Developer Note

LaserWriter 12/640 PS Printer

Contents

Figures and Tables

Chapter 3

PostScript Level 1 Compatibility Operators   87

About This Note

The LaserWriter 12/640 PS printer is a new member of the Apple Computer LaserWriter printer family. This developer note describes the features and capabilities of the printer and is intended for use by software and hardware developers.

To use this note, you must understand the Adobe™ PostScript™ Level 2 programming language and the printer terminology referred to in PostScript programming documentation.

You do not need to use this note if you are simply running packaged programs for your Apple computer. Your owner's guide provides instructions for connecting the printer to your computer, inserting paper, and performing other routine operating tasks. This note does not provide that type of information.

This preface describes the contents of this note, explains visual cues and conventions, and lists other books to which you can refer.

What This Note Contains

This note consists of three chapters, a glossary, and an index.

■ Chapter 1, "Introduction to the LaserWriter 12/640 PS Printer," describes the hardware features of the LaserWriter 12/640 PS printer, the built-in communication ports, the configuration switch, memory capabilities, the printer's paper-handling capabilities, and supported fonts.

■ Chapter 2, "LaserWriter 12/640 PS Software," provides general information about the PostScript Level 2 programming language, the LaserWriter 12/640 PS driver, the utility program, page types, interpreter parameters, and resource categories.

■ Chapter 3, "PostScript Level 1 Compatibility Operators," describes the PostScript Level 1 compatibility operators present in the LaserWriter 12/640 PS printer.

Conventions and Abbreviations

This developer note uses the following typographical conventions and abbreviations.

Typographical Conventions

Computer-language text, that is any text literally the same as it appears in computer input or output, is shown in `Courier` font.

Certain terms used in this note may appear in different typographical formats—for example, `BuildTime` and `buildtime`. In this developer note, `BuildTime` is the format used for the system parameter, and `buildtime` is the format used for the `buildtime` operator.

Terms described in the glossary are marked in **boldface** where first referenced.

Note

A note like this contains information that is interesting but not essential for an understanding of the text. ◆

IMPORTANT

A note like this contains important information that you should read before proceeding. ▲

▲ **WARNING**

A note like this directs your attention to something that could cause damage or result in loss of data. ▲

Standard Abbreviations

When unusual abbreviations appear in this developer note, the corresponding terms are spelled out. Standard units of measure and other widely used abbreviations are not spelled out in the text. The following abbreviations are used in this note:

AEP	AppleTalk Echo Protocol
AIS	Adobe Intelligent Software
AMD	Advanced Micro Devices
ARP	Address Resolution Protocol
ASCII	American Standard Code for Information Interchange
ASIC	application specific IC
ATP	AppleTalk Transaction Protocol

continued

AUI	attachment unit interface
BOOTP	Bootstrap Protocol
CAS	column address strobe
DDP	Datagram Delivery Protocol
DOS	disk operating system
dpi	dots per inch
DRAM	dynamic RAM
EEPROM	electrically erasable programmable ROM
EMSCC	enhanced mono serial communications controller
EPROM	electrically programmable ROM
GVU	Griffin video unit
IC	integrated circuit
ICMP	Internet Control Message Protocol
I/O	input/output
IOP	input/output processing
IP	Internet Protocol
ISO	International Standards Organization
JIS	Japanese Institute for Standardization
KB	kilobyte
Kb	kilobit
lpd	line printer daemon
MB	megabyte
Mb	megabit
MHz	megahertz
MROM	masked ROM
NBP	Name Binding Protocol
NIC	Network Interface Card
NV	nonvolatile
NVM	nonvolatile memory
PCL	Page Control Language
PDL	page description language
PDS	processor direct slot
PJL	printer job language
ppm	pages per minute
RAM	random-access memory
RARP	Reverse Address Resolution Protocol
ROM	read-only memory

SIMM	single inline memory module
SNIC	serial network interface chip
SRAM	static RAM
TBCP	Tagged Binary Communication Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VM	virtual memory
ZIP	Zone Information Protocol

Other Reference Material

This developer note assumes that you are familiar with printer technology and know how to operate and program Apple LaserWriter printers. Additional information is available in the following publications:

■ The owner's guide that is shipped with every Apple printer explains how to set up the printer in the standard configuration. The guide gives basic operating information on how to load toner cartridges and paper tray. The owner's guide also provides basic troubleshooting information.

■ *PostScript Language Reference Manual*, second edition, published by the Addison-Wesley Publishing Company, is required if you plan to write programs in the PostScript Level 2 programming language. The supplement to this manual, the *PostScript Language Reference Manual Supplement* (for version 2015), is available from Adobe Systems, Inc.

■ *PostScript Language Tutorial and Cookbook*, published by the Addison-Wesley Publishing Company, provides a basic introduction to the PostScript programming language. It also includes sample PostScript programs that help you quickly understand how the PostScript programming language works.

■ *PostScript Language Program Design*, published by the Addison-Wesley Publishing Company, is written for programmers who want to take advantage of the PostScript programming language to design efficient PostScript programs and printer devices.

■ *Inside AppleTalk*, second edition, published by the Addison-Wesley Publishing Company, provides information about AppleTalk communication protocols.

For More Information

ADC is Apple Computer's worldwide source for hundreds of development tools, technical resources, training products, and information for anyone interested in developing applications on Apple platforms. Customers receive the *ADC Tools Catalog* featuring all current versions of Apple development tools and the most popular third-party development tools. ADC offers convenient payment and shipping options, including site licensing.

To order products or to request a complimentary copy of the *Apple Developer Catalog,* contact

ADC
Apple Computer, Inc.
P.O. Box 319
Buffalo, NY 14207-0319

Telephone	1-800-282-2732 (United States)
	1-800-637-0029 (Canada)
	716-871-6555 (International)
Fax	716-871-6511
AppleLink	ORDER.ADC
Internet	order.adc@applelink.apple.com

Introduction to the LaserWriter 12/640 PS Printer

The LaserWriter 12/640 PS printer is a mainstream network laser printer designed for midsize to large businesses, higher education institutions, Macintosh and non-Macintosh networks, and graphics and desktop publishing environments. It supports Adobe™ PostScript Level 2 programming functions and produces printed pages at a rate of up to 12 letter-size pages per minute.

The LaserWriter 12/640 PS printer supports 600 dpi resolution. FinePrint can be selected to smooth text and line art. **FinePrint** technology gives the printer the ability to print dots of different widths, producing crisper text and graphics.

The printer also supports **PhotoGrade** printing. This is a technology that enables the LaserWriter 12/640 PS printer to print photographs with as many as 97 shades of gray. PhotoGrade can designate more than one level of gray for each pixel by controlling the size of the dots. Photographs printed using PhotoGrade technology retain a higher level of detail than that achieved by other 600-dpi laser printers. You need a minimum of 12 MB of DRAM, implemented by the 8 MB DRAM update, to support this feature.

In low-memory configurations (printers with less than 12 MB), the LaserWriter 12/640 PS printer employs a printing method referred to as super pixel dithering that produces nearly as many levels of gray as PhotoGrade.

The LaserWriter 12/640 PS printer comes with 4 MB of DRAM installed in one of its two SIMM slots. You can expand DRAM capacity up to 64 MB by using higher capacity SIMMs and populating both slots.

The LaserWriter 12/640 PS has separate controller systems for imaging and I/O processing. The imaging system uses an AMD AM29040 processor, and the I/O processing system uses an 80C186 embedded processor. The imaging and I/O systems share messages and data through a shared SRAM (static RAM).

The imaging system runs two Page Description Language (PDL) interpreters: Adobe PostScript and Hewlett Packard's Page Control Language (PCL). An intelligent PDL sensing algorithm can switch between PDLs while the LaserWriter 12/640 PS is printing.

The LaserWriter 12/640 PS printer works with several network interfaces simultaneously by means of its three I/O ports: the Ethernet port, the LocalTalk port, and the parallel port. The I/O processor supports active port switching among the three ports.

During standard operation, the printer uses the simplex printing method, which means it prints on one side of the paper only. An optional duplexer unit available with the printer enables it to print on both sides of the paper.

The LaserWriter 12/640 PS printer is Energy Star compliant and is available in 110-volt and 220-volt versions.

This chapter provides

■ an overview of hardware features

■ an overview of the printer's controller board features

■ specifications for the communication ports

■ a description of the interface configuration push-button switch and its settings

■ an overview of memory capabilities

■ a summary of page types supported

■ a description of paper-handling capabilities

■ a description of the status lights

■ information about fonts supported

Features of the Printer

The LaserWriter 12/640 PS printer supports the entire PostScript Level 2 language as specified in the *PostScript Language Reference Manual*, second edition, as well as the PCL5 Printer Control Language. In addition, the printer has features, capabilities, and operating modes not present in other PostScript language printers. You may access these additional facilities by executing special PostScript operators that exist only in the LaserWriter 12/640 PS printer's PostScript interpreter.

Because the LaserWriter 12/640 PS printer uses dynamic interface switching and automatically selects the appropriate communication parameters and port based on the incoming data stream, the rotary switch used on previous LaserWriters to select different communication protocol setups is not required for the LaserWriter 12/640 PS. Communication parameters can be modified using the Apple Printer Utility on Macintosh computers, the Windows LaserWriter Utility on Windows systems, or PostScript operators. A push-button switch located on the back of the printer sets the interface ports to known default parameters or allows you to set the parameters by means of the software.

The printer has EEPROM (electrically erasable programmable ROM) that is used for nonvolatile storage. The PostScript interpreter's default parameters are placed in the EEPROM and persist across power cycles.

Table 1-1 summarizes the features of the LaserWriter 12/640 PS printer.

Table 1-1   LaserWriter 12/640 PS printer features

Features	Specifications
Printing speed	12 pages per minute (ppm)
Imaging	User-selectable resolution and imaging features: ■ 600 dpi bilevel text and images ■ Selectable FinePrint text antialiasing ■ PhotoGrade
Imaging system processor	AMD 29040, 30 MHz RISC processor
I/O system processor	80C186 embedded controller
Interface ports	Ethernet 14-pin Apple AUI (attachment unit interface) connector (IEEE 802.3) 8-pin mini-DIN connector for LocalTalk Centronics (IEEE 1284-B) 36-pin bidirectional parallel port

continued

Table 1-1   LaserWriter 12/640 PS printer features (continued)

Features	Specifications
Paper handling (standard)	Standard output:
	■ Face-down tray for 250 sheets of paper or 60-envelopes
	Optional output:
	■ Face-up tray to minimize curl on thick paper, envelopes, and transparencies
	Standard inputs:
	■ Multipurpose tray for 80 sheets of paper, ranging from postcard to U.S. legal size, or 10 envelopes
	■ 250-sheet cassette feeder supports U.S. letter, U.S. legal, A4, B5, and executive paper size
	Optional inputs:
	■ 500-sheet cassette feeder
	■ 50-sheet envelope feeder
	Optional duplexer for two-sided printing
ROM	4 MB of onboard masked ROM for the PDLs and fonts
	4 Mb (256K x 16) of onboard ROM for IOP code
DRAM	4 MB SIMM (single inline memory module) in the first SIMM slot (bank A, slot J7) standard installation
	DRAM capacity expandable up to 64 MB using higher capacity SIMMs in the first and second SIMM slots
EEPROM	2 KB of onboard EEPROM to store persistent parameters
SRAM	128 KB shared SRAM for communication between the imaging and IOP systems
Fonts	35 PostScript Type I fonts
	13 PCL5 fonts stored in ROM for use in PCL5 emulation mode
PDL (page description language)	Adobe PostScript Level 2, or compatible; Hewlett-Packard Page Control Language (PCL5)
Emulation	HP LaserJet III (PCL5), automatic emulation sensing and switching
Support for n-up printing	Allows 1, 2, or 4 pages to be printed on one sheet of paper

Controller Overview

Many of the key features of the LaserWriter 12/640 PS printer are located on the controller board. Figure 1-1 shows an outline of the board with connectors and key components.

Figure 1-1   Outline of the controller board with connectors and key components
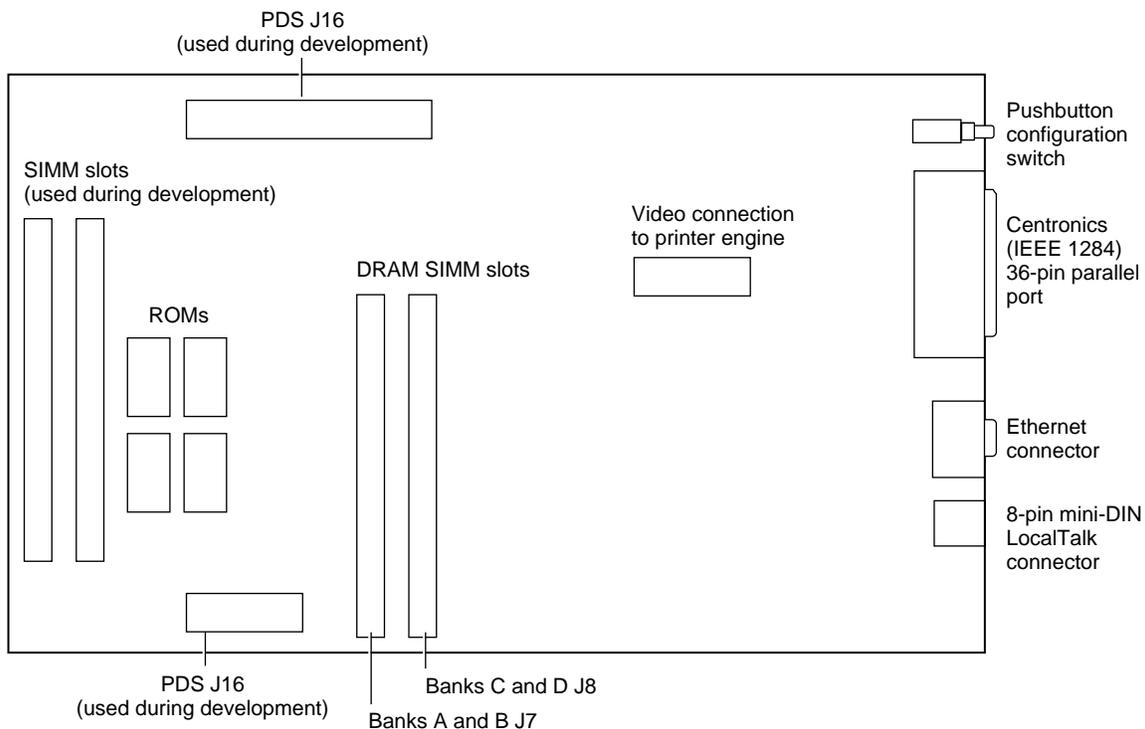
Communication Ports

The LaserWriter 12/640 PS printer works with several network interfaces simultaneously by means of its three I/O ports: the Ethernet port, the LocalTalk port, and the parallel port. The I/O processor supports active port switching among the three ports. The Ethernet port supports EtherTalk, TCP/IP, and Novell NetWare network protocols. The LocalTalk port is a serial port that may be connected to a network of one or more Macintosh computers, or any other computer that supports LocalTalk on a serial port. The parallel port supports LJ4-compatible, bidirectional Centronics communications; this port is typically used for DOS-based IBM or IBM-compatible personal computers that are not on larger networks. All communication protocols and the switching intelligence are local to the I/O system.

The LaserWriter 12/640 PS printer includes I/O processing (IOP) hardware that supports the three communication ports independently of the main processor. Table 1-2 lists the communication ports on the printers, the types of connectors used, and the network protocols supported.

Introduction to the LaserWriter 12/640 PS Printer

Table 1-2   LaserWriter 12/640 PS communication ports

Port	Connector type	Network protocols
Ethernet	14-pin Apple AUI	EtherTalk[*], NetWare, TCP/IP
LocalTalk[†]	8-pin mini-DIN	AppleTalk
Parallel	36-pin IEEE 1284-B standard Centronics	HP LaserJet 4 Bi-Tronics

[*] EtherTalk is Apple's data link product. It enables an AppleTalk network to be connected by means of Ethernet cables.
[†] LocalTalk is an Apple product. It connects local work groups in an AppleTalk network system.

Figure 1-2 shows the relative positions of the built-in ports on the back panel of the printer. It also shows the position of the configuration switch, which is described on page 13. All ports are active during operation. Adobe Intelligent Software (AIS) selects between PDLs.

Figure 1-2   LaserWriter 12/640 PS back-panel connectors and configuration switch

8-pin mini-DIN
LocalTalk connector

Ethernet port

Centronics (IEEE 1284-B)
36-pin parallel port

Configuration switch
(push button)

CHAPTER 1

Introduction to the LaserWriter 12/640 PS Printer
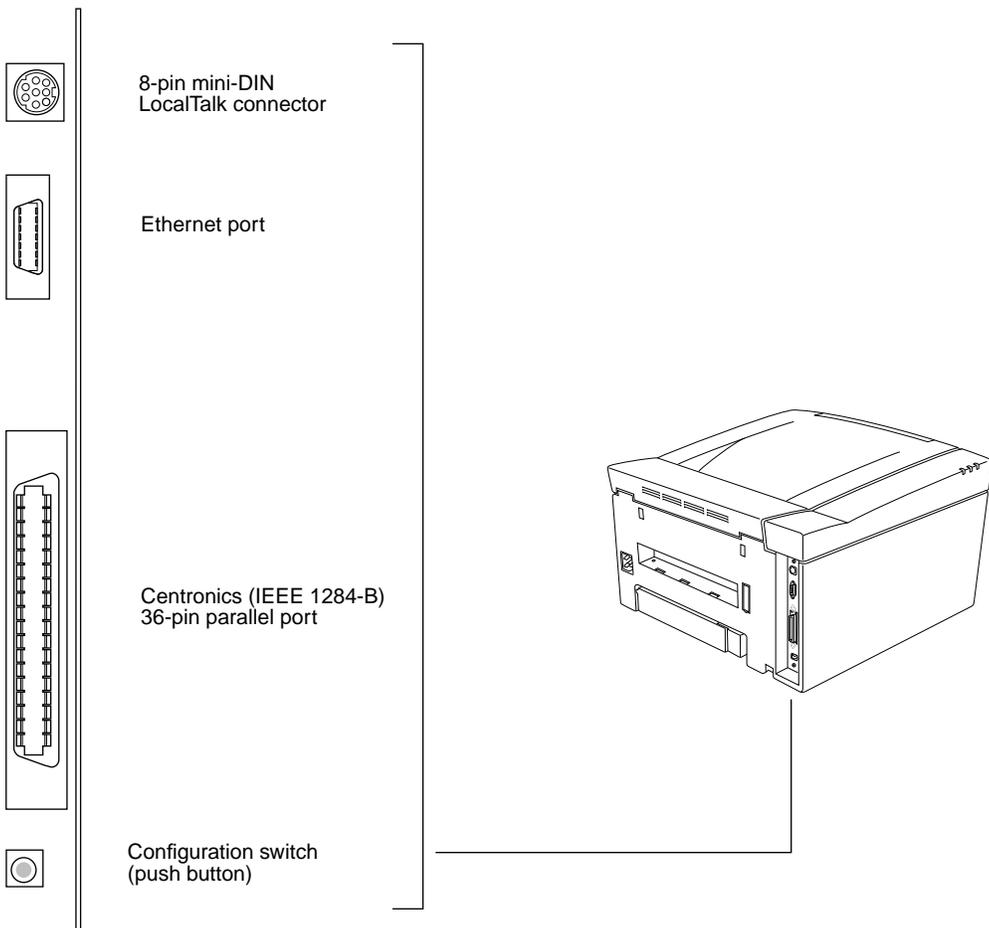
The three communication ports, and the network protocols that support them, are described in more detail in the following sections.

Ethernet

Macintosh and PC-DOS Ethernet network protocols are supported through a 14-pin AUI connector. Supported Ethernet protocols include AppleTalk, NetWare, and TCP/IP. The LaserWriter 12/640 PS printer uses dynamic protocol switching, which allows support for multiple Ethernet protocols running simultaneously on the same network medium. Support for the port is provided by a 16-bit DP83901A serial network interface chip (SNIC). Figure 1-3 shows the connector's pin designations. Table 1-3 lists and describes the signals.

Figure 1-3   Ethernet connector
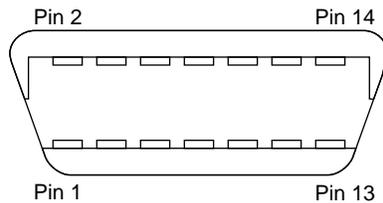
Note
TXD and /TXD are differential pairs, as are RXD and /RXD, and CNTL and /CNTL. ◆

Table 1-3   Signal descriptions for Ethernet connector

Pin number	Signal name	I/O	Descriptions
1, 7, 8, 14	PWR	Power	+5 VDC
2	RXD	I	Receive data
3	/RXD	I	Receive data
4, 11	GND	Power	Ground
5	CNTL	I	Collision detect
6	/CNTL	I	Collision detect
9	TXD	O	Transmit data
10	/TXD	O	Transmit data
12, 13	n.c.	—	Not connected

Communication Ports   7

EtherTalk Data Link

EtherTalk is the Apple Computer's data-link product that enables an AppleTalk network to be connected by means of Ethernet cables. The LaserWriter 12/640 PS printer supports a variety of AppleTalk protocols, including PAP (Printer Access Protocol), NBP (Name Binding Protocol), ATP (AppleTalk Transaction Protocol), DDP (Datagram Delivery Protocol), ZIP (Zone Information Protocol), and AEP (AppleTalk Echo Protocol). These protocols may be used for both EtherTalk Phase I and EtherTalk Phase II Ethernet implementations. You will find a general description of each protocol in the glossary at the end of this developer note. For detailed information about AppleTalk, refer to *Inside AppleTalk,* second edition, published by the Addison-Wesley Publishing Company.

NetWare Protocols

NetWare versions 2.15, 2.20, 3.10, 3.11, 3.12, 4.0, 4.0.1, and 4.1 are supported. These versions of NetWare provide Ethernet support for complete SPX/IPX implementation of a Novell print server.

The print server environment includes support for both remote printer mode and dedicated print server mode. The following server features are also supported:

■ multiple file servers

■ multiple file queues

■ automatic reattachment to the file server

■ encrypted passwords

■ compatibility with Novell Print Server VAP/NLM/EXE

Refer to standard NetWare documentation for further information about NetWare protocols.

TCP/IP Protocols

In the TCP/IP environment, the LaserWriter 12/640 PS printer appears as a remote UNIX system with an attached printer. Users on the TCP/IP network perform print job setup and spool print jobs for the LaserWriter 12/640 PS printer to a spool directory through the `lpr` command. The UNIX system lpd (line printer daemon) scans the spool directory and, when it encounters a print job, sends it to the specified printer.

The LaserWriter 12/640 PS printer TCP/IP network implementation includes support for

■ Telnet configuration

■ lpd (line printer daemon)

■ multitasking kernel to support up to five hosts

■ IP, TCP, UDP (User Datagram Protocol), ICMP (Internet Control Message Protocol), ARP (Address Resolution Protocol), RARP (Reverse Address Resolution Protocol), and BOOTP (Bootstrap Protocol)

The UNIX system network administrator must configure the following network parameters for the LaserWriter 12/640 PS printer:

■ IP address

■ subnet mask and default network gateway

■ printer type: PostScript, PCL, or ASCII

■ banner pages always on or always off

Refer to standard UNIX networking documentation for further information about TCP/IP.

LocalTalk Connector

The LocalTalk connector is an 8-pin mini-DIN connector that supports AppleTalk protocols on the LocalTalk port. Figure 1-4 shows the connector pin designations for the 8-pin connector.

Figure 1-4   An 8-pin mini-DIN LocalTalk connector
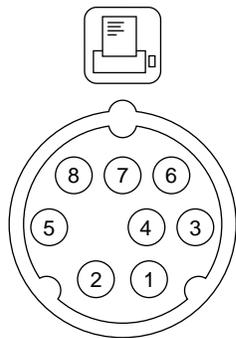
Table 1-4 on page 10 lists the pin functions for the 8-pin connector.

Note
TXD and /TXD are differential pairs, as are RXD and /RXD. ◆

Table 1-4   Signal descriptions for LocalTalk connector

Pin number	Signal name	I/O	Description
1	SERV_IN	I	Service in
2	SERV_OUT	O	Service out
3	/TXD	O	Transmit data
4, 8	CGND	Power	Chassis ground
5	RXD	I	Receive data
6	TXD	O	Transmit data
7	/RXD	I	Receive data

Centronics Parallel Connector (IEEE 1284-B)

The LaserWriter 12/640 PS printer provides a 36-pin connector for bidirectional communication with a Centronics (IEEE 1284-B) parallel interface. The connector is fully compatible with the IBM PC Centronics port and, from a software perspective, the port operates exactly like a Hewlett-Packard LaserJet 4 Bi-Tronics parallel interface. The Centronics interface also supports the high-speed parallel interface. The high-speed capability of the parallel port can be enabled or disabled with the Macintosh Apple Printer Utility, the Windows LaserWriter Utility, or PostScript operators.

The parallel channel is basically unidirectional and is used to transfer data and control information from the host computer to the printer. The printer returns minimal status information to the host, such as PAPER ERR and /FAULT, that flag paper errors. It also returns handshaking signals such as BUSY and /ACK.

Figure 1-5 shows the pin designations for the parallel connector. Table 1-5 lists the signal descriptions. Figure 1-6 shows the timing requirements for the Centronics interface.

Figure 1-5   Centronics (IEEE 1284-B) parallel connector

Pin 18   Pin 1

Pin 36   Pin 19
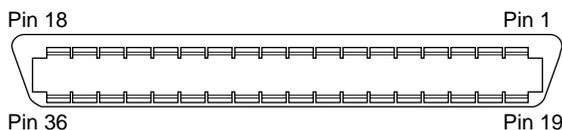
Note
In Table 1-5, inputs and outputs are referenced to the printer. This means an input (I) is a signal sent from the host computer to the printer, and an output (O) is a signal sent by the printer to the host. A slash before a signal name (/STROBE) indicates an active-low signal. Signal names shown in parentheses are specific to the IEEE 1284-B interface. ◆

Table 1-5   Signal descriptions for the Centronics parallel port

Pin number	Signal name	I/O	Description
1	/STROBE (HostClk)	I	Strobe for parallel input data
2	DATA 0	I	Data input bit 0 (least significant bit)
3	DATA 1	I	Data input bit 1
4	DATA 2	I	Data input bit 2
5	DATA 3	I	Data input bit 3
6	DATA 4	I	Data input bit 4
7	DATA 5	I	Data input bit 5
8	DATA 6	I	Data input bit 6
9	DATA 7	I	Data input bit 7 (most significant bit)
10	/ACK (PtrClk)	O	Handshaking output signal; printer uses this signal to acknowledge receipt of parallel data
11	BUSY (PtrBusy)	O	Busy output signal; indicates that a /STROBE signal has been received, but that /ACK has not yet been given
12	PAPER ERR (AckDataReq)	O	Paper error, an output error signal; indicates the printer has run out of paper
13	SELECT (Xflag)	O	Printer select line; driven high to indicate that the LaserWriter 12/640 PS printer is online
14	/AUTOFEED (HostBusy)	I	Printer to operate in autofeed mode
15, 33, 34, 35	n.c.	–	These lines are not connected
16, 17	GND	–	Ground
18	Peripheral logic high	–	Not used, tied high
19	Signal ground	–	Signal ground for STROBE
20	Signal ground		Signal ground for DATA 1
21	Signal ground	–	Signal ground for DATA 2
22	Signal ground		Signal ground for DATA 3
23	Signal ground	–	Signal ground for DATA 4
24	Signal ground		Signal ground for DATA 5
25	Signal ground	–	Signal ground for DATA 6
26	Signal ground		Signal ground for DATA 7
27	Signal ground	–	Signal ground for DATA 8
28	Signal ground		Signal ground for PERROR, SELECT, /ACK
29	Signal ground	–	Signal ground for BUSY, /FAULT

continued

Introduction to the LaserWriter 12/640 PS Printer

Table 1-5   Signal descriptions for the Centronics parallel port (continued)

Pin number	Signal name	I/O	Description
30	Signal ground		Signal ground for /AUTOFEED, /SELECTIN, INPRIME (/INIT)
31	INPRIME (nInit)	I	Reset signal; host CPU asserts this signal to cancel the current job on this port
32	/FAULT (nDataAvail)	O	Fault signal; asserted if there is a printer problem
36	/SELECTIN (1284 Active)	I	Select port; port is active

Figure 1-6   Timing for Centronics interface
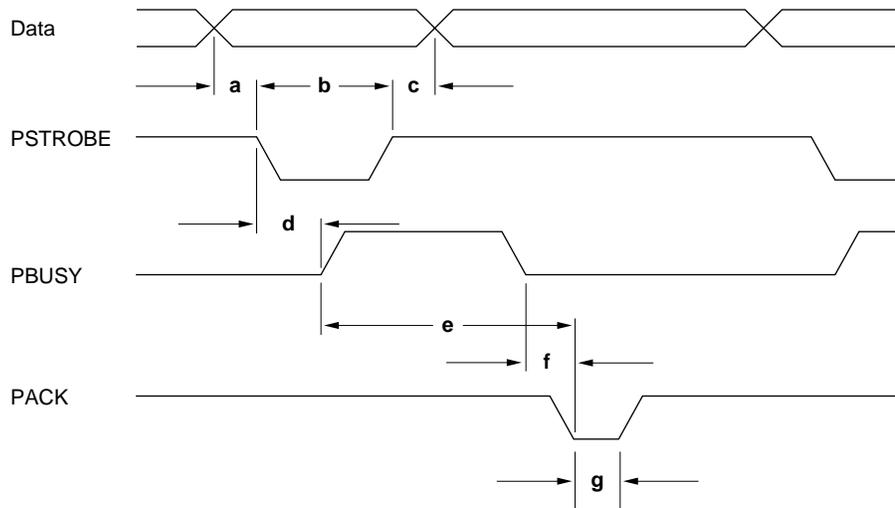
Timing specification	Min. value	Typical value	Max. value
		Values in μseconds	
a. Data setup time before STROBE on	0.5		
b. STROBE on pulse width	1.0		
c. Data hold time after STROBE off	0.5		
d. STROBE on to BUSY on	0.0		
e. Duration of BUSY on (printer on line)	10.0		
f. BUSY off to /ACK on	0.0	0.1	
g. /ACK on pulse width	1.5		10.0

Configuration Switch

The LaserWriter 12/640 PS printer has a two-position push-button configuration switch. It is located on the back panel of the printer (see Figure 1-2 on page 6) and is easy to reach. The switch allows you to use preset parameters for the communication ports or to select an option where you can modify the parameters through the software. If you are using a user-defined parameter set that causes difficulties in communicating with the printer, you can use the button to return the printer to a set of preset communication parameters. To do this, the button should be in the out position when you power down the printer and then power it up again.

Note

If the button is pushed in when you press it, it will pop out. If the button is out when you press it, it will push in and lock. ◆

When the button is out, the printer uses preset communication parameters that should work for most LaserWriter 12/640 PS printer users. The communication parameters can be modified but will not persist. Changes made to the communication parameter set using the Apple Printer Utility, LaserWriter Utility for Windows, or low-level PostScript operators are saved to nonvolatile RAM regardless of the button's position, but the changes are not used for any print job until you push in the button.

When the button is pushed in (user-defined parameter set), any changes made to the communication parameters will affect the next print job. See Chapter 2, "LaserWriter 12/640 PS Software," for further information about the communication parameters. Table 1-6 on page 14 shows the default parameter values for the configuration switch.

Note

The printer is shipped from the factory with the button pushed in. When the button is out, it is in the reset position. ◆

Table 1-6   Configuration switch default parameter values

Switch setting	Type of connector	Type of connection and default parameter values	Interpreter
Preset (button pushed in) logical 0	8-pin mini-DIN	LocalTalk	PostScript
	36-pin parallel (IEEE 1284-B)	Centronics (IEEE 1284-B) fast mode Protocol: Raw	AutoSelect
	Ethernet	EtherTalk NetWare TCP/IP	PostScript AutoSelect AutoSelect
User defined (button out) logical 1	8-pin mini-DIN	LocalTalk	PostScript
	36-pin parallel	Centronics (IEEE 1284-B), fast mode Protocol: Normal	PostScript
	Ethernet	EtherTalk NetWare TCP/IP	PostScript PostScript PostScript

If the LaserWriter Utility cannot communicate with the printer, the configuration button gives users connected to the parallel port of the LaserWriter 12/640 PS printer a way to recover from this situation. For example, when the button is pushed in and the parallel port communication parameters are set to PCL5, the LaserWriter Utility cannot send commands to the printer because the utility uses PostScript commands rather than PCL5 commands to modify printer behavior. If you push the button out and power down and restart the printer, it returns the parallel port to AutoSelect mode. In this mode, the parallel port is automatically configured for the PostScript data stream from the LaserWriter Utility.

You can find out how the button is currently set by

■ using the PostScript Level 2 system parameter `PrinterMode`

■ checking the contents of the utility register: if bit 2 is 0, the configuration button is pushed in; if bit 2 is 1, the button is out

■ looking at the configuration switch on the back of the printer

Note
Changing the configuration switch to the user-defined position during a printing operation affects the next print job and does not modify parameters for the job in progress. Turning off the Ethernet channel will not take effect until the printer has been turned off and then powered up again. ◆

Memory Capabilities

The LaserWriter 12/640 PS printer comes with 4 MB of masked ROM (MROM) for the imaging processor, 500 KB of masked ROM for the I/O processor, 4 MB of DRAM, and 2 KB of EEPROM. Figure 1-1 on page 5 shows the positions of the memory components on the controller board.

ROM

The LaserWriter 12/640 PS printer has 4 MB of MROM installed on the controller board to store the diagnostic software, fonts, and the PostScript and PCL interpreters required by the printer. This memory is made up of four 8 Mbit chips, configured as a 512K by 16 bit memory, with an access rate of 100 ns.

The IOP also uses 500 KB of separate MROM to store IOP code. This ROM is configured as a 256 K by 16 bit memory, with an access rate of 120 ns.

Nonvolatile Memory

The LaserWriter 12/640 PS controller uses an EEPROM to store persistent parameters, that is, the parameters that persist across power cycles and restarts. The EEPROM is a 2 KB device with a 200 ns access rate.

DRAM SIMM

The LaserWriter 12/640 PS printer has two 72-pin SIMM slots that accommodate DRAM SIMMs. The printer comes with one 4 MB SIMM installed in the SIMM slot at location J7. You can expand DRAM capacity by replacing the 4 MB SIMM in the J7 slot with higher capacity SIMMs (up to 32 MB), and adding a SIMM in the second slot at location J8 to provide total expanded DRAM capacity up to 64 MB. Both slots accept 72-pin 70 ns DRAM SIMMs.

The LaserWriter 12/640 PS supports double- or single-sided SIMMs. The double-sided SIMMs provide two memory banks, and the single-sided SIMMs provide one memory bank. Each memory bank can be either 4 MB or 16 MB. The base DRAM installed in the LaserWriter 12/640 PS is a single-sided SIMM that provides 4 MB of DRAM in a single bank (bank A). Figure 1-7 shows the positions of the SIMM slots on the controller board.

Figure 1-7   SIMM configuration and location
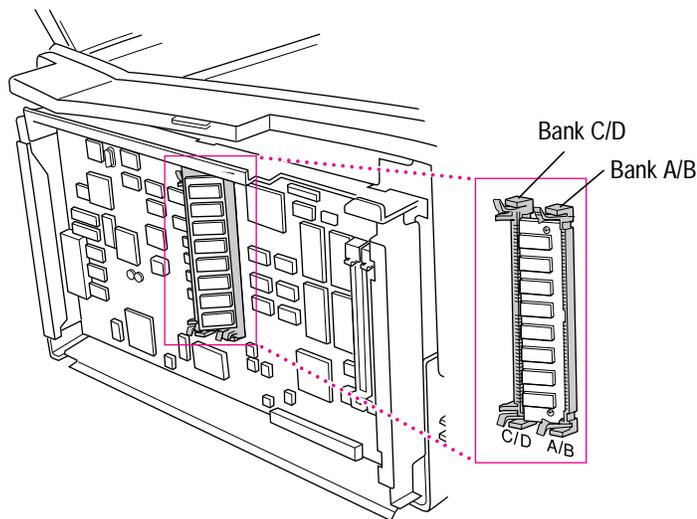
The DRAM SIMM installed in either of the SIMM slots must

- be a 70 ns, fast-page-mode device

- use CAS before RAS refresh

- use symmetrical addressing

- be a +5 VDC device

IMPORTANT

With symmetrical addressing, the number of row and column address bits differs by 1. With asymmetrical addressing, the number of row and column address bits differs by 2. The LaserWriter 12/640 PS does not support DRAMs that use asymmetrical addressing. ▲

Table 1-7 lists the possible configurations for 4, 8, 16, and 32 MB DRAM SIMMs installed in the printer. As shown in Table 1-7, bank A must have a 4 MB SIMM or a 16 MB SIMM. Bank B, which is on the same SIMM as bank A, may be the same as bank A, or it may be empty. Bank C may be be populated up to the same capacity as bank A, or it may be empty. Bank D, which is on the same SIMM as bank C, may be the same is bank C, or it may be empty. No bank should contain more memory than bank A. Memory is arranged contiguously, even if bank B is empty and bank C is populated.

Note

The 4 MB and 16 MB SIMMs are single-sided SIMMs. The 8 MB and 32 MB SIMMs are double-sided SIMMs. ◆

Table 1-7   DRAM SIMM configurations for the LaserWriter 12/640 PS printer

Total SIMM capacity (MB)	SIMMs installed (MB)		Banks populated (MB)			
	A/B (J7)	C/D (J8)	A	B	C	D
4	4	0	4	0	0	0
8	4	0	4	0	4	0
8	8	0	4	4	0	0
12	8	4	4	4	4	0
16	8	8	4	4	4	4
16	16	0	16	0	0	0
20	16	4	16	0	4	0
24	16	8	16	0	4	4
32	16	16	16	0	16	0
32	32	0	16	16	0	0
36	32	4	16	16	4	0
40	32	8	16	16	4	4
48	32	16	16	16	16	0
64	32	32	16	16	16	16

You need the following minimum DRAM capacities to support the duplexer and PhotoGrade options:

- 12 MB to support PhotoGrade only

- 12 MB to support duplexer only

- 20 MB to support PhotoGrade and duplexer for all accepted paper sizes except legal

- 24 MB to support PhotoGrade and the duplexer for all accepted paper sizes

Table 1-8 on page 18 lists the pin designations and signal descriptions for the DRAM SIMM connector.

Note
A slash before a signal name (/RAS_B) indicates an active-low signal. ◆

Table 1-8   Signal descriptions for the SIMM connector

Pin number	Signal name	I/O	Description
1	DGND	Power	Ground
2	D0	I/O	Data bit 0 (least significant bit)
3	D16	I/O	Data bit 16
4	D1	I/O	Data bit 1
5	D17	I/O	Data bit 17
6	D2	I/O	Data bit 2
7	D18	I/O	Data bit 18
8	D3	I/O	Data bit 3
9	D19	I/O	Data bit 19
10	VCC	Power	+5 VDC
11, 35, 36, 37, 38, 46, 48, 66, 67, 68, 69, 70, 71,	n.c.	—	Not connected
12	A0	I	Address bit 0 (least significant bit)
13	A1	I	Address bit 1
14	A2	I	Address bit 2
15	A3	I	Address bit 3
16	A4	I	Address bit 4
17	A5	I	Address bit 5
18	A6	I	Address bit 6
19	A10	I	Address bit 10
20	D4	I/O	Data bit 4
21	D20	I/O	Data bit 20
22	D5	I/O	Data bit 5
23	D21	I/O	Data bit 21
24	D6	I/O	Data bit 6
25	D22	I/O	Data bit 22
26	D7	I/O	Data bit 7
27	D23	I/O	Data bit 23
28	A7	I	Address bit 7
29	A11	I	Address bit 11 (most significant bit)

continued

Table 1-8　　　Signal descriptions for the SIMM connector (continued)

Pin number	Signal name	I/O	Description
30	VCC	Power	+5 VDC
31	A8	I	Address bit 8
32	A9	I	Address bit 9
33	/RAS_B	I	Row address strobe bank B
34	/RAS_A	I	Row address strobe bank A
39	VCC	Power	+5 VDC
40	/CAS_LL	I	Column address strobe lower low
41	/CAS_UM	I	Column address strobe upper middle
42	/CAS_UU	I	Column address strobe upper high
43	/CAS_LM	I	Column address strobe lower middle
44	/RAS_A	I	Row address strobe bank A
45	/RAS_B	I	Row address strobe bank B
49	D8	I/O	Data bit 8
50	D24	I/O	Data bit 24
51	D9	I/O	Data bit 9
52	D25	I/O	Data bit 25
53	D10	I/O	Data bit 10
54	D26	I/O	Data bit 26
55	D11	I/O	Data bit 11
56	D27	I/O	Data bit 27
57	D12	I/O	Data bit 12
58	D28	I/O	Data bit 28
59	VCC	Power	+5 VDC
60	D29	I/O	Data bit 29
61	D13	I/O	Data bit 13
62	D30	I/O	Data bit 30
63	D14	I/O	Data bit 14
64	D31	I/O	Data bit 31
65	D8	I/O	Data bit 8
72	DGND	Power	Ground

Page Types

The page size (the area in which printed output may appear) is constrained by

■ the physical size of the paper (paper size)

■ the margins required by the printing engine

■ the amount of memory available for the full-page frame buffer

Table 1-9 lists the range of page sizes supported by the LaserWriter 12/640 PS printer.

Table 1-9   Available page types

Name	Paper size in inches	Page size in inches[*]	Description
a4	8.26 x 11.69	7.84 x 11.42	Standard page type for European A4-size paper
a4small	8.26 x 11.69	7.57 x 11.00	Smaller version of A4
a5	5.83 x 8.26	5.55 x 7.93	Standard page type for A5-size paper
b5	7.17 x 10.11	6.83 x 9.79	Standard page type for Japanese B5-size paper
c5	6.38 x 9.01	6.03 x 8.62	Standard page type for the C5-size envelope
com10	4.13 x 9.5	3.85 x 9.1	Standard page type for the COM10-size envelope
dl	4.33 x 8.67	4.0 x 8.22	Standard page type for the DL-size envelope
EuroPostCard	4.13 x 5.83	3.81 x 5.43	Standard version of European-size postcard
executive	7.25 x 10.5	6.93 x 10.17	Standard page type for executive-size paper
legal	8.5 x l4	8.16 x 13.66	Standard page type for legal-size paper
legalsmall	8.5 x 14	7.80 x 13.30	Smaller version of legal size
letter	8.5 x 11	8.16 x 10.66	Standard page type for letter-size paper
lettersmall	8.5 x 11	7.80 x 10.30	Smaller version of letter size
monarch	3.875 x 7.5	3.57 x 7.11	Standard version of Monarch-size envelope

[*] The margins required in all cases are 0.2 inch on each side, and at the top and bottom. All images may be centered either horizontally or vertically, with the exception of b5, which must be centered horizontally.

Paper Handling

The LaserWriter 12/640 PS printer offers a variety of paper-handling features.

- The multipurpose tray is an integral part of the printer. To use it, you pull down a small flap on the front of the printer. You may use this tray for manual feed jobs or to feed
  - □ 80 sheets of paper of various sizes—U.S. letter, U.S. legal, A4, B5, and executive
  - □ 10 envelopes of various sizes—Com10, Monarch, DL, and C5
  - □ 40 sheets of transparency film or labels
  - □ 25 sheets of post cards of various sizes—European post card, 4" by 6" index, and Japanese post card
- The 250-sheet cassette feeder pulls out like a drawer from the front of the printer. It holds 250 sheets of either U.S. letter-size or A4 paper.
- An optional 500-sheet cassette feeder accommodates paper sizes A4, U.S. letter, and U.S legal. This cassette is installed under the printer. If the optional duplexing unit is also installed, this cassette is installed under the duplexer.
- An optional envelope cassette can be installed, which holds up to 50 envelopes.

The standard configuration of the printer comes with

- the 80-sheet multipurpose tray
- the 250-sheet cassette feeder

An optional duplexing unit may be installed. This unit allows printing on both sides of the paper. The unit is easy to install below the printer engine. It accepts paper from the 250- or 500-sheet cassette and accommodates A4, U.S. letter, and U.S. legal paper. You need a minimum of 12 MB of DRAM, implemented by the 8 MB DRAM update, to support the standard duplexer. You need 20 MB of DRAM, implemented by the 16 MB upgrade, for the fast duplexer.

As shown in Figure 1-8, if you use the basic printer with additional optional feeders, you can extend the printer's paper-feeding capability to 850 sheets.

Figure 1-8   Paper handling options

Base product

Side view

Manual feed

Multipurpose tray
80 sheet
10 envelope

250 letter, A4

Top view

Paper cassette options

250
Universal

500 letter,
A4

500
Universal

Extended configurations

80

250

500

850-sheet
capacity
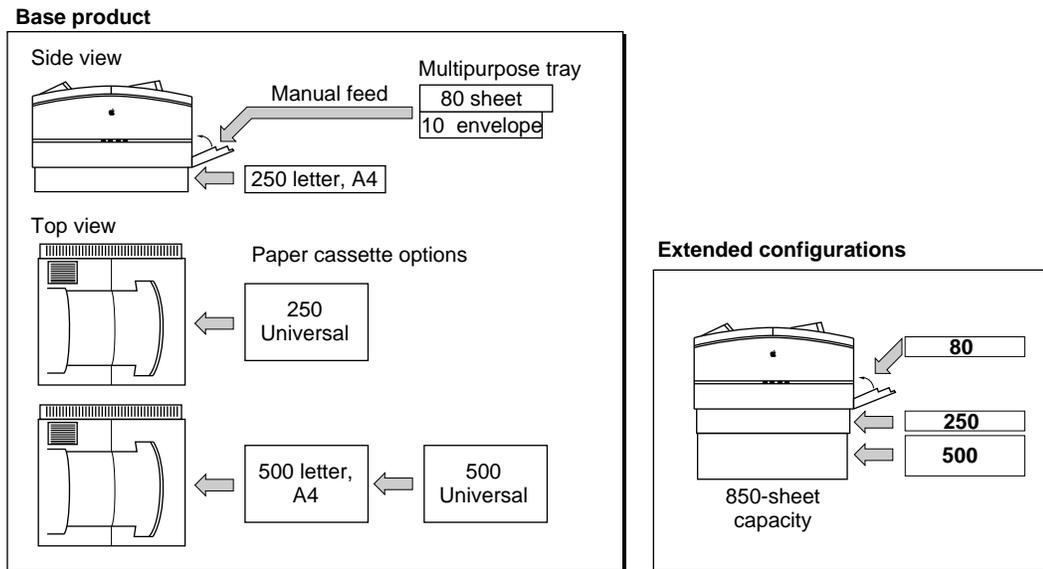
Status Lights

The LaserWriter 12/640 PS printer has three colored lights on the top panel of the printer at the left side. These lights indicate the function the printer is performing or possible error conditions. Figure 1-9 shows the status light symbols and their position on the printer.

Figure 1-9   LaserWriter 12/640 PS status lights

Green

Ready/
In use

Amber

Paper
out

Amber

Paper
jam

Status
light
location
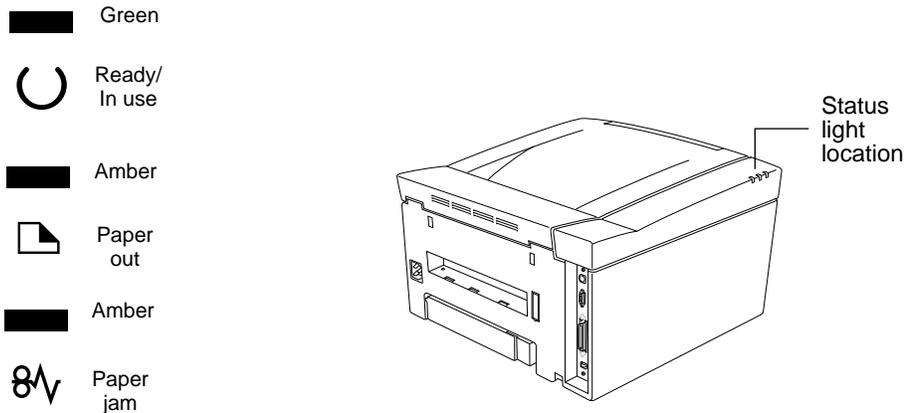
Table 1-10 describes the functions of the status lights.

Table 1-10   Status light functions

Light	Light's state	Printer's state
Ready/in use (green)	On	The printer is ready to use.
	Off	The printer cannot print because there is an error condition, or because the printer cover is open.
	Flashing	The printer is warming up, or it is processing data for the next print job.
Paper out (amber)	On	The paper tray is empty, or it has been removed from the printer.
	Off	There is an adequate supply of paper in the paper tray.
	Flashing	
		The printer is in manual-feed mode and is ready for the next sheet of paper. The printer failed the startup test and requires service.
Paper jam (amber)	On	There is a paper jam.
	Off	The paper is feeding correctly through the printer.
	Flashing	The toner cartridge may be missing or the printer requires service.

LaserWriter 12/640 PS Fonts

The LaserWriter 12/640 PS printer supports both PostScript and PCL5 fonts. These fonts are stored separately in LaserWriter 12/640 PS ROM.

PostScript Fonts

LaserWriter 12/640 PS ROMs contain 35 Type I PostScript fonts. The default font is Courier. Table 1-11 lists the typefaces in this category. Refer to the trademark information in the front of this developer note for information about trademark owners. Symbol, Courier, and New Century Schoolbook are fonts in the public domain.

Introduction to the LaserWriter 12/640 PS Printer

Table 1-11   PostScript fonts supported

Identifying trademark	Typeface
Helvetica	Bold Oblique Bold Oblique
Helvetica Narrow	Narrow Narrow Bold Narrow Oblique Narrow Bold Oblique
Times	Roman Bold Italic Bold Italic
Symbol	—
Courier	Bold Oblique Bold Oblique
Palatino	Roman Bold Italic Bold Italic
ITC Avant Garde	Gothic Book Gothic Book Oblique Gothic Demi Gothic Demi Oblique
ITC Bookman	Light Light Italic Demi Demi Italic
ITC Zapf Dingbats	—
ITC Zapf Chancery	Medium Italic
New Century Schoolbook	Roman Bold Italic Bold Italic

PCL5 Fonts

When the LaserWriter 12/640 PS printer is in PCL5 emulation mode, it uses typefaces that are stored in ROM or are downloaded in the print job data stream. The ROM-resident PCL5 outline fonts stored in ROM are listed in Table 1-12. These fonts are stored separately from the PostScript fonts. Refer to the trademark information in the front of this developer note for information about trademark owners. Symbol, Courier, and Line Printer are fonts in the public domain.

Table 1-12   PCL5 fonts supported

Identifying trademark	Typeface
Scaleable Intellifont CG-Times equivalent: Times	Roman Bold Italic Bold Italic
Scaleable Intellifont CG-Univers equivalent: Univers	Medium Medium Bold Medium Italic Medium Bold Italic
Bitmap fonts in both portrait and landscape orientations: Courier	12 pitch, 10 pt, medium 12 pitch, 10 pt, bold 12 pitch, 10 pt, italic 10 pitch, 12 pt, medium 10 pitch, 12 pt, bold 10 pitch, 12 pt, italic
Line Printer Font	16.67 pitch, 8.5 pt, medium
Symbols Sets	—

TrueType Fonts

The LaserWriter 12/640 PS has no Type 42 fonts in ROM. However, the printer's firmware includes the TrueType font scaler that handles downloaded Type 42 fonts.

LaserWriter 12/640 PS Software

This chapter describes the LaserWriter 12/640 PS software. It includes

■ an overview of the programming language, interpreter, driver, utility program, and page types

■ descriptions of the software parameters that enable you to set up and configure the printer, including page-device parameters, product strings, interpreter parameters, and resource categories

Note

To use the information presented in this chapter you must be thoroughly familiar with the PostScript Level 2 programming language and preferably have access to the information contained in the *PostScript Language Reference Manual Supplement* (for version 2015). ◆

Software Overview

This section provides an overview of the PostScript programming language, the PostScript interpreter, the printer driver, the printer utility program, and the page and envelope types supported by the printer.

Adobe PostScript Programming Language

The LaserWriter 12/640 PS printer executes descriptions written in the PostScript language. The version of the PostScript language used has features and capabilities that might not be present in other PostScript output devices. This developer note describes only the supplementary PostScript language features of the LaserWriter 12/640 PS printer. You should use this note in conjunction with the *PostScript Language Reference Manual*, second edition, and the *PostScript Language Reference Manual Supplement* (for version 2015).

PostScript Interpreter

You may access the special features of the LaserWriter 12/640 PS printer by executing PostScript operators that exist only in this printer's interpreter. The current PostScript interpreter version at the time of publication is 2015.

Special operators are intended for use by interactive users, by programmers of host software that carries out user requests, or by users who may want to configure the LaserWriter 12/640 PS printer in nonstandard ways. Normally page descriptions should not refer to the special operators, since doing so impairs software portability.

Printer Driver

The LaserWriter 12/640 PS printer driver and Print Manager provide a general interface to the printer. The interface should meet the needs of most Macintosh applications.

The printer driver

■ provides full support for both PostScript Level 1 and Level 2

■ fully supports device-specific features, including installable options, with PostScript Printer Description files

■ maintains full-duplex communication with the printer and informs the user of conditions such as paper out and paper jam

■ supports printing with both TrueType and PostScript fonts

■ is compatible with Macintosh system software version 7.1 and later

■ is compatible with version 7 of the Macintosh LaserWriter driver

■ supports multiple bins, a multipurpose paper tray, an optional duplexer, and an envelope feeder

■ allows you to configure the driver according to your printer configuration

■ enables the printer to report to the user the paper size in the standard and optional cassettes

■ supports optical density control through the video interface

■ provides support for *n*-up printing; this is a driver feature offered by version 8.0 of the LaserWriter driver that allows you to print one, two, or four logical pages on a single sheet of paper

Apple Printer Utility Program

The Apple Printer Utility program, which is shipped with the LaserWriter 12/640 PS printer, allows you to control and configure the printer. Using the utility you can perform the following types of functions:

■ set printer parameters, such as printer name and start page mode

■ control face-up and face-down output

■ control duplex printing

■ set printer density

■ add or remove fonts and display or print a list of available fonts

■ set page parameters and get the number of pages printed by the printer

■ send PostScript files to the printer

■ set imaging options, such as FinePrint and PhotoGrade

■ set communication parameters for each I/O port

Page and Envelope Types

At the beginning of each job, the server selects the default paper tray, as assigned by the defaultpapertray operator. Table 2-1 lists the paper sizes available with the LaserWriter 12/640 PS printer. Table 2-2 lists the available paper tray slots and the corresponding slot numbers. If the default is the main 250-sheet cassette, the server can detect its size and install the appropriate image region. If the default is the 80-sheet multipurpose tray, the server uses the image region most recently installed by the setdefaultmultipurposetraysize operator. When the multipurpose tray is selected either as just described or by using the setpapertray operator, it is treated like the main cassette. Up to 80 sheets of paper may be stacked in it, and it feeds continuously until it is empty, at which time the paper-out light comes on.

When a job requires a particular paper size, it invokes one of the paper tray selection operators listed in Table 2-3 before it generates an image. That paper tray selection stays in effect for the duration of the job. The server restores the default paper tray selection when that job is finished.

If there is more than one paper source with the size of paper requested, the PostScript interpreter follows the Priority array from InputAttributes in the setpagedevice dictionary. The value of Priority is an array of integers. The first integer in the array represents the media source with the highest priority. When a setpagedevice request matches two or more media sources, setpagedevice chooses the one with the highest priority in the array of integers. If none of the matching sources appears in the array, setpagedevice chooses among them arbitrarily.

Table 2-1 lists the different page sizes that can be used for the PageSize key. Page size is indicated by an array of two numbers ([595 842]), which indicate width and height. Each unit is equivalent to 1/72 of an inch.

Table 2-1   Page sizes

Page size	Name	Page size	Name
[595 842]	A4	[522 756]	Executive
[595 842]	A4 small	[284 419]	European postcard
[420 595]	A5	[612 1008]	Legal
[516 728]	B5	[612 792]	Letter
[459 649]	C5 envelope	[612 792]	Letter small
[297 684]	COM10 envelope	[279 540]	Monarch envelope
[312 624]	DL envelope		

Table 2-2 lists the paper-tray slot numbers and corresponding input sources. Table 2-3 lists the paper-tray selection operators.

IMPORTANT

You cannot use the multipurpose tray to feed paper
if you are using the duplex printing option. ▲

Table 2-2   Paper-tray slot numbers and input sources

Slot number	Input source
0	Cassette (250 sheets)
1	Multipurpose tray (80 sheets)
2	Cassette (500 sheets)
3	Envelope/postcard tray

Table 2-3   Paper tray selection operators

Operator	Description
a4tray	Selects the paper tray containing A4-size paper and sets the page type to a4.
a5tray	Selects the paper tray containing A5-size paper and sets the page type to a5.
b5tray	Selects the paper tray containing B5-size paper and sets the page type to b5.
c5tray	Selects the paper tray containing C5-size paper and sets the page type to c5.
com10tray	Selects the paper tray containing COM10-size paper and sets the page type to com10.
dltray	Selects the paper tray containing DL-size paper and sets the page type to dl.
europostcardtray	Selects the tray containing EuroPostCard-size paper and sets the page type to europostcard.
legaltray	Selects the paper tray containing legal-size paper and sets the page type to legal.
lettertray	Selects the paper tray containing letter-size paper and sets the page type to either letter or lettersmall, depending on the value of pagetype.
monarchtray	Selects the paper tray containing Monarch-size paper and sets the page type to monarch.

NOTE   In all instances, a rangecheck error occurs if the server selects a tray for which no
matching paper tray is installed.

Device Setup

The PostScript language facilities set up the raster output device (printer) to fulfill the processing requirements of the page description. The setpagedevice operator performs the following device setup functions:

- Specifies processing requirements, such as making multiple copies or two-sided printing.

- Selects optional printer features, such as the proper input tray, paper size, and image area.

- Establishes device-dependent rendering parameters needed to produce output.

- Specifies default device setup or configuration parameters that may be used when the page description does not specify the parameters.

The currentpagedevice operator gets the current accumulated values and the adjusted state of the page device. The parameters for the setpagedevice operator are cumulative. This means that each new call to setpagedevice does not reset the state in total but modifies it. In addition, on each call to setpagedevice, the resulting accumulated page-device state is processed by the interpreter so that the printer can produce the required results. This may cause further modification of the page-device state.

The LaserWriter 12/640 PS printer uses the PostScript Level 2 implementation, which provides device control operators defined in the special dictionary statusdict.

For more information about how the setpagedevice operator specifies the processing requirements of a document, refer to Section 4.11 of the *PostScript Language Reference Manual*, second edition.

Page Device Parameters

This section describes the page-device parameters present in the LaserWriter 12/640 PS printer. Refer to the *PostScript Language Reference Manual*, Section 4.11.3, for supplemental information on parameter semantics. Table 2-4 lists the page device parameters and their defaults, and provides additional technical information.

Table 2-4   Page device parameters

Key	Type	Default	Description
BeginPage	*procedure*	{pop}	This procedure is executed at the beginning of each page. A BeginPage procedure occurs at the end of setpagedevice, at the end of showpage or copypage, and during any operation that reinstates a page device different from the existing one.
Duplex	*boolean*	false	If this parameter is true, each pair of consecutive pages is printed duplex, that is, on opposite sides of a single sheet of paper. If it is false, pages are printed simplex, that is, on one side only.
			The value persists across power cycles and restarts if it is set outside the server loop.
EndPage	*procedure*	{exch pop 2 ne}	This procedure is executed at the end of each page. An EndPage procedure occurs at the beginning of each showpage or copypage, and when the current page device is about to be replaced by a different page device.
ExitJamRecovery	*boolean*	false	If the value of this parameter is true (jam recovery enabled), pages that jam in the exit path are reprinted. If the value of this parameter is false (jam recovery disabled), pages that jam are not reprinted. Disabling jam recovery may improve performance, because without jam recovery it is possible to overlap more page processing.
			The value persists across power cycles and restarts if it is set outside the server loop.
HWResolution	*array*	[600 600]	This parameter indicates the resolution of the output in pixels (dots) per inch along the *x* and *y* axes. LaserWriter 12/640 PS resolution is 600 dpi.
ImagingBBox	*array* or *null*	null	This parameter is an optional bounding box. If not null, the value is an array of four numbers in the default user-coordinate system stating lower-left *x*, lower-left *y*, upper-right *x*, and upper-right *y* of the page image bounding box. When a PostScript program specifies an ImagingBBox, it asserts that it will not paint any marks outside the rectangle. However, any marks that fall outside the rectangle may still be painted.

continued

Table 2-4   Page device parameters (continued)

Key	Type	Default	Description
InputAttributes	*dictionary*	Depends on configuration	This dictionary contains an entry for each input media source available to the printer. The values *x* and *y* depend on which paper tray is installed. The 80-sheet manual feeder and 250-sheet universal cassette are always present. However, if an optional paper cassette is installed but missing, the corresponding entry in the `InputAttributes` dictionary is set to `null`. This can happen only when the printer is turned on and the tray is not installed. If a job is sent to the printer and the tray is removed, the PostScript interpreter assumes that a tray of the same size will be installed and sets the attributes accordingly. If a different tray is installed, the attributes change to reflect the characteristics of the new tray. There are values of matching tolerance for the `PageSize` parameter described later in this table.

In the LaserWriter 12/640 PS printer, the entries for the slots correspond to the following input sources:

- 0   250-sheet tray
- 1   Multipurpose tray
- 2   500-sheet tray
- 3   Envelope tray

Here is one example of how to use `InsertSheet`:

```
%... PostScript language code for page n
%... page n+1 is an inserted sheet
%
    save
    <</InsertSheet true>> setpagedevice % selects InsertSheet media showpage
    %send the InsertSheet media on to the output bin as page n+1
    restore %implicitly go back to using the regular media
%
%... PostScript language code for page n+2
```

Key	Type	Default	Description
Install	*procedure*		This procedure installs values in the graphics state during each call to `setpagedevice`. The `setpagedevice` operator calls this procedure after setting up the device and installing it as the current device in the graphics state, but before executing the implicit `erasepage` and `initgraphics` operators.

Table 2-4   Page device parameters (continued)

Key	Type	Default	Description
Install *(continued)*			The default install procedure is

```
{
currentpagedevice /PreRenderingDetails get dup
DefaultHalftone get exch /ActualPreRenderingEnhance get not {
-{ --nostringval-- exch 2 copy known {get}{exch pop} ifelse}
if Halftone findresource sethalftone
{} settransfer
false setstrokeadjust
DefaultColorRendering /ColorRendering findresource setcolorrendering
}
```

Key	Type	Default	Description
ManualFeed	*boolean*	false	The value of this parameter determines whether the input medium (paper, transparency, and so on) is to be drawn from the manual or from the automatic feeder. The value of this parameter is `true` for manual feeding and `false` for automatic feeding.
ManualFeedTimeout	*integer*	60	This parameter specifies the number of seconds the printer will wait for a page to be fed manually before generating a timeout error. The default is 60 seconds. If the value is set to 0, there is no timeout, and the printer waits infinitely. The value persists across power cycles and restarts if it is set outside the server loop.
Margins	*array*	[0 0]	This parameter is an array of two numbers that relocate the page image on the media by *x* units in the direction of the *x* coordinate and *y* units in the direction of the *y* coordinate. The *x* and *y* values are expressed as 1/600 inch. The value persists across power cycles and restarts if it is set outside the server loop.
MediaColor	*string* or *null*	null	This parameter specifies the color of the input media. If `MediaColor` is not `null`, `setpagedevice` compares it with the `MediaColor` values, if there are any, in the `InputAttributes` entries for all media available for consideration.

continued

Table 2-4 Page device parameters (continued)

Key	Type	Default	Description
MediaType	*string* or *null*	null	This parameter specifies the type of media, that can be used in the LaserWriter 12/640 PS—paper, transparency, and so forth. If MediaType is not null, setpagedevice compares it with the MediaType values, if there are any, in the InputAttributes entries for all media available for consideration. The value of the parameter is an aribitrary string that idnetifies such things as preprinted forms or other media attributes that are not defined by size, color, or weight.
MediaWeight	*number* or *null*	null	This parameter specifies the weight of the media. If MediaWeight is not null, setpagedevice compares it with the MediaWeight values, if there are any, in the InputAttributes entries for all media available for consideration. Weight is expressed in grams per square meter. You can convert ream weight, which is in pounds, to gram weight by multiplying the ream weight by 3.76. For example, 10-pound paper is about 37.6 grams per square meter.
NumCopies	*integer* or *null*	null	If the value of this parameter is not null, it specifies the number of copies to produce. The value applies to each individual page, or to the entire document, depending on the setting of Collate. If the value of NumCopies is null, showpage and copypage should consult the value of #copies in the current dictionary stack each time they are executed.
OutputFaceUp	*boolean*	false	The value of this parameter determines whether the printed pages are output face up or face down in the output tray. If the value is false, the pages are output face down. If the value is true, the pages are output face up.

The value persists across power cycles and restarts if it is set outside the server loop. |

continued

Table 2-4   Page device parameters (continued)

Key	Type	Default	Description
OutputPage	*boolean*	true	If the value of this parameter is `true`, pages are printed normally and are output into the output tray. If the value is `false`, no pages are actually printed. However, all other processing is done as if the pages were to be printed, including rasterizing to a frame buffer. In this case, the time required to process a page includes everything except the time spent waiting for the marking engine. In addition, rasterization occurs synchronously with the execution of `showpage` instead of being overlapped with the execution of subsequent pages. This function measures the cost in time of executing a page.
PageDeviceName	*null*	null	This parameter, used by the `findcolorrendering` operator, is a string that provides a way to label a specific device setup. The parameter may be a *string*, a *name*, or *null*.
PageSize	*array*	Depends on configuration	This parameter defines the overall page size that was assumed during generation of the page description. The `PageSize` parameter is an array of two numbers [width height], that specify the overall size of the page including borders. Matching tolerance is 5 default user space units in either dimension. Landscape mode ([792 612]) is also valid. Table 2-1 on page 30 provides information on paper sizes available.
Policies	*dictionary*		This dictionary contains feature-policy pairs that specify what `setpagedevice` should do when a feature request cannot be satisifed. It contains an overall policy and may also contain individual policies for specific features. A policy is an integer that provides a number of ways that an unsatisfied request can be handled. Changes to the contents of the dictionary are cumulative and you can add new features to ones already present. There are three basic policy choices contained in the `PolicyNotFound` key of the dictionary:

■ 0 Generate a `configurationerror`, and abandon execution of `setpagedevice`, leaving the current device unchanged.
■ 1 Ignore the feature request.
■ 2 Interact with a human operator.

continued

Table 2-4   Page device parameters (continued)

Key	Type	Default	Description

Policies *(continued)*			The default in the LaserWriter 12/640 PS dictionary is 1, as shown below:
			
			`<</PolicyNotFound 1`
			`/PageSize 0`
			`/PolicyReport{pop}`
			`OutputDevice 0`
			`/ProcessColorModel 0>>`

PostRendering Enhance	*boolean*	true	If the value of this parameter is `true`, product-specific image enhancements are enabled. These enhancements are made after the page is rasterized in memory. The value persists across power cycles and restarts if it is set outside the server loop.
PostRendering EnhanceDetails	*dictionary*	Type 1	This dictionary describes product-specific details related to the postrendering image enhancement. Refer to "Details Dictionary" on page 40 for further information.
PreRendering Enhance	*boolean*	true	If the value of this parameter is `true`, product-specific image enhancements are enabled. These enhancements are made before the image is rasterized into memory. The `PreRenderingEnhance` parameter in the page-device dictionary is treated as a hint rather than an assertion. If there is not sufficient memory to create an enhanced frame buffer of the requested size, this parameter is treated as an unsatisfied request to be handled by the `Policies` dictionary. The value persists across power cycles and restarts if it is set outside the server loop.

PreRendering Enhance Details	*dictionary*	Hardware dependent	This dictionary describes product-specific details related to the prerendering image enhancement.
			
			Refer to "Details Dictionary" on page 40 for further information.
			
			The LaserWriter 12/640 PS dictionary has the following default setting:
			
			`<</Type 1`
			`/S2 string`
			`/actualPreRenderingEnhance false`
			`/S3 string`
			`/DefaultHalftone 106x45`
			`/S4 string`
			`/S1 string>>`

continued

Table 2-4   Page device parameters (continued)

Key	Type	Default	Description
ProcessColorModel	*name* or *string*	DeviceGray	This *name* or *string* specifies the colorant model used for rendering colors in the device. It affects rendering for all color spaces except separation color spaces that actually produce separations. It does not affect the interpretation of color values in any color space. It controls only the rendering method.
			Legal values are DeviceGray, DeviceRGB, DeviceCMYK, DeviceCMY, and DeviceRGBK, where RGB refers to Red, Green, and Blue; RGBK refers to Red, Green, Blue, and Black; CMY refers to Cyan, Magenta, and Yellow; and CMYK refers to Cyan, Magenta, Yellow, and Black. The default value, DeviceGray, selects the native device color (gray) space.
TraySwitch	*boolean*	false	If the value of this parameter is true, automatic tray switching is provided. When one tray runs out of paper, the printer switches to another tray containing the same type of medium, without alerting you that the printer has run out of paper.
Tumble	*boolean*	false	When Duplex is true, Tumble specifies how the page images on opposite sides of a sheet are oriented in relation to each other. If Tumble is false, the default user spaces of the two pages are oriented so that the highest values of *y* in the two spaces lie along the same edge of the media. If Tumble is true, the default user spaces are oriented so that the highest values of *y* lie along opposite edges of the media.
			A Tumble value of false produces output that is suitable for binding along the left or right sides of the page. A value of true produces output that is suitable for binding at the top or the bottom of the page.

NOTE   All the terms in column 1, for example PostRenderingEnhanceDetails, are one word. They may be split in this table because of column width restrictions.

CHAPTER 2

LaserWriter 12/640 PS Software

Details Dictionary

Certain page-device features have many variables that determine how the features function. These features include folding the paper, stapling, trimming, binding, and so forth. The LaserWriter 12/640 PS printer has two such features associated with image enhancement. They are prerendering enhancement described on page 38, and postrendering enhancement described on page 38. The page-device feature is enabled or disabled by a primary page-device entry. However, the exact way in which the feature functions is governed by secondary entries in a `Details` dictionary page-device entry. This means an application that is not knowledgeable about the details of the feature can enable and disable the feature, while more sophisticated utilities configure the details separately. Section 2.1 of the *PostScript Language Reference Manual Supplement* provides more information on this subject.

Product Strings

The LaserWriter 12/640 PS printer's strings contain characters that provide information about the printer and the printer software. Table 2-5 lists values assigned to the LaserWriter 12/640 PS product strings.

Table 2-5   Product string values

String name	Type	Value	Definition
languagelevel	*integer*	2	Level of the PostScript language
product	*string*	LaserWriter	Product name
revision	*integer*	1	Current revision level of the printer
serialnumber	*integer*	Depends on the individual printer	Serial number of the printer
version[*]	*string*	2015	Version of the PostScript language

[*]The value of `version` is the current version of the PostScript language. This may be updated in printers that ship later.

Interpreter Parameters

Interpreter parameters control the operation and behavior of the PostScript interpreter. Many of them are connected with memory allocation and other specific-purpose resources. For instance, interpreter parameters control the maximum amount of memory allocated to virtual memory, font cache, and halftone screens.

The LaserWriter 12/640 PS printer is configured initially with interpreter parameter values appropriate for most applications. Using a PostScript language program, however, you can alter the interpreter parameters to favor certain applications or to adapt the printer to special requirements. There are three classes of interpreter parameters—user, system, and device—and several types of device parameters, including communications, parallel port, engine, and emulator parameters.

Each class has a PostScript language operator to read the parameter values and an operator to set parameter values. There are six resulting operators: `currentuserparams`, `setuserparams`, `currentsystemparams`, `setsystemparams`, `currentdevparams`, and `setdevparams`.

You will find information on parameter semantics in the *PostScript Language Reference Manual*, second edition.

User Parameters

Within reasonable limits, you can change user parameters without special authorization or a password, using any PostScript language program. User parameters establish temporary policies on issues such as size limits and insertion of new items into caches.

The `setuserparams` operator sets user parameters, and the `currentuserparams` operator reads their current values. Unless otherwise indicated, all user parameters are subject to `save` and `restore` boundaries. The `restore` operator resets all user parameters to their values at the time of the matching `save`. The initial value of the user parameters when the printer is turned on for the first time depends on the product. Table 2-6 lists the user parameters present in the LaserWriter 12/640 PS printer. You can find further information on these parameters in the *PostScript Language Reference Manual*, second edition, and the *PostScript Language Reference Manual Supplement*, (for version 2015).

Table 2-6 User parameters

Key	Type	Default	Description
AccurateScreens	*boolean*	false	This is an optional parameter. If its value is `true`, it invokes a special halftone algorithm that is extremely precise but requires a lot of computation.
JobName	*string*	()	This parameter establishes *string* as the name of the current job. It should contain no more than 32 characters.
JobTimeout	*integer*	0	This parameter sets the number of seconds a job is allowed to run before it is aborted and a `timeout` error is generated. This parameter may be any number larger than 0. If you set this parameter to 0, time out is disabled.
MaxDictStack	*integer*	530	This parameter determines the maximum number of elements in the dictionary stack. This parameter may be set to 0 or any number larger than 0.
MaxExecStack	*integer*	10015	This parameter determines the maximum number of elements in the execution stack. This parameter may be set to 0 or any number larger than 0.
MaxFontItem	*integer*	12500	This parameter determines the maximum number of bytes occupied by the pixel array of a single character in the font cache. This parameter may be set to 0 or any number larger than 0.
MaxFormItem	*integer*	100000	This parameter determines the number of bytes occupied by a single cached character. This parameter may be set to 0 or any number larger than 0.
MaxLocalVM	*integer*	2147483647	This parameter determines the maximum number of bytes occupied by values in local virtual memory. This parameter may be set to 0 or any number larger than 0.
MaxOpStack	*integer*	100000	This parameter determines the maximum number of elements in the operand stack. This parameter may be set to 0 or any number larger than 0.
MaxPatternItem	*integer*	20000	This parameter determines the maximum number of bytes occupied by a single cached pattern. This parameter may be set to 0 or any number larger than 0.
MaxScreenItem	*integer*	48000	This parameter determines the maximum number of bytes occupied by a single halftone screen. This parameter may be set to 0 or any number larger than 0.

continued

Table 2-6   User parameters (continued)

Key	Type	Default	Description
MaxUPathItem	*integer*	5000	This parameter determines the maximum number of bytes occupied by a single cached user path. This parameter may be set to 0 or any number larger than 0.
MinFontCompress	*integer*	1250	This parameter sets the threshold at which a cached character is stored in compressed form instead of as a full pixel array. This parameter may be set to 0 or any number larger than 0.
VMReclaim	*integer*	0	This parameter enables or disables local garbage collection. ■ 0 Enables automatic collection ■ -1 Disables local garbage collection for VM ■ -2 Disables both local and global garbage collection for VM.
VMThreshold	*integer*	40000	This parameter indicates the frequency of garbage collection. Collection is triggered whenever the number of bytes indicated by the parameter setting has been allocated. This parameter may be set to 0 or any number larger than 0.
WaitTimeout	*integer*	40	This parameter indicates the current wait timeout, which is the number of seconds the interpreter waits to receive additional characters from the host before it aborts the current job by executing a timeout error. This parameter may be set to 0 or any number larger than 0.

System Parameters

System parameters alter the overall configuration of the printer. You can set system parameters using the setsystemparams operator and read them using the currentsystemparams operator. You must use a password to change system parameters. System parameters are not subject to save and restore. Their values persist across jobs and may persist across power cycles. Table 2-7 lists the system parameters in the LaserWriter 12/640 PS printer.

Note
For further information about parameters listed in Table 2-7, refer to the *PostScript Language Reference Manual Supplement*, Sections 3.4 and 3.9. ◆

Table 2-7   System parameters

Key	Type	Default	Description
BuildTime	*integer*	812665928	This is a time stamp that identifies the date the PostScript interpreter was built. It is a read-only constant.
ByteOrder	*boolean*	false	This parameter determines the order of multiple-byte numbers in binary-encoded tokens: false indicates high-order byte first and true indicates low-order byte first. This is a read-only constant.
CurDisplayList	*integer*	0	This parameter identifies the amount of RAM currently occupied by the display list. This is a read-only parameter that may be changed when the amount of RAM occupied changes.
CurFontCache	*integer*	0	This parameter identifies the amount of RAM currently occupied by the font cache. This is a read-only parameter that may be changed when the amount of RAM occupied changes.
CurFormCache	*integer*	0	This parameter identifies the amount of RAM currently occupied by the form cache. This is a read-only parameter that may be changed when the amount of RAM occupied changes.
CurInputDevice	*string*	()	This parameter indicates the name of the communications device that corresponds to the current input file for the PostScript language program currently being executed. This is a read-only parameter that may be changed when the input file changes.
CurOutlineCache	*integer*	0	This parameter identifies the amount of RAM currently occupied by the outline cache. This is a read-only parameter that may be changed when the amount of RAM occupied changes.
CurOutputDevice	*string*	()	This parameter indicates the name of the communications device that corresponds to the current output file for the PostScript language program currently being executed. This is a read-only parameter that may be changed when the output file changes.

continued

Table 2-7   System parameters (continued)

Key	Type	Default	Description
CurPatternCache	*integer*	0	This parameter identifies the amount of RAM currently occupied by the pattern cache. This is a read-only parameter that may be changed when the amount of RAM occupied changes.
CurScreenStorage	*integer*	0	This parameter identifies the amount of RAM currently occupied by screen storage. This is a read-only parameter that may be changed when the amount of RAM occupied changes. Possible values are: ■ 3250 for **24 MB, 20 MB, 16 MB** ■ 9642 for **8 MB, 4 MB**
CurSourceList	*integer*	0	This parameter indicates the number of bytes currently occupied by source lists. This is a read-only parameter and may be set to **0** or any number larger than **0**. It may be changed when the number of bytes occupied changes.
CurUPathCache	*integer*	0	This parameter indicates the number of bytes currently occupied by the U path cache. This is a read-only parameter and may be set to **0** or any number larger than **0**. It may be changed when the number of bytes occupied changes.
DoStartPage	*boolean*	true	This parameter indicates whether or not the start page should print during system initialization. The start page prints if the value is `true`. The value persists across power cycles and restarts if it is set outside the server loop.
FactoryDefaults	*boolean*	false	This parameter is generally `false`. However, if you set the parameter to `true` and immediately turn off the printer, all nonvolatile parameters will revert to the factory default values the next time the printer is turned on. The value persists across power cycles and restarts if it is set outside the server loop.

continued

Table 2-7   System parameters (continued)

Key	Type	Default	Description
FatalErrorAddress	*integer*	0	This integer is the hardware address of the last call to the fatal error handler. A nonzero value for this parameter indicates that a fatal system error occurred earlier.
			The value persists across power cycles and restarts if it is set outside the server loop.
FontResourceDir	*string*	(fonts/)	This parameter controls the location of external fonts that are resources in PostScript Level 2.
GenericResourceDir	*string*	(Resource/)	This parameter controls the location of external resources for the `Generic` category and all other categories based upon it.
GenericResource PathSep	*string*	(/)	This parameter is used in conjunction with `GenericResourceDir` to control the location of external resources for the `Generic` category and all other categories based upon it.
			With `GenericResourceDir` as (Resource/) and `GenericResourcePathSep` as (/), the `AdobeLogo` resource of the `Pattern` category would be in `Resource/Pattern/AdobeLogo`.
JobTimeout	*integer*	0	This parameter indicates the value in seconds to which the user parameter `JobTimeout` is initialized at the beginning of each job. This parameter may be set to 0 or any number larger than 0.
			The value persists across power cycles and restarts if it is set outside the server loop.
LicenseID	*string*	(LN-001-013)	This parameter contains the Adobe-assigned license identification. This value is unique to each printer. Any string of non-null characters is legal. This is a read-only constant.

continued

Table 2-7   System parameters (continued)

Key	Type	Default	Description
MaxDisplayList	*integer*	Depends on RAM size	This parameter indicates the maximum number of bytes occupied by display lists, excluding those held in caches. Initial value is generally about 8% of installed RAM. This number is recomputed when the RAM configuration changes. This parameter may be set to 0 or any number larger than 0.
MaxFontCache	*integer*	Depends on RAM size	This parameter indicates the maximum number of bytes occupied by the font cache. Initial value is based on the amount of RAM installed. The value is 167,772 bytes for 4 MB RAM. Otherwise, the value is 10% of installed RAM. This number is recomputed when the RAM configuration changes.
			The value persists across power cycles and restarts if it is set outside the server loop.
MaxFormCache	*integer*	100000	This parameter indicates the maximum number of bytes occupied by the form cache. This parameter may be set to 0 or any number larger than 0.
MaxImageBuffer	*integer*	65536	This parameter indicates the maximum number of bytes that can be used for a single image buffer. The image buffer holds an internal data representation for sampled image source data. The interpreter may round the value if the value requested is out of range.
MaxOutlineCache	*integer*	65536	This parameter indicates the maximum number of bytes occupied by cached character outlines (CharStrings) for fonts whose definitions are kept on disk instead of in VM. This parameter may be set to 0 or any number larger than 0.
MaxPatternCache	*integer*	100000	This parameter indicates the maximum number of bytes occupied by the pattern cache. This parameter may be set to 0 or any number larger than 0.

continued

Table 2-7   System parameters (continued)

Key	Type	Default	Description
MaxRasterMemory	*integer*	Depends on hardware	This parameter indicates the largest amount of memory, in bytes, that may be allocated to the frame buffer. A value of 0 indicates that enough memory should be reserved for the largest achievable frame buffer. The implementation ignores values that are too small, and guarantees that an `a4small`, `lettersmall`, or `b5` size frame buffer can be allocated. This parameter may be set to 0 or any number larger than 0.
			This value can only be raised from the initial startup value. This is done to prevent some pages from having insufficient memory and failing to print. To reset this parameter, you must use the `FactoryDefaults` parameter to restore the default value.
			Possible values for this parameter are:
			■ `20333520` for **24 MB** ■ `16404000` for **20 MB** ■ `12793984` for **16 MB** ■ `10166760` for **12 MB** ■ `5388535` for **8 MB** ■ `2333434` for **4 MB**
MaxScreenStorage	*integer*	120000	This parameter indicates the maximum number of bytes occupied by all active halftone screens. Initial value is 30,000 bytes per MB of RAM installed, up to a maximum of 120,000 bytes. This number is recomputed when the RAM configuration changes. This parameter may be set to 0 or any number larger than 0.
			The value persists across power cycles and restarts if it is set outside the server loop.
MaxSourceList	*integer*	40960	This parameter indicates the maximum number of bytes that can be used by source lists. This parameter may be set to 0 or any number larger than 0.
			The value persists across power cycles and restarts if it is set outside the server loop.

continued

Table 2-7   System parameters (continued)

Key	Type	Default	Description
MaxUPathCache	*integer*	300000	This parameter indicates the maximum number of bytes occupied by the user path. This parameter may be set to 0 or any number larger than 0.
PageCount	*integer*	0	This parameter indicates how many pages have been successfully printed since manufacture. This is a read-only parameter that changes as the number of pages printed changes. The value persists across power cycles and restarts if it is set outside the server loop.
PrinterMode	*integer*	0	This parameter indicates the position of the printer's push-button configuration switch. The value is 0 when the switch is pushed in and 1 when it is out.
PrinterName	*string*	(LaserWriter 12/640 PS)	This parameter establishes *string* as the current name of the printer. You may set this parameter to any string of 32 or fewer characters. The colon (:) and the at symbol (@) are not allowed. The value persists across power cycles and restarts if it is set outside the server loop.
RamSize	*integer*	Depends on RAM size	This read-only parameter indicates in bytes the amount of the RAM installed in the printer. The LaserWriter 12/640 PS printer is initially configured with 4 MB of RAM. A total of 64 MB can be installed. The value of this parameter changes if the amount of RAM installed changes. Possible values are: ■ 25165824 for 24 MB ■ 20971520 for 20 MB ■ 16777216 for 16 MB ■ 12582912 for 12 MB ■ 8388608 for 8 MB ■ 4194304 for 4 MB
RealFormat	*string*	IEEE	This read-only constant is a native representation of real numbers in binary encoded tokens.

continued

Table 2-7 System parameters (continued)

Key	Type	Default	Description
Revision	*integer*	1	This parameter designates the current revision level of the ROM in which the interpreter is running. It is a read-only constant.
StartupMode	*integer*	1	This parameter decides whether the system start file or some other startup procedure should be executed during system initialization. If the value is 0, there are no special startup procedures. Other values may be used that are product specific, and they result in product-dependent startup procedures.
ValidNV	*boolean*	true	This read-only parameter indicates whether nonvolatile memory is currently used to store persistent parameters. When it is true, persistent parameters are stored in nonvolatile memory. The value of the parameter changes if the status of the nonvolatile memory changes.
WaitTimeout	*integer*	40	This parameter indicates the value in seconds to which the user parameter WaitTimeout is initialized at the beginning of each job. The parameter may be set to 0 or any number larger than 0. A value of 0 indicates an infinite wait period. The value persists across power cycles and restarts if it is set outside the server loop.

Device Parameters

Each PostScript interpreter uses device parameters to support a collection of input/output storage devices such as communciation channels, disks, and cartridges. You may set device parameters using the setdevparams operator, and you may read them using currentdevparams. Device parameters have similar characteristics to system parameters: you require a password to change these parameters, they are global to the PostScript environment, they have similar persistence characteristics, and some of them can be stored in nonvolatile storage.

Device parameters are different from system and user parameters in that device parameters may be interdependent. This means that the legality of a given parameter may depend on the value of another parameter.

Device parameters fall into sets that correspond to a particular communications device (`%EtherTalk%`, `%parallel%`, and so on). Some device parameters correspond to a software entity such as a language emulator.

Note

Even if two printers are using the same I/O storage device, the parameters in the set may be different because the hardware support for that device is different. ◆

There are two communication parameters used in the LaserWriter 12/640 PS to which you should pay particular attention. They are `Filtering` and `Interpreter`. The following section provides background information on these parameters.

Filtering and Interpreter Parameters

The `Filtering` and `Interpreter` parameters are used with the following communication protocols: LocalTalk, EtherTalk, LPR, print server, and remote printer. The parallel port uses only the `Interpreter` parameter. This section provides general background information about the parameters. Information specific to each communication channel is provided in the related table later in this chapter.

The `Filtering` parameter is a protocol detection device, and it determines whether or not the Adobe IntelliSelect heuristic method is used for automatic protocol detection. Supported values are `None`, which means that the automatic protocol handling does not occur, and `InterpreterBased`, which means that the heuristic method is used. The `/InterpreterBased` setting is generally used when the `Interpreter` parameter is set to `AutoSelect`. The default is `None`.

Note

The term *heuristic* may be applied to a method of gathering information based upon the creation of models as a working hypothesis of a goal or solution. ◆

The `InterpreterBased` setting does not support asynchronous status inquiries, and may therefore render many host print drivers and spoolers unusable.

Normally automatic detection is used when the `Interpreter` is set to `AutoSelect`. However, if you are using the parameter on LocalTalk, EtherTalk, or the LPR channel, you may use automatic detection with a fixed `Interpreter` value, such as `PostScript` or `LaserJetIII`, to support Adobe Standard, TBCP, and PJL protocols.

The `Interpreter` parameter indicates the type of executable job represented by the arriving data. The alternative settings for this parameter are `PostScript`, `LaserJetIII`, `AutoSelect`, `PCL`, and `HexDmp`. `PostScript` is the default for the LaserWriter 12/640 PS printer. The function of the parameter varies slightly depending on the environment in which it is used.

If you select `AutoSelect` as the LocalTalk `Interpreter` setting, the value invokes the heuristic-based algorithm (IntelliSelect) to determine the language of the incoming data stream (PostScript, PCL, or screen dump). If you select `AutoSelect` as the parallel port `Interpreter` setting, the value invokes the heuristic-based algorithm to determine the

protocol of the incoming data stream (Adobe Standard, TBCP, PJL, or none) as well as the language (PostScript, PCL, or screen dump). In both cases, you should be careful if you make this selection, since some print jobs are valid in more than one language and there is no guarantee that this algorithm will select the most appropriate language. In addition, `AutoSelect` does not support asynchronous status inquiries and may thus render many host print drivers and spoolers unusable.

Device Parameters for Type /FileSystem Devices

The LaserWriter 12/640 PS printer supports `%rom%` file system devices. The parameters are listed in Table 2-8. The term cartridge in this context refers to the ROM device.

Table 2-8   Parameters for `%rom%` devices

Key	Type	Default	Description
BlockSize	*integer*	1	This read-only constant indicates the formatting size of a page.
CartridgeID	*integer*	9110	This read-only parameter indicates the ID that uniquely identifies the cartridge. The parameter may be changed if the cartridge is changed
			The value persists across power cycles and restarts if it is set outside the server loop.
CartridgeType	*integer*	4	This read-only parameter indicates the category classification of the cartridge. The classification is a registry maintained by Adobe Systems, and may be changed if the cartridge type is changed.
			The value persists across power cycles and restarts if it is set outside the server loop.
Free	*integer*	0	This read-only parameter indicates the amount of free space (in pages) on the storage medium. It is set to 0 for cartridge devices, but may be changed when the amount of free space changes.
			The value persists across power cycles and restarts if it is set outside the server loop.
HasNames	*boolean*	true	This parameter indicates whether the device supports named files. If the device is not mounted, the parameter has a value of `false`. This is a read-only constant.

continued

Table 2-8   Parameters for `%rom%` devices (continued)

Key	Type	Default	Description
InitializeAction	*integer*	0	This parameter specifies an action for initializing the device. There are four possible values: ■ **0** no action required ■ **1** delete current file system ■ **2** reformat the medium ■ **3** similar to 2 Refer to the *PostScript Language Reference Manual Supplement,* (for version 2015), for further information.
LogicalSize	*integer*	98520	This read-only parameter specifies the size of the file system to be created and is used as an argument to the action performed by the InitializeAction parameter. The parameter may be changed when the size of the file system changes. The value persists across power cycles and restarts if it is set outside the server loop.
Mounted	*boolean*	true	This parameter specifies or determines whether or not a device is mounted. When the parameter is set to true, the system attempts to mount the device. When it is set to false, the system attempts to dismount the device. When queried, the value indicates whether the device is currently mounted. A value of true indicates the device is mounted, and a value of false indicates it is not mounted.
PhysicalSize	*integer*	98520	This read-only parameter indicates the size of the media. This value is in *pages* if page size is indicated by the BlockSize parameter. The value is only valid when the device is mounted. A value of 0 indicates the device is not mounted. The value of the parameter may be changed when the size of the media changes. The value persists across power cycles and restarts if it is set outside the server loop.
Removable	*boolean*	false	This parameter indicates whether the device, in this case ROM, is removable. This is a read-only constant. It is true when the device is removable, and false when it is not.
Searchable	*boolean*	true	This parameter indicates whether the device supports file system search operations without specifying a device.

continued

Table 2-8   Parameters for `%rom%` devices (continued)

Key	Type	Default	Description
SearchOrder	*integer*	11	This parameter indicates the priority at which a device searches for a file when no device has been specified. Lower values indicate a higher priority.
Type	*name*	/FileSystem	The value of this parameter is always /FileSystem for disk devices. This is a read-only constant.
Writeable	*boolean*	false	This parameter indicates whether the files on the device can be opened for a write access. It is true when the files can be accessed for a write operation, and false when they cannot. The parameter can be set only during the device mounting operation. It is a read-only constant.

Communication Device Parameters

The LaserWriter 12/640 PS printer has three communication ports that implement six communication channels:

■ A 9-pin mini-DIN connector is configured to use LocalTalk protocol and supports the `%LocalTalk%` channel.

■ A 36-pin Centronics parallel port supports the `%Parallel%` channel.

■ A 14-pin AUI connector supports the `%EtherTalk%`, `%LPR%`, `%PrintServer%`, and `%RemotePrinter%` channels.

Each channel has three related parameter sets:

■ nonvolatile (NV)

■ pending

■ RAM

The factory default values for the parameter sets are listed inTables 2-9 through 2-14.

LocalTalk Parameters

The RS-422 port supports LocalTalk. Table 2-9 lists the factory default settings for `%LocalTalk%`, `%LocalTalk_NV%`, and `%LocalTalk_Pending%`.

Table 2-9   Parameters for `%LocalTalk%`, `%LocalTalk_NV%`, and `%LocalTalk_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all pages of a job have been printed. The network channel remains open. Messages such as printer error messages are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for processing. If the value is `true`, data is processed. If the value is `false`, data is not processed.
Filtering	*name*	/None	This parameter controls whether or not Adobe IntelliSelect heuristics are used for automatic protocol detection. The default setting `None` means that automatic protocol handling does not occur.
			Refer to "Filtering and Interpreter Parameters" on page 51 and to the note at the end of this table for further information on this subject.
HasNames[1]	*boolean*	false	This read-only parameter indicates whether the printer supports named files. If the printer is not mounted, or if `Type` is `/Communications`, the value of this parameter is `false`.

1. The `HasNames` and `Type` parameters are read-only constants.

continued

Table 2-9 Parameters for `%LocalTalk%`, `%LocalTalk_NV%`, and `%LocalTalk_Pending%` (continued)

Key	Type	Default	Description
Interpreter	*name*	/PostScript	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are ■ PostScript ■ LaserJetIII ■ AutoSelect ■ PCL ■ HexDmp Refer to "Filtering and Interpreter Parameters" on page 51 and to the note at the end of this table for further information on this subject.
LocalTalkType	*string*	(LaserWriter)	This parameter represents the `Type` piece of the LocalTalk entity name. It is set to the name of the printer type. In the case of the LaserWriter 12/640 PS printer, the type is `LaserWriter`.
NodeID	*integer*	0	This read-only parameter represents the local network address of the printer. Legal addresses are values between `128` and `254`. A value of **0** indicates that the address has not yet been set. You should set `NodeID` at startup.
On	*boolean*	true	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value of this parameter is `false`, data sent to the printer is lost.

continued

Table 2-9 Parameters for `%LocalTalk%`, `%LocalTalk_NV%`, and `%LocalTalk_Pending%` (continued)

Key	Type	Default	Description
PrinterControl	*name*	/PSPrinter	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are ■ PSPrinter ■ PJL When the parameter is set to PSPrinter, the Interpreter parameter selects the page description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the Interpreter parameter is set to AutoSelect or PCL. When the parameter is set to PJL, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands, The PJL current environment is used on each invocation of a PDL to set up the initial state.
Type[1, 2]	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

1. The HasNames and Type parameters are read-only constants.
2. All values, with the exception of Type, persist across power cycles and restarts.

IMPORTANT

Automatic protocol detection may be used with a fixed parameter value to provide Adobe Standard, TBCP, and PJL protocol support. To implement this function, you must set the Filtering parameter to /InterpreterBased, and the Interpreter parameter to /AutoSelect. The /InterpreterBased filter does not support asynchronous status inquiries. Therefore it can make many host printer drivers and spoolers unusable. ▲

Parallel Port Parameters

The 36-pin Centronics parallel connector supports parallel communication. Table 2-10 lists the factory default settings for `%Parallel%`, `%Parallel_NV%`, and `%Parallel_Pending%`.

Table 2-10   Parameters for `%Parallel%`, `%Parallel_NV%`, and `%Parallel_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all of the pages of a job have been printed. The network channel remains open. Messages such as printer error messages are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for processing. If the value is `true`, data is processed. If the value is `false`, data is not processed.
HandShake	*integer*	1	This parameter indicates the requirements for special handshaking on the parallel port. A value of 0, 3, 4, or 5 indicates that the transfer will be a unidirectional parallel transfer. A value of 1 indicates that handshaking should occur in accordance with the *Hewlett-Packard® "Boise" Parallel Port Interface Specification*, Revision 0.6. A value of 2, 6, 7, or 8 reflects IEEE 1284 specifications, version 1.00 or 2.00. You must set `OutputDevice` to `Parallel` to take advantage of the handshaking protocol.
			When this parameter is set to 0, `OutputDevice` must be set to `()`. Otherwise, a configuration error will occur.

continued

Table 2-10   Parameters for `%Parallel%`, `%Parallel_NV%`, and `%Parallel_Pending%` (continued)

Key	Type	Default	Description
HasNames	*boolean*	`false`	This parameter indicates whether the printer supports named files. If the printer is not mounted, or if `Type` is `/Communications`, the value is `false`. This value is a read-only constant.
Interpreter	*name*	`/PostScript`	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are ■ `PostScript` ■ `LaserJetIII` ■ `AutoSelect` ■ `PCL` ■ `HexDmp` Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
On	*boolean*	`true`	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value is `false`, data sent to the printer is lost.
OutputDevice	*string*	`(%Parallel%)`	This parameter specifies which communications device to use for `stdout` and `stderr`. When it is set to `%Parallel%` and the `HandShake` parameter is set to 1, the output is directed out through the parallel port. If `HandShake` is set to 0, this parameter must be set to `()`.
PrinterControl	*name*	`/PSPrinter`	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are ■ `PSPrinter` ■ `PJL`

continued

Table 2-10   Parameters for `%Parallel%`, `%Parallel_NV%`, and `%Parallel_Pending%` (continued)

Key	Type	Default	Description
PrinterControl *(continued)*			When the parameter is set to `PSPrinter`, the `Interpreter` parameter selects the page-description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the `Interpreter` parameter is set to `AutoSelect` or `PCL`.
			When the parameter is set to `PJL`, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands. The PJL current environment is used on each invocation of a PDL to set up the initial state.
Protocol	*name*	/Normal	This parameter indicates the type of communications protocol to be used: ■ `Normal` ■ `Raw` ■ `TBCP` (tagged binary communication protocol) For further information on protocols, refer to Section 3.5.3 of the *PostScript Language Reference Manual Supplement*.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

NOTE   All values, with the exception of `DelayedOutput`, `HasNames`, and `Type`, persist across cycles and restarts.

EtherTalk Parameters

The 14-pin AUI connector supports EtherTalk communication. Table 2-11 lists the factory default settings for `%EtherTalk%`, `%EtherTalk_NV%`, and `%EtherTalk_Pending%`.

Table 2-11   Parameters for `%EtherTalk%`, `%EtherTalk_NV%`, and `%EtherTalk_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all pages of a job have been printed. The network channel remains open. Messages such as printer error messages are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for processing. If the value is `true`, data is processed. If the value is `false`, data is not processed.
EthernetAddress	*string*	Hardware dependent	This is a unique 17-character string that represents the Ethernet address of the printer.
EtherTalkType	*string*	(LaserWriter)	This parameter indicates the *type* piece of the EtherTalk *entity name*. The entity name consists of three pieces— *zone*, *type*, and *object*—each of which is a string of 32 or fewer non-null characters.
			Setting the `EtherTalkType` string also sets the `LocalTalkType` string within the `%LocalTalk%` parameter set to the same value. The `appletalktype` compatibility operator also reflects the same value.
EtherTalkZone	*string*	(*)	This parameter indicates the zone piece of the EtherTalk entity name.

continued

Table 2-11   Parameters for `%EtherTalk%`, `%EtherTalk_NV%`, and
`%EtherTalk_Pending%` (continued)

Key	Type	Default	Description
Filtering	*name*	/None	This parameter indicates whether the input data stream needs further filtering before it can be correctly interpreted as a page description language.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
HasNames	*boolean*	false	This read-only parameter indicates whether the printer supports named files. If the printer is not mounted, or if `Type` is `/Communications`, the value is `false`.
Interpreter	*name*	/PostScript	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are
			■ `PostScript` ■ `LaserJetIII` ■ `AutoSelect` ■ `HexDmp`
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
On	*boolean*	true	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value of this parameter is `false`, data sent to the printer is lost.
PrinterControl	*name*	/PSPrinter	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are
			■ `PSPrinter` ■ `PJL`

continued

Table 2-11 Parameters for `%EtherTalk%`, `%EtherTalk_NV%`, and `%EtherTalk_Pending%` (continued)

Key	Type	Default	Description
PrinterControl *(continued)*			When the parameter is set to `PSPrinter`, the `Interpreter` parameter selects the page-description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the `Interpreter` parameter is set to `AutoSelect` or `PCL`.
			When the parameter is set to `PJL`, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands. The PJL current environment is used on each invocation of a PDL to set up the initial state.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

Ethernet (LPR) Parameters

Table 2-12 lists the factory default settings for `%LPR%`, `%LPR_NV%`, and `%LPR_Pending%`, implemented via the 14-pin AUI Ethernet connector. These parameters are used when the printer is operating with a UNIX® system. The UNIX command lpr sends a printer job to the LaserWriter 12/640 PS. On the printer side, `LPR` is the device name used as a job source for incoming lpr jobs.

Table 2-12   Parameters for `%LPR%`, `%LPR_NV%`, and `%LPR_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all the pages of a job have been printed. The network channel remains open. Messages, such as printer error messages, are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for execution. If the value is `true`, data is executed. If the value is `false`, data is not executed. Always set the value of this parameter to `true` for this communications channel.
Filtering	*name*	/None	This parameter indicates whether the input data stream needs further filtering before it can be correctly interpreted as a page description language.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
HasNames	*boolean*	false	This parameter indicates whether the printer supports named files. If the printer is not mounted, or if `Type` is `/Communications`, the value is `false`. This parameter is a read-only constant.
Interpreter	*name*	/PostScript	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are
			■ `PostScript` ■ `LaserJetIII` ■ `AutoSelect` ■ `PCL` ■ `HexDmp`
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.

continued

Table 2-12 Parameters for `%LPR%`, `%LPR_NV%`, and `%LPR_Pending%` (continued)

Key	Type	Default	Description
On	*boolean*	true	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value is `false`, data sent to the printer is lost. Always set the value of this parameter to `true` for this channel.
PrinterControl	*name*	/PSPrinter	This parameter is used to select or to indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS printer are
			■ PSPrinter ■ PJL
			When the parameter is set to PSPrinter, the Interpreter parameter selects the page description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the Interpreter parameter is set to AutoSelect or PCL.
			When the parameter is set to PJL, the PJL controls language selection; printer errors are in PJL format and are disabled by PJL commands. The PJL current environment is used on each invocation of a PDL to set up the initial state.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

Network Parameters

Parameters in the network layer determine which physical interface is to be used to send outgoing messages and which transport layer is to receive incoming messages. If you make changes to the parameters in this area, they will not take effect until the printer is initialized. The parameters for `%NetworkInterface%`, `%NetworkInterface_NV%`, and `%NetworkInterface_Pending%` are listed in Table 2-13.

Table 2-13   Parameters for `%NetworkInterface%`, `%NetworkInterface_NV%`, and `%NetworkInterface_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	true	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all of the pages of a job have been printed. The network channel remains open. Messages such as printer error messages are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for execution. If the value is `true`, data is executed. If the value is `false`, data is not executed. Always set this parameter to `true` for this channel.
EthernetAddress	*string*	Printer specific	This read-only parameter returns a unique string that represents the Ethernet address of the unit. The string is in the form (`XX:XX:XX:XX:XX:XX`), where each `X` represents a hexadecimal digit. Any string of up to 17 characters represents a legal Ethernet address.
EthernetType	*name*	/AUI	This parameter reflects the type of Ethernet connection used by the printer. The LaserWriter 12/640 PS has only one Ethernet connector (the attachment unit interface) so this value is always `AUI`.

continued

Table 2-13 Parameters for `%NetworkInterface%`, `%NetworkInterface_NV%`, and `%NetworkInterface_Pending%` (continued)

Key	Type	Default	Description
Filtering	*name*	/None	This parameter indicates whether the input data stream needs further filtering before it can be correctly interpreted as a page description language.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information on this subject.
FrameType	*name*	/802.3	This parameter reflects the frame type being used on the Ethernet port. The value is a constant. Defined values are `Ethernet II`, `802.3`, `802.2`, `SNAP`, and `Unknown`.
GatewayAddress	*string*	(0.0.0.0)	This string contains the destination-address or gateway-address to other networks. The addresses are Internet Protocol addresses of the form `N.N.N.N`, where each `N` is a decimal number in the range 0 to 255. An empty string specifies that dynamic routing is enabled, if available. The network address `0.0.0.0` is a special case used by default if no previous network address matches the desired target IP address.
HasNames	*boolean*	false	This parameter indicates whether the printer supports named files. If the printer is not mounted or, if `Type` is `/Communications`, the value of this parameter is `false`. This value is a read-only constant.
Interpreter	*name*	/PostScript	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are

Interpreter (continued):

- `PostScript`
- `LaserJetIII`
- `AutoSelect`
- `PCL`
- `HexDmp`

The default for the nonvolatile parameter is always `PostScript`.

Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.

continued

Table 2-13 Parameters for `%NetworkInterface%`, `%NetworkInterface_NV%`, and `%NetworkInterface_Pending%` (continued)

Key	Type	Default	Description
IPAddress	*string*	0.0.0.0	This unique string represents the Internet Protocol address of the printer. It is mapped to the lowest physical address by which the printer is known. An empty string or a string of up to 15 non-null characters may be used.
			The default setting, 0.0.0.0, indicates that you should use the Reverse Address Resolution Protocol (RARP). If you set the value to any other number, that number is used as the IP address of the printer.
NetworkMask	*string*	0.0.0.0	This parameter indicates which fields of `IPAddress` designate the network portion of the IP address, and which designate the node. Any string of up to 15 non-null characters is valid. IP masks are in the form `N.N.N.N`, where each `N` is a decimal number in the range 0 to 255.
NetworkName	*string*	(LaserWriter 12/ 640 PS)	This parameter reflects the name actually chosen by the printer on the network. Because of possible name conflicts, this name may be different from the system parameter `SystemName`.
NICData	*string*	(...)	This parameter is an ASCII read-only string. It gives the NIC a mechanism for communicating miscellaneous TCP/IP, Novell, and NIC related parameters to PostScript. The data is self describing and is in a form suitable for constructing a PostScript dictionary.
On	*boolean*	true	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value is `false`, data sent to the printer is lost. Always set this parameter to `true` for this channel.

continued

Table 2-13 Parameters for `%NetworkInterface%`, `%NetworkInterface_NV%`, and `%NetworkInterface_Pending%` (continued)

Key	Type	Default	Description
PrinterControl	*name*	/PSPrinter	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are ■ `PSPrinter` ■ `PJL` When the parameter is set to `PSPrinter`, the `Interpreter` parameter selects the page description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the `Interpreter` parameter is set to `AutoSelect` or `PCL`. When the parameter is set to `PJL`, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands, The PJL current environment is used on each invocation of a PDL to set up the initial state.
ProtocolData (obsolete)	*string*	()	This parameter is an artifact from earlier versions. It is currently not used.
ROMVersion	*string*	(1.0)	This parameter indicates the ROM version.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

Print Server Parameters

The LaserWriter 12/640 PS printer can act as a print-server device (`%PrintServer%`) on the Ethernet channel. The 14-pin AUI Ethernet connector supports this type of communication. The parameters for `%PrintServer%`, `%PrintServer_NV%`, and `%PrintServer_Pending%` are listed in Table 2-14.

Table 2-14   Parameters for `%PrintServer%`, `%PrintServer_NV%`, and `%PrintServer_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all of the pages of a job have been printed. The network channel remains open. Messages such as printer-error messages are sent to the channel if it is either the output channel for the job executing, or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for execution. If the value is `true`, data is executed. If the value is `false`, data is not executed. Always set this parameter to `true` for this channel.
Filtering	*name*	/None	This parameter indicates whether the input data stream needs further filtering before it can be correctly interpreted as a page-description language.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information on this subject.
HasNames	*boolean*	false	This parameter indicates whether the printer supports named files. If the printer is not mounted or if `Type` is `/Communications`, the value of this parameter is `false`. This value is a read-only constant.
Interpreter	*name*	/AutoSelect	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are
			■ PostScript ■ LaserJetIII ■ AutoSelect ■ PCL ■ HexDmp

continued

Table 2-14   Parameters for `%PrintServer%`, `%PrintServer_NV%`, and `%PrintServer_Pending%` (continued)

Key	Type	Default	Description
Interpreter *(continued)*			The default for the nonvolatile parameter is always `PostScript`.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
On	*boolean*	true	This parameter indicates whether the printer driver for the communications device is turned on and able to receive and send data. If the value is `false`, data sent to the printer is lost. Always set this parameter to `true` for this channel.
PrinterControl	*name*	/PSPrinter	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are
			■ `PSPrinter` ■ `PJL`
			When the parameter is set to `PSPrinter`, the `Interpreter` parameter selects the page-description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the `Interpreter` parameter is set to `AutoSelect` or `PCL`.
			When the parameter is set to `PJL`, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands. The PJL current environment is used on each invocation of a PDL to set up the initial state.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

Remote Printer Parameters

The LaserWriter 12/640 PS printer can act as a line printer device (`%RemotePrinter%`) on the Ethernet channel. The 14-pin AUI Ethernet connector supports this type of communication. The parameters for `%RemotePrinter%`, `%RemotePrinter_NV%`, and `%RemotePrinter_Pending%` are listed in Table 2-15.

Table 2-15   Parameters for `%RemotePrinter%`, `%RemotePrinter_NV%`, and
`%RemotePrinter_Pending%`

Key	Type	Default	Description
DelayedOutputClose	*boolean*	false	This parameter determines how the output channel is managed after a job completes execution.
			When the value is set to `true`, an end-of-file indicator is not sent until all of the pages of a job have been printed. The network channel remains open. Messages such as printer-error messages are sent to the channel if it is either the output channel for the job executing or the output channel for jobs that have finished executing but have not finished printing.
Enabled	*boolean*	true	This parameter indicates whether data arriving at the printer should be scheduled for execution. If the value is `true`, data is executed. If the value is `false`, data is not executed. Always set this parameter to `true` for this channel.
Filtering	*name*	/None	This parameter indicates whether the input data stream needs further filtering before it can be correctly interpreted as a page-description language.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter.
HasNames	*boolean*	false	This parameter indicates whether the printer supports named files. If the printer is not mounted or if `Type` is `/Communications`, the value is `false`. This parameter is a read-only constant.

continued

Table 2-15   Parameters for `%RemotePrinter%`, `%RemotePrinter_NV%`, and `%RemotePrinter_Pending%` (continued)

Key	Type	Default	Description
Interpreter	*name*	/AutoSelect	This parameter indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter 12/640 PS are
			■ `PostScript` ■ `LaserJetIII` ■ `AutoSelect` ■ `PCL` ■ `HexDmp`
			The default for the nonvolatile parameter is always `PostScript`.
			Refer to "Filtering and Interpreter Parameters" on page 51 for further information about this parameter,
On	*boolean*	true	This parameter indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If the value is `false`, data sent to the printer is lost. Always set this parameter to `true` for this channel.
PrinterControl	*name*	/PSPrinter	This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with the parameter. Alternatives available on the LaserWriter 12/640 PS are
			■ `PSPrinter` ■ `PJL`
			When the parameter is set to `PSPrinter`, the `Interpreter` parameter selects the page description language; printer error messages are sent in the usual Adobe fashion (on channels processing jobs, and in `%%[...]%%` format); PJL (printer job language) commands are not recognized unless the `Interpreter` parameter is set to `AutoSelect` or `PCL`.

continued

Table 2-15 Parameters for `%RemotePrinter%`, `%RemotePrinter_NV%`, and `%RemotePrinter_Pending%` (continued)

Key	Type	Default	Description
PrinterControl *(continued)*			When the parameter is set to `PJL`, the PJL controls language selection; printer errors are in PJL format, and are disabled by PJL commands, The PJL current environment is used on each invocation of a PDL to set up the initial state.
Type	*name*	/Communications	This parameter indicates the general category of device represented by the parameter set.

Engine Device Parameters

The `%Engine%` device contains parameters that control the print engine itself. The LaserWriter 12/640 PS printer's `%Engine%` device contains the parameters listed in Table 2-16.

Table 2-16 Parameters for `%Engine%` device

Key	Type	Default	Description
BSizeStandard	*name* *string*	/ISO (ISO)	This parameter helps the engine to determine the physical dimensions when B4 or B5 paper is selected. There are two valid values for this parameter—`ISO`, which represents the value for the International Standards Organization, and `JIS`, which represents the value for Japanese Institute for Standardization.
			The following setting is possible for the ISO standard:
			■ `B5` 176 x 250 mm., or 499 x 709 default units
			The following setting is possible for the JIS standard:
			■ `B5` 182 x 257 mm., or 516 x 729 default units

continued

Table 2-16   Parameters for `%Engine%` device (continued)

Key	Type	Default	Description
Darkness	*real*	`0.5`	This parameter controls the amount of toner applied to the paper. A value of 0.0 signifies the minimum darkness, and 1.0 signifies the maximum darkness. Values outside this range are not legal. The LaserWriter 12/640 PS printer supports 16 levels of darkness, so this parameter is quantized into 16 steps. This is done by taking the integer portion of `Darkness*15`. Therefore, a value of 0.0 is not distinguishable from 0.05, but it is distinguishable from 0.1. Changes in the `Darkness` parameter are not sent to the engine until there are no pages in the paper path, either feeding or being copied.
			The value persists across power cycles and restarts if it is set outside the server loop.
PageCount	*integer*	`0`	Keeps count of all pages fed by the printer engine. The count includes all pages successfully printed as well as pages that were jammed or spoiled. You can get the value by querying the engine.
TimeToStandby	*integer*	`60`	If the printer is not in use, the engine goes into standby mode after the number of minutes specified by this parameter. This means the engine does not keep the fuser hot, and the next time the controller sends a feed or prefeed command, the engine starts to warm up.
			The value persists across power cycles and restarts if it is set outside the server loop.
Type	*name*	`/Parameters`	This read-only constant always returns a value of `/Parameters`.

Emulator Parameters

The LaserWriter 12/640 PS printer can emulate the Hewlett-Packard LaserJet III. To do this, the printer requires an alternative interpreter for the input stream and the interpreter requires a set of emulator parameters to implement the emulation. The `%LaserJetIII%` emulator (PCL5) is a body of code that processes data and generates pages of output. The language that is processed is specified by Hewlett-Packard. Adobe Systems has emulated the actions of the Hewlett-Packard printer series as closely as possible.

Typically, PCL5 consumes data from the host, produces pages, and then terminates its operation. In some cases, you will want to set the environment for PCL5 before the print job begins. Table 2-17 lists and defines the parameters you use to change attributes such as default font.

IMPORTANT

Certain parameters, as noted in Table 2-17, were originally used to select
the default font and are now obsolete. They are listed in this table for
your information only. You should not use these parameters. ▲

Table 2-17   Parameters for the `%LaserJetIII%` emulator

Key	Type	Default	Description
Copies	*integer*	1	This parameter specifies the default number of copies to be printed.
Duplex	*integer*	0	This parameter sets the initial state of duplexing within a PCL job for printers capable of duplex operation. Language commands within the print stream can override the setting of this parameter. The values 0, 1, and 2 are acceptable: ■ 0 Simplex single sided ■ 1 Long-edge binding duplex ■ 2 Short-edge binding duplex
FontFixed (obsolete)	*boolean*	true	This parameter selects the font pitch. If the value is true, a fixed font such as Courier is selected. If the value is false, a proportionally spaced font, such as Helvetica®, is selected. This is an obsolete parameter, originally used to select the default font. It is used only if the FontSource parameter is set to -1.
FontHeight	*integer*	1200	This parameter selects the height of the font and is applicable to scalable proportional fonts. The value set is the point size, multiplied by 100 to avoid floating point representation. For instance, the default value 1200 specifies a 12-point font. Note that this value is used only if the font specified by the combination FontSource and FontNumber is scalable and proportional.
FontItalic (obsolete)	*boolean*	false	This parameter, if true, selects an *italic* or *oblique* font. This is an obsolete parameter, originally used to select the default font. This parameter is used only if the FontSource parameter is set to -1.
FontNumber	*integer*	–1	This parameter selects the font within the current FontSource. Applicable values are determined based upon FontSource and the number of fonts that are available from that font source. If the FontNumber parameter specified is outside the range, the value 0 is used instead.

continued

Table 2-17 Parameters for the `%LaserJetIII%` emulator (continued)

Key	Type	Default	Description
FontPitch	*real*	1000	This parameter specifies the number of characters per inch to be used for monospace scalable fonts. The value is multiplied by 100 to avoid floating-point representation. To select a 12-pitch font, you use the value 1200. This parameter is used only by the PCL5 interpreter if the font specified by the combination `FontSource` and `FontNumber` is scalable and monospace.
FontSource	*integer*	-1	This parameter selects the source of the desired font. Currently, 0 selects an internal font, and 1 selects a downloaded font. The value -1 is used when a default font is not to be selected. In this case, the obsolete method of selection, described later in this section, is used to select the font source. This method uses the parameters `FontFixed`, `FontItalic`, `FontWeight`, and `FontTypeFace`.
FontSymbolSet	*integer*	277	This parameter is the equivalent of the Symbol Set code. The applicable values are described in Hewlett-Packard manuals. Note that this value is consulted only if the font specified by the combination `FontSource` and if `FontNumber` is an unbound font. There are 35 legal values. See Table 2-18 for further information on Symbol Set legal values.
FontTypeface (obsolete)	*integer*	3	This parameter describes the typeface, for example, Times®, Helvetica, Palatino®, and so on. The integer value, which can be up to 16 bits, comes from a table published by Hewlett-Packard. This is an obsolete parameter, originally used to select the default font. It is used only if the `FontSource` parameter is set to -1.
FontWeight (obsolete)	*integer*	0	This parameter specifies the weight or boldness of the font. For example, -7 is very light and +7 is very bold. This is an obsolete parameter, originally used to select the default font. It is used only if the `FontSource` parameter is set to -1.
Landscape	*boolean*	false	This parameter determines whether the initial orientation of the page will be landscape or portrait. If the value of this parameter is `true`, the page orientation will be landscape. If the value is `false`, the page orientation will be portrait.
Linewrap	*boolean*	false	Decides whether long lines are wrapped to the next line or truncated. If the value of this parameter is `true`, long lines wrap to the next line. If the value is `false`, long lines are truncated.

continued

Table 2-17   Parameters for the `%LaserJetIII%` emulator (continued)

Key	Type	Default	Description
MaxLJMemory	*integer*	RAM dependent	This parameter specifies the maximum amount of memory the emulator will ask for from the page allocator to store downloaded fonts and macros. With 4 MB of RAM installed, the default value of `MaxLJMemory` is 700K. You should add 500K to the default value for each additional 1 MB of RAM installed. The limit is important because the emulator acquires memory at the expense of the PostScript interpreter's memory needs for items such as virtual memory or font cache. The `MaxLJMemory` parameter is rounded to the nearest multiple of a memory block size (8192 bytes).
PaperSize	*integer*	–1	This parameter sets the size of paper to be used within the PCL job. Values available are ■ -1 Unspecified ■ 1 Executive ■ 2 Letter ■ 3 Legal ■ 26 A4 ■ 80 Monarch envelope ■ 81 Com-10 envelope ■ 90 International dl envelope ■ 91 International C5 envelope ■ 95 B5
TopMargin	*integer*	3600	This parameter specifies in IPU (1/7200 inch) the amount of white space at the top of the page. The default, 3600, represents half an inch.
Type	*name*	/Emulator	This parameter indicates the general category of device represented by the parameter set. For the LaserWriter 12/640 PS printer, /Emulator is the only available value.
WaitTimeout	*integer*	30	This parameter indicates the current wait time-out, which is the number of seconds the interpreter waits to receive additional characters from the host before it aborts the current job by executing a `timeout` error. This parameter may be set to 0 or any number larger than 0.
VMI	*integer*	1200	This parameter specifies the space between lines of text in 1/7200 inch units. The default, 1200, represents 1/6 inch.

NOTE   All values, with the exception of `Type`, persist across power cycles and restarts.

The Symbol Set code has 35 legal values, as listed in Table 2-18.

Table 2-18   Symbol Set code legal values

Value	Symbol Set code
4	*/OD "ISO-60 Norweg"*/
6	*/OF "ISO-25 French"*/
7	*/OG "German"*/
9	*/OI "ISO-15 Italian"*/
11	*/OK "ISO-14 JISASCII"*/
14	*/ON "ECMA-94 Latin 1"*/
19	*/OS "ISO-11 Swedish"*/
21	*/OU "ISO-6 ASCII"*/
36	*/1D "ISO-61 Norweg"*/
37	*/1E "ISO-4 UK"*/
38	*/1F "ISO-69 French"*/
39	*/1G "ISO-21 German"*/
51	*/1S "Spanish"*/
53	*/1U "Legal"*/
75	*/2K "ISO-57 Chinese"*/
83	*/2S "ISO-17 Spanish"*/
85	*/2U "ISO-2 IRV"*/
115	*/3S "ISO-10 Swedish"*/
147	*/4S "ISO-16 Portug"*/
173	*/5M "PS-Math"*/
179	*/5S "ISO-84 Portug"*/
202	*/6J "Microsoft Pub"*/
205	*/6M "Ventura Math"*/
211	*/6S "ISO-85 Spanish"*/
234	*/7J "Desktop"*/
269	*/8M "Math-8"*/
277	*/8U "Roman-8"*/
309	*/9U "Windows"*/
330	*/10J "PS-Text"*/

continued

Table 2-18   Symbol Set code legal values (continued)

Value	Symbol Set code
341	`*/10U "PC-8 US"*/`
373	`*/11U "PC-8 DN"*/`
405	`*/12U "PC-850"*/`
426	`*/13J "Ventura Intl"*/`
458	`*/14J "Ventura US"*/`
501	`*/15U "PiFont"*/`

Resource Categories

In PostScript Language Level 2, PostScript objects such as fonts, patterns, and filters can be managed as open-ended collections of resources grouped into categories. A resource is requested by resource category and name. If the resource does not reside in virtual memory, the resource-management mechanism loads it from an external source, such as a disk, a ROM cartridge, or a network file server.

There are several groups of resources. The LaserWriter 12/640 PS uses the following groups: new resources, output device resources, implicit resources, resources that define new catergories.

Most of the instances listed in the following tables are described in the *PostScript Language Reference Manual*, second edition, or the *PostScript Language Reference Manual Supplement*.

Regular Resource Categories

You can add new resources in the regular resource categories, including items such as font and pattern resources. Table 2-19 lists the regular resources specific to the LaserWriter 12/640 PS.

Table 2-19   Regular resource categories

Category name	Instances
`CIDFont`	No instances defined.
`CMap`	No instances defined.
`Encoding`	`ISOLatin1Encoding` `StandardEncoding`

continued

Table 2-19   Regular resource categories (continued)

Category name	Instances
Font	AvantGarde-Book AvantGarde-BookOblique AvantGarde-Demi AvantGarde-DemiOblique Bookman-Demi Bookman-DemiItalic Bookman-Light Bookman-LightItalic Courier Courier-Bold Courier-BoldOblique Courier-Oblique Helvetica Helvetica-Bold Helvetica-BoldOblique Helvetica-Narrow Helvetica-Narrow-Bold Helvetica-Narrow-BoldOblique Helvetica-Narrow-Oblique Helvetica-Oblique NewCenturySchlbk-Bold NewCenturySchlbk-BoldItalic NewCenturySchlbk-Italic NewCenturySchlbk-Roman Palatino-Bold Palatino-BoldItalic Palatino-Italic Palatino-Roman Symbol Times-Bold Times-BoldItalic Times-Italic Times-Roman ZapfChancery-Medium Italic ZapfDingbats
Form	No instances defined.
Generic	No instances defined.
Halftone	DefaultHalftone 141 × 45 141 × 45d 106 × 45 106 × 45d 85 × 45

continued

Table 2-19   Regular resource categories (continued)

Category name	Instances
HWOptions	No instances defined.
Pattern	No instances defined.
ProcSet	CIDInit CIDInitN ColorRendering DiagnosticProcs LaserJetIII NetworkInterface SamplePages Test
	The LaserWriter 12/640 PS printer has eight predefined `ProcSet` instances, as listed above. You should note the following supplementary information. `CIDInit` and `CIDInitN` are used for CID fonts. `ColorRendering` is used for color rendering. `NetworkInterface` has two procedures that determine how the parallel port works using the NIC (Network Interface Card). `DiagnosticProcs` has three instances: the first is for sending raw engine commands; the second is for setting the envelope size when the envelope tray is not installed; the third is for reading and writing the nonvolatile RAM (NVRAM) and is used for Apple diagnostics. `SamplePages` is a dictionary that contains the named start-page procedure and the configuration page. `Test` is a dictionary that contains named test procedures.
ColorSpace	No instances defined.
ColorRendering	DefaultColorRendering
OutputDevice	Default
	`Default` is the instance for the default output device characteristics. The default output device is equivalent to the `Printer` instance. Each instance is represented as a resource dictionary containing key-value pairs describing certain capabilities of that particular output device. For details about key-value pairs for `Printer` output devices, see Table 2-20. The `OutputDevice` resource category performs the following functions: ■ Enables applications to query printer capabilities directly. ■ Maintains functional equivalence with PostScript Language Level 1.
PDL	PostScript PCL AutoSelect
ControlLanguage	PostScript

Key-Value Pairs for Printer/Default Output Device Resources

This resource category has an instance called `Default` that represents the characteristics of the default output device. The default output device is the LaserWriter 12/640 PS printer, so the `Default` instance is equivalent to the `Printer` instance. Each instance is represented as a dictionary that contains key-value pairs. The key-value pairs describe certain capabilities of the printer. Table 2-20 lists the key-value pairs in the resource dictionary for `Printer/Default` that are specific to the LaserWriter 12/640 PS.

Table 2-20   Resource dictionary for `Printer/Default` output device instances

Key	Value
HWResolution	[600 600]
ManualSize	[612 792] [612 1008] [595 842] [420 595] [516 729] [522 756] [297 684] [279 540] [460 649] [312 624] [284 420]
PageSize	[612 792] [612 1008] [595 842] [522 756][420 595] [516 729] [297 684] [279 540] [460 649] [312 624] [284 420]
ProcessColorModel	DeviceGray

Implicit Resource Categories

Categories of implicit resources represent built-in capabilities of the printer's interpreter. For example, the `FormType` category indicates that the interpreter understands Type 1 only. Table 2-21 lists categories of implicit resources specific to the LaserWriter 12/640 PS interpreter.

Table 2-21   Resources with implicit instances

Category name	Instances
ColorRendering	DefaultColorRendering
ColorRenderingType	1
ColorSpace	No instances defined
ColorSpaceFamily	CIEBasedA CIEBasedABC DeviceCMYK DeviceGray DeviceRGB Indexed Pattern Separation
Emulator	LaserJetIII

continued

Table 2-21   Resources with implicit instances (continued)

Category name	Instances
Filter	ASCII85Decode ASCIIHexDecode ASCII85Encode ASCIIHexEncode CCITTFaxDecode CCITTFaxEncode DCTDecode DCTEncode LZWDecode LZWEncode NullEncode RunLengthDecode RunLengthEncode SubFileDecode
FMaptype	2, 3, 4, 5, 6, 7, 8 , 9
FontType	0, 1, 3, 4, 5, 6, 9, 10, 11, 42 The integers 0, 1, 3, 4, 5, 6, 9, 10, 11, and 42 are the instances supported for the LaserWriter 12/640 PS printer. The value 42 indicates the printer has a built-in TrueType font rasterizer.
FormType	1
HalftoneType	1, 2, 3, 4, 5, 6, 10
IODevice	%AppSocket% %Calendar% %Engine% %EtherTalk% %EtherTalk_NV% %EtherTalk_Pending% %LocalTalk% %LocalTalk_NV% %LocalTalk_Pending% %LPR% %Parallel% %Parallel_NV% %Parallel_Pending% %PrintServer% %RemotePrinter% %rom% %ScsiComm% %ScsiComm_NV% %ScsiComm_Pending% %Telnet%
ImageType	1
PatternType	1

Resource Categories for Defining New Resources

Table 2-22 defines resources used to define new categories.

Table 2-22   Resources to define new categories

Category	Instances
Category	CIDFont
	CMap
	Category
	ColorRendering
	ColorRenderingType
	ColorSpace
	ColorSpaceFamily
	ControlLanguage
	Emulator
	Encoding
	Filter
	FMapType
	Font
	FontType
	Form
	FormType
	Generic
	Halftone
	HalftoneType
	ImageType
	IODevice
	OutputDevice
	Pattern
	PatternType
	PDL
	ProcSet
Generic	No instances defined.

PostScript Level 1 Compatibility Operators

The PostScript language is designed to be a universal standard for device-independent page descriptions, but each PostScript language implementation supports features and capabilities particular to that implementation. For that reason, the PostScript language has a number of significant extensions. Appendix D, "Compatibility Strategies," in the *PostScript Language Reference Manual*, second edition, presents guidelines for taking advantage of language extensions while maintaining compatibility with PostScript interpreters.

The LaserWriter 12/640 PS printer is a Level 2 printer. This chapter lists the compatibility operators that make the LaserWriter 12/640 PS printer compatible with existing PostScript Level 1 language driver software. It also defines compatibility operators that are not found, or that differ from the operators described in the chapter on compatibility in the *PostScript Language Reference Manual Supplement* (for Version 2014) of the PostScript programming language.

This chapter describes the page-size and paper-tray compatibility operators.

▲ **WARNING**
The operators described in this chapter are included only to support compatibility with PostScript Level 1 programs. You should not use them in PostScript Level 2 programs. ▲

Overview of Compatibility Operators

The compatibility operators present in the LaserWriter 12/640 PS printer appear in three dictionaries: `statusdict`, `userdict`, and `systemdict`. These operators set

- system parameters
- page device parameters
- user parameters
- device parameters

Table 3-1 provides a complete list of compatibility operators arranged by dictionary.

Table 3-1　　Compatibility operators

---

statusdict

a4tray	pagecount
a5tray	pagestackorder
appletalktype	papersize
b5tray	papertray
buildtime	printername
byteorder	product
c5tray	ramsize
checkpassword	realformat
com10tray	revision
defaultmultipurposetraysize	setdefaultmultipurposetraysize
defaultpapertray	setdefaultpapertray
defaulttimeouts	setdefaulttimeouts
dltray	setdostartpage
dostartpage	setdosysstart
dosysstart	setduplexmode
duplexmode	setjobtimeout
firstside	setmargins
executivetray	setpagestackorder
jobname	setpapertray
jobtimeout	setprintername
legaltray	setsoftwareiomode
lettertray	settumble
manualfeed	softwareiomode
margins	tumble
monarchtray	waittimeout
newsheet	

userdict

#copies	legal
=string	legalsmall
a4	letter
a4small	lettersmall
a5	monarch
b5	note
c5envelope	serverdict
com10envelope	smooth4
dlenvelope	stretch
executivepage	quit

systemdict

devdismount	devmount
devforall	devstatus
devformat	

Page-Size Compatibility Operators

The page-size compatibility operators are in the user dictionary `userdict`. Each operator requests a specific page size and imaging boundary box, as shown in Table 3-2. The operators use the sizes indicated in the table as a page device `PageSize` parameter. All operators set the `Policy` for `PageSize` to 7, which guarantees that the imaging area established is correct for the size requested, regardless of which paper tray is chosen.

The only error generated is `limitcheck`, which occurs when there is not sufficient memory for the imaging area requested.

Table 3-2   Page-size compatibility operators

Operator	Page size[*]	Imaging boundary box
a3	[842 1191]	null
a4	[595 842]	null
a5	[420 595]	null
b4	[729 1032] or [709 11001]	null
b5	[516 729] or [499 709]	null
c5	[459 649]	null
com10	[297 684]	null
dl	[312 624]	null
europostcard	[298 420]	null
executivepage	[522 756]	null
legal	[612 1008]	null
letter	[612 792]	null
note	[*width height*]	[*width height*]

[*] Units shown (842, 1191, and so on) are points. One point is 1/72 inch.

The `note` operator modifies the current page device settings by establishing an `ImagingBBox` parameter of [25 25 *width* minus 25 *height* minus 25] if the current `PageSize` parameter is [*width height*].

Paper-Tray Compatibility Operators

The paper-tray operators are in the status dictionary `statusdict`. Each operator requests a tray containing a specific page size. The only difference between the operators is the size of paper requested. The `PageSize` and `ImagingBBox` parameters requested are the same as those for the corresponding page-size operator. These operators use the specified size as a page-device `PageSize` parameter. All the operators set the `Policy` for `PageSize` to 0, which guarantees that a `rangecheck` error is generated if a tray containing the requested page size is not found. In addition, a `limitcheck` error can occur if there is not sufficient memory for the imaging area requested.

The paper-tray compatibility operators and associated page sizes and imaging boundary box parameters are shown in Table 3-3.

Table 3-3   Paper tray compatibility operators

Operator	Page size	Imaging boundary box
a3tray	[842 792]	null
a4tray	[595 842]	null
a5tray	[420 595]	null
b4tray	[729 1032] or [709 1001]	null
b5tray	[516 729] or [499 709]	null
c5tray	[461 648]	null
com10tray	[297 684]	null
dltray	[312 624]	null
europostcardtray	[298 240]	null
executivetray	[522 756]	null
legaltray	[612 1008]	null
lettertray	[612 792]	null

Compatibility Operator Descriptions

This section describes the compatibility operators that are not found or that differ from the operators described in the compatibility chapter of the *PostScript Language Reference Manual Supplement* (for Version 2014).

The compatibility operators described in this section deal with page size and paper-tray sizes. The various tray sizes are represented with a tray slot number. The tray slot numbers and the associated tray descriptions are listed in Table 3-4.

Table 3-4   Tray numbers and descriptions for compatibility operators

Tray slot number	Tray description
0	250-sheet tray
1	Multipurpose tray
2	500 sheet tray
3	Envelope tray

defaultmultipurposetraysize

Syntax	– defaultmultipurposetraysize *name bool*
Definition	This operator returns the name of the default multipurpose paper tray. The Boolean value *bool* is `true` if the paper feeds short edge first and `false` if the paper feeds long edge first. Because the LaserWriter 12/640 PS printer only feeds paper short edge first, the Boolean value is always `true` in this application.
Error(s)	`stackoverflow`

defaultpapertray

Syntax	– defaultpapertray *int*
Definition	This operator returns an integer that is the first element in the `Priority` array of the `InputAttributes` dictionary found within the current page device. This value represents the default paper tray slot, which may or may not be installed. If there is no `Priority` array within the `InputAttributes` array at the time `defaultpapertray` is called, an arbitrary slot number is returned.
Error(s)	`stackoverflow`

papersize

Syntax	– papersize *name bool*
Definition	This operator returns the name of the compatibility operator that selects a tray containing the current media size. For example, if the current selected paper is letter size paper, the /lettertray name is returned. The Boolean value *bool* is true if the paper feeds short edge first and false if the paper feeds long edge first.
Error(s)	stackoverflow

papertray

Syntax	– papertray *int*
Definition	This operator returns an integer that is the first element in the Priority array of the InputAttributes dictionary found within the current page device. This value represents the default paper-tray slot, which may or may not be installed. If there is no Priority array within the InputAttributes array at the time papertray is called, an arbitrary slot number is returned.
Error(s)	stackoverflow

setdefaultmultipurposetraysize

Syntax	*name bool* setdefaultmultipurposetraysize
Definition	This operator sets the value for the PageSize of the multipurpose tray slot in the InputAttributes dictionary to the size corresponding to the *name* parameter. The Boolean value *bool* is true if the paper feeds short edge first and false if the paper feeds long edge first.
	This operator may be used to notify the interpreter of the default page size installed in the multipurpose tray. The same function can be performed with the setpagedevice operator.
	If setdefaultmultipurposetraysize is called at a time when the save level is any value other than 0, an invalidaccess error is returned.
Error(s)	invalidaccess, rangecheck, stackunderflow, typecheck

setdefaultpapertray

Syntax	*int* `setdefaultpapertray` –
Definition	This operator copies the values for the `PageSize`, `MediaType`, `MediaColor`, and `MediaWeight` parameters found in the `InputAttributes` dictionary for the specified tray, into a dictionary with keys for `PageSize`, `MediaType`, `MediaColor`, and `MediaWeight`.
	The operator also writes the requested tray number in the *int* parameter into the first element of the `Priority` array in the `InputAttributes` dictionary and places it in the dictionary being built. The new dictionary is passed to the `setpagedevice` operator, and the requested tray is selected as the default paper tray for printing. This paper tray will be used by any PostScript job that does not expressly request another page size or medium.
	If `setdefaultpapertray` is called at a time when the save level is any value other than zero, an `invalidaccess` error is returned.
Error(s)	`rangecheck`, `stackunderflow`, `typecheck`

setpapertray

Syntax	*int* `setpapertray` –
Definition	This operator copies the values for the `PageSize`, `MediaType`, `MediaColor`, and `MediaWeight` parameters found in the `InputAttributes` dictionary for the specified tray, into a dictionary with keys for `PageSize`, `MediaType`, `MediaColor`, and `MediaWeight`.
	The operator also writes the requested tray number in the *int* parameter into the first element of the `Priority` array in the `InputAttributes` dictionary and places it in the dictionary being built. The new dictionary is passed to the `setpagedevice` operator, and the requested paper tray is selected. This paper tray will be used by any PostScript job that does not expressly request another page size or medium.
Error(s)	`rangecheck`, `stackunderflow`, `typecheck`

Glossary

AARP (AppleTalk Address Resolution Protocol)   This protocol reconciles addressing discrepancies in networks that support more than one set of protocols.

AEP (AppleTalk Echo Protocol)   A simple protocol that allows a node to send a packet to any other node in an AppleTalk internet and to receive an etched copy of that packet in the return.

ATP (AppleTalk Transaction Protocol)   A transport protocol that provides a loss-free transaction service between sockets. It allows exchanges between two socket clients in which one client requests the other to perform a particular task and to report the results. ATP binds the request and response together to ensure that request-response pairs are exchanged reliably.

big-endian   A method of data formatting in which each field is addressed by referring to its most significant byte. This means that if you are accessing a 4-byte, 32-bit data word, the most significant byte is byte 03, and the most significant bit is bit 31. Macintosh computers use the big-endian data format. Computers based on Intel architectures, such as IBM PCs, use the little-endian format. In the LaserWriter 12/640 PS printer, the I/O processor uses the little-endian format and the system processor uses the big-endian format. See also **little-endian.**

byte swapping   This is a technique of changing the order of byte lanes as they pass through a data bridge, such as the shared SRAM in the LaserWriter 12/640 PS printer, so that there is no address variance between the system processor and the IO processor. The technique is used in systems that have dual processors, where one processor supports **little-endian** addressing and the other supports **big-endian** addressing.

DDP (Datagram Delivery Protocol)   The network-layer protocol that is responsible for the socket-to-socket delivery of datagrams over an AppleTalk internet.

FinePrint   A proprietary Apple technology that enables the printer to print dots of different widths. This eliminates jagged edges and produces precise, smooth text and line art.

little-endian   A method of data formatting in which each field is addressed by referring to its least significant byte. This means that if you are accessing a 4-byte, 32-bit word, the most significant byte is byte 00, and the most significant bit is bit 00. Computers based on Intel architectures, such as IBM PCs, use the little-endian format. Macintosh computers use the big-endian format. In the LaserWriter 12/640 PS printer, the IO processor uses the little-endian format and the system processor uses the big-endian format. See also **big-endian.**

NBP (Name Binding Protocol)   The AppleTalk transport-level protocol that translates a character string name into the internet address of the corresponding socket client. It enables AppleTalk protocols to understand user-defined zones and device names by providing and maintaining translation tables that map these names to the corresponding socket addresses.

PAP (Printer Access Protocol)   This AppleTalk protocol manages interaction between workstations and print servers. PAP handles data transfer and sets up, maintains, and terminates the connection.

PhotoGrade   A proprietary Apple technology that enables the printer to print photographs with as many as 97 shades of gray. PhotoGrade can designate more than one level of gray for each pixel by controlling the size of the dots. The level of detailed attained with this technology is much higher than that attained by standard 600-dpi printers.

TBCP (Tagged Binary Communication Protocol) With this protocol, an encoding system allows the full range of 8-bit values to be transmitted as data. It also provides for certain communication functions, such as end-of-file, and provides explicit begin-protocol and end-protocol sequences that permit the receiver to switch automatically between normal and TBCP protocols. This protocol is suitable for use with any language, particularly the PostScript interpreter or a printer emulation.

ZIP (Zone Information Protocol) The AppleTalk session-layer protocol that is used to maintain and discover the Internet-wide mapping of network number ranges to zone names. ZIP is used by NBP to determine which networks contain nodes that belong to a zone.

Index