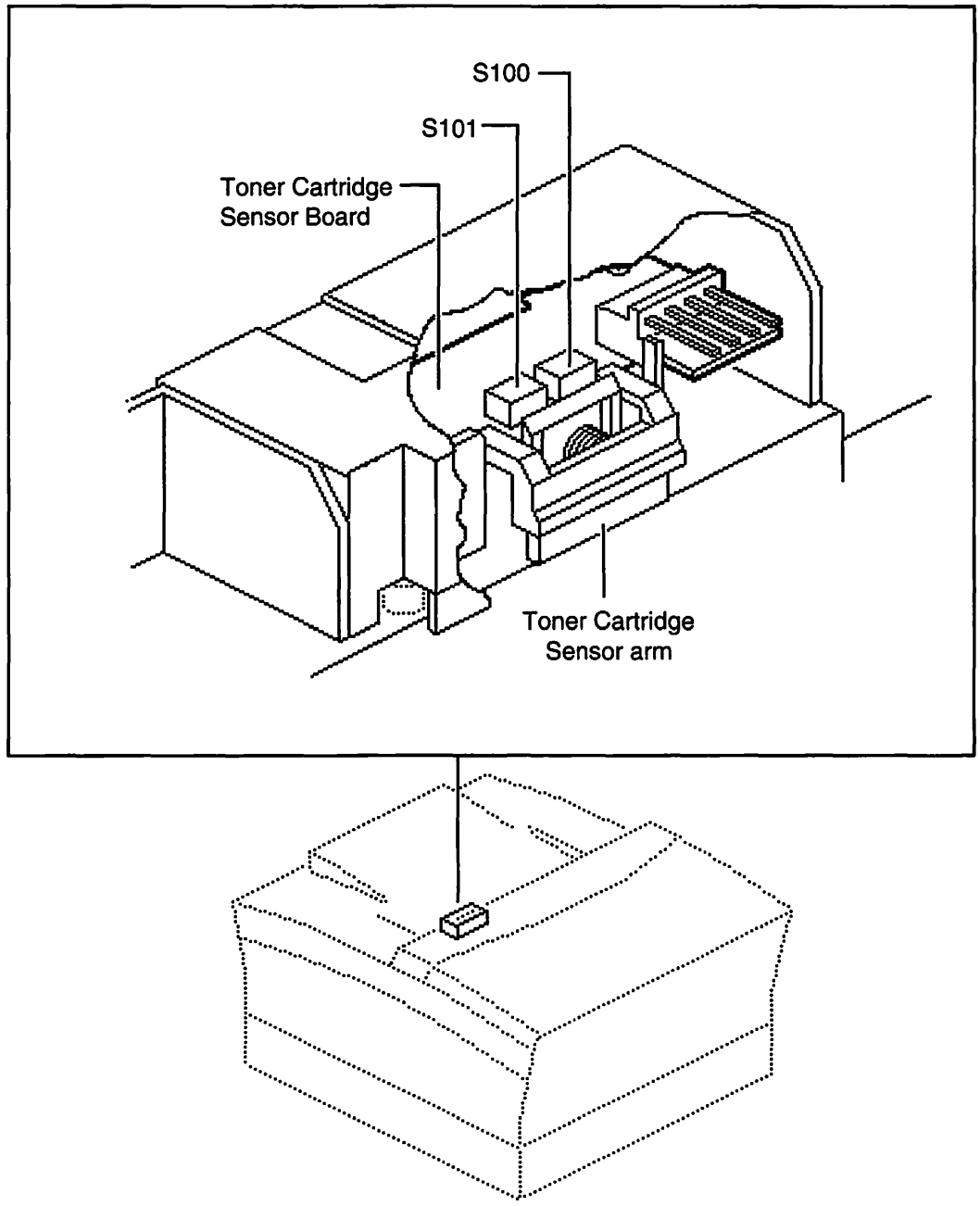


Figure 1-17
LaserWriter Select Toner Cartridge Sensor Assembly

Print Cycle Completion

- The transfer roller (see Figure 1-18) applies a positive charge to the sheet of paper, causing the developed image to transfer from the photosensitive drum to the paper.

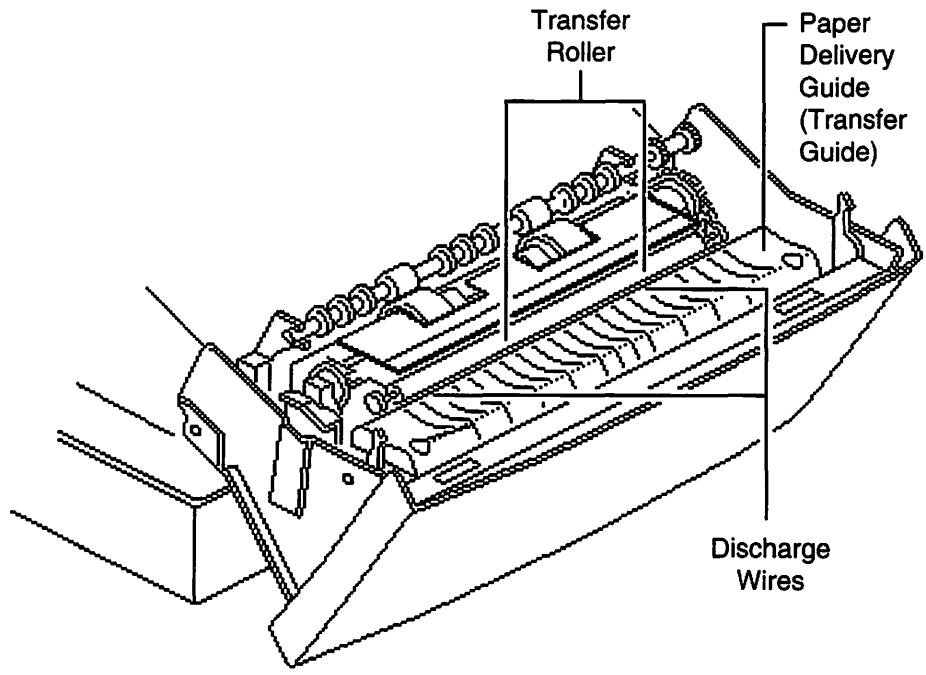


Figure 1-18
LaserWriter Select Front Access Door

- The paper delivery guide (see Figure 1-18), referred to as the transfer guide in the *LaserWriter Select Service Training* videotape, removes any charge left on the paper as it passes over the wire-like teeth along the paper delivery guide's front edge. The paper delivery guide also guides the printed page from the transfer roller and toner cartridge toward the fuser assembly.

Print Cycle Completion

- The fuser assembly (see Figure 1-19) applies pressure and heat to the printed page after it leaves the photosensitive drum, fusing the toner image onto the paper. The fuser assembly includes the thermistor, the thermostat fuse, the heater bulb and the pressure rollers (identified in the LaserWriter Select "Parts" chapter on *Apple Service Source*). The thermistor communicates temperature information to the DC controller. During printer warm up, the temperature is 150° C/302° F. During printing, the temperature is 160° C/320° F.

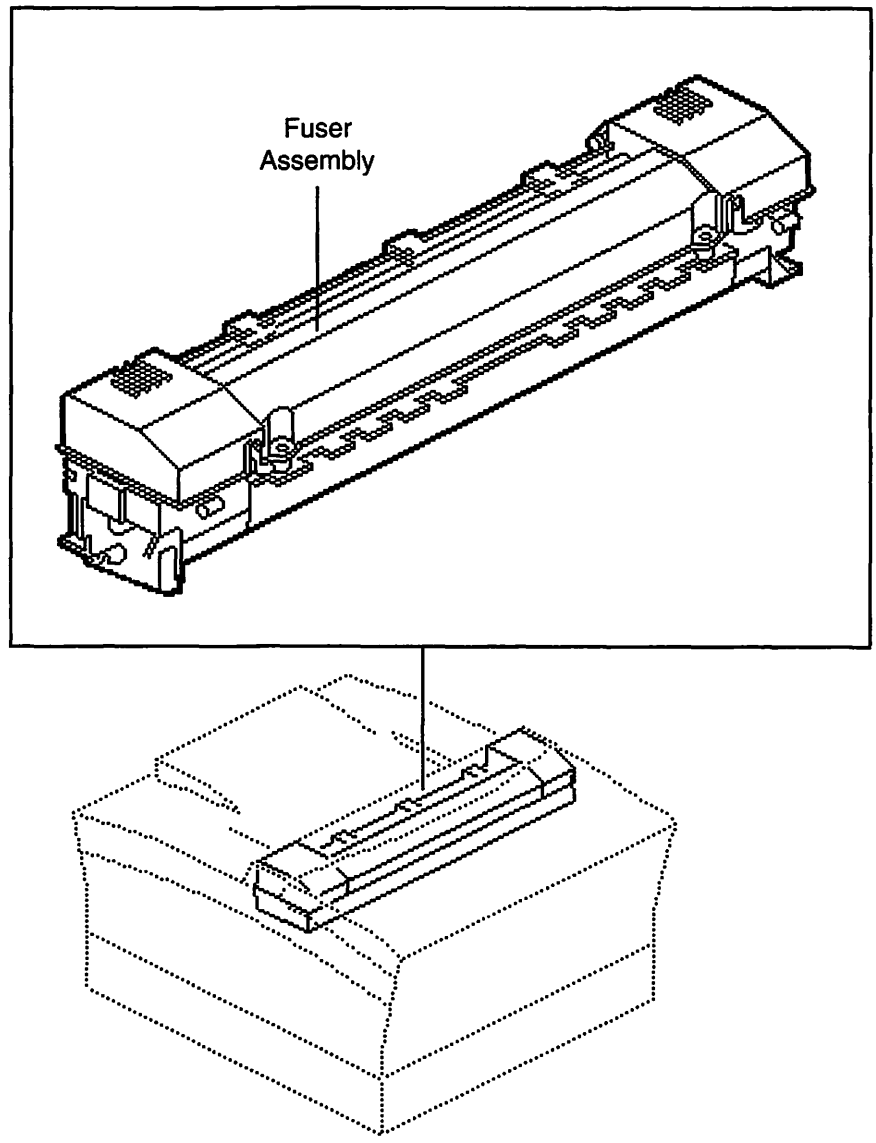


Figure 1-19
LaserWriter Select Fuser Assembly

Print Cycle Completion

The thermostat fuse cuts off power to the fuser heater bulb if the temperature of the fuser roller rises above 185° C/365° F. The heater bulb provides the heat, and the pressure rollers provide the pressure required to fuse the image on to the paper.

- The exit roller assembly (see Figure 1-20) moves the paper from the fuser assembly to the paper delivery tray on top of the printer.

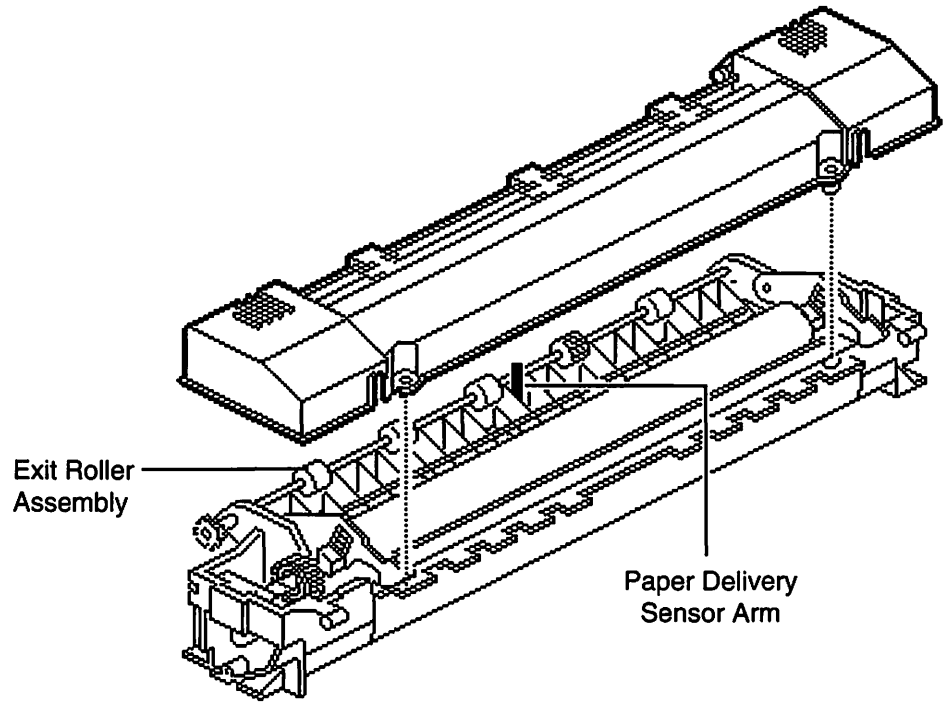


Figure 1-20
LaserWriter Select Fuser Assembly

- The paper delivery sensor arm, located under the exit roller assembly (see Figure 1-20), and the sensor PS201, located on the I/O controller mount below the sensor arm (see Figure 1-21), detect when the printed page leaves the fuser assembly. If the page does not reach this sensor arm within a set period of time after activating the paper registration sensor, a paper jam is detected. An 8 1/2-by-11-inch sheet of paper must activate the paper delivery sensor in 17.960 seconds, and a legal size sheet of paper must activate the sensor in 22.776 seconds.

Print Cycle Completion

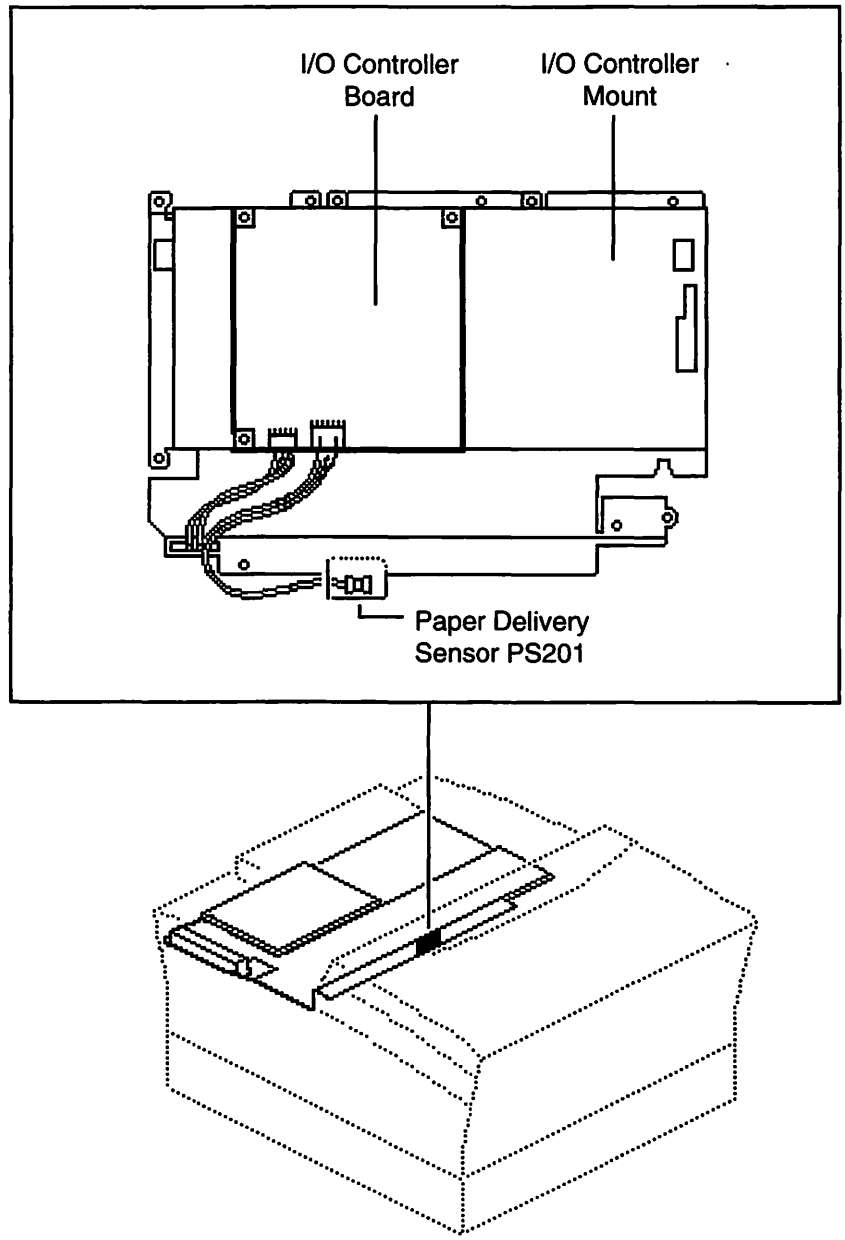


Figure 1-21
LaserWriter Select Paper Delivery Sensor

Continue with "Practice Exercise 3."

Practice Exercise 3

In this exercise you will locate the LaserWriter Select printer components that function during the completion phase of the print cycle.

Warning: The LaserWriter Select contains potentially dangerous voltage. To eliminate the risk of injury due to shock, ensure that the power cable is disconnected from the printer before beginning this exercise.

Using appropriate reference documents, practice locating each component from the component list below until you can locate all components from memory. You may want to ask a colleague to name each item in the list so you can point to it.

- High-voltage power supply
- High-voltage contact assembly
- Laser/optic assembly
- Power switch lever
- Toner cartridge
- Toner cartridge sensor assembly, S101 and S100
- Transfer roller
- Paper delivery guide (Transfer guide)
- Fuser assembly
- Exit roller assembly
- Paper delivery sensor PS201 and sensor arm

If you were unable to locate some components, review the videotape or the "Parts" chapter in the LaserWriter Select manual on *Apple Service Source*.

When you are ready, begin "Practice Exercise 4" on the next page.

Practice Exercise 4

Match the components with their functions by writing the letter of the function next to the appropriate component. (Note: Write your answers on a separate sheet of paper if this manual will be used later by other technicians.)

___ Laser/optic assembly

___ High-voltage power supply

___ High-voltage contact assembly

___ Toner cartridge

___ Transfer roller

___ Paper delivery guide (transfer guide)

___ Power switch lever

___ Fuser assembly

___ Paper delivery sensor PS201 and sensor arm

___ Toner cartridge sensor assembly, S101 and S100

___ Exit roller assembly

A. Detect when the printed page leaves the fuser assembly.
B. Connects the high-voltage power supply to the toner cartridge, and the transfer roller.
C. Applies heat and pressure to the printed page.
D. Puts a charge on the paper causing the toner image on the photosensitive drum to adhere to the paper.
E. Supplies voltage to the toner cartridge and the transfer roller.
F. Develops the image created by the laser beam.
G. Generates and scans the laser beam.
H. Activates the cover interlock switch when the front access door is open.
I. Removes any charge left on the page and guides the paper toward the fuser assembly.
J. Moves the page from the fuser assembly to the paper delivery tray on top of the printer.
K. When activated, cuts power and signals the DC controller that the toner cartridge is removed.

When you are finished, compare your answers to those on the following page.

Practice Exercise 4

Compare your answers with those given below.

G	Laser/optic assembly
E	High-voltage power supply
B	High-voltage contact assembly
F	Toner cartridge
D	Transfer roller
I	Paper delivery guide (transfer guide)
H	Power switch lever
C	Fuser assembly
A	Paper delivery sensor PS201 and sensor arm
K	Toner cartridge sensor assembly, S101 and S100
J	Exit roller assembly

A. Detect when the printed page leaves the fuser assembly.
B. Connects the high-voltage power supply to the toner cartridge, and the transfer roller.
C. Applies heat and pressure to the printed page.
D. Puts a charge on the paper causing the toner image on the photosensitive drum to adhere to the paper.
E. Supplies voltage to the toner cartridge and the transfer roller.
F. Develops the image created by the laser beam.
G. Generates and scans the laser beam.
H. Activates the cover interlock switch when the front access door is open.
I. Removes any charge left on the page and guides the paper toward the fuser assembly.
J. Moves the page from the fuser assembly to the paper delivery tray on top of the printer.
K. When activated, cuts power and signals the DC controller that the toner cartridge is removed.

If you missed more than two practice items, review this section before continuing.

When you are finished, continue with "Module Test."

Module Test

To prepare for this test, you may wish to review the practice exercises, and/or review Parts 1 and 2 of the *LaserWriter Select Service Training* videotape.

Circle the letter of the correct answer for each test item. (Note: Write your answers on a separate sheet of paper if this manual will be used later by other technicians.)

1. When the front access door is open, the cover interlock switch

   A. cuts power to the fuser assembly.

   B. causes a blank page to be printed.

   C. disables the I/O controller board.

   D. resets user options and disables PostScript.

   E. disables the paper registration sensor PS602.

2. The manual feed pickup solenoid activates the

   A. paper delivery guide.

   B. pickup roller assembly.

   C. cassette feed rollers.

   D. cassette pickup rollers.

   E. paper separation assembly.

3. The DC controller board

   A. is the interface between the I/O controller and the print engine.

   B. prints the user test page.

   C. contains the paper-out sensor PS601 and paper sizing switches SW1, SW2, SW3, and SW4.

   D. contains the manual feed sensor (PS701) assembly.

   E. performs all of the above functions.

Module Test

4. Which component provides power to the toner cartridge and transfer roller?

   A. fuser assembly

   B. I/O controller

   C. DC controller

   D. high-voltage power supply

   E. power supply

5. The drive assembly provides operation to the

   A. toner cartridge, fuser assembly, and transfer roller.

   B. toner cartridge, fuser assembly, and cassette feed rollers.

   C. cassette pickup rollers, cassette feed rollers, and toner cartridge.

   D. pickup roller assembly, cassette pickup rollers, and paper feed rollers.

   E. entire printer.

6. The I/O controller

   A. controls the laser/optic process.

   B. provides AC power to the fan.

   C. is the interface between the printer and external devices.

   D. controls the stages of the print cycle.

   E. provides DC power to the DC controller.

Module Test

7. The laser/optic assembly

   A. generates the laser beam.

   B. focuses the laser beam.

   C. scans the laser beam onto the photosensitive drum.

   D. alerts the DC controller when the next scan line can be generated.

   E. perfroms all the functions listed above.

8. The power supply provides

   A. AC power to the primary and transfer rollers.

   B. DC power to the DC controller and AC power to the fuser assembly.

   C. DC power to the fan and transfer roller.

   D. AC power to the DC controller and DC power to the transfer roller.

   E. DC power to the DC controller and toner cartridge.

9. The pickup roller assembly picks up paper from the

   A. manual feed tray.

   B. paper delivery guide.

   C. cassette tray.

   D. cassette feed rollers.

   E. paper feed rollers.

Module Test

10. The transfer roller

    A. transfers the page from the manual feed tray to the toner cartridge.

    B. transfers the page from the pickup roller assembly to the toner cartridge.

    C. applies toner to the photosensitive drum.

    D. transfers the laser beam to the photosensitive drum.

    E. applies a charge to the page.

11. The fuser assembly

    A. transfers the developed image from the toner cartridge to the page.

    B. fuses the toner on to the photosensitive drum.

    C. applies heat and pressure to the printed page after it passes the toner cartridge.

    D. applies a positive charge to the photosensitive drum.

    E. fuses the laser beam on to the photosensitive drum.

12. The cassette feed rollers

    A. pick up paper from the cassette tray.

    B. move paper from the cassette tray and manual feed tray toward the toner cartridge.

    C. move paper from the manual feed tray toward the cassette tray.

    D. pick up paper from the manual feed tray.

    E. move paper from the cassette pickup rollers toward the paper feed rollers.

Module Test

13. The paper-out sensor PS601 and sensing arm detect whether

    A. there is paper in the manual feed tray.

    B. there is paper in the cassette tray.

    C. the printed page has exited the printer.

    D. there is paper in both the manual feed tray and the cassette tray.

    E. the page has passed the toner cartridge and transfer roller.

14. When activated, the manual feed sensor (PS701) assembly

    A. aligns paper picked up from the manual feed tray with the photosensitive drum.

    B. detects that the manual feed tray is in the open position.

    C. detects whether there is paper in the manual feed tray.

    D. ensures that paper picked up from the manual feed tray is fed into the printer evenly.

    E. cuts power to the fuser assembly if both the front access cover and manual feed tray are open.

15. The paper delivery guide (transfer guide) guides paper from the

    A. cassette tray to the toner cartridge.

    B. pickup roller assembly to the transfer roller.

    C. transfer roller and toner cartridge to the fuser assembly.

    D. manual feed tray to the toner cartridge.

    E. optional sheet feeder to the toner cartridge.

Module Test

16. The paper delivery guide

    A. removes any charge left on the printed page after it passes the transfer roller and toner cartridge.

    B. puts a negative charge on the printed page as it exits the printer.

    C. removes any charge already on the page before it reaches the transfer roller and toner cartridge.

    D. puts a positive charge on the page as it moves toward the toner cartridge and the transfer roller.

    E. removes any charge remaining on the photosensitive drum after the image is transferred to the page.

17. The toner cartridge sensor assembly (S101 and S100), when activated, signals the DC controller that the

    A. toner cartridge toner level is low.

    B. toner cartridge is removed.

    C. image on the photosensitive drum is aligned with the paper.

    D. page has received sufficient pressure from the transfer roller to transfer the image.

    E. page reached the toner cartridge within a preset amount of time.

18. Which component detects the alignment of the page with the image on the photosensitive drum?

    A. toner cartridge sensor assembly (S101 and S100)

    B. manual feed sensor (PS701) assembly

    C. paper registration sensor PS602 and sensor arm

    D. pPaper delivery sensor PS201 and sensor arm

    E. cassette sizing switches SW1, SW2, SW3, and SW4

Module Test

19. The paper registration sensor PS602 and sensor arm are located on the

    A. cassette feeder PCB.

    B. manual feed sensor assembly.

    C. paper charge deflector.

    D. DC controller board.

    E. toner cartridge sensor assembly.

20. The cassette feeder PCB contains the

    A. paper delivery sensor PS201 and sensor arm.

    B. manual feed sensor (PS701) assembly and cassette size sensing switches SW1, SW2, SW3, and SW4.

    C. cassette pickup and cassette feed solenoids.

    D. paper-out sensor PS601 and cassette size sensing switches SW1, SW2, SW3, and SW4.

    E. cassette pickup solenoid and cassette size sensing switches SW1, SW2, SW3, and SW4.

This concludes the module test. When you have finished, compare your answers with those on the next page.

Module Test

Compare your answers to the Module Test with those provided below.

1. A
2. B
3. A
4. D
5. E
6. C
7. E
8. B
9. A
10. E
11. C
12. E
13. B
14. C
15. C
16. A
17. B
18. C
19. C
20. D

Overview

Servicing the LaserWriter Select depends on your ability to remove and replace components correctly and safely. You will use the information you learned about printer components in the previous module to take apart the LaserWriter Select printer. The *LaserWriter Select Service Training* videotape demonstrates how to remove and replace the parts that you will service most often.

Objectives

When you finish this module, you should be able to take apart and reassemble the LaserWriter Select printer safely and correctly, without damaging the printer, by following the procedures on the *LaserWriter Select Service Training* videotape and *Apple Service Source*.

Required Materials

This module requires the following materials and equipment:

- LaserWriter Select printer
- Three Phillips #2 screwdrivers—small, medium, and long (magnetized)
- #2 flat-blade screwdriver
- Small flat-blade screwdriver
- Needlenose pliers
- Small wire cutters
- Grounded ESD workstation
- *LaserWriter Select Service Training* videotape
- *Apple Service Source* CD, version 2.0 (February 1996 or later)

Module Organization

This module has two sections—"Overview" and "Take-Apart Instructions." This "Overview" provides basic information about the module. The latter section lists the components you will take apart and reassemble according to the procedures in the *LaserWriter Select Service Traning* videotape and *Apple Service Source*.

Module Test

This module does not have a separate module test. However, you must meet the module objective by safely reassembling the LaserWriter Select without damaging any parts and printing a user test page.

Take-Apart Instructions

The following list contains the components you will most frequently remove and replace:

- Cassette tray and toner cartridge
- Cover set
- Fuser assembly
- I/O shield
- I/O controller and mount plate
- DC controller and mount plate
- High-voltage power supply
- Power switch lever
- High-voltage contact assembly
- Power supply
- Drive assembly
- Transfer roller
- Paper charge deflector
- Pickup roller assembly

Make sure the LaserWriter Select you take apart is operating properly before you begin. Follow these guidelines to complete this module:

1. Begin viewing "Part 3, Take-Apart and Reassembly" of the *LaserWriter Select Service Training* videotape. Part 3 demonstrates how to take apart and reassemble the above components. The tape goes to black briefly between each take-apart and reassembly demonstration.

   Watch the procedures for one or two parts. You are not expected to take apart and reassemble the printer without stopping or pausing the tape.

2. ***Important:*** Carefully read and follow all procedures and cautions presented on *Apple Service Source* as you remove/replace each component. If you fail to use this resource, you will be unaware of special procedures needed to take apart and reassemble the printer properly, and you will be unaware of changes to procedures demonstrated on the videotape, such as the number and location of screws.

3. As you remove and replace each component, check it off on the Take-Apart / Reassembly Checklist at the end of this section. Be sure to show a colleague the disassembled printer before beginning reassembly.

Caution: Be sure to replace each screw exactly in the location from which it was removed, or you may reduce grounding and cause premature component failure.

Take-Apart Instructions

Take-Apart / Reassembly Checklist

(Note: Check off your progress on a separate sheet of paper if this manual will be used later by other technicians.)

Remove	Replace	
____	____	Cassette tray and toner cartridge
____	____	Cover set
____	____	Fuser assembly
____	____	I/O shield
____	____	I/O controller and mount plate
____	____	DC controller and mount plate
____	____	High-voltage power supply
____	____	Power switch lever
____	____	High-voltage contact assembly
____	____	Power supply
____	____	Drive assembly
____	____	Transfer roller
____	____	Paper charge deflector
____	____	Pickup roller assembly
____	____	Verify disassembled printer with colleague
	____	Generate User Test Page
	____	Verify reassembled printer and operation with colleague

After you successfully perform the tasks on the Take-Apart / Reassembly Checklist, you have completed this module.

When you are ready, begin the next module, "LaserWriter Select Troubleshooting."

Overview

In the *Introduction to Laser Printer Service* course, you learned general troubleshooting procedures for all Apple laser printers. This module builds on that information and presents troubleshooting information and procedures unique to the LaserWriter Select family of printers.

Objectives

When you finish this module, you should be able to

- indicate troubleshooting steps when given Apple service reference materials and a description of a LaserWriter Select failure.
- return a printer to functional condition when given Apple service reference materials and a faulty LaserWriter Select printer.

Required Materials

This module requires the use of *Apple Service Source* CD, version 2.0 (February 1996 or later).

Module Organization

This module has five sections:

- Overview
- Hands-On Troubleshooting
- Practice Exercise 1
- Module Test — Part 1
- Practice Exercise 2
- Module Test — Part 2

This "Overview" section provides basic information about this module. "Hands-On Troubleshooting" reviews the hands-on troubleshooting process from the *Introduction to Laser Printer Service* course and discusses how and when to use service resources to troubleshoot the LaserWriter Select.

"Practice Exercise 1" contains questions about how to use your troubleshooting resources and what to do about specific printer problems. "Practice Exercise 2" gives you the opportunity to troubleshoot and repair a faulty printer.

The module test has two parts. Part 1 consists of multiple-choice questions about logical troubleshooting; you should be able to answer with at least 80 percent accuracy. Part 2 directs you to troubleshoot and repair two faulty LaserWriter Select printers.

Hands-On Troubleshooting

This section reviews the general hands-on troubleshooting process presented in the *Introduction to Laser Printer Service* course. We will emphasize the service resources for hands-on troubleshooting of the LaserWriter Select family of printers.

Troubleshooting Process

Perform hands-on troubleshooting in the following circumstances:

- You cannot resolve the customer's laser printer problem over the telephone (that is, you must replace a module or part).
- You rule out software, setup, user, and network problems as the cause of the printer malfunction.

Hands-on troubleshooting consists of three major steps:

1. Verify deviation from normal operation.
2. Take troubleshooting/resolution actions.
3. Verify problem resolution.

Step 1: Verify Deviation From Normal Operation

Begin hands-on troubleshooting by verifying the deviation from normal operation. You cannot be sure that the information given by the customer or written on the work order is correct. If this is the first time you have seen the laser printer, you must verify that the assumed deviation from normal operation is accurate.

The best way to verify the deviation from normal operation is to set up the laser printer and try to recreate the problem. Make sure that you have all the customer's equipment. A problem may be caused by a bad cable, but if you don't have the customer's cable, you won't be able to recreate the problem. If you can't recreate the problem, contact the customer and repeat the customer's actions until you see the symptom.

Step 2: Take Troubleshooting/ Resolution Actions

When you have an accurate problem description, you are ready to isolate and resolve the problem. Continue troubleshooting and then repair the laser printer by carefully following the step-by-step procedures in the various laser printer service resources that are covered in the "Service Resources" section of this module. Use the service resources to guide you through the most effective and efficient sequence of hands-on troubleshooting actions.

Important: Apple strongly encourages you to use these service resources whenever you service laser printers. If you telephone Apple for information or support, the representative will assume you have already exhausted the service resources.

Step 3: Verify Problem Resolution

After you identify and replace a faulty part, you must thoroughly test the laser printer to verify the repair. Testing is essential for several reasons. First, you may have identified the faulty component, but you may not have identified all the faulty parts. Second, the problem may reappear when you repeat the actions that originally caused the problem.

Hands-On Troubleshooting

Third, some problems are intermittent and may not immediately reappear. Test the laser printer by following these steps before you return it to the customer:

1. Set up the laser printer.
2. Run the diagnostics (if available for the printer).
3. Recreate the original problem (if possible).
4. Perform basic functions.
5. Leave the printer on for 24 hours and periodically repeat steps 2 through 4.

Testing the laser printer helps verify that the problem is completely resolved and ensures that the customer will not have to place another service call for the same problem. The extra effort you make in testing the repair will pay off in customer satisfaction and increased confidence in your service organization.

Troubleshooting Printer Setup

Check printer software when troubleshooting LaserWriter Select printer setup. The LaserWriter Select printer can be used as a personal printer, or shared with other users on an AppleTalk network when connected to the modem port with AppleTalk turned on. Network users can see the printer's name and select it in the Macintosh Chooser like any other network printer. The documents they send to the printer are stored on the host computer's disk and printed in the order received. Printer sharing can be turned on or off at any time. When troubleshooting printer setup, begin by isolating the problem either to the host computer, the network, or to the printer.

Service Resources

Three service resources are available to help you perform LaserWriter Select hands-on troubleshooting:

- Printer diagnostics
- *Apple Service Source* CD and *Service Source Companion* CD
- *Apple Service Guides for LaserWriter Printers* (information on the LaserWriter Select family of printers is in *Volume III*)

Printer Diagnostics

Diagnostic error messages are displayed by the LaserWriter Select 300 printer driver when the printer is connected to a Macintosh. For example, if there is a problem with the fuser assembly, the user may receive a fuser assembly malfunction error message. To verify deviation from normal operation of the LaserWriter Select 300, always attempt to print from a Macintosh computer to activate any error messages. Potential LaserWriter Select 300 error messages and their likely resolution are presented in Table 3-1. The LaserWriter Selects 310 and 360 go through a self-diagnostic (the Power-On Self Test—POST) each time you switch the printer on, and you may be able to isolate certain failures by observing how and when the LEDs extinguish during the POST. The LaserWriter Select 360 (only) also offers diagnostic LEDs that provide a test of the engine (for instructions on how to activate the diagnostic LEDs, see the "Troubleshooting" chapter of the LaserWriter Select service manual on *Apple Service Source* CD).

Hands-On Troubleshooting

Error Message	Likely Resolution of Error (If the following resolutions do not fix the problem, go to "Troubleshooting: Flowcharts and Tables" in Service Source)
Printer is not connected	Check that the printer is properly connected.
Communication error	Check the serial port connection.
Paper out	Add paper.
Printer cover is opened	Check that the toner cartridge is properly installed and that the front access door is closed.
Paper jam	Remove jammed paper from inside the printer, multipurpose tray, or the cassette tray.
Wrong paper size	Reset the paper size in the Page setup dialog box.
Printer out of memory	Reduce the complexity of the file to be printed, or add more printer memory.
Fuser assembly malfunction	Replace the fuser assembly.
Time-out error	Check the peripheral-8 cable connections.
Engine error	Refer to "Flowcharts," "Print Engine Check."
Macintosh out of memory	Close other applications or add RAM.
Laser assembly malfunction	Replace the laser/optic assembly.
Scanner motor malfunction	Replace the scanner motor.

Table 3-1
LaserWriter Select 300 Printer Driver Error Messages

Hands-On Troubleshooting

Apple Service Source

Apple Service Source will be your primary reference for hands-on troubleshooting and is the most comprehensive service reference for Apple products. The step-by-step technical procedures help you isolate and resolve all laser printer problems in the most effective and efficient manner. In addition, many other useful references are included with the *Apple Service Source* CD.

To use *Apple Service Source,* click on both the "Hardware" and "Service Manuals" tabs in the Service Source Startup 2.0 window. Then click on "Printers" and choose **LaserWriter Select** from the printer product list that appears. You are now in the LaserWriter Select manual of *Apple Service Source.* (To select a different laser printer or other Apple product, return to the Service Source Startup 2.0 window.) Next, use the bookmarks to the left of the LaserWriter Select manual window to go to the **Flowcharts and Tables** section in the "Troubleshooting" chapter. **Flowcharts and Tables** will usually be the most useful section to you when troubleshooting.

The Flowcharts guide you through a comprehensive check of the LaserWriter Select, directing you when to use a particular Table for troubleshooting a specific problem. Use the Flowcharts when you have verified a deviation from normal operation, but have *not* yet isolated the problem. Use the appropriate Table when you have isolated the problem to a specific subsystem or component, or to a print quality issue. Choose the Table which most closely describes the problem you are troubleshooting, and follow the step-by-step procedures.

After resolving the problem, use the Flowcharts again as a first step in verifying problem resolution. Apple recommends that you also thoroughly test the printer over a period of several hours.

Apple Service Guides

If you have not carefully reviewed the LaserWriter Select manual on *Apple Service Source*, stop and do so now. You will use *Apple Service Source* to complete the practice exercises and test later in this module. To successfully complete the module test, you must accurately follow the troubleshooting procedures on *Apple Service Source.*

Technical Info Library

The *Apple Service Guides for LaserWriter Printers* provide a subset of the most frequently used procedures and information on *Apple Service Source* and other laser printer service references. This portable guide is especially helpful for on-site service calls when *Apple Service Source* is not readily available.

The Technical Info Library (TIL), included with *Apple Service Source* CD, is an excellent source of product troubleshooting information and may contain helpful tips that have not been added to either *Apple Service Source* or the *Apple Service Guide for LaserWriter Printers.* Look first on *Apple Service Source* or in the service guide. If you don't find the answer you need, check the TIL.

These service resources are an essential part of your troubleshooting and repair tools. The more you use them, the more effectively and efficiently you will be able to troubleshoot and repair the LaserWriter Select family of printers.

Continue with "Practice Exercise 1."

Practice Exercise 1

Answer the following questions using your course materials and *Apple Service Source*. (Note: Write your answers on a separate sheet of paper if this manual will be used later by other technicians.)

1. A customer has delivered a faulty laser printer to your service center for repair. After discussing the problem with the customer, what general troubleshooting action should you take first?

2. A customer has delivered a LaserWriter Select to your service center for repair. What can you do to generate printer diagnostic information?

3. According to this course module, which chapter and section in the LaserWriter Select manual on *Apple Service Source* should you use to begin testing the printer after replacing the faulty component?

4. When troubleshooting printer setup, which three potential sources, according to this module, can the problem be isolated to?

5. The printer generates a service test print, but the print quality is poor. Which chapter and section in the LaserWriter Select manual on *Apple Service Source* should you use?

Practice Exercise 1

6. While trying to print a service test page, you find that the fuser bulb does not illuminate, causing you to suspect a faulty fuser assembly. Following the Fuser Assembly Failure Table of the **Flowcharts and Tables** section of the Troubleshooting chapter in the LaserWriter Select manual on *Apple Service Source*, you find that the voltage does measure between +90 and +132 VAC when the printer is switched on. What should you do next?

7. While trying to print to a LaserWriter Select 300, the "Time-out error" message is displayed. What should you do?

8. What are the three stages of hands-on troubleshooting, according to this module?

9. According to the Specifications chapter on *Apple Service Source*, what are the life expectancies of the various models of the LaserWriter Select printer?

10. Which chapter and section in the LaserWriter Select manual on *Apple Service Source* will usually be the most useful to you when troubleshooting?

When you finish, compare your answers to those on the next page.

Practice Exercise 1

Compare your answers to Practice Exercise 1 with those provided below.

1. Verify the deviation from normal operation.

2. If the printer is a LaserWriter Select 300, display any diagnostic error messages on the computer screen by printing from a Macintosh to the LaserWriter Select. If the printer is a LaserWriter Select 310 or 360, switch on the printer and observe how and when the LEDs may extinguish during the Power-On Self-Test (POST). If the printer is a LaserWriter Select 360, you can also trigger the diagnostic LEDs for an engine check.

3. In the **Flowcharts and Tables** section in the Troubleshooting chapter, follow the model-appropriate Flowchart to confirm the repair.

4. The problem can be isolated to either the user's computer, the network, or to the printer.

5. In the **Flowcharts and Tables** section in the Troubleshooting chapter, refer to the Table which best describes the print quality problem.

6. Switch off the printer and disconnect P11 from the DC controller board. Measure resistance between pins P11-13 (STS) and P11-14 (GND).

7. Check the peripheral-8 cable connections.

8. The stages of hands-on troubleshooting are: 1) verify deviation from normal operation, 2) take troubleshooting/resolution action, 3) verify problem resolution.

9. The life expectancy of the LaserWriter Select 300 and the LaserWriter Select 310 is 150,000 pages. The life expectancy of the LaserWriter Select 360 is 300,000 pages.

10. The **Flowcharts and Tables** section in the Troubleshooting chapter will usually be the most useful to you when troubleshooting the LaserWriter Select.

If you missed any of the practice items, review this module before continuing.

After reviewing your answers, continue with "Module Test" on the next page. You may want to review the module and the practice exercise before starting the test.

Module Test–Part 1

Circle the correct answer to the following questions using your course materials and *Apple Service Source*. Assume you are repairing a LaserWriter Select at your service center. (Note: Write your answers on a separate peice of paper if this manual will be used later by other technicians.)

1. Printed pages have ghosting. Following the instructions in the **Flowcharts and Tables** section you replace the toner cartridge, but the problem still exists. What should you do next?

   A. Install a second cartridge.
   B. Replace the paper in the cassette tray.
   C. Check the voltage to the laser diode at J202-4.
   D. Visually inspect the transfer roller.
   E. Replace the high-voltage power supply.

2. Which manual, chapter, and section on *Apple Service Source* should you primarily use when troubleshooting?

   A. LaserWriter Select: Basics: Sensing System
   B. LaserWriter Select: Specifications: Performance
   C. LaserWriters: Troubleshooting: Flowcharts and Tables
   D. LaserWriters: Flowcharts: Print Engine Check
   E. LaserWriter Select: Troubleshooting: Flowcharts and Tables

3. The "Wrong paper size" message is displayed when you try to print. What should you do?

   A. Add legal-size paper.
   B. Adjust the manual feed tray paper guide.
   C. Open the Chooser and select the LaserWriter Select printer icon.
   D. Reset the paper size in the Page setup dialog box.
   E. Try printing several times before taking action.

4. The "Communication error" message is displayed when you try to print from a LaserWriter Select 300. What should you do?

   A. Replace the laser/optic assembly.
   B. Close applications or add RAM to the host computer.
   C. Check the serial port connection.
   D. Reset the target printer resolution in the page setup dialog box.
   E. Reduce the copmplexity of the file to be printed, or add more printer memory.

Module Test–Part 1

5. When trying to print a service test page, you find that paper is not picked up from the paper cassette. According to the **Flowcharts and Tables** section in the "Troubleshooting" chapter on *Apple Service Source*, what should you do first?

   A. Replace the paper in the cassette tray.
   B. Inspect connector P13 on the DC controller board.
   C. Try printing from the manual feed tray.
   D. Inspect connectors P50 and P51 on the I/O controller board.
   E. Switch the printer off, then on, to print a user test page.

6. While printing you notice that the paper-out LED illuminates, even though pages are being printed. The paper cassette tray is installed correctly and has paper. According to the **Flowcharts and Tables** section in the Troubleshooting chapter on *Apple Service Source*, what should you do next?

   A. See if the paper-out LED goes out when printing from the manual feed tray.
   B. Fill the paper cassette tray completely and try printing again.
   C. Print a service test print.
   D. Switch the printer off, then on and see if the paper-out LED illuminates.
   E. Inspect the paper-sensing arm.

7. According to this course module, which chapter and section on *Apple Service Source* should you use to begin testing the printer after it is fixed?

   A. Basics: Troubleshooting Tips
   B. Troubleshooting: Flowcharts and Tables
   C. Basics: Wiring Diagram
   D. Specifications: Performance
   E. Basics: Service Test Page

8. While trying to print to a LaserWriter Select 300, you receive the "Printer out of memory" error message. You are unable to add more printer memory. What should you do?

   A. Immediately quit printing.
   B. Add more memory to your computer.
   C. Reduce the complexity of the file to be printed.
   D. Reduce the size of font used in the file to be printed.
   E. Close unused applications on your computer.

Module Test–Part 1

9. The "Time-out error" message is displayed when you try to print. What should you do?

   A. Check the peripheral-8 cable connections.
   B. Switch printer off, then on.
   C. Check the AppleTalk cables and connectors.
   D. Turn the printer off and wait 5 minutes before printing.
   E. Check the version of printer software used.

When you finish, compare your answers with those on the next page.

Module Test–Part 1

Compare your answers to Module Test—Part 1 with those provided below.

1. D
2. E
3. C
4. D
5. B
6. E
7. B
8. C
9. A

If you answered fewer than 8 items correctly, go back and review the material in this Hands-On Troubleshooting module before you continue.

When you have successfully passed this part of the Module Test, begin the final practice exercise on the next page.

Practice Exercise 2

This final practice exercise gives you an opportunity to troubleshoot and repair a faulty LaserWriter Select printer. After you complete this exercise, you will begin Part 2 of the module test, which directs you to troubleshoot and repair two LaserWriter Select printers.

Follow these directions to complete the practice exercise:

1. Ask your service manager or a colleague to assign you a faulty LaserWriter Select to troubleshoot and repair.

2. Complete the three stages of hands-on troubleshooting : 1) verify deviation from normal operation, 2) take troubleshooting/resolution actions, and 3) verify problem resolution.

3. Make a copy of the "Troubleshooting and Repair Record" form on the next page (Figure 3-1). As you complete each troubleshooting stage, fill in your copy of the form.

   Use the form to create a detailed listing of the actions you perform to troubleshoot and repair the printer. When you check or replace components, print a service test page, or refer to *Apple Service Source*, list your actions in the order you perform them. Write the name of the parts you check or replace and the names of the sections you refer to on *Apple Service Source*. Be sure to follow closely the procedures as presented on *Apple Service Source*.

   In the second column of the form, state the reason you performed each action. For example, if you check whether a toner cartridge is installed, you might write "The motor was not operational. The Flowchart directed me to...".

   The purpose of the "Troubleshooting and Repair Record" is to allow your service manager or colleague to review the actions you performed to troubleshoot and repair the printer. Based on this information, the your manager or colleague can give you feedback on the appropriateness and effectiveness of the actions you took. The more detailed your record, the more specific and helpful the feedback can be.

4. When you have finished repairing the printer, ask your manager or colleague to review your "Troubleshooting and Repair Record." You are now ready to begin the Module Test—Part 2.

Practice Exercise 2

Troubleshooting and Repair Record

Your name _____

Laser printer to be repaired _____

Deviation from normal operation _____

Repair solution _____

Directions:
Provide the information requested above and complete the "Action Taken" and "Reason for Taking the Action" sections for each action you take. Be very specific.

	Action Taken	Reason for Taking the Action
1		
2		
3		
4		
5		
6		

Continue on the reverse side of this form for more space.

Figure 3-1
Troubleshooting and Repair Record Form

Module Test–Part 2

This second and final part of the module test directs you to troubleshoot and repair two faulty LaserWriter Select printers correctly and efficiently.

Follow these directions to complete Part 2 of the module test:

1. Ask your service manager or a collegue to assign you a faulty LaserWriter Select printer to troubleshoot and repair.

2. Troubleshoot and repair the printer following the procedures in this module and on *Apple Service Source.*

3. Record and explain the reasons for each of your actions on a "Troubleshooting and Repair Record" form, as you did in the practice exercise.

4. After you have repaired the first printer, ask your manager or collegue to review your "Troubleshooting and Repair Record" form.

5. Complete steps 2–4 for a second faulty LaserWriter Select printer assigned to you.

6. Consult with your manager or colleague to see if you need to complete any additional activities.

When you have correctly and efficiently repaired two LaserWriter Select printers, you have completed the LaserWriter Select Service Course. Congratulations!

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