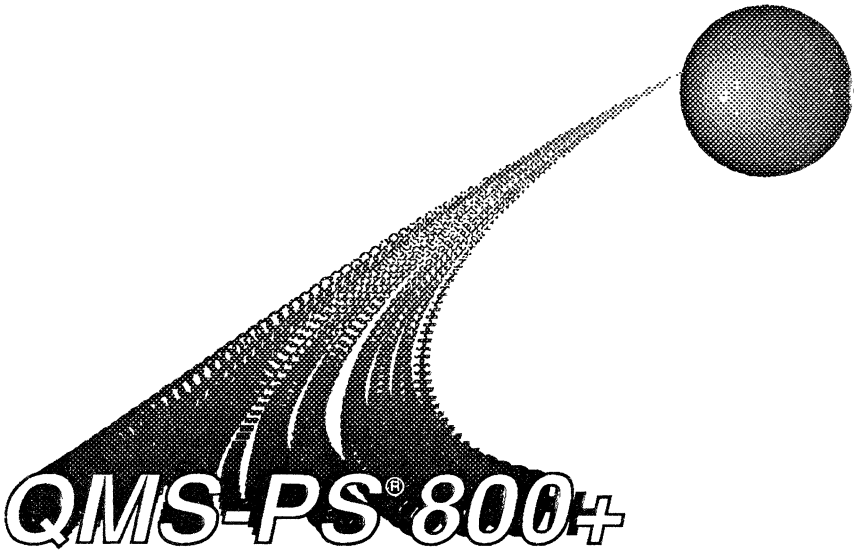

User's Guide

Publication Number

1720393A

February 1987

About This Manual

The manual is divided into these major parts:

- Part I, "Getting Started"
- Part II, "Tutorial"
- Part III, "Maintenance and Troubleshooting"
- Part IV, "Advanced User's Information"
- Part V, "POSTSCRIPT Addendum"
- Appendix A, "Font Tables"
- Appendix B, "Printer Specifications"
- Appendix C, "Diablo 630 Emulation Mode"
- Appendix D, "Hewlett-Packard LaserJet Plus Emulation Mode"
- Appendix E, "Hewlett-Packard 7475 Plotter Emulation Mode"

Part I, "Getting Started" will take you from unpacking to power-up.

Part II, "Tutorial" will acquaint you with the many features of your laser printer and help you start printing. If you are new to POSTSCRIPT or laser printers, you will want to read this section throroughly (after Part I) before you go on to any other part of the manual.

POSTSCRIPT Compatibility

Your QMS-PS 800+ printer uses the newest, most accurate version of the POSTSCRIPT Language, Version 46.1. Other printers may use an older version of POSTSCRIPT. This POSTSCRIPT version contains changes which may not be compatible with some software packages written for earlier versions. Although unlikely, it is possible that a software package developed using an earlier version of POSTSCRIPT may cause an error. If this should occur it is NOT due to printer failure. It is caused by the incompatibility of the software package with the newest version of the POSTSCRIPT Language.

QMS is committed to providing our customers with the highest quality products. Thank you for your interest in the QMS POSTSCRIPT family of printers.

Proprietary Statements & Notices

Proprietary Statement

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Manual Notice

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bility for, or liability for, errors contained in this manual or for incidental, special, or consequential damages arising out of the furnishing of this manual, or the use of this manual in operating the equipment, or in connection with the performance of the equipment when so operated.

Laser Safety

This printer is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laserbeam cannot escape from the machine during any phase of user operation.

FCC Compliance

This equipment generates and uses radio frequency energy. If not installed and used properly, (in strict accordance with the manufacturer's instructions) it may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

(1) Reorient the receiving antenna. (2) Relocate the computer with respect to the receiver. (3) Move the computer away from the receiver. (4) Plug the computer into a different outlet so that computer and receiver are on different branch circuits. (5) If

necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The Federal Communications Commision has prepared a helpful booklet: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

A SHIELDED INTERFACE CABLE IS REQUIRED TO COMPLY WITH CLASS B LIMITS.

Warning

To prevent electrical shock, do not remove the cover of the laser printer. There are NO user-serviceable parts inside. Servicing should be done ONLY by qualified service personnel.

Contents

Part I

Getting Started

Introduction

The QMS-PS 800+ is a compact printer which combines the high quality of laser printing and the flexibility of the powerful POSTSCRIPT programming language. The QMS-PS 800+ can be used with a wide variety of computer systems, including IBM PC/compatibles and the Apple Macintosh. It will also work with many mainframe and minicomputers.

This user's guide provides all the necessary information for the unpacking, inspection, installation, operation, and maintenance of your printer. Technical information for advanced users is also included.

A Unpacking and Inspection

Before you attempt to use your QMS-PS 800+ carefully unpack and inspect it. Retain the shipping carton and packing materials until the contents have been inspected and checked against the packing list. If there is any evidence of external damage, do not attempt to use the equipment. Contact the carrier immediately, initiate a damage claim, and notify your dealer of the problem.

A.1 What's Included

The QMS-PS 800+ printer system is shipped in two parts: the printer unit and the print cartridge.

The following items should be enclosed in the Printer unit shipping container:

1. QMS-PS 800+ print engine
2. Print tray with sliding extension
3. Manual-feed extension
4. Cassette paper tray
5. *POSTSCRIPT Language Reference Manual*
6. *POSTSCRIPT Language Tutorial and Cookbook*
7. *QMS-PS 800+ User's Guide*

The following items should be included in the Print Cartridge shipping container:

1. Print Cartridge
2. Fixing Assembly Cleaner (plastic/felt rod)
3. Installation sheet

A.2 Unpacking

After opening the shipping container, carefully remove the trays from the depression in the foam packing. Lift off the foam packing and locate the handles on the front and rear of the printer (Figure 1). Lift the printer out of the shipping container. **Always use the HANDLES when lifting the printer!** Remove the plastic bag enclosing the printer.

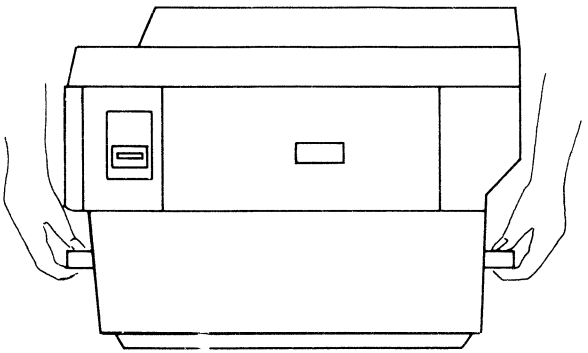


Figure 1: Lifting the Printer

A.3 Inspection

Carefully inspect the printer as follows:

1. Examine the paper cassettes and inspect them for damage.
2. Check for exterior damage to the printer.
3. Locate the green release lever (right side of printer) and lift it to raise the springloaded top half of the printer. Inspect the inside of the printer for damage. If it is dirty, clean the inside with a damp cloth.

4. Inspect the bag enclosing the print cartridge for tears or any other indications of damage. Locate the fixing assembly cleaner (separate) and check for damage to the rod or the felt.

A.4 Reshipping

If it becomes necessary to return your printer, a Returned Merchandise Authorization (RMA) number must first be obtained from QMS (call 1-205-633-4300). The RMA number must accompany the returned equipment. This will help QMS to make arrangements for repair or replacement as soon as possible.

When preparing the equipment for reshipment, please give special attention to packing in order to prevent further damage.

B Printer Set-Up

To set up your printer, complete the procedures on the following pages:

B.1 Find A Good Spot

Choose a location for your QMS-PS 800+ that meets the following guidelines:

1. Your printer should be installed on a sturdy, level surface.

2. It should be located where there is sufficient space to permit unimpeded operation. Refer to Figure 2 for recommended space requirements for the printer.

3. It should not be installed in a location making it susceptible to water damage or variations in temperature/humidity, i.e., near water faucets, boilers, humidifiers, refrigerators, air conditioners, etc.

4. It should not be exposed to excessive heat, dust, ammonia fumes, or direct sunlight.

5. The room temperature should be 50 to 90 degrees Fahrenheit, and the relative humidity 20 to 80 percent.

6. The location should be well ventilated.

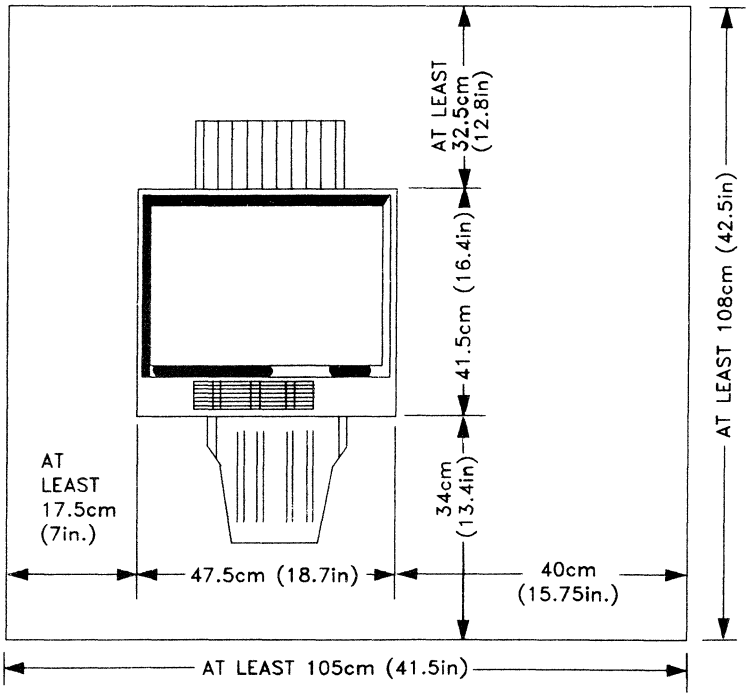


Figure 2: Space Requirements

B.3 Print Cartridge Installation

1. Open the right door to install the print cartridge. (The right door will not open unless the upper half of the printer has been raised.) Place your thumb on the ribbed surface of the window in the center of the door. Curve your fingers down under the door and pull out and down with your thumb. The door should pop open.

2. Take the print cartridge out of its bag. Hold the cartridge as shown in Figure 4. Rotate it slowly 45-degrees in both directions several times in order to distribute the toner evenly inside the cartridge. Tilting the cartridge toward either end can cause uneven distribution of the toner and should be avoided.

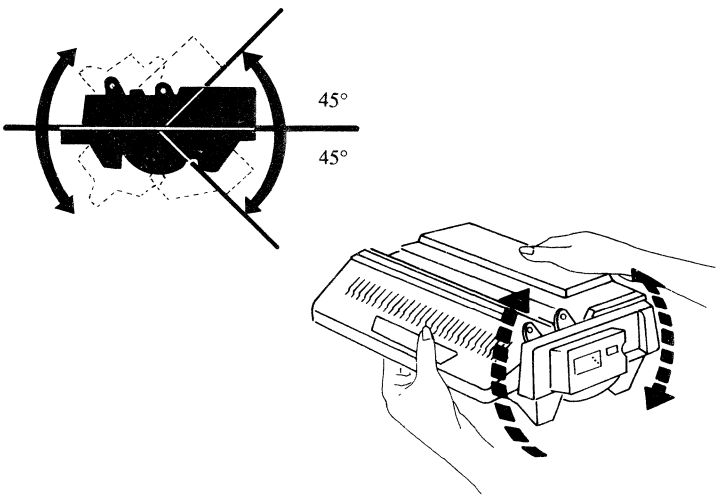


Figure 4: Rotating the Print Cartridge

3. Insert the print cartridge into the printer through the right door. The cartridge handle should be to the left and the instruction label should face upward. (See Figure 5.)

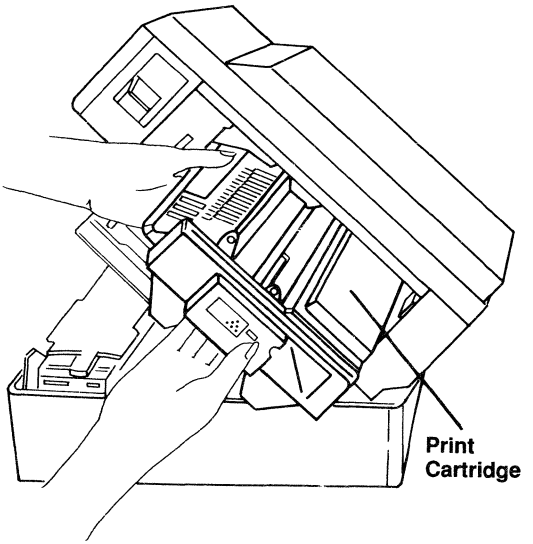


Figure 5: Inserting the Print Cartridge into the Printer

4. Hold the print cartridge and flex the black tab back and forth until it breaks loose. Pull the tab out completely to remove the attached sealing tapes. (See Figure 6.)

5. Close the right door.

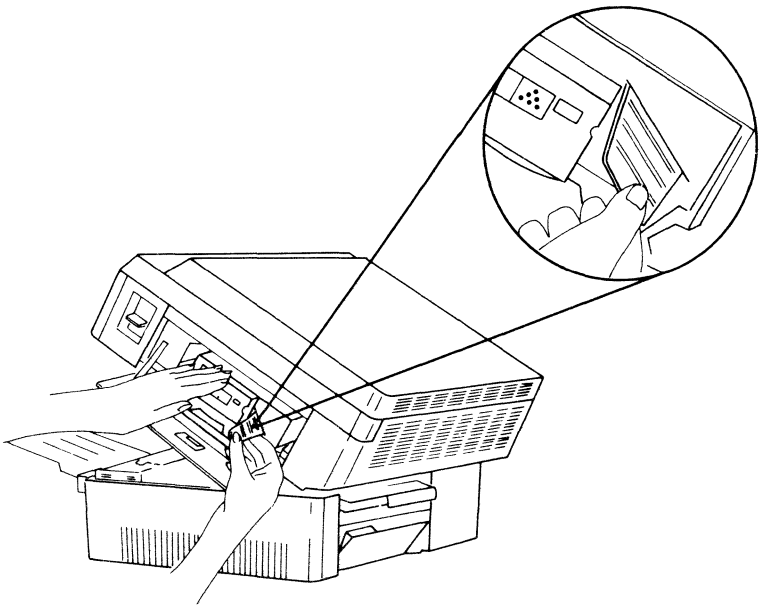


Figure 6: Breaking the Black Tab

B.4 Fixing Assembly Cleaner Installation

1. Take the fixing assembly cleaner (a long plastic and felt stick) out of the print cartridge box. Remove its plastic wrapper.

2. Raise the upper half of the printer.

3. Open the fixing assembly cover and insert the cleaner into the groove on the underside of the cover. (See Figure 7.)

4. Close the fixing assembly cover and the upper half of the printer.

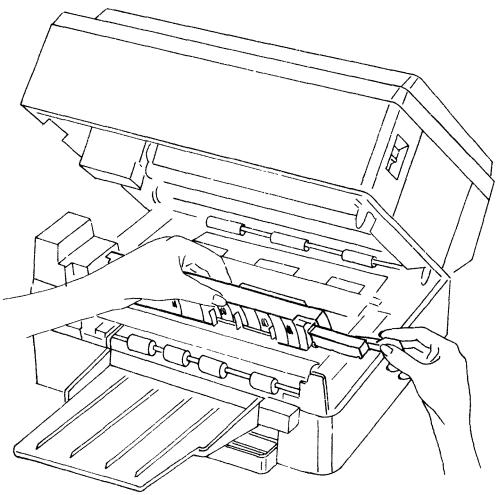


Figure 7: Inserting the Fixing Assembly Cleaner

B.5 Paper Tray Installation

The QMS-PS 800+ has two paper trays: the print tray and the smaller manual-feed tray. Both trays are installed by fitting plastic pegs into the appropriate holes as described below.

1. Locate the print tray and move to the front of the printer. Hold the tray so that the wide end is toward the front of the printer and the sliding extension is underneath (the end corner of the sliding extension should point down). Taking one side at a time, insert the installation nubs into the slots directly above the front handle of the printer. (See Figure 8.)

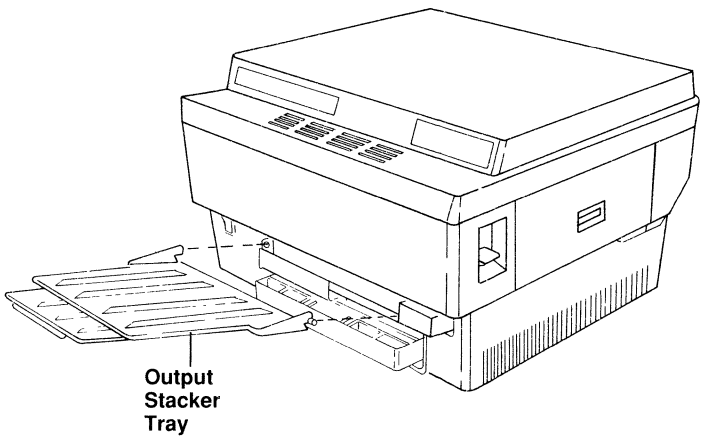


Figure 8: Installing the Print Tray

2. Locate the manual-feed tray. Move to the rear of the printer and hold the tray so the installation brackets are toward the rear of your printer. The top of the tray has raised lines along the surface. Install the tray by inserting the installation nubs on the outside edges of the printer's rear handle into the holes of the tray's installation brackets. (See Figure 9.)

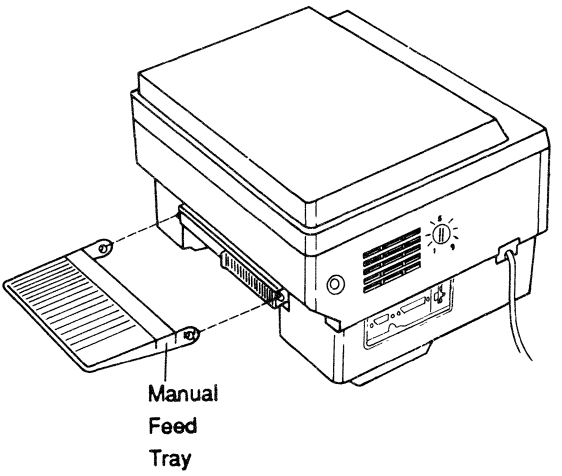


Figure 9: Installing the Manual Feed Tray

B.6 Installing the Paper Cassettes

1. Check the paper cassette to make sure it is the correct size for the paper length you intend to use. The cassette size is on a foil label on its right side. Position the adjustment bar to the appropriate paper size.

2. Place paper into the cassette and push the paper under the paper-control clips. (See Figure 10.)

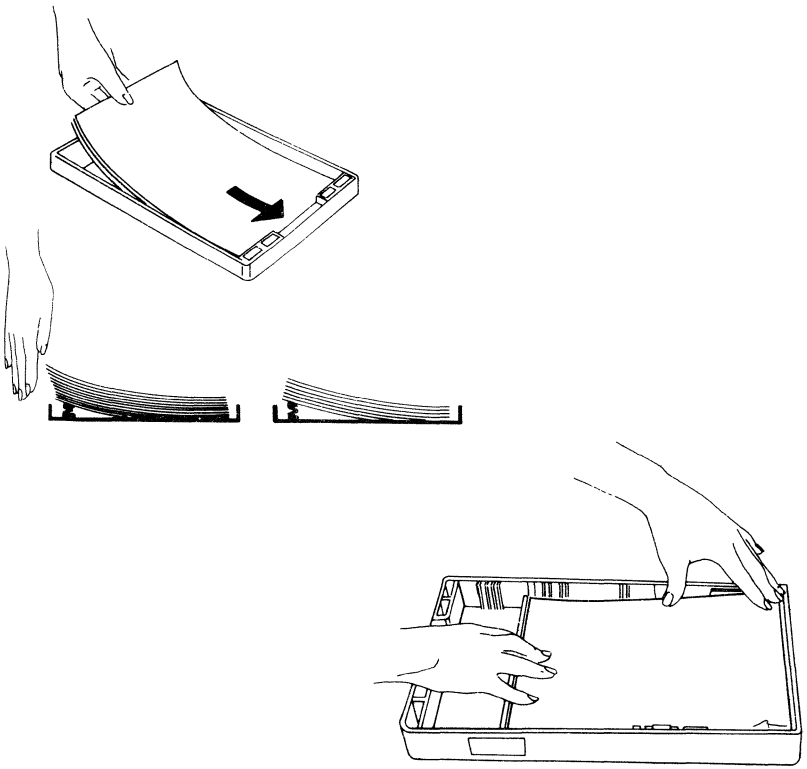


Figure 10: Inserting Paper into the Paper Cassettes

3. Insert the paper cassette into the slot under the front handle until it stops. (See Figure 11.)

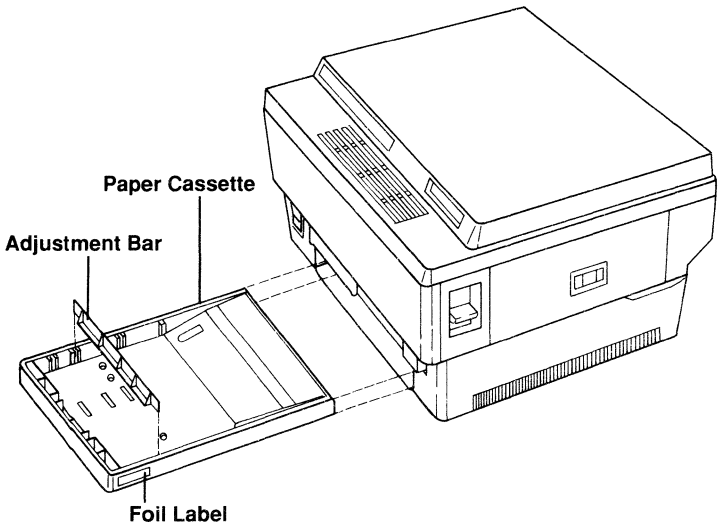


Figure 11: Inserting the Paper Cassette into the Printer

B.7 Print Density

The print density adjustment dial (Figure 12) is used to adjust the darkness of the print. Turning the dial counter-clockwise darkens the print; turning it clockwise lightens the print.

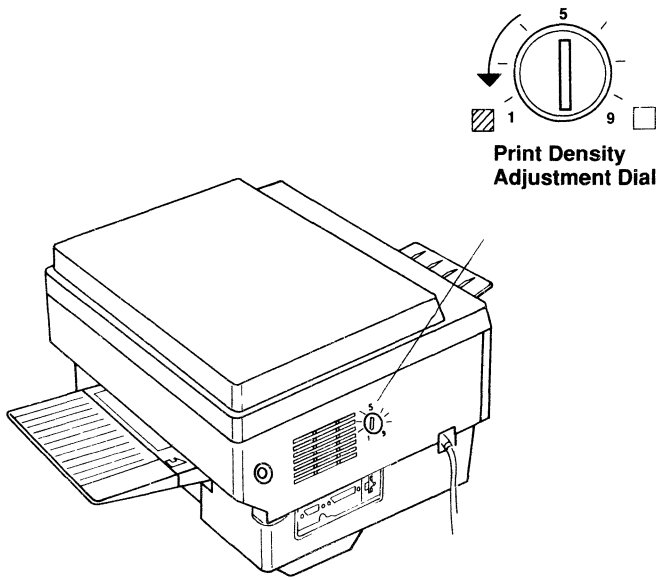


Figure 12: The Print Density Adjustment Dial

C Connecting the Printer

After the printer is properly set up it is ready to be connected to the power source and to the host computer.

C.1 Connecting the Interface Cable

The interface cable connects your computer or terminal to the printer and allows them to communicate. You may purchase the appropriate interface cable for the communication channel you intend to use (25-pin serial or 9-pin serial or AppleTalk) from your dealer[1].

Connect the interface cable to the communication ports on your host computer and on the left side of your printer. (See Figure 13.) The cable's connectors should match the communication ports on the printer and your computer or terminal.

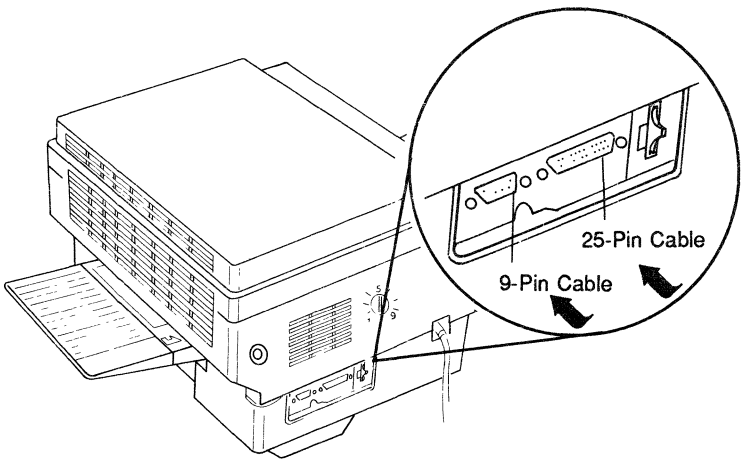


Figure 13: Connecting the Cables

[1]See Part IV, "Advanced User's Information", Section B for details on the required cables.

You can connect your printer directly to the communication port of your host computer with no signal reversals required. However, connecting your printer to a standalone terminal or IBM PC (or compatible) requires a "null modem" cable.[2]

C.2 Connecting the Power Cord

Connect the power cord to a grounded outlet where the line voltage varies no more than 10 percent from the voltage marked on the printer nameplate (inside).

D Ready To Go...

Now that your printer is properly set up, carefully go through the Tutorial in Part II to get it printing and to learn its functions and features.

[2]For more information about the null modem cable see "Part IV, "Advanced User's Information", Section B.3.

Part II

Tutorial

Introduction

Once you have followed the steps in Part I, "Installation", this Tutorial will introduce you step-by-step to the QMS-PS 800+ and its basic functions.

The QMS-PS 800+ offers many useful features which can be changed to allow you to customize your printer to meet your specific requirements. The Tutorial will describe how to change these features using POSTSCRIPT commands.

The Tutorial will not attempt to teach the POSTSCRIPT language. For a detailed explanation of the POSTSCRIPT language refer to *The POSTSCRIPT Language Tutorial and Cookbook* and the *The POSTSCRIPT Language Reference Manual.*

This Tutorial contains information on the following printer functions:

- Power On
- Start-Up Page
- Communications
- Printing a File
- Paper Size
- Paper Source
- Fonts

These sections of the Tutorial describe the most common functions of the printer and their features. They point out:

1. The purpose of each function.
2. What the **default** features are. (Features which will be in effect if no changes are made.)
3. How to change printer features.
4. Where to look in this user's guide for more information if it is needed.

In the section called "The Display Panel", the Tutorial introduces you to the printer's display panel. It points out the lights and explains their purposes.

"Making Changes" explains how to change the features of the printer.

"Things You Need To Know..." covers routine maintenance as well as some common problems and their solutions.

"For More Information..." describes the structure of the remainder of the user's guide and tells you where to look for specific information.

A *The Display Panel*

The indicator lights on the display panel provide a simple visual indication of what your printer is doing. There are three colored lights. These include, from left to right, a green light over the word **Ready**, an amber light over the words **Active** and **Paper Out**, and another amber light over the words **Paper Jam**. These lights appear in different combinations to indicate various states of printer operation.

Figure 1: The Printer Display Panel

A.1 Display Light Functions

The display lights and their meanings are as follows:

Status	Display
Idle	If the green light is on continuously, the machine is completely idle and waiting to execute your next POSTSCRIPT file.
Warming Up	If green is flashing while the other lights are off, the printer is warming up (this should take no longer than two minutes).
Busy	If green is alternating with a single quick flash of the amber "Active/Paper Out" light, the printer is busy executing a job (or, immediately after power-on, computing the start-up page to be printed).
Printing	A steady green light is displayed whenever paper is in motion in the printer.
Waiting	If green is alternating with two quick flashes of the amber "Active/Paper Out" light, the printer is in the middle of executing a job but is waiting to receive more data over the communication channel.

These functions are described in more detail in the appropriate places in the Tutorial. Other display light functions are listed in Part III, "Maintenance and Troubleshooting", Section H.1.

A.2 Display Panel Illustrations

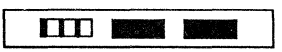
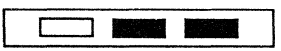
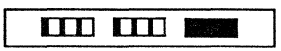
The illustrations in the following sections show you what you see on the display panel as you follow the step-by-step procedures. The display panel is shown as a box containing the three panel lights. The indicator lights are shown white if they are lighted, black if they are not lighted, and black and white if they are blinking.

- – Light is On
- – Light is Off
- – Light is Blinking (Single)
- – Light is Blinking (Double)

Figure 2: Display Panel Lights

B Power On

To power on the printer do the following:

Do This:	Display:	Meaning:
Press the half of the power switch marked with a "1".		Power-Up cycle
		Power-Up cycle complete
		Computing Start-Up page.
		Paper in Motion.
Start-Up Page Ejected		Ready to Print

C Start-Up Page

At the end of the printer's power-up cycle it prints a **start-up page**[1]. This page contains information about the printer which will be explained in the following sections of the Tutorial or in other parts of the user's guide.

The start-up page is divided into two parts: the upper box and the lower box.

The upper box contains:

- The product name (QMS-PS 800+).
- The version number of the POSTSCRIPT software.
- A listing of the font outlines (typefaces) built into the printer.

The lower box contains:

- The number of pages printed to date by the printer.
- The currently selected interface.
- The baud rates and parities of each of the communication channels.
- The printer name.[2]

Note the small gap in the line at the top of the lower box. This gap will appear at the exact center of a standard letter-size page (8.5 x 11 inches) if the printer is properly aligned.[3]

---

[1]The printing of the start-up page can be suppressed with the setdostartpage operator. See Part V, "PostScript Addendum", Section B.2.9

[2]This may be changed with the setprintername parameter. See Part V, "PostScript Addendum", Section B.2.3. (The default is "QMS-PS 800+").

[3]The printer alignment may be adjusted with the setmargins parameter. See Part V, "PostScript Addendum", Section B.2.11.

All of the information contained in the start-up page will be discussed either in the Tutorial or in other parts of the user's guide. See the following chart for locations of information:

Topic:	Location:
Fonts	Part IV, Section I Appendix A
Interface	Part IV, Section E.1
Baud Rate	Part IV, Section E.2
Parity	Part IV, Section E.2

QMS-PS 800+

Version 46.1

Defined Font Outlines

Times®-Roman	Helvetica®	Courier
Times-Bold	Helvetica-Bold	Courier-Bold
Times-Italic	Helvetica-Oblique	Courier-Oblique
Times-BoldItalic	Helvetica-BoldOblique	Courier-BoldOblique
ITC Avant Garde Gothic®-Book	Palatino®-Roman	New Century Schoolbook-Roman
ITC Avant Garde Gothic-Demi	Palatino Bold	New Century Schoolbook-Bold
ITC Avant Garde Gothic-BookOblique	Palatino-Italic	New Century Schoolbook-Italic
ITC Avant Garde Gothic-DemiOblique	Palatino-BoldItalic	New Century Schoolbook-BoldItalic
Helvetica®-Narrow	ITC Zapf Chancery®-MediumItalic	ITC Bookman®-Light
Helvetica-Narrow-Bold	ITC Zapf Dingbats®	ITC Bookman-Demi
Helvetica-Narrow-Oblique	Symbols Set	ITC Bookman-LightItalic
Helvetica-Narrow-BoldOblique		ITC Bookman-DemiItalic

1802 pages printed

Interface: RS232C Serial, Batch

9 pin channel: 9600 baud, parity ignored

25 pin channel: 9600 baud, parity ignored

QMS-PS 800+

D Making Changes

The QMS-PS 800+ has an extensive set of options, called **parameters** that control its features and functions. Some of these options remain in effect after the printer is powered off. These are called **persistent parameters**. Other parameters remain in effect only for a single job or until the printer is powered off. These are called **volatile parameters**.

The printer comes from the factory with these parameters set in **default** settings. These default settings remain in effect unless they are changed. This Tutorial will show you the proper step-by-step sequence to change several common parameters.

D.1 Changing Persistent Parameters

Changes to persistent parameters described in this Tutorial are made with POSTSCRIPT programs[4] (a series of POSTSCRIPT instructions) sent to the printer like a text file.

The method for doing this will vary from system to system. Your software package may include a specific procedure for sending POSTSCRIPT commands directly to the printer. If it does not, a file containing the POSTSCRIPT commands may be written using an editor or word processor and sent to the printer.[5]

---

[4]Persistent parameters may also be changed through the interactive mode. For information on interactive mode see Part IV, "Advanced User's Information", Section D.

[5]If you wish to use your word processor, it must be able to output a straight "ASCII" text file. Many word processing programs have this option.

The POSTSCRIPT program to change persistent parameters must first contain a statement which directs the printer to allow persistent changes to be made. That statement is as follows:

serverdict begin *password*[6] **exitserver**

Next should be the statement:

statusdict begin

This statement is followed by specific instructions for the parameter to be changed. These instructions will be given in detail throughout this Tutorial and in other portions of the user's guide. (For a complete listing of parameters, see Part V, "PostScript Addendum".)

The entire program should be concluded by:

end

This program is sent to the printer like any file. All changes made by the program will be in effect for all subsequent jobs (after a ^D), even after the printer is powered off and back on.

In this Tutorial the statements:

serverdict begin *password* **exitserver**
statusdict begin
end

will appear in the instructions for changing each of the persistent parameters described. You may change more than one persistent parameter at a time. If more than one persistent parameter will be changed in one program, these statements should only appear once.

---

[6]The default value of the password is 0, but it may be changed to any other integer by executing the setpassword operator. See Part V, "PostScript Addendum", Section B.2.15.

D.2 Changing Volatile Parameters

The statements:

serverdict begin *password* **exitserver**
statusdict begin
end

may also be utilized to change volatile parameters.

E Printer Communications

The QMS-PS 800+ is equipped with two communication ports, located on the left side of the printer. These are the channels through which your host computer[7] communicates with the printer. Each of these channels is bidirectional which means the printer can receive data and send output over the same channel. The output it most frequently sends back to your host computer are error messages.

E.1 Interfaces

One of the channels is wired to a 9-pin connector and the other to a 25-pin connector. Either can be used for conventional **serial** communication. The 25 pin connector wired as a RS-232 interface. The 9-pin connector is wired as a RS-422 interface[8]. The 9-pin connector is also used for connecting to AppleTalk.

[7]For technical information concerning communications, see Part IV, "Advanced User's Information", Section B.

[8]For signal pin assignments see Part IV, "Advanced User's Information", Section B.2.

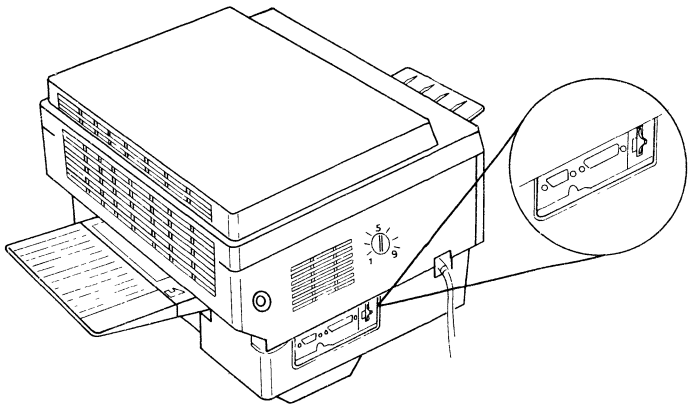


Figure 3: Communication Ports

E.2 Set-Up

Before your QMS-PS 800+ will be ready to print, you must ensure that both the printer and computer are set to the same **baud rate**, **parity** and **protocol** as defined below:

Baud rate is speed of transmission measured in **bits per second**.

Parity is a type of error checking having four options: **odd parity**, **even parity**, **no parity**, or **ignore parity**.

Protocol is the set of rules that the computer and printer use when they communicate. The QMS-PS 800+ uses either **XON/XOFF** or **DTR** protocol.

E.3 Modes of Operation

The QMS-PS 800+ can print in three basic **modes** (methods of operation): **batch**, **interactive**, and **emulation**.

Batch mode is the normal way of operating the printer. In this mode, the printer processes a single job containing POSTSCRIPT information (either from the output of a software package or from a POSTSCRIPT program). When it reaches the end of the job the output is printed.

The **interactive** mode allows you to interact directly with the POSTSCRIPT **interpreter** from a terminal, using your printer as if it were a personal computer. In this mode, the **server** (printer controller) prompts you to type in a single POSTSCRIPT statement. The server immediately executes that statement and then prompts again for the next. This continues until the job is completed. This direct interaction makes this mode very useful for experimenting with POSTSCRIPT [9].

In **emulation** mode, the printer emulates or acts like some other printer. The QMS-PS 800+ printer has a built-in emulators for the Diablo 630[10] and the Hewlett-Packard LaserJet Plus[11] printers. In the emulation mode, the printer does not interpret the incoming characters as a POSTSCRIPT program, but instead treats them as either text or control codes that are understood by the printer being emulated. Emulation allows you to print a file that is not compatible with POSTSCRIPT.

E.4 The Mode Switch

The mode switch is located on the lower-left side of the printer, just to the right of the communication port. This switch selects different modes of operation. Each of these modes has default values for baud rate, parity, and protocol. The settings of switches "1" and "2" can be changed. Switch setting "1" can be changed with the **setsccbatch** operator[12]. Switch setting "2" can be changed with the **setsccinteractive** operator[13].

---

[9]For more information about interactive mode see Part IV, "Advanced User's Information", Section D.

[10]For complete information about the Diablo 630 emulation mode see Appendix C.

[11]For complete information about the LaserJet Plus emulation mode see Appendix D.

[12]See Part V, "PostScript Addendum", Section B.2.5. Refer to Part IV, "Advanced User's Information", Section D.2. for an example of using interactive mode to set the setsccbatch operator to change the baud rate and parity of switch setting "1".

[13]See Part V, "PostScript Addendum", Section B.2.7.

Note: Changing a switch setting has an immediate effect: if a job is in-progress, it is terminated when the switch is changed. Set the switch to the desired mode before printing.

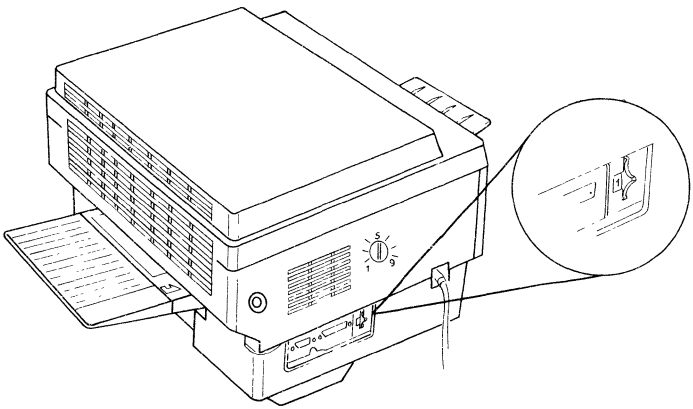


Figure 4: Mode Switch

The switch positions are assigned the following meanings:

Switch	Operational Mode
0	Batch mode operation. Serial (RS-232/422) communication via either of the two communication ports at 1200 baud, with parity ignored.
1	Batch mode operation. Serial communication using parameters established with the **setsccbatch** operator. The default parameters are 9600 baud, parity ignored. Since these parameters can be set through software, the '1' switch position may select a baud rate different from 9600 as well as other parities.
2	Diablo 630 emulation mode. Serial communication using parameters established through software. The default parameters are 9600 baud, parity ignored. This switch position can also be configured to come up in interactive mode.
3	POSTSCRIPT batch mode operation. AppleTalk communication (9-pin connector only).
4-7	For Centronics option. See your dealer for details.
8	Hewlett-Packard LaserJet Plus printer emulation mode. Serial communication using parameters established in last call to **sccinteractive**. The default parameters are 9600 baud, parity ignored.
9	Hewlett-Packard HPGL Plotter Graphics emulation mode. Serial communication using parameters established in last call to **sccinteractive** The default parameters are 9600 baud, parity ignored.

These parameters are standard values. To change the parameters to match your system see Section E.5.

E.5 Changing Communication Parameters

If the parameters defined by the switch are not compatible with your host computer, then you can change them accordingly with the **setsccbatch** operator[14] (for switch setting "1"), or **setsccinteractive** operator[15] (switch setting "2"). The **setsccbatch** and **setsccinteractive** operators change: channel, baud rate, and option number.

To change communications parameters for switch "1" send the following program to the printer:

serverdict begin *password* **exitserver**
statusdict begin
channel baud option **setsccbatch**
end

To change communications parameters for switch "2" send the following program to the printer:

serverdict begin *password* **exitserver**
statusdict begin
channel baud option **setsccinteractive**
end

Channel specifies which of the two connectors (the 9-pin or the 25-pin connector) you will be using. This is indicated by either "9" or "25".

Baud sets the baud rate and is an integer, such as 1200 or 9600. Above 9600 baud, the available baud rates are: 10473, 11520, 12800, 14400, 16457, 19200, 23040, 28800, 38400, and 57600.

---

[14]For more detailed information see Part V, "PostScript Addendum", Section B.2.5, and Part IV, "Advanced User's Information", Section D.2.

[15]For more detailed information see Part V, "PostScript Addendum" Section B.2.6.

Option is specified by an integer (0 to 7). It determines the parity and chooses either XON/XOFF or DTR protocol. The following table lists these option numbers and their assigned values:

Option	Description
0	Ignore parity: the high-order bit is ignored (i.e. the eighth bit of every character transmitted is zero). XON/XOFF flow control is used.
1	Odd parity: the eighth bit of every character transmitted is checked for odd parity (a POSTSCRIPT **ioerror** occurs if it is incorrect); XON/XOFF flow control is used.
2	Even parity: the eighth bit is checked for even parity. XON/XOFF flow control is used.
3	No parity: all 8 bits of each character are treated as data and no parity checking is performed. XON/XOFF flow control is used.
4	Ignore parity; DTR flow control (see next page).
5	Odd parity; DTR flow control.
6	Even parity; DTR flow control.
7	No parity; DTR flow control.

For example, for switch setting "1" to set the 25 pin connector to 1200 baud with odd parity and DTR flow control (protocol), you would send the following program to the printer:

```
serverdict begin 0[16] exitserver
statusdict begin
25 1200 5 setsccbatch
end
```

[16]This password is always 0 unless it has been changed.

E.6 Setting Up the Host

If you are an IBM-PC user, the following commands will set up serial port 1 for communication with the QMS-PS 800+. The examples below set the baud rate to 9600, parity to none and direct printer output to the serial port. For XON/XOFF flow control, issue the commands:

MODE COM1:9600,n,8,1
MODE LPT1:=COM1:

For DTR flow control, issue the commands:

MODE COM1:9600,n,8,1,p
MODE LPT1:=COM1:

F Printing a File

Once the printer is properly set up you are ready to print. Send the sample file below or a file made with your software package to confirm that the printer is properly set up and communicating with the host computer. The chart in Section F.2 illustrates the sequence of events for properly printing a file. If your printer does not properly print, carefully recheck the previous steps in Part I, "Getting Started" and in this tutorial.

F.1 Sample File

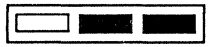
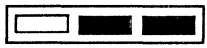
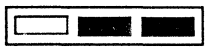
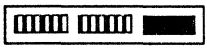
Type this program carefully and exactly as it appears (with your name in the places marked with bold text). Any mistakes will result in an error and no output will be delivered[17].

[17] A very useful diagnostic tool for PostScript files is the Error Handler file. This file prints a page showing PostScript syntax errors which would keep a file from printing. For more details see Part IV, "Advanced User's Information", Section H.

```
/inch {72 mul} def

/Helvetica-Bold findfont 30 scalefont setfont

/outline
{true charpath stroke} def

/namecir
{15 15 345
{gsave
rotate 0 0 moveto
(Your Name Here) outline
grestore
} for} def

4.25 inch 5.75 inch translate
.5 setlinewidth

namecir

0 0 moveto
(Your Name Here) true charpath
gsave 1 setgray fill grestore
stroke

showpage
```

F.2 Printing Sequence

The following chart illustrates the sequence of events for a properly printed file:

Do This:	This Will Result:	Meaning:
		Ready to print.
Send file to the printer.		Receiving data.
		Paper in motion.
		Receiving data.
		Paper in motion.
Until:		File completed. (Awaiting Data.)[18]
		Ready to print.

G Paper Size

The QMS-PS 800+ can print on four page sizes. The table on the following page lists the available page sizes and the dimensions of their actual printable areas. The size of the printable area is determined by the physical capabilities of the printer and the size of its data storage space.

[18] After the end of a file the Active light double blinks indicating it is waiting for more data. If it does not receive more data it goes idle. The length of time the printer will wait for more data is determined either by the setdefaulttimeouts or setjobtimeout parameters. See Part V, "PostScript Addendum", Section B.2.13. and Section C.1.1

The available page sizes are:

Page	Dimensions
Letter	Printable area of 8.0 by 10.92 inches, centered on an 8.5 by 11 inch page (0.25 inch margins on left and right and 0.04 inch margins on top and bottom).
Legal	Printable area of 8.0 by 13.5 inches, centered on an 8.5 by 14 inch page (0.25 inch margins on all four sides).
A4	Printable area of 203 by 285 mm, centered on a 210 by 297 mm page.
B5	Printable area of 175 by 248 mm, on a 176 by 250 mm page.

G.1 Changing Paper Size

Each paper size (letter, legal, A4 or B5) must be used with the appropriate paper tray. Each paper tray, when inserted, depresses a unique combination of internal switches which identifies it to the printer. At the beginning of each job, the printer detects the size paper tray installed and sets the page size automatically.

Since the printer judges the paper size by the tray installed, use only the page size the tray was designed to hold. For example, letter-sized paper in a legal-sized tray will not print properly[19].

[19]The page size may be overridden within a PostScript program by using the procedures: **letter**, **legal**, **a4**, or **b5**. See the *PostScript Language Reference Manual* for details.

H Paper Source

Your printer can print automatically from the paper cassette or manually from the manual feed tray. For normal printing use the automatic feed. Envelopes or other special forms (such as sheets of self-adhesive labels and transparencies) must be inserted by hand from the manual feed tray at the rear of the printer (Figure 5).

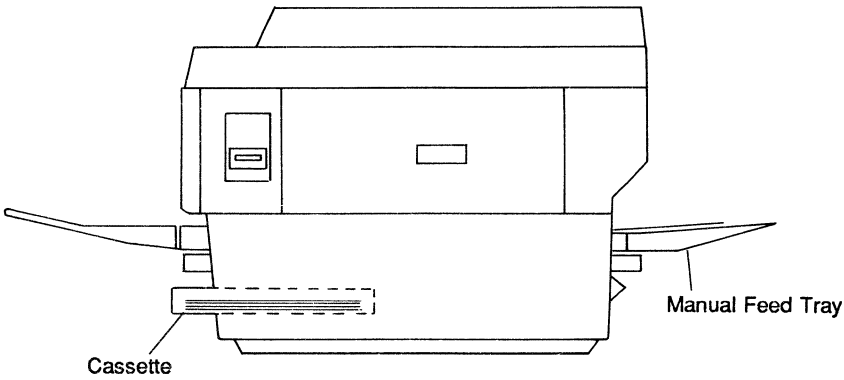


Figure 5: Paper Sources

H.1 The Default: Automatic Paper Feed

The default setting for the paper source is automatic (cassette) paper feed. If you do not wish to use the manual feed function, the printer is properly set.

The cassette feed method allows the paper to be fed automatically to the printer from a cassette paper tray at the front of the printer (refer to Figure 5). The cassette can operate with paper with weights of 16 pound to 21 pound. The tray has a maximum loading depth of .4 inches and holds 100 sheets of 20 pound paper.

H.2 Manual Feed

Manual feed is used to print heavy paper, envelopes, transparency stock, etc. and for overlay and double-sided printing. When in manual feed the printer no longer accepts paper from the paper cassette, but, instead, waits for a sheet of paper to be inserted into the manual feed slot in back[20]. The amber "Paper Out" light comes on and will remain lighted until a sheet is inserted.

In manual feed paper weight can range from 11 pound to 33 pound for single-sided printing, and from 16 pound to 33 pound for double-sided printing.

H.3 Selecting Manual Feed

Configure your QMS-PS 800+ for manual feed operation by sending your printer a file with the following procedure:

1. Send the following program to the printer:

   serverdict begin *password* **exitserver**

   statusdict begin

   /manualfeed true def

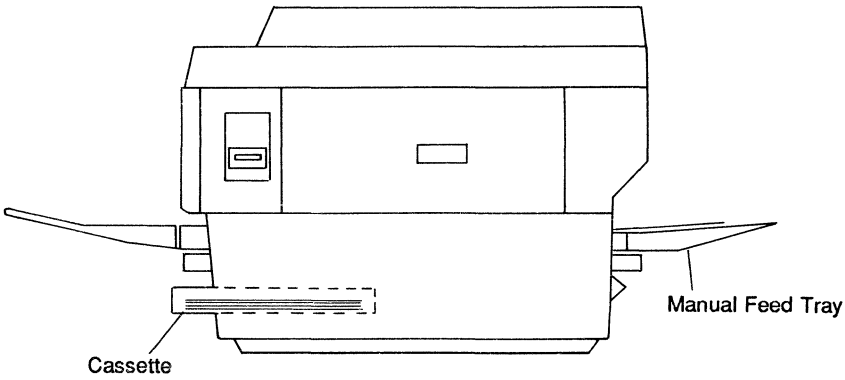
   end

2. Send the file to be printed to the printer.
3. Line up a sheet of paper with the arrow on the manual feed tray with the side of the paper to be printed upon facing up. Insert the sheet into the manual feed slot (Figure 6). The printer will draw the sheet in, running it straight through to the paper tray in front.

[20]The amount of time the QMS-PS 800+ will wait for a sheet of paper to be inserted into its manual feed slot is set by either of two parameters: **setdefaulttimeouts** or **manualfeedtimeout**. If no paper is inserted within the time allotted, a **timeout** error occurs and the current job will be aborted. For information on **setdefaulttimeouts** and **manualfeedtimeout**, see Part V, "PostScript Addendum", Section B.2.13 and Section C.1.3

H Paper Source

Your printer can print automatically from the paper cassette or manually from the manual feed tray. For normal printing use the automatic feed. Envelopes or other special forms (such as sheets of self-adhesive labels and transparencies) must be inserted by hand from the manual feed tray at the rear of the printer (Figure 5).



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   end

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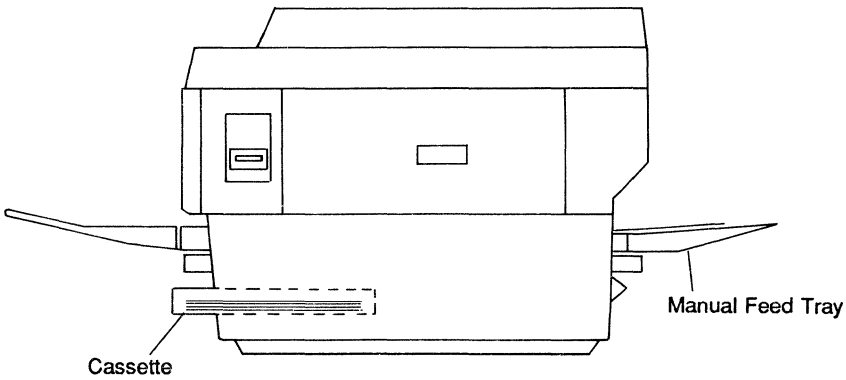

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   statusdict begin

   /manualfeed true def

   end

2. Send the file to be printed to the printer.
3. Line up a sheet of paper with the arrow on the manual feed tray with the side of the paper to be printed upon facing up. Insert the sheet into the manual feed slot (Figure 6). The printer will draw the sheet in, running it straight through to the paper tray in front.

[20]The amount of time the QMS-PS 800+ will wait for a sheet of paper to be inserted into its manual feed slot is set by either of two parameters: **setdefaulttimeouts** or **manualfeedtimeout**. If no paper is inserted within the time allotted, a **timeout** error occurs and the current job will be aborted. For information on **setdefaulttimeouts** and **manualfeedtimeout**, see Part V, "PostScript Addendum", Section B.2.13 and Section C.1.3

H Paper Source

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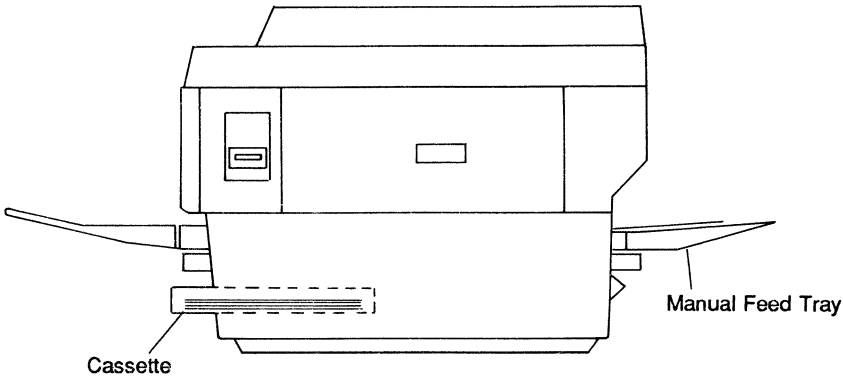

Figure 5: Paper Sources

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The default setting for the paper source is automatic (cassette) paper feed. If you do not wish to use the manual feed function, the printer is properly set.

The cassette feed method allows the paper to be fed automatically to the printer from a cassette paper tray at the front of the printer (refer to Figure 5). The cassette can operate with paper with weights of 16 pound to 21 pound. The tray has a maximum loading depth of .4 inches and holds 100 sheets of 20 pound paper.

H.2 Manual Feed

Manual feed is used to print heavy paper, envelopes, transparency stock, etc. and for overlay and double-sided printing. When in manual feed the printer no longer accepts paper from the paper cassette, but, instead, waits for a sheet of paper to be inserted into the manual feed slot in back[20]. The amber "Paper Out" light comes on and will remain lighted until a sheet is inserted.

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H.3 Selecting Manual Feed

Configure your QMS-PS 800+ for manual feed operation by sending your printer a file with the following procedure:

1. Send the following program to the printer:

   serverdict begin *password* **exitserver**

   statusdict begin

   /manualfeed true def

   end

2. Send the file to be printed to the printer.
3. Line up a sheet of paper with the arrow on the manual feed tray with the side of the paper to be printed upon facing up. Insert the sheet into the manual feed slot (Figure 6). The printer will draw the sheet in, running it straight through to the paper tray in front.

[20]The amount of time the QMS-PS 800+ will wait for a sheet of paper to be inserted into its manual feed slot is set by either of two parameters: **setdefaulttimeouts** or **manualfeedtimeout**. If no paper is inserted within the time allotted, a **timeout** error occurs and the current job will be aborted. For information on **setdefaulttimeouts** and **manualfeedtimeout**, see Part V, "PostScript Addendum", Section B.2.13 and Section C.1.3

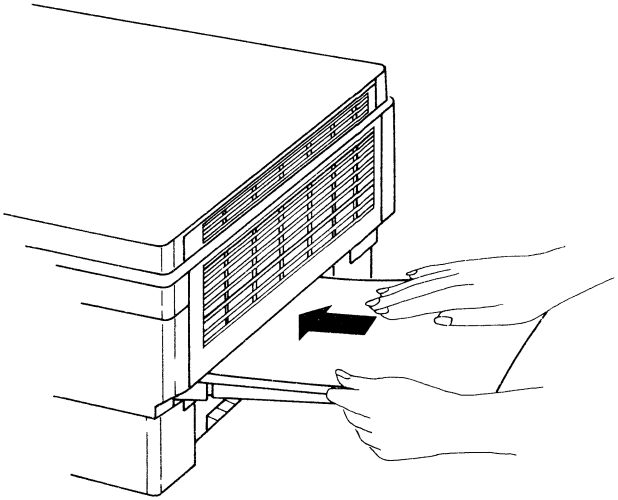
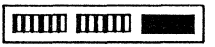
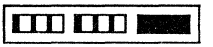
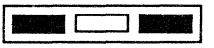
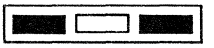
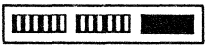


Figure 6: Manually Feeding a Sheet of Paper

4. If your current job produces more than one page, then the amber "Paper Out" light will light again and the printer will wait for another sheet to be inserted into its manual feed slot.

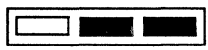
The following table shows the process of printing with manual feed:

Do This:	This Will Result:	Meaning:
Send program to the printer.		Receiving program.
		Ready for file.
Send file to the printer.		Receiving data.
		Ready to feed paper.
Align paper with tray guide.	Feed mechanism will pull sheet into printer.	
		Paper in Motion
		Feed Paper
Continue feeding paper until:		Printing complete.
		Printer ready.

The printer will remain in manual feed until it is powered off or until it is returned to automatic feed. To return the printer to automatic feed send the following program to the printer:

```
serverdict begin password exitserver
statusdict begin
/manualfeed false def
end
```

This will result in the following:

Do This:	This Will Result:	Meaning:
Send program.		Receiving program.
		Printer ready.

H.4 Overlay Printing

To do overlay printing (printing two images on the same side), print the first image and reinsert the paper with the same side up. This will overlay the second image over the first.

H.5 Double-Sided Printing

Double-sided printing is also possible using manual feed. Print the first side and turn the sheet over and reinsert it back into the printer (Figure 5). If the paper curls after the first pass, uncurl it before inserting it back into the printer.

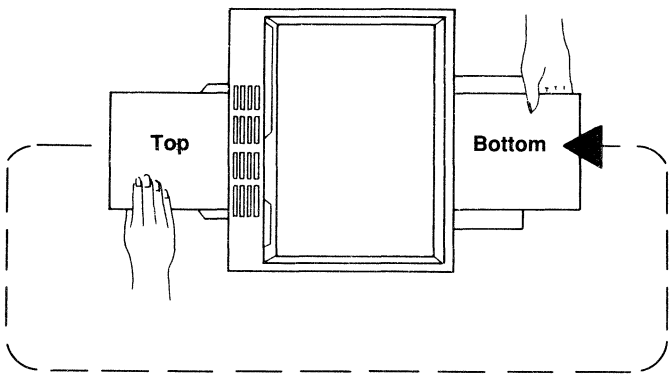


Figure 7: Double-Sided Printing

I Fonts

A **font** is a set of characters in a particular **style** and **size**.

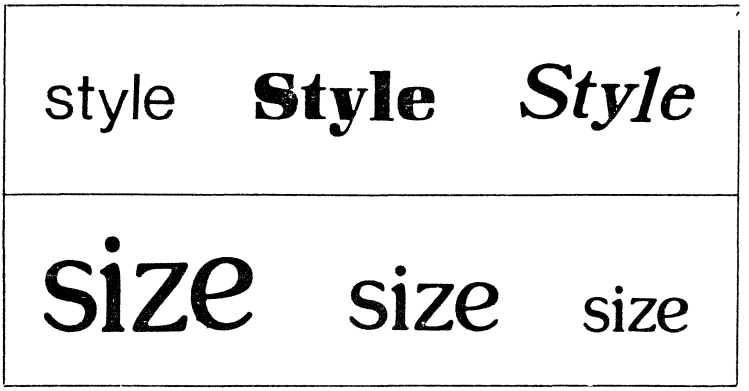


Figure 8: Font Style and Size

I.1 The Fonts

The QMS-PS 800+ has available the following fonts:

Courier

Courier-Bold

Courier-Oblique

Courier-Bold Oblique

Times-Roman

Times-Italic

Times-Bold Italic

Helvetica

Helvetica-Bold

Helvetica-Oblique

Helvetica-Bold Oblique

Helvetica-Narrow

Helvetica-Narrow-Bold

Helvetica-Narrow-Oblique

Helvetica-Narrow BoldOblique

Σψμβολ Σετ (Symbol Set)

Avant Garde-Book

Avant Garde-BookOblique

Avant Garde-Demi

Avant Garde-DemiOblique

Bookman-Demi

Bookman-DemiItalic

Bookman-Light

Bookman-LightItalic

New Century Schoolbook-BoldItalic

New Century Schoolbook-Bold

New Century Schoolbook-Italic

New Century Schoolbook-Roman

Palatino-Roman

Palatino-Bold

Palatino-Italic

Palatino-BoldItalic

Zapf Chancery-MediumItalic

 (Zapf Dingbats)

I.2 Selecting a Font

Fonts are selected by the software package. See the software user's guide for instructions.[21]

J Things You Need To Know...

After you have successfully set up your printer, there are a few things you need to know. Read through each topic and look up the referenced sections when necessary.

J.1 When to Replace the Print Cartridge.

The print cartridge has a color-coded indicator that shows through a window in the right door of the printer. As the print cartridge is used the color changes from green to yellow to red. When the indicator begins to show red, the print cartridge will print about 1,000 more pages (depending on the type printing being done). When printing begins to appear faint, a new print cartridge should be installed.

For more information see the following section in Part III, "Maintenance and Troubleshooting":

Part III, Section A Print Cartridge

[21] Fonts may be selected within a PostScript program by using the font's literal name and the appropriate PostScript operators. See Chapter 5 of the *PostScript Language Tutorial and Cookbook* for details. For a listing of font literal names see Section E.

J.2 Paper Jam

Paper jams, though infrequent, may occur. A paper jam is indicated on the display panel by the amber light over the words "PAPER JAM". Paper jams may be cleared by opening the upper half of the printer and removing any jammed paper from four main areas: (1) the manual feed area; (2) the cassette feed area; (3) the separation/feeder area; and (4) the fixing delivery area. After clearing the jam close the printer and it will resume printing. Paper jams may sometimes be cleared by opening the back door under the manual feed tray.

For complete information and illustrations see the following section in Part III, "Maintenance and Troubleshooting":

Part III, Section C Paper Jams

J.3 Print Quality

Print Quality problems can often be corrected by rotating the print cartridge or installing a new print cartridge. Other problems may require cleaning the corona wires or installing a new fixing assembly cleaner. Only a few situations will require a service call.

For complete information see the following section in Part III, "Maintenance and Troubleshooting":

Part III, Section H.2 Print Quality

K For More Information...

The remainder of this user's guide and reference manual contains more detailed information about the features of your printer and how to utilize them.

Part III, "Maintenance and Troubleshooting" explains maintenance tasks which you can perform. The troubleshooting section lists status codes, error codes, and diagnostic messages. It also discusses common print quality problems and their solutions.

Part IV, "Advanced User's Information" provides more information on the printer and the POSTSCRIPT language for the experienced user.

Part V, "POSTSCRIPT Addendum" is an addendum to the *POSTSCRIPT Language Reference Guide.* It contains printer-specific POSTSCRIPT operators used to change printer parameters.

Appendix A, "Font Information" provides tables which give character locations and widths.

Appendix B, "Printer Specifications" outlines specifications for the printer's optical system, printing system, interface, system memory, and others.

Appendix C, "Diablo Emulation Mode" presents a description of the Diablo Emulation Mode. It lists supported and unsupported commands and explains differences between the Diablo 630 and the emulation.

Appendix D, "Hewlett-Packard LaserJet Plus Emulation Mode" presents a description of the HP LaserJet Emulation Mode. It lists supported and unsupported commands and explains differences between the LaserJet Plus and the emulation.

Appendix E, "Hewlett-Packard 7475 Plotter Emulation Mode" presents a description of the HP 7475 Plotter Emulation Mode. It lists supported and unsupported commands and explains differences between the 7475 Plotter and the emulation.

The **Glossary** lists key terms and gives their definitions.

Part III

Maintenance and Troubleshooting

Introduction

The Maintenance portion of Part III gives the "why," "when," and "how" of basic maintenance. Routine maintenance of your printer helps insure consistent, high-quality printing. The Troubleshooting portion tells you what to do about possible operating problems, and print quality problems.

In Part III you will find:

1. Basic maintenance you can do and how to do it.
2. Step-by-Step instructions for clearing a paper jam.
3. A discussion of print quality problems and how they may be corrected.

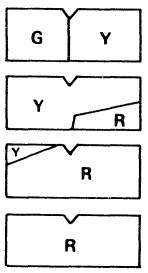
The instructions in Part III will refer to parts of the printer and will assume that you know how to raise the upper half of the printer, open the right side door and remove or insert a print cartridge. This information is explained with illustrations in Part I, "Getting Started".

A Print Cartridge

Because the printer uses a dry toner print cartridge, toner is never added. When the old print cartridge is used up, remove the entire cartridge and install a new one.

A.1 When to Replace the Print Cartridge

The print cartridge has a color-coded indicator that shows through a window in the right door of the printer. This indicator, which is green on a new cartridge, changes from green to yellow to red as the cartridge is used. Another print cartridge should be ordered when the indicator begins to show red. At this time about 2,000 copies have been printed with about 1,000 more copies remaining (depending on the type of printing being done. See Figure 1 for a comparison of indicator color and number of copies printed.



Printing Capacity Indicator	Number of prints (approx.)	Meaning
	1,700	
	2,000	A new EP cartridge should be ordered.
	2,800	
	3,000	Replace the EP cartridge.

G: Green
R: Red
Y: Yellow

Figure 1: Cartridge-Life Indicator

White stripes and faint areas on the printed page mean the toner in the print cartridge is low or that it needs to be redistributed. (See Section A.2). If faint areas occur after the color indicator turns red, it is best to install a new print cartridge.

A.2 How to Replace the Print Cartridge

1. To access the print cartridge, open the right side door of the printer as explained in Part 1, "Getting Started".

2. Remove the old print cartridge and discard it. Hold the cartridge as level as possible in order to avoid spilling toner.

3. Distribute the toner in the new print cartridge by holding it horizontally and rotating it at 45-degree angles several times.

4. Insert the print cartridge and pull the black tab to remove the sealing tapes. For details, cautions and illustrations, see the instructions included with the print cartridge.

5. Replace the fixing assembly cleaner (see Section D).

A.3 Storing/Handling Cartridges

The print cartridge is affected by its environment, even if its seal is still intact. When the cartridge is installed in the printer, it continues to be affected by the environment whether it is in use or not.

The expiration date of the print cartridge is specified on the cartridge box. A cartridge more than two and one-half years old may give you poor print quality.

Storage Suggestions

1. The temperature should be between 32 and 104 degrees Fahrenheit.
2. Relative humidity should be between 35 and 85 percent.
3. Atmospheric pressure should be between 0.6 and 1.0 atmospheres (460 to 760 millimeters of mercury).
4. Avoid direct sunlight even if the cartridge is still in its storage box.
5. Avoid dusty locations and areas exposed to ammonia gas or organic solvent vapors.
6. Always store the cartridge boxes flat.

Handling Suggestions

1. Avoid standing the cartridge on its end, inverting it, or handling it roughly (toner can be difficult to remove from clothing).
2. Avoid touching the surface of the drum. If the surface of the drum becomes dirty, wipe it clean with a piece of flannel that has been liberally sprinkled with toner **ONLY**.

Normal room light, measured a few yards from a window on an average day, is about 1500 lux. Do not expose the photosensitive drum to light of this intensity for more than 5 minutes. The cartridge can be stored in a dark place to "recuperate" from overexposure to sunlight; however, exposure to direct sunlight (10,000 to 30,000 lux) can ruin the drum.

B Paper

Paper in the printer passes through four main areas (Figure 2): (1) the manual feed area, (2) the cassette feed area, (3) the separation/feeder area, and (4) the fixing/delivery area.

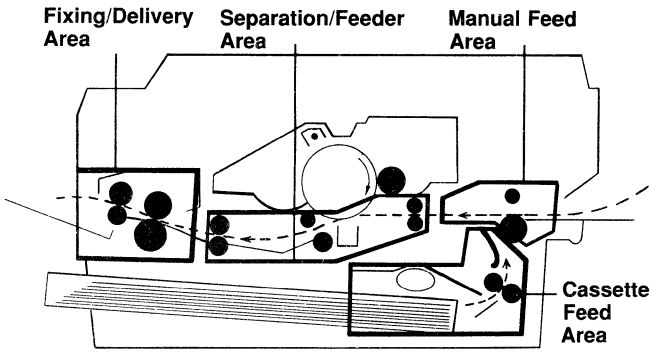


Figure 2: Paper Path

C Clearing a Paper Jam

When a paper jam occurs, the amber light above the words "PAPER JAM" on the display window lights. (see Part II, "Tutorial", Section A). Frequent jams in any area indicate that the area should be checked and either repaired or cleaned. Clear paper jams as follows:

1. Open the upper half of the printer.
2. Remove any jammed paper from the separation/feeder area (Figure 3).

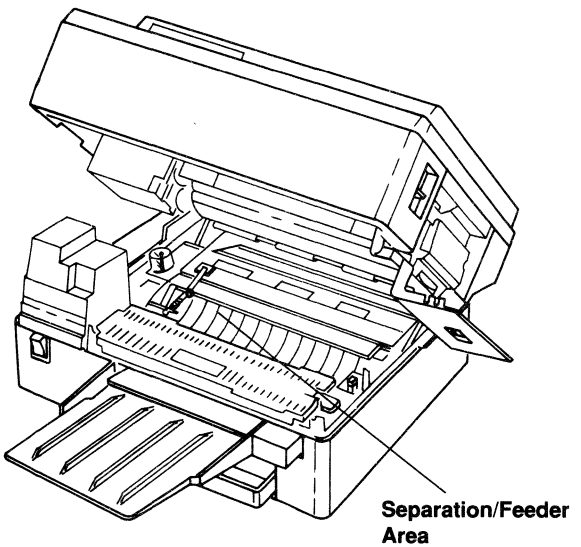


Figure 3: Separation/Feeder Area

3. Open the rear door (Figure 4) and remove any jammed paper there.

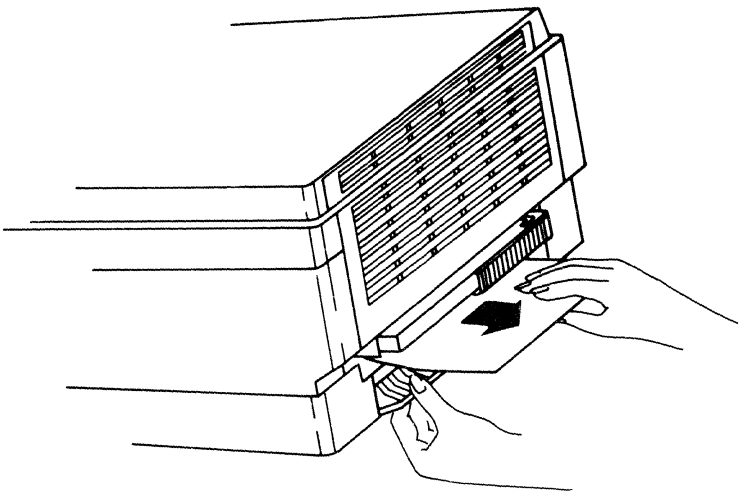


Figure 4: Rear Door

4. If the paper jam has not been cleared, as a last resort check for the jam under the green fixing assembly cover (Figure 5). **Be careful; it may be hot.**

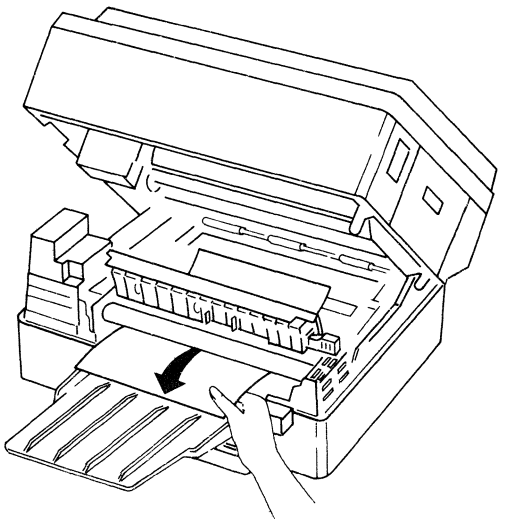


Figure 5: The Fixing Assembly Area

5. Close the upper half of the printer after the paper jam is cleared. The page that was being printed when the jam occurred will be reprinted (unless the printer is in manual feed).

B.2 Paper Storage

The manner in which your paper is stored can make a big difference in print quality and printer operation. Improperly stored paper increases the chance of paper jams during printing and can drastically affect the appearance of your printed pages. Keep paper in good condition by storing it:

1. in its wrapper,
2. on a flat surface,
3. in a closed cabinet, and
4. in a cool dry area.

Do not leave paper unwrapped or in a place where it can be damaged by dampness or heat.

C Fixing Assembly Cleaner

The fixing assembly cleaner is a long plastic stick with a felt pad along its length. This pad is used to keep the fixing roller clean. It should be replaced whenever the print cartridge is replaced.

C.1 Replacing the Fixing Assembly Cleaner

1. Raise the upper half of the printer. Lift the green fixing assembly cover using the extended lip on the right front.

2. The fixing assembly cleaner is in a groove in the cover. Grasp the cleaner by the green felt-covered extension and slide it out. Throw the old cleaner away. Avoid touching the felt which covers the stick.
3. For details, cautions and illustrations, see the instructions included with the print cartridge.
4. Clean the fixing roller as described in Section D.2.

C.2 Cleaning the Fixing Roller

The fixing roller is located under the fixing assembly cover. Because toner collects across the top of the roller, it should be cleaned when replacing the fixing assembly cleaner. **This area may be hot if the printer has been recently used.**

1. Turn the power switch off.
2. Clean the fixing roller with a damp (not wet) cloth after the printer has cooled down.
3. Close the fixing assembly cover before lowering the upper half of the printer.

D Corona Wires

There are two wires which require cleaning from time to time, the primary corona wire and the transfer corona wire.

E.1 Cleaning the Primary Corona Wire

1. Lift up the upper half of the printer, open the right door, and remove the print cartridge. Locate the wire cleaner stored inside the printer toward the right front. (See Part 1, "Getting Started")

2. The primary corona wire is located in the top side of the print cartridge and is labeled "Corona Wire." A thin plastic shield protects the wire.

3. Insert the wire cleaner into the long slot of the print cartridge (Figure 6). The plastic shield gives way to allow the wire cleaner to reach the primary corona wire inside.

4. Move the wire cleaner back and forth to clean the primary corona wire.

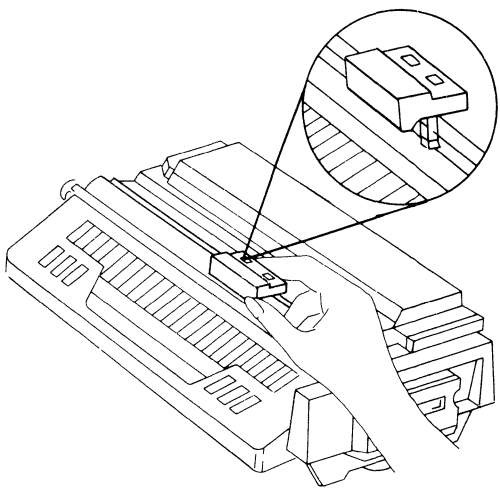


Figure 6: Cleaning the Primary Corona Wire

E.2 Cleaning the Transfer Corona Wire

1. The transfer corona wire is located in the lower half of the printer. This very fine wire is hard to see against the chrome background.

2. Use a cotton swab (provided with the print cartridge) to gently clean the transfer corona wire (Figure 7). It may be helpful to dip the swab in alcohol if there is a stubborn spot on the wire.

3. After cleaning, close the upper half of the printer.

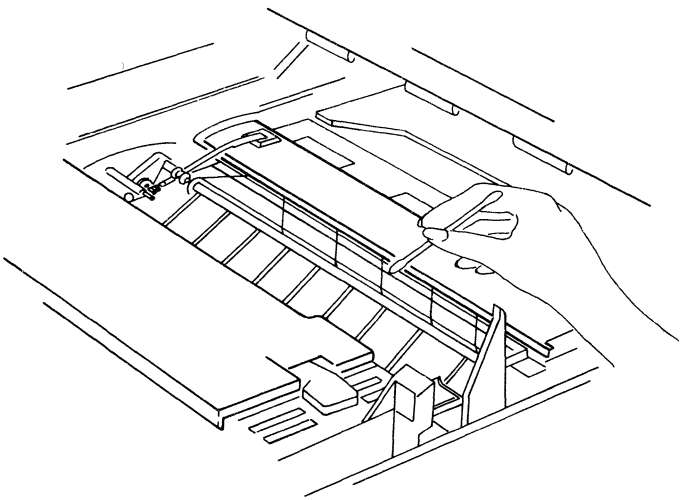


Figure 7: Cleaning the Transfer Corona Wire

F Cleaning the Transfer Guide

The transfer guide is the brass-colored area toward the back of the inside the printer. Paper dust collects in this area.

1. Raise the upper half of the printer.

2. Moisten a cloth and wipe the transfer guide clean (Figure 8).

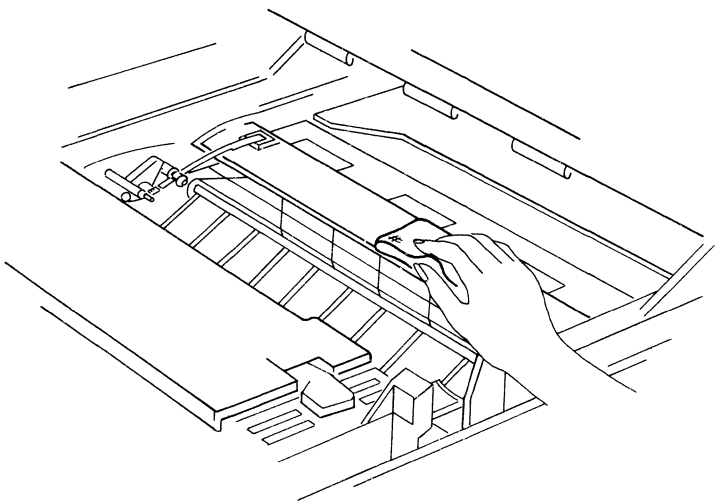


Figure 8: Cleaning the Transfer Guide

F The Separation Belt

The separation belt is a thin plastic strip that has a plastic loop on one end and a metal loop on the other. This belt helps guide paper through your printer. It should be cleaned occasionally.

F.1 Cleaning the Separation Belt

When a black line appears on the right edge of the printed page, the separation belt probably needs to be cleaned.

1. Raise the upper half of the printer. Locate the separation belt using Figure 9 as a guide.

2. If there is any residue on the belt, clean it with a cotton swab or soft cloth.

F.2 Replacing the Separation Belt

The separation belt lasts for about 50,000 pages. If the belt breaks, there is a spare belt located beside the wire cleaner. You can replace it as follows:

1. Open loop A on the separation belt with a screwdriver (Figure 9).

2. Remove the old belt by sliding loop A from its hanger and unhooking loop B from the spring suspender.

3. Hang loop A of the new belt from the right side of the upper transfer guide. The indentation on the belt should be on the right.

4. Pass the separation belt over the transfer roller and under the separation pinch roller (Figure 9).

5. Hook loop B to the underside of the spring suspension side of the spring suspender.

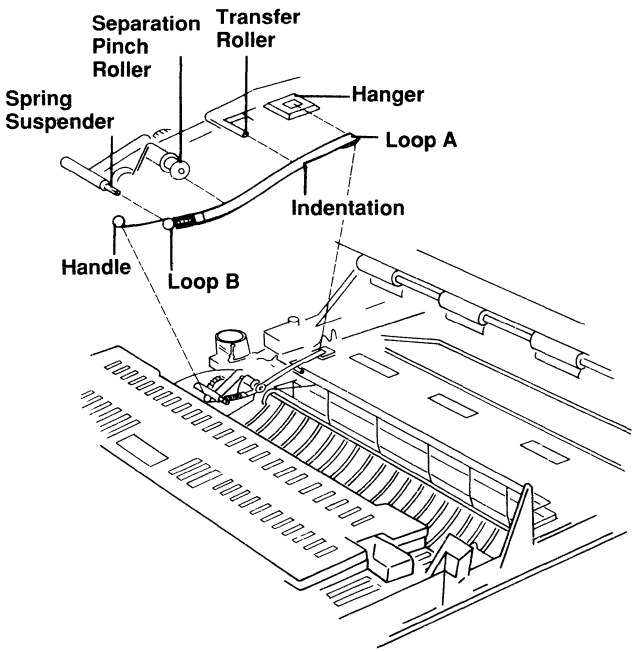


Figure 9: The Separation Belt

G *Troubleshooting*

This section deals with problems and their solutions. It includes the display panel lights and print quality.

G.1 Display Panel Lights

The following problems or conditions are indicated by the lights on the Display Panel:

Status	Display
No Paper	If the amber "Active/Paper Out" light is on continuously, the paper tray is empty (or absent), or the printer is in manual feed mode waiting for a sheet of paper to be inserted. See Part I, "Getting Started", Section B.6 for instructions for replacing paper. See Part II, "Tutorial", Section H.2 for manual feed.
Paper Jam	If the **amber** "Paper Jam" light is **on**, a sheet of paper has failed to feed from the paper tray or has jammed in the printer. The jam may be cleared by releasing the top of the printer and removing the paper. It is not necessary to turn power off while doing this. See Section C.
Printer Failure	If the power is on but the green, and both amber lights are all off, the printer mechanism or electronics have suffered a failure requiring manual intervention and possibly a service call. **A common cause of this indication is failure to insert a toner cartridge.**

G.2 Print Quality Problems

Below are listed several print quality problems with possible solutions. Try the solutions in the sequence given. If the solutions listed do not solve the problem, place a service call.

- **White or Light Lines**

  1. Remove the print cartridge and rotate it as you do before installing a new cartridge. This redistributes the toner inside the print cartridge.
  2. Install a new print cartridge.

- **Light Image** (entire page)

  1. Increase the print density by using the print density adjustment dial on the left side of the printer.
  2. Remove the print cartridge and rotate it as you would when installing a new cartridge. This redistributes the toner inside the print cartridge.
  3. If the cartridge indicator is red, install a new print cartridge. If it is not red, make sure the sealing tape is properly removed from the cartridge.

- **Dark Image** (entire page)

  1. Decrease the print density by using the print density adjustment dial on the left side of the printer.
  2. Remove the print cartridge and rotate it as you would when installing a new cartridge. This redistributes the toner inside the print cartridge.
  3. Install a new print cartridge.

- **Blank Print**

  1. Increase the print density by using the print density adjustment dial on the left side of the printer.

2. Remove the print cartridge and rotate it as you do before installing a new cartridge. This redistributes the toner inside the print cartridge.
3. If the cartridge indicator is red, replace the cartridge. If it is not red, make sure the sealing tapes are properly removed from the cartridge.
4. Place a service call (see the end of this section).

- **Black Image** (entire page)

1. Remove the print cartridge and rotate it as you would when installing a new cartridge. This redistributes the toner inside the print cartridge.
2. Install a new print cartridge.

- **Stain Along Right Edge of Page**

1. Clean the separation belt (see Section G.1).
2. Install a new print cartridge.

- **Stains On Back of Page**

1. Clean the area around the manual paper feed slot at the rear of the printer with a damp cloth. Dry the area.
2. Clean the corona wires and the surrounding area (see Sections E.1 and E.2). Emphasize cleaning the underside of the print cartridge.
3. Inspect the fixing assembly cleaner. If it is dirty, replace it (see Section D.1).

- **Dark Vertical Lines** (in direction of paper feed)

1. Inspect the fixing assembly cleaner. If it is dirty, replace it (see Section D.1).
2. Install a new print cartridge.

- **Sharp Horizontal Black Lines** (across feed direction)

  1. Place a service call.

- **Blurred Horizontal Stripes**

  1. Remove the print cartridge and rotate it as you do before installing a new cartridge. This redistributes the toner inside the print cartridge.
  2. Install a new print cartridge.

- **Blurred Vertical Stripes**

  1. Clean the primary corona wire (see Section E.1).
  2. Install a new print cartridge.

- **White Horizontal Shapes on a Black Print**

  1. Replace the paper in the printer with dry paper.

- **White Vertical Lines on a Black Page**

  1. Remove the print cartridge and rotate it as you would when installing a new cartridge. This redistributes the toner inside the print cartridge.
  2. If the cartridge indicator is red, install a new cartridge. If it is not red, inspect the fixing assembly cleaner. Replace a dirty fixing assembly cleaner (see Section D.1).

- **Image Easily Smears When Rubbed**

  1. Place a service call.

H Placing A Service Call

If you have a problem that you can't resolve, please contact your dealer or distributor. Your dealer/distributor is best equipped to immediately handle any problem that you may encounter. Be prepared to provide a complete description of the problem, a start-up test page and sample printouts if available.

Part IV

Advanced User's Information

Introduction

This part of the user's guide provides the more advanced user with useful and interesting technical information. Knowledge of this information is not a prerequisite to operate the QMS-PS 800+ printer.

A The Printer

The QMS-PS 800+ is a compact laser printer consisting of two parts, the **print engine** and the **controller**.

The print engine (the main printer body) is a laser printer with horizontal and vertical resolutions of 300 dots per inch, and a maximum printing speed of 8.1 pages per minute.

The controller (the top lid of the printer which houses the POSTSCRIPT software) contains a single board built around a MC68000 microprocessor. This board has 2 Megabytes of RAM (Random Access Memory) and 1 Megabyte of ROM (Read Only Memory).

The QMS-PS 800+ is designed for users of POSTSCRIPT, a page description language that is becoming a printing standard for raster printers. POSTSCRIPT allows you to combine text, graphics, and scanned images on a page at any scale or rotation. The QMS-PS 800+ utilizes the full power of POSTSCRIPT and produces high quality output.

A.1 The Controller

The controller executes POSTSCRIPT programs sent to it from the host computer. During normal operation, the controller cycles through the following sequence of steps:

- First, it sets up a clean **virtual memory**. This means it prepares a new working environment for the next **job** it is about to receive. (Note: Throughout this manual, the term "job" will refer to a POSTSCRIPT program).
- Then it executes the job by interpreting the POSTSCRIPT data which it receives from the host computer as an input file.
- When it encounters an end-of-file indicator (which marks the end of the job) or an error occurs, the printer cleans up after the current job and restores the virtual memory to its initial state in preparation for the next job.

Ordinarily, each job is executed solely for the purpose of generating printed pages. However, under certain conditions, a job may change some permanent parameters in the printer itself, or may perform some computation whose results are sent back to the host computer.

POSTSCRIPT data sent to the QMS-PS 800+ is first scanned by the POSTSCRIPT software which determines the printing/graphic operation to perform. This information is then processed into a bit-mapped image which is formatted and stored into page memory. Printing can now take place. The printer reads the image information from page memory, serializes it, and sends it to the print engine via a high-speed video interface.

A.2 The Print Engine

Once in the print engine, the video data is used to modulate a tightly focused beam of light produced by a semiconductor laser. This laser beam is directed to a rotating, hexagonal mirror which causes the beam to scan across a photosensitive print drum. Each scan results in a raster line on the print drum. The raster lines are transferred from the print drum to the paper by electrostatic attraction and heated-roller fusion. The result is a high-quality, smudge-proof image on standard copier paper.

B Serial Communication

Serial communication is asynchronous, start-stop, with 8 data bits per character (of which the eighth bit may or may not be used for parity), one start bit, and two stop bits.

B.1 The Communication Channels

The QMS-PS 800+ is equipped with two bidirectional communication ports:

1. 25-pin RS-232 serial I/O connector.

2. 9-pin RS-422 serial I/O connector (AppleTalk compatible).

These channels are selected with the mode switch on the printer. The procedure to do this is explained in Part II "Tutorial", Section E.4.

B.2 Pin Assignments

The signal pin assignments for the 9-pin (RS-422) connector are:

1,3	Signal Ground
4	Transmit Data +
5	Transmit Data -
8	Receive Data +
9	Receive Data -

The assignments for the 25-pin (RS-232) connector are:

2	Transmit Data
3	Receive Data
4	Request To Send (optional)
6	Data Set Ready (optional)
7	Signal Ground
20	Data Terminal Ready (optional)

The pins marked "optional" only need to be used if your host computer requires them or if you are using DTR flow control. The remaining pins are not used.

B.3 Connecting to the Host

Technically, the QMS-PS 800+ has a DTE type of RS-232 interface. This means that you can connect your printer directly to the communication port of your host computer with no signal reversals required. However, connecting your printer to a stand-alone terminal or IBM PC requires a "null modem" cable. A null modem cable reverses the Transmit Data and Receive Data signals (i.e. switches pins 2 and 3), as well as the Data Terminal Ready and Data Set Ready signals if used.

These are the pin assignments for such a null modem for using DTR and an IBM-PC AT or XT (or compatibles).

XT	AT	Controller
1		1
3	2	2
2	3	3
5		4
4		5
20		6
7	5	7
20		8
		9
		10
6,8	6,8	20

C Protocols

The QMS-PS 800+ uses one of two conventions for controlling the flow of characters between itself and the host computer (in both directions). These conventions are the **XON/XOFF** and the **DTR** flow control protocols. The choice of protocol is controlled with the *options* parameter of the **setsccbatch** or **setsccinteractive** operators[1]. The default is XON/XOFF flow control.

XON/XOFF flow control makes use of two special characters, called **XON** and **XOFF**. These are sent back and forth between the printer and host computer as a means of controlling the flow of data.

DTR flow control makes use of a control signal, **Data Terminal Ready**, to control the flow of data. (DTR can only be used through the 25-pin connector).

[1]See Section D.2 and Part II, "Tutorial", Section E.5.

In order to communicate, the printer must be expecting the protocol which the host computer is using. Choose the appropiate number for the *options* parameter of **setsccbatch** or **setsccinteractive** to ensure that the two are using the same protocol. Failure of the host computer to conform to the selected flow control protocol may result in unexpected occurrences of **ioerror** (an input/output error), caused by the overflow of the printer's input buffer.

There are also several character codes that are reserved for simple communication protocol. Some of these may be useful at times. For example, **Control-C** causes the current job to be interrupted; **Control-D** marks the end of the file; and **Control-T** causes the printer to send the host computer a one-line status message. A complete listing of these character codes is as follows (The ASCII character codes are given in decimal.):

Character	*Code*	*Function*
Control-C	3	Interrupt: causes execution of the PostScript **interrupt** error (see Chapter 6 of the *PostScript Language Reference Manual*)
Control-D	4	End-of-file
Control-S	19	Stop output (XOFF flow control) - only if XON/XOFF flow control is in use
Control-Q	17	Start output (XON flow control) - 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 it is doing (see Section F)
Return	13	End-of-line: translated to the PostScript **newline** character
Line-feed	10	End-of-line: this is the PostScript **newline** character (see Section 3.3 of the *PostScript Language Reference Manual*). If a return and a line-feed are received in sequence, only one newline character is passed to the PostScript interpreter. When a newline character is written to the standard output file, it is translated to the two-character sequence return, line-feed.

There is no way to "quote" the reserved characters (to pass them through to the printer's software), nor is there any way to transmit characters in the "high ASCII" range (128 to 255) when using parity settings 0, 1, and 2, as these cause the high-order bit of each character to be ignored or used for parity. Thus, the serial link is not a fully transparent channel. However, this causes no difficulty in normal operation since the standard POSTSCRIPT character set consists entirely of printable characters (see

section 6 of the *POSTSCRIPT Language Reference Manual*). The language itself provides means for encoding arbitrary characters in strings (the \nnn escape sequence). True binary data, such as images and encrypted programs, are transmitted in hexadecimal.

C.1 AppleTalk

Before connecting the printer to an AppleTalk network, you should first turn the printer off and then set the four-position switch to "3". **Never operate a QMS-PS 800+ connected to AppleTalk with the switch set to anything but "3".** Failure to heed this precaution may leave the machine in an inoperable state or even bring down the entire network.

Connecting the printer to an AppleTalk network requires that you use an AppleTalk connection box with a 9-pin plug. A connection box with a 25-pin plug will not work, even though the printer has a 25-pin socket.

While the QMS-PS 800+ is attached to AppleTalk, it listens for a connection request from an AppleTalk host. When it "hears" a request, it uses that connection to receive a POSTSCRIPT file to execute. Any error messages that occur are sent back to the host over the same connection. Data is carried transparently in both directions; that is, there are no character codes reserved for AppleTalk communication functions.

The AppleTalk protocol defines an end-of-file indication. When the printer reaches an end-of-file, it sends a matching end-of-file indication back to the host, ends the current job, and begins a new one. Several files may be sent in sequence over a single AppleTalk connection.

While the printer is busy with one connection, it refuses any additional connection requests. This causes the requesting host computers to queue up and wait for the printer to become free. At that time, the printer accepts the request from the host computer that has waited the longest.

A QMS-PS 800+ is identified by a three-part name constructed according to the Name Binding Protocol. The first or *object* part is the printer's individual name, which is initially "QMS-PS 800+" but may be set to any other value by means of the **setprintername** operator[2]. The second or *type* part is always "LaserWriter"[3], and the third or *zone* part is unspecified.

It is possible to connect more than one QMS-PS 800+ to the same AppleTalk network. If an additional machine has the same name as an existing one, it will automatically choose a new name to resolve the conflict.

D Interactive Mode

The interactive mode allows you to interact with the printer from a terminal and use it as a general-purpose computer. In this mode, you type in a POSTSCRIPT statement in response to a prompt. The printer immediately executes the statement and then prompts again for the next. While you are entering in a statement, the printer **echoes** characters (i.e. the printer allows you to see the characters on the terminal screen) and provides some limited means for making corrections. This can be very useful to a new user as it allows experimentation with instantaneous feed-back.

D.1 Using the Interactive Mode

A terminal with a standard RS-232 interface can be connected directly to the printer, usually via its 25-pin connector. When making this connection, one must generally use a "null modem" or "modem eliminator" that reverses the Transmit Data and Receive Data signals (see Section B.3). In place of a terminal, one can use a per-

[2]See Part V, "PostScript Addendum", Section B.2.3

[3]The reason for this is that the Macintosh Print Manager assumes that all PostScript printers are of the type "LaserWriter".

sonal computer running terminal emulation software. For example, a Macintosh running MacTerminal can be connected to the printer's 9-pin connector using an Apple Modem cable or to its 25-pin connector using an Apple ImageWriter cable.

There are two ways to put the QMS-PS 800+ into interactive mode. One way is to select either of the batch mode switch positions ("0" or "1"), making sure the attached terminal is set to the correct baud rate and parity, and then invoking the POSTSCRIPT procedure named **executive**. That is, type "executive" followed by return or line-feed. (Since the printer is in batch mode, the characters you type are not echoed back to you.) Once you do this, a POSTSCRIPT herald and prompt should appear:

```
POSTSCRIPT (TM) version 46.1
Copyright (c) 1986 Adobe Systems Incorporated.
PS>
```

Each time the printer prints the PS> prompt, it is waiting for you to enter a complete POSTSCRIPT statement followed by return or line-feed. It then executes that statement and prints another PS> prompt.

While you are typing, the printer echoes the characters you type (i.e., sends them back to the terminal, so you can see them). You can use the following special characters to make corrections while entering a statement:

Backspace (control-H)	backs up and erases one character
Delete (rubout)	same as backspace
Control-U	erases the current line
Control-R	re-displays the current line
Control-C	aborts the entire statement and starts over

Interactive mode continues until you type control-D (the serial end-of-file character), execute the POSTSCRIPT **quit** operator, or change the mode number. Execution of **stop** (due to an error or control-C interrupt) does not terminate the job but simply aborts the statement currently being executed and prompts for a new one.

By changing a system parameter through the POSTSCRIPT operator **seteescratch**, you can redefine the meaning of the "2" switch position so that selecting it invokes interactive instead of emulation mode.

D.2 Changing setsccbatch

Interactive mode may be used to change the default parameters of the serial channel. This is done by invoking the POSTSCRIPT operator **setsccbatch**[4], which determines the baud rate, parity sense, and choice of flow control protocol used when the mode switch is set to "1"[5]. The default parameters for switch position "1" are 9600 baud, parity ignored, and XON/XOFF flow control. If these parameters are compatible with the system, then you are configured to print. If you need to change these default parameters, follow the procedure described below.

In Interactive mode, you set parameters while engaged in a dialogue with the POSTSCRIPT interpreter. This allows you to quickly check the current values of any operator and to instantly change it.

The procedure to gain access into **statusdict** and permanently change the parameters of the **setsccbatch** operator is as follows:

---

[4]See Part II, "Tutorial", Section E.5 and Part V, "PostScript Addendum", Section B.2.5 for more information on setsccbatch operator

[5]See Part II, "Tutorial", Section E.4.

1. Ensure that both the printer and the terminal are set to the same baud rate and parity. There are two ways to do this:

   (a) Switch the QMS-PS 800+ off and on. The resulting start-up page will tell you the baud rate of the current channel. Set the terminal or PC to the same baud rate and parity.

   OR

   (b) Set the four-position switch to "0". This will set the 25-pin serial channel to 1200 baud, parity ignored. Set up the terminal or PC to the same.

2. Connect a serial cable from the communication port on the PC or terminal to the 25-pin port on the left side of the QMS-PS 800+'s controller. More than likely, a "null modem" cable will need to be interposed somewhere in the connection.

3. Type in "**executive**" (all lower-case letters) at the terminal. press return. Immediately after this, a POSTSCRIPT prompt should appear:

   ```
   POSTSCRIPT (TM) version 46.1
   Copyright (C) 1986 Adobe Systems Incorporated
   PS>
   ```

4. At the "**PS>**" prompt type in:

   serverdict begin 0 exitserver

   press return. This command allows you to make permanent changes to the POSTSCRIPT operators. (Note: characters are normally not echoed back to the screen after keying in this command. However, typing in "executive" immediately after this command returns you to the POSTSCRIPT prompt and all subsequent characters will be echoed to the screen.).

5. Next, call up the **statusdict** dictionary. Do this by typing in:

   statusdict begin.

   press return.

6. Now you can change the parameters of the **setsccbatch** operator. To set the parameters, follow this formula:

   channel baud options **setsccbatch**

   Channel is either "9" for 9-pin or "25" for 25-pin. The integer typed in for *options* determines the parity sense and choice of protocol (see Part II, "Tutorial", Section E.5). All of these parameters determine the state of the serial channel when the four-position switch is set to "1". Thus typing in:

   25 9600 2 setsccbatch

   sets the 25-pin channel to 9600 baud with even parity and XON/XOFF flow control when the four-position switch is set to "1".

   (Note: once again, characters will not be echoed to the screen.)

7. Finally, set the four-position switch to "1". Now the 25-pin serial channel will have the same parameters that you just set through the **setsccbatch** operator.

This same procedure for establishing the parameters of **setsccbatch** can be used to permanently change the parameters of any of the other POSTSCRIPT operators. These can be found in Part V, "POSTSCRIPT Addendum". They include **setmargins**, which adjusts the printer margins, and **setdefaulttimeouts**, which establishes the default values for the three timeouts[6].

There are other operators which simply return the pa-

[6]See Part V, "PostScript Addendum", Section B.2.11 and Section B.2.13.

rameter values of the operators listed in the previous paragraph. It is not necessary to exit the server's normal state (step 4 of the procedure above) in order to invoke these operators. It is necessary, however, to call up the **statusdict** dictionary (step 5). To view the returned values on the terminal screen, type in **stack** after invoking the operator.

While the interactive mode gives you more control over changing parameters, there is an alternative, quicker way of changing parameters through the usual batch mode. This is done by sending the QMS-PS 800+ a batch file with the appropriate commands. You must, of course, already have communication established with the printer before a file can be sent.

The batch file should contain the following commands in order to permanently change the parameters of the **setsccbatch** operator:

```
serverdict begin 0 exitserver
statusdict begin
25 9600 2 setsccbatch
end
```

This, once again, sets the 25-pin channel to 9600 baud, even parity, and XON/XOFF flow control when the four-position switch is set to "1".

E Fonts

The following are the literal names for the QMS-PS 800+ fonts[7]:

Courier
Courier-Bold
Courier-Oblique
Courier-BoldOblique
Times-Roman
Times-Bold
Times-Italic
Time-BoldItalic
Helvetica
Helvetica-Bold
Helvetica-Oblique
Helvetica-BoldOblique
Symbol
AvantGarde-Book
AvantGarde-BookOblique
AvantGarde-Demi
AvantGarde-DemiObique
Bookman-Demi
Bookman-DemiItalic
Bookman-Light
Bookman-LightItalic
Helvetica-Narrow
Helvetica-Narrow-Bold
Helvetica-Narrow-BoldOblique
Helvetica-Narrow-Oblique
NewCenturySchlbk-Roman
NewCenturySchlbk-Bold
NewCenturySchlbk-Italic
NewCenturySchlbk-BoldItalic
Palatino-Roman
Palatino-Bold
Palatino-Italic
Palatino-BoldItalic
ZapfChancery-MediumItalic
ZapfDingbats

F Status Queries and Spontaneous Messages

The printer has a status query facility that provides you details on what it is doing. This facility is intended primarily to allow "spoolers" (printer control programs) to keep track of the activities of a QMS-PS 800+ under their control.

[7] See Chapter 5 of the *PostScript Language Tutorial and Cookbook* for information on specifying fonts in PostScript Programs.

The status query mechanism works differently depending on whether AppleTalk or serial communication is in use, but the syntax and semantics of the response are the same in either case.

In the case of AppleTalk, a request to open a connection to a busy QMS-PS 800+ yields a rejection packet whose data consists of a status message.

In the case of serial communication, when the printer receives a **Control-T** over either serial channel, it sends a one-line status message back to the host over the same channel. This channel does not have to be the same one from which the printer is receiving its current file. The message is bracketed by the text sequences "%%[" and "]%%" to enable the host computer to extract the message from ordinary data generated by the file being executed.

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

```
%%[job: Fred's Memo; status: busy; source:
    serial 9]%%
```

The possible keys, values, and meanings of the various fields are as follows:

Job	the name of the job (PostScript file), as stored in the **jobname** entry in **statusdict** (described in the *Addendum to PostScript Programming Manual*). This field is omitted if the current job has not defined **jobname**.
Status	what the QMS-PS 800+ is currently doing: "idle" (no job in progress), "busy" (executing user's PostScript program), "waiting" (I/O wait in mid-job), "printing" (paper in motion), "PrinterError: reason" (no paper, jam, etc.), "initializing" (during startup), "printing test page".
Source	"serial 9", "serial 25", or "AppleTalk" – the source of the job that the printer is currently executing. This field is omitted if the server is idle.

All messages generated spontaneously by the printer conform to the same syntax as the status messages. These are:

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

An error has been detected by the POSTSCRIPT software and the standard error handler (**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. See the *POSTSCRIPT Language Reference Manual* for more information about error handling.

%%[PrinterError: reason]%%

A problem has been reported by the printer mechanism; the nature of the problem is detailed by *reason* (no paper, no paper tray, jam, cover open, etc.) A printer error can only occur when the printer is actually trying to print a page, i.e., during execution of a **showpage** or **copypage**. After generating this message, the printer usually waits for the condition to be corrected and then continues automatically. (The printer's behavior upon encountering a

printer error is controlled by the **printererror** procedure defined in **statusdict**; see Part V, "POSTSCRIPT Addendum", Section C.1.7.)

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

Due to a previous error or other abort condition (e.g., **stop** or control-C interrupt), the remainder of the current job is being discarded. The printer reads and discards characters from the standard input file until it receives an end-of-file indication (control-D).

%%[exitserver: permanent state may be changed]%%

The POSTSCRIPT program has successfully exited from the printer's normal **save/restore** context and may now make permanent changes to system parameters or to the VM (see Part V, "POSTSCRIPT Addendum").

G Timeouts

The POSTSCRIPT software in the printer contains operators which limit the amount of time that the printer will remain in various states of operation. These are the three **timeouts**:

- The **job** timeout
- The **manualfeed** timeout
- The **wait** timeout

At the beginning of each job, the printer sets these timeouts to their default values (initially 0, 60, and 30 seconds respectively). You can send the printer a POSTSCRIPT command which will change these values. The operators

which control the values of the timeouts are described in Part V, "POSTSCRIPT Addendum", Section C.

The **job** timeout limits the total amount of time that the printer will execute a job. This is to protect the QMS-PS 800+ from being tied up by a POSTSCRIPT program that runs for an unexpectedly long time (or forever).

The **manual** feed timeout limits the amount of time the printer will wait for a sheet of paper to be inserted into its manual feed slot when the printer is in manual feed mode.

The **wait** timeout limits the time the printer will wait to receive additional input for a job that is already in progress. This is to protect the QMS-PS 800+ from being tied up indefinitely by a host computer that crashes or is disconnected in the midst of sending a file to the printer.

If a job or wait timeout expires, the POSTSCRIPT software executes the **timeout** error. This causes the current job to terminate. Setting a timeout value to zero gives that timeout no time limit (i.e. it will never timeout). It is generally a good idea to leave the job timeout at its default value of 0, especially when printing long files.

The timeout facility is not ordinarily enabled when the QMS-PS 800+ is in interactive mode.

H The Error Handler

Type this program into a file exactly as follows then send it to the QMS-PS 800+. Whenever the printer encounters an error while in QMS POSTSCRIPT Mode, it will print a page identifying the error. It must be sent again to the printer after each power-off.

```
%!
% lib/ehandler.ps -- Downloaded Error
%                    Break-page handler
% Copyright (c) 1984 Adobe Systems, Inc.
% All Rights Reserved.
% assumes serverloop password is the default one
/$brkpage where
{pop(Error Handler in place - not loaded again\n)print
flush stop}
{serverdict begin statusdict begin 0 checkpassword
 {(Error Handler downloaded.\n)print
       flush 0 exitserver}
 {(Bad Password on loading error handler!!!\n)print
      flush}ifelse
 end%statusdict
}ifelse
/$brkpage 64 dict def $brkpage begin
/prnt
 {dup type/stringtype ne{=string cvs}if dup length
      6 mul/tx exch def/ty 10 def
  currentpoint/toy exch def/tox exch def 1 setgray
    newpath
  tox toy 2 sub moveto 0 ty rlineto tx 0 rlineto
      0 ty neg rlineto
  closepath fill tox toy moveto
      0 setgray show}bind def
/n1{currentpoint exch pop lmargin exch moveto
      0 -10 rmoveto}def
/==={/cp 0 def typeprint n1}def
/typeprint{dup type exec}readonly def
/lmargin 72 def
/rmargin 72 def
/tprint
   {dup length cp add rmargin gt{n1/cp 0 def}if
    dup length cp add/cp exch def prnt}readonly def
/cvsprint{=string cvs tprint( )tprint}readonly def
/integertype{cvsprint}readonly def
/realtype{cvsprint}readonly def
/booleantype{cvsprint}readonly def
/operatortype{(--)tprint =string cvs
     tprint(--)tprint}readonly def
/marktype{pop(-mark- )tprint}readonly def
```

```
/dicttype{pop(-dictionary- )tprint}readonly def
/nulltype{pop(-null- )tprint}readonly def
/filetype{pop(-filestream- )tprint}readonly def
/savetype{pop(-savelevel- )tprint}readonly def
/fonttype{pop(-fontid- )tprint}readonly def
/nametype{dup xcheck not{(/)tprint}if
      cvsprint}readonly def
/stringtype
 {dup rcheck{(\()tprint tprint (\))tprint}
      {pop(-string- )tprint}ifelse
 }readonly def
/arraytype
 {dup rcheck{dup xcheck
  {({)tprint{typeprint}forall(})tprint}
  {([)tprint{typeprint}forall(])tprint}ifelse}
      {pop(-array- )tprint}ifelse
 }readonly def
/courier/Courier findfont 10 scalefont def
end %$brkpage
errordict/handleerror
 {systemdict begin $error begin $brkpage
    begin newerror
 /newerror false store grestoreall
    initgraphics courier setfont
 lmargin 720 moveto(ERROR: )prnt errorname prnt
 n1 (OFFENDING COMMAND: )prnt/command load prnt
 n1 n1(STACK:)prnt n1 n1
     $error/ostack get aload length{==}repeat
 systemdict/showpage get exec(%%[ Error: )print
 errorname =print(; offendingCommand: )print/command
 load =print( ]%%)= flush
  }if end end end}dup 0 systemdict put dup 4 $brkpage
   put bind readonly put
```

```
/dicttype{pop(-dictionary- )tprint}readonly def
/nulltype{pop(-null- )tprint}readonly def
/filetype{pop(-filestream- )tprint}readonly def
/savetype{pop(-savelevel- )tprint}readonly def
/fonttype{pop(-fontid- )tprint}readonly def
/nametype{dup xcheck not{(/)tprint}if
      cvsprint}readonly def
/stringtype
 {dup rcheck{(\()tprint tprint (\))tprint}
      {pop(-string- )tprint}ifelse
 }readonly def
/arraytype
 {dup rcheck{dup xcheck
  {({)tprint{typeprint}forall(})tprint}
  {([)tprint{typeprint}forall(])tprint}ifelse}
      {pop(-array- )tprint}ifelse
 }readonly def
/courier/Courier findfont 10 scalefont def
end %$brkpage
errordict/handleerror
 {systemdict begin $error begin $brkpage
    begin newerror
 /newerror false store grestoreall
    initgraphics courier setfont
 lmargin 720 moveto(ERROR: )prnt errorname prnt
 n1 (OFFENDING COMMAND: )prnt/command load prnt
 n1 n1(STACK:)prnt n1 n1
     $error/ostack get aload length{==}repeat
 systemdict/showpage get exec(%%[ Error: )print
 errorname =print(; offendingCommand: )print/command
 load =print( ]%%)= flush
  }if end end end}dup 0 systemdict put dup 4 $brkpage
   put bind readonly put
```

Part V

POSTSCRIPT Addendum

Introduction

The POSTSCRIPT Addendum is an addendum to the *POSTSCRIPT Language Reference Manual.* It contains information on printer-specific system parameters and idle-time font scan conversion. Refer to the *POSTSCRIPT Language Reference Manual* for information on standard POSTSCRIPT operators.

A System Parameters

The QMS-PS 800+ has an extensive set of parameters that control its behavior. Some of these parameters are stored in non-volatile memory (EEROM), so they persist even when the machine is turned off. Other parameters are volatile and generally remain in effect only through the execution of a single job. This addendum covers both types of parameters.

All system parameters are accessed through a special dictionary named **statusdict**, which is separate from **systemdict** and **userdict** (where all the standard PostScript operators and procedures are defined). System parameters are changed by sending the QMS-PS 800+ a POSTSCRIPT program that accesses **statusdict**.

To gain access to **statusdict**, execute **statusdict begin**, which pushes **statusdict** on the dictionary stack. Once this is done, the operators defined in **statusdict** may be invoked directly by executing their names (until the matching **end**).

Some system parameters are stored in **statusdict** as ordinary data values (integers, booleans, strings, etc.) that may be read by executing their names. They may be changed by using the **def** operator.

The detailed explanations of the **statusdict** operators follow the format described in the introduction to Chapter 6 of the *POSTSCRIPT Language Reference Manual.* Since the number of operators is relatively small, there is no summary section; instead, the operator descriptions are organized functionally rather than alphabetically.

B Persistent Parameters

Ordinarily, the printer brackets each job with **save** and **restore** so that changes made to the virtual memory (VM) apply only to that job. Parameters which cause changes which affect subsequent jobs are called **persistant parameters**.

B.1 Changing Persistent Parameters

To make permanent changes (e.g., to install additional font definitions), it is necessary to execute a job that is not bracketed by **save** and **restore**. This is also necessary in order to execute any of the **statusdict** operators that change the persistent (non-volatile) parameters.

The ability to make permanent changes is controlled by a password. Some printers are used in a shared environment in which it is undesirable for individual users to change the persistent state. In such cases, only a system administrator should be permitted to make such changes. But in the case of a QMS-PS 800+ dedicated to a single user or a small group of cooperative users, the users should be permitted to make changes freely.

The system administrator password is a POSTSCRIPT integer. The default value is zero, but it may be changed to any other value by executing the **setpassword** operator.

To escape from the normal printer **save/restore** context, issue the POSTSCRIPT statement:

serverdict begin *password* **exitserver**

where *password* is the system administrator password. If the password is incorrect, **exitserver** executes the error **PasswordIncorrect** (which immediately invokes **stop**, bypassing **errordict**). If the password is correct, however, **exitserver** responds with the message:

%% **[exitserver: permanent state may be changed]**%%

as a positive acknowledgment to the **exitserver** request. It then performs an implicit **restore**, clears the operand and dictionary stacks, etc., as if it were preparing to execute the next job, but it does not perform another **save**.

The POSTSCRIPT program executed between a successful **exitserver** and the next end-of-file is permitted to invoke the **statusdict** operators that may change persistent parameters. Additionally, all changes made by that program to the state of the POSTSCRIPT VM, such as creating new objects, storing values into dictionaries, etc., persist until power-off; the modified VM appears as the initial state of all subsequent jobs.

During execution of this program, the VM is not protected from harmful changes that could cause the printer to malfunction. (This is to permit the printer's software itself to be patched, should that become necessary.) Also, VM resources consumed by that program remain in use indefinitely; there is no way to reclaim them other than by turning the QMS-PS 800+ off and on.

B.2 Persistant Statusdict Operators

The **statusdict** operators for accessing persistent parameters are described below. The volatile parameters are described in Section C.1.

In order to invoke any of the operators that change persistent parameters, it is first necessary to escape from the normal printer **save/restore** context as described above; otherwise an **invalidaccess** error will occur. The operators for which this is required are marked with a '†'.

B.2.1 pagecount

– pagecount int

Returns the number of pages that have been printed by this QMS-PS 800+. (There is no way to reset this value.)

ERRORS:
stackoverflow

B.2.2 pagestackorder

–pagestackorder boolean

Returns *true* if the second page printed faces the back of the first page when it is stacked in the output tray; *false* if the second page faces away from the first. For the current QMS-PS 800+ product this is always *false*, meaning that pages are collated in reverse order.

ERRORS:
stackoverflow

B.2.3 setprinternameˆ

string **setprintername –**

Establishes *string* to be this printer's name. This string is printed on the test page at power-on time; it also de-

fines the name used to identify this QMS-PS 800+ on AppleTalk. The *string* should be 31 or fewer characters long, should consist entirely of printing characters, and should not contain the characters ':' or '@'.

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.4 printername

string **printername** substring

Stores the printer's name into the supplied *string* (overwriting some initial portion of its value) and returns a string object designating the substring actually used.

STANDARD VALUE: (QMS-PS 800+)

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.5 setsccbatch†

channel baud options **setsccbatch–**

Sets communication parameters as specified by three integers designating *channel* (9 or 25), *baud* rate, and *options*. These determine how serial communication is to be performed on that channel when the 'mode' number is '1' (which selects batch mode operation). Note that these parameters may be set independently for each of the two channels.

The new baud rate and options do not take effect until the end of the current job. Setting a channel's baud rate to zero disables the channel; but disabling both channels is not permitted.

EXAMPLE:

25 19200 2 setsccbatch

This sets the 25-pin channel to 19,200 baud with even parity and XON/XOFF flow control.

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.6 sccbatch

channel **sccbatch** baudoptions

Returns the baud rate and parity for the specified *channel* (9 or 25). These are the parameters used when the mode number is '1'.

STANDARD VALUE: 9600 0

ERRORS:
rangecheck, stackoverflow, stackunderflow, typecheck

B.2.7 setsccinteractive†

channel baud options **setsccinteractive –**

Similar to **setsccbatch**, but it sets serial communication parameters to be used when the mode number is '2' (which selects either interactive or emulation mode operation).

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.8 sccinteractive

channel **sccinteractive** baud options

Returns the baud rate and options for the specified *channel* (9 or 25). These are the parameters used when the mode number is '2'.

STANDARD VALUE: 9600 0

ERRORS:
rangecheck, stackoverflow, stackunderflow, typecheck

B.2.9 setdostartpage†

bool **setdostartpage** –

Specifies whether or not the QMS-PS 800+ is to print a test page upon subsequent power-on.

ERRORS:
invalidaccess, stackunderflow, typecheck

B.2.10 dostartpage

– **dostartpage** bool

Returns the boolean that specifies whether a test page is printed at power-on.

STANDARD VALUE: true

ERRORS:
stackoverflow

B.2.11 setmargins†

top left **setmargins** –

Adjusts the printer's margins, thereby changing the alignment of the imageable area on the physical page. The

top and *left* operands are integers that specify distances in device space (the unit size is one device pixel or 1/300 inch). A positive *top* widens the top margin and negative *top* narrows it relative to the standard margin width. (The top of the page is the edge that emerges first from the printer.) Similarly, a positive *left* widens the left margin and a negative *left* narrows it.

setmargins is intended only for use at installation time to correct any physical alignment errors that may exist; it has nothing to do with setting the dimensions of the imageable area. There are limits to the range of adjustment that is possible. The printer hardware imposes margins that cause the image to be clipped if it is moved too closed to the edge of the paper; unfortunately, the hardware-imposed margins are not symmetrical about the center of the paper.

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.12 margins

– **margins** top left

Returns the two margin adjustment parameters set by **setmargins.**

STANDARD VALUE: 0 0

ERRORS:
stackoverflow

B.2.13 setdefaulttimeouts†

job manualfeed wait **setdefaulttimeouts** –

Establishes the default values for the three timeouts. At the beginning of each job, these values are used to initialize the job, manual feed, and wait timeouts. (A POSTSCRIPT program may change a timeout for the

remainder of the current job by executing the **setjobtimeout** operator or changing the **manualfeedtimeout** or **waittimeout** value in **statusdict**.) Each parameter must be a non-negative integer denoting a time interval in seconds; the value 0 indicates that the corresponding timeout should never occur.

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.14 defaulttimeouts

– **defaulttimeouts** job manualfeed wait

Returns the default job, manual feed, and wait timeout values.

STANDARD VALUE: 0 60 30

ERRORS:
stackoverflow

B.2.15 setpassword†

old new **setpassword** bool

Sets the system administrator password controlling the ability to make persistent changes to system parameters or to the VM (see page 1 of this addendum). **setpassword** requires two integer operands: the *old* password and the *new* password. If *old* is the correct old password, **setpassword** changes the password to *new* and returns *true*; otherwise it returns *false*.

STANDARD VALUE: 0

ERRORS:
stackunderflow, typecheck

B.2.16 checkpassword

int **checkpassword** bool

Returns *true* if *int* is equal to the current system administrator password; otherwise it returns *false* (after delaying for one second).

STANDARD VALUE: 0

ERRORS:
stackunderflow, typecheck

B.2.17 setidlefonts†

mark font s_x s_y rot nchars ... **setidlefonts** –

Expects the operand stack to contain up to 150 integers in the range 0 to 255, delimited by a *mark* immediately below them. **setidlefonts** removes the *mark* and the integers and remembers them permanently. The integers are interpreted in groups of 5 to specify characters to be scan converted while the QMS-PS 800+ is idle, as described at the beginning of this addendum. An empty list of integers (i.e., just a *mark* on the top of the operand stack) specifies that the standard set of characters is to be scan converted.

ERRORS:
invalidaccess, rangecheck, typecheck, unmatchedmark

B.2.18 idlefonts

– **idlefonts** mark font s_x s_y rot nchars ...

Pushes a *mark* followed by the integers controlling idle time scan conversion (see **setidlefonts**).

STANDARD VALUE: mark

ERRORS:
stackoverflow

B.2.19 seteescratch†

index value **seteescratch** –

Writes *value* at position *index* in an array in the EEROM reserved for scratch use. The *index* must be an integer in the range 0 to 63; the *value* must be an integer in the range 0 to 225. The EEROM scratch array is intended for storing persistent parameters that were not envisioned in the original design of the QMS-PS 800+. Several entries in the array have already been assigned; they are described below.

ERRORS:
invalidaccess, rangecheck, stackunderflow, typecheck

B.2.20 eescratch

index **eescratch** value

Returns the value at position *index* in the EEROM scratch array (see **seteescratch**).

STANDARD VALUE: 0

ERRORS:
rangecheck, stackunderflow, typecheck

B.3 Additional Persistent Parameters

Several capabilities have been added to the QMS-PS 800+ since the standard set of persistent parameters (just described) was established. Notable among these are parameters that control the Diablo 630 emulator[1] and the sharing of mode number "2" between interactive and emulation modes. Entries in the EEROM scratch array (accessed by **seteescratch** and **eescratch**) have been assigned to control these capabilities.

[1]For a listing of these parameters, see Appendix C, "Diablo 630 Emulation".

To change the meaning of mode number '2' from Diablo 630 emulation to POSTSCRIPT interactive mode, execute the POSTSCRIPT program:

```
serverdict begin 0 exitserver
statusdict begin
58 1 seteescratch end
```

The EEROM in which the persistent parameters are stored can be written only a limited number of times before wearing out. Each location in the EEROM is capable of being written approximately 10,000 times. For this reason, the EEROM is used only for parameters that are expected to change infrequently.

At power-on time, the QMS-PS 800+'s POSTSCRIPT interpreter checks the contents of the EEROM for consistency; it reports the result by defining an entry named **eerom** in **statusdict**. Normally, it defines **eerom** to be *true*. If it detects an inconsistency, it defines **eerom** to be a 512-character POSTSCRIPT string into which it reads the entire contents of the EEROM; then it sets the page count to zero and resets all system parameters to their default values. If it finds that the EEROM has failed altogether (perhaps because it has worn out), the interpreter shifts to a simulation of the EEROM parameters in the RAM. All the operations for setting and reading parameters continue to work, but the values no longer survive power-off.

C Volatile Parameters

Parameters which cause changes which do not persist until the next job are called **volatile parameters**.

statusdict contains two operators (**setjobtimeout** and **jobtimeout**) with immediate effects that do not persist from one job to the next. The remaining **statusdict** entries are not operators but are ordinary data values such as booleans, integers, and strings. They may be read and

written in the usual way by POSTSCRIPT dictionary operators such as **get** and **put**. There are no restrictions on changing these parameters; the effects of changes normally persist only until the end of the current job.

C.1 Volatile statusdict Operators

The **statusdict** operators for accessing persistent parameters are described below. The persistant parameters are described in Section B.2.

There are several additional **statusdict** entries that are not documented here. They have to do with the operation of the printer and are not intended for execution by user programs.

C.1.1 setjobtimeout

int **setjobtimeout** –

Sets the timeout for the current job to the value *int*, a non-negative integer specifying a time interval in seconds. If the current job continues for *int* seconds without either completing or executing **setjobtimeout** again, the POSTSCRIPT interpreter executes a **timeout** error. The value 0 disables the job timeout altogether.

At the beginning of a job, the printer initially sets the job timeout to the default job timeout returned by **defaulttimeouts**. (However, in interactive mode, the initial job timeout is always 0.)

ERRORS:
rangecheck, stackunderflow, typecheck

C.1.2 jobtimeout

– **jobtimeout** int

Returns the number of seconds remaining before the job timeout will occur. A returned value of 0 means the job will never time out.

STANDARD VALUE: 0

ERRORS:
stackoverflow

C.1.3 manualfeedtimeout

– **manualfeedtimeout** int

The manual feed timeout currently in effect, i.e., the number of seconds the QMS-PS 800+ will wait for a page to be inserted into the manual feed slot. This timeout applies only when the QMS-PS 800+ is in manual feed mode, i.e., when **manualfeed** is *true* (see the description of **manualfeed**).

At the beginning of a job, the printer initializes **manualfeedtimeout** to the default manual feed timeout returned by **defaulttimeouts**; but a POSTSCRIPT program may change it to any non-negative integer value (by using **def**, **put**, or **store**).

STANDARD VALUE: 60

C.1.4 waittimeout

– **waittimeout** integer

The wait timeout currently in effect, i.e., the number of seconds the QMS-PS 800+ will wait to receive additional characters from the host computer before it will give up and abort the current job by executing a **timeout**. At the beginning of a job, the printer initializes **waittimeout** to the default wait timeout returned by **defaulttimeouts**; but a POSTSCRIPT program may change it to any non-negative integer value. (However, in interactive mode, the wait timeout is always 0.)

STANDARD VALUE: 30

C.1.5 manualfeed

– **manualfeed** bool

A boolean that controls whether paper is to be fed manually (*true*) or from the paper tray (*false*).

STANDARD VALUE: false

C.1.6 jobname

– **jobname** string

A string that specifies the name of the current job. If a POSTSCRIPT program defines **jobname**, status responses generated during the remainder of the current job will include a 'job' field that reports the text of this string. The string should not contain the characters ':'a or ']', since that would disrupt the syntax of status messages.

STANDARD VALUE: null

C.1.7 printererror

status tries **printererror** –

A procedure called during execution of **showpage** or **copypage** if the printer mechanism reports an error, such as no paper, jam, cover open, etc. The *status* is an integer that encodes details of the error condition; it is device-dependent and is not documented here. *tries* is the number of times **printererror** has previously been called during the same **showpage** or **copypage**. If **printererror** returns, the printing operation is retried; if it aborts (by executing **stop**), the printing operation is abandoned.

The standard **printererror** procedure interprets *status* and generates a 'PrinterError' status message (enclosed by '%%[' and '%%]'). It then returns, thus allowing printer errors to be retried indefinitely.

C.1.8 product

– **product** string

A string object which is the name of the laser printer product (QMS-PS 800+). The rare program that needs to know what type of printer it is running on should check this string.

STANDARD VALUE: (QMS-PS 800+)

D Idle-Time Font Scan Conversion

While the printer is waiting for a job to begin (i.e., before the arrival of the first character of a new job), it utilizes the available time to scan-convert a standard selection of characters in commonly-used fonts and point sizes, and to load the results into the font cache. (See Section 5.6 of the *POSTSCRIPT Language Reference Manual.*) If the next job uses those characters, it will execute faster than it otherwise would.

The characters normally scan-converted during idle time are listed below (the sizes marked with an asterisk are prescanned and permanently resident in ROM):

- Courier 10 point, full ASCII set.
- Times-Roman, NewCenturySchlbk-Roman, Helvetica, Bookman-Light, Helvetica-Narrow, AvantGarde-Book, and Palatino-Roman 10 and 12* point alphanumerics and common punctuation.
- Times-Roman and Helvetica 14 point alphanumerics.

The standard selection of fonts to be scan-converted during idle time may be overridden by use of the **setidlefonts** operator in **statusdict**. Each font to be scan-converted is specified by a sequence of five integers:

font $s_x \times 10$ $s_y \times 10$ *rot/5 nchars*

where *font* is a font number taken from the table below, s_x and s_y are the scale factors for *x* and *y*, *rot* is the rotation in degrees, and *nchars* is the number of characters to be converted. The font numbers are:

0	**Courier**	**18**	**Bookman-DemiItalic**
1	**Courier-Bold**	**19**	**Bookman-Light**
2	**Courier-Oblique**	**20**	**Bookman-LightItalic**
3	**Courier-BoldOblique**	**21**	**Helvetica-Narrow**
4	**Times-Roman**	**22**	**Helvetica-Narrow-Bold**
5	**Times-Bold**	**23**	**Helvetica-Narrow-BoldOblique**
6	**Times-Italic**	**24**	**Helvetica-Narrow-Oblique**
7	**Time-BoldItalic**	**25**	**NewCenturySchlbk-Roman**
8	**Helvetica**	**26**	**NewCenturySchlbk-Bold**
9	**Helvetica-Bold**	**27**	**NewCenturySchlbk-Italic**
10	**Helvetica-Oblique**	**28**	**NewCenturySchlbk-BoldItalic**
11	**Helvetica-BoldOblique**	**29**	**Palatino-Roman**
12	**Symbol**	**30**	**Palatino-Bold**
13	**AvantGarde-Book**	**31**	**Palatino-Italic**
14	**AvantGarde-BookOblique**	**32**	**Palatino-BoldItalic**
15	**AvantGarde-Demi**	**33**	**ZapfChancery-MediumItalic**
16	**AvantGarde-DemiObique**	**34**	**ZapfDingbats**
17	**Bookman-Demi**		

The characters converted are the first *nchars* characters of the standard set of 94 characters (lower-case, upper-case, numerals, and special characters).

For example, the following sequence of numbers (used as operands to **setidlefonts**) would specify conversion of all lower-case and upper-case alphabetic characters of Helvetica-Bold in a 12-point size, narrowed by the ratio 10/12, and rotated by 90 degrees:

9 100 120 18 52

The complete set of fonts to be scan-converted is specified as a sequence of integers, interpreted in groups of five as just described. If the sequence is empty, the standard fonts are converted. See the description of **setidlefonts** (Section B.2.17) for more information.

E Known Problems

The POSTSCRIPT interpreter in the QMS-PS 800+ is extremely complex. Not surprisingly, it contains a few bugs that have been discovered since manufacture of the QMS-PS 800+ began.

The following problems are known to exist in the initial release of the QMS-PS 800+ software. These bugs will be present in the product until the next complete ROM revision. Most of the problems are relatively obscure. Fortunately, it is possible either to avoid or to work around the problems that affect the QMS-PS 800+'s function.

E.1 Input/Output Problems

The **readline** operator does not recognize return as a newline character, only line-feed. This does not matter for serial communication, since return characters and return/line-feed pairs are converted to newlines. However, for AppleTalk communication, no such translation is done. POSTSCRIPT programs that expect to read data from the program file using **readline** should use line-feed as their newline character.

E.2 Font and Cache Problems

More than two levels of recursion in calls to **BuildChar** procedures may cause the QMS-PS 800+ to crash. A user-defined font's **BuildChar** procedure may execute a **show** using a built-in font. But it is unsafe for that user-defined font to be invoked from the **BuildChar** procedure of yet another user-defined font.

E.3 Miscellaneous Problems

If manual feed is invoked (by setting **manualfeed** to be *true* in **statusdict**) too quickly after printing a previous page using normal feed (from the paper tray), the printer mechanism ignores the request to use manual feed. To avoid this problem, when switching from normal to manual feed, be sure at least 5 seconds elapse before issuing the next **showpage**. If necessary, insert a delay explicitly by executing the statement:

```
usertime 5000 add
{dup usertime lt {pop exit} if} loop
```

Appendix A
Font Tables

Times-Roman — Times Roman

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	’
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	‘	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	*f*	§
\25x	¤	'	“	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

AvantGarde-Book — ITC Avant Garde Gothic Book

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	’
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	`	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	*ƒ*	§
\25x	¤	'	"	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

Helvetica-Narrow — Helvetica Narrow

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	`	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	ƒ	§
\25x	¤	'	"	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	"	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	l	ø	œ	ß				

Helvetica — Helvetica

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	‘	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	*ƒ*	§
\25x	¤	'	“	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	l	ø	œ	ß				

Palatino-Roman — Palatino Roman

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	‘	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	*ƒ*	§
\25x	¤	'	“	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

ZapfChancery-MediumItalic — ITC Zapf Chancery Medium Italic

octal	0	1	2	3	4	5	6	7
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	`	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	ƒ	§
\25x	¤	'	"	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	"	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

ZapfDingbats — ITC Zapf Dingbats

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		✁	✂	✃	✄	☎	✆	✇
\05x	✈	✉	☛	☞	✌	✍	✎	✏
\06x	✐	✑	✒	✓	✔	✕	✖	✗
\07x	✘	✙	✚	✛	✜	✝	✞	✟
\10x	✠	✡	✢	✣	✤	✥	✦	✧
\11x	★	☆	✪	✫	✬	✭	✮	✯
\12x	✰	✱	✲	✳	✴	✵	✶	✷
\13x	✸	✹	✺	✻	✼	✽	✾	✿
\14x	❀	❁	❂	❃	❄	❅	❆	❇
\15x	❈	❉	❊	❋	●	○	■	❑
\16x	❒	❑	❒	▲	▼	◆	❖	◗
\17x	❘	❙	❚	❛	❜	❝	❞	
\20x								
\21x								
\22x								
\23x								
\24x		❡	❢	❣	❤	❥	❦	❧
\25x	♣	♦	♥	♠	①	②	③	④
\26x	⑤	⑥	⑦	⑧	⑨	⑩	❶	❷
\27x	❸	❹	❺	❻	❼	❽	❾	❿
\30x	①	②	③	④	⑤	⑥	⑦	⑧
\31x	⑨	⑩	❶	❷	❸	❹	❺	❻
\32x	❼	❽	❾	❿	→	↔	↕	
\33x	➘	➙	➚	➛	➜	➝	➞	➟
\34x	➠	➡	➢	➢	➤	➥	➦	➧
\35x	➨	➩	➩	➪	➫	➬	➭	➮
\36x		➱	➲	➳	➴	➵	➶	➷
\37x	➸	➹	➺	➻	➼	➽	➾	

Symbol — Symbol

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	∀	#	∃	%	&	∍
\05x	(	)	*	+	,	−	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	≅	Α	Β	Χ	Δ	Ε	Φ	Γ
\11x	Η	Ι	ϑ	Κ	Λ	Μ	Ν	Ο
\12x	Π	Θ	Ρ	Σ	Τ	Υ	ς	Ω
\13x	Ξ	Ψ	Ζ	[	∴	]	⊥	_
\14x	‾	α	β	χ	δ	ε	φ	γ
\15x	η	ι	φ	κ	λ	μ	ν	ο
\16x	π	θ	ρ	σ	τ	υ	ϖ	ω
\17x	ξ	ψ	ζ	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		ϒ	′	≤	⁄	∞	*f*	♣
\25x	♦	♥	♠	↔	←	↑	→	↓
\26x	°	±	″	≥	×	∝	∂	•
\27x	÷	≠	≡	≈	…	|	—	↵
\30x	ℵ	ℑ	ℜ	℘	⊗	⊕	∅	∩
\31x	∪	⊃	⊇	⊄	⊂	⊆	∈	∉
\32x	∠	∇	®	©	™	∏	√	·
\33x	¬	∧	∨	⇔	⇐	⇑	⇒	⇓
\34x	◊	〈	®	©	™	∑	⎛	⎜
\35x	⎝	⎡	⎢	⎣	⎧	⎨	⎩	⎪
\36x	·	〉	∫	⌠	⎮	⌡	⎞	⎟
\37x	⎠	⎤	⎥	⌡	⎫	⎬	⎭	

Courier — Courier

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	`	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	⁄	¥	ƒ	§
\25x	¤	'	"	«	‹	›		
\26x	.	–	†	‡	·		¶	•
\27x	‚	„	”	»	…			¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	˙		˚	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x				ª				
\35x	Ł	Ø		º				
\36x						ı		
\37x	ł	ø		ß				

NewCenturySchlbk-Roman — New Century Schoolbook Roman

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	’
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	‘	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	⁄	¥	*f*	§
\25x	¤	’	“	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

Bookman-Light — ITC Bookman Light

octal	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
\00x								
\01x								
\02x								
\03x								
\04x		!	"	#	$	%	&	'
\05x	(	)	*	+	,	-	.	/
\06x	0	1	2	3	4	5	6	7
\07x	8	9	:	;	<	=	>	?
\10x	@	A	B	C	D	E	F	G
\11x	H	I	J	K	L	M	N	O
\12x	P	Q	R	S	T	U	V	W
\13x	X	Y	Z	[	\	]	^	_
\14x	‘	a	b	c	d	e	f	g
\15x	h	i	j	k	l	m	n	o
\16x	p	q	r	s	t	u	v	w
\17x	x	y	z	{	|	}	~	
\20x								
\21x								
\22x								
\23x								
\24x		¡	¢	£	/	¥	*ƒ*	§
\25x	¤	'	“	«	‹	›	fi	fl
\26x		–	†	‡	·		¶	•
\27x	‚	„	”	»	…	‰		¿
\30x		`	´	ˆ	˜	¯	˘	˙
\31x	¨		°	¸		˝	˛	ˇ
\32x	—							
\33x								
\34x		Æ		ª				
\35x	Ł	Ø	Œ	º				
\36x		æ				ı		
\37x	ł	ø	œ	ß				

Appendix B
Printer Specifications

The following are specifications for the QMS-PS 800+ printer:

Type: Desk-top page printer

Printing method: Electrophotography (single component-dry process), laser-beam scanning

Print speed:

Cassette feed: 6.9 (Legal-size) sheets/minute
8.1 (A4, Letter, and other sizes) sheets/minute

Manual feed: 5.1 (all sizes) sheets/minute

Optical system:

Laser: Semiconductor laser

Scanning system: Rotating six-faced mirror

Scanning pitch: Horizontal: Selectable (0-300 dots/inch)
Vertical: 300 raster lines/inch

Printing system:

Process speed: 47.1 mm/sec (1.85 in./sec.)

Photosensitive drum: Two-layer structure; conductive base, photoconductive upper layer (OPC)

Charging: Corona

Exposure method: Laser scanning system

Development: Single-component, dry toner; Toner Projection Development System

Paper supply: Manual or cassette feed

Image transfer: Corona transfer

Separation: Fixed belt and roller

Fixing method: Heated roller (115V, 220V:500W)

Toner supply: Replaceable toner cartridges

Paper: Plain paper (manufacturer-approved)

Cassette feed: 60 g/m^2 - 80 g/m^2
[16 lb -21 lb]

Manual feed: Single-sided print: 40 g/m^2 - 128 g/m^2
[11 lb - 33 lb]
Double-sided print: 60 g/m^2 - 128 g/m^2
[16 lb - 33 lb]

Cassette feed:

Maximum paper load: Cassette loading depth is 10 mm (0.4 in.), max.

Cassette:

Paper size	mm	inches	Cassette
A4	210 x 297	8.3 x 11.7	A4
B5	182 x 257	7.2 x 10.1	B5
Legal	216 x 356	8.5 x 14.0	Legal
Letter	216 x 279	8.5 x 11.0	Letter

Manual feed:

Paper size: from 100 mm (H) x 140 mm (V) to
216 mm (H) x 356 mm (V)

Output Tray capacity: About 20 sheets (80 g/m^2)

Power consumption:

Operating: Max 690W (115V), 750W (220V)

Standby: Typical avg. 120W

Environment:

Temperature: 10-32.5 degrees Celsius
(50-90.5 degrees Fahrenheit)

Humidity: 20% - 80%RH

Noise Level: Under 55 dB (A) (during printing)
Under 45 dB (A) (during standby)

Dimensions: 475 mm (W) x 279.4 mm (H) x 533.4 mm (D)
18.7 in. (W) x 11.0 in. (H) x 21.0 in. (D)

Weight: 33 kg (72 lb)

Line voltage requirements:

Voltage (V)	Freq. (Hz)
115	60
220	50

The Controller:

The PostScript controller is a single board built around a MC68000 microprocessor. This board utilizes 2 Megabytes of RAM (Random Access Memory) and 1 Megabyte of ROM (Read Only Memory).

Appendix C
Diablo 630 Emulation

Introduction

Your printer has the ability to **emulate**, or act like a Diablo 630 daisy wheel printer. This means it can be connected in place of a Diablo 630 printer and produce output which matches that of the Diablo printer. While in the emulation mode, the printer no longer interprets the incoming characters as POSTSCRIPT, but instead treats them as text and control codes understood by the printer being emulated.

A Purpose

This emulation mode is used primarily for printing simple text files that are not in POSTSCRIPT form or for processing output from software packages that do not directly support POSTSCRIPT.

B How to Use Diablo 630 Emulation

If you have not changed the default values of the system parameters, you can put Diablo 630 emulation into effect by setting the mode switch to "2" and connecting one of the printer's serial ports to your computer's serial interface. Your host computer should then send the text to be printed at the interactive baud rate (originally set to 9600 baud) with any parity and using XON/XOFF flow control protocol.

C Communications

Most of the information about serial communication (see Part II, "Tutorial", Section E and Part IV, "Advanced User's Guide", Section B) also applies in the case of Diablo 630 emulation. However, the special meanings of control characters such as control-C, control-D, etc., are disabled; instead, all characters are treated according to the Diablo 630 protocol.

D Protocol

If XON/XOFF flow control is selected, your printer still sends XON and XOFF characters to control the flow of data from your host computer. Not all printer drivers in microcomputer operating systems support the XON/XOFF protocol. It may be necessary to issue special commands or to obtain a separate software package to support this protocol. (The procedure for dealing with this problem varies from one computer and operating system to another. Consult your own computer's documentation for the necessary information.)

You may change the *option* parameter of **setsccinteractive** to select DTR flow control instead of XON/XOFF flow control[1].

E Diablo 630 Parameters

All the parameter settings that can be changed with Diablo 630 commands are initialized as they are in the Diablo 630. For information about these commands, refer to the Diablo 630 documentation.

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[1]See Part V, "Postscript Addendum", Section B.2.7.

There are other parameters that in the Diablo 630 require setting hardware switches or changing print wheels. These are listed in the following table:

Parameter	*Initial setting*
pitch	10
font	Courier
font for bold	Courier-Bold
auto-linefeed	off

In the QMS-PS 800+ these features of the Diablo 630 emulator may be accessed by the **seteescratch** and **eescratch** operators [2].

To access these features send the following program to the printer:

serverdict begin 0 exitserver
statusdict begin
index value **seteescratch**
end

Where *index* and *value* are as follows:

[2]See Part V, "Postscript Addendum", Section B.1.3 and Part II, "Tutorial", Section D for more information on accessing these features.

Parameter	*Index*	*Value*
Special mode	58	Selects the function of the "Special" switch setting: the value 0 means Diablo 630 emulation mode, 1 means PostScript interactive mode, and other values are reserved for future capabilities.
Auto-linefeed	59	The value 1 enables the Diablo 630 auto-linefeed feature; any other value disables it.
Pitch	60	Selects the Diablo 630 "pitch" (number of characters per inch). Reasonable values are 10, 12,and 15; the default value 0 selects 10 characters per inch.
Bold font	61	Selects the "bold" font used for Diablo 630 emulation. This is a font number taken from the table in the QMS-PS 800+ addendum, except that if the number is 0 (selecting Courier) then 1 (selecting Courier-Bold) is used instead. (To actually select Courier as the "bold" font, use some unreasonable font number such as 255.)
Normal font	62	Selects the "normal" font used for Diablo 630 emulation. This is a font number taken from the table in Part IV, "Advanced User's Information", Section E. The default value 0 selects Courier.
—	63	Internal use only.

F Fonts

The Diablo 630 emulator supports all of your printer's standard typefaces. The default font is Courier, which is the fixed-pitch font most commonly used in daisy wheel printers and is the one most likely to give the best results for typical application programs. Note that the regular and bold fonts are specified separately. Thus, one could use Courier for regular printing and Courier-Oblique for bold. If so, the bold text would print as italic instead.

G Differences

Your printer emulates the Diablo 630 as closely as possible, however, there are some differences you should be aware of:

The QMS-PS 800+ has no way to detect that the end of a document has been reached other than by noticing that characters have stopped arriving. All Diablo 630 printer settings (margins, tabs, spacing, etc.) remain in effect for about 30 seconds after the last character is received. Then the printer automatically performs a Diablo 630 "reset" operation to restore all settings to standard values; i.e., to put margins and spacing back to normal and to clear tab settings and any special word processing modes.

The QMS-PS 800+ actually prints a page when it either reaches the bottom of the page or receives a form-feed (control-L) character. If the last page of a document is not full and does not have a form-feed at the end, it will not be printed immediately. Instead, it will be printed when the printer resets approximately 30 seconds later or as part of the next document. You should take care to ensure that each document has a final form-feed character so that documents printed in close succession do not get run together.

Some word processors produce bold by double-striking characters. Such characters will not appear bold in output from the QMS-PS 800+. Only the bold produced by issuing the proper Diablo 630 command sequence (escape-O) will result in bold characters.

All QMS-PS 800+ fonts but Courier are narrow fonts that may look squeezed if no adjustment of page width is made by the word processor. Very few word processing programs are capable of producing correctly formatted output using proportionally spaced fonts such as these.

The emulator uses exact positioning on the paper. Output from a word processor that has attempted to compensate for slippage on vertical movement may appear slightly uneven.

H Unsupported Commands

The following Diablo 630 commands and features are not supported by the QMS-PS 800+:

- Print suppression
- HY-plot
- Extended character set
- Ability to download information for print wheels, including program mode
- Ability to override printwheel spacing (for proportional spacing), although the offset for proportional spacing can be changed
- Page lengths other than 11 inches
- Paper feeder control
- Hammer energy control
- Remote diagnostic
- Backward printing control (note, however, that "reverse printing" is supported)

Appendix D
Hewlett-Packard Laser Jet Plus Emulation

Introduction

Your printer has the ability to **emulate**, or act like a Hewlett-Packard LaserJet Plus printer. This means it can be connected in place of a LaserJet Plus printer and produce output which matches that of the LaserJet Plus. While in an emulation mode, the printer no longer interprets the incoming characters as POSTSCRIPT, but instead treats them as text and control codes understood by the printer being emulated.

A Purpose

This emulation mode is used primarily for printing simple text files that are not in POSTSCRIPT form or for processing output from software packages that do not directly support POSTSCRIPT.

B How to Use LaserJet Plus Emulation

If you have not changed the default values of the system parameters, you can put LaserJet Plus emulation into effect by setting the mode switch to "8" and connecting one of the printer's serial ports to your computer's RS-232 interface. Your host computer should then send the text to be printed at the interactive baud rate (originally set to 9600 baud) with any parity and using XON/XOFF flow control protocol.

C Communications

Most of the information about serial communication[1] also applies in the case of LaserJet Plus emulation. However, the special meanings of control characters such as ^C, ^D, etc., are disabled; instead, all characters are treated according to the LaserJet Plus protocol.

D Protocol

If XON/XOFF flow control is selected, your printer still sends XON and XOFF characters to control the flow of data from your host computer. Not all printer drivers in microcomputer operating systems support the XON/XOFF protocol. It may be necessary to issue special commands or to obtain a separate software package to support this protocol. (The procedure for dealing with this problem varies from one computer and operating system to another. Consult your own computer's documentation for the necessary information.)

You may change the *option* parameter of **setsccinteractive** to select DTR flow control instead of XON/XOFF flow control[2].

E LaserJet Plus Parameters

All the parameter settings that can be changed with LaserJet Plus commands are initialized as they are in the LaserJet Plus. For information about these commands, refer to the LaserJet Plus documentation.

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[1]See Part II, "Tutorial", Section E and Part IV, "Advanced User's Guide", Section B

[2]See Part V, "PostScript Addendum", Section B.2.7.

F Supported Commands

The Hewlett-Packard LaserJet Plus printer emulator supports with very few exceptions the entire set of escape sequences for both the LaserJet and LaserJet Plus printers. This includes the positioning commands, font selection commands, and bitmap graphics of the LaserJet Plus printer with no limitation on the area covered by bitmaps, as well as the rules, macros, overlays, and downloadable fonts of the LaserJet Plus printer.

The LaserJet Plus printer programs which are run through the emulator have access to the roman, bold, italic, and bold italic faces of the built-in POSTSCRIPT typefaces, Courier, Times, and Helvetica. Unlike the actual LaserJet Plus printer, these can all be scaled to any size, and can be used for printing either in portrait or landscape mode.

G Differences

The remainder of this appendix will document how the emulator differs from the LaserJet Plus printer.

G.1 Clipping Region

The left margin of the LaserJet Plus printer defaults to the leftmost printable position on the page. Although the emulator also does this, the imageable areas of the page on the two printers may not be exactly the same. The LaserJet Plus claims to avoid printing any characters that would lie partially outside the printable area. The emulator will print them and allow them to be clipped. Both printers throw away information if instructed to print completely outside of the printable area (as in perf-skip mode).

G.2 Paper Size Interactions

The LaserJet Plus printer has a few commands that interact with the "operator" to change the printer's paper. These include the **<ESC>&1#H** for manual feed of paper or envelopes, and **<ESC>&1#P**, to change among letter, legal, etc. sizes of paper. The emulator treats these commands as form feed requests, but does not halt printing for paper to be changed. In the case of <ESC>&1#P, if # is less than the maximum lines for the current paper size, the number of lines per page is set to # (as if the **<ESC>&1#F** had been received). The paper size that it uses is passed into it by the server loop when the emulator job is executed.

G.3 Symbol Set

The LaserJet Plus printer escape sequences define a number of symbol sets. The most widely used is Roman8, an 8-bit extension of the ASCII symbol set. This is the symbol set for all of the actual LaserJet Plus printer's built-in fonts (although on the LaserJet Plus printer, either half may be considered as a 7-bit font). The emulator uses the POSTSCRIPT interpreter's capability of reencoding a typeface to produce Roman8 versions of the built-in POSTSCRIPT typefaces, Courier, Times, and Helvetica when it starts up. There are four characters in the Roman8 symbol set that are not in the Adobe Standard symbol set and therefore cannot be printed. They are:

Symbol	Location
Gray patch for rubout	Decimal 127
Overline	Decimal 176
Solid black square	Decimal 252
Italian Lira Symbol	Decimal 175

G.4 Character Widths

The Times and Helvetica POSTSCRIPT typefaces, being licensed from Allied Corporation, have the character proportions for which they were originally designed. The LaserJet Plus printer approximations of these typefaces, called "Tms Rmn" and "Helv", have copied the style, but have other proportions. In fact, there are several versions of Tms Rmn that have different proportions, even for the same point size, and the proportions do not scale with the dimensions of the font (i.e. there are separate width tables for each point size on the typeface). As a result, applications which produce justified output when printed in Helv or Tms Rmn will not have properly justified when printed on the emulator. However, the print widths are close enough so that the appearance is not objectionable.

If printing justified proportional spaced documents with the emulator is of critical importance, a downloadable bitmap font designed for a LaserJet Plus printer may be purchased and used with an applications software package which knows the widths of the font. Unlike the LaserJet Plus, portrait downloadable fonts may be used with the emulator in either portrait or landscape orientation. Because Courier is a mono-spaced font, justified documents printed with Courier will print properly.

G.5 Line Printer Font

The LaserJet Plus printer has a built-in line printer font, a 16.67 pitch 8.5 point font. When the Line Printer font is called for, the emulator scales Courier to 16.67 pitch. But since it then has a height of 7.2 points, it is a little shorter than the LaserJet Plus printer built-in font. The bold version of the font is easier to read, since the stroke weights of a 7-point Courier are rather light.

G.6 Transparent Communication

The bitmap graphics of the LaserJet Plus printer require that 8 bit data be transmitted to the printer. Hence, when the QMS-PS 800+ is in the LaserJet Plus printer emulation mode, it configures the communications parameters so that all 256 characters are transmitted uninterpreted to the emulator. This has the effect of eliminating the **^T** status request and **^C** job interrupt command. The standard POSTSCRIPT end-of-file (**^D** is recognized and marks the end of job unless the **^D** appears as data for raster line or font definition in which case it is simply treated as data.

G.7 Storage of Information

Storage management in POSTSCRIPT printers is accomplished by means of the **save** and **restore** operators. There is an implicit **save** before each POSTSCRIPT job and a **restore** after its completion. The emulator works similar to POSTSCRIPT, by running a series of "jobs" with storage reclamation at the end of each job. Since transparent communication in the emulator makes sending any kind of end-of-file character impossible, the only end-of-file is either a manual reset or wait timeout. The length of the timeout period may be set by the user, and infinite is one of the options.

The LaserJet Plus printer allows fonts and macros to be downloaded into the printer for use in printing subsequent pages. On the LaserJet Plus printer, there is a hierarchy of "temporary" and "permanent" for both fonts and macros. Temporary ones are deleted by a printer reset (e.g. **<ESC>E**), and by explicit escape sequences. Permanent ones are deleted when the printer is powered off and back on (or by other explicit escape sequences). When a font or macro is deleted, is space becomes available for reuse, i.e., for subsequently downloaded fonts or macros.

Within a given POSTSCRIPT job, the emulator models the storage management of the LaserJet Plus printer. Fonts and/or macros may be designated permanent or temporary and may be deleted via the standard LaserJet Plus printer escape sequences. When a font or macro is deleted, the storage that it occupies becomes available for new downloaded fonts or macros.

G.8 Typeface Size

The POSTSCRIPT typefaces are scaleable, where LaserJet Plus fonts are not. Thus you are more likely get what you ask for in the emulation than on the LaserJet Plus. If the application software is sloppy, realizing that "close enough" will get the right font, then the output may be different. There is, in fact, an approximation margin in the emulator for picking font height and/or pitch (currently .4 pts). Thus, if you ask for 16.67 pitch and then ask for 17 pitch, you will reuse the 16.67. On the LaserJet Plus, if you ask for 12 pitch and 10 pitch is the closest available, you will get 10 pitch. However, the emulator would provide 12 pitch in that example. The same holds true for selecting font sizes.

Appendix E
Hewlett-Packard 7475 Plotter Emulation

Introduction

Your printer has the ability to **emulate**, or act like a Hewlett-Packard 7475 Plotter (HPGL). This means it can be connected in place of a 7475 Plotter and produce output which matches that of the 7475 Plotter. While in an emulation mode, the printer no longer interprets the incoming characters as POSTSCRIPT, but instead treats them as text and control codes understood by the printer being emulated.

A Purpose

This emulation mode is used primarily for printing simple text files that are not in POSTSCRIPT form or for processing output from software packages that do not directly support POSTSCRIPT.

B How to Use 7475 Plotter Emulation

If you have not changed the default values of the system parameters, you can put 7475 Plotter emulation into effect by setting the mode switch to "8" and connecting one of the printer's serial ports to your computer's RS-232 interface. Your host computer should then send the text to be printed at the interactive baud rate (originally set to 9600 baud) with any parity and using XON/XOFF flow control protocol.

C Communications

Most of the information about serial communication[1] also applies in the case of 7475 Plotter emulation. However, the special meanings of control characters such as ^C, ^D, etc., are disabled; instead, all characters are treated according to the 7475 Plotter protocol.

D Protocol

If XON/XOFF flow control is selected, your printer still sends XON and XOFF characters to control the flow of data from your host computer. Not all printer drivers in microcomputer operating systems support the XON/XOFF protocol. It may be necessary to issue special commands or to obtain a separate software package to support this protocol. (The procedure for dealing with this problem varies from one computer and operating system to another. Consult your own computer's documentation for the necessary information.)

You may change the *option* parameter of **setsccinteractive** to select DTR flow control instead of XON/XOFF flow control[2].

E 7475 Plotter Parameters

All the parameter settings that can be changed with 7475 Plotter commands are initialized as they are in the 7475 Plotter. For information about these commands, refer to the 7475 Plotter documentation.

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[1]See Part II, "Tutorial", Section E and Part IV, "Advanced User's Guide", Section B.

[2]See Part V, "PostScript Addendum", Section B.2.7.

The 7475 Plotter emulation supports most of the command set of the plotter, including the entire set of drawing commands. Since the QMS-PS 800 is a monochrome printer, the multi-color capacity of the 7475 Plotter is not supported.

F Paper Size

The 7475 Plotter emulation supports either A or A4 sized paper depending upon the default paper size when the 7475 Plotter emulation is entered. The 7475 Plotter emulation also supports B and A3 paper.

G Text

The 7475 Plotter emulation uses Courier for text labels. As in the 7475 Plotter the characters may be independently scaled horizontally and vertically using the appropriate command sequences. Unlike the 7475 Plotter, the stroke widths of the characters are correspondingly scaled. Thus large characters have thicker stroke widths than smaller characters.This produces easier to read large characters, but simulating proportional spacing by individually scaling characters does not work well.

H Character Sets

While the 7475 Plotter has 20 character encodings built in, the 7475 Plotter emulation provides only character set 0, the ASCII encoding. Character set changing commands are ignored.

I Pens

The 7475 Plotter has a carousel of six pens that may be of different colors and widths. The 7475 Plotter emulation simulates 6 black pens whose widths can be specified by the user. The pen thickness command "PT" is not needed for its original purpose, filling solids, so it is redefined to set the thickness of the current pen. Each pen is initialized to 0.3 mm thickness.

J Transparent Communication

When the QMS-PS 800 is in the 7475 Plotter emulation mode it reconfigures the communication parameters so that all 256 characters are transmitted uninterpreted. To be compatible with the 7475 Plotter the 7475 Plotter emulation masks off the high order bit of each character, simulating 7 bit communications. Transparent communications has the effect of eliminating the ^T status request and ^C job interrupt commands. The ^D end-of-file indicator is supported.

K Removing the Output

On a real plotter the user removes the paper when the plot operation is complete. When using the 7475 Plotter emulation it is sometimes possible to rject the current page by using buttons on the printer. Or in any event the QMS-PS 800 will eject a page if it receives a end-of-file (^D), or receives no input for the current wait timeout period (usually 30 seconds). It is also possible to use the "AF" command to eject the page.

L Persistent State

For each "job" the 7475 Plotter emulation starts with a clean slate. Plotter state variables such as user scaling, line type, pen thickness, character size, and label terminator have their default values. The job terminates either upon the receipt of an end-of-file (^D) or a wait timeout.

M Commands

Most of the commands of the 7475 Plotter are supported by the 7475 Plotter emulation. Others are supported with differences and some are not supported.

M.1 Supported Commands

CP	Character Plot
DF	Set Default Values
DI	Absolute Direction
DR	Relative Direction
DT	Define Terminator
EA	Edge Rectange Absolute
ER	Edge Rectangle Relative
FT	Fill Type
IN	Initialize
IP	Input P1, P2
IW	Input Window
LB	Label
LT	Line Type
OA	Output Actual Position

Continued...

Supported Commands – Continued

OC	Output Commanded Position
PA	Plot Absolute
PD	Pen Down
PR	Plot Relative
PU	Pen Up
RR	Shade Rectangle Relative
SC	Scale
SI	Absolute Character Size
SL	Character Slant
SP	Pen Select
SR	Relative Character Size
TL	Tick Length
UC	User Defined Character
XT	X Tick
YT	Y Tick

M.2 Unsupported Commands

CA	Alternate Character Set
CS	Standard Character Set
DC	Digitize Clear
DP	Digitize Point
IM	Input Mask
OD	Output Digitized Point
OE	Output Error
OF	Output Factors

Continued...

Unsupported Commands – Continued

OH	Output Hard Clip Limits
OI	Output Identification
OO	Output Options
OP	Output P1, P2
OS	Output Status
OW	Output Window
PS	Paper Size
SA	Select Alternate Character Set
SS	Select Standard Character Set
VS	Velocity Select

M.3 Supported Commands with Differences

AA	Arc Absolute
AR	Arc Relative
CI	Circle
EW	Edge Wedge
WG	Shade Wedge

On the 7475 Plotter the chord length is 5 degrees. In the emulator, the default is 0. Circles and arcs are drawn as circular as possible.

PT Pen Thickness

On the 7475 Plotter this command is used to determine spacing between lines drawn in a solid fill. The 7475 Plotter emulation uses this command to set the thickness of the current pen. This thickness is remembered by the QMS-PS 800 so that if a pen's thickness has been set and another pen is selected, re-selecting the original pen will reestablish the thickness. The pen thickness is used to determine the weight of stroked lines, but has no effect on solid fill or characters.

SM Symbol

On the 7475 Plotter this mode causes a specified character character to be drawn at each plotted point. This is also true for the 7475 Plotter emulation, but the exact placement of the symbol in the character box for the 7475 Plotter emulation may differ from that of the 7475 Plotter.

AF Advance Film

This is not a 7475 Plotter command, but is an HPGL command from a film recorder. It causes the current page to be printed and any further plotting commands to be applied to the next page. If initialization is required for this page, the "AF" command should be followed by an "IN" command.

Glossary

ASCII

An acronym for American Standard Code for Information Exchange. It is a 7-bit (or 8-bit) coding scheme for the computer representation of letters, numbers, and other symbols commonly found on a standard typewriter. It also represents special unprintable characters used by computer devices, e.g. carriage return, line feed, form feed, escape, etc.

Baud

The measure of speed at which information is transferred indicated by changes in line condition. Baud is equivalent to bits per second (BPS) which is the number of information bits that can be sent through a channel in a second.

Buffer

A storage device used to compensate for a difference in rate or sequence of data flow when transmitting data from one device to another.

Controller

The device which contains the Printer's "intellegence".

Default

A preset value programmed into a computer or printer which it will use unless changed by a switch setting or software command.

DTR

Data Terminal Ready. A signal set by a printer or terminal to a host computer indicating it is ready to receive data.

Font

A complete character set in one size and style.

Interface

A circuit board or other piece of equipment that allows two systems or devices to communicate with each other.

Mode

One of several alternative conditions or methods of operation.

Octal

A number system with the base 8. The octal system uses eight number symbols (0 through 7) and is used as a simple way to represent binary numbers.

Page Memory

A special buffer large enough to hold an entire page of data.

Parity Bit

An additional non-data bit attached to a set of data bits to check their validity.

PROM

An acronym for Programmable Read Only Memory. A storage device that can be programmed by electrical pulses. A PROM does not lose its memory when it is powered off.

Protocol

A system of messages sent back and forth between a computer and printer which defines the order in which information is to be transferred.

Raster Line

One horizontal line of dots of a laser-printed page.

Resolution

A measure of the dot density of the printer's output. The QMS-PS 800+ has a vertical and horizontal resolution of 300 dots per inch (90,000 dots per square inch).

RS-232

Designation for the industry-standard interface for serial devices. The RS-232 insures: 1) that voltage and signal levels will be compatible; 2) that interface connectors may be mated together with identical pin wiring and corresponding pin connectors; 3) that certain control information supplied by one device must be understood by the other device.

RTS

Request To Send. A signal sent from the host to the printer indicating it is ready to send data.

Serial Interface

An interface which sends the bits representing each character sequentially along a single wire.

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