



Developer Note

LaserWriter Select 360 Printer



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About This Note

The LaserWriter Select 360 printer is a new member of Apple's LaserWriter printer family. This developer note describes the features and capabilities of the printer, and it is intended for use by software and hardware developers.

To use this note, you need to understand the Adobe™ PostScript™ Level 2 programming language. You should also be familiar with the computer for which you intend to develop software.

You do not need to use this note if you are simply running packaged programs for your Apple computer. However, the note is useful if you are writing or modifying a program that is used with the LaserWriter Select 360 printer.

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 the note, explains visual cues and conventions used in the note, and lists other books to which you can refer.

What This Note Contains

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

- Chapter 1, "LaserWriter Select 360 Printer Hardware," describes the hardware features of the LaserWriter Select 360 printer, including the built-in communication ports and interfaces and the printer's paper handling capabilities. It also shows how to select printer modes using the rotary mode-selection switch.
- Chapter 2, "LaserWriter Select 360 Software," provides general information about the PostScript Level 2 programming language, the LaserWriter Select 360 driver, the utility program, and page types.
- Chapter 3, "LaserWriter Select 360 Compatibility Operators" explains how to set the different software parameters using the LaserWriter Select 360 printer's compatibility operators. They enable the LaserWriter Select 360 printer, which uses PostScript Level 2, to maintain compatibility with printers that use PostScript Level 1.
- Chapter 4, "Communication Channels," describes the software support provided for the LaserWriter Select 360 printer's communication channels.

Conventions and Abbreviations

This developer note uses the following typographical conventions and abbreviations.

Typographical Conventions

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

Terms shown in **boldface** are described in the glossary.

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

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 a loss of data. ▲

Standard Abbreviations

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

ADB	Apple Desktop Bus
AIS	Adobe Intelligent Software
AMD	Advanced Micro Devices
dpi	dots per inch
DRAM	dynamic RAM
EEPROM	electronically erasable and programmable ROM
EPROM	electronically programmable ROM

Mbit	megabit
MB	megabyte
MHz	megahertz
MPF	multipurpose feeder
MROM	masked ROM
OTP	one-time programmable (as applied to ROMs)
PCL	Programming Control Language
PDL	Page Description Language
ppm	pages per minute
RAM	random-access memory
SCC	Serial Communications Controller
SIMM	Single In-line Memory Module
TBCP	tagged binary communication 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, load the paper tray, set up the configuration switch for your communications environment, and set up an external hard disk for fonts. It also provides basic troubleshooting information.
- *Apple LaserWriter Reference*, published by Addison-Wesley, describes the capabilities of the LaserWriter Plus, the LaserWriter IINT, and the LaserWriter IINTX printers. It also includes information that is not in this note about fonts and about communicating with LaserWriter printers over the serial channels.
- *PostScript Language Reference Manual*, second edition, published by Addison-Wesley, is required if you plan to write programs in the PostScript Level 2 programming language. There is also a supplement to this manual, referred to as the *PostScript Language Reference Manual Supplement*, or simply the *Supplement*. This book is available from Adobe Systems, Inc.
- *PostScript Language Tutorial and Cookbook*, published by Addison-Wesley, 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 Addison-Wesley, is written for programmers who want to take advantage of the PostScript program language to design efficient PostScript programs and printer devices.

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Apple Computer, Inc.

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Telephone	800-282-2732 (United States) 800-637-0029 (Canada) 716-871-6555 (International)
Fax	716-871-6511
AppleLink	APDA
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LaserWriter Select 360 Printer Hardware

LaserWriter Select 360 Printer Hardware

The LaserWriter Select 360 printer is a mainstream network laser printer designed for the small-business market. Replacing the Apple Personal LaserWriter NTR, it supports PostScript Level 2 functions, and produces printed pages at a rate of up to ten pages per minute. The LaserWriter Select 360 printer has improved imaging capabilities. It supports 300 dpi and 600 dpi resolutions, with **FinePrint** text at 300 dpi, as well as line art **anti-aliasing**. FinePrint technology gives the printer the ability to print dots of different widths, producing crisper text and graphics. Anti-aliasing smooths the jagged edges of both characters and lines, producing an effective resolution much greater than 300 dpi.

The LaserWriter Select 360 printer is intended to work with several different interfaces. The LocalTalk port may be connected to a network of one or more Macintosh computers, or any other computers that can support LocalTalk on an RS-422 serial port. DOS-based IBM or IBM-compatible personal computers typically connect to the Centronics-style parallel port. The RS-232 serial port provides an interface for those computers that require a lower speed serial port. The printer is available in 110-volt and 220-volt versions.

This chapter describes:

- hardware features of the printer
- communication ports
- status lights
- mode switch settings
- memory capabilities
- basic operation
- page types
- paper handling capabilities

Features of the Printer

The LaserWriter Select 360 printer supports the entire PostScript Level 2 language as specified in the second edition of the *PostScript Language Reference Manual*, as well as the PCL5 Printer Control Language. In addition, the LaserWriter Select 360 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 Select 360 printer's PostScript interpreter.

A rotary switch allows you to select different communication protocol setups. The printer has EEPROM (electronically erasable and programmable ROM). This means that any of the interpreter's default parameters that are changed using `statusdict` operators are placed in nonvolatile storage and will persist across power cycles. Table 1-1 lists functional features of the LaserWriter Select 360 printer.

Table 1-1 LaserWriter Select 360 printer features

Features	Specifications
Printing speed	10 pages per minute (ppm)
PostScript processing	60% faster than Personal LaserWriter NTR
Imaging	User-selectable resolution and imaging features: <ul style="list-style-type: none"> ■ 600 dpi bi-level text and images (no FinePrint) ■ Selectable 300 dpi resolution. Automatically selected for PCL jobs ■ Selectable FinePrint text anti-aliasing (300 dpi only)
Processor	RISC processor (AMD 29200, 15 MHz)
Paper handling	Standard output: 150-page, face-down tray Standard inputs: manual feeder with additional paper tray for 50 sheets of paper or 5 envelopes; 250-page feeder with 250-page universal cassette Optional inputs: additional 250-page feeder; additional 500-page feeder; 250-page legal-size cassette, 30-page envelope-size cassette, 500-page B5-size cassette, 500-page letter-size cassette, 500-page A4-size cassette For more information see sections "Page Types," and "Paper Handling," at the end of this chapter
ROM	4 MB of on-board masked ROM
DRAM	7 MB: 3 MB on board; 4 MB SIMM (single in-line memory module). Expandable to 16 MB using 16 MB SIMM. (If you use a 16 MB SIMM, you cannot access the 3 MB of on-board DRAM.)
EEPROM	1 KB of on-board electronically erasable and programmable memory
EPROM	4 MB of electronically programmable memory mounted on a plug-in secondary logic board (for development use only)
Interface ports	RS-232 25-pin serial port RS-422 9-pin serial port for LocalTalk Centronics 36-pin parallel port
RS-232 communication rates	300, 600, 1800, 2400, 3600, 4800, 9600, 19200, and 38400 baud, with potential for 57600 baud
Fonts	35 PostScript Type I fonts
PDL (Page Description Language)	Adobe PostScript Level 2, or compatible
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

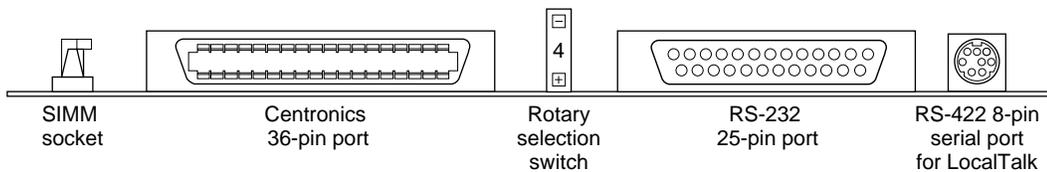
Communication Ports

The LaserWriter Select 360 printer supports three communication ports:

- RS-232 25-pin serial port
- RS-422 8-pin serial port for LocalTalk
- Centronics 36-pin parallel port

Figure 1-1 shows the relative positions of these ports on the rear panel of the printer.

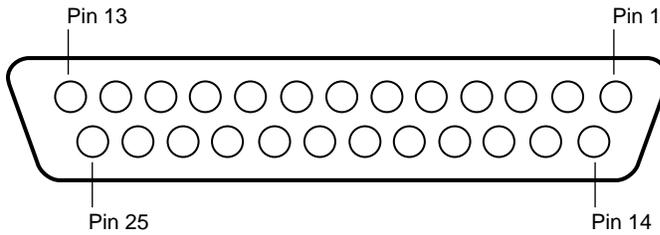
Figure 1-1 LaserWriter Select 360 rear-panel connectors



Adobe™ Intelligent Software (AIS) selects between the ports during operation. The default communication protocol is selected by the rotary switch.

RS-232C Serial Connector

The LaserWriter Select 360 printer supports the RS-232 specification by means of a 25-pin connector. This connector provides an alternate interface between the printer and host computer if the host is not an Apple Macintosh computer, and if there is no LocalTalk or parallel interface available. Figure 1-2 shows the connector pin designations and Table 1-2 lists the pin functions for this 25-pin connector. You can also connect the LaserWriter Select 360 printer directly to a Macintosh computer using an Apple modem cable, and communicate with the computer using MacTerminal to perform diagnostic or other service functions.

Figure 1-2 The 25-pin RS-232C serial port connector**Table 1-2** Signal descriptions for the 25-pin RS-232 serial port

Pin number	Signal name	Description
1	GND	Ground
2	/TXD	Transmit data (inverted)
3	/RXD	Receive data (inverted)
4	RTS	Request to send; asserted by CPU and sent to printer
5	CTS	Clear to send; asserted by printer in response to RTS
6	DSR	Data send ready; indicates the printer is ready to send data
8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25	NC	Not connected
7	GND	Chassis ground
20	DTR	Data terminal ready; indicates the printer is ready to receive data

LocalTalk and RS-422 Serial Connector

An 8-pin mini-DIN connector supports LocalTalk. Figure 1-3 shows the connector pin designations for the 8-pin connector and Table 1-3 lists the pin functions.

Figure 1-3 The 8-pin mini-DIN connector for LocalTalk

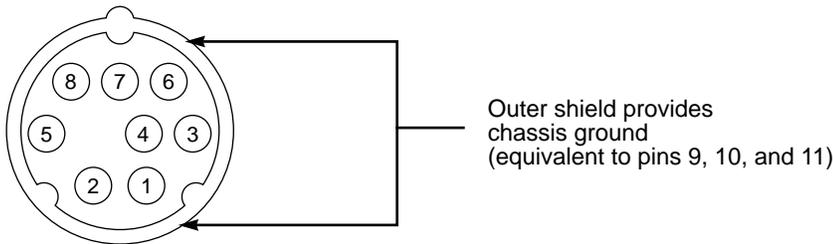


Table 1-3 Signal descriptions for LocalTalk

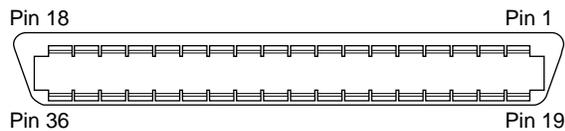
Pin number	Signal name	Description
1, 2, 7	NC	Not connected
3	/TXD	Transmit data (inverted)
4	GND	Signal ground
5	/RXD	Receive data (inverted)
6	TXD	Transmit data
8	RXD	Receive data

Centronics Parallel Connector

The LaserWriter Select 360 printer provides a 36-pin connector for communication with a standard Centronics parallel interface. It is fully compatible with the IBM PC Centronics port.

The parallel channel is basically unidirectional and is used to input information from the host computer to the printer. The printer returns minimal status information to the host, such as PAPER ERR and /FAULT, which flag paper errors. It also returns handshaking signals such as BUSY and /ACK. If you require additional status information from the printer, you can use the serial channel, provided you enable this feature using the `setdevparam PostScript` operator.

Figure 1-4 shows the pin designations for the parallel connector and Table 1-4 lists the signal descriptions. Figure 1-5 on page 8 shows the timing requirements for the Centronics interface.

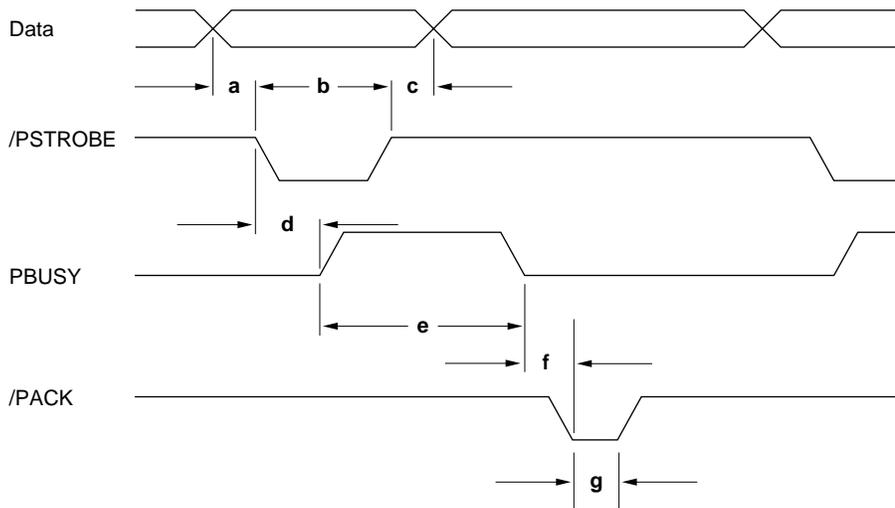
Figure 1-4 The Centronics parallel connector**Note**

In Table 1-4, inputs and outputs are referenced to the printer. This means that 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. ♦

Table 1-4 Signal descriptions for the Centronics parallel port

Pin number	Signal name	I/O	Description
1	/STROBE	I	Strobe for parallel input data
2	DATA 0	I	Data input bit 0
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
10	/ACK	O	Handshaking output signal; printer uses it to acknowledge receipt of parallel data
11	BUSY	O	Busy output signal; indicates that a /STROBE signal has been received, but that /ACK has not yet been given
12	PAPER ERR	O	Paper error, an output error signal; indicates the printer has run out of paper
13	SELECT	O	Printer select line; driven high to indicate the LaserWriter Select 360 printer is online
14, 15, 34, 36	Not connected	–	These lines are not connected
17	GND	–	Chassis ground
18, 33, 35	Tied high	–	Not used, tied high
16, 19-30	GND	–	Signal ground
31	INPRIME	I	Reset signal; host CPU asserts it to cancel the current job on this port
32	/FAULT	O	Fault signal; asserted if there is a printer problem

Figure 1-5 Timing for Centronics interface



Timing specification	Min. value	Typical value	Max. value
a. Data setup time before STROBE on	0.5μsec		
b. STROBE on pulse width	1.0μsec		500μsec
c. Data hold time after STROBE off	0.5μsec		
d. STROBE on to BUSY on	0.0μsec		1.0μsec
e. Duration of BUSY on (printer on line)	10.0μsec		
f. BUSY off to /ACK on	0.0μsec	0.1μsec	
g. /ACK on pulse width	1.5μsec		10.0μsec

Status Lights

The LaserWriter Select 360 printer has three colored lights on the left side of the printer. These lights indicate what the printer is doing. Figure 1-6 shows a view of the status light symbols, and Table 1-5 describes the functions of the lights.

Figure 1-6 Status lights

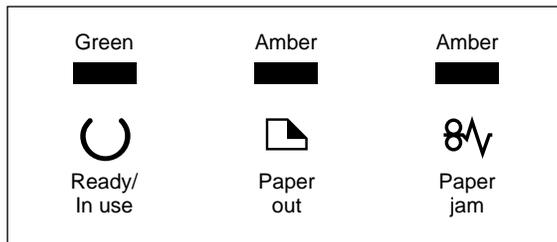


Table 1-5 Status light messages

Light	Light's state	Printer's state
Ready/In use Green	On	The printer is ready to use.
	Off	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	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.
Paper jam Amber	On	There is a paper jam.
	Off	Paper is feeding correctly through the printer.
	Flashing	Printer requires service.

NOTE If both the Paper Out and Paper Jam lights flash, or if they both stay on, there may be an entry jam for a multipurpose tray job. If there is no jam, or if clearing the jam does not fix the problem, the printer requires service.

Mode Switch

The LaserWriter Select 360 printer has a ten-position rotary wheel that allows you to set the printer to work in different communication environments. Positions 0-7 and 9 allow you to select a set of fixed parameters for each of the communication channels. You cannot change these sets of parameters using the PostScript operators. You may change the the set of parameters for switch setting 8, and the changes made will persist across power cycles. See Chapters 2 and 3 for further information. Table 1-6 on page 10 shows the types of connections and the default parameter values for each switch setting.

LaserWriter Select 360 Printer Hardware

Table 1-6 Switch settings and default parameter values

Switch setting	Port name	Type of connection and default parameter values	AIS setup
0	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: raw	All
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: raw	All
1	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: normal	PostScript
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: normal	PostScript
2	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: raw	PCL
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: raw	PCL
3	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: XON/XOFF Protocol: normal	PostScript
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: raw	All

continued

LaserWriter Select 360 Printer Hardware

Table 1-6 Switch settings and default parameter values (continued)

Switch setting	Port name	Type of connection and default parameter values	AIS setup
4	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 19200 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: normal	PCL
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: raw With this switch setting, the configuration page is printed at power up instead of the startup page.	PCL
5	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: XON/XOFF Protocol: normal	All
	36-pin parallel	Centronics, standard handshake mode Protocol: normal	All
6	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 19200 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: normal	PostScript
	36-pin parallel	Centronics, standard handshake mode Protocol: normal	PostScript

continued

LaserWriter Select 360 Printer Hardware

Table 1-6 Switch settings and default parameter values (continued)

Switch setting	Port name	Type of connection and default parameter values	AIS setup
7	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 19200 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: XON/XOFF Protocol: normal	All
	36-pin parallel	Centronics, fast handshake mode Protocol: normal	All
8	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 38400 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: DTR Protocol: raw	All
	36-pin parallel	Centronics, standard handshake mode Protocol: raw	All
9	8-pin/RS-422	LocalTalk	PostScript
	9-pin/RS-232	Serial 9600 baud rate Data bits: 8, no parity Stop bits: 1 Flow control: XON/XOFF Protocol: normal	PostScript
	36-pin parallel	Centronics, with LaserJet III standard handshake mode Protocol: raw	All

NOTE With switch setting 9, the printer executes extended service diagnostics at power up before coming on line.

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You can find out the number of the current switch position by:

- using the PostScript Level 2 system parameter `PrinterMode`
- choosing Configure Communication from the Utilities menu of the LaserWriter Select 360 printer utility program
- looking at the switch on the back of the printer

▲ **WARNING**

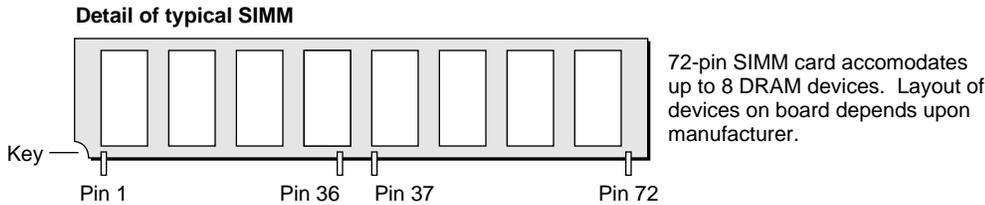
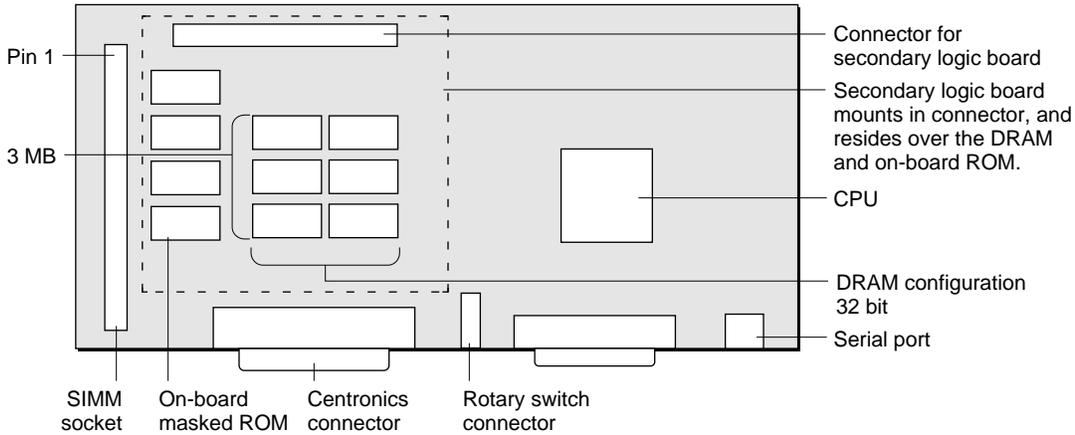
You should change mode switch settings only between jobs. Changing the mode switch during operation immediately affects the printing in progress. The PostScript language interrupt aborts the job, and the printer looks for a new job with the communication parameters designated by the new switch settings, which become active after two seconds. If the host computer continues to run the job that was in progress, the data it sends to the printer may cause unpredictable results.

In addition, if you change the switch settings on a LaserWriter Select 360 printer that is connected to a LocalTalk network, other users on the network may not be aware of the new communication parameters. This can disrupt network activity as well as the printing. It can result in pages of spurious information being generated. ▲

Memory Capabilities

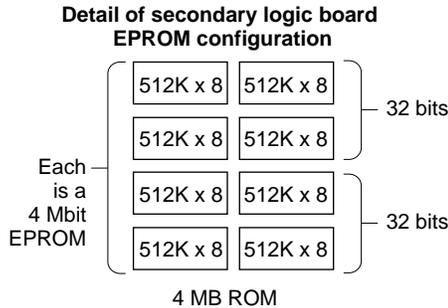
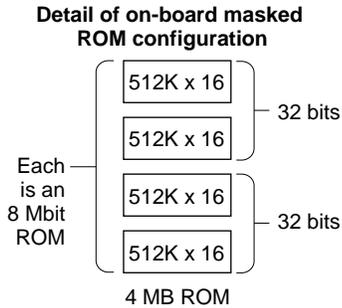
The standard configuration of the LaserWriter Select 360 printer comes with 4 MB of masked ROM (MROM) and 3 MB of DRAM mounted on the main circuit board, or controller. The printer also accommodates a SIMM card that holds an additional 4 MB of DRAM and a card that holds 4 MB of EPROM. Figure 1-7 shows the positioning of the DRAM and ROM on the controller board.

Figure 1-7 ROM, DRAM, and EPROM locations on the controller board



8 DRAMs supply up to 4 MB —1Mbit x 32, or
8 DRAMs supply up to 16 MB —4 Mbit x 32

Note: You must use 32-bit wide SIMMs.



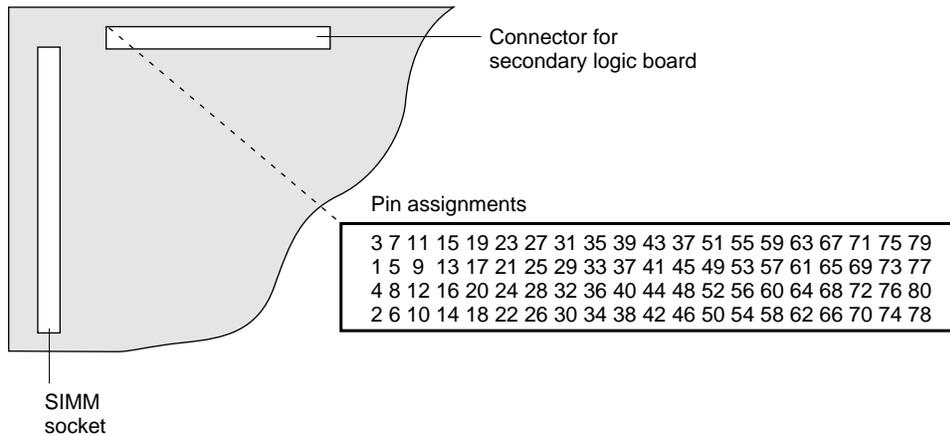
ROM Capability

The LaserWriter Select 360 printer has 4 MB of MROM installed on the controller board, to store the diagnostic software, fonts, and the PostScript and PCL interpreter required by the printer. For the first few months of production, four 8-megabit on-board OTP ROM (one-time-programmable ROM) devices will implement the ROM function. They are mounted on an 80-pin secondary logic board that plugs into a dedicated socket on

LaserWriter Select 360 Printer Hardware

the controller board, as shown in Figure 1-7. When the secondary logic board is plugged into the controller, it overrides any ROM devices installed on the controller. This secondary logic board may also be used for future upgrades to the printer firmware. Pin assignments for the secondary logic board connector are shown in Figure 1-8.

Figure 1-8 Pin assignments for the secondary logic board connector



DRAM Expansion

The LaserWriter Select 360 printer comes with 3 MB of DRAM installed on the main circuit board (Figure 1-7). A SIMM installed in a vertical SIMM socket on the board provides an additional 4 MB of DRAM for a total of 7MB of DRAM in a standard configuration. The DRAM has sufficient capacity for a full 600 dpi frame buffer, or a 4-bit deep 300 dpi frame buffer for FinePrint mode. The LaserWriter Select 360 printer does not use data compression techniques for the frame buffer.

As an option, you can replace the 4 MB SIMM card with a 16 MB SIMM card. However, in this case, memory system design prevents the 3 MB of on-board DRAM from being used, so the total amount of RAM is 16 MB.

Basic Operation

The LaserWriter Select 360 printer operates in two modes: batch and interactive. Since much of the printer's behavior may be changed by changing the parameter settings, as described in Chapter 3, this section assumes that all adjustable options are set to their standard values.

LaserWriter Select 360 Printer Hardware

The printer's main function is to execute the PostScript language programs and PCL jobs sent to it from a computer. In normal operation, the printer cycles endlessly through the following sequence of steps:

1. It sets up a clean initial execution environment (virtual memory) for the PostScript language program. This is what is known as setting up a job.
2. It executes the job by interpreting the standard input data stream, which is received on either the LocalTalk port, the serial port, or the Centronics parallel port. All ports are active at all times. Data stream sensing determines the start and end of PostScript print jobs, PCL5 print jobs, PC DOS Print Screen dumps, Hewlett-Packard TBCP (tagged binary communication protocol), and raw text dumps (as enabled by the mode switch settings).
3. When the printer encounters an end-of-job indicator (this may be a character or a packet), or when an error occurs, the printer cleans up after the job and restores the virtual memory to its initial state in preparation for the next job. Fonts downloaded outside the server loop persist in memory for both the PostScript environment and the PCL environment. These fonts may be released back to the memory pool as required by the active environment. Fonts downloaded with a job do not persist.

The main object of this process is to produce printed pages. However, a program may change some permanent parameters in the printer itself, or may perform some computation that causes results to be sent back to the host computer, rather than causing hard copy to be printed.

Batch Mode

Batch mode is the normal way of operating the LaserWriter Select 360 printer. In this mode, it operates as a printing device for a computer.

A batch-mode job consists of executing a single file containing a PostScript language program. When an end-of-job character is reached, or the PostScript language terminates, the job is finished. In this mode, the only data transmitted from the LaserWriter Select 360 printer to the host is generated by the PostScript language printer operator or by errors. The printer provides no echoing, editing, or other user amenities.

Interactive Mode

You can use the LaserWriter Select 360 printer as a personal computer and control it directly by means of a terminal or other input device. This way of using the printer is known as interactive mode, and it allows you to experiment with the PostScript language.

In interactive mode, a job consists of a long dialogue, in which you issue a PostScript language statement, and the server executes the statement and prompts you for the next one. The state of the PostScript interpreter's virtual memory persists until you explicitly end the job. While you are entering a statement, the printer echoes characters and provides you with limited means for making corrections.

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 1-7 lists the range of page sizes supported by the LaserWriter Select 360 printer.

Table 1-7 Available page types

Name	Paper size in inches	Page size in inches	Description
a4	8.27 x 11.69	7.84 x 11.42	Standard page type for European A4-size paper
a4small	8.27 x 11.69	7.47 x 10.85	Smaller version of a4
b5	7.17 x 10.12	6.97 x 9.72	Standard page type for Japanese B5-size paper
c5	6.38 x 9.02	5.98 x 8.62	Standard page type for the C5-size envelope
com10	4.13 x 9.5	3.73 x 9.1	Standard page type for the COM10-size envelope
dl	4.33 x 8.66	3.93 x 8.26	Standard page type for the DL-size envelope
executivepage	7.25 x 10.5	6.85 x 10.1	Standard page type for Executive-size paper
legal	8.5 x 14	8.1 x 13.67	Standard page type for legal-size paper
legalsmall	8.5 x 14	TBS	Smaller version of legal size
letter	8.5 x 11	8.1 x 10.67	Standard page type for letter-size paper
lettersmall	8.5 x 11	7.68 x 10.16	Smaller version of letter size
monarch	3.87 x 7.5	3.47 x 7.1	Standard page type for the Monarch-size envelope

NOTE 1. The margins required in all cases are 0.2 inches on each side, and at the top and bottom.

NOTE 2. All images may be centered either horizontally or vertically, with the exception of b5, which must be centered horizontally.

NOTE 3. See the sections "Page Size Compatibility Operators," and "Paper Tray Compatibility Operators," in Chapter 3 for further information.

Paper Handling

The LaserWriter Select 360 printer offers a variety of paper handling features, as shown in Figure 1-9. It has three paper feeders and six types of cassettes:

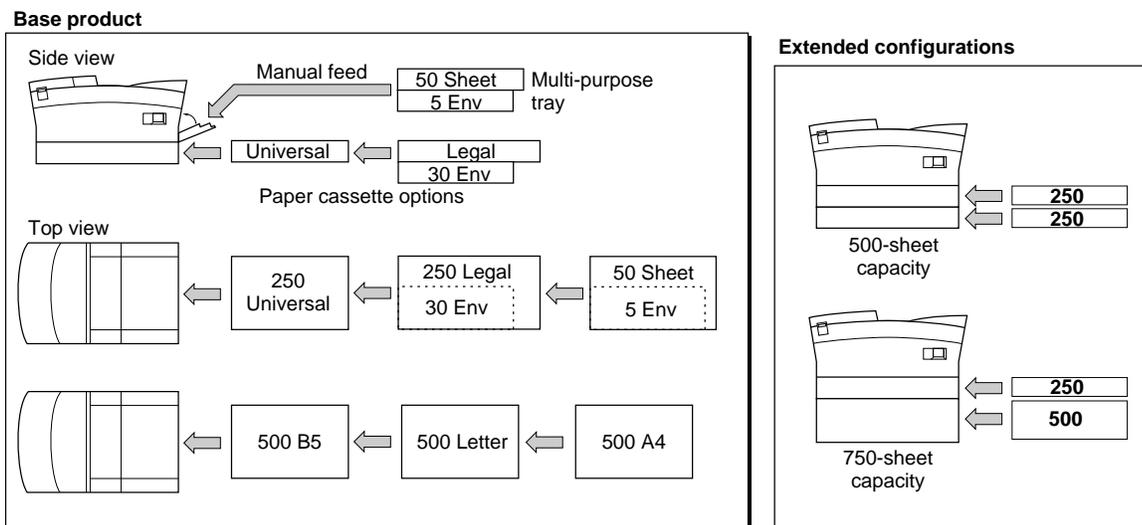
- The manual feeder is an integral part of the printer. To use it, you pull down a small flap on the front of the printer. You may use this feeder to feed single sheets manually, or you may attach an optional multipurpose tray that accommodates up to 50 sheets of varying sizes, or five envelopes.
- The 250-page feeder pulls out like a drawer from the front of the printer. It accommodates a cassette that holds three paper sizes: letter, legal, and envelope.
- The 250-page optional feeder is a separate unit. It is installed under the LaserWriter Select 360 printer, and holds paper sizes letter, legal, and envelope.
- The 500-page optional feeder is a separate unit. It is installed underneath the LaserWriter Select 360 printer. It accommodates a cassette that holds paper sizes A4, B5, and letter.

The basic printer comes with:

- the 50-sheet feeder
- the 250-sheet feeder
- a universal cassette 250-sheet cassette that holds U.S. letter-size paper, A4-size paper, A5-size paper, and executive-size paper

As shown in Figure 1-9, if you use the basic printer with additional optional feeders, you can extend the printer's paper-feeding capability to 500 or 750 sheets. You can also use the manual feed tray in any of these configurations.

Figure 1-9 Paper handling options



LaserWriter Select 360 Software

LaserWriter Select 360 Software

This chapter describes the LaserWriter Select 360 software. It includes:

- an overview of the programming language, interpreter, driver, utility program, and page types
- a detailed description of the software parameters that enable you to set up and configure the LaserWriter Select 360 printer, including page device parameters, product strings, interpreter parameters, and resource categories.

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 types supported by the printer.

Adobe PostScript Programming Language

The LaserWriter Select 360 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 Select 360 printer. You should use this note in conjunction with the *PostScript Language Reference Manual*, published by the Addison-Wesley Publishing Company.

PostScript Interpreter

You may access the special features of the LaserWriter Select 360 printer by executing PostScript operators that exist only in this printer's interpreter. The PostScript Interpreter version at the time of printing is 2013.112.

The 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 Select 360 printer in non-standard ways. Normally page descriptions should not refer to the special operators, since doing so impairs portability.

LaserWriter Select 360 Printer Driver

The LaserWriter Select 360 printer driver and Print Manager provide a general interface to the LaserWriter Select 360 printer. The interface should meet the needs of most Macintosh applications.

The driver:

- provides full support for PostScript Level 2
- supports multiple bins, a multipurpose paper tray, and an envelope feeder
- allows you to configure the driver according to your printer configuration

LaserWriter Select 360 Software

- enables the printer to report paper size in the standard and optional cassettes to the user
- presents error messages if they are reported back by the printer, for example: printer jam status, paper out
- supports optical density control through the video interface
- supports both TrueType and Type 1 fonts
- is compatible with version 7.X of the Macintosh LaserWriter driver
- provides support for n-up printing: this is a new driver feature offered by LaserWriter 8.0 that allows you to print 1, 2, or 4 logical pages on a single sheet of paper

LaserWriter Select 360 Printer Utility Program

The LaserWriter Select 360 printer utility program, which is shipped with each 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 so forth
- add or remove fonts, and display available fonts
- set page parameters and get the count of pages printed by the printer
- set imaging options, such as dots per inch and FinePrint

Page Types

The page types for the LaserWriter Select 360 printer are the same as those described in Chapter 4 of the *LaserWriter Reference*. At the beginning of each job, the server selects the default paper tray, as assigned by the `defaultpapertray` operator. 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 50-sheet multipurpose tray, the server uses the image region most recently installed by means of the `setdefaultmultipurposepaper-traysize` operator. When the multipurpose tray is selected in this way, or by using the `setpapertray` operator, it is treated like the main cassette. Up to 50 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.

If a job requires a particular paper size, it should invoke one of the paper tray selection operators listed in Table 2-1 on page 22 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. Table 1-7, in Chapter 1, defines the different paper sizes.

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

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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 Paper tray selection operators

Operator	Description
<code>a4tray</code>	Selects the paper tray containing A4-size paper and sets the page type to either <code>a4</code> or <code>a4small</code> , depending on the value of <code>pagetype</code> .
<code>a5tray</code>	Selects the paper tray containing A5-size paper and sets the page type to <code>a5</code> .
<code>b5tray</code>	Selects the paper tray containing B5-size paper and sets the page type to <code>b5</code> .
<code>c5tray</code>	Selects the paper tray containing C5-size paper and sets the page type to <code>c5</code> .
<code>com10tray</code>	Selects the paper tray containing COM10-size paper and sets the page type to <code>com10</code> .
<code>dltray</code>	Selects the paper tray containing DL-size paper and sets the page type to <code>dl</code> .
<code>executivetray</code>	Selects the paper tray containing Executive-size paper and sets the page type to <code>executivesize</code> .
<code>legaltray</code>	Selects the paper tray containing legal-size paper and sets the page type to <code>legal</code> .
<code>lettertray</code>	Selects the paper tray containing letter-size paper and sets the page type to either <code>letter</code> or <code>lettersmall</code> , depending on the value of <code>pagetype</code> .
<code>monarchtray</code>	Selects the paper tray containing Monarch-size paper and sets the page type to <code>monarch</code> .

NOTE In all instances, a `rangecheck` error occurs if 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:

- It specifies processing requirements, such as making multiple copies or two-sided printing.
- It selects optional printer features, such as the proper input tray, paper size, and image area.

LaserWriter Select 360 Software

- It establishes device-dependent rendering parameters needed to produce output.
- It also specifies default device setup or configuration parameters that may be used when the page description does not specify the parameters.

The `currentpagedevice` operator is used to get the current accumulated values and the adjusted state of the page device. The parameters for the `setpagedevice` operator are cumulative, in 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 so that the printer can produce the required results. This may cause further modification of the page device state.

The LaserWriter Select 360 printer uses the Level 2 implementation, which provides device control operators defined in the special dictionary, `statusdict`.

For more information about how the `setpagedevice` operator is used to specify the processing requirements of a document, refer to Section 4.11 of the *PostScript Language Reference Manual*.

Page Device Parameters

This section describes the page device parameters present in the LaserWriter Select 360 printer. Refer to the *PostScript Language Reference Manual*, Section 4.11.3, for supplemental information on parameter semantics. Table 2-2 lists the page device parameters and their defaults, and provides additional technical information.

IMPORTANT

The LaserWriter Select 360 printer does not support the PhotoGrade feature. However, page device parameters normally associated with PhotoGrade, such as `PreRenderingEnhance` and `PreRenderingEnhanceDetails`, are used to support FinePrint, and they remain in the page device dictionary. ▲

Table 2-2 Page device parameters

Key	Type	Default	Description
<code>BeginPage</code>	<i>procedure</i>	{pop}	This parameter is executed at the beginning of each page: at the end of <code>setpagedevice</code> , at the end of <code>showpage</code> or <code>copypage</code> , and during any operation that reinstates a page device different from the existing one.
<code>EndPage</code>	<i>procedure</i>	{exch pop 2 ne}	This parameter is executed at the end of each page. End of page occurs at the beginning of each <code>showpage</code> or <code>copypage</code> , and when the current page device is about to be replaced by a different page device.

continued

Table 2-2 Page device parameters (continued)

Key	Type	Default	Description
ExitJamRecovery	<i>boolean</i>	false	If this parameter is <code>true</code> , pages that jam in the exit path are reprinted. If it is <code>false</code> (jam recovery disabled), pages that jam are not reprinted. In this case, performance may be improved because it is possible to overlap more page processing. Value persists across power cycles.
FaxOptions	<i>dictionary</i>		This dictionary contains parameters used to direct fax transmissions from a PostScript language program. Refer to “Fax Parameters” later in this chapter for further information about <code>FaxOptions</code> defaults and the keys found in this dictionary.
HWResolution	<i>array</i>	[600 600]	This key controls the resolution of the output. It is used in conjunction with the <code>Policies</code> dictionary (see below) and the amount of available memory in the printer to determine if compression will be attempted on the frame buffer and at which resolution the frame buffer will print. In addition to the standard policies, a <code>HWResolution</code> policy is included by default. Three <code>HWResolution</code> policies are available. They specify the recovery policy to use when the <code>HWResolution</code> selected cannot be satisfied because of memory limitations. The policy is an integer code with the following meanings: 0 Generate a configuration error 1 Ignore request 2 Provide the best resolution possible. Consider requested resolution first, and then drop successively to each achievable resolution.
ImagingBBox	<i>array or null</i>	null	This parameter is an optional bounding box. If not <code>null</code> , the value is an array of four numbers in the default user coordinate system stating lower-left <i>x</i> , lower-left <i>y</i> , upper-right <i>x</i> , and upper-right <i>y</i> of the page image bounding box. In some configurations, this may be set to a default to reduce the imaging area allowed to less than a full page.
InputAttributes	<i>dictionary</i>	Depends on configuration	This parameter contains an entry for each source of input media available for use by the printer. The values <i>x</i> and <i>y</i> depend upon which paper tray is installed. The 50-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 <code>InputAttributes</code> dictionary is set to <code>null</code> . This can only happen 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 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 <code>PageSize</code> parameter. See <code>PageSize</code> later in this table.

Table 2-2 Page device parameters (continued)

Key	Type	Default	Description
Install	<i>procedure</i>		<p>This procedure installs values in the graphics state during each invocation of <code>setpagedevice</code>, which calls this procedure after setting up the device and installing it as the current device in the graphics state, but before executing the implicit <code>erasepage</code> and <code>initgraphics</code>.</p> <p>The default install procedure is:</p> <pre>{currentpagedevice dup /PreRenderingEnhanceDetails get /ActualPreRenderingEnhance get {PreRenderingEnhanceDetails get /DefaultHalftone get /Halftone findresource} {pop << /SpotFunction {abs exch abs 2 copy add 1 get {1 sub dup mul exch 1 sub dup mul add 1sub} {dup mul exch add 1 exch sub} ifelse} /HalftoneType 1 /Frequency /ActualValues /ProcSet find resource /HWResolution get exec 0 get 300 eq {60} {85} ifelse /Angle 45 >>} ifelse sethalftone { } settransfer false setstrokeadjust << 300 /DefaultColorRendering300 600 /DefaultColorRendering600 >> /ActualValues /ProcSet findresource /HWResolution get exec 0 get get /ColorRendering findresource setcolorrendering}</pre>
ManualFeed	<i>boolean</i>	false	<p>This parameter determines whether the input medium (paper, and so on) is to be drawn from the manual or the automatic feeder. It is <code>true</code> for manual feeding, and <code>false</code> for automatic feeding.</p>
ManualFeedTimeout	<i>integer</i>	60	<p>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.</p> <p>Value persists across power cycles.</p>
Margins	<i>array</i>	[0 0]	<p>This parameter is an array of two numbers that relocates 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 $1/300$ of an inch, or $1/600$ of an inch, depending on the resolution.</p> <p>Value persists across power cycles.</p>
MediaColor	<i>string or null</i>	null	<p>This parameter specifies the color of the input media.</p>
MediaType	<i>string or null</i>	null	<p>This parameter specifies the type of media, paper, transparency, and so on.</p>
MediaWeight	<i>number or null</i>	null	<p>This parameter specifies the weight of the media.</p>

continued

Table 2-2 Page device parameters (continued)

Key	Type	Default	Description
NumCopies	<i>integer or null</i>	null	If it is not null, this parameter specifies the number of copies to produce. The value applies to each individual page, or to the entire document, depending on the setting of <code>Collate</code> . If <code>NumCopies</code> is null, <code>showpage</code> and <code>copypage</code> should consult the value of <code>#copies</code> in the current dictionary stack each time they are executed.
OutputDevice	<i>name</i>	/Printer	This parameter specifies which communications device is to be used for <code>stdout</code> and <code>stderr</code> .
OutputFaceUp	<i>boolean</i>	false	This value 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 up. If it is true, they are output face down. Value persists across power cycles.
OutputPage	<i>boolean</i>	true	If this parameter is true, pages are printed normally, and output into the output tray. If it 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 <code>showpage</code> instead of being overlapped with the execution of subsequent pages. This function is used to measure the complete cost of executing a page.
PageSize	<i>array</i>	Depends on configuration	This parameter defines the overall page size that was assumed during generation of the page description. <code>PageSize</code> is an array of two numbers [width height], which 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.
Policies	<i>dictionary</i>		This dictionary contains feature-policy pairs that specify what <code>setpagedevice</code> should do when a feature request cannot be satisfied. The default procedure is: <pre><</PolicyNotFound 1 /PageSize \\0\\ /PolicyReport {pop}>></pre>
PostRendering Enhance	<i>boolean</i>	true	If this parameter is true, product-specific image enhancements are enabled. These enhancements are made after the page is rasterized in memory. Value persists across power cycles.
PostRendering EnhanceDetails	<i>dictionary</i>	Hardware dependent	This dictionary describes product-specific details related to the post-rendering image enhancement. Refer to "Details Dictionary," later in this chapter for further information.

continued

Table 2-2 Page device parameters (continued)

Key	Type	Default	Description
PreRenderingEnhance	<i>boolean</i>	true	If the value for this parameter is true, product-specific image enhancements are enabled. These enhancements are made before the image is rasterized into memory. PreRenderingEnhance 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, it is treated as an unsatisfied request to be handled by the Policies dictionary. Value persists across power cycles.
PreRenderingEnhanceDetails	<i>dictionary</i>	Hardware dependent	This dictionary describes product-specific details related to the pre-rendering image enhancement. Refer to "Details Dictionary," later in this chapter for further information.
TraySwitch	<i>boolean</i>	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.

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

Table 2-3 lists the different page sizes.

Table 2-3 Paper sizes

Paper size	Name
[595 842]	A4
[422 595]	A5
[516 729]	B5
[459 649]	C5 Envelope
[297 684]	COM10 Envelope
[312 624]	DL Envelope
[522 756]	Executive
[612 1008]	Legal
[612 792]	Letter
[279 540]	Monarch Envelope

Note

Page size is indicated by an array of two numbers ([595 842], and so on) that indicate width and height. The units are equivalent to 1/72 of an inch. ♦

Table 2-4 lists the paper-tray slot numbers and corresponding input sources.

Table 2-4 Paper tray slot numbers and input sources

Slot number	Input source
0	Cassette (250 sheets)
1	Multipurpose tray (50 sheets)
2	Cassette (250/500 sheets)

Fax Parameters

PostScript language drivers create pages that can be printed or faxed. If you intend to build PostScript language drivers and utility software to work with PostScript fax printers, you will need the information about fax parameters contained in the `FaxOptions` dictionary, and listed in Table 2-5.

Table 2-5 FaxOptions dictionary parameters

Key	Type	Default	Description
<code>CalleePhone</code>	<i>string or null</i>	null	Indicates the telephone number of the fax machine to which the call is being directed. The value of <code>CalleePhone</code> is used for <code>Confirmation</code> , <code>CoverSheet</code> , and <code>PageCaption</code> procedures. It differs from <code>DialCallee</code> in that it omits or alters routing prefixes and suffixes. Compare the following versions of a Swiss phone number with the version shown under <code>DialCallee</code> . (0041-5-55-55-55732) or (CH 5-55-55-55732) If the value of <code>CalleePhone</code> is null, the value of <code>DialCallee</code> is used.
<code>CallerID</code>	<i>string or null</i>	null	This ID is defined by the CCITT (1988) fax protocol. It is a string of up to 20 characters which the caller uses to identify himself to the callee. If the value of <code>CallerID</code> is null, then the value of <code>ID</code> from the <code>%Fax%</code> device parameter set is used. If this device parameter is not set, the string returned by the system parameter <code>PrinterName</code> is used. If this string is greater than 20 characters, the 20 leftmost characters are used.

continued

Table 2-5 FaxOptions dictionary parameters (continued)

Key	Type	Default	Description
CallerPhone	<i>string or null</i>	null	Indicates the telephone number of the caller fax machine.
Confirmation	<i>procedure or null</i>	See description.	Prints a confirmation sheet on the print mechanism at the sending end. The <code>Confirmation</code> procedure is executed when the fax job is finished, and the transmission has been completed. You can omit the confirmation report by setting the value of this parameter to <code>null</code> . You can also customize the report using your own procedure. You should set the value to <code>null</code> if the <code>%Fax%</code> parameter <code>DefaultConfirmOn</code> is <code>false</code> , otherwise the default value is <code>{DefaultConfirmationOn faxopsexec}</code> .
Copies	<i>array of dictionaries or null</i>	null	Enables you to broadcast the same raster or PostScript language file to multiple recipients. The only keys allowed in these dictionaries are the ones allowed in the <code>FaxOptions</code> dictionary and listed in this table. If the same key is defined in both dictionaries, the value from <code>Copies</code> takes precedence.
CoverNote	<i>array of strings or null</i>	null	Passes information to the <code>CoverSheet</code> procedure. It may also be used for the entire fax message if the message consists only of the cover sheet.
CoverSheet	<i>procedure or null</i>	See description.	Allows you to define <code>CoverSheet</code> as a PostScript language procedure that produces a customized cover sheet. When this parameter is <code>null</code> , the software does not generate cover sheets. The default value is <code>null</code> if the <code>%Fax%</code> parameter <code>DefaultCoversOn</code> is <code>false</code> . Otherwise, the default value is <code>{/DefaultCoverSheet faxopsecec}</code> .
CoverSheetOnly	<i>boolean</i>	<code>false</code>	Indicates that it is all right to send an empty job (cover sheet only). If the <i>boolean</i> is <code>false</code> and the PostScript language job produces no pages, no phone call is made and nothing is sent. If the <i>boolean</i> is <code>true</code> and <code>CoverSheet</code> is not <code>null</code> , then the page generated by the cover sheet procedure is sent in any case.

continued

Table 2-5 FaxOptions dictionary parameters (continued)

Key	Type	Default	Description																					
DialCallee	<i>string</i>	null	<p>Indicates the phone number of the fax machine to which the call is being directed. The string is sent to the telephone auto-dialer in the fax printer. It consists of a sequence of the following characters:</p> <p>P Begin dialing T Begin DTMF (Touch-Tone) dialing 0-9 Send signal digit to telephone exchange *# Send DTMF symbol to telephone exchange , pause for 2 seconds W Wait for dial tone</p> <p>The auto-dialer ignores any other characters.</p> <p>This <i>string</i> contains a maximum of 100 characters. The following string represents a Swiss phone number preceded by the routing prefix T and the suffix #:</p> <p>T9,011-41-5-55-55-55732#</p>																					
ErrorCorrect	<i>boolean</i>	true	<p>Decides whether or not error correction should be attempted for the transmission. If the receiving machine does not have the error correction facility, the transmission takes place without it.</p>																					
FaxType	<i>integer or null</i>	null	<p>Decides how the actual page contents are prepared and transmitted. If the value is an integer, it should be 0 or 1:</p> <p>0 Use standard CCITT group 3 resolution 1 Use fine CCITT group 3 resolution</p> <p>If the FaxType is 0, the transmitted y resolution is approximately 100 lines per inch. If FaxType is 1, resolution is twice as fine, and transmission time is correspondingly longer. If FaxType is null, the value of the %Fax% device parameter, DefaultResolution, which is 0 or 1, selects the resolution.</p>																					
MailingTime	<i>array of integers or null</i>	null	<p>Indicates when the fax message should be transmitted. The value is an array of integers with the following entries:</p> <table border="1"> <thead> <tr> <th>Index</th> <th>Values</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>[1980-2079]</td> <td>Year</td> </tr> <tr> <td>1</td> <td>[1-12]</td> <td>Month</td> </tr> <tr> <td>2</td> <td>[1-31]</td> <td>Day</td> </tr> <tr> <td>3</td> <td>[0-23]</td> <td>Hour</td> </tr> <tr> <td>4</td> <td>[0-59]</td> <td>Minute</td> </tr> <tr> <td>5</td> <td>[0-59]</td> <td>Second</td> </tr> </tbody> </table> <p>If the value is null, the message is sent immediately.</p>	Index	Values	Meaning	0	[1980-2079]	Year	1	[1-12]	Month	2	[1-31]	Day	3	[0-23]	Hour	4	[0-59]	Minute	5	[0-59]	Second
Index	Values	Meaning																						
0	[1980-2079]	Year																						
1	[1-12]	Month																						
2	[1-31]	Day																						
3	[0-23]	Hour																						
4	[0-59]	Minute																						
5	[0-59]	Second																						

continued

Table 2-5 FaxOptions dictionary parameters (continued)

Key	Type	Default	Description
MaxRetries	<i>integer or null</i>	null	Indicates how many additional times (after the first time) the machine should try to send the fax message, before giving up on transmission. The maximum value is 100. If the value is null, the value provided by %Fax% parameter DefaultRetryCount is used.
nPages	<i>integer or null</i>	null	Supplies the application's estimate of page count, exclusive of automatically generated cover sheets. If transmission starts before the transmitting machine has finished processing the job, the number of pages is not known to the printer, and it uses the value supplied by nPages. If nPages is null, the cover sheet lists an unknown number of pages.
PageCaption	<i>procedure or null</i>	See description.	Generates a page caption for the cover sheet, with information such as sender's name, recipient, and so on. The caption will not be generated if the value is null. The value is null if the %Fax% parameter DefaultCaptionOn is false, otherwise the default value is: {DefaultPageCaption faxopsexec}
PostScript Password	<i>string or null</i>	null	Specifies the password to be used to gain permission from the machine being called to transmit the fax job as a PostScript language file. The default is null, which means that no password is used.
ProcInfo	<i>dictionary or null</i>	null	Supplies any number of additional application-specific key-value pairs. The key-value pairs convey variable information for cover sheets, confirmation reports, and page captions.
RecipientID	<i>string or null</i>	null	Contains a string that uniquely identifies the individual within an organization to whom the fax message is addressed. This ID may be read only by a computer, and it enables subsequent delivery of the fax message within the recipient's organization. If the value is null, a string of nulls is transmitted.
RecipientMail Stop	<i>string or null</i>	null	Contains information needed for hand delivery of the fax message, including mail stop, building number, and so on.
RecipientName	<i>string or null</i>	null	Provides the name of the person to whom the fax is being sent. If there is a default value for RecipientName, the code seeks alternative non-null values to store in the job log, looking at the following items, in the order shown. Each time the code finds a default value, it goes to the next parameter on the list: <ul style="list-style-type: none"> ■ RecipientOrg ■ CalleePhone ■ DialCallee

continued

Table 2-5 FaxOptions dictionary parameters (continued)

Key	Type	Default	Description
RecipientOrg	<i>string or null</i>	null	Indicates the name of the company and organization of the person receiving the fax message. If the code finds a default value, it falls back to: <ul style="list-style-type: none"> ■ CalleePhone ■ DialCallee
RecipientPhone	<i>string or null</i>	null	Indicates the voice-phone number of the person to whom the fax message is being sent. It is not the same as DialCallee, which is the fax number. RecipientPhone is used to generate custom cover sheets that provide routing information for the fax attendant. If the code finds a default value, it falls back to: <ul style="list-style-type: none"> ■ CalleePhone ■ DialCallee
Regarding	<i>string or null</i>	null	Passes information to the CoverSheet procedure. This string is used typically to add a subject line to the cover sheet.
RetryInterval	<i>string or null</i>	null	This parameter is a positive integer that specifies the number of minutes to wait before trying to resend a fax that failed. The maximum value is 60, indicating 60 minutes. If the value is null, the length of the retry interval is determined by the %Fax% device parameter DefaultRetryInterval.
RevertToRaster	<i>boolean</i>	true	Used by the faxsendops operator to decide what to do when the receiving machine refuses to accept a PostScript language transmission. If it is true, the PostScript language job is imaged locally and a rasterized fax transmission is made. If it is false, the job will fail.
SenderID	<i>string or null</i>	null	Contains a string that uniquely identifies the sender.
SenderMailStop	<i>string or null</i>	null	Contains information such as the sender's mail stop and building number. It facilitates hand delivery of return fax messages.
SenderName	<i>string or null</i>	null	Provides the name of the sender. If the code finds a null value for SenderName, it seeks an alternative non-null value to store in the job log. The fall back order is shown below: <ul style="list-style-type: none"> ■ SenderOrg ■ CallerID If both parameters contain null values, the value of the %Fax% device parameter ID is used.

continued

Table 2-5 FaxOptions dictionary parameters (continued)

Key	Type	Default	Description
SenderOrg	<i>string or null</i>	null	Indicates the sender's company or organization name. If the code finds a null value for SenderOrg, it seeks an alternative non-null value to store in the job log, and uses the value of SenderOrg. If the value of SenderOrg is null, the value of %Fax% device parameter ID is used.
SenderPhone	<i>string or null</i>	null	Indicates the sender's voice-phone number.
TrimWhite	<i>boolean</i>	false	Determines the size of the white space at the top and bottom of pages. If it is true when the raster transmission is being prepared, the white space at the top and bottom is removed before the pages are transmitted. This results in shorter phone calls, but also results in a mixture of page lengths.

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

Details Dictionary

Certain page device features have many variables which decide how the features function. These variables are different on different products. The feature is enabled or disabled by a primary page device entry. However, the exact way in which the feature functions is decided 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 Select 360 printer's strings contain characters that provide information about the printer and the printer software. Table 2-6 lists values assigned to the LaserWriter Select 360 product strings.

Table 2-6 Product string values

String name	Type	Value	Definition
languagelevel	integer	2	Level of the PostScript language
product	string	LaserWriter Select 360	Printer name
revision	integer	1	Current revision level of the printer
serialnumber	integer	Depends on individual printer	Serial number of the printer
version	string	2013.112	Version of the PostScript language

NOTE The `version` suffix (112) is the current version. This may be updated in printers that ship later.

Interpreter Parameters

Certain 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 Select 360 printer is configured initially with interpreter parameter values appropriate for most applications. However, using a PostScript language program, 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. There are several types of device parameters, including communications, parallel port, engine, and emulator.

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*.

User Parameters

Within reasonable limits, you can change user parameters without special authorization or password, using any PostScript Language program. User parameters establish temporary policies on issues such as size limits and inserting 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. `Restore` resets all user parameters to their values at the time of the matching `save`. The initial value of the user parameters when

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the printer is turned on for the first time depends upon the product. Table 2-7 lists the user parameters present in the LaserWriter Select 360 printer. You can find further information on these parameters in the *PostScript Language Reference Manual*, and the *PostScript Language Reference Manual Supplement*.

Table 2-7 User parameters in the LaserWriter Select 360 printer

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

continued

Table 2-7 User parameters in the LaserWriter Select 360 printer (continued)

Key	Type	Default	Description
MaxScreenItem	<i>integer</i>	12000	Determines the maximum number of bytes occupied by a single halftone screen. It may be set to 0, or any number larger than 0. The initial value is 3000 bytes per MB of installed RAM, up to a maximum of 12000 bytes.
MaxUPathItem	<i>integer</i>	5000	Determines the maximum number of bytes occupied by a single cached user path. It may be set to 0, or any number larger than 0.
MinFontCompress	<i>integer</i>	1250	Sets the threshold at which a cached character is stored in compressed form instead of as a full pixel array. It may be set to 0, or any number larger than 0.
VMReclaim	<i>integer</i>	0	Enables or disables local garbage collection. <ul style="list-style-type: none"> ■ 0 enables automatic collection ■ -1 disables it for local VM ■ -2 disables it for both local and global VM
VMThreshold	<i>integer</i>	40000	This is the frequency of garbage collection. It is triggered whenever the number of bytes indicated by the setting has been allocated. It may be set to 0, or any number larger than 0.
WaitTimeout	<i>integer</i>	40	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. It 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 2-8 lists the system parameters present in the LaserWriter Select 360 printer.

Note

For further information about parameters listed in Table 2-8, refer to the *PostScript Language Reference Manual Supplement*, Section 3.4 and Section 3.9. ♦

Table 2-8 System parameters in the LaserWriter Select 360 printer

Key	Type	Default	Details
BuildTime	<i>integer</i>	Actual date the interpreter was built	This is a time stamp that identifies the date the PostScript interpreter was built. It is a read-only parameter.
ByteOrder	<i>boolean</i>	false	Determines the order of multiple-byte numbers in binary-encoded tokens: <i>false</i> indicates high-order byte first, <i>true</i> indicates low-order byte first.
CurDisplayList	<i>integer</i>	0	Identifies amount of RAM currently occupied by the display list. It is a read-only parameter.
CurFontCache	<i>integer</i>	0	Identifies amount of RAM currently occupied by the font cache. It is a read-only parameter.
CurFormCache	<i>integer</i>	0	Identifies amount of RAM currently occupied by the form cache. It is a read-only parameter.
CurInputDevice	<i>string</i>	()	Indicates the name of the communications device that corresponds to the current input file for the PostScript language program currently being executed. It is a read-only parameter.
CurOutlineCache	<i>integer</i>	0	Identifies the amount of RAM currently occupied by the outline cache. It is a read-only parameter.
CurOutputDevice	<i>string</i>	()	Indicates the name of the communications device that corresponds to the current output file for the PostScript language program currently being executed. It is a read-only parameter.
CurPatternCache	<i>integer</i>	0	Identifies the amount of RAM currently occupied by the pattern cache. Indicates the name of the communications device that corresponds to the current input file for the PostScript language program currently being executed. It is a read-only parameter.
CurScreenStorage	<i>integer</i>	0	Identifies the amount of RAM currently occupied by screen storage. Indicates the name of the communications device that corresponds to the current input file for the PostScript language program currently being executed. It is a read-only parameter.

continued

Table 2-8 System parameters in the LaserWriter Select 360 printer (continued)

Key	Type	Default	Details
CurSourceList	<i>integer</i>	0	Indicates the number of bytes currently occupied by source lists. It is a read-only parameter, and may be set to 0 or any number larger than 0.
CurStoredScreenCache	<i>integer</i>	0	Indicates the number of bytes currently used for screen files on the storage device. This number includes currently active screens.
CurUPathCache	<i>integer</i>	0	Indicates the number of bytes currently occupied by the U path cache. It is a read-only parameter, and may be set to 0 or any number larger than 0.
DoStartPage	<i>boolean</i>	true	Indicates whether or not the start page should print during system initialization. The start page prints if the value is true. Value is persistent across power cycles.
FactoryDefaults	<i>boolean</i>	false	This parameter is generally false. However, if you set it 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.
FatalErrorAddress	<i>integer</i>	0	This integer is the hardware address of the last call to the fatal error handler. A non-zero value for this parameter indicates that a fatal system error has occurred earlier.
FontResourceDir	<i>string</i>	(fonts/)	Controls the location of external fonts, which are resources in PostScript Level 2.
GenericResourceDir	<i>string</i>	(Resource/)	Controls the location of external resources for the Generic category and all other categories based upon it.
GenericResourcePathSep	<i>string</i>	(/)	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.

continued

Table 2-8 System parameters in the LaserWriter Select 360 printer (continued)

Key	Type	Default	Details
JobTimeout	<i>integer</i>	0	Indicates the value in seconds to which the user parameter JobTimeout will be initialized at the beginning of each job. It may be set to 0 or any number larger than 0.
LicenseID	<i>string</i>	Unique to each printer	Contains the Adobe-assigned license identification. The value is unique to each printer. Any string of non-null characters is legal.
MaxDisplayList	<i>integer</i>	Function of RAM size	Indicates the maximum number of bytes occupied by display lists, excluding those held in caches. Initial value is 4% of installed RAM. This number is recomputed when the RAM configuration changes. It may be set to 0 or any number larger than 0.
MaxFontCache	<i>integer</i>	Function of RAM size	Indicates the maximum number of bytes occupied by the font cache. Initial value is based on the amount of RAM installed. It is 167,772 bytes for 4 MB RAM. Otherwise, it is 10% of installed RAM. This number is recomputed when the RAM configuration changes.
MaxFormCache	<i>integer</i>	100000	Indicates the maximum number of bytes occupied by the form cache. It may be set to 0 or any number larger than 0.
MaxImageBuffer	<i>integer</i>	65536	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	<i>integer</i>	65536	Indicates the maximum number of bytes occupied by cached character outlines (CharStrings) for fonts whose definitions are kept on disk instead of in VM. It may be set to 0 or any number larger than 0.
MaxPatternCache	<i>integer</i>	100000	Indicates the maximum number of bytes occupied by the pattern cache. It may be set to 0 or any number larger than 0.

continued

Table 2-8 System parameters in the LaserWriter Select 360 printer (continued)

Key	Type	Default	Details
MaxRasterMemory	<i>integer</i>	0	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. It may be set to 0 or any number larger than 0.
MaxScreenStorage	<i>integer</i>	Function of RAM size	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. It may be set to 0 or any number larger than 0.
MaxSourceList	<i>integer</i>	24576	Indicates the maximum number of bytes that can be used by source lists. It may be set to 0 or any number larger than 0.
MaxUPathCache	<i>integer</i>	300000	Indicates the maximum number of bytes occupied by the user path. It may be set to 0 or any number larger than 0.
PageCount	<i>integer</i>	0	Indicates how many pages have been successfully printed since manufacture. This is a read-only parameter.
PrinterMode	<i>integer</i>	Depends on the mode switch setting	Indicates the printer's operating mode.
PrinterName	<i>string</i>	(LaserWriter Select 360)	Establishes <i>string</i> 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.
RamSize	<i>integer</i>	Function of RAM size	Indicates in bytes the amount of installed RAM available to the printer. This is a read-only parameter. It may be set to 0 or any number larger than 0.
RealFormat	<i>string</i>	IEEE	Native representation of real numbers in binary encoded tokens.

continued

Table 2-8 System parameters in the LaserWriter Select 360 printer (continued)

Key	Type	Default	Details
Revision	<i>integer</i>	1	Designates the current revision level of the ROM in which the interpreter is running. This is a read-only parameter.
StartJobPassword	<i>string</i>	()	This write-only password authorizes the use of the <code>startjob</code> operator. Any string of 32 or fewer characters may be used.
StartupMode	<i>integer</i>	1	Controls 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.
SystemParamsPassword	<i>string</i>	()	This write-only password authorizes the use of the <code>setsystemparams</code> and <code>setdevparams</code> operators. Any string of 32 or fewer characters may be used. Value is persistent across power cycles.
ValidNV	<i>boolean</i>	true	Indicates whether nonvolatile memory is currently used to store persistent parameters. This is a read-only parameter.
WaitTimeout	<i>integer</i>	40	Indicates the value in seconds to which the user parameter <code>waitTimeout</code> will be initialized at the beginning of each job. It may be set to 0 or any number larger than 0. 0 indicates an infinite wait period.

Device Parameters

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

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Device parameters are different from both 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 (%Serial%, %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. ♦

Communication Device Parameters

The LaserWriter Select 360 printer has three communication ports that implement three communication channels:

- a 25-pin RS-232 serial connector supports the %Serial% channel
- an 8-pin RS-422 serial connector is configured to use LocalTalk protocol, and supports the %LocalTalk% channel
- a Centronics 36-pin parallel port supports the %Parallel% channel

Each channel has three related parameter sets:

- nonvolatile
- pending
- RAM

The section “Setting Communication Parameters,” in Chapter 3, defines serial channel parameters. Chapter 4, “Communication Channels,” provides detailed information on serial and parallel communication channels. Section 3.5.2 in the *PostScript Language Reference Manual Supplement* also provides further information on the three parameter sets.

RS-232 Serial Port Parameters

The RS-232 connector implements the following serial channels: %Serial%, %Serial_NV%, and %Serial-Pending%. Table 2-9 lists the factory default values for these channels.

Table 2-9 Parameters for %Serial%, %Serial_NV%, and %Serial_Pending%

Key	Type	Default	Description
Baud	<i>integer</i>	19200	Designates the baud rate on the serial hardware.
CheckParity	<i>boolean</i>	false	Designates whether or not the device will perform a parity check on incoming data. If the parameter is <code>true</code> , parity checking occurs. If it is <code>false</code> , there is no parity checking.

continued

Table 2-9 Parameters for %Serial%, %Serial_NV%, and %Serial_Pending% (continued)

Key	Type	Default	Description
DataBits	<i>integer</i>	8	Designates the number of data bits per byte transferred over the channel. If it is set to 7, the high bit of the byte is set to 0.
Enabled	<i>boolean</i>	true	Indicates whether data arriving at the printer should be scheduled for execution. If it is true, data is executed. If it is false, data is not executed.
FlowControl	<i>name</i>	/XonXoff	Indicates the serial flow control method used between the host computer and the printer. Alternatives available with the LaserWriter Select 360 printer are: <ul style="list-style-type: none"> ■ Dtr ■ XonXoff
HasNames	<i>boolean</i>	false	Indicates whether the printer supports named files. If the printer is not mounted, or if Type is /Communications, this value is false. This value is a read-only constant.
Interpreter	<i>name</i>	/PostScript	Indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter Select 360 are: <ul style="list-style-type: none"> ■ PostScript ■ LaserJet III ■ AutoSelect
On	<i>boolean</i>	true	Indicates whether or not the printer driver for the communications device is turned on and is able to receive and send data. If this value is false, data sent to the printer is lost.
Parity	<i>name</i>	/None	Indicates the type of parity to be used between the host computer and the printer: <ul style="list-style-type: none"> ■ Space Parity is 0 ■ Mark Parity is 1 ■ None No parity sent ■ Even Even parity sent ■ Odd Odd parity sent
Protocol	<i>name</i>	/Normal	Indicates the type of communications protocol to be used: <ul style="list-style-type: none"> ■ Binary ■ Normal ■ Raw ■ TBCP (tagged binary communication protocol) <p>For further information on protocols, refer to Section 3.5.3 of the <i>PostScript Language Reference Manual Supplement</i>.</p>

continued

Table 2-9 Parameters for %Serial%, %Serial_NV%, and %Serial_Pending% (continued)

Key	Type	Default	Description
StopBits	<i>integer</i>	1	Indicates the number of stop bits to be transmitted by the serial hardware. Alternative settings are 1 and 2.
Type	<i>name</i>	/Communications	Designates the general category of the device represented by the parameter set.

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

Note

The %Serial% parameter set supports only the values /Dtr, and /XonXoff for the FlowControl parameter. No other FlowControl choices are allowed. A configurationerror results if you attempt to set other values. ♦

IMPORTANT

The Interpreter values supported are /AutoSelect, /PostScript, and /LaserJetIII. Use caution if you select /AutoSelect. This value invokes the Adobe IntelliSelect heuristic-based algorithm to determine both the protocol (Adobe Standard, TBCP, PjL, or none) and the language (PostScript, PCL, or screen dump) of the incoming data stream. Because there are print jobs that are valid in multiple languages, there is no guarantee that this algorithm will choose the required language. In addition, /AutoSelect does not support asynchronous status inquiries, and can therefore make many host print drivers and spoolers unusable. When combined with a Protocol value of /Raw, Adobe IntelliSelect supports Adobe Standard, TBCP, and PjL data protocols. ▲

LocalTalk Parameters

The RS-422 port supports LocalTalk. Table 2-10 lists the factory defaults settings for %LocalTalk%, %LocalTalk_NV%, and %LocalTalk_Pending%.

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 Filtering to /InterpreterBased, and Interpreter to /AutoSelect. /InterpreterBased does not support asynchronous status inquiries, and it can therefore make many host printer drivers and spoolers unusable. ▲

Table 2-10 Parameters for %LocalTalk%, %LocalTalk_NV%, and %LocalTalk_Pending%

Key	Type	Default	Description
Enabled	<i>boolean</i>	true	Indicates whether data arriving at the printer should be scheduled for execution. If it is <code>true</code> , data is executed. If it is <code>false</code> , data is not executed.
Filtering	<i>name</i>	/None	Controls whether or not the Adobe IntelliSelect heuristics are used for automatic protocol detection. Supported values are /None, which means that automatic protocol handling does not occur, and /InterpreterBased, which means that the heuristics are used. They are generally used when Interpreter is set to /AutoSelect.
HasNames	<i>boolean</i>	false	Indicates whether the printer supports named files. If the printer is not mounted, or if Type is /Communications, this value is false. This value is a read-only constant.
Interpreter	<i>name</i>	/PostScript	Indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter Select 360 are: <ul style="list-style-type: none"> ■ PostScript ■ LaserJet III ■ AutoSelect
LocalTalkType	<i>string</i>	(LaserWriter)	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 Select 360 printer, the type is LaserWriter.
NodeID	<i>integer</i>	Depends on the connection	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. This parameter is a read-only constant.
On	<i>boolean</i>	true	Indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If this value is false, data sent to the printer is lost.
Type	<i>name</i>	/Communications	Indicates the general category of device represented by the parameter set.

NOTE 1 All values, with the exception of Type, persist across cycles and restarts.

NOTE 2 HasNames and Type are read-only constants.

Parallel Port Parameters

The 36-pin Centronics parallel connector supports parallel communication.

Table 2-11 lists the factory default settings for %Parallel%, %Parallel%_NV, and %Parallel_Pending%.

Table 2-11 Parameters for %Parallel%, %Parallel_NV, and %Parallel_Pending%

Key	Type	Default	Description
Enabled	<i>boolean</i>	true	Indicates whether data arriving at the printer should be scheduled for execution. If it is true, data is executed. If it is false, data is not executed.
HasNames	<i>boolean</i>	false	Indicates whether the printer supports named files. If the printer is not mounted, or if Type is /Communications, this value is false. This value is a read-only constant.
Interpreter	<i>name</i>	/PostScript	Indicates the type of executable job represented by the arriving data. Alternatives available on the LaserWriter Select 360 are: <ul style="list-style-type: none"> ■ PostScript ■ LaserJet III ■ AutoSelect
On	<i>boolean</i>	true	Indicates whether or not the printer driver for the communications device is turned on and able to receive and send data. If this value is false, data sent to the printer is lost.
OutputDevice	<i>string</i>	()	Specifies which communication device is to be used for stdout and stderr.
Protocol	<i>name</i>	/Raw	Indicates the type of communications protocol to be used: <ul style="list-style-type: none"> ■ Binary ■ Normal ■ Raw ■ TBCP (tagged binary communication protocol) For further information on protocols, refer to Section 3.5.3 of the <i>PostScript Language Reference Manual Supplement</i> .
Type	<i>name</i>	/Communications	Indicates the general category of device represented by the parameter set.

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

IMPORTANT

The `OutputDevice` parameter selects which communications device receives standard output from the PostScript interpreter when input is being received on the parallel port. When this parameter is set to the empty string, the standard output is forfeited. When it is set to (`%Serial%`), the output appears on the related serial channel. ▲

Engine Device Parameters

The `%Engine%` device contains parameters that control the print engine itself. The LaserWriter Select 360 printer's `%Engine%` device contains the parameters listed in Table 2-12.

Table 2-12 `%Engine%` communication parameter sets

Key	Type	Default	Details
<code>BSizeStandard</code>	<i>name</i>	ISO	<p>Helps the printer engine to determine the physical dimensions of the paper when B4 or B5 paper is selected. There are two choices for the value of <code>BSizeStandard</code>: ISO and JIS.</p> <p>ISO (International Standards Organization) defines metric paper sizes (B4, B5, etc.). These sizes are used in Europe and certain other areas.</p> <p>B4 is 250 x 353 mm (708 x 1001 default units). B5 is 176 x 250 mm (499 x 708 default units).</p> <p>JIS (Japanese Institute for Standardization) specifies standards for use in Japan.</p> <p>B4 is 257 x 364 mm (729 x 1032 default units) B5 is 182 x 257 mm (516 x 729 default units)</p> <p>A default unit is 1/72 of an inch.</p>
<code>Darkness</code>	<i>real</i>	0.75	<p>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 Select 360 printer supports 16 levels of darkness, so this parameter is quantized into 16 steps. This is done by taking the integer portion of <code>Darkness * 15</code>. Therefore, a value of 0.0 is not distinguishable from 0.05, but it is distinguishable from 0.1. Changes in the <code>Darkness</code> parameter are not sent to the engine until there are no pages in the paper path, either feeding or being copied.</p> <p>This value persists across power cycles and restarts.</p>

continued

Table 2-12 %Engine% communication parameter sets (continued)

Key	Type	Default	Details
PageCount	<i>integer</i>	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	<i>integer</i>	30	If the printer is not actually in use, after the number of minutes specified by this parameter, the engine goes into standby mode. This means it does not keep the fuser hot, and the next time the controller sends a feed or prefeed command, the engine starts to warm up. This value persists across power cycles and restarts.
Type	<i>name</i>	/Parameters	This constant always returns a value of /Parameters. This value is a read-only constant.

Emulator Parameters

The LaserWriter Select 360 printer can emulate the LaserJet III. To do this, it requires an alternative interpreter for the input stream. 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 mimicked 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 2-13 lists and defines the parameters you will use to change such attributes as default font.

IMPORTANT

Certain parameters, as noted in Table 2-13, 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 2-13 %LaserJetIII% emulator parameters

Key	Type	Default	Description
Copies	<i>integer</i>	1	Specifies the default number of copies to be printed.
Duplex	<i>integer</i>	0	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. 0, 1 and 2 are acceptable values: 0 simplex 1 long-edge binding duplex 2 short-edge binding duplex
FontFixed	<i>boolean</i>	true	Selects the font pitch. If it is <code>true</code> , a fixed font such as <code>Courier</code> , is selected. If it is <code>false</code> , a proportionally spaced font, such as <code>Helvetica</code> , is selected. This is an obsolete parameter, originally used to select the default font. It is used only if the <code>FontSource</code> parameter is set to <code>-1</code> .
FontHeight	<i>real</i>	1200	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 <code>FontSource</code> and <code>FontNumber</code> is scalable and proportional.
FontItalic	<i>boolean</i>	false	If this parameter is <code>true</code> , an <i>italic</i> or <i>oblique</i> font is requested. This is an obsolete parameter, originally used to select the default font. It is used only if the <code>FontSource</code> parameter is set to <code>-1</code> .
FontNumber	<i>integer</i>	-1	Selects the font within the current <code>FontSource</code> . Applicable values are determined based upon <code>FontSource</code> and the number of fonts that are available from that font source. You should use the fonts listed in Table 2-15. If a <code>FontNumber</code> outside the range is specified, the value 0 is used instead.
FontPitch	<i>real</i>	1000	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 <code>FontSource</code> and <code>FontNumber</code> is scalable and monospace.

continued

Table 2-13 %LaserJetIII% emulator parameters (continued)

Key	Type	Default	Description
FontSource	<i>integer</i>	0	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 there is to be no selection of a default font. 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	<i>integer</i>	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 FontNumber is an unbound font. There are 35 legal values. See Table 2-15 for further information.
FontTypeface	<i>integer</i>	3	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	<i>integer</i>	0	Specifies the weight or boldness of the font. -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	<i>boolean</i>	false	Determines whether the initial orientation of the page will be landscape or portrait. If it is true, the page orientation will be landscape. If it is false, the page orientation will be portrait.
Linewrap	<i>boolean</i>	false	Decides whether long lines are wrapped to the next line or truncated. If this parameter is true, long lines wrap to the next line. If it is false, long lines are truncated.
MaxLJMemory	<i>integer</i>	1048576	Specifies the maximum amount of memory the emulator will ask for from the page allocator to store downloaded fonts and macros. 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. MaxLJMemory is rounded to the nearest multiple of a memory block size (8192 bytes).

continued

Table 2-13 %LaserJetIII% emulator parameters (continued)

Key	Type	Default	Description
PaperSize	<i>integer</i>	-1	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
TopMargin	<i>integer</i>	3600	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	<i>name</i>	/Emulator	Indicates the general category of device represented by the parameter set. For the LaserWriter Select 360, /Emulator is the only available value.
VMI	<i>real</i>	1200	Specifies the space between lines of text in 1/7200 inch units. The default, 1200, represents 1/6 inch.
WaitTimeout	<i>integer</i>	30	Specifies the time in seconds after which a page is ejected.

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 2-14.

Table 2-14 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" */

continued

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Table 2-14 Symbol Set code legal values (continued)

Value	Symbol set code
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"*/
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. The *PostScript Language Reference Manual* discusses named resources in detail.

There are several groups of resources:

- New resources in the regular resource categories can be added. These include such items as font and pattern resources (Table 2-15).
- Categories of implicit resources represent built-in capabilities of the LaserWriter Select 360 interpreter. For example, the `FormType` category indicates that the interpreter understands Type 1 only (Table 2-16).
- Some resources are used to define new categories (Table 2-17).

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

Table 2-15 lists the new resources in regular resource categories.

Table 2-15 Regular resource categories

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

continued

Table 2-15 Regular resource categories (continued)

Category name	Instances
Font (continued)	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
Encoding	ISOLatin1Encoding StandardEncoding
Form	No instances defined.
Pattern	No instances defined.
ProcSet	ActualValues DiagnosticProcs FaxAdminOps FaxDefaultProcs FaxOps LaserJetIII SamplePages Test The LaserWriter Select 360 printer has two predefined ProcSet instances, one which is a dictionary that contains named test procedures (the SendCommand proc) called DiagnosticProcs, and another called SamplePages, which is a dictionary containing named start page procedures (StartPage proc).
Halftone	DefaultHalftone 150 x 0 106 x 45 83 x 56 75 x 0 53 x 45 80 x 45

continued

Table 2-15 Regular resource categories (continued)

Category name	Instances
OutputDevice	Default Fax FaxReceived OutputDevice performs the following functions: <ul style="list-style-type: none"> ■ Enables applications to query printer capabilities directly. ■ Maintains functional equivalence with PostScript Language Level 1. Default is equivalent to the <code>Printer</code> instance. Each instance is represented as a dictionary which contains key-value pairs describing certain capabilities of that particular device.
HWOptions	Clock Fax

Table 2-16 lists categories of implicit resources with the built-in capabilities of the LaserWriter Select 360 interpreter.

Table 2-16 Resources with implicit instances

Category name	Instances
Filter	ASCII85Decode ASCIIHexDecode ASCII85Encode ASCIIHexEncode CCITTFaxDecode CCITTFaxEncode DCTDecode DCTEncode LZWDecode LZWEncode NullEncode RunLengthDecode RunLengthEncode SubFileDecode
ColorSpaceFamily	CIEBasedA CIEBasedABC DeviceCMYK DeviceGray DeviceRGB Indexed Pattern Separation
Emulator	LaserJetIII

continued

Table 2-16 Resources with implicit instances (continued)

Category name	Instances
IIODevice	%Calendar% %Engine% %Fax% %LaserJetIII% %LocalTalk% %LocalTalk_NV% %LocalTalk_Pending% %rom% %Parallel% %Parallel_NV% %Parallel_Pending% %Serial% %Serial_NV% %Serial_Pending% %SerialB% %SerialB_NV% %SerialB_Pending%
ColorRenderingType	1
FMaptype	2, 3, 4, 5, 6, 7, 8
FontType	0, 1, 3, 4, 5, 6, 42 The integers 0, 1, 3, 4, 5, and 6 are the instances supported for the LaserWriter Select 360 printer. Type 42, a TrueType font with the PostScript wrapper, is also supported.
FormType	1
HalftoneType	1, 2, 3, 4, 5, 6
ImageType	1
PatternType	1
ColorRendering	DefaultColorRendering600 DefaultColorRendering300 DefaultColorRendering
ColorSpace	No instances defined.

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Table 2-17 defines resources used to define new categories.

Table 2-17 Resources to define new categories

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

LaserWriter Select 360 Compatibility Operators

LaserWriter Select 360 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, and for that purpose has undergone a number of significant extensions. Appendix D, “Compatibility Strategies,” in the *PostScript Language Reference Manual*, presents guidelines for taking advantage of language extensions, while maintaining compatibility with PostScript interpreters.

The LaserWriter Select 360 printer is a Level 2 printer. This chapter describes the compatibility operators that make the LaserWriter Select 360 printer compatible with existing PostScript Level 1 language driver software. It also explains how to set system, page device, user, device, and communication parameters.

Overview of Compatibility Operators

The compatibility operators present in the LaserWriter Select 360 printer appear in two dictionaries: `statusdict` and `userdict`. These operators set

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

This chapter describes the page size and paper tray compatibility operators. It also shows you how to set the different parameters, which are presented in the order shown above.

▲ **WARNING**

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

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

Table 3-1 Compatibility operators**statusdict**

a4tray	printername
appletalktype	product
b5tray	ramsize
buildtime	realformat
byteorder	revision
checkpassword	sccbatch
defaultmultipurposetraysize	sccinteractive
defaultpapertray	setdefaultmultipurposetraysize
defaulttimeouts	setdefaultpapertray
diskonline	setdefaulttimeouts
diskstatus	setdostartpage
dostartpage	setdosysstart
dosysstart	setduplexmode
duplexmode	sethardwareiomode
emulate	setjobtimeout
firstsid	setmargins
hardwareiomode	setpagestackorder
jobname	setpapertray
jobtimeout	setprintername
legaltray	setsccbatch
lettertray	setscinteractive
manualfeed	setsoftwareiomode
manualfeedtimeout	settle
margins	setuserdiskpercent
newsheet	softwareiomode
pagecount	tumble
pagestackorder	userdiskpercent
papersize	waittimeout
papertray	

userdict

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

Page Size Compatibility Operators

The page size operators are in the user dictionary, `userdict`. Each operator requests a specific paper 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 `PageSizePolicy` 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	PageSize	ImagingBBox
a4	[595 842]	Null
a4small	[595 842]	[25 25 570 817]
b5	[516 729]	Null
c5	[459 649]	Null
com10	[297 684]	Null
d1	[312 624]	Null
executivepage	[522 756]	Null
legal	[612 1008]	Null
letter	[612 792]	Null
lettersmall	[612 792]	[25 25 587 767]
monarch	[279 540]	Null
note	[width height]	[25 25 <i>width-25</i> <i>height-25</i>]

NOTE Units shown (595, for example) are points. 1 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 paper size. The only difference between the operators is the size of paper requested. The `PageSize` parameter requested is the same as for the corresponding page size operator, and the `ImagingBBox` parameter requested is always null. These operators use the specified size as a page device `PageSize` parameter. All the operators set the `PageSizePolicy` parameter to 0, which guarantees that a `rangecheck` error is generated if a tray containing the requested paper size is not found. In addition, a `limitcheck` error can occur if there is not sufficient memory for the imaging area requested.

Setting System Parameters

System parameters have a system-wide impact, and they may be changed only by a program that presents a valid password. Alterations made to system parameters may persist through restarts of the PostScript interpreter. This section describes the compatibility operators that set Level 2 system parameters.

buildtime

Syntax	- <code>buildtime</code> <i>int</i>
Definition	This operator is a time stamp that identifies a specific build of the PostScript interpreter. It returns an integer with the same value as the system parameter <code>BuildTime</code> . Default value: <code>false</code>
Error(s)	<code>stackoverflow</code>

byteorder

Syntax	- <code>byteorder</code> <i>bool</i>
Definition	This is a boolean with the same value as the system parameter <code>ByteOrder</code> . Default value: <code>false</code>
Error(s)	<code>stackoverflow</code>

checkpassword

Syntax	<i>int</i> checkpassword <i>bool</i> or <i>string</i> checkpassword <i>bool</i>
Definition	This operator checks whether <i>string</i> or <i>int</i> (<i>int</i> is converted to a <i>string</i>) is the valid password for either <code>SystemParamsPassword</code> , or <code>StartJobPassword</code> . If the password is valid, it returns <code>true</code> . Otherwise, after delaying for one second, it returns <code>false</code> . Default value: 0
Error(s)	<code>stackunderflow</code> , <code>typecheck</code> , <code>stackoverflow</code>

defaultmultipurposetraysize

Syntax	- defaultmultipurposetraysize <i>name bool</i>
Definition	This operator returns the <i>name</i> and <i>bool</i> parameters used with <code>setdefaultmultipurposetraysize</code> to set the default multi-purpose tray size. The boolean <i>bool</i> is <code>true</code> if the paper feeds short edge first, and <code>false</code> if the paper feeds long edge first. Standard value: <code>/letter true</code>
Error(s)	<code>stackoverflow</code>

defaultpapertray

Syntax	- defaultpapertray <i>int</i>
Definition	This operator returns the first element of the <code>Priority</code> array in the <code>InputAttributes</code> dictionary found within the current page device. This number represents the default paper tray slot which may or may not be installed. If there is no <code>Priority</code> array within <code>InputAttributes</code> at the time that <code>defaultpapertray</code> is executed, an arbitrary slot number is returned. Standard value: 0
Error(s)	<code>stackoverflow</code>

defaulttimeouts

Syntax	– defaulttimeouts <i>job manualfeed wait</i>
Definition	This operator returns the following values: <ul style="list-style-type: none"> ■ default job ■ manual feed ■ wait timeout values Standard value: 0 60 40
Error(s)	stackoverflow

dostartpage

Syntax	– dostartpage <i>bool</i>
Definition	This operator returns the Boolean set during the most recent execution of DoStartPage. Standard value: true
Error(s)	stackoverflow

emulate

Syntax	<i>input-stream emulation-name</i> emulate – or <i>input-stream params-dict emulation-name</i> emulate –
Definition	This operator causes the PostScript language interpreter to yield control, and the emulator specified by <i>emulation-name</i> to start processing. The operator is present only in products that have one or more emulators co-resident with the PostScript language interpreter. The exact semantics are dependent upon the printer. A <i>params-dict</i> argument is optional.
Error(s)	invalidaccess, rangecheck, stackoverflow, stackunderflow

hardwareiomode

Syntax	- hardwareiomode <i>int</i>
Definition	This operator returns <i>int</i> , which indicates a current communications channel for which the corresponding device parameter Enabled Boolean value is +. Because multiple channels may be enabled, the smallest <i>int</i> is returned. The interpretation of <i>int</i> is as follows: 0 %Serial% 2 %Parallel% 2 %LocalTalk% 3 %SerialB%
Error(s)	stackoverflow

printername

Syntax	<i>string printername substring</i>
Definition	This operator stores the value of the system parameter PrinterName in <i>string</i> , and returns a string object designating the <i>substring</i> actually used. Standard value: (LaserWriter Select 360)
Error(s)	invalid access, rangecheck, stackunderflow, typecheck

product

Syntax	- product <i>string</i>
Definition	This operator is a <i>string</i> object which is the name of the laser printer product. If a program needs to know what type of printer it is running on, it should check this string. Standard value: (LaserWriter Select 360)
Error(s)	stackoverflow

ramsize

Syntax	- ramsize <i>int</i>
Definition	This operator returns the number of bytes of RAM in the printer. It does this by returning an <i>integer</i> with the same value as the system parameter RamSize.
Error(s)	stackoverflow

realformat

Syntax	- realformat <i>string</i>
Definition	This operator is a <i>string</i> with the same value as the system parameter RealFormat.
Error(s)	stackoverflow

revision

Syntax	- revision <i>int</i>
Definition	This operator is an integer which designates the current revision level of the machine-dependent portion of the PostScript interpreter. It does this by returning an <i>integer</i> with the same value as the system parameter Revision.
Error(s)	stackoverflow

setdefaultmultipurposepapertraysize

Syntax	<i>name bool</i> setdefaultmultipurposetraysize -
Definition	This operator tells the interpreter what paper size is installed in the multipurpose tray. It sets the <code>PageSize</code> of the multipurpose slot in the <code>InputAttributes</code> dictionary to the size that corresponds to the value of the <i>name</i> operand. The boolean <i>bool</i> is <code>true</code> if the paper feeds short edge first, and <code>false</code> if the paper feeds long edge first. This operator may be used to inform the interpreter of the default paper size installed in the multipurpose tray, and it is only supplied to maintain compatibility. The same function may be performed by directly using the <code>setpagedevice</code> operator. If <code>setdefaultmultipurposetraysize</code> is invoked at any save level other than 0, an <code>invalidaccess</code> error occurs.
Error(s)	<code>invalidaccess</code> , <code>rangecheck</code> , <code>stackunderflow</code> , <code>typecheck</code>

setdefaultpapertray

Syntax	<i>tray</i> setdefaultpapertray -
Definition	This operator copies the values of <code>PageSize</code> , <code>MediaType</code> , <code>MediaColor</code> , and <code>MediaWeight</code> found in the <code>InputAttributes</code> dictionary for the specified tray, into a dictionary with keys for <code>PageSize</code> , <code>MediaType</code> , <code>MediaColor</code> , and <code>MediaWeight</code> . It also writes the requested tray number into the first element of the <code>Priority</code> array in the <code>InputAttributes</code> dictionary, and places

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this entry in the dictionary it is building. This dictionary is then passed to `setpagedevice`. This results in the requested tray being selected as a default that will be used by any PostScript language job that does not expressly select a paper size or medium. If `setdefaultpapertray` is invoked at any save level other than 0, an `invalidaccess` error occurs.

Error(s) `rangecheck, stackunderflow, typecheck`

setdefaulttimeouts

Syntax `job manualfeed wait setdefaulttimeouts -`

Definition This operator establishes the default values for the three timeouts. It returns the following:

- system parameter `JobTimeout` for *job*
- page device parameter `ManualFeedTimeout` for *manualfeed*
- system parameter `WaitTimeout` for *wait*

Error(s) `invalidaccess, rangecheck, stackunderflow, typecheck`

setdostartpage

Syntax `bool setdostartpage -`

Definition Since the LaserWriter Select 360 printer has no start page, executing this operator with a value of `true` has no effect and is ignored. The operator is present to maintain compatibility with the Personal LaserWriter NT.

Error(s) `invalidaccess, stackunderflow, typecheck`

sethardwareiomode

Syntax `int sethardwareiomode`

Definition This operator opens the specified channel for communications, and closes all other channels. The channel selected depends upon the value of *int*:

- 0 Open `%Serial%` and `%SerialB%`, close all others
- 1 Open `%Parallel%`, close all others
- 2 Open `%LocalTalk%`, close all others
- 3 Open `%Serial%` and `%SerialB%`, close all others

Error(s) `invalidaccess, rangecheck, stackunderflow, typecheck`

setpapertray

Syntax	<i>integer</i> setpapertray -
Definition	This operator sets the paper tray from which paper will be fed, and it sets the image area according to the size of paper in the tray and the value of the <code>pagetype</code> operator. The integer argument must be: <ul style="list-style-type: none"> 0 for the main cassette (cassette 250) 1 for the multipurpose tray 2 for the optional cassette (cassette 250/500) Because this operator installs a new image area, it should be invoked before any marks are placed on the current page. If this operator is executed while an outstanding printer error exists, the interpreter waits until the error has been cleared before completing the execution of this operator.
Error(s)	rangecheck, stackunderflow, typecheck

setprintername

Syntax	<i>string</i> setprintername -
Definition	This operator establishes the string to be the printer's name, by setting the system parameter <code>PrinterName</code> to the value of <i>string</i> . The string should be no longer than 32 characters. It should consist entirely of printing characters and should not contain the following three characters: colon (:), comma (,) or at sign (@).
Error(s)	invalidaccess, limitcheck, stackunderflow, typecheck

setsoftwareiomode

Syntax	<i>int</i> setsoftwareiomode -
Definition	This operator sets the values of the interpreter, and, if appropriate, protocol device parameters for the current communication device parameter set. The following <i>int</i> values are used with the LaserWriter Select 360 printer:

<i>int</i>	Interpreter value	Protocol value
0	PostScript	Normal
5	LaserJetIII	Raw
100	PostScript	Binary

If the printer has both the LaserJetIIP and the LaserJetIII emulators installed, passing the value 5 to `setsoftwareiomode` selects only LaserJetIIP.

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Binary protocol is standard in the LaserWriter Select 360 printer, and it should be used by any driver that sends binary data to the printer. A driver that does not use the binary protocol and does not filter the back channel data when `setsoftwareiomode` is 100 will see receive control characters as quoted characters. For example, Control-D will be seen as Control-A/ASCII-D.

The `softwareiomode` operator does not need to be set outside the server loop to be compatible with other printer implementations of `setsoftwareiomode`. However, changes to it do not take effect until the job that makes the changes is completed.

Standard value: 100

Error(s) `invalidaccess, rangecheck, stackunderflow, typecheck`

softwareiomode

Syntax - `softwareiomode int`

Definition This operator returns *int*, which indicates the interpretation code for the current communications device. See `setsoftwareiomode`.

Error(s) `stackoverflow`

Setting Page Device Parameters

Page device parameters control page formatting, for example margins and paper size. They also control the output processing of pages, determining whether pages are output face up or face down, which paper tray is selected, and so forth. This section describes compatibility operators that set Level 2 page device parameters in the LaserWriter Select 360 printer.

margins

Syntax - `margins top left`

Definition This operator returns the *x* and *y* components of the page device Margins parameter as *left* and *top*, respectively.

Standard value: 0 0

Error(s) `stackoverflow`

pagecount

Syntax	- pagecount <i>int</i>
Definition	This operator returns the value of the system parameter PageCount. That is, it returns the number of pages that have been printed by the LaserWriter Select 360 printer.
Error(s)	stackoverflow

pagestackorder

Syntax	- pagestackorder <i>bool</i>
Definition	This operator returns the last value set by setpagestackorder. It should be <code>true</code> if the pages are to be stacked face down in the output tray, and <code>false</code> if the pages are to be stacked face up.
Error(s)	stackoverflow

papersize

Syntax	- papersize <i>name bool</i>
Definition	This operator returns the name of the compatibility operator that selects a tray containing paper of the current size. For example, if the current paper size is letter, this operator returns the value <code>/lettertray</code> . The value of <i>bool</i> is <code>true</code> if the page feeds short edge first, <code>false</code> if the page feeds long edge first. Note that if there is more than one tray installed with the same paper size, and the operator returned by <code>papersize</code> is executed again at some later point, the operator will not necessarily select the same tray it selected the previous time.
Error(s)	stackoverflow

papertray

Syntax	- papertray <i>integer</i>
Definition	This operator returns the paper tray number most recently set by the setpapertray operator. It returns the first element of the Priority array in the InputAttributes dictionary that is found within the current page device. This number represents the current paper tray slot which may or may not be installed. If there is no Priority array within InputAttributes at the time that papertray is executed, an arbitrary slot number is returned.
Error(s)	stackoverflow

setmargins

Syntax	<i>top left</i> setmargins -
Definition	This operator sets the two margin adjustment parameters set by <code>setmargins</code> .
Error(s)	<code>invalidaccess</code> , <code>rangecheck</code> , <code>stackunderflow</code> , <code>typecheck</code>

setpagestackorder

Syntax	<i>bool</i> setpagestackorder -
Definition	This operator sets the value returned by <code>pagestackorder</code> . A value of <code>true</code> indicates that the output is going to the face-down tray. A value of <code>false</code> indicates that the output is directed to the face-up tray. Since the LaserWriter Select 360 printer has only a face-down tray, <code>true</code> is the only correct value for this parameter.
Error(s)	<code>rangecheck</code> , <code>invalidaccess</code> , <code>stackunderflow</code> , <code>typecheck</code>

Setting User Parameters

User parameters enable you to control certain printer functions, such as defining job names and selecting the length of time the printer will wait before aborting a print job. Using a PostScript language program, you can change user parameters within reasonable limits, without special authorization. This section describes the compatibility operators that set Level 2 user parameters in the LaserWriter Select 360 printer.

jobname

Syntax	- jobname <i>string</i>
Definition	This operator is a string with the same value as the user parameter <code>JobName</code> . It specifies the name of the current job. If a PostScript language program defines <code>jobname</code> , status responses generated during the remainder of the job in progress will include a job field that reports the text of this string. The string should not contain the characters <code>semicolon (;)</code> or <code>end bracket (])</code> , since they disrupt the syntax of the status messages. Standard value: ()
Error(s)	<code>stackoverflow</code>

jobtimeout

Syntax	- jobtimeout <i>int</i>
Definition	This operator returns the number of seconds remaining before the job timeout will occur. It does this by returning the value of the user parameter <code>JobTimeout</code> . If the returned value is 0, the job will never time out. Standard value: 0
Error(s)	<code>stackoverflow</code>

setjobtimeout

Syntax	<i>int</i> setjobtimeout -
Definition	This operator sets the timeout for the current job to the value <i>int</i> , a non-negative integer specifying a time interval in seconds. If the current job continues for <i>int</i> seconds without either completing or executing <code>setjobtimeout</code> again, the PostScript interpreter executes a <code>timeout</code> error. The value 0 disables the job timeout altogether. At the beginning of a job, the server initially sets the job timeout to the default job timeout returned by <code>defaulttimeouts</code> . However, in interactive mode, the initial job timeout is always 0.
Error(s)	<code>rangecheck</code> , <code>stackunderflow</code> , <code>typecheck</code>

waittimeout

Syntax	- waittimeout <i>int</i>
Definition	This operator is the wait timeout currently in effect, that is, it is the number of seconds the LaserWriter Select 360 printer will wait to receive additional characters from the host before it aborts the current job by executing a <code>timeout</code> . At the beginning of a job, the server initializes <code>waittimeout</code> to the default wait time returned by <code>defaulttimeout</code> . However, a PostScript language program may change it to any non-negative integer value. In interactive mode, the wait timeout is always 0. Standard value: 40
Error(s)	<code>stackoverflow</code>

Setting Device Parameters

Each PostScript interpreter supports a collection of input/output devices, such as disks, cartridges, and printers. Device parameters perform functions similar to the functions performed by system parameters. However, they are device dependent, which means they only impact the printer for which they are set. This section describes the compatibility operator that sets Level 2 device parameters.

manualfeed

Syntax	- manualfeed <i>bool</i>
Definition	This operator is a Boolean that works in conjunction with the page device parameter <code>ManualFeed</code> to determine whether a page is to be fed manually. If either <code>manualfeed</code> or <code>ManualFeed</code> is <code>true</code> at the time of a <code>showpage</code> or <code>copypage</code> , then that page will be fed manually. Otherwise, the page will not be fed manually. The <code>manualfeed</code> compatibility operator is present in <code>statusdict</code> only if the page device parameter <code>ManualFeed</code> is defined for the product. Standard value: <code>false</code>
Error(s)	<code>stackoverflow</code>

Setting Communication Parameters

Communications parameters control the functions of the different communications channels, such as AppleTalk and the serial channel. The following compatibility operators set Level 2 communications parameters in the LaserWriter Select 360 printer. Serial communications channel (SCC) operator encoding is described in Chapter 4, "Communication Channels," in the section "SCC Operator Encoding."

appletalktype

Syntax	- appletalktype <i>string</i>
Definition	This operator is a string with the same value as the <code>LocalTalkType</code> device parameter that is found in the <code>%LocalTalk%</code> parameter set.
Error(s)	<code>stackoverflow</code>

sccbatach

Syntax	<i>channel</i> sccbatach <i>baud options</i>
Definition	This operator returns the baud rate and options for the specified serial channel. You should use Channel 25 with the LaserWriter Select 360 printer. <i>baud</i> and <i>options</i> affect the following device parameters: <ul style="list-style-type: none"> ■ Baud, StopBits, and FlowControl ■ DataBits and Parity ■ CheckParity See the description of <code>setsccbatach</code> , later in this section, for further information. The values for data bits and parity are determined by the bit positions. See the section “SCC Operator Encoding,” in Chapter 4. Baud, stop bits, and flow control are determined respectively by the corresponding settings for Baud, StopBits, and FlowControl device parameters. Standard value: 57600 68 This value represents an 8-pin serial channel, with a baud rate of 57600, space parity, DTR flow control, 8 data bits, and one stop bit.
Error(s)	<code>rangecheck</code> , <code>stackoverflow</code> , <code>stackunderflow</code> , <code>typecheck</code>

sccinteractive

Syntax	<i>channel</i> sccinteractive <i>baud options</i>
Definition	This operator pops the input argument off the stack and pushes 00 on the stack.
Error(s)	<code>invalidaccess</code> , <code>rangecheck</code> , <code>stackoverflow</code> , <code>stackunderflow</code> , <code>typecheck</code>

setsccbatach

Syntax	<i>channel</i> <i>baud options</i> setsccbatach -
Definition	This operator sets the communication parameters as specified by three integers: <ul style="list-style-type: none"> ■ <i>channel</i>, which designates the serial channel; only channel 25 is available ■ <i>baud</i> rate, which determines the rate of data transfer ■ <i>options</i>, which encodes parity, flow control, the number of data bits, and the number of stop bits to be used in serial communication mode

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The new baud rate and options do not take effect until the end of the current job. You may not set the serial channel's baud rate to 0. A 0 setting causes a `rangecheck` error to occur.

Example: `25 19200 2 setscbatch` sets the RS-232 serial channel to 19200 baud, with even parity.

Refer to the section "SCC Operator Encoding," in Chapter 4, for detailed information on this subject.

Error(s) `invalidaccess, rangecheck, stackunderflow, typecheck`

Communication Channels

Communication Channels

The LaserWriter Select 360 printer has three communication ports that support three communication channels:

- the RS-232C serial port supports RS-232C serial devices (`%serial%`)
- the RS-422 port supports LocalTalk (`%LocalTalk%`)
- the Centronics parallel port connects the LaserWriter Select 360 printer to IBM-PC compatible computers (`%parallel%`)

This chapter deals with the software support for the serial, LocalTalk, and parallel communication channels. It describes:

- the parameters that control the serial communications channel
- operator encoding for the serial channel
- LocalTalk communication
- simple and binary communication protocols
- how to communicate with an IBM PC using both parallel and serial interfaces
- communication dynamics between the host computer and the printer
- the queries and messages that enable the host computer or the user to know what the printer is doing

You will find information about the physical characteristics of the communication channel connectors in the section “Communication Ports,” in Chapter 1. Further information is available in Chapter 2, under the section “Communication Device Parameters,” and in Chapter 3, under “Setting Communication Parameters.”

Serial Communication

When the LaserWriter Select 360 printer is in serial mode, it uses the RS-232C port to send and receive data encoded in ASCII. Certain characters serve special purposes. For example, Control-D marks the end of the file, Control-M, or carriage return, indicates the end of line. The server processes a job by reading and executing a PostScript program from the serial port. When it reads the end-of-file character and the program terminates, the server sends an end-of-file character, ends the job, and starts a new one.

Three parameters control the details of serial communication. They are channel, baud rate, and options. These parameters may be changed by invoking the `statusdict` operator `setscbatch`. Serial communication is asynchronous, start-stop, and uses 7 or 8 bits per character. Table 4-1 summarizes the default settings for the LaserWriter Select 360 printer serial communication channel.

Communication Channels

Table 4-1 Default settings for the serial communication channel parameters

Parameter	Default settings	Other settings
Data bits	8	7
Parity	None	None
Stop bits	1	–
Flow control	DTR	XON/XOFF
Baud rate	9600	Any baud rate that divides into 115,200 with a quotient of two or more
Protocol	Binary	Simple

Baud Rates

The baud rate is given as an integer, such as 1200 or 9600. The baud-rate parameter may be any positive integer less than 100,000. However, the hardware can only achieve certain baud rates, and other values are rounded to the nearest achievable rate. Below 57,600 baud, the achievable rates are 300, 600, 1200, 2400, 9600, 38400, and 57600. Any baud rate that divides into 115,200 with a quotient of two or more is legal. The Macintosh host computer supports a 57,600 baud rate. Host systems other than the Macintosh are most likely to support at least a 9600 baud rate.

Parity Settings

The parity settings for the serial channel may be odd, even, space, mark, or none. The default for the LaserWriter Select 360 printer is none. Table 4-2 indicates how the parity setting and number of data bits work together.

Table 4-2 Data and parity choices for the LaserWriter Select 360 printer

Data bits	Parity	Description
Standard	Space	8 bits are sent. The eighth bit transmitted is zero, and the eighth bit received is ignored.
Standard	Odd or even	8 bits are sent. The eighth bit is used for parity.
Standard	Mark	8 bits are sent and received. The parity bit is not stripped. Since the PostScript interpreter expects ASCII data (high bit zero), a host that sends mark parity data will not be understood, and in this case, you should select 7-bit mode, in which the parity bit is stripped.
7 bits	Space	7 data bits are sent. A zero is added.
7 bits	Odd or even	7 data bits are sent. A parity bit is added to the 7 data bits in either odd or even parity, depending on the parity setting.

continued

Communication Channels

Table 4-2 Data and parity choices for the LaserWriter Select 360 printer (continued)

Data bits	Parity	Description
7 bits	Mark	7 data bits are sent. A one is added.
8 bits	Space	8 bits are sent.
8 bits	Odd or even	8 bits are sent. A parity bit is added to the 8 bits in either odd or even parity, depending on the parity setting.
8 bits	Mark	8 bits are sent.

NOTE Parity is checked on received characters only when the parity setting is even or odd. If a parity error is detected the PostScript interpreter generates an `ioerror`.

Flow Control

The LaserWriter Select 360 printer uses one of two conventions for controlling the flow of characters between printer and the host computer. These conventions are DTR and XON/XOFF. If the host fails to conform to the selected flow control protocol, an `ioerror` may result unexpectedly.

DTR Flow Control

DTR flow control makes use of the Data Terminal Ready control signal. Normally, the printer leaves this signal turned on. However, when it needs to stop the flow of characters from the host, it turns DTR off. The host must then immediately stop sending characters until the LaserWriter Select 360 printer turns DTR back on again. Similarly, another signal, Data Set Ready (DSR) may be used by the host to control the flow of data sent to it from the LaserWriter Select 360 printer. Packet DTR is an implementation of DTR flow control specifically set and used by the Apple LaserWriter driver. It uses the DSR signal to control the flow of data sent to the host in packets of three characters at a time.

XON/XOFF Flow Control

XON/XOFF flow control uses two special characters, XON and XOFF, that may be sent either to the printer or to the host to control the flow of characters. When the LaserWriter Select 360 printer sends an XOFF character to the host, the host must immediately stop sending characters to the printer. When the printer sends XON to the host, the host may resume sending characters.

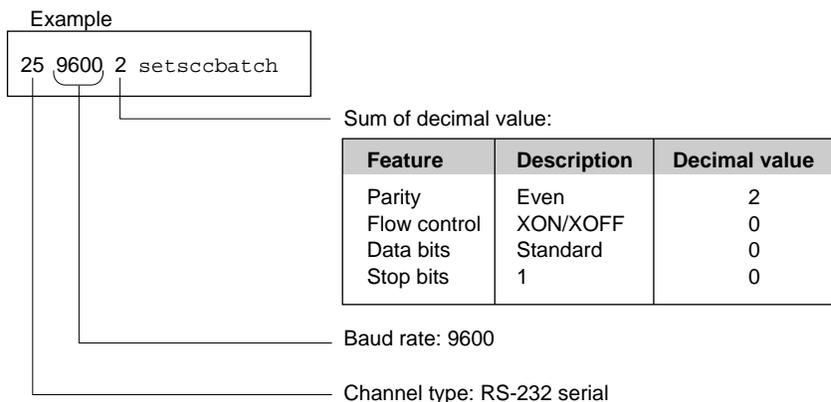
SCC Operator Encoding

The serial communications parameters are set by `setsccbatch`, a 1-byte options argument that holds four SCC encoded parameters: stop bits, data bits, flow control, and parity. The argument is an integer parameter with values in the range 0–255. The bits are assigned to different fields, as shown in Table 4-3, with the most significant bit representing the field stop bits, and so on. Table 4-3 lists the proper field value for each setting. You may determine the value of the options integer by simply selecting one decimal value for each field, and adding those decimal integers together. Figure 4-1 shows an example of SCC operator encoding.

Table 4-3 SCC compatibility operators options byte values

Bit position	Field	Setting	Decimal value	Field value
Bit 7	Stop bits	1 stop bit	0	0
		2 stop bits	128	1
Bits 6 and 5	Number of data bits	Standard	0	0
		7 bits	32	1
		8 bits	64	2
		Undefined	96	3
Bits 4–2	Flow control	XON/XOFF	0	0
		DTR	4	1
		Undefined	8, 12, 16, 29, 24, 28	2, 3, 4, 5, 6, 7
Bits 1 and 0	Parity	Space	0	0
		Odd	1	1
		Even	2	2
		Mark	3	3

Figure 4-1 Example of SCC operator encoding



LocalTalk

The LaserWriter Select 360 printer can communicate with the host computer, or other peripheral devices using the AppleTalk network system. The printer implements the AppleTalk standard protocol using the LocalTalk physical link. The transceiver for transmitting and receiving information over LocalTalk is built into every Macintosh host computer, as well as into the LaserWriter Select 360 printer, making it easy to set up the printer-host interface.

Communication Protocols

The LaserWriter Select 360 printer supports both simple and binary communication protocols for serial and parallel channels. Several character codes in both protocols are reserved for communication functions and are not passed through the PostScript interpreter. The default protocol is binary. The section on `setsoftwareiomode`, in Chapter 3, describes how to change the default protocol from binary to simple.

Simple Communication Protocol

Table 4-4 lists the character codes reserved for communication functions in simple communication protocol. The ASCII character codes are given in decimal.

The serial and parallel communication handlers perform the special processing of the return and line-feed characters, as described in Table 4-4. This processing is independent of the return and line-feed handling performed by the PostScript interpreter itself. Unlike the processing done at the level of the PostScript interpreter, this processing is done regardless of how the data is to be treated by the interpreter.

With simple protocol, there is no way to quote the reserved characters, that is to pass them through to the PostScript interpreter. Nor is there any way to transmit characters in the high ASCII range (128–255) when using parity settings 0, 1, and 2, which cause the high-order bit of each character to be ignored or used for parity. Therefore, with this protocol, the communication link is not fully transparent. This causes no difficulty in normal use, since the standard PostScript language character set consists entirely of printable characters. The language itself provides means for encoding arbitrary characters in strings (the `\nnn` escape sequence).

When the server encounters an end-of-file character and the job terminates, the server sends an end-of-file character back to the host. This character marks the end of the data (if any) written to the standard output file while the job was being executed. This enables the application program running on the host computer to synchronize with the server, if this is desired, and to correlate a given output batch with the job that generated it.

Communication Channels

Table 4-4 Reserved characters in simple communication protocol

Character	ASCII code	Function
Control-C	3	Interrupt. Causes execution of the PostScript language <code>interrupt</code> error. See the <i>PostScript Language Reference Manual</i> , Chapter 6, for further information on <code>interrupt</code> .
Control-D	4	End of file.
Control-S	19	Stop output (XOFF). Functional only if XON/XOFF flow control is in use.
Control-Q	17	Start output (XON). Functional only if XON/XOFF flow control is in use.
Control-T	20	Status query. Causes the server to produce a one-line message that describes what the server is doing.
Control-M or carriage return	13	End of line. Translated to the PostScript language <code>newline</code> character.
Control-S or line-feed	10	End of line. This is the PostScript language <code>newline</code> character. If a return and a line-feed are received in sequence, only one <code>newline</code> character is passed to the PostScript interpreter. When a <code>newline</code> character is written to the standard output file, it is translated to the two-character sequence <code>return, line-feed</code> .

Binary Communication Protocol

As an alternate to simple protocol, the LaserWriter Select 360 printer supports binary protocol for both the serial and parallel channels. Binary protocol allows all character codes to be transmitted as data, but also allows certain characters to be used for specifying control functions, which may be handled asynchronously by the communications driver. These functions include status requests, aborting of jobs, end-of-job markers, and flow control for the serial channel.

Since any character code can be transmitted as data with this protocol, it can be used for sending PostScript language jobs that contain binary images. Binary protocol is set by default when the LaserWriter Select 360 printer is powered on. It may also be selected by setting `softwareiomode` to 100.

This protocol requires that a quoting character be inserted at certain places in the data stream and that the character codes for certain characters be altered. Therefore, the host computer must filter binary data before sending it to the printer. When the protocol is enabled, it is used for transmission in both directions. The host should therefore filter any data it receives from the printer. Filtering may be done by an application program or within the operating system of the host. In the case of the LaserWriter Select 360 printer, the Apple LaserWriter driver does this filtering. Table 4-5 lists the control characters for the binary serial protocol.

Communication Channels

Table 4-5 Control characters in binary serial protocol

Hex value	ASCII name	ASCII keyboard	Control function
01	SOH	Control-A	Quote data byte
03	ETX	Control-C	Abort job and flush to end of file
04	EOT	Control-D	End-of-job marker
05	ENQ	Control-E	None
11	DC1	Control-Q	XON in XON/XOFF flow control
13	DC3	Control-S	XOFF in XON/XOFF flow control
14	DC4	Control-T	Request printer status
1C	FS	Control-\	None

To transmit the control characters as data, they must be quoted. This means that the character being sent is replaced by a two-character sequence, control character CTL-A, which indicates a quoted data byte, followed by the character itself XORed with 40 hex. So if, for example, the host wants to send a request for printer status (hex value 14), it sends 01 hex-54.

This method of quoting means that whenever one of the eight special characters is received, the control function is intended, regardless of whether or not the preceding character is CTL-A. Asynchronous control characters may therefore be generated and processed at a lower level than the data stream may be generated and consumed. On a host machine, the user program may implement the CTL-A quoting convention, while the operating system is independently performing XON/XOFF processing.

Note

All byte values other than those of the eight special characters are transmitted by simply sending the value. ♦

After CTL-A is received, the next character received that is not one of the special characters must be the result of XORing one of the special characters with 40 hex. If any other character is received, it is considered to be an input error. Any number of special characters may appear between CTL-A and the XORed character, with the exception of special characters CTRL-D and CTRL-A, which are handled asynchronously. If either of these characters is received between CTL-A and the XORed character, it is considered to be an error condition.

If a special character arrives unquoted, and it specifies no control function for the channel, the character is simply discarded. For example, if XON or XOFF is received, and XON/XOFF flow control is not in use, it is discarded.

Communication Channels

IMPORTANT

CTL-E and CTL-\ currently specify no control functions, and should not be sent to the LaserWriter Select 360 printer. They are included in the list of quoted characters in case new control functions are added in the future. ▲

In contrast with simple protocol, binary protocol provides for no mapping between end-of-line conventions. The end-of-line characters (<CR>, <LF>, or <CR><LF>) sent by the host are exactly what are received by the interpreter in the printer. The PostScript scanner handles the different end-of-line conventions in a uniform way, but a program that reads data from the channel directly (via `read` or `readstring`) receives whatever characters were sent by the host. Similarly, whatever output is generated by a PostScript program (via `print` or `=`) is sent unchanged.

Note

In this connection, the standard end-of-line in the PostScript language (`\n` in a PostScript language string) is <LF>. ♦

Communicating With an IBM PC

You may connect the LaserWriter Select 360 printer to an IBM PC, or an IBM-compatible computer, through either the Centronics 36-pin parallel connector or the RS-232 serial port. The physical characteristics of the connectors are described in Chapter 1, in the sections “Centronics Parallel Connector” and “Serial Port for RS-232C Devices.” This section describes the software support for the interfaces.

Parallel Interface

To set up the parallel port for communication between the LaserWriter Select 360 printer and the IBM PC, issue the following command:

```
MODE LPT1: , , P
```

This command allows the Centronics busy signal to be active for extended periods of time.

Unlike the serial port, the Centronics parallel input allows no parameters. It always accepts 8-bit data with no parity, and it reserves the same set of characters for communication functions that the serial port reserves, with the exception of XON/XOFF characters. The characters are passed through the PostScript interpreter, since flow control is maintained by means of the /BUSY signal.

Communication Channels

The Centronics parallel interface is essentially an input-only channel. This means it transfers information from the host to the printer. However, the PostScript interpreter always deals with both the input and output sides of an I/O channel. When operating in Centronics parallel input mode, the printer sets up the 8-pin serial port for the PostScript language print operator. The output from this port may be ignored for simple one-way communication. However, important information may be output via this port. Printer errors are always reported, since the Paper Error signal on the Centronics interface cannot be relied upon to report all printer errors. Table 4-6 summarizes the settings for the serial communications port when it is used as the output port during parallel communication.

Table 4-6 Settings for the serial output channel during parallel communication

Parameter	Settings
Data bits	8
Parity	None
Stop bits	1
Flow control	DTR
Baud rate	9600
Protocol	Binary

Serial Interface

You may also use the serial port as a means of communicating with the IBM PC. You may use XON/XOFF or DTR flow control. XON/XOFF flow control is preferred, since this is the default serial flow control for the LaserWriter Select 360 printer.

XON/XOFF Flow Control for PC Communication

To set up the LaserWriter Select 360 printer for serial interface with the IBM PC, or with IBM-compatible computers, over the serial port, using XON/XOFF flow control at 9600 baud, issue the following MS-DOS commands to your computer:

```
MODE COM1:9600,N,8,1
MODE LPT1:=COM1:
```

These commands alone are not sufficient to handle XON/XOFF flow control. Some applications may handle this protocol themselves. Otherwise, you should install a different MS-DOS printer driver to avoid communication problems when printing large documents.

Communication Channels

Note

You must issue these commands to your IBM PC whenever the computer is turned on. Alternatively, you may place them in the AUTOEXEC.BAT file on your MS-DOS disk. ♦

The LaserWriter Select 360 printer comes from the factory with the serial port configured for option 68: 8-bit data, no parity, DTR flow control, with 57,600 baud. You may therefore need to set up the printer for XON/XOFF communication at 9600 baud. Send the following routine to the printer from the host, using either the parallel port or the serial port at 57,600 baud.

```
serverdict begin 0 exitserver
statusdict begin
25sccbatch 0 eq exch 9600 eq and not
{25 9600 0 setsccbatch} if not
end stop
```

This routine tests the current values of the `sccbatch` parameters (see Chapter 3), and if they are not set for 9600 baud and option 0, it sets these values using `setsccbatch`.

DTR Flow Control for PC Communication

To set up the LaserWriter Select 360 printer for serial interface with the IBM PC over the serial port using DTR flow control, issue the following MS-DOS commands to your computer:

```
MODE COM1:9600,N,8,1,P
MODE LPT1:=COM1:
```

Communication Dynamics

Data transmitted by the LaserWriter Select 360 printer, whether it is generated by executing the PostScript language program, or by some other spontaneous event such as an error, is logically asynchronous with respect to the data received. This means that the host computer must be prepared to consume data received from the printer while waiting to send more data to the printer. If the host computer is not set up to do this, the printer and the host may each wait for the other to consume data, and a deadlock will occur.

Typically, characters written to the standard output file by PostScript operators such as `print` are not sent immediately. They are buffered until a flush is executed. A flush occurs automatically

- at the end of a job
- in interactive mode, whenever the user is prompted to make an entry

Communication Channels

IMPORTANT

If a PostScript language program writes data that is needed immediately by the host, for example a reply to an environmental query, it is important to flush after writing the data. Otherwise, a deadlock may occur. ▲

Status Queries and Spontaneous Messages

The LaserWriter Select 360 printer provides a status query facility that enables the host or user to determine what the printer is doing. The printer responds to a status query asynchronously with respect to normal job execution. That is, it sends a response immediately, regardless of what has gone on before, or how much input data has been buffered. This facility primarily enables spoolers (printer control programs) to track the activities of the LaserWriter Select 360 printers under their control.

If the printer receives a CTL-T character from the active input channel, it replies with a one-line status message over the active port's output channel. The message is bracketed by the text sequences `%%[` and `]%%`, to enable the host software to extract the message from the ordinary data generated by the job being executed.

The status message has standardized syntax that is intended to be machine readable. It consists of one or more key value pairs, separated by semicolons. For example:

```
%%[job: Jane's report; status: busy; source: serial ]%%
```

The possible keys, values, and meanings are as follows:

<code>job</code>	The name of the job is stored as <code>jobname</code> entry in <code>statusdict</code> (see Chapter 3). This field is omitted if the current job has not defined <code>jobname</code> .
<code>status</code>	Indicates what the printer is currently doing: <ul style="list-style-type: none"> ■ <code>idle</code> indicates there is no job in progress ■ <code>busy</code> means the printer is executing the user's PostScript language program ■ <code>waiting</code> means that the I/O is waiting in the middle of a job ■ <code>printing</code> indicates that the printer is printing, and that paper is in motion ■ <code>PrinterError: reason</code> means that there is a printer error such as a paper jam, or printer out of paper. ■ <code>initializing</code> indicates the printer is starting up
<code>source</code>	<code>serial</code> , <code>parallel</code> , or <code>LocalTalk</code> indicates the source of the job that the server is currently executing. This field is omitted if the server is idle.

Communication Channels

All messages generated spontaneously by the server, (as opposed to those messages produced when the PostScript language program executes `print`) conform to the same syntax as status messages. They are sent as ordinary data through the communication channel, in sequence with any other characters written to the standard output file. Consequently, they are always bracketed with `%%[and]%%`, for either serial or parallel channels:

```
%%[Error:error; OffendingCommand: operator ]%%
```

An error has been detected by the PostScript interpreter and the standard error handle (`handleerror`) has been invoked.

`error` is the name of the error operator originally invoked.

`operator` is the operator or other PostScript object being executed at the time of the error.

Refer to the *PostScript Language Reference Manual* for further information on error handling.

```
%%[PrinterError:reason]%%
```

A problem has been reported by the printer mechanism. The type of problem is indicated by `reason`: no paper, no paper tray, paper jam, cover open, and so forth.

A printer error can only occur during execution of `showpage` or `copypage`, that is when the printer is actually trying to print a page. After generating this message, the server usually waits for the condition to be corrected and then continues printing automatically.

The server's behavior when it encounters a printer error is controlled by the `printererror` procedure described in Chapter 3.

```
%%[Flushing: rest of job (to end-of-file) will be ignored ]%%
```

Because of a previous error or abort condition, for example `stop` or CTL-C interrupt, the remainder of the current job is being discarded. The server reads and discards characters from the standard input file until it receives an end-of-file indication.

```
%%[exit server: permanent state may be changed ]%%
```

The PostScript language program has successfully exited from the server's normal `save/restore` context, and may now make permanent changes to the system parameters or to the virtual memory.

Glossary

anti-aliasing This technique is implemented at 300 dpi. It smooths the jagged edges of characters and lines, producing an effective resolution greater than 300 dpi.

binary protocol With binary protocol, an encoding scheme allows the full range of 8-bit values to be transmitted as data, while also providing for certain communication functions, such as end-of-file, software flow control, and so forth. This protocol is suitable for use with any language (for example, PostScript) or a printer emulation. However, it is obsolete, and has been replaced by tagged binary communication protocol.

FinePrint Apple's FinePrint technology enables the printer to produce dots of different widths. This in turn produces precise, smooth text and line art. Most printers generate text and line art with jagged edges because they can only produce print dots of one size.

normal protocol With normal protocol, certain control characters are reserved as communication functions such as end-of-file, and so on. These codes cannot be carried as data. The protocol is suitable for use only when sending ASCII-encoded PostScript language jobs. It is not suitable for PostScript language jobs containing binary data, or for any printer emulation jobs.

page size The area of the paper within which the printed image appears. It is also known as the imageable area.

protocol See the entries for **binary protocol**, **normal protocol**, **raw protocol**, and **tagged binary communication protocol**.

raw protocol With raw protocol, all the characters are treated as data. There are no reserved characters, and no communication functions are available. Normally, this protocol is used only with printer emulation, and not with the PostScript interpreter.

tagged binary communication protocol (TBCP) 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.

TrueType TrueType fonts are crafted to produce type that is scalable to any size. Letters and line art look as smooth and precise on screen as they do in print. All characters are defined mathematically and stored as outlines. The rasterizers that render these mathematical equations are integrated into the System 7 operating system, as well as into the printer's controller.

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