❤ Apple Technical Procedures

LaserWriter Plus

Section 1 – LaserWriter Plus Kit

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Note: If a step is underlined, detailed instructions for that step can be found in *LaserWriter Technical Procedures*, Section 2, Take-Apart.

WARNING: This installation may involve soldering a socket onto a four-layer board. If soldering is necessary and you are not experienced at soldering, do not attempt this procedure. Call your regional Apple Support Center for an Advance Exchange Module.

❏ INTRODUCTION

Product Description

The LaserWriter Plus Kit adds 35 typeset-quality, built-in fonts to the LaserWriter printer.

Things to Remember

1. The LaserWriter I/O board can have four, eight, or sixteen ROMs. Regardless of how many ROMs are on the original board, you will be removing **all** the original ROMs and installing sixteen 512K Rev. 47 ROMs to make a LaserWriter Plus configuration.

2. LaserWriter and LaserWriter Plus printers can coexist on the same AppleTalk network; **however, all users on the network should upgrade at the same time to the current system software, in particular to the current LaserWriter Driver and Laser Prep file.**

❏ ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

The LaserWriter I/O board is the most expensive single module in the printer, and its components are soldered into place. It is therefore very important to protect the chips on the board from damage.

Electrostatic discharge can be an important factor in causing board failures. Just touching a chip or brushing it with a nylon sleeve can degrade a circuit so that it never again performs to specification. Some microcircuits are sensitive to as little as 500 volts, or about one-sixth as much static electricity as you can feel.

Certain preventive measures must be taken to avoid ESD damage. When you are unwrapping, installing, or replacing any microcircuits, observe the following precautions:

Grounds

Before working on any device containing a printed circuit, ground yourself and your equipment to an earth or building ground.

Use a grounded conductive workbench mat and a grounding wriststrap, and ground your equipment to the mat.

Bodies

Don't touch anybody who is working on integrated circuits.

If that person is properly grounded, your "zap" may not cause any damage, but just to be on the safe side, keep your own body charge away from other technicians.

Bags

Use antistatic bags for boards and chips during handling.

Whenever you are about to leave your bench and take a board to a storage place, first put the board in an antistatic bag. Leave all Apple service exchange components in their ESD-safe packaging until needed for use.

Leads

Handle all ICs by the body, not the leads.

Also, do not touch PCB edge connectors, exposed circuitry, or printed circuits. Handle ICs and PCBs by the edges, or use extractors.

Synthetics

Do not wear polyester clothing or bring plastic, vinyl, or styrofoam into the work environment.

The electrostatic field around these nonconductors cannot be removed.

Metals

Never place components on any metal surface.

Use antistatic or conductive mats or foam.

Atmosphere

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 where an ion generator is used routinely.

❏ INSTALLATION PROCEDURES

The LaserWriter board has either four, eight, or sixteen ROMs. Regardless of how many ROMs are on the original board, remove **all** of them. You may need to install a configuration block on some older versions of the I/O board.

Before you begin the installation, plug in the LaserWriter to make sure it produces the user test print.

1. **Read the ESD precautions before you begin.**

2. Turn off and unplug the LaserWriter. Then, to be sure you and the LaserWriter are grounded to the same potential, set up your grounded workstation and attach yourself (with a wriststrap) and the LaserWriter (with an alligator clip) to the grounded workbench pad.

3. <u>Remove the top cover of the LaserWriter and the card cage cover.</u> Disconnect the cables attached to the I/O board, and remove the board from the card cage. Place the I/O board on the grounded workbench pad. Orient the board so that the three rows of RAM chips are on your left.

4. Using an IC extractor, **carefully** remove the original ROMs from rows E and F on the I/O board, and place them on the grounded workbench pad. (There may be four, eight, or sixteen original ROMs. Remove them all.)

5. The upgrade kit includes a 16-pin socket. Newer LaserWriter I/O boards with 512K or 1M ROMs already have the socket and configuration block installed. If you have an older board without the socket, you must solder it on the I/O board at position E-20 (see Figure 1, #1). To install the socket, follow the directions below:

a) Desolder and discard the four jumper wires at the socket location.

b) Desolder (clear) 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.
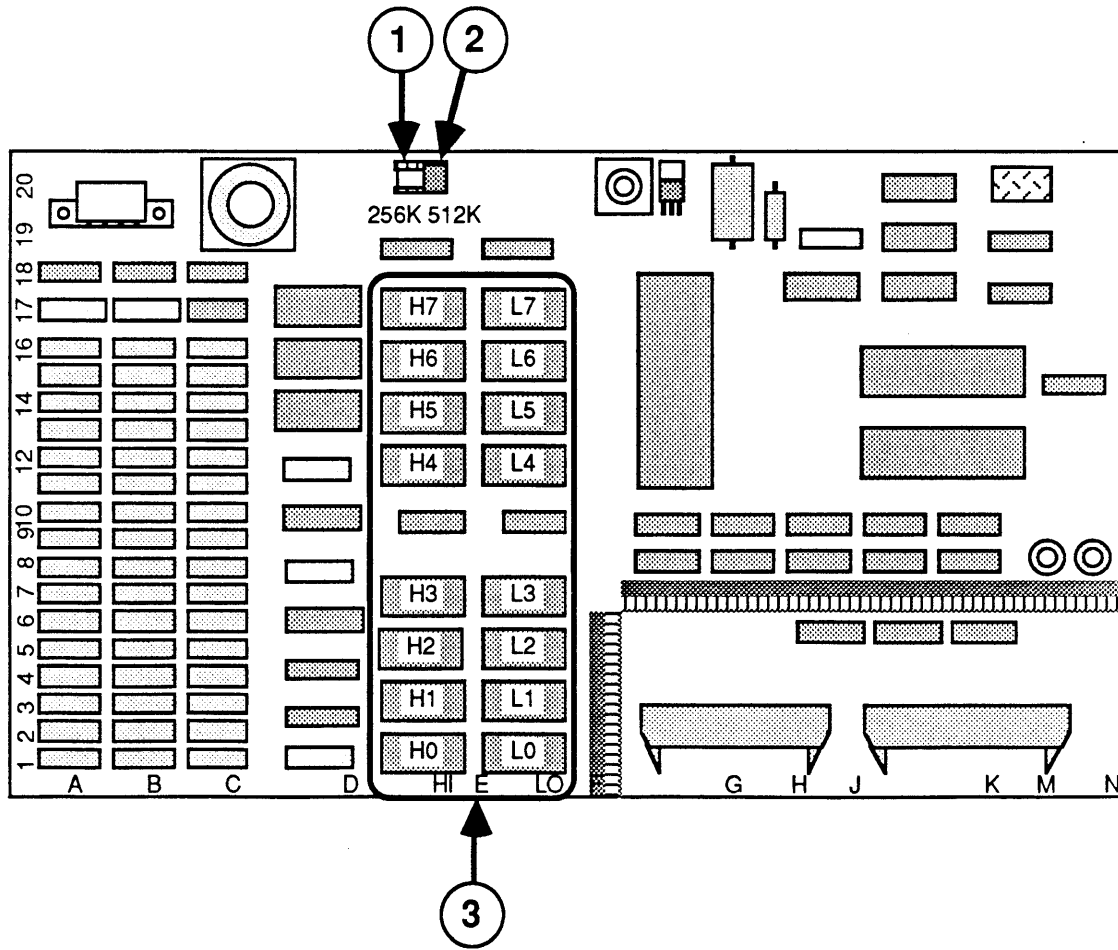

FIGURE 1

6. Install the configuration block:

If you have the 256K/512K I/O board (Figure 1), install the configuration block into the eight holes of the socket labeled "512K" (Figure 1, #2).

If you have the 1M I/O board (Figure 2), install the configuration block into the eight holes of the socket labeled "512K" (Figure 2, #2).
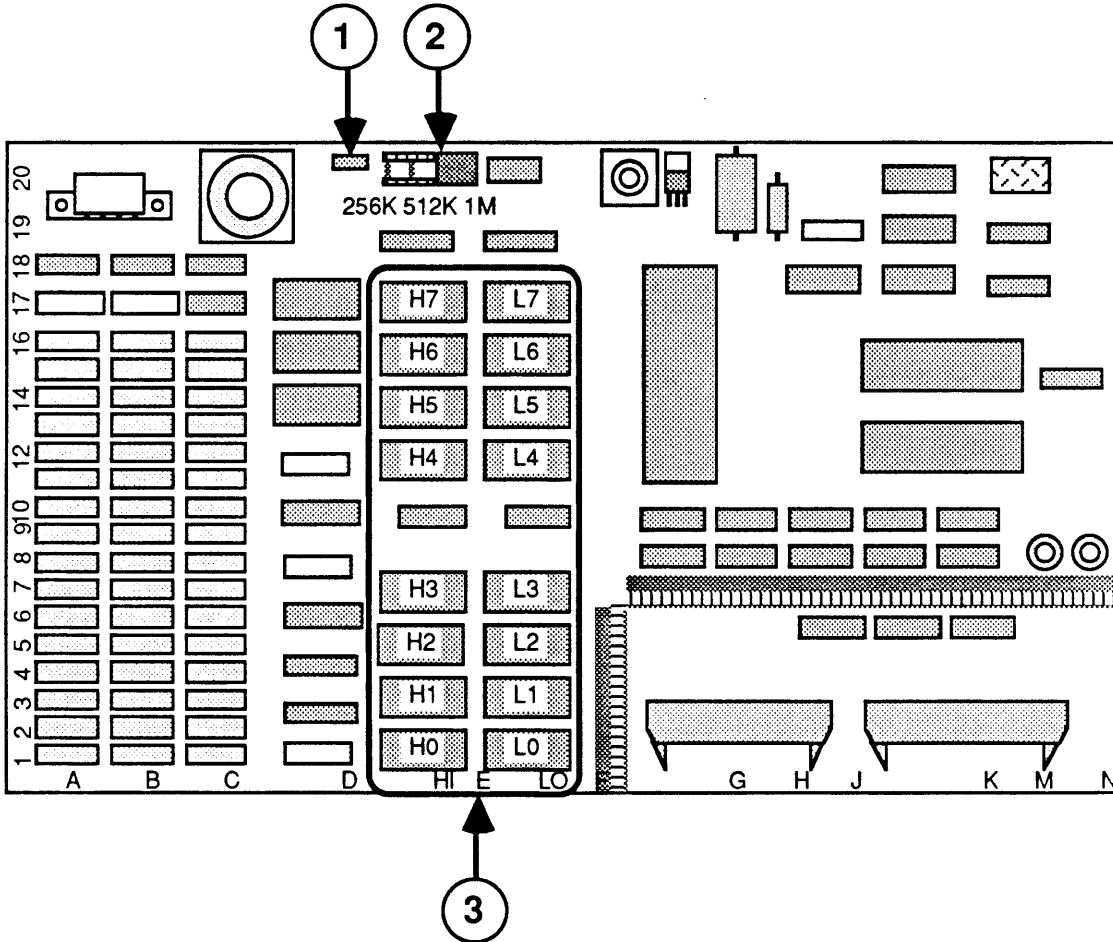
FIGURE 2

7. If you are installing the upgrade kit on an I/O board with the 512K/1M jumper--as shown in Figure 2, #1--place the jumper plug on the set of pins marked "512K."

8. Look at the markings on each new ROM. At the end of the third line of print, you will see one of the following markings:

H0, H1, H2, H3, H4, H5, H6, or H7 (H = High side)

OR

L0, L1, L2, L3, L4, L5, L6, or L7 (L = Low side)

The corresponding locations are marked on the board.

9. One at a time, carefully remove the new ROMs from their antistatic pad, **handling them by the body, not the leads**. Match the markings on the ROMs with the appropriate socket (see Figure 3, #3). Install the ROMs, making sure that the notch along the edge is on the left.

Make sure the ROM pins are placed correctly in the socket. If a ROM is installed with one pin out of its socket, or with a pin bent, the LaserWriter will not work.
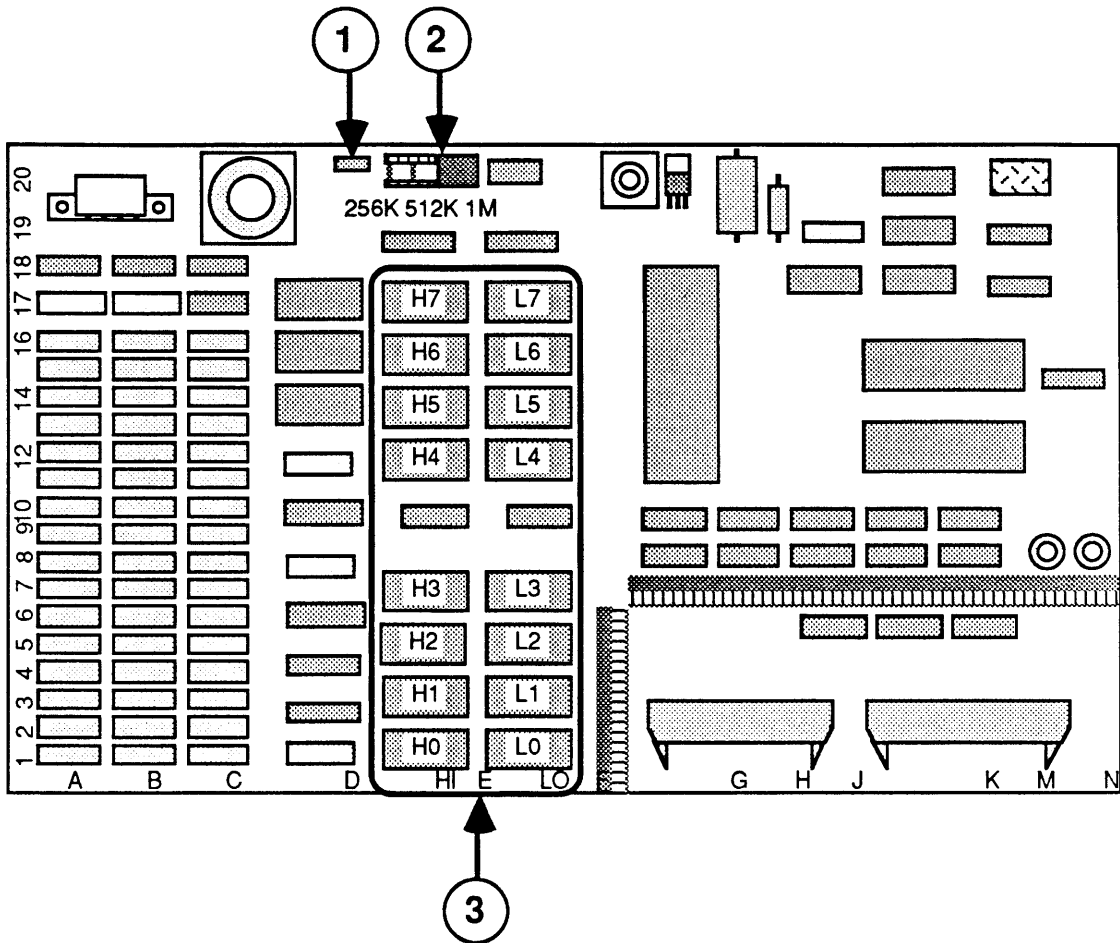
FIGURE 3

10. Place the old ROMs in the kit packaging to return to Apple for credit. You must use the LaserWriter Plus Return Form, included in the kit, to receive credit when you return the old LaserWriter ROMs.

11. Replace the I/O board, the card cage cover, and the top cover of the printer. Attach the LaserWriter Plus label just below the serial number plate on the back of the printer.

12. Power on the LaserWriter Plus. It should produce a test print within two minutes.

   If the printer does not produce a test print, check to see that the ROMs are properly installed.

If it still doesn't produce the test print, run the built-in diagnostics described in Section 2, LaserWriter Plus Diagnostics. These procedures will identify specific faulty ROMs. Exchange any ROMs specified by the built-in diagnostics.

If the printer still doesn't produce the test print, replace all the old ROMs with ROMs from a new LaserWriter Plus Kit.

When a good test print is produced, leave the printer on overnight.

13. The next day, test the LaserWriter Plus with a Macintosh using the following steps:

   a) Connect the LaserWriter Plus to the Macintosh using AppleTalk cables.

   b) Switch on the LaserWriter Plus and wait two minutes for a test print.

   c) Be sure the Macintosh is switched off. Then insert the *Printer Installation Diskette* in the disk drive and switch on the Macintosh.

   d) Open the disk icon if it is not already open.

   e) Choose **Control Panel** from the **Apple** menu and click the **AppleTalk Connected** button if it is not already selected.

   f) Close the **Control Panel**.

   g) Choose **Chooser** from the **Apple** menu. Click on the LaserWriter icon as the printer type.

   When the LaserWriter's name appears, select the name by clicking on it.

   h) Close the **Chooser**.

   i) Choose **Print Catalog** from the **File** menu

   j) Click **OK** or press <Return> in the print dialog box.

   k) When the document has been printed, eject the *Printer Installation Diskette*.

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LaserWriter Plus

Section 2 – Diagnostics

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❏ INTRODUCTION

AppleCAT™ LaserWriter is a diagnostic tool that uses a known-good Macintosh to diagnose failures in a defective LaserWriter or LaserWriter Plus. For instructions on the use of *AppleCAT LaserWriter*, see Section 7, Diagnostics, under the LaserWriter tab in this manual.

The LaserWriter Plus also has on-board diagnostics that verify that the ROMs on the board are good. This section will explain what materials are needed to access the built-in diagnostics and how to interpret the results you receive.

Materials Required

Macintosh 512K, 512K Enhanced, Plus, SE, or II
The correct ImageWriter cable for the computer being used (Refer to the *Apple Service Technical Procedures — Peripheral Interface Guide* if you need assistance.)
MacTerminal diskette
LaserWriter Plus

Things to Remember

1. Any setting of the mode selection switch on the rear of the LaserWriter Plus will work for the diagnostics.

2. Before attempting to use *MacTerminal* to display the results of the built-in diagnostics, be sure to use either the Control Panel or Chooser to disable AppleTalk, depending on which version of System you are using.

3. The built-in diagnostics check **only** the ROMs and work **only** on the LaserWriter Plus with sixteen 512K ROMs or eight 1M ROMS.

4. If a ROM is indicated as bad, exchange the ROM. Do not exchange the entire board.

5. If ROMs H0 and/or L0 are bad, you will have a solid failure (no test print and/or the internal diagnostics will not run).

6. If a completely dead ROM is on the I/O board, you will have a solid failure (no test print and/or the internal diagnostics will not run).

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❏ BUILT-IN DIAGNOSTICS
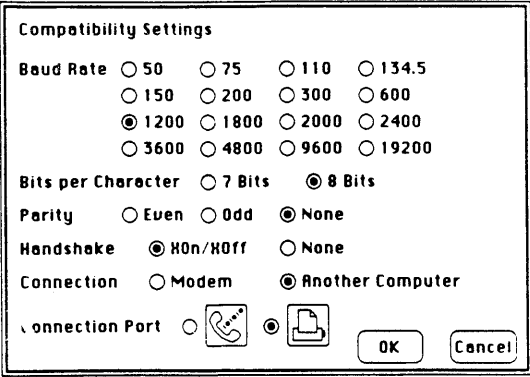
Running the
Diagnostic

1. Set up the Macintosh computer, keyboard, and mouse.

2. Connect the ImageWriter cable from the printer port on the rear of the Macintosh to the RS232 connector on the LaserWriter. The mode selection switch on the back of the LaserWriter Plus does not need to be changed.

    Note: Do not turn on the LaserWriter Plus until instructed to do so.

3. Insert the *MacTerminal* diskette into the internal drive on the Macintosh or Macintosh Plus.

4. Select **Chooser** from the **Apple** menu and click the **AppleTalk Inactive** button if it is not already selected.

    Note: If the version of Chooser is lower than 3.0, you will need to disable AppleTalk using the Control Panel.

5. Open the *MacTerminal* diskette icon. Double-click on the *MacTerminal* icon.

6. Pull down the **Settings** menu and select **Compatibility**.

7. Set the settings by clicking once in the appropriate circle. The settings that should be selected are shown below.

```
┌──────────────────────────────────────────────────┐
│ Compatibility Settings                           │
│                                                  │
│ Baud Rate  ○ 50    ○ 75    ○ 110   ○ 134.5       │
│            ○ 150   ○ 200   ○ 300   ○ 600         │
│            ◉ 1200  ○ 1800  ○ 2000  ○ 2400        │
│            ○ 3600  ○ 4800  ○ 9600  ○ 19200       │
│                                                  │
│ Bits per Character  ○ 7 Bits    ◉ 8 Bits         │
│                                                  │
│ Parity      ○ Even  ○ Odd  ◉ None                │
│                                                  │
│ Handshake   ◉ XOn/XOff   ○ None                  │
│                                                  │
│ Connection  ○ Modem      ◉ Another Computer      │
│                                                  │
│ Connection Port  ○ [☎]  ◉ [🖨]   [ OK ] [Cancel] │
└──────────────────────────────────────────────────┘
```

8. Turn on the LaserWriter Plus.

The *MacTerminal* screen will scroll and display a number. See the next page for interpretation.

Note: No information will be displayed if the ROMs test OK. An error code is displayed only if a defective ROM is found.

**Interpreting
the Results**

The *MacTerminal* screen will scroll and display the results.

*Version 2.0
ROMs*

If the LaserWriter Plus has version 2.0 ROMs installed, the results will be displayed in the format **XXXXXXTB.** T stands for "top" and B for "bottom." The **XXXXXX** can be ignored.

If the value of T is greater than 0, an error was encountered in the top or upper bank of ROMs (Figure 1, #1).

If the value of B is greater than 0, an error was encountered in the bottom or lower bank of ROMs (Figure 1, #2).

The value of **T** or **B** indicates which **pair** of ROMs may be bad. Figure 1 shows the values of the error codes next to the number of the ROMs.

For example, if you received the error **XXXXXX40**, the position of the "4" (corresponding to the **T**) in the error code indicates an error occurred in the top bank (Figure 1, #1). The value "4" indicates which ROMs in the top bank may be bad. In this example, the indicated ROMs are H6 or L6 (Figure 1, #3).

If you received the error **XXXXXX02**, the position of the "2" (corresponding to the **B**) in the error code indicates an error occurred in the bottom bank (Figure 1, #1). The value "2" indicates which ROMs in the bottom bank may be bad. In this example, the indicated ROMs are H1 or L1 (Figure 1, #4).

When you have determined where the error took place, exchange the ROMs one at a time, and rerun the built-in diagnostics. When the error has been corrected, both **T** and **B** will have the value of 0, and no error message will be displayed.
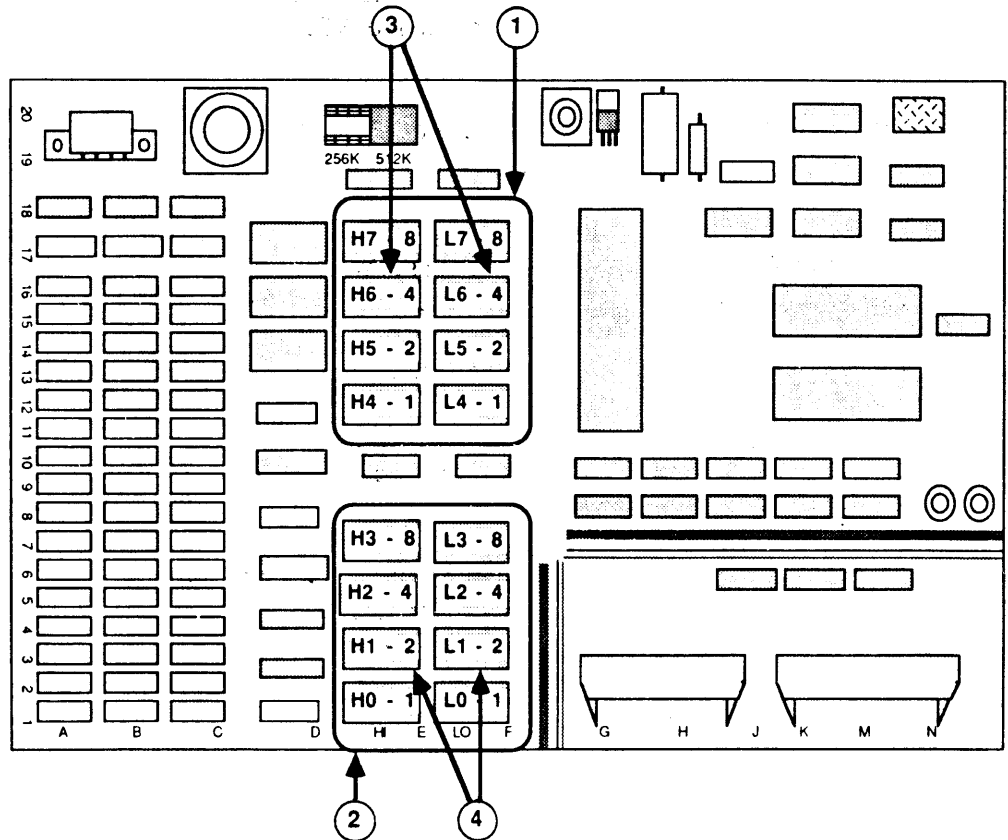

FIGURE 1

Version 3.0
ROMs

If the LaserWriter Plus has version 3.0 ROMs installed, the results will be displayed in the format **XXXXXXBB**. BB indicates which ROM in the bottom bank may be bad. The **XXXXXX** can be ignored.

The value of **BB** indicates which **pair** of ROMs may be bad. Figure 2, #1 shows the values of the error codes next to the number of the ROMs.

For example, if you received the error **XXXXXXC0**, the H3 and L3 ROMs (Figure 2, #2) may be bad.

When you have determined where the error took place, exchange the ROMs one at a time, and rerun the built-in diagnostics. When the error has been corrected, no error message will be displayed.
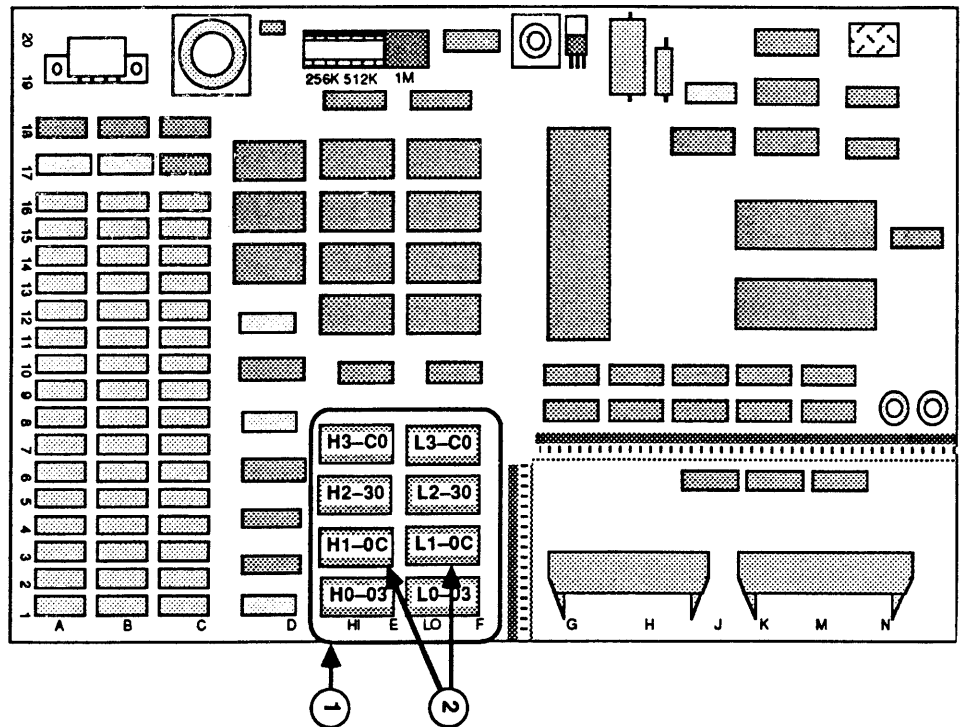

FIGURE 2

Apple Technical Procedures

LaserWriter Plus

Section 3 – Troubleshooting

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❏ LASERWRITER PLUS TROUBLESHOOTING

The LaserWriter Plus has built-in diagnostics that allow you to verify that the ROMs on the I/O board are good.

If you suspect one of the ROMs may be defective, refer to Section 2, Diagnostics to access the built-in diagnostic.

If a ROM is designated as bad, exchange it and rerun the built-in diagnostics.

If exchanging ROMs does not solve the problem, go to the *LaserWriter Technical Procedures*, Section 4, Troubleshooting, and follow the procedures given.

Special Cases

The following ROMs cause special symptoms or require special attention.

1. If either of the first two ROMs (H0 or L0) is bad, the green test light will come on and stay on steadily.

2. ROMs H7 and L7 exist in two revisions. If either H7 or L7 needs to be replaced, make sure that both ROMs on the I/O board are of the same revision when you are done; otherwise, the printer will not function properly.

    If you have to exchange a ROM for compatibility, return the old ROM with an SRO. List the ROM part number on the SRO, and write the authorization code 5ER541 on the line marked *Other* in the *Warranty Information* section.

3. If the green light does not come on, replace all four ROMs (H0, L0, H7, and L7) one at a time. Retest the printer after each replacement.

Exchanging
I/O Boards

If you have to exchange a faulty LaserWriter Plus I/O board, Apple recommends that you replace it with a LaserWriter Plus exchange module rather than with a LaserWriter exchange module. If you use a LaserWriter exchange module, you will have to swap in the customer's LaserWriter Plus ROMs, and you run the risk of in the process damaging the ROMs with electrostatic discharge.

LaserWriter Plus exchange boards are available from Apple as exchange modules, and Apple recommends that you stock a spare along with your LaserWriter I/O board.