# QMS® SmartWriter 80+®
# User's Guide

Publication Number
1720389A
February 1987

---

QMS, Inc.
P.O. Box 81250
Mobile, AL 36689

QMS® is a registered trademark of QMS, Inc. SmartWriter 80+® is a registered trademark of QMS, Inc. Paper+™ is a trademark of QMS, Inc. Centronics® is a registered trademark of Centronics Data Computer Corp. Diablo® is a registered trademark of Xerox Corp. Epson® is a registered trademark of Epson America, Inc. FX-80™ is a trademark of Epson America, Inc. HP™ and LaserJet™ is a trademark of Hewlett-Packard Company. MS-DOS™ is a trademark of MicroSoft, Inc. Qume® and Sprint® are registered trademarks of Qume, Inc. IBM® and Proprinter® are registered trademarks of International Business Machines, Inc.

# About This Manual

The manual is divided into these major parts:

- Part I, *Installation*
- Part II, *Tutorial*
- Part III, *Printer Setup*
- Part IV, *Printer Software Commands*
- Part V, *Maintenance and Troubleshooting*
- Appendices

Part II, *Tutorial*, will acquaint you with the many features of your laser printer and help you start printing. Included in the *Tutorial* are explanations of the printer keypad and the different terms that are used throughout this manual. If you are new to laser printers, you will want to read this section throroughly (after installing the printer) before you go on to any other part of the manual.

# Proprietary Statements and Notices

## *Proprietary Statement*

The digitally encoded software included with the QMS SmartWriter 80+ laser printer is ©Copyrighted 1986 by QMS, Inc., All Rights Reserved. This software may not be reproduced, modified, displayed, transferred, or copied in any form or in any manner or on any media, in whole or in part, without the express written permission of QMS, Inc.

## *Copyright Notice*

This manual is ©Copyrighted 1986, 1987 by QMS, Inc. All Rights Reserved. This manual may not be copied in whole or in part, nor transferred to any other media or language, without the express written permission of QMS, Inc.

## *Manual Notice*

QMS, Inc. reserves the right to make changes to this manual and to the equipment described herein without notice. Considerable effort has been made to insure that this manual is free of inaccuracies and omissions. However, QMS makes no warranty of any kind including, but not limited to, any implied warranties of merchantability and fitness for a particular purpose with regard to this manual. QMS assumes no responsibility 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.

# Approvals

## *Electronics Emissions*

This printer complies with the Electronics Emissions Requirements of the West-German Federal Minister for Postal and Telecommunication Technology regulation:

VFG. 1046/1984

This printer complies with the Electronics Emissions Requirements of the European Economic Council directive:

82/499/EEC

NOTE: A SHIELDED CABLE IS REQUIRED TO COMPLY WITH VFG 1046, 82/499/EEC.

## *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.

# *Warning*

This equipment generates, uses, and can radiate radio frequency energy and if not installedand used in accordance with the Instruction Manual may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**CAUTION:**To prevent electrical shock, do not remove the top cover of your laser printer. No user-serviceable parts are inside. Any servicing should be referred to a qualified technician.

# Notice

Your QMS SmartWriter 80+ printer emulates Diablo® 630, Qume® Sprint®, HP LaserJet PLUS™, and ONE of the following: Epson® FX-80 or IBM® Proprinter®.

If your SmartWriter 80+ emulates Epson FX-80, all references to the Proprinter Emulation in this user's guide will NOT be applicable and should be ignored. Conversely, if your SmartWriter 80+ emulates the IBM Proprinter, all references to Epson Emulation will NOT be applicable and should likewise be ignored.

# Contents


## *I Installation* 1–1

**A Installation** 1–2

**B Adjusting Print Contrast** 1–7

## *II Tutorial* 2–1

**A The Keypad** 2–2

A.1 Function Keys . . . . . 2–3

A.2 Printer Setup Keys . . . . . 2–4

**B Making Changes** 2–5

**C Paper Size** 2–7

C.1 The Default: Letter . . . . . 2–7

C.2 Changing Paper Size . . . . . 2–7

**D Paper Source** 2–10

D.1 The Default: Automatic Paper Feed . . . . 2–11

D.2 Selecting Manual Feed . . . . . 2–11

**E Page Orientation** 2–13

E.1 Selecting a Page Orientation . . . . . 2–13

E.2 The Default: Portrait Orientation . . . . . 2–13
E.3 Selecting Landscape Orientation . . . . . 2–14

**F Page Margins 2–15**
F.1 Default Margins . . . . . 2–15
F.2 Setting Page Margins . . . . . 2–16

**G Emulation Modes 2–18**
G.1 Selecting an Emulation Mode . . . . . 2–18
G.2 The Default: Epson Emulation OR Proprinter Emulation . . . . . 2–18
G.3 Selecting Another Emulation . . . . . 2–18
G.4 Selecting Emulation Features . . . . . 2–23

**H Fonts 2–25**
H.1 The Default Fonts . . . . . 2–25
H.2 Selecting a Font . . . . . 2–25
H.2.1 Changing the Current Font . . . . . 2–26
H.2.2 Changing Power-Up Fonts . . . . . 2–27
H.3 Download Fonts . . . . . 2–28
H.4 Optional Font Cartridge . . . . . 2–28

**I Copy Count 2–28**
I.1 The Default: Single Copies . . . . . 2–29
I.2 Changing the Copy Count . . . . . 2–29
I.3 Copy Count Reset . . . . . 2–29

**J Form Feed Command 2–30**

J.1 Sending the Form Feed . . . . . 2–31

**K Dual Interface 2–31**

K.1 The Default: Parallel Interface . . . . . 2–31

K.2 Specifying Serial Interfacing . . . . . 2–32

**L Using Software Commands 2–33**

L.1 The Default: <ESC> . . . . . 2–33

L.2 Substituting Tilde . . . . . 2–34

**M Things You Need To Know... 2–35**

M.1 When to Replace the Print Cartridge. . . . 2–35

M.2 Paper Jam . . . . . 2–36

M.3 Print Quality . . . . . 2–36

M.4 Status and Error Codes . . . . . 2–37

**N For More Information... 2–38**

***III Printer Setup* 3–1**

**A Groups 3–6**

A.1 Options . . . . . 3–7

A.2 Printer Setup Keys . . . . . 3–7

A.3 Option 0 . . . . . 3–8

A.4 How To Change a Printer Feature . . . . . 3–9

A.5 Example: Changing Page Orientation . . . 3–10

**B ANSI Command Mode Options (Group A) 3–12**

B.1 Options 1 and 2 – Units for Status Summary Sheet . . . . . 3–12

B.2 Option 3 – ANSI Character Spacing . . . . 3–12

B.3 Options 4 and 5 – Line Spacing . . . . . 3–13

B.4 Option 6 – Line Overflows . . . . . 3–13

B.5 Option 7 – Carriage Returns . . . . . 3–14

B.6 Option 8 – Line Feeds . . . . . 3–14

B.7 Option 9 – Double-spaced Lines . . . . . 3–14

**C Changing Fonts (Group C) 3–15**

C.1 Font Numbers . . . . . 3–15

C.2 Procedure . . . . . 3–16

C.3 Font Selection and the Option 0 Warm Restart 3–19

C.4 Automatic Font Selection . . . . . 3–20

**D Diablo Emulation Options (Group D) 3–20**

D.1 Options 1 and 2 – Diablo Character Spacing . . . . . 3–21

D.2 Option 3 – Carriage Returns . . . . . 3–21

D.3 Option 4 – Line Feeds . . . . . 3–22

D.4 Option 5 – Upper Case/Lower Case . . . . 3–22

D.5 Option 6 – Select Character Spacing . . . 3–22

**E Epson Emulation Options (Group E) 3–23**

E.1 Option 1 – Epson Print Mode . . . . . 3–24

E.2 Option 2 – Pica Print Quality . . . . . 3–24

E.3 Options 3 through 5 – International Character Sets . . . . . 3–25
E.4 Option 6 – Carriage Returns . . . . . 3–26
E.5 Option 9 – Printing Zeros . . . . . 3–26
E.6 Option A – Changing Epson Default Font 3–26

**F Proprinter Emulation Options (Group I) 3–27**
F.1 Option 1 – Printing Zeros . . . . . 3–27
F.2 Option 2 – Automatic Line Feed . . . . . 3–27
F.3 Option 3 – Character Set . . . . . 3–28
F.4 Option 4 – Carriage Returns . . . . . 3–28
F.5 Option 5 – Pica Default Font . . . . . 3–28

**G Power-Up Landscape Font (Group L) 3–29**

**H Power-Up Portrait Font (Group P) 3–29**

**I Qume Emulation Options (Group Q) 3–30**
I.1 Options 1 and 2 – Qume Character Spacing . . . . . 3–30
I.2 Option 3 – Line Spacing . . . . . 3–30
I.3 Option 4 – Carriage Return . . . . . 3–31
I.4 Option 5 – Automatic Carriage Return/Line Feed . . . . . 3–31
I.5 Option 6 – Select Character Spacing . . . 3–32

**J System Function Options (Group 0) 3–32**
J.1 Option 1 – Copy Count Reset . . . . . 3–33

J.2 Option 2 – Cancel Printing . . . . . 3–34
J.3 Option 3 – Hex Dump . . . . . 3–35
J.4 Option 4 – Form Feed/Carriage Return . . 3–35
J.5 Option 5 – Printer Setup Reset . . . . . 3–36
J.6 Option 6 – Reset Translation Tables . . . . 3–37
J.7 Option 7 – Suppress Blank Pages . . . . . 3–37
J.8 Option 8 – Suppress Status Summary Sheet 3–38
J.9 Option 9 – Immediate Command Translation Table Reset . . . . . 3–39
J.10 Option A – Immediate Font Translation Table Reset . . . . . 3–40

**K Selecting Emulation Mode and Page Size/ Orientation (Group 1) 3–41**

K.1 Options 1, 2, and 3 – Emulation Mode . . 3–41
K.2 Options 4 through 6 – Paper Size . . . . . 3–42
K.3 Delay Before Form Feed . . . . . 3–43
K.4 Option 9 – Page Orientation . . . . . 3–43
K.5 Option A – Embedding the Escape Character . . . . . 3–44

**L Number of Copies (1 to 9 copies – Group 2) 3–44**

L.1 Options 1 to 9 – Number of Copies . . . . 3–44

**M Number of Copies (multiples of 10 – Group 3) 3–45**

M.1 Options 1 through 9 – Number of Copies 3–45
M.2 Copy Count Examples . . . . . 3–45

**N Page Margin Settings (Group 4) 3–46**

N.1 Options 1 through 4 – Left Margin . . . . 3–46

N.2 Options 5 through 8 – Right Margin . . . . 3–47

N.3 Options 9 through C – Top Margin . . . . 3–48

N.4 Options D through F – Bottom Margin . . 3–49

**O Common Interface Options (Group 5) 3–50**

O.1 Option 1 – Interface Type . . . . . 3–50

O.2 Option 2 – Online/Offline . . . . . 3–50

O.3 Options 3, 4, 5, 6, 7 – Print Buffer . . . . 3–51

O.4 Option 8 – Print Buffer Magnification . . . 3–53

O.5 Options 9 and A – 8th Bit . . . . . 3–53

**P Serial Interface Options (Group 6) 3–54**

P.1 Option 1 – Parity Checking . . . . . 3–54

P.2 Options 2 and 3 – Parity Type . . . . . 3–55

P.3 Option 4 – Stop Bits . . . . . 3–56

P.4 Option 5 – Data Bits . . . . . 3–56

P.5 Options 6, 7, 8, and 9 – Bit Rate . . . . . 3–57

P.6 Option A – DTR . . . . . 3–57

P.7 Option B – RTS . . . . . 3–58

P.8 Option C – XON/XOFF . . . . . 3–58

**Q Parallel Interface Options (Group 7) 3–59**

Q.1 Option 1 – Printer Error . . . . . 3–59

Q.2 Option 2 – Set Printer Error . . . . . 3–60

Q.3 Option 3 – Set Fault Bit . . . . . 3–60

Q.4 Option 4 – Off-Line on Error . . . . . 3–61
Q.5 Option 5 – Busy on Off-Line . . . . . 3–61
Q.6 Option 6 – Data Flow Control . . . . . 3–61

**R Printer Alignment (Group 8) 3–62**

R.1 Options 1 through 4 – Horizontal Alignment . . . . . 3–62
R.2 Options 5 through 8 – Vertical Alignment 3–63

**S Diagnostic Options (Group 9) 3–63**

S.1 Option D – Debugger . . . . . 3–64
S.2 Option E – Diagnostic Page . . . . . 3–64
S.3 Option F – Enter Debugger Mode . . . . . 3–64

***IV Printer Software Commands*** **4–1**

**A Command Diagrams 4–2**

**B Changing Fonts/Overlays 4–3**

B.1 Command Diagram . . . . . 4–3
B.2 Using the Command . . . . . 4–3
B.3 Examples . . . . . 4–

**C Changing Page Orientation 4–5**

C.1 Command Diagram . . . . . 4–5
C.2 Using the Command . . . . . 4–5

C.3 Examples . . . . . 4–6

**D Selecting Paper Feed and Paper Size 4–6**

D.1 Command Diagram . . . . . 4–6

D.2 Using the Command . . . . . 4–6

D.3 Examples . . . . . 4–7

**E Selecting Number of Copies 4–7**

E.1 Command Diagram . . . . . 4–7

E.2 Using the Command . . . . . 4–8

E.3 Examples . . . . . 4–8

**F Selecting Emulation Mode 4–9**

F.1 Command Diagram . . . . . 4–9

F.2 Using the Command . . . . . 4–9

F.3 Examples . . . . . 4–10

**G Extended Printer Control Command 4–10**

G.1 Command Diagram . . . . . 4–10

G.2 Using the Command . . . . . 4–10

G.3 Examples . . . . . 4–11

**H Redefining Translation Tables 4–12**

H.1 Command Diagram . . . . . 4–12

H.2 Using the Command . . . . . 4–12

H.3 Changing the Command Translation Table 4–13

H.4 Changing the Font Translation Table . . . . 4–14

H.5 Resetting Translation Tables . . . . . 4–15
H.6 Decimal Values . . . . . 4–15
H.7 Examples . . . . . 4–16

*V Maintenance and Troubleshooting* 5–1

**A Print Cartridge** 5–2
A.1 When to Replace the Print Cartridge . . . . 5–2
A.2 How to Replace the Print Cartridge . . . . 5–3

**B Fixing Assembly Cleaner** 5–4
B.1 Replacing the Fixing Assembly Cleaner . 5–4
B.2 Cleaning the Fixing Roller . . . . . 5–5

**C Corona Wires** 5–5
C.1 Cleaning the Primary Corona Wire . . . . . 5–5
C.2 Cleaning the Transfer Corona Wire . . . . 5–7

**D Cleaning the Transfer Guide** 5–8

**E The Separation Belt** 5–9
E.1 Cleaning the Separation Belt . . . . . 5–9
E.2 Replacing the Separation Belt . . . . . 5–9

**F Clearing a Paper Jam** 5–11

**G Troubleshooting** 5–15

G.1 Status Codes . . . . . 5–15
G.2 Error Codes . . . . . 5–16
G.3 The Diagnostic Page . . . . . 5–17
G.4 Print Quality Problems . . . . . 5–18

**H Placing A Service Call** **5–21**

# *Appendices*

**Appendix A** **A–1**

**Appendix B** **B–1**

**Appendix C** **C–1**

**Appendix D** **D–1**

**Appendix E** **E–1**

**Appendix F** **F–1**

**Appendix G** **G–1**

**Appendix H** **H–1**

**Appendix I** **I–1**

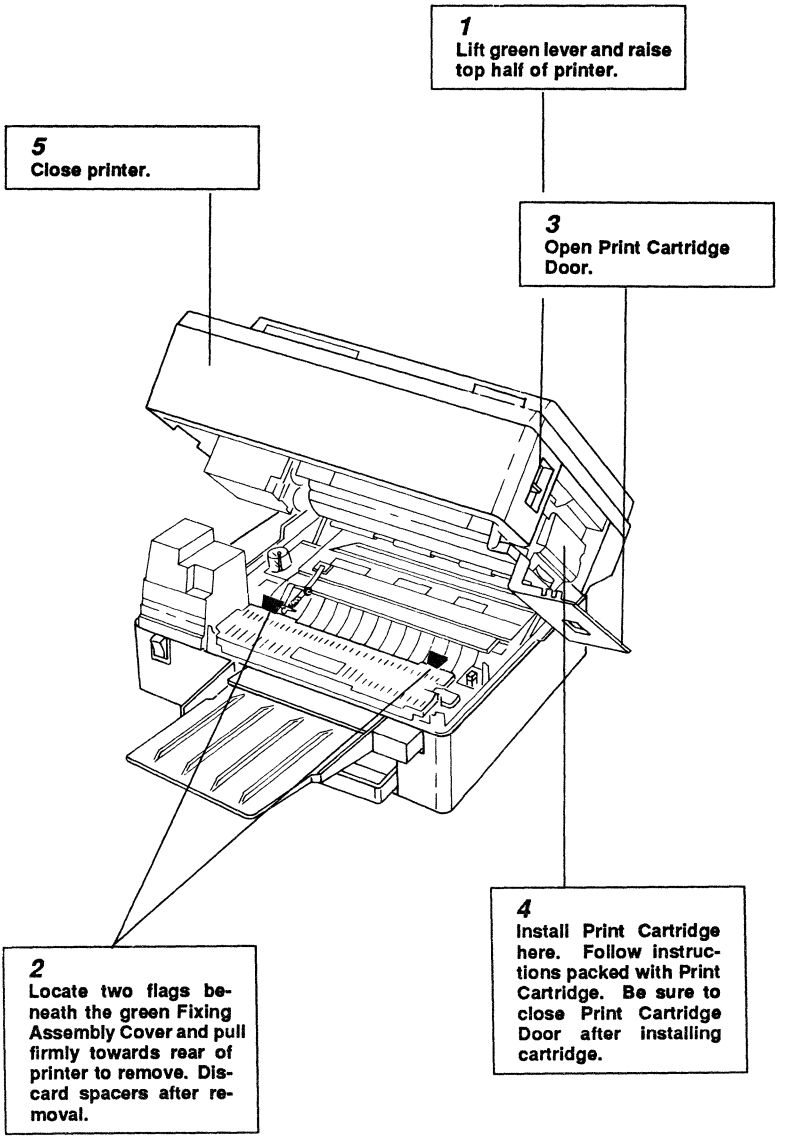
Part I

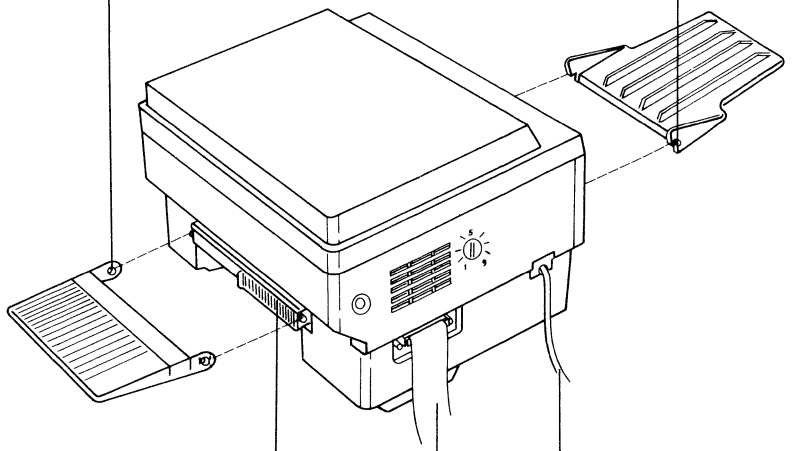
# Installation

## *Introduction*

This section of the manual will guide you through the installation of your QMS laser printer. Follow the numbered instructions on the next five pages in sequence. Skipping steps or performing steps out of sequence may cause problems.

# A Installation





***8***
**Attach Manual Feed Tray to nubs on rear of printer. Tray must be tilted slightly to fit over nubs.**

***9***
**Fit nubs on Output Stacker Tray into holes on front of printer.**

***7***
**Move printer to selected location. Lift using handles (front and rear).**

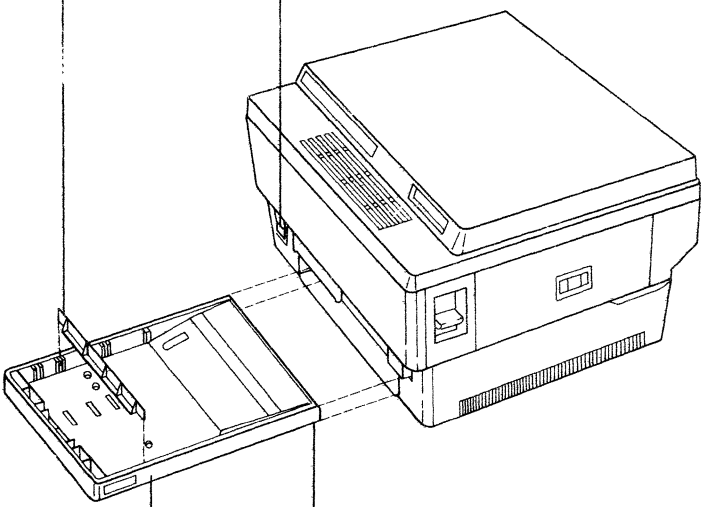
***11***
**Connect Power Cord to outlet.**

***6***
**Select a suitable location for the printer. Be sure to allow enough space to open printer, replace Print Cartridge, remove Paper Cassette, and to access the Manual Feed area of the printer. Refer to Printer Specifications in Appendix G.**

***10***
**Connect Printer Interface Cable (not included) to printer and computer. Cable may be purchased from dealer. Refer to Part III of manual for instructions on interface setup.**

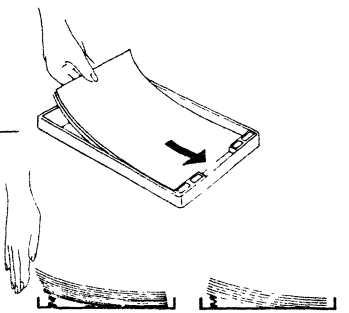
**15**
Turn on printer.

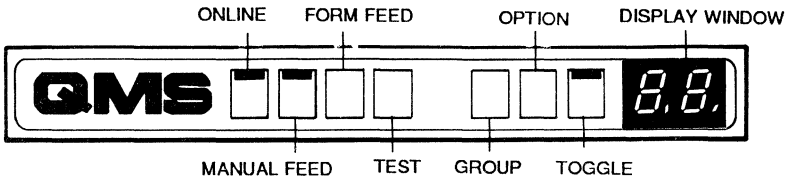
**12**
Set [illegible] bar to the pa[illegible] using (sizes are molded into bottom of Paper Cassette).



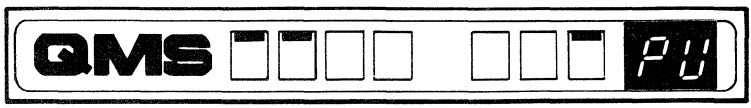
**14**
Insert Paper Cassette into printer.

**13**
Fill Paper Cassette with approximately 100 sheets of ordinary office copier paper. Fit paper under the clips in the Paper Cassette. Side of paper to be printed should be face down.

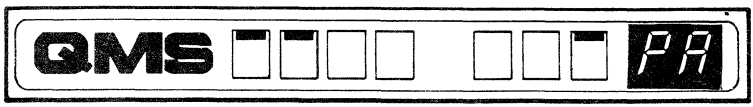




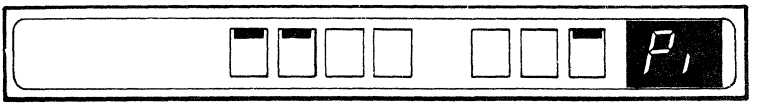

***16***
**Printer performs self-test.**



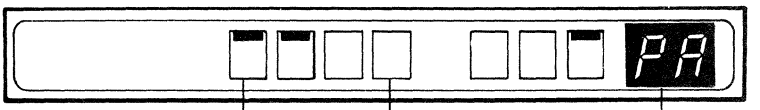

***17***
**Printer warms-up.**




***18***
**Printer prints a Status Summary Sheet. Never send data to the printer until after the status summary sheet has printed.**




*19*
**Printer idle. Ready to receive data.**

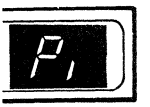



*20*
**Push ONLINE key.**

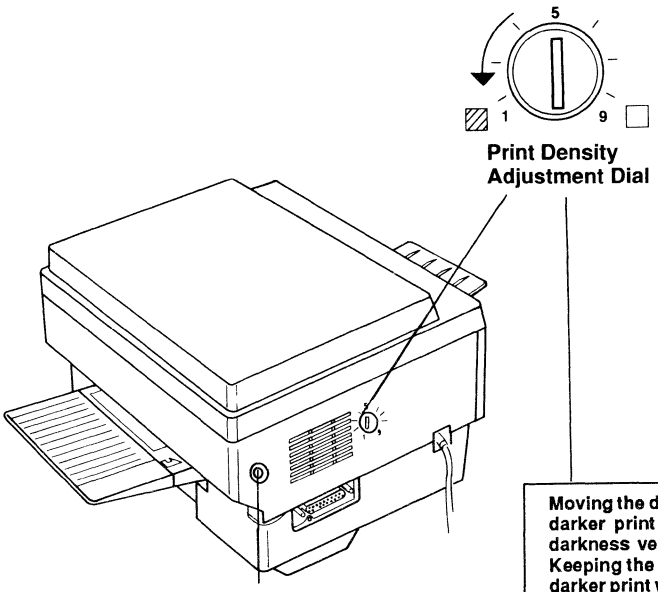
*21*
**Push TEST key.**

*22*
**Printer prints samples of each "Defined Font" listed on Status Summary Sheet.**

*23*
**Printer idle. Press the ONLINE key and printer is ready to receive data.**



# *B Adjusting Print Contrast*




## Test Button

Depressing the Test Button prints a test of the printer's mechanical function.

Part II

# Tutorial

## *Introduction*

Your laser printer offers many adaptable features. Most of these features provide a variety of settings so that you can customize your printer to meet your requirements.

This *Tutorial* will introduce you to the following basic features, explain their purpose, and tell you how they may be changed:

- Paper Size
- Manual/Automatic Feed
- Page Orientation
- Page Margins
- Emulation Modes
- Fonts
- Copy Count
- Form feed
- Dual Interface

In the section called *The Keypad*, the *Tutorial* introduces you to the printer's keypad. It points out the keys and display window of the keypad and explains their functions.

*Making Changes* explains when to change a printer feature. It also discusses the two methods for making a change.

The following sections of the *Tutorial* describe the most common features of the printer. They point out:

1. What each feature does.
2. Which feature settings will be in effect if no changes are made.
3. How to change settings.
4. Where to look in this user's guide for more information if it is needed.

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

# A The Keypad

The keypad of your printer has four function keys, three printer setup keys, and a two-digit display window. (See *Figure 1.*) The function keys are used in the normal operation of the printer. The printer setup keys are used only to change the settings of the printer. The display window displays status and error messages during normal operation and other information when the printer setup keys are being used.

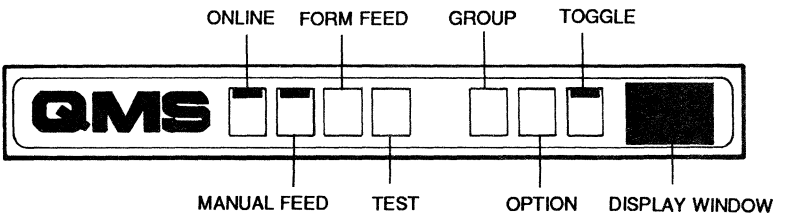
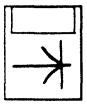


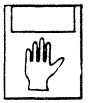

**Figure 1: The Printer Keypad**

## A.1 Function Keys

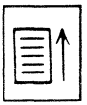
The four Function keys are: **ONLINE**, **MANUAL FEED**, **FORM FEED**, and **TEST**. Their purposes are as follows:



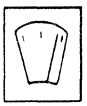
The **ONLINE** key takes the printer on-line (in communication with the computer) or off-line. When the green indicator light is on, the printer is on-line.



The **MANUAL FEED** key switches the printer from automatic (cassette) paper feed to manual feed. When the green indicator light is on, the paper may be hand fed from the manual feed tray. This key works only if the printer is off-line. (See *Section C.*)



The **FORM FEED** key causes the printer to print a partial page. (See *Section I.*) This key works only if the printer is off-line.



The **TEST** key prints a sample page of each of the printer's resident character sets. The printer must be off-line for this key to work.

## A.2 Printer Setup Keys

The three printer setup keys are: **GROUP**, **OPTION**, and **TOGGLE**. Their purposes are as follows:

The printer features are divided into categories called **Groups**, each represented by a letter or number. The **GROUP** key calls up each Group and displays it as the left digit of the Display Window.

To use the GROUP key place the printer off-line. Press the GROUP key. The letter of the first Group will appear in the display window. As you continue to press the Group key, the left digit of the display will show each of the Groups in sequence. If your printer has the Epson option, the order of Groups is: A, C, d, E, L, P, q, 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. If your printer has the Proprinter option the order of Groups is A, C, d, i, L, P, q, 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. (The "d", "i", and "q" are lowercase.)

Groups have sub-categories called **Options**. To use the **OPTION** key, first follow the procedure to select the proper Group. Then press the OPTION key. The right digit of the display window will change to the next Option number ("1"). As you continue to press the OPTION key, the right digit of the display will show each of the Options. The number of Options will vary according to the Group. The sequence of Option numbers is 0 through 9 and may extend into alphabetic characters.

**Group Option**

**Figure 2: Display Window**

The **TOGGLE** key is the "on/off" switch for the Options. An Option will be either on or off. If the Option is off, pressing the TOGGLE key will turn it on. If the Option is on, it will turn it off.

The TOGGLE key has a green lighted indicator. This indicator is lighted when the Option appearing in the display window is on.

# *B Making Changes*

The printer comes from the factory with each feature set in a **default** setting. This default setting remains in effect unless you change it. As you read about each feature decide if the default If you prefer to change the setting, carefully follow the directions to make the change.

There are two ways to change a selection: with the Keypad or a software command. The changes illustrated in this *Tutorial* are made with the Keypad. If you wish to make the changes through software commands refer to the referenced portions of the user's guide.

This *Tutorial* will show you the proper step-by-step sequence to press the GROUP, OPTION, and TOGGLE keys to change the settings for several common features. All setting changes except "current font" (*Section H.2.1*) remain in effect after the printer is powered off.

The "0" Option is used to store setting changes. When the TOGGLE key is pressed with the "0" Option of **any** Group in the display window, all setting changes are put into effect and a status summary sheet is printed.

The illustrations in the following section show you what you see as you follow the step-by-step procedure. The display window illustrations show the display which occurs after each change. The indicator lights on the ONLINE, MANUAL FEED, and TOGGLE keys are shown white if they are lighted and black if they are not.

Light is ON. Light is OFF.

**Figure 3: Indicator Lights**

**NOTE FOR LASERJET EMULATION MODE USERS:** When the printer is in LaserJet Emulation Mode, it ignores all settings made through the keypad affecting page description (i.e., current font, page margins, page size, page orientation, and number of copies).

# *C Paper Size*

The first step in setting up the printer is to select the paper size. The paper sizes you may use with your printer are listed on the status summary sheet.

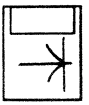
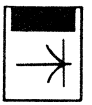
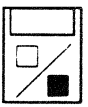
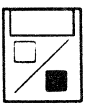
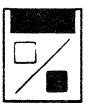
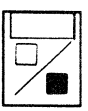
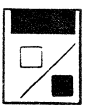
The printer uses the paper size setting to compute the area on which it can print. This print area affects the page margins that are set in the printer. You must specify the paper size to insure the page margins are correct.

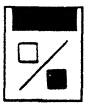
## C.1 The Default: Letter

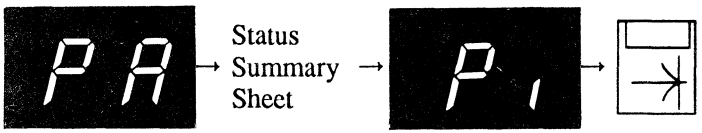
If you wish to use letter size (8.5×11", 216×279mm) paper, the printer is properly set.

## C.2 Changing Paper Size

If you want to print on paper other than letter size, you will need to purchase the paper cassette for that size from your dealer. You must also change the paper size setting in your printer. The following example illustrates how to change to A4 size (210×297mm, 8.3×11.7").

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: | | Option 4 |
| 4. Press  | | Option 4 Off |
| 3. Press until: | | Option 5 |
| 4. Press  |  | Option 5 Off |
| 5. Press until: | | Option 6 |
| 6. Press  |  | Option 6 Off |

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 7. Press | | Ready to save changes |
| 8. Press  | See sequence below: | Changes saved. |




To change to any other size or for more detailed instructions for making this change, see:

| Paper Size (Keypad) | |
|---|---|
| **Part III Section K.3** | **Group 1 Options 4-6** |

You may also make this change through a software command. For the instructions for using this method see:

| | |
|---|---|
| **Part IV Section D** | **Paper Size (Software)** |

# D 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 3).

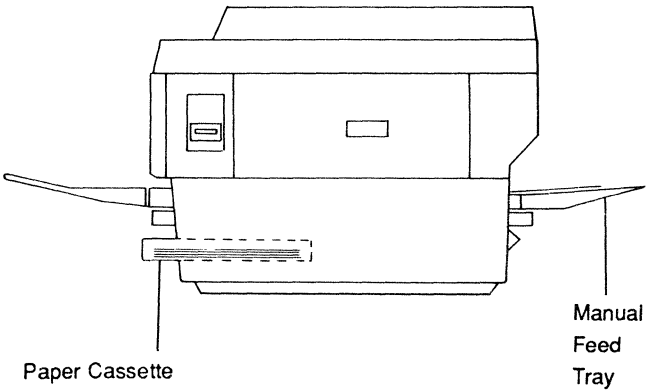


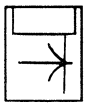
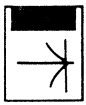
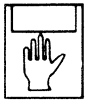
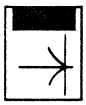
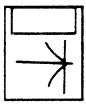

**Figure 4: Paper Sources**

## D.1 The Default: Automatic Paper Feed

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

## D.2 Selecting Manual Feed

To set the printer for manual feed:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press |  | Set for manual feed |
| 3. Press  |  | On-line |

Once the printer is set for manual feed use the following procedure. (Be sure you insert the paper with the side to be printed facing up.)

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| Send data to the printer. | | Feed Paper |
| Align paper with tray guide. | Feed mechanism will pull sheet into printer. | |
| | | Printer Active |
| | | Feed Paper |

To return the printer to automatic paper feed, reverse the procedure for selecting manual feed. The lighted indicator in the MANUAL FEED key will go out signifying that the printer is set for automatic paper feed.

You may also make this change through a software command. For the instructions for using this method see:

| Part IV Section D Paper Source (Software) |
|---|

**NOTE: Paper source is a part of the page description that may not be changed once page description is complete. See "Form Feed Command" (Section J).**

# E Page Orientation

**Page orientation** refers to the direction that text is printed on the page. Your printer can print in two page orientations: **portrait** and **landscape**. In the portrait orientation the text is parallel to the short dimension of the page. This user's guide is printed in portrait. In landscape the text is parallel to the long dimension of the page.

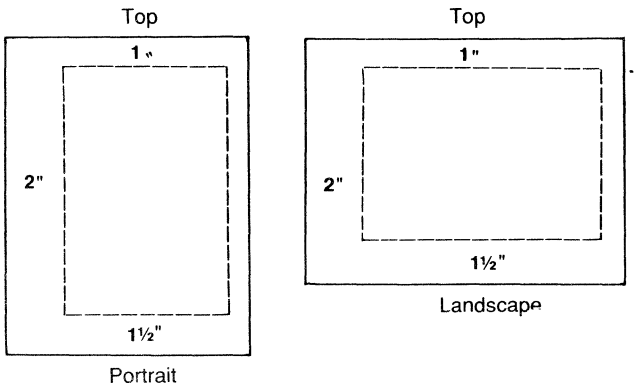



**Figure 5: Page Orientation**

## E.1 Selecting a Page Orientation

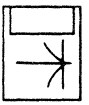
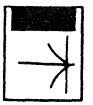
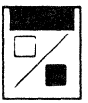
Your choice of page orientation depends upon what you intend to print. For letters and most documents, portrait is the preferred orientation. For wide tables or spread sheets, landscape may be needed.

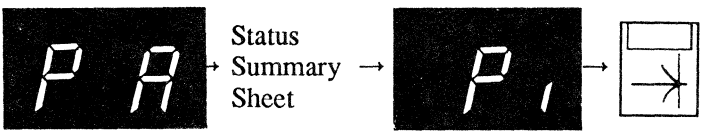
## E.2 The Default: Portrait Orientation

The default page orientation is portrait. If you will be printing letters, reports, or most other documents, your printer is properly set.

## E.3 Selecting Landscape Orientation

If you wish to print spreadsheets or other documents in the Landscape Orientation, follow this procedure:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: | | Option 9 |
| 4. Press  | | Option 9 On |
| 5. Press | | Ready to save changes |
| 6. Press | See sequence below: | Changes saved. |



For more detailed instructions for making this change, see:

| Page Orientation (Keypad) | |
|---|---|
| **Part III Section K.2** | **Group 1 Option 9** |

You may also make this change through a software command. For the instructions for using this method see:

| | |
|---|---|
| **Part IV Section C** | **Page Orientation (Software)** |

# *F Page Margins*

Page margins can be set in the printer but may also be set by the software package you are using. Page margins set using a software package will take precedence over the margins set in the printer.

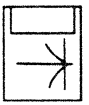
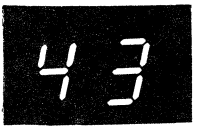
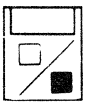
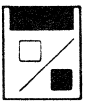
**There is also a limit of approximately 3mm (0.1") at the top of the page, 6mm (0.25") at the left and bottom of the page, and 9mm (0.3") at the right of the page where no characters may be printed. This limit, imposed by the printing mechanism, must be taken into account when specifying page margins.**

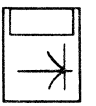
## F.1 Default Margins

The printer's default page margins are 0 cm for the top, bottom, left and right margins. If you wish to use your software package to set the margins, your printer is properly set.

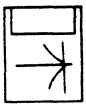
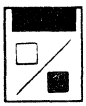
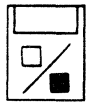
## F.2 Setting Page Margins

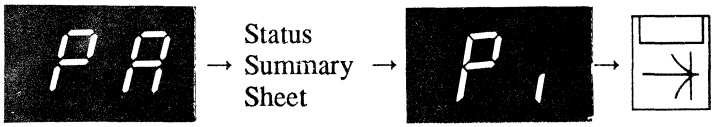
To set the left page margin to 2,54 cm (1"):

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  | | Off-line |
| 2. Press until: | | Group 4 |
| 3. Press until: |  | Option 3 |
| 4. Press  |  | Option 3 On |
| 5. Press | | Ready to save changes |
| 6. Press | See sequence below: | Changes saved. |

→ Status Summary Sheet → → 

To set the right page margin to 2,54 cm (1"):

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  | | Off-line |
| 2. Press until: | | Group 4 |
| 3. Press until: | | Option 7 |
| 4. Press  |  | Option 5 On |
| 5. Press | | Ready to save changes |
| 6. Press | See sequence below: | Changes saved. |




To select any other setting or for more detailed instructions for making this change, see:

| Page Margins (Keypad) | |
|---|---|
| **Part III Section N** | **Group 4 Options 1-F** |

# *G Emulation Modes*

Your laser printer is designed to respond to many of the same programs and commands as these line printers: Qume Sprint, the Diablo 630, the HP LaserJet and either the Epson FX-80, or IBM Proprinter depending to the model purchased. The laser printer can **emulate** (imitate) any one of these printers. To select an emulation mode is to specify the printer that you wish your laser printer to imitate.

## G.1 Selecting an Emulation Mode

You might choose an emulation mode because of previous use of one of the emulated printers. Or, it could be based on a preference for the features of one emulation.

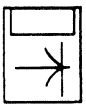
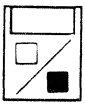
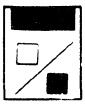
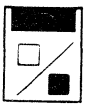
## G.2 The Default: Epson Emulation OR Proprinter Emulation

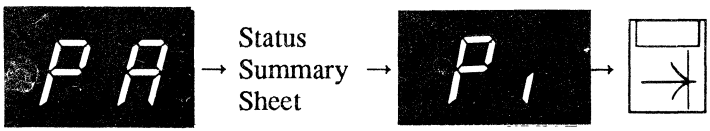
The default emulation for your printer is either Epson or Proprinter. If you do not change this setting in your printer, it will carry out the commands and features of either an Epson FX-80 or IBM Proprinter (depending on the model). If you are currently using a word processing package or other software designed to work with the default emulation of your printer, it is ready to print.

## G.3 Selecting Another Emulation

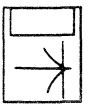
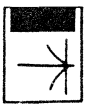
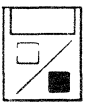
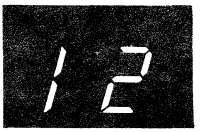
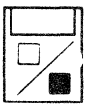
If your word processing package is set up for a Diablo, Qume or LaserJet printer, or if you prefer one of these emulations or the ANSI command mode, you should change the emulation mode setting.

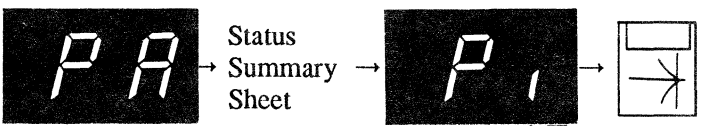
To select ANSI command mode do the following:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  | | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: | | Option 2 |
| 4. Press  |  | Option 2 Off |
| 5. Press | | Ready to save changes |
| 6. Press  | See sequence below: | Changes saved. |

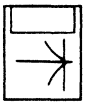
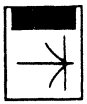
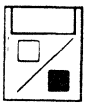
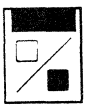


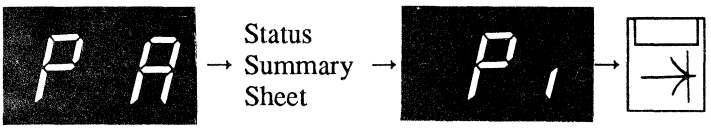
To select Diablo emulation do the following:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: | | Option 1 |
| 4. Press |  | Option 1 On |
| 5. Press until: |  | Option 2 |
| 6. Press  | | Option 2 Off |
| 7. Press | | Ready to save changes |
| 8. Press | See sequence below: | Changes saved. |

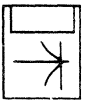
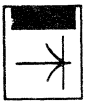
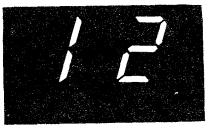
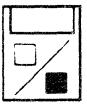
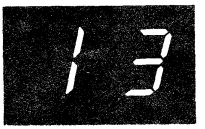
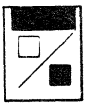
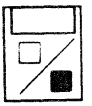
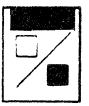


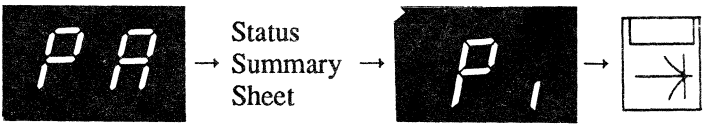
To select Qume emulation do the following:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: | | Option 1 |
| 4. Press |  | Option 1 On |
| 5. Press | | Ready to save changes |
| 6. Press  | See sequence below: | Changes saved. |



To select LaserJet emulation do the following:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  |  | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: |  | Option 2 |
| 4. Press  | | Option 2 Off |
| 5. Press until: |  | Option 3 |
| 6. Press  |  | Option 3 On |
| 7. Press | | Ready to save changes |
| 8. Press  | See sequence below: | Changes saved. |



For more detailed instructions for making this change, see the following section of the user's guide:

| Emulation Mode (Keypad) | |
|---|---|
| **Part III Section K.1** | **Group 1 Options 1, 2, and 3** |

You may also make this change through a software command. The instructions for using this method are located in the following place in this user's guide:

| | |
|---|---|
| **Part IV Section F** | **Emulation Mode (Software)** |

Be sure to make any necessary changes to your software setup so it matches the emulation you have chosen. You will find this information in the instructions for your software package. It is usually listed under "Printer Configuration" or a similar heading.

## G.4 Selecting Emulation Features

Once an emulation mode has been selected, the default features of that emulation are in effect. These features can be changed to meet your requirements. (See *Appendices D-H* of this user's guide for a detailed description of the features and commands of each emulation.)

For instructions for making these changes, see the following sections of the user's guide:

| ANSI Command Mode Features | |
|---|---|
| **Part III Section B** | **Group A Options 1 to 9** |

| Diablo Emulation Features | |
|---|---|
| Part III Section D | Group D Options 1 to 6 |

| Epson Emulation Features | |
|---|---|
| Part III Section E | Group E Options 1 to A |

| Proprinter Emulation Features | |
|---|---|
| Part III Section F | Group I Options 1 to 5 |

| Qume Emulation Features | |
|---|---|
| Part III Section I | Group Q Options 1 to 6 |

# *H Fonts*

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

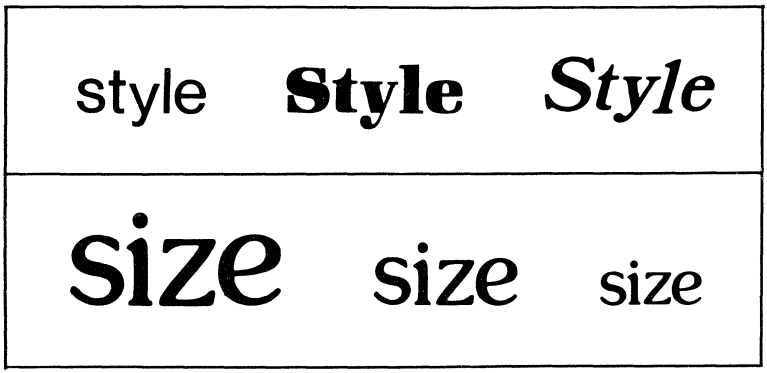



**Figure 6: Font Style and Size**

## H.1 The Default Fonts

Two fonts are pre-set as default fonts (one for portrait and one for landscape orientation). These default fonts are shown in reverse type on the status summary sheet. If you do not specify a different font, the printer will automatically print in the default font for the orientation it is in. If you do not wish to select a different font, the printer is properly set.

## H.2 Selecting a Font

Fonts may be selected two ways: by changing the current font, or by changing the power-up fonts.

## H.2.1 Changing the Current Font

The font may be changed at any time during the operation of the printer. The fonts you may use are listed on the status summary sheet. (Each font may be used in any emulation.) If you change fonts, the new font will become the **current font**. The current font will be in effect until the printer is powered off.

Because of the number of possible settings, please see the following section of *Printer Setup* for instructions for changing the current font:

| Changing Fonts (Keypad) | |
|---|---|
| **Part III Section C** | **Group C Options 1-5** |

You may also make this change through a software command. For the instructions for using this method see:

| Part IV Section B | Selecting a Font (Software) |
|---|---|

## H.2.2 Changing Power-Up Fonts

The printer powers up in the default font of each orientation (portrait or landscape). The printer will print in these fonts until a new current font is specified. Each default font (portrait and landscape) can be changed so that the printer powers up in whichever font you specify.

**NOTE:** When the printer is in the factory default setting (either Epson or Proprinter emulation depending on the model you ordered), it selects the Pica font (font number 382 or 385) regardless of the font specified as the power-up font. If the printer is powered-up in Diablo or Qume Emulation Mode and then switched to Epson or Proprinter Emulation Mode, it will automatically select the Pica font and ignore the power-up font.

See *Part III Section E.6* (Group E Option A) or *Part III Section F.5* (Group I Option 5) for printer set-up information that allows a font already in use to override the Pica font when either Epson or Proprinter Emulation Mode is accessed.

To change the power-up landscape font see the following section of the user's guide:

| Changing Power-Up Landscape Font (Keypad) | |
|---|---|
| **Part III Section G** | **Group L Options 1-5** |

To change the Power-Up Portrait Font see the following section of the user's guide:

| Changing Power-Up Portrait Font (Keypad) | |
|---|---|
| **Part III Section H** | **Group P Options 1-5** |

## H.3 Download Fonts

**Download fonts** are fonts which are stored outside of the printer (usually on floppy diskette) and are loaded into the printer's memory when needed. Your dealer can assist you with purchasing downloadable fonts. Downloading of fonts may only be done when the printer is in ANSI command mode, Epson Emulation Mode, Proprinter Emulation Mode, or HP LaserJet Emulation Mode. Refer to the *ANSI X3.64 Programming Language Manual* or the applicable appendix at the back of this manual for more information.

## H.4 Optional Font Cartridge

Additional fonts may be accessed by your printer through optional font cartridges. Refer to Appendix A for more information on the use and installation of font cartridges.

# *I Copy Count*

Copy count is the number of copies of a single job that the printer will print. The copy count may be set from 1 to 99 using the keypad or to as many as 5000 by using the software command.

## I.1 The Default: Single Copies

The default copy count is one. If you want to print one copy of any file, the printer is properly set.

## I.2 Changing the Copy Count

Because of the number of possible settings, please see the following section of *Printer Setup* for instructions for changing the copy count:

| Copy Count (Keypad) | |
|---|---|
| **Part III Section L** | **Group 2 Options 1-9** |
| **Part III Section M** | **Group 3 Options 1-9** |

You may also make this change through a software command. The instructions for using this method are located in the following place in this user's guide:

| | |
|---|---|
| **Part IV Section E** | **Copy Count (Software)** |

## I.3 Copy Count Reset

The Copy Count may be reset to one with the following procedure:

| Copy Count Reset (Keypad) | |
|---|---|
| **Part III Section J.1** | **Group 0 Option 1** |

You may also make this change through a software command. The instructions for using this method are located in the following place in this user's guide:

| Part IV Section E Copy Count (Software) |
|---|

# *J Form Feed Command*

Your laser printer is a "page printer" (instead of a "line" printer). A page printer gathers in all the data that is sent from the computer and stores it in an area called "page description memory." When the printer senses that this area is full, it prints the data. **Once the printer senses that this area is full, no changes to the "description" of the page can be made (i.e., current font, paper source, orientation, etc.).**

If the data sent to the printer does not fill up the page description memory, the printer will show **P A** in its display window and will wait until one of the following happens:

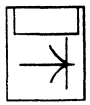
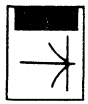
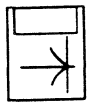
- More data is received and the page description memory is filled.
- A command signal to print whatever is stored in page description memory is received.

The command signal to print whatever is stored in page description memory is the **form feed** command. If your word processor or software package does not attach a form feed command to the end of every file, the last page of some files may not be ejected from the printer (not enough data to fill page description memory). If you do not eject this data from the memory area, it will be printed on the first page of the next file you send.

**If the printer has not received the form feed command, changes to the page description memory may be made.**

## J.1 Sending the Form Feed

To send the form feed command through the printer keypad:

| Do This: | This Will Result: |
|---|---|
| 1. Press  |  |
| 2. Press | Page will eject. |
| 3. Press |  |

# *K Dual Interface*

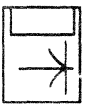
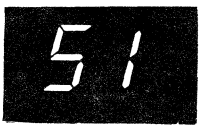
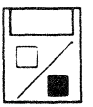
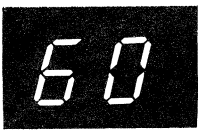
Your laser printer supports both parallel and serial interfacing. The computer and printer communicate through the interface. If the proper interface is not established between computer and printer, there can be no communication.

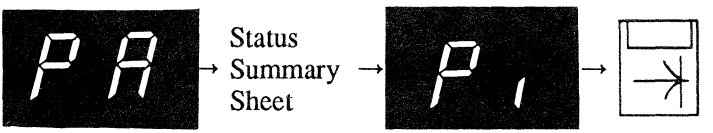
## K.1 The Default: Parallel Interface

The printer's default interface is Parallel. If you wish to use a parallel interface, your printer is properly set.

## K.2 Specifying Serial Interfacing

If you wish to use a serial interface, you will need to make the following changes:

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  | | Off-line |
| 2. Press until: | | Group 5 |
| 3. Press until: |  | Option 1 |
| 4. Press |  | Option 1 On |
| 5. Press |  | Ready to save changes |
| 6. Press | See sequence below: | Changes saved. |



To ensure that computer and printer protocols match, and for more detailed instructions for making this change, see:

| Interface Options | | |
|---|---|---|
| **Part III** | **Section P** | **Serial Interface Options** |
| **Part III** | **Section Q** | **Parallel Interface Options** |

# *L Using Software Commands*

Software commands are commands to the printer that you type at your computer keyboard and transmit to the printer just as you would send a file for printing. Since you transmit software commands to the printer over the same line as print data, the printer needs a signal that tells it, "This is a command." Your laser printer uses the "<ESC>" code (decimal code 27) as this signal.

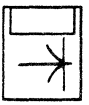
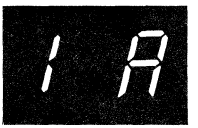
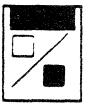
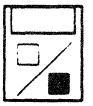
Do not confuse <ESC> with the **Esc** key on your computer keyboard. Transmitting an <ESC> code to the printer can pose problems on many computer systems. You may wish to refer to your computer's documentation for any special instructions for transmitting "low-value" codes. If your computer does not allow transmission of an <ESC> code, you may set your laser printer to use the "tilde" character (~) as the signal for software commands.

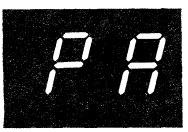
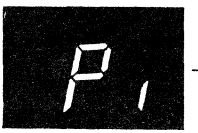
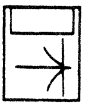
## L.1 The Default: <ESC>

If you do not need to transmit software commands from your computer or if you intend to use <ESC> (decimal code 27), you do not need to make any changes to the printer.

## L.2 Substituting Tilde

If you want to set the printer to substitute ~ as the signal to the printer for software commands, do this.

| Do This: | This Will Result: | Meaning: |
|---|---|---|
| 1. Press  | | Off-line |
| 2. Press until: | | Group 1 |
| 3. Press until: |  | Option A |
| 4. Press  |  | Option A On |
| 5. Press | | Ready to save changes |
| 6. Press | See sequence below: | Changes saved. |

 → Status Summary Sheet →  → 

After making this change, transmitting a tilde (~) to the printer will signal the printer to interpret the data following the tilde as a software command.

For more detailed instructions about making this change, see:

| Embedding <ESC> | |
|---|---|
| **Part III Section K.5** | **Group 1 Option A** |

You may also make this change through a software command. For the instructions for using this method see:

| | |
|---|---|
| **Part IV Section H** | **Redefining Characters** |

# *M 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.

## M.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. When printing begins to appear faint, a new print cartridge should be installed.

For more information see the following section in *Part V, Maintenance and Troubleshooting*:

| Part V Section A | Print Cartridge |
|---|---|

## M.2 Paper Jam

Paper jams, though infrequent, may occur. A paper jam is indicated in the display window as a **PJ**. 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.

For complete information and illustrations see the following section in *Part V, Maintenance and Troubleshooting*:

| Part V Section F | Paper Jams |
|---|---|

## M.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 V, Maintenance and Troubleshooting*:

| | |
|---|---|
| **Part V Section G.3** | **Print Quality** |

## M.4 Status and Error Codes

Errors and other conditions are indicated by a two-digit error code or status code appearing in the keypad display window or on the diagnostic page. The display window codes usually represent either normal operating conditions ("data being received", "printer idle", etc.) or less harmful errors (such as "paper jam" or "paper out"). A **diagnostic page** is printed when the printer senses a more serious condition.

For a complete listing of error codes and status codes see the following section in *Part V, Maintenance and Troubleshooting*:

| | |
|---|---|
| **Part V Section G.1** | **Error Codes** |
| **Part V Section G.2** | **Status Codes** |

# N 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, Printer Setup* gives more information about selecting features with the keypad and provides a complete listing of Groups and Options.

*Part IV, Printer Software Commands* presents complete instructions for changing printer features with commands sent to the printer from your computer.

*Part V, 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.

*Appendix A, Font Information* describes fonts and font commands. It also provides tables which give character locations and widths.

*Appendix B, Conversion Tables* lists hex, decimal, octal and binary equivalents of ASCII characters.

*Appendix C, Printer Setup* is a summary of the Groups and Options used to configure the printer. These are explained in detail in *Part III.*

*Appendix D, Diablo Emulation Mode* presents a complete description of the Diablo Emulation Mode. It lists supported and unsupported commands and offers a complete explanation of each feature.

*Appendix E, Epson Emulation Mode* provides a complete description of the Epson Emulation Mode. It lists supported and unsupported commands and gives a complete explanation of each feature.

*Appendix F, Proprinter Emulation Mode* presents a complete description of the Proprinter Emulation Mode. It lists supported and unsupported commands and offers a complete explanation of each feature.

*Appendix G, Qume Emulation Mode* gives a complete description of the Qume Emulation Mode. It lists supported and unsupported commands and presents a complete explanation of each feature.

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

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

Part III

# Printer Setup

## *Introduction*

**Printer Setup** means customizing the printer to meet your particular printing needs. Printer Setup is performed through the printer's keypad.

In Part III you will find:

1. A description of the GROUP, OPTION, and TOGGLE keys and the display window.
2. Step-by step instructions for making printer setup changes.
3. An explanation of all features that can be changed.

The features you can use to customize your printer are explained in the order the Groups and Options appear in the display window of the printer. However, a cross-reference is provided on the next few pages that groups these feature into the following task categories:

**Paper Handling Features**

**Printer Emulation Features**

**Printer Interface Features**

**Diagnostic Features**

**Font Handling Features**

**Printer Resets**

**Miscellaneous Features**

## *Paper Handling Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Blank Pages, Suppressing** | 0 | 7 |
| **Number of Copies** | 2 | 1 through 9 |
| | 3 | 1 through 9 |
| **Page Margins** | 4 | |
| Left Margin | 4 | 1,2,3,4 |
| Right Margin | 4 | 5,6,7,8 |
| Top Margin | 4 | 9,A,B,C |
| Bottom Margin | 4 | D,E,F |
| **Page Orientation** | 1 | 9 |
| **Paper Size** | 1 | 4,5,6 |

## *Printer Emulation Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Diablo Emulation Features** | D | |
| Character Spacing | D | 1,2 |
| Carriage Returns | D | 3 |
| Line Feeds | D | 4 |
| Proportional Spacing | D | 6 |
| **Emulation Mode, Selecting** | 1 | 1,2,3 |
| **Epson Emulation Features** | E | |
| Default Font | E | 1 |
| Default Print Quality | E | 2 |
| Int'l Characters | E | 3,4,5 |
| Carriage Returns | E | 6 |
| Zeros w/slash | E | 7 |
| Active Font | E | A |

## *(Emulation Features, cont.)*

| | | |
|---|---|---|
| **Proprinter Emulation Features** | I | |
| Carriage Return | I | 2,4 |
| Character Set | I | 3 |
| Pica Mode Font | I | 5 |
| Printing Zeros | I | 1 |
| **Qume Emulation Features** | Q | |
| Character Spacing | Q | 1,2 |
| Line Spacing | Q | 3 |
| Carriage Returns | Q | 4 |
| Auto Carriage Return/Line Feed | Q | 5 |
| Proportional Spacing | Q | 6 |

## *Printer Interface Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Eighth Bit** | 5 | 9,A |
| **Interface Type** | 5 | 1 |
| **Parallel Interface Features** | 7 | |
| Printer Error | 7 | 1 |
| Set Printer Error | 7 | 2 |
| Set Fault Bit | 7 | 3 |
| Off-line on Error | 7 | 4 |
| Busy on Off-line | 7 | 5 |
| Data Flow Control | 7 | 6 |

## *(Interface Features, cont.)*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Serial Interface Features** | 6 | |
| Bit Rate | 6 | 6,7,8,9 |
| Data Bits | 6 | 5 |
| DTR | 6 | A |
| Parity | 6 | 1,2,3 |
| RTS | 6 | B |
| Stop Bits | 6 | 4 |
| XON/XOFF | 6 | C |

## *Diagnostic Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Diagnostic Features** | 9 | |
| Debugger | 9 | D |
| Diagnostic Page | 9 | E |
| Debugger Mode | 9 | F |
| **Hex Dump** | 0 | 3 |

## *Font Handling Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Changing Fonts** | C | 1,2,3,4,5 |
| **Power-Up Landscape Font** | L | 1,2,3,4,5 |
| **Power-Up Portrait Font** | P | 1,2,3,4,5 |

## *Printer Resets*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Cancel Printing** | 0 | 2 |
| **Number of Copies** | 0 | 1 |
| **Printer Setup Reset** | 0 | 5 |
| **Translation Tables** | 0 | 6 |
| | 0 | 9 |
| | 0 | A |
| **Warm Restart** | Any | 0 |

## *Miscellaneous Features*

| FEATURE | GROUP | OPTION(S) |
|---|---|---|
| **Form Feed/Carriage Return** | 0 | 4 |
| **Input Buffer** | 5 | 3,4,5,6,7,8 |
| **On-line/Off-line** | 5 | 2 |
| **Printer Alignment** | 8 | |
| Horizontal | 8 | 1,2,3,4 |
| Vertical | 8 | 5,6,7,8 |
| **Status Summary, Suppressing** | 0 | 8 |
| **Substituting Tilde for <ESC>** | 1 | A |

# A Groups

The available printer features are categorized into *Groups*:

- GROUP A – ANSI Command Mode Options
- GROUP C – Changing Fonts
- GROUP d – Diablo Emulation Options
- GROUP E – Epson Emulation Options
- GROUP i – Proprinter Emulation Options
- GROUP L – Select Power-Up Landscape Font
- GROUP P – Select Power-Up Portrait Font
- GROUP q – Qume Emulation Options
- GROUP 0 – System Function Options
- GROUP 1 – Selecting Emulation Mode, Page Size, and Page Orientation
- GROUP 2 – Number of Copies (1 to 9 copies)
- GROUP 3 – Number of Copies (Multiples of 10)
- GROUP 4 – Page Margin Settings
- GROUP 5 – Common Interface Options
- GROUP 6 – Serial Interface Options
- GROUP 7 – Parallel Interface Options
- GROUP 8 – Printer Alignment
- GROUP 9 – Diagnostics Options

## A.1 Options

Each Group has many *Options*. These Options work alone or sometimes in conjunction with other Options to control a certain feature of the printer. For example, page margins are controlled by four Options working together. Page orientation is controlled by only one Option.

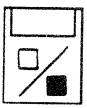
## A.2 Printer Setup Keys

The three printer setup keys are: **GROUP**, **OPTION**, and **TOGGLE**. Their purposes are as follows:

The printer features are divided into categories called **Groups**, each represented by a letter or number. The **GROUP** key calls up each Group and displays it as the left digit of the Display Window.

To use the GROUP key place the printer off-line. Press the GROUP key. The letter of the first Group will appear in the display window. As you continue to press the Group key, the left digit of the display will show each of the Groups in sequence. If your printer has the Epson option, the order of Groups is: A, C, d, E, L, P, q, 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. If your printer has the Proprinter option the order of Groups is A, C, d, i, L, P, q, 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. (The "d", "i", and "q" are lowercase.)

Groups have sub-categories called **Options**. To use the **OPTION** key, first follow the procedure to select the proper Group. Then press the OPTION key. The right digit of the display window will change to the next Option number ("1"). As you continue to press the OPTION key, the right digit of the display will show each of the Options. The number of Options will vary according to the Group. The sequence of Option numbers is 0 through 9 and may extend into alphabetic characters.



The **TOGGLE** key is the "on/off" switch for the Options. An Option will be either on or off. If the Option is off, pressing the TOGGLE key will turn it on. If the Option is on, it will turn it off. Once you press the key, the Option is changed. Do not press the **TOGGLE** key unless you are certain of the change it will cause. The TOGGLE key has a green lighted indicator. This indicator is lighted when the Option appearing in the display window is on.

## A.3 Option 0

Option 0 is the first Option displayed in every Group. This Option has a special function.

After making all the changes to customize your printer, use Option 0 of any Group to save the changes. Pressing TOGGLE whenever a zero is showing in the right half of the display window stores the current setting of all the Options into memory and executes a "warm restart". A warm restart is the equivalent of powering the printer off/on. (A warm restart will not delete any download fonts that are stored in the printer.) A status summary sheet will print out after the warm restart is completed.

## A.4 How To Change a Printer Feature

To change the setting of a printer feature, carefully follow this procedure:

1. Take the printer off-line.

2. Press GROUP to select the desired Group.

3. After the desired Group is showing in the left half of the display window, press OPTION to select the desired Option.

4. Note the setting (on/off) of the Option as indicated by the light in TOGGLE. (The light is on if the Option is on.)

5. If you wish to change the setting of the displayed Option, press TOGGLE. The light in the TOGGLE key will change immediately. Never press TOGGLE unless you are certain of the change it will cause.

6. Continue using GROUP, OPTION, and TOGGLE to change any printer features.

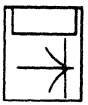
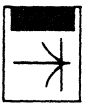
7. After you have made all desired changes, press GROUP to display any Option 0.

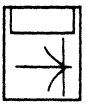
8. When a "0" is showing in the right half of the display window, press TOGGLE to store all settings (including those settings you just changed) into memory. The printer will print out a status summary sheet.

9. Check the section of the status summary sheet labelled "Enabled Options" to make sure all your changes were saved. Options that are not listed under "Enabled Options" are disabled (off).

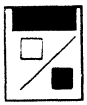
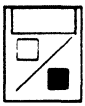
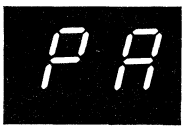
## A.5 Example: Changing Page Orientation

As an example of how to make changes to a printer feature, let's change the page orientation from portrait to landscape. Page orientation is controlled by Group 1 Option 9.

In the following example,  means the light in ON-LINE is on.  means the light in the key is off.

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press |  | | Printer is off-line. |
| Press | until | | Group 1. |

Continued on next page.

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press | until | | Group 1 Option 9. |
| Press |  |  | Turns Option 9 on. |
| Press | | | Setup Option 0. |
| Press | |  | Executes warm restart. |

When the status summary sheet prints out, notice that "LANDSCAPE" is printed in reverse type. Now, use this same procedure to change the orientation back to portrait.

# *B ANSI Command Mode Options (Group A)*

The Options in Group A only affect the printer when it is in ANSI Command Mode.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## B.1 Options 1 and 2 – Units for Status Summary Sheet

Group A Options 1 and 2 work together to tell the printer the units of measure to use when describing page margins on the status summary sheet.

**Dots**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 1 | off |
| A | 2 | off |

**Decipoints**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 1 | on |
| A | 2 | off |

**Centimetres**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 1 | off |
| A | 2 | on |

**Inches†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 1 | on |
| A | 2 | on |

(300 dots = 1" or 2,54cm)

## B.2 Option 3 – ANSI Character Spacing

This controls the default character spacing that the printer

uses if no character spacing is specified. "Font spacing" means the printer uses the spacing of the current font.

**Font Spacing†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 3 | on |

**Proportional**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 3 | off |

## B.3 Options 4 and 5 – Line Spacing

These Options work together to set the default line spacing value (expressed as *lines per inch* or *lpi*) that the printer uses if no line spacing is specified. "Font spacing" means the printer uses the line spacing of the current font.

**Font Spacing**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 4 | off |
| A | 5 | off |

**4 lpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 4 | on |
| A | 4 | off |

**6 lpi†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 4 | off |
| A | 5 | on |

**8 lpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 4 | on |
| A | 5 | on |

## B.4 Option 6 – Line Overflows

This Option controls how the printer will handle lines that are too long to fit inside the right margin.

**Print Data Past Margin†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 6 | off |

**Absorb Data Past Margin**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 6 | on |

## B.5 Option 7 – Carriage Returns

Option 7 determines how the printer will respond to Carriage Return (<CR >) characters that are received when in ANSI Command Mode.

<CR>†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 7 | off |

<CR><LF>

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 7 | on |

## B.6 Option 8 – Line Feeds

Option 8 determines how the printer will respond to Line Feed (<LF>) characters that are received when in ANSI Command Mode.

<LF>†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 8 | off |

<LF><CR>

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 8 | on |

## B.7 Option 9 – Double-spaced Lines

This Option controls whether lines will be single or double-spaced when the print is in ANSI Command Mode.

Single†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 9 | off |

Double

| GROUP | OPTION | TOGGLE |
|---|---|---|
| A | 9 | on |

# *C Changing Fonts (Group C)*

Changing from one font (typeface) to another is a task that will probably be performed frequently. The procedure for using the keypad (Group C Setup Options) to change fonts is slightly different from that for other Printer Setup Options.

**IMPORTANT: Do not use the warm restart when changing fonts.**

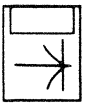
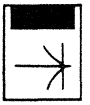
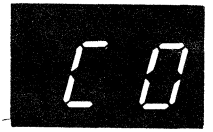
## C.1 Font Numbers

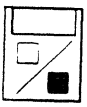
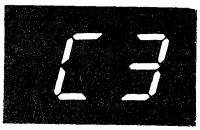
The fonts that are available in the printer are listed numerically on the status summary sheet. When using the keypad and the Group C Options to change fonts, however, the font number must be converted to a five-digit number. This is done by adding enough zeros to the front of the number shown on the status summary sheet to make it a five-digit number.

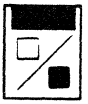
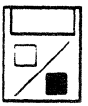
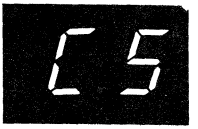
| This font number: | Converts to this number: |
|---|---|
| 382 | 00382 |
| 380 | 00380 |
| 10 | 00010 |
| 7504 | 07504 |

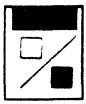
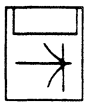
## C.2 Procedure

Here is an example of using the keypad and the Group C Options to change to Font 7504. Use this example as a guide when changing to the particular font you wish to use. This same procedure is also valid for the Group L and Group P Options. **NOTE: GROUP, OPTION, and TOGGLE function differently for the Group C, Group L, and Group P Options.**

| ACTION | RESULT | MEANING |
|---|---|---|
| Press  |  | Printer is off-line. |
| Press until |  | Group C. |
| Press | | Group C Option 1. |
| Press | | **The Option number is now shown in the left half of the window. The first digit of the font number is shown in the right half.** |

| ACTION | RESULT | MEANING |
|---|---|---|
| Press  | | Since the first digit of our font number (07504) is a zero, we continue with Option 2. |
| Press | | Now we select the second digit. |
| Press until | | The second digit is 7. |
| Press |  | This "locks in" 7 as the second digit of the font number and we continue with Option 3. |
| Press | | Third digit. |

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press | until | | Third digit is 5. |
| Press |  | | 5 is locked in and we continue with Option 4. |
| Press | | | Fourth digit is 0. |
| Press |  |  | Lock in 0 as fourth digit and continue with Option 5. |
| Press | | | Fifth digit. |

| ACTION | RESULT | MEANING |
|---|---|---|
| Press until | | Fifth digit is 4. |
| Press  | | Lock in 4 as fifth digit. End of procedure. **Do not push TOGGLE while C0 is displayed.** |
| Press |  | Printer is back online. |

## C.3 Font Selection and the Option 0 Warm Restart

Notice that the procedure for changing fonts does not include an Option 0 warm restart. **The warm restart is not necessary when changing fonts.** Performing a warm restart after changing fonts would reset the font choice to the font specified as the factory setting.

## C.4 Automatic Font Selection

If you do not specify a particular font, the printer is designed to select one automatically. The font that the printer would select in such a case depends on the current emulation mode. If the printer is in Diablo or Qume emulation mode, it is designed to select either the power-up portrait font (Group P Options) or the power-up landscape font (Group L Options) depending on which page orientation is being used.

If you are using Epson emulation mode, the printer is designed to select the "Epson Pica" font (font number 382) regardless of the font specified by the Group P or Group L Options. If you are using Proprinter emulation mode, the printer is designed to select the "Proprinter Pica" font (font number 385) regardless of the font specified by the Group P or Group L Options.

If you use the Group C Options while in Diablo or Qume emulation mode and then switch the printer to Epson emulation mode, the printer is designed to automatically select the "Epson Pica" font and ignore the font you were using.

(**NOTE:** Group E Option A allows you to prevent the printer from selecting the Pica font when Epson emulation mode is accessed. Group I Option 5 allows you to prevent the printer from selecting the Pica font when Proprinter emulation mode is accessed.)

# *D Diablo Emulation Options (Group D)*

The Options in Group D only affect the printer when it is in Diablo emulation mode.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## D.1 Options 1 and 2 – Diablo Character Spacing

Group D Options 1 and 2 work together to control character spacing (expressed as *characters per inch* or *cpi*) when the printer is in Diablo emulation mode and no character spacing is specified by the Diablo Horizontal Motion Index (HMI) command. (See also Group D Option 6.)

**Proportional**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 1 | off |
| D | 2 | off |

**10 cpi †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 1 | on |
| D | 2 | off |

**12 cpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 1 | off |
| D | 2 | on |

**15 cpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 1 | on |
| D | 2 | on |

## D.2 Option 3 – Carriage Returns

Option 3 determines how the printer will respond to Carriage Return (<CR>) characters that are received when in Diablo emulation mode.

**<CR>†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 3 | off |

**<CR><LF>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 3 | on |

If Option 3 is on, the result simulates a typewriter carriage return.

## D.3 Option 4 – Line Feeds

Option 4 determines how the printer will respond to Line Feed (<LF>) characters that are received when in Diablo emulation mode.

<LF>†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 4 | off |

<LF><LF>

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 4 | on |

If Option 4 is on, the result is double spaced lines.

## D.4 Option 5 – Upper Case/Lower Case

When this Option is on and the printer is in Diablo emulation, all characters "a" through "z" are converted to the upper case (capitalized) version of the character. Leave the Option off if you want upper and lower case characters determined by your files.

Normal Printing†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 5 | off |

All Upper Case

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 5 | on |

## D.5 Option 6 – Select Character Spacing

This Option lets you select either the Diablo emulation character spacing (specified by Group D Options 1 and 2) or the character spacing "built into" whatever font you are using. If no character spacing is specified through the Diablo HMI command and Option 6 is off, the printer will

use the character spacing set through Options 1 and 2. If Option 6 is on, the printer will use the character spacing of the font in use. (Refer to the status summary sheet for the character spacing of the fonts.)

**Use Diablo Spacing†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 6 | off |

**Use Font Spacing**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| D | 6 | on |

# *E Epson Emulation Options (Group E)*

The Group E Options control the printer during Epson Emulation Mode.

**NOTE: These Options will apply only if your printer emulates the Epson FX-80. If it does not emulate Epson, see the Options listed under Group I – Proprinter Emulation Mode.**

**The printer must be in Epson Emulation Mode before these Options will take effect. See Group 1 Options 1, 2 and 3 for instructions for selecting Epson Emulation Mode.**

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## E.1 Option 1 – Epson Print Mode

Option 1 allows you to select the character spacing ("pitch") of the default printing mode. Depending on the setting of this Option, the laser printer prints in either Pica format (10 characters per inch) or Compressed format (17 characters per inch) whenever you do not select a specific font.

**Pica Format (10 cpi) †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 1 | off |

**Compressed Format (17 cpi)**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 1 | on |

## E.2 Option 2 – Pica Print Quality

This Option allows you to control print darkness during Pica format printing.

**Normal†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 2 | off |

**Emphasized**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 2 | on |

## E.3 Options 3 through 5 – International Character Sets

This Option allows you to select international character sets when in Epson emulation mode.

**U.S.A. †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | on |
| E | 4 | on |
| E | 5 | on |

**France**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | off |
| E | 4 | on |
| E | 5 | on |

**Germany**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | on |
| E | 4 | off |
| E | 5 | on |

**United Kingdom**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | off |
| E | 4 | off |
| E | 5 | on |

**Denmark**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | on |
| E | 4 | on |
| E | 5 | off |

**Sweden**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | off |
| E | 4 | on |
| E | 5 | off |

**Italy**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | on |
| E | 4 | off |
| E | 5 | off |

**Spain**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 3 | off |
| E | 4 | off |
| E | 5 | off |

## E.4 Option 6 – Carriage Returns

This Option controls how the printer will respond to carriage return (<CR>) characters when in Epson emulation mode.

**<CR>†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 6 | off |

**<CR><LF>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 6 | on |

If Option 6 is on, the result simulates a typewriter carriage return.

## E.5 Option 9 – Printing Zeros

When in Epson emulation mode, this Option allows you to specify the printing of zeros with or without slashes.

**No Slashes†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 7 | off |

**Slashes**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | 7 | on |

## E.6 Option A – Changing Epson Default Font

This Option allows you to prevent the printer from selecting the "Epson Pica Font" (font 382) whenever Epson emulation mode is accessed. If this Option is on, the font in use before accessing Epson emulation mode will remain in effect after accessing Epson emulation.

**Pica Font †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | A | off |

**Current Font**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| E | A | on |

# *F Proprinter Emulation Options (Group I)*

The Group I Options control the printer during Proprinter Emulation Mode.

**NOTE: These Options will apply only if your printer emulates the IBM Proprinter. If it does not emulate Proprinter , see the Options listed under Group E – Epson Emulation Mode.**

**The printer must be in Proprinter Emulation Mode before these Options will take effect. See Group 1 Options 1 and 2 for instructions for selecting Proprinter Emulation Mode.**

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## F.1 Option 1 – Printing Zeros

When in Proprinter Emulation Mode, this Option allows you to specify the printing of zeros with or without slashes.

No Slashes†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 1 | off |

Slashes

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 1 | on |

## F.2 Option 2 – Automatic Line Feed

This Option controls the interpretation of the carriage return (<CR>) character when in Proprinter Emulation Mode.

<CR>†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 2 | off |

<CR><LF>

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 2 | on |

## F.3 Option 3 – Character Set

This Option selects Character Set 1 or Character Set 2.

**Set 1†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 3 | off |

**Set 2**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 3 | on |

## F.4 Option 4 – Carriage Returns

This Option determines whether an automatic Carriage Return is placed after each Line Feed, Vertical Tab, and <ESC>J.

**No Auto <CR>†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 4 | off |

**Auto <CR>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 4 | on |

## F.5 Option 5 – Pica Default Font

This Option allows the Current Font to remain in effect whenever Proprinter Pica Mode is entered.

**Use Pica Font†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 5 | off |

**Use Current Font**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| I | 5 | on |

## G Selecting Power-Up Landscape Font (Group L)

This Group lets you specify the landscape font that the laser printer chooses whenever it is switched to landscape orientation. After you use these Group L Options to choose a default landscape font, you can use the Group C Options to temporarily choose a different landscape font (if one is available in the printer's memory). The range of valid font numbers and the process for selecting a power-up landscape font is the same as that for Group C except that you use Group L.

**NOTE: You must use the Option 0 to store the selected power-up landscape font into memory.**

## H Selecting Power-Up Portrait Font (Group P)

This Group lets you specify the portrait font that the laser printer chooses whenever it is switched to portrait orientation. After you use these Group P Options to choose a default portrait font, you can use the Group C Options to temporarily choose a different portrait font (if one is available in the printer's memory).The range of valid font numbers and the process for selecting a power-up portrait font is the same as that for Group C except that you use Group P.

**NOTE: You must use the Option 0 to store the selected power-up portrait font into memory.**

# I Qume Emulation Options (Group Q)

The Group Q Options only take effect when the printer is in Qume emulation mode.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## I.1 Options 1 and 2 – Qume Character Spacing

Group Q Options 1 and 2 work together to control character spacing (expressed as *characters per inch* or *cpi*) when the printer is in Qume emulation mode and no character spacing is specified by the Qume Horizontal Motion Index (HMI) command. (See also Group Q Option 6.)

**Proportional**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 1 | off |
| Q | 2 | off |

**10 cpi †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 1 | on |
| Q | 2 | off |

**12 cpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 1 | off |
| Q | 2 | on |

**15 cpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 1 | on |
| Q | 2 | on |

## I.2 Option 3 – Line Spacing

This Option allows you to specify the line spacing (ex-

pressed as *lines per inch* or *lpi*) when the printer is in Qume emulation mode.

**6 lpi †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 3 | off |

**8 lpi**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 3 | on |

Six lines per inch is standard for most of the fonts in your printer. Use 8 lines per inch for smaller fonts.

Using the Vertical Motion Index (VMI) command in Qume emulation mode will allow you to more closely match the line spacing to the font in use.

## I.3 Option 4 – Carriage Return

This Option controls how the printer responds to Carriage Return (<CR>) characters it receives while in Qume emulation mode.

**<CR>†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 4 | off |

**<CR><LF>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 4 | on |

If Option 4 is on, the result simulates a "typewriter" carriage return.

## I.4 Option 5 – Automatic Carriage Return/Line Feed

This Option controls the action which the printer will take when it reaches the right margin. Some word processors insert a carriage return and line feed at the right margin. When this Option is on, files which already have carriage returns and line feeds will **not** print properly because the

printer will also insert extra ones of its own. If this Option is off, files which do not have carriage returns and line feeds will overprint on one line.

**No Auto <CR><LF>†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 5 | off |

**Auto <CR><LF>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 5 | on |

## I.5 Option 6 – Select Character Spacing

This Option lets you select either the Qume emulation character spacing (specified by Group Q Options 1 and 2) or the character spacing "built into" whatever font you are using. If no character spacing is specified through the Qume HMI command and Option 6 is off, the printer will use the character spacing set through Options 1 and 2. If Option 6 is on, the printer will use the character spacing of the font in use. (Refer to the status summary sheet for the character spacing of the fonts.)

**Use Qume Spacing†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 6 | off |

**Use Font Spacing**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| Q | 6 | on |

# *J System Function Options (Group 0)*

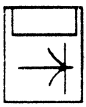
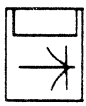
This Group controls some of the basic operation capabilities of the printer.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

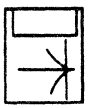
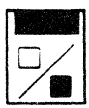
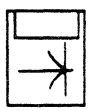
# J.1 Option 1 – Copy Count Reset

This Option allows you to interrupt the printing of multiple copies and reset the number of copies to one. This Option takes effect immediately; there is no on or off as with other Options. Use the following procedure:

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press |  | | Printer is off-line. |
| Press | | | Group 0 Option 0 |
| Press | | | Group 0 Option 1 |
| Press | | Display blinks. | Number of copies is reset to one. |
| Press | |  | Printer is back on-line. |

## J.2 Option 2 – Cancel Printing

This Option lets you cancel a print job. This Option takes effect immediately; there is no on or off as with other Options. Use the following procedure:

| ACTION | RESULT | MEANING |
|---|---|---|
| Press  | | Printer is off-line. Printing will continue until the page description memory area is clear. |
| Press until | | Group 0 Option 0 |
| Press until | | Group 0 Option 2 |
| Press  | Display blinks. | Buffer is cleared. |
| Press |  | Printer is back online. |

## J.3 Option 3 – Hex Dump

This Option is used to put the printer into hex dump mode – a diagnostic mode that allows you to examine the exact data being received by the printer. When in hex dump mode, the printer prints the hex values of the data it receives. All characters' values, including control characters, are printed. This is useful for determining exactly what characters the printer is actually receiving. Hex dump data prints on the left side of the page. Matching print data appears on the right side of the page. Control characters (values less than hex 20) and any unprintable characters appear on the right side as periods. To exit the hex dump mode, turn this Option off and toggle any Option 0.

**Normal Operation†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 3 | off |

**Hex Dump Mode**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 3 | on |

## J.4 Option 4 – Form Feed/Carriage Return

This Option controls how the printer interprets Form Feed (<FF>) characters that are followed by Carriage Return (<CR>) characters. If carriage returns following form feeds are ignored, printing will start at the top margin.

**<FF><CR>†**

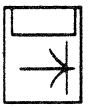
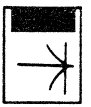
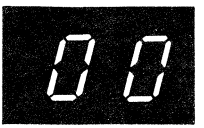
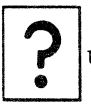
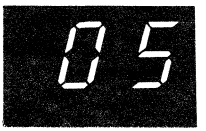
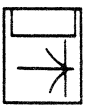
| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 4 | off |

**<FF>**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 4 | on |

## J.5 Option 5 – Printer Setup Reset

When this Option is used, all Options will be returned to their factory settings (indicated by "†"). This Option takes effect immediately; there is no on or off as with other Options. Use the following procedure:

| ACTION | RESULT | MEANING |
|---|---|---|
| Press  |  | Printer is off-line. |
| Press |  | Group 0 Option 0 |
| Press  until |  | Group 0 Option 5 |
| Press | Display blinks. | All Options are reset to factory settings. |
| Press |  | Printer is back on-line. |

## J.6 Option 6 – Reset Translation Tables

This Option concerns the software command that redefines the translation tables (explained in Part IV). It determines whether or not the Command and Font translation tables will be reset when a new emulation mode is entered or a warm restart (Option 0) is performed.

**Reset Tables†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 6 | off |

**Do Not Reset Tables**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 6 | on |

## J.7 Option 7 – Suppress Blank Pages

This Option is used to prevent the printer from ejecting blank sheets of paper. If this Option is on, the printer will not eject a page when it receives a Form Feed (<FF>) command unless it has stored some data since the last page-end.

**Print Blank Pages†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 7 | off |

**Do Not Print Blank Pages**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 7 | on |

## J.8 Option 8 – Suppress Status Summary Sheet

This Option allows you to prevent a status summary sheet from printing after a warm restart. If this Option is on, the status summary sheet will print only when you turn your printer on or when a printer software command orders it (see Part IV).

**Print Status Always†**

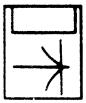
| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 8 | off |

**Only at Power-Up**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 0 | 8 | on |

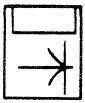
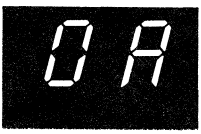
## J.9 Option 9 – Immediate Command Translation Table Reset

This Option initiates an immediate reset of the Command translation table (explained in Part IV). To reset the table to its factory setting values, follow this procedure:

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press |  | | Printer is off-line. |
| Press | | | Group 0 Option 0 |
| Press | until | | Group 0 Option 9 |
| Press | | | Command translation table is reset to factory settings. Printer is returned to on-line. |

## J.10 Option A – Immediate Font Translation Table Reset

This Option initiates an immediate reset of the Font translation table (explained in Part IV). To reset the table to its factory setting values, follow this procedure:

| ACTION | | RESULT | MEANING |
|---|---|---|---|
| Press |  | | Printer is off-line. |
| Press | | | Group 0 Option 0 |
| Press | until |  | Group 0 Option A |
| Press | | | Font translation table is reset to factory settings. Printer is returned to on-line. |

# K Selecting Emulation Mode and Page Size/Orientation (Group 1)

Group 1 Options allow you to select emulation mode, paper size, and page orientation.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting ‡= Factory setting for Epson model.

## K.1 Options 1, 2, and 3 – Emulation Mode

These Options let you specify the printer emulation mode.

**Proprinter Emulation†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | off |
| 1 | 2 | on |
| 1 | 3 | off |

**Epson Emulation‡**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | off |
| 1 | 2 | on |
| 1 | 3 | off |

**Diablo Emulation**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | on |
| 1 | 2 | off |
| 1 | 3 | off |

**Qume Emulation**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | on |
| 1 | 2 | on |
| 1 | 3 | off |

**ANSI Command Mode**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | off |
| 1 | 2 | off |
| 1 | 3 | off |

**HP LaserJet Emulation**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 1 | off |
| 1 | 2 | off |
| 1 | 3 | on |

## K.2 Options 4 through 6 – Paper Size

Always specify the paper size that you are using in the printer. If the paper size is not specified, the printer will not be able to compute page margins correctly. The choices of paper size are: A4 (Europe), 8.3× 11.7 inches (210×297mm); B5 (Europe), 7.2×10.1 inches (182×257mm); Legal (USA), 8.5×14 inches (216×356mm); Letter (USA), 8.5×11 inches (216×279mm); and Mini, 3.9×5.5 inches (100×140mm).

**A4**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 4 | off |
| 1 | 5 | off |
| 1 | 6 | off |

**B5**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 4 | on |
| 1 | 5 | off |
| 1 | 6 | off |

**Legal**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 4 | off |
| 1 | 5 | on |
| 1 | 6 | off |

**Letter†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 4 | on |
| 1 | 5 | on |
| 1 | 6 | off |

**Mini**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 4 | off |
| 1 | 5 | off |
| 1 | 6 | on |

## O.3 Options 3, 4, 5, 6, 7 – Print Buffer

Options 3, 4, 5, 6 and 7 work together to tell your printer the number of input data bytes that it can hold at one time before it must stop receiving data. This is called specifying the size of the "print buffer". There are a variety of selections for these option in order to meet most application requirements. Generally, the larger the print buffer is, the faster your data is printed and the sooner your computer is free to do other things. The range is from 132 bytes to 432K (432 times 1024) bytes in size.

**NOTE:** The print buffer shares its memory area with download fonts and overlays, and the size of the print buffer will affect the amount of bytes that are available for downloading fonts and overlays. If, after using these options to increase the size of the print buffer, you receive a Diagnostic Page with the code **15** printed under "Status Messages," it will mean that the increase in buffer size threatens to destroy some portion of memory already used by a download font or overlay. At this point you will have four choices:

1. Do not increase the size of the print buffer.

2. Check the latest status summary sheet and use the information on the number of bytes available for download to determine how much larger to make the print buffer.

3. Use a software command to selectively delete download fonts or overlays from the download area of memory.

4. Power-off/power-on the printer to clear the download area and then use options 3 through 7 to enlarge the print buffer.

(In the following table, D = off, E = on.)

| | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 | Results In |
|---|---|---|---|---|---|---|
| | D | D | D | D | D | 132 bytes |
| | E | D | D | D | D | 256 bytes |
| | D | E | D | D | D | 512 bytes |
| | E | E | D | D | D | 1 K |
| | D | D | E | D | D | 4 K |
| | E | D | E | D | D | 8 K |
| | D | E | E | D | D | 16 K |
| † | E | E | E | D | D | 32 K |
| | D | D | D | E | D | 48 K |
| | E | D | D | E | D | 64 K |
| | D | E | D | E | D | 80 K |
| | E | E | D | E | D | 96 K |
| | D | D | E | E | D | 112 K |
| | E | D | E | E | D | 128 K |
| | D | E | E | E | D | 144 K |
| | E | E | E | E | D | 160K |
| | D | D | D | D | E | 176 K |
| | E | D | D | D | E | 192 K |
| | D | E | D | D | E | 208 K |
| | E | E | D | D | E | 224 K |
| | D | D | E | D | E | 240 K |
| | E | D | E | D | E | 256 K |
| | D | E | E | D | E | 272 K |
| | E | E | E | D | E | 288 K |
| | D | D | D | E | E | 304 K |
| | E | D | D | E | E | 320 K |
| | D | E | D | E | E | 336 K |
| | E | E | D | E | E | 352 K |
| | D | D | E | E | E | 368 K |
| | E | D | E | E | E | 384 K |
| | D | E | E | E | E | 400 K |
| | E | E | E | E | E | 432 K |

## N.4 Options D through F – Bottom Margin

Options D, E, and F work together to set the bottom margin. To determine the setting, measure from the bottom edge of the paper to the place where you want the margin to be. Then select the bottom margin listed below that is closest to your measurement.

| | OPTIONS | | | BOTTOM MARGIN | |
|---|---|---|---|---|---|
| | D | E | F | | |
| † | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | 0.25" | 0,64 cm |
| | off | on | off | 0.50" | 1,27 cm |
| | on | on | off | 0.75" | 1,91 cm |
| | off | off | on | 1.00" | 2,54 cm |
| | on | off | on | 1.25" | 3,18 cm |
| | off | on | on | 1.50" | 3,81 cm |
| | on | on | on | 1.75" | 4,45 cm |

# *O Common Interface Options (Group 5)*

The Options of this Group provide limited control of the printer for specifications that are common to both parallel (Centronics type) and serial (RS-232) interfaces.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## O.1 Option 1 – Interface Type

This Option allow you to specify the type of interface you are using with the printer. If the proper interface is not established between computer and printer, there can be no communication.

**Centronics Parallel†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 1 | off |

**RS-232 Serial**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 1 | on |

## O.2 Option 2 – Online/Offline

This Option allows you to control whether the printer powers-up off-line or on-line. When off-line, the printer is under your control. If you want to change printer features whenever you turn the printer on, Option 2 should be off. If you do not need to make changes, Option 2 should be on.

**Power-up Off-line**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 2 | off |

**Power-up On-line†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 2 | on |

## N.2 Options 5 through 8 – Right Margin

Options 5, 6, 7, and 8 work together to set the right margin. To determine the setting, measure from the right edge of the paper to the place where you want the margin to be. Then select the right margin listed below that is closest to your measurement.

| | OPTIONS | | | | RIGHT MARGIN | |
|---|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | | |
| † | off | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | off | 0.25" | 0,64 cm |
| | off | on | off | off | 0.50" | 1,27 cm |
| | on | on | off | off | 0.75" | 1,91 cm |
| | off | off | on | off | 1.00" | 2,54 cm |
| | on | off | on | off | 1.25" | 3,18 cm |
| | off | on | on | off | 1.50" | 3,81 cm |
| | on | on | on | off | 1.75" | 4,45 cm |
| | off | off | off | on | 2.00" | 5,08 cm |
| | on | off | off | on | 2.25" | 5,72 cm |
| | off | on | off | on | 2.50" | 6,35 cm |
| | on | on | off | on | 2.75" | 6,90 cm |
| | off | off | on | on | 3.00" | 7,62 cm |
| | on | off | on | on | 3.25" | 8,26 cm |
| | off | on | on | on | 3.50" | 8,89 cm |
| | on | on | on | on | 3.75" | 9,53 cm |

## N.3 Options 9 through C – Top Margin

Options 9, A, B, and C work together to set the top margin. To determine the setting, measure from the top edge of the paper to the place where you want the margin to be. Then select the top margin listed below that is closest to your measurement.

| | OPTIONS | | | | TOP MARGIN | |
|---|---|---|---|---|---|---|
| | 9 | A | B | C | | |
| † | off | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | off | 0.25" | 0,64 cm |
| | off | on | off | off | 0.50" | 1,27 cm |
| | on | on | off | off | 0.75" | 1,91 cm |
| | off | off | on | off | 1.00" | 2,54 cm |
| | on | off | on | off | 1.25" | 3,18 cm |
| | off | on | on | off | 1.50" | 3,81 cm |
| | on | on | on | off | 1.75" | 4,45 cm |
| | off | off | off | on | 2.00" | 5,08 cm |
| | on | off | off | on | 2.25" | 5,72 cm |
| | off | on | off | on | 2.50" | 6,35 cm |
| | on | on | off | on | 2.75" | 6,90 cm |
| | off | off | on | on | 3.00" | 7,62 cm |
| | on | off | on | on | 3.25" | 8,26 cm |
| | off | on | on | on | 3.50" | 8,89 cm |
| | on | on | on | on | 3.75" | 9,53 cm |

# *M Number of Copies (multiples of 10 – Group 3)*

The Group 3 Options work in conjunction with Group 2 Options to set the printer for up to 99 copies per page. The status of Group 2 will affect these Options.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

## M.1 Options 1 through 9 – Number of Copies

Options 1 through 9 control the number of copies (in multiples of ten) that the printer will print per page. If Option 3 is on and the other Options in this Group are off, thirty copies per page will be printed. If Group 2 Option 7, for example, is also on, 37 copies will be printed.

## M.2 Copy Count Examples

28 Copies

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 2 | 8 | on |
| 3 | 2 | on |

99 Copies

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 2 | 9 | on |
| 3 | 9 | on |

40 Copies

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 2 | all | off |
| 3 | 4 | on |

4 copies

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 2 | 4 | on |
| 3 | all | off |

**Only one Option in Groups 2 and 3 may be on at one time.**

# *N Page Margin Settings (Group 4)*

The Group 4 Options provide limited control of the printer for the page margin settings.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## N.1 Options 1 through 4 – Left Margin

Options 1, 2, 3, and 4 work together to set the left margin. To determine the setting, measure from the left edge of the paper to the place where you want the margin to be. Then select the left margin listed below that is closest to your measurement.

| | OPTIONS | | | | LEFT MARGIN | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | | |
| † | off | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | off | 0.25" | 0,64 cm |
| | off | on | off | off | 0.50" | 1,27 cm |
| | on | on | off | off | 0.75" | 1,91 cm |
| | off | off | on | off | 1.00" | 2,54 cm |
| | on | off | on | off | 1.25" | 3,18 cm |
| | off | on | on | off | 1.50" | 3,81 cm |
| | on | on | on | off | 1.75" | 4,45 cm |
| | off | off | off | on | 2.00" | 5,08 cm |
| | on | off | off | on | 2.25" | 5,72 cm |
| | off | on | off | on | 2.50" | 6,35 cm |
| | on | on | off | on | 2.75" | 6,90 cm |
| | off | off | on | on | 3.00" | 7,62 cm |
| | on | off | on | on | 3.25" | 8,26 cm |
| | off | on | on | on | 3.50" | 8,89 cm |
| | on | on | on | on | 3.75" | 9,53 cm |

## K.3 Delay Before Form Feed

These Options specify how long the printer will wait before ejecting the last page of a file in order to clear data from its memory.

**No Form Feed**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 7 | off |
| 1 | 8 | off |

**Wait 15 seconds**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 7 | on |
| 1 | 8 | off |

**Wait 30 seconds**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 7 | off |
| 1 | 8 | on |

**Wait 60 seconds†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 7 | on |
| 1 | 8 | on |

## K.4 Option 9 – Page Orientation

This Option controls whether words and characters will read across the narrow dimension of the page (portrait orientation) or across the longer dimension of the page (landscape orientation). **NOTE:** Changing to landscape orientation limits the choice of fonts and changes the reference point from which page margins are measured.

**Portrait †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 9 | off |

**Landscape**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | 9 | on |

## K.5 Option A – Embedding the Escape Character

If your software package does not allow you to embed the <ESC> character this option tells the printer to act on the tilde (~) character as if it were the <ESC> character.

~=~†

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | A | off |

~=<ESC>

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 1 | A | on |

# *L Number of Copies (1 to 9 copies – Group 2)*

The Group 2 Options allow you to specify the number of copies for each printed page. These Options work in conjunction with the Group 3 Options.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

## L.1 Options 1 to 9 – Number of Copies

Options 1 through 9 control the number of copies that the printer will print per page. For example, if Option 1 is on and the other Options in this Group are off, the printer will print one copy per page. If Option 7 is on and the other Options in this Group are off, seven copies will be printed.

## O.4 Option 8 – Print Buffer Magnification

Option 8 gives you the capability of multiplying by two the print buffer size selected through options 3, 4, 5, and 6. With option 8 on, the maximum print buffer size is 825K bytes.

**Print Buffer As-Is†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 8 | off |

**Print Buffer Size 2X**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 8 | on |

## O.5 Options 9 and A – 8th Bit

Options 9 and A allow you to tell the printer how to handle the 8th bit. These Options are especially important if you are using your printer for graphics applications. (See Epson or Proprinter emulation mode.)

**Pass Bit 8 Unchanged†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 9 | off |
| 5 | A | off |

**Bit 8 = 1**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 9 | off |
| 5 | A | on |

**Strip Bit 8**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 9 | on |
| 5 | A | off |

**Reverse Value of Bit 8**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 5 | 9 | off |
| 5 | A | on |

# *P Serial Interface Options (Group 6)*

The Group 6 Options provide limited control of the printer for interface specifications that apply to serial interfaces only.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## P.1 Option 1 – Parity Checking

This Option tells the printer whether or not to perform parity checking (a type of error checking) on the data it receives. Set this Option according to the same setting on your computer.

**No Parity Checking†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 1 | off |

**Parity Checking**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 1 | on |

## P.2 Options 2 and 3 – Parity Type

If Option 1 is on, these Options specify the type of parity checking that printer should perform on the data it receives. Set this Option according to the same setting on your computer.

**Odd Parity†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 2 | off |
| 6 | 3 | off |

**Even Parity**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 2 | on |
| 6 | 3 | off |

**Mark Parity**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 2 | off |
| 6 | 3 | on |

**Space Parity**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 2 | on |
| 6 | 3 | on |

## P.3 Option 4 – Stop Bits

This Option alerts the printer to the number of stop bits in the data it will receive from your computer. Set this option according to the same setting on your computer.

**One Stop Bit†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 4 | off |

**Two Stop Bits**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 4 | on |

## P.4 Option 5 – Data Bits

This Option alerts the printer to the number of data bits per byte it will receive from your computer. Set this Option according to the same setting on your computer.

**Eight Data Bits†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 5 | off |

**Seven Data Bits**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | 5 | on |

## P.5 Options 6, 7, 8, and 9 – Bit Rate

These Options work together to tell the printer the bit rate for data transmitted by your computer. Set these Options according to the same setting on your computer.

| | Option 6 | Option 7 | Option 8 | Option 9 | Bit Rate (bits per second) |
|---|---|---|---|---|---|
| | off | off | off | off | 9600 |
| | on | off | off | off | 50 |
| | off | on | off | off | 75 |
| | on | on | off | off | 110 |
| | off | off | on | off | 134.58 |
| | on | off | on | off | 150 |
| | off | on | on | off | 300 |
| | on | on | on | off | 600 |
| | off | off | off | on | 1200 |
| | on | off | off | on | 1800 |
| † | off | on | off | on | 2400 |
| | on | on | off | on | 3600 |
| | off | off | on | on | 4800 |
| | on | off | on | on | 7200 |
| | off | on | on | on | 9600 |
| | on | on | on | on | 19200 |

## P.6 Option A – DTR

This Option tells the printer whether or not to use DTR (Data Terminal Ready) data flow control. Set this Option according to the same setting on your computer.

**Do Not Use DTR**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | A | off |

**Use DTR†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | A | on |

## P.7 Option B – RTS

This Option tells the printer whether or no to use RTS (Request to Send) data flow control. Set this Options according to the same setting on your computer.

**Do Not Use RTS†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | B | off |

**Use RTS**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | B | on |

## P.8 Option C – XON/XOFF

This Option tells the printer whether or not to use XON/XOFF data flow control. Set this Option according to the same setting on your computer.

**Do Not Use XON/XOFF**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | C | off |

**Use XON/XOFF†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 6 | C | on |

# *Q Parallel Interface Options (Group 7)*

The Group 7 Options provide limited control of the printer for interface specifications that apply to parallel interfaces only.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## Q.1 Option 1 – Printer Error

This Option allows you to specify whether or not the printer will "go busy" when there is a printer error. Your computer should have a similar feature. Be sure the settings match.

**Do Not "Go Busy"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 1 | off |

**"Go Busy"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 1 | on |

## Q.2 Option 2 – Set Printer Error

This Option lets you specify whether or not the printer will "set the printer error bit" when there is a printer error. This setting should match the setting on your computer.

**Do Not "Set Printer Error"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 2 | off |

**"Set Printer Error"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 2 | on |

## Q.3 Option 3 – Set Fault Bit

This Option allows you to specify whether or not the printer will "set the fault bit" when there is a printer error. This setting should match the setting on your computer.

**Do Not "Set Fault Bit"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 3 | off |

**"Set Fault Bit"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 3 | on |

## Q.4 Option 4 – Off-Line on Error

This Option lets you specify whether or not the printer will "go off-line" when there is a printer error. This setting should match the setting on your computer.

**Do Not "Go Off-line"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 4 | off |

**"Go Off-line"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 4 | on |

## Q.5 Option 5 – Busy on Off-Line

Option 5 allows you to tell the printer whether or not to "go busy" when the printer is taken off-line. "Enabling" this Option is especially useful if your computer is an IBM PC. Data can be lost because the PC continues sending data unless a "busy signal" is sent by the printer. Match the specification your computer uses.

**Do Not "Go Busy"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 5 | off |

**"Go Busy"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 5 | on |

## Q.6 Option 6 – Data Flow Control

Option 6 is used to tell the printer when to use the "busy bit" to control the data flow from the Host (computer). If Option 5 is on, this Option should also be on.

**Do Not Use "Busy Bit"†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 6 | off |

**Use "Busy Bit"**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 7 | 6 | on |

# R Printer Alignment (Group 8)

The Group 8 Options provide limited control for aligning the printer's zero reference point. The zero reference point is the point on the page from which the printer makes its printing measurements. This should normally be the top left corner of the page.

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## R.1 Options 1 through 4 – Horizontal Alignment

Options 1, 2, 3, and 4 move the zero reference point a specified horizontal distance from the left edge of the page.

| | OPTIONS | | | | Horizontal Distance | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | | |
| | off | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | off | 0.05" | 0,127 cm |
| † | off | on | off | off | 0.10" | 0,254 cm |
| | on | on | off | off | 0.15" | 0,381 cm |
| | off | off | on | off | 0.20" | 0,508 cm |
| | on | off | on | off | 0.27" | 0,69 cm |
| | off | on | on | off | 0.32" | 0,813 cm |
| | on | on | on | off | 0.37" | 0,94 cm |
| | off | off | off | on | 0.43" | 1,09 cm |
| | on | off | off | on | 0.48" | 1,22 cm |
| | off | on | off | on | 0.53" | 1,35 cm |
| | on | on | off | on | 0.59" | 1,5 cm |
| | off | off | on | on | 0.64" | 1,63 cm |
| | on | off | on | on | 0.69" | 1,75 cm |
| | off | on | on | on | 0.75" | 1,91 cm |
| | on | on | on | on | 0.80" | 2,03 cm |

## R.2 Options 5 through 8 – Vertical Alignment

Options 5, 6, 7, and 8 move the zero reference point a specified vertical distance from the top edge of the page.

| | OPTIONS | | | | Horizontal Distance | |
|---|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | | |
| | off | off | off | off | 0.00" | 0,00 cm |
| | on | off | off | off | 0.05" | 0,127 cm |
| † | off | on | off | off | 0.10" | 0,254 cm |
| | on | on | off | off | 0.15" | 0,381 cm |
| | off | off | on | off | 0.20" | 0,508 cm |
| | on | off | on | off | 0.27" | 0,69 cm |
| | off | on | on | off | 0.32" | 0,813 cm |
| | on | on | on | off | 0.37" | 0,94 cm |
| | off | off | off | on | 0.43" | 1,09 cm |
| | on | off | off | on | 0.48" | 1,22 cm |
| | off | on | off | on | 0.53" | 1,35 cm |
| | on | on | off | on | 0.59" | 1,5 cm |
| | off | off | on | on | 0.64" | 1,63 cm |
| | on | off | on | on | 0.69" | 1,75 cm |
| | off | on | on | on | 0.75" | 1,91 cm |
| | on | on | on | on | 0.80" | 2,03 cm |

# *S Diagnostic Options (Group 9)*

The Group 9 Options are used for factory diagnostics and for limited control of the optional Paper Plus™ sheet feeder if ordered. If you are using the Paper Plus sheet feeder, refer to its Operator's Manual for instructions on setting Options 1 through C. Group 9 Options D, E, and F are for diagnostic use only. **You should not alter the settings of these Options unless instructed to do so by a QMS representative.**

**Toggle Option 0 of any Group to save changes to Printer Setup.**

†= Factory setting

## S.1 Option D – Debugger

This Option is used to tell the printer whether or not to scan the debugger address space for fonts.

**Do Not Scan †**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | D | off |

**Scan**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | D | on |

## S.2 Option E – Diagnostic Page

This Option is used to print a "diagnostic page" showing the last error that caused the printer to stop printing.

**Do Not Print†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | E | off |

**Print**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | E | on |

## S.3 Option F – Enter Debugger Mode

This Option should be on if, when the debugger is installed, the debugger needs to be initialized on power-up.

**Initialize Only†**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | F | off |

**Initialize at Power-Up**

| GROUP | OPTION | TOGGLE |
|---|---|---|
| 9 | F | on |

Part IV

# Printer Software Commands

## *Introduction*

**Printer software commands** are an alternative to the printer keypad for controlling some printer functions. By using these commands you can by-pass the printer's keypad when you wish to change fonts, emulation mode, page orientation, paper source, paper size, or number of copies. Some of the software commands explained here have no equivalent keypad sequence (such as "Redefining Translation Tables").

Each of these commands begins with an "ESCape" – a special character that tells the printer "a command follows." **Do not confuse the ESCape character with the Esc key on your computer keyboard.** The ESCape character cannot usually be "sent" to the printer by just pressing a key on the computer's keyboard.

The examples in this section illustrate how to send the software commands to the printer using BASIC. If you use your word processor or applications package exclusively, you will use a different method when sending commands to the printer. Refer to your software package's instructions for using the ESCape character. Your laser printer also provides a method for substituting the "tilde" character (~) as the special character signalling the beginning of a software command. Refer to Part III of this manual for information on using Group 1 Option A.

# A Command Diagrams

A diagram accompanies each command to illustrate how the command would be used in BASIC. There are various parts to each diagram with which you need to be familiar.

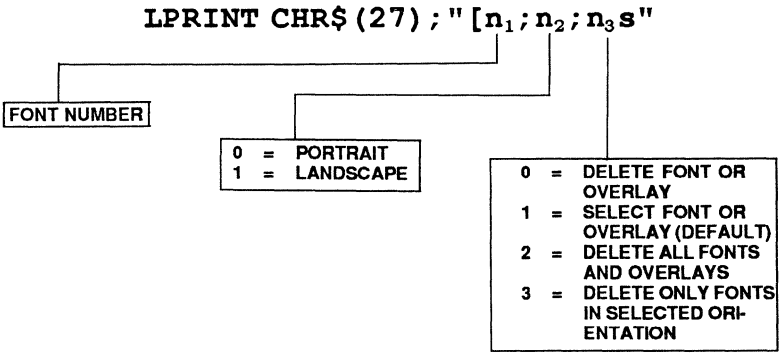
**LPRINT CHR$(27);"[$n_1$;$n_2$x"**

| | |
|---|---|
| **LPRINT** | A BASIC command to print data on the printer. |
| **CHR$(27)** | The BASIC command that issues a decimal value 27 for the ESCape character. |
| **" "** | Quotation marks enclose a string of characters that is to be sent to the printer "as is". |
| **[** | A left bracket is always the first character in the command string. |
| **$n_1$;$n_2$** | Numeric parameters separated by semi-colons are used to specify the action you wish the printer to take. (Semi-colons must be included where they appear in the command diagrams.) |
| **r x u s** | These are examples of the command terminator. The terminator is the last character before the closed quotation marks. Any "space" immediately preceding the terminator must also be included if it appears in the command diagram. |

Remember that the following examples of the Printer Software Commands are illustrated using the BASIC programming language. If you are using an applications package, refer to its instructions for "embedding" ESCape characters.

# B Changing Fonts/Overlays

## B.1 Command Diagram




## B.2 Using the Command

This software command allows you to change fonts, select a pre-defined overlay from the printer's memory, to delete a particular downloaded font or overlay from the printer's memory, or to delete only downloaded fonts in a particular orientation.

- Omitting $n_1$ causes the power-up default font in the current page orientation to be selected.
- If $n_1$ is omitted and "overlay" is selected in $n_2$, the printer ignores the entire command.
- Overlays can only be defined through the ANSI command mode. See the *ANSI X3.64 Programming Manual.*
- Only downloaded fonts and overlays may be deleted.
- Any font selected using this software command remains in effect until you select another font or until you do a printer reset. This command will override

the default Epson Pica font that would normally be activated as soon as Epson emulation mode is entered.

- The $n_2$ parameter *does not change* the page orientation. The $n_2$ parameter lets the printer know which orientation you are choosing. Omitting the $n_2$ parameter would automatically specify the current orientation.

- If you use this command to change to a font that has a different orientation from the one in which the printer is operating (e.g., landscape when the printer is operating in portrait), the printer does not change fonts. It saves that font number request and, when you switch the printer to the other page orientation, then selects the font. (Note: If the font number you select does not exist in the orientation that you specified, the command is ignored and the power-up default font is selected.)

- Invalid values in any of the command parameters will cause the command to be ignored. The range of valid values for $n_1$ is 0 to 37627.

## B.3 Examples

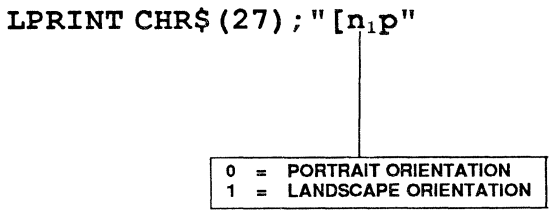
`LPRINT CHR$(27);"[380;0;1s"` Selects font 380 in portrait orientation.

`LPRINT CHR$(27);"[382;0;1s"` Selects font 382 in portrait orientation.

`LPRINT CHR$(27);"[7504;1;1s"` Selects font 7504 in landscape orientation.

# C Changing Page Orientation

## C.1 Command Diagram




## C.2 Using the Command

This software command allows you to select either portrait or landscape page orientation.

- Changing page orientation affects the fonts that are available for use. Only portrait fonts (see the status summary sheet) may be used in portrait orientation and only landscape fonts may be used in landscape orientation.

- Changing page orientation also changes the reference point from which page margins are measured. Always check and reset the page margins (if necessary) after changing page orientation.

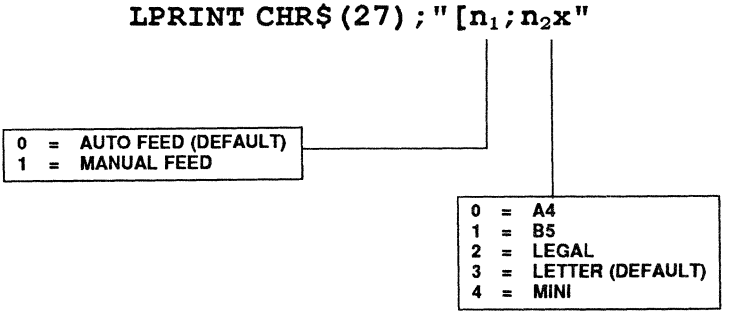
## C.3 Examples

`LPRINT CHR$(27);"[0p"` Selects portrait orientation.

`LPRINT CHR$(27);"[1p"` Selects landscape orientation.

# *D Selecting Paper Feed and Paper Size*

## D.1 Command Diagram




## D.2 Using the Command

This command allows you to specify manual feed or automatic paper feed and also the size of paper being used.

- Paper size *must* be specified in order for page margins to be set correctly.

- With automatic paper feed you must use a paper cassette that matches the paper size you are using.

- When the printer is in manual feed mode, the indicator in the MANUAL FEED will light and the display window will show P O.

## D.3 Examples

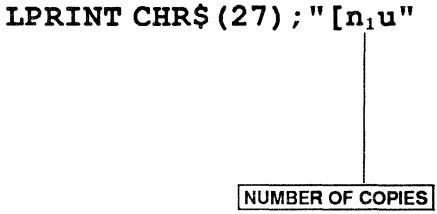
`LPRINT CHR$(27);"[0;3x"` Selects automatic paper feed and letter paper size.

`LPRINT CHR$(27);"[0;0x"` Selects automatic paper feed and A4 paper size.

`LPRINT CHR$(27);"[1;4x"` Selects manual feed and mini paper size.

# *E Selecting Number of Copies*

## E.1 Command Diagram



## E.2 Using the Command

This command lets you to tell the printer to print more than one copy per job. The number of copies may be set at any value between one and 5000.

- The copy count set using this command remains in effect until a new copy count command is sent, a warm restart (Option 0) is performed, or until power is turned off.
- A value of 0 or omitting a value for $n_1$ selects one copy (default).
- Values greater than 5000 cause the command to be ignored.

## E.3 Examples

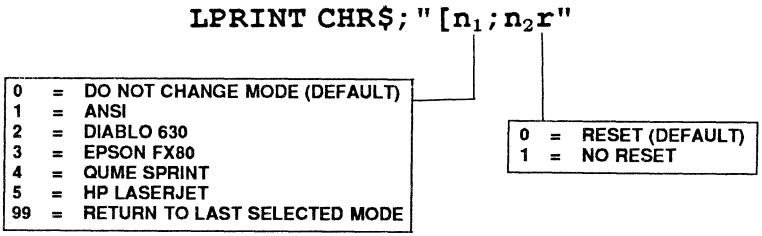
`LPRINT CHR$(27);"[10u"` Sets copy count to 10.

`LPRINT CHR$(27);"[5050u"` Command is ignored due to invalid parameter.

`LPRINT CHR$(27);"[u"` Sets copy count to 1 (default).

# F Selecting Emulation Mode

## F.1 Command Diagram




## F.2 Using the Command

The printer always operates in one of its emulation modes: Diablo, Qume, HP LaserJet, ANSI command, or Proprinter/Epson (depending on the model). Through this software command you tell the printer which mode you want it to use.

- If you type 0 for $n_2$ the printer resets the current font, page margins, horizontal and vertical tab settings, and the character and line spacing to their power-up conditions. The printer also resets its horizontal position to the left margin. Vertical position is not affected.

- If you write your own programs, you may find the "99" value for $n_1$ useful for switching between two modes. For example, if you first select HP LaserJet Emulation Mode and then select ANSI Command Mode, use the "99" to exit ANSI and return to HP LaserJet emulation. You may find this useful for incorporating certain features of one emulation (such as the "quadding" found in ANSI Command Mode) into programs written for a different emulation mode.

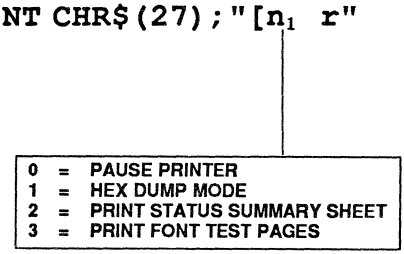
## F.3 Examples

`LPRINT CHR$(27);"[2;0r"` puts the printer in Diablo Emulation Mode and resets printer to power-up conditions (see above).

`LPRINT CHR$(27);[5;1r"` puts the printer in HP LaserJet Emulation Mode and does not reset printer.

# *G Extended Printer Control Command*

## G.1 Command Diagram




## G.2 Using the Command

This command causes the printer to pause, enter hex dump mode, print the status summary sheet, or to print the font test pages without using the printer keypad.

- When the printer executes a pause as directed by this command, the display window will show UP. A pause command is useful for changing to a different

type of paper or for inserting dividers between print jobs. To exit a pause, press the ONLINE key twice.

- Hex dump mode is a diagnostic mode that allows you to examine the exact data being received by the printer. Hex dump mode has its own page margins that automatically take effect. When the printer is placed in hex dump mode, the hex values of all characters are printed in groups of 32 pairs on the left side of the page. The printable characters associated with these 32 hex values will be printed on the right side of the page. Unprintable characters (those with hex values lower than 20) will appear on the right side as "periods." To exit hex dump mode, power the printer off/on or perform a warm restart (Option 0).

- The "space" before the command terminator must be included.

- Invalid values for the parameter will cause the command to be ignored.

## G.3 Examples

`LPRINT CHR$(27);"[0 r"` Pauses the printer.

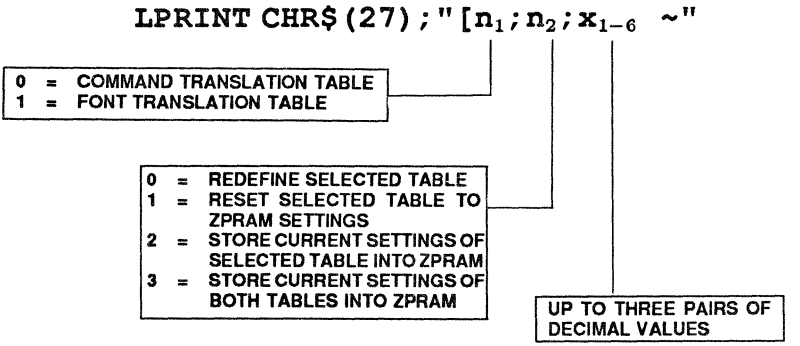
`LPRINT CHR$(27);"[1 r"` Printer enters hex dump mode.

`LPRINT CHR$(27);"[2 r"` Prints out the status summary sheet.

`LPRINT CHR$(27);"[3 r"` Prints the font test pages.

# H Redefining Translation Tables

## H.1 Command Diagram




## H.2 Using the Command

**WARNING: This feature of your QMS printer is designed for advanced users. Study these instructions carefully before using the command.**

The "translation tables" act as "switchboards" that pass the decimal codes received from your computer to the area in the printer that makes up the page for printing. Most of the time you want the decimal codes that the computer sends to be relayed exactly as they are to the printing area. For example, if your computer sends the decimal code 65 (*A*), you probably want the printer to print an *A*. In this case the translation tables pass the decimal code 65 along as a decimal code 65.

However, you may have instances where you need to print a character or transmit a control character (a value lower than decimal 20) that your computer will not accommodate. Your laser printer provides the two translation tables for these occurences. **You should use the command**

**translation table when you wish to transmit a control character to the printer. Use the font translation table when you wish to print a special character that is beyond the normal range of your computer keyboard.**

## H.3 Changing the Command Translation Table

If your computer will not transmit control characters to the printer, you can change the command translation table to assign a control character to any decimal code you desire. For example, you could assign the **Form Feed** character (decimal code 12) to the *backslash* character (decimal code 92) or to any other decimal code you choose. (When reassigning characters you should choose characters that you do not normally need during printing.)

To make this change to the command translation table, you would send this command:

```
LPRINT CHR$(27);"[0;0;92;12 ~"
```

**Important Considerations:**

- *Once you modify the command translation table, it will affect all emulation modes.*
- *Modifications to the command translation table affect all fonts.*
- *If two or more people are using the same printer, all users need to be aware of modified translation tables.*

## H.4 Changing the Font Translation Table

If you want the printer to print a character that does not appear on your computer keyboard, you can change the font translation table to assign that character to another character that does appear on your keyboard. For example, you could assign *ä* (decimal code 228 in any font having a QMS-Multilingual character set) to the *left bracket* character (decimal code 91) or to any other character you choose. (When reassigning characters you should choose characters that you do not normally need during printing.)

To make this change to the font translation table, you would send this command:

```
LPRINT CHR$(27);"[1;0;91;228 ~"
```

**Important Considerations:**

- *When the printer is in Epson or Proprinter emulation mode, the Font translation table is ignored. Any modifications to the translation table will not affect fonts selected during Epson or Proprinter emulation mode.*

- *Modifications to the font translation table affect all fonts selected during any other mode except Epson and Proprinter emulation modes. All fonts, however, do not have the same characters in the same locations. Refer to the tables in Appendix A for the correct locations of all characters in the resident fonts.*

- *If two or more people are using the same printer, all users need to be aware of modified translation tables.*

## H.5 Resetting Translation Tables

Knowing how to reset the translation tables to their factory default values is helpful if you lose track of which decimal values have been reassigned. Whenever $n_2$ = 1, the table specified in $n_1$ is reset to its ZPRAM (zero-power random access memory) settings. If you have not previously stored the table(s) into ZPRAM, the translation tables will be reset to factory default values (decimal values 0 - 255) whenever the printer is powered off/on or whenever a warm restart is performed (Option 0). If you have previously stored the table(s) into ZPRAM and you wish to restore them to factory settings (0-255), you must perform a "Printer Setup Reset". This is a printer keypad procedure and is described in Part III of this manual. A printer setup reset will reset **all** printer setup options (including page margins, default fonts, interface settings, etc.) to the factory settings. After performing the printer setup reset, you may use any of the following to reset the translation tables:

- Group 0 Option 9 to reset the command translation table.
- Group 0 Option A to reset the font translation table.

**CAUTION:** In plot or graphics mode, reassigned characters may cause problems (depending upon what characters have been reassigned). Plot mode is only affected by the command translation table. Do a reset of the command translation table before sending plot or graphics mode data to the printer.

## H.6 Decimal Values

Parameters $x_1$ through $x_6$ are "paired" parameters and

must always be used in pairs.

The printer will take the value in $x_1$ and "change" it to the value in $x_2$. If a decimal 66 (*upper case B*) is in $x_1$ and a decimal 67 (*upper case C*) is in $x_2$, the printer would change *BAT* to *CAT*. When *BAT* was received by the printer, the decimal 66 (*B*) was changed to a decimal 67 (*C*). This same "switching" occurs for whatever values you place in the pairs $x_3;x_4$ and $x_5;x_6$.

**WARNING: When redefining the command translation table, never enter 27 in $x_1$, $x_3$, or $x_5$. This would have serious consequences for your printer or software.**

Valid values for the three paired parameters are the decimal values 0 through 255.

## H.7 Examples

`LPRINT CHR$(27);"[0;0;94;10 ~"` redefines the command translation table and causes the printer to interpret every ^ it receives from the computer as the control character <LF> (Line Feed).

`LPRINT CHR$(27);"[0;2 ~"` stores the command translation table (and any changes to it that are in effect) into the printer's ZPRAM. Whenever the printer is turned on, the ZPRAM initializes the printer.

`LPRINT CHR$(27);"[1;0;91;228;93;235 ~"` redefines the font translation table and causes the printer to interpret every *left bracket* character it receives from the computer as *ä* and every *right bracket* character as *ë*.

Part V

# Maintenance and Troubleshooting

## *Introduction*

*Maintenance and Troubleshooting* 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, error codes in the display window and print quality problems.

In *Part V* 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. Lists of the codes that may appear in the display window and what they mean.

4. An explanation of the contents and importance of a diagnostic page.

5. A discussion of print quality problems and how they may be corrected.

The instructions in *Part V* 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, Installation.*

# 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. See *Figure 1* for a comparison of indicator color and number of copies printed.

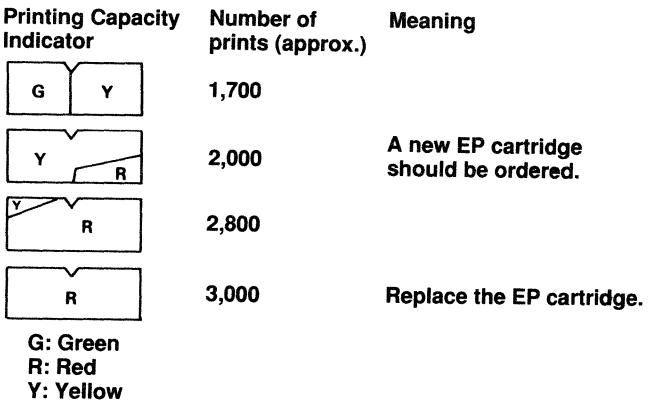



**Figure 1: Cartridge-Life Indicator**

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 G.3*). 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, Installation.*

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 B*).

# *B 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.

## B.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 B.2*.

## B.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.

# *C Corona Wires*

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

## C.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.*)

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 2*). 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.

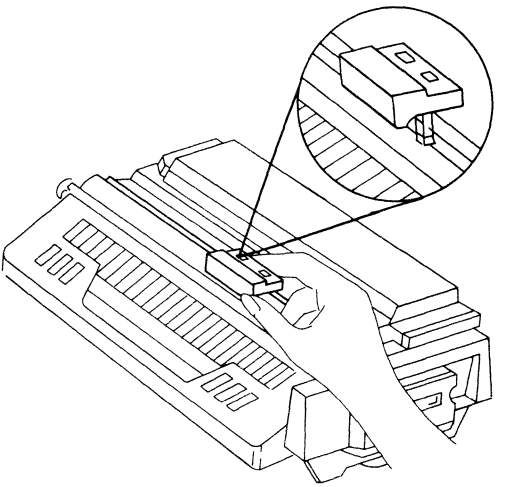


**Figure 2: Cleaning the Primary Corona Wire**

## C.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 3*). 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.

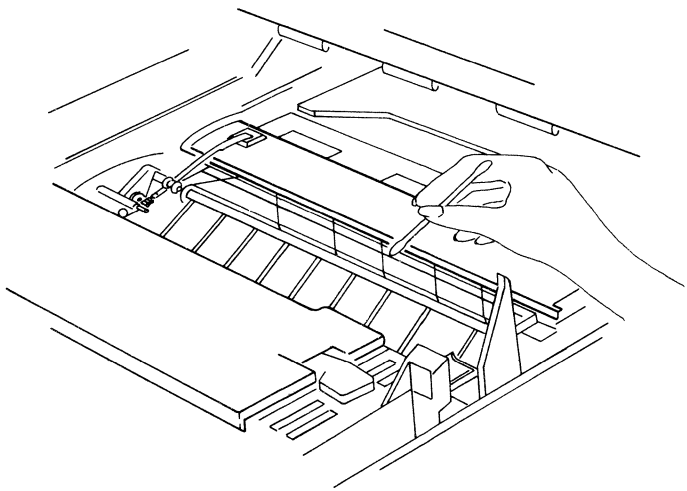


**Figure 3: Cleaning the Transfer Corona Wire**

# *D 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 4*).

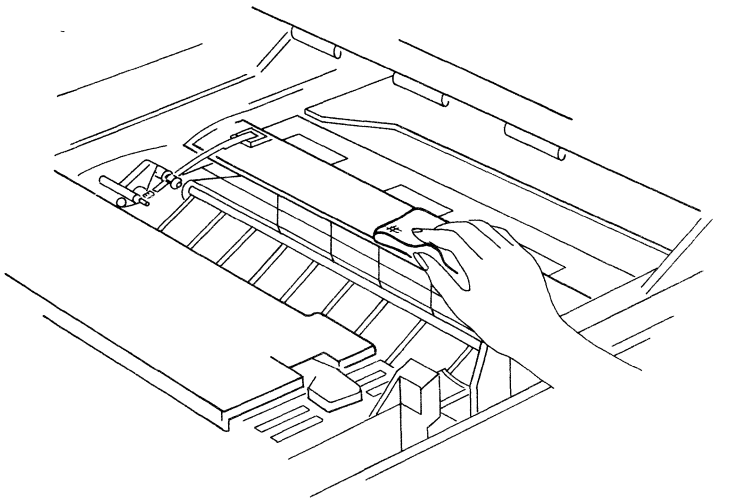


**Figure 4: Cleaning the Transfer Guide**

# *E 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.

## E.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 5* as a guide.

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

## E.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 5*).

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.

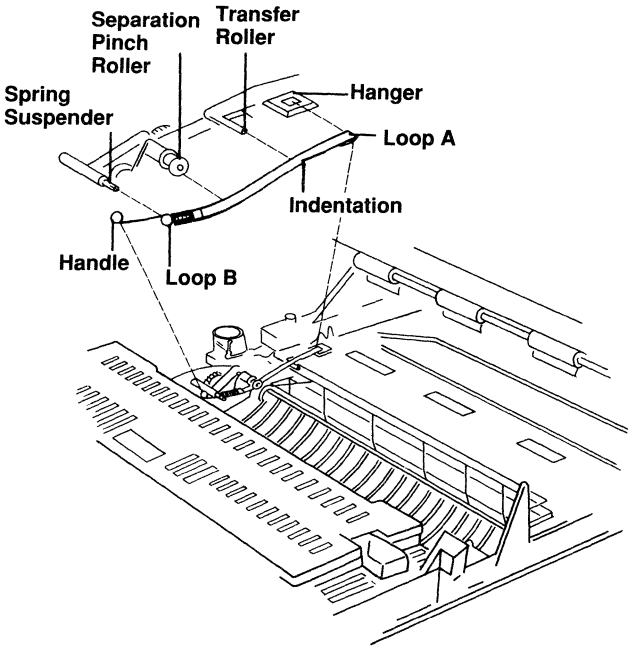



**Figure 5: The Separation Belt**

4. Pass the separation belt over the transfer roller and under the separation pinch roller (*Figure 5*).

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

# *F Clearing a Paper Jam*

Paper in the printer passes through four main areas (Figure 12.8): (1) the manual feed area, (2) the cassette feed area, (3) the separation/feeder area, and (4) the fixing/delivery area.

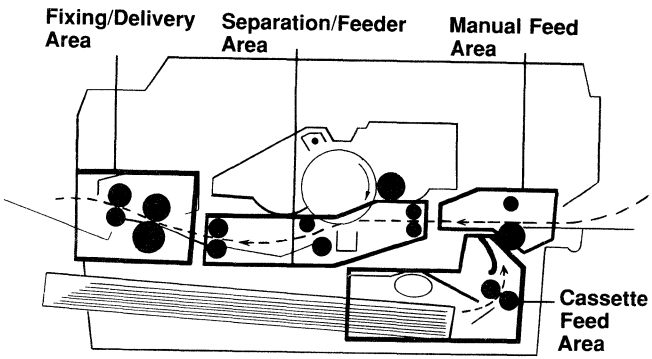



**Figure 6: Paper Path**

When a paper jam occurs, a **PJ** appears in the printer's display window (see "Error Codes" *Section G.1*). 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 7*).

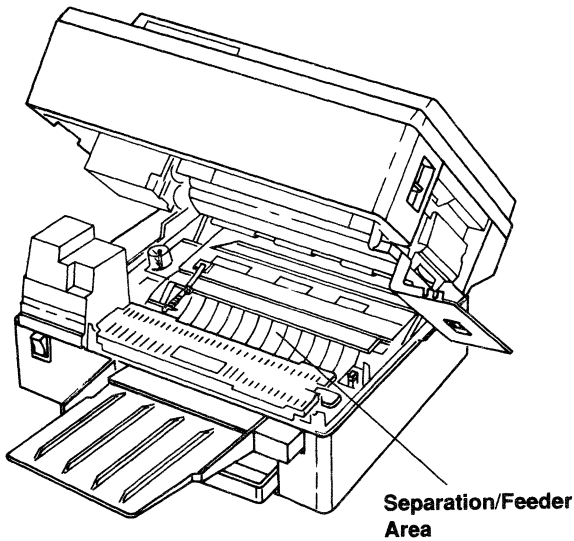



**Figure 7: Separation/Feeder Area**

3. Open the rear door (*Figure 8*) and remove any jammed paper there.

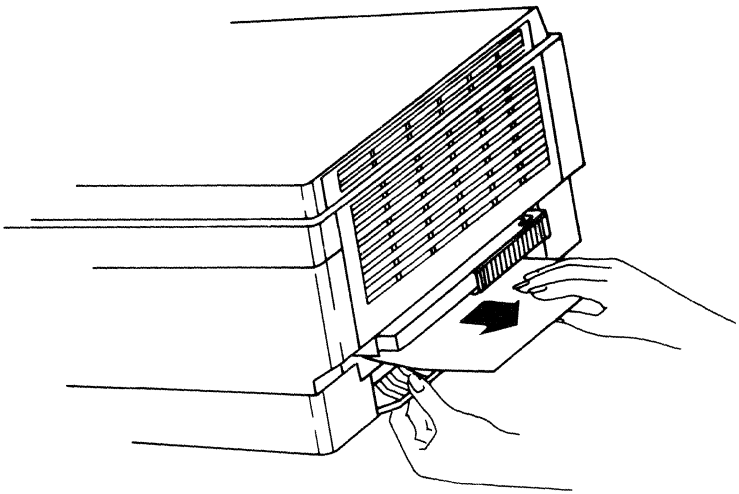


**Figure 8: Rear Door**

4. If the paper jam has not been cleared, as a last resort check for the jam under the green fixing assembly cover (*Figure 9*). **Be careful; it may be hot.**

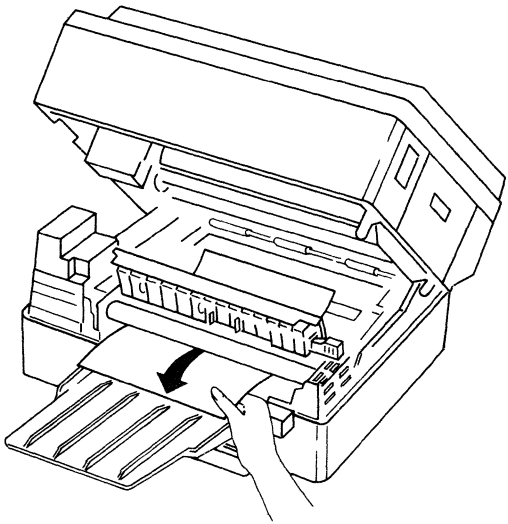


**Figure 9: The Fixing Assembly Area**

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.

# G *Troubleshooting*

This section deals with problems and their solutions. It includes error codes, status codes, the diagnostic page, and print quality.

## G.1 Status Codes

Status codes that may appear in the display window:

| Code | Meaning | Explanation |
|---|---|---|
| **dA** | Download Active | A font or overlay has been downloaded, the printer is active. |
| **dF** | Download Font | A downloaded font or overlay is being received. |
| **di** | Download Idle | Downloading completed. The printer is idle. |
| **PA** | Printer Active | Data has been received, or printer has data that has not been printed. |
| **Pi** | Printer Idle | Printer is ready to receive data. |
| **PU** | Power-Up | Self-Tests in Progress. |
| **UP** | User Pause | Software-initiated pause. |
| **8.8.** | Display Window Test | Engine test in progress (at power-up) . |

## G.2 Error Codes

| Code | Meaning | Explanation |
|---|---|---|
| **CE** | Controller Error | The printer's controller has stopped functioning. Turn the printer off and back on again. The printer will print a diagnostic page for the error. If the problem reoccurs, contact your dealer/distributor. |
| **CO** | Cartridge Out | There is no print cartridge installed in the printer. |
| **FE** | Font Error | There are no fonts available for printing. Turn the printer off and back on in order to get a diagnostic page of the error. |
| **IE** | Interface Error | There is a problem with the interface protocols (see Part III Sections O, P, and Q). The interface characteristics for your printer and computer must match. |
| **PE** | Printer Error | There is a problem in the print engine. Contact your dealer/ distributor. |
| **PC** | Page Size Error | (LaserJet Emulation Mode only.) The page size selected through the LaserJet Emulation Mode Page Length command does not match the paper cassette installed in the printer. This error code flashes alternately with one of these codes for the paper size requested: L (letter), LL (legal), A4 (A4), b5 (B5). Install the correct size paper cassette or turn the printer off and back on again and send the correct Page Length command. |
| **PJ** | Paper Jam | Paper jam. Refer to Section F. |
| **PO** | Paper Out | There is no paper in the paper cassette, the paper cassette is not installed, or manual feed is selected. |

## G.3 The Diagnostic Page

The diagnostic page indicates problems and their solutions. Below is a list of the diagnostic numbers and the corresponding error.

| Diagnostic Messages | |
|---|---|
| 1 | Errors were encountered while scanning resident prom. |
| 2 | Errors were encountered while scanning cartridge prom. |
| 3 | No portrait fonts were observed during system initialization. |
| 4 | No landscape fonts were observed during system initialization. |
| 5 | An interface error currently exists in the system. |
| 6 | The default landscape font was not observed during system initialization. |
| 7 | The default portrait font was not observed during system initialization. |
| 8 | Download font errors encountered. |
| 9 | Download overlay errors encountered. |
| 10 | Font download memory exceeded. |
| 11 | Invalid cartridge header encountered while scanning cartridge. |
| 12 | Incomplete page due to sequence queue overflow. |
| 13 | Incomplete page due to maximum sequences exceeded. |
| 14 | Maximum number of fonts exceeded. |
| 15 | Ring buffer size error (see *Part III Section O.3*) |

## G.4 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 tapes are 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 E.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 *Section C.1*). Emphasize cleaning the underside of the print cartridge.
  3. Inspect the fixing assemply cleaner. If it is dirty, replace it (see *Section B.1*).

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

  1. Inspect the fixing assembly cleaner. If it is dirty, replace it (see *Section B.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 C.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 B.1*).

Appendix A

# Font Information

## A What Is a Font?

Each QMS laser printer font is a particular *character set* in a particular *style*, a particular *size* and *orientation*. Each font is also assigned a name and font number.

Table A.1 lists the standard fonts in your laser printer.

| # | NAME | SIZE | CHAR. SET | BYTES | ORIENT. |
|---|---|---|---|---|---|
| 7504 | Courier | 10cpi, 12pt | HP Roman 8 | 26981 | Portrait |
| 7504 | Courier | 10cpi, 12pt | HP Roman 8 | 25617 | Landscape |
| 941 | Q-Format | 16.6cpi, 8.5pt | HP Roman 8 | 14481 | Portrait |
| 1104 | Q-Roman Med. | Prop., 10pt | QMS-ML | 25044 | Portrait |
| 1144 | Q-Roman Med. It. | Prop., 10pt | QMS-ML | 26628 | Portrait |
| 824 | Hamilton Med. | Prop., 10pt | QMS-ML | 27272 | Portrait |
| 3104 | Hamil. Med. It. | Prop., 10pt | QMS-ML | 29156 | Portrait |
| 7505 | Letter Gothic | 12cpi | QMS-ML | 34138 | Portrait |
| 7505 | Letter Gothic | 12cpt | QMS-ML | 34138 | Landscape |
| 7525 | Letter Gothic It. | 12cpi | QMS-ML | 35022 | Portrait |
| 7506 | Prestige Elite | 12cpi | QMS-ML | 29606 | Portrait |
| 7506 | Prestige Elite | 12cpi | QMS-ML | 29606 | Landscape |
| 7526 | Prestige Elite It. | 12cpi | QMS-ML | 30374 | Portrait |
| 958 | Q-Format | 17.6cpi, 5pt | QMS-ML | 17100 | Landscape |
| 950 | Q-Format | 16pt | QMS-ML | 46040 | Portrait |
| 942 | Q-Format | 13cpi, 8pt | QMS-ML | 18160 | Landscape |

**Table A.1 Standard Fonts**

In addition to these fonts, your printer has three other fonts available in its memory depending on the printer option (Epson or Proprinter) that you ordered.

Table A.2 lists the fonts included in printers with the Proprinter option:

| # | NAME | SIZE | CHAR. SET | BYTES | ORIENT. |
|---|---|---|---|---|---|
| 383 | Compressed | 17.6cpi | Proprinter | 23716 | Portrait |
| 384 | Elite | 12cpi | Proprinter | 30992 | Portrait |
| 385 | Pica | 10cpi | Proprinter | 32488 | Portrait |

**Table A.2 Proprinter Fonts**

Table A.3 lists the fonts included in printers with the Epson option:

| # | NAME | SIZE | CHAR. SET | BYTES | ORIENT. |
|---|---|---|---|---|---|
| 380 | Compressed | 17.6cpi | Epson | 22026 | Portrait |
| 381 | Elite | 12cpi | Epson | 32362 | Portrait |
| 382 | Pica | 10cpi | Epson | 32580 | Portrait |

**Table A.3 Epson Fonts**

## A.1 Character Set

A character set is the group of characters that can be printed when using a particular font. Each member (character) of a character set has a unique "location" expressed as a hexadecimal number.

In the preceding tables you found four different character set that the QMS laser printer fonts use: HP Roman 8, QMS-ML, Proprinter, and Epson. Tables A.4, A.5, A.6, and A.7 illustrate the character sets and the hexadecimal location of each member of the sets.

## HP ROMAN 8 CHARACTER SET
## ASCII LAYOUT

FIRST HEX. CHARACTER

| SEC HEX CHAR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | NUL | DLE | SP | 0 | @ | P | ' | p | | | | | | Å | Á | Þ |
| 1 | SOH | DC1 | ! | 1 | A | Q | a | q | | | À | ¯ | è | ì | Ã | þ |
| 2 | STX | DC2 | " | 2 | B | R | b | r | | | Â | ° | ò | Ø | ã | |
| 3 | ETX | DC3 | # | 3 | C | S | c | s | | | È | Ç | Ù | Æ | Đ | |
| 4 | EOT | DC4 | $ | 4 | D | T | d | t | | | Ê | ç | á | å | đ | |
| 5 | ENQ | NAK | % | 5 | E | U | e | u | | | Ë | Ñ | é | í | Ĩ | |
| 6 | ACK | SYN | & | 6 | F | V | f | v | | | Î | ñ | ó | ø | ĩ | – |
| 7 | BEL | ETB | ' | 7 | G | W | g | w | | | Ï | ¡ | ú | æ | Ó | ¼ |
| 8 | BS | CAN | ( | 8 | H | X | h | x | | | ´ | ¿ | à | Ä | Ò | ½ |
| 9 | HT | EM | ) | 9 | I | Y | i | y | | | ` | ¤ | è | ì | Õ | ¾ |
| A | LF | SUB | * | : | J | Z | j | z | | | ^ | £ | ò | Ó | õ | ‚ |
| B | VT | ECS | + | ; | K | [ | k | { | | | ¨ | ¥ | ù | Ü | Š | « |
| C | FF | FS | , | < | L | \ | l | \| | | ~ | § | ä | É | š | ■ |
| D | CR | GS | - | = | M | ] | m | } | | | Ù | ƒ | ë | ï | Ú | » |
| E | SO | RS | . | > | N | ^ | n | ~ | | | Û | ¢ | ö | ß | Ÿ | ± |
| F | SI | US | / | ? | O | _ | o | DEL | | | € | à | ü | Ô | ÿ | |

**Table A.4 HP Roman 8 Character Set**

**Table A.5 QMS-Multilingual Character Set**

## QMS Multilingual Character Set

*Standard ASCII Code Table*

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | NUL | DLE | SP | 0 | @ | P | ` | p | Ś | DCS | NBSP | ° | À | Đ | à | đ |
| 1 | SOH | DC1 | ! | 1 | A | Q | a | q | š | PU1 | ¡ | ± | Á | Ñ | á | ñ |
| 2 | STX | DC2 | " | 2 | B | R | b | r | Y | PU2 | ¢ | ² | Â | Ò | â | ò |
| 3 | ETX | DC3 | # | 3 | C | S | c | s | ▪ | STS | £ | ³ | Ã | Ó | ã | ó |
| 4 | EOT | DC4 | $ | 4 | D | T | d | t | IND | CCH | ¤ | ´ | A | Ô | a | ò |
| 5 | ENQ | NAK | % | 5 | E | U | e | u | NEL | MW | ¥ | µ | Å | Õ | å | õ |
| 6 | ACK | SYN | & | 6 | F | V | f | v | SSA | SPA | ¦ | ¶ | Æ | O | æ | o |
| 7 | BEL | ETB | ' | 7 | G | W | g | w | ESA | EPA | § | · | Ç | Œ | ç | œ |
| 8 | BS | CAN | ( | 8 | H | X | h | x | HTS | *f* | ¨ | ¸ | È | Ø | è | ø |
| 9 | HT | EM | ) | 9 | I | Y | i | y | HTJ | ₧ | © | ¹ | É | Ù | é | ù |
| A | LF | SUB | * | : | J | Z | j | z | VTS | Ğ | ª | º | Ê | Ú | ê | ú |
| B | VT | ESC | + | ; | K | [ | k | { | PLD | £ | « | » | Ë | Û | e | ù |
| C | FF | FS | , | < | L | \ | l | \| | PLU | ST | ¬ | ¼ | Ì | U | ì | u |
| D | CR | GS | - | = | M | ] | m | } | RI | OSC | SHY | ½ | Í | Ý | í | ý |
| E | LS1 | RS | . | > | N | ^ | n | ~ | SS2 | PM | ® | ¾ | Î | Þ | î | þ |
| F | LS0 | US | / | ? | O | _ | o | DEL | SS3 | APC | ¯ | ¿ | I | ß | ı | y |

If your computer system cannot access characters in the Hex 80 to Hex FF locations, you may use a special Printer Software Command to redefine the font translation table and place specific characters into the Hex 20 to Hex 7E range. See Part IV, Section H, for the details of using this command. **NOTE:** This command may only be used with fonts having the QMS-ML character set.

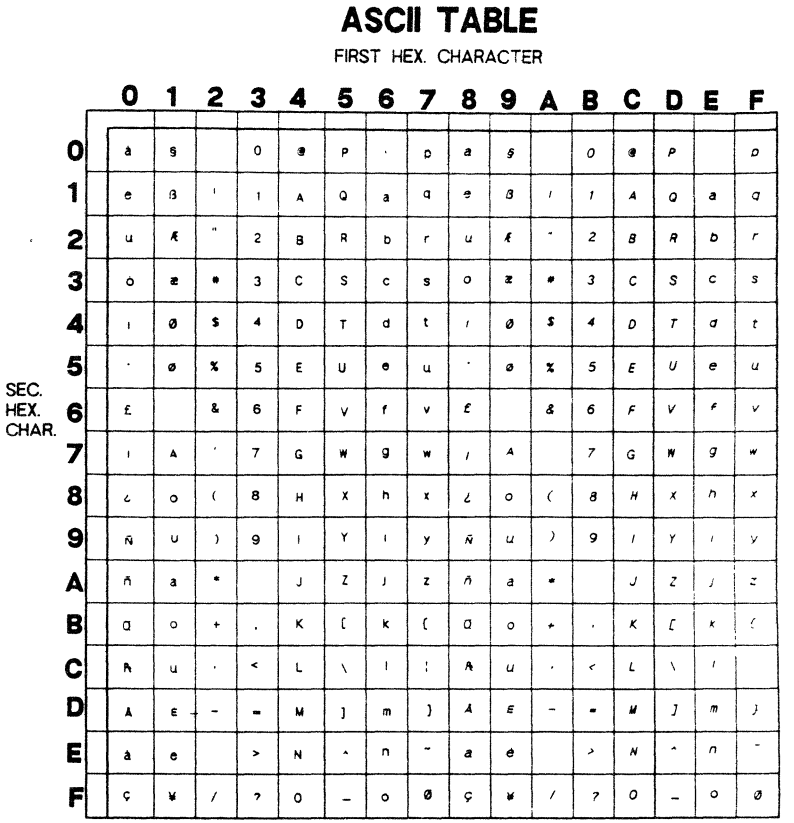
## Table A.7 Proprinter Character Set

# IBM P.C. GRAPHICS LAYOUT

FIRST HEX. CHARACTER

| SEC. HEX. CHAR. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | sp | 0 | @ | P | ` | p | Ç | É | á | | └ | ╨ | α | ≡ |
| 1 | | | ! | 1 | A | Q | a | q | ü | æ | í | ▓ | ┴ | ╤ | β | ± |
| 2 | | | " | 2 | B | R | b | r | é | Æ | ó | ▓ | ┬ | ╥ | Γ | ≥ |
| 3 | ♥ | | # | 3 | C | S | c | s | â | ô | ú | ┃ | ├ | ╙ | π | ≤ |
| 4 | ♦ | ¶ | $ | 4 | D | T | d | t | a | o | ñ | ┤ | — | ╘ | Σ | ⌠ |
| 5 | ♣ | § | % | 5 | E | U | e | u | à | ò | Ñ | ╡ | ┼ | ╒ | σ | ⌡ |
| 6 | ♠ | | & | 6 | F | V | f | v | å | û | ª | ╢ | ╞ | ╓ | µ | ÷ |
| 7 | | | ' | 7 | G | W | g | w | ç | u | º | ╖ | ╟ | ╫ | τ | ≈ |
| 8 | | | ( | 8 | H | X | h | x | ê | y | ¿ | ╕ | ╚ | ╪ | Φ | ° |
| 9 | | | ) | 9 | I | Y | i | y | e | ö | ⌐ | ╣ | ╔ | ┘ | Θ | |
| A | | → | * | . | J | Z | j | z | è | u | ¬ | ║ | ╩ | ┌ | Ω | |
| B | | ← | + | ; | K | [ | k | { | ï | ¢ | ½ | ╗ | ╦ | ▓ | δ | √ |
| C | | | , | < | L | \ | l | \| | î | £ | ¼ | ╝ | ╠ | ▄ | ∞ | n |
| D | | | - | = | M | ] | m | } | ì | ¥ | ¡ | ╜ | ═ | ▌ | ø | ² |
| E | | | . | > | N | ^ | n | ~ | Ä | ₧ | « | ╛ | ╬ | ▐ | Є | ■ |
| F | | Ø | / | ? | O | _ | o | | Å | ƒ | » | ┐ | ╧ | ▀ | ∩ | sp |

## Table A.6 Epson Character Set



## A.2 Style

Style refers to the design of the characters in the font. The name of the font reflects the style of the font. *Hamilton Medium* and *Hamilton Medium Italic* are two different fonts that have the same style (Hamilton). As you gain experience with the fonts in your QMS laser printer, you will recognize names and styles of fonts.

## A.3 Size

The size of the fonts in your QMS laser printer is measured in *points* and in *cpi* (characters per inch). A "point" is approximately 1/72nd inch and measures the height of the font. This measurement is actually the distance from the bottom of a character such as "y" that descends below the line to the top of a character such as "k" that is taller than the other characters. The number of characters per inch gives the width of the characters in a font (narrower fonts have a higher cpi number).

Some fonts are "proportional" fonts. These allot space to characters based on the width of the character. In a proportional font, the character "m" is given more space than the character "i". Proportional fonts, therefore, cannot be categorized in terms of a "fixed" number of characters per inch.

## A.4 Orientation

Orientation is the direction in which characters appear on the page after the page is printed. This page is an example of text printed in portrait orientation. Landscape orientation places the text on the page perpendicular to what you are reading now. If this page had been printed in landscape orientation, you would have to turn the page so that the left edge was at the top before you could read it.

The orientation of a font actually refers to the *printer's* orientation. In order to use a portrait font, the printer must be set to portrait orientation and vice versa for landscape fonts.

If a landscape font is selected while the printer is in portrait orientation, the printer would not change the font that it was using. However, that landscape font selection would be stored in memory and, after the printer was set to landscape orientation, would be recalled. The same is true for a portrait font selected while the printer is set to landscape orientation.

# *B Selecting a Font*

"Selecting a font" means choosing a font and causing the printer to use it for printing your file. You can select a font by using the printer keypad or by sending special *escape sequences* from your computer.

## B.1 Keypad Font Selection

The keypad of your laser printer provides three different ways of selecting a font for printing: the Group C Options which select a font that stays current only until the next font selection or the next warm restart; the Group P Options which select a default font for printing during portrait page orientation; and the Group L Options which select a default font for printing during landscape page orientation.

If you use the printer keypad to select a font, you will enter the font number **digit by digit** until all five digits of the font number have been locked into the printer's memory. Part III of this manual contains step-by-step instructions for using the printer keypad to select a font. The procedure of selecting a font through the keypad is identical in all three Groups.

**NOTE:** When entering Epson or Proprinter emulation mode, the default font automatically becomes the Pica font (382 in Epson and 385 in Proprinter) regardless of the settings of Group C, P, or L. There is an Option in both Group E (Epson Emulation Options) and Group I (Proprinter Emulation Options) that may be set to override this automatic selection of the Pica font. Refer to Part III of this manual for details.

Whenever the printer is in LaserJet emulation mode the settings of Groups C, P, and L are ignored. Courier (font 7504, portrait orientation) is the default font for LaserJet emulation mode. Changing to a different font while in LaserJet emulation mode may only be done through special LaserJet font selection escape sequences or through the Printer Software Command to change fonts (see *Section B.2*).

## B.2 Escape Sequence Font Selection

An "escape sequence" is a command to the printer that begins with the <ESC> command. This character is represented by the hexadecimal code 1B, the binary number 00011011, the octal code 33 or the decimal code 27. Computers and software packages differ in the ways that they transmit an <ESC> command to a printer. You should find out how your system transmits these codes before trying to work with the escape sequences in this manual. **NOTE:** There is no connection between <ESC> and the **Esc** key on your computer keyboard.

You can select a font at any time with this printer software command:

**<ESC>[***font number***;*X*;1s**

*Font number* is the number (found on the status summary sheet) assigned to the font you wish to select. *X* is 0 if the font you wish to select is for portrait orientation or 1 if the font is for landscape orientation. This information is also found on the status summary sheet.

**Example** — If your computer allows you to send escape sequences to a printer by using the BASIC command `LPRINT` and you wish to use the escape sequence method to select "Prestige Elite", use this BASIC command:

```
LPRINT CHR$(27);"[7506;0;1s"
```

In this example, `CHR$(27)` is the BASIC method of sending a decimal code that represents a command instead of a printable character. Decimal code 27 is the <ESC> command. Prestige Elite is a portrait font and the font number assigned to it is 7506. Once you select a font, the printer continues to use it for printing until you send another command to change fonts. The command to change fonts could be another software command selecting a different font or a printer keypad font selection. Turning the printer off or resetting the printer also causes a "font change" (i.e., it selects the default font).

**NOTE:** Epson, Proprinter, and LaserJet emulation modes have other escape sequences that select fonts. Refer to the sections of this manual covering these emulation modes for details.

## B.3 Additional Fonts

In addition to the standard fonts in your QMS laser printer you may use fonts from the optional font cartridges or you may "download" (copy) fonts that you may have stored in your computer.

The font cartridges plug into the slot on the front panel of the laser printer (Figure A.1). As soon as a font cartridge is installed in this slot, the fonts it contains can be selected just like the standard fonts. (NOTE: The printer must be off-line before the font cartridge is inserted.)

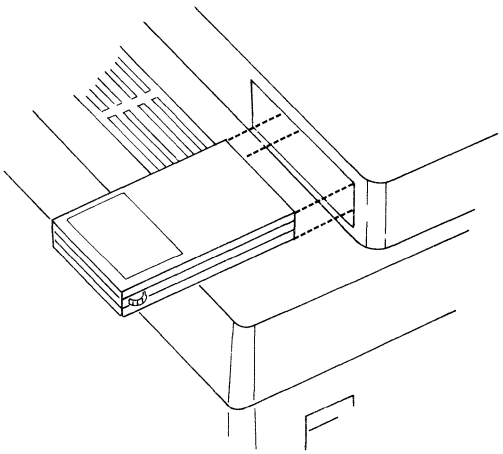


**Figure A.1. Optional Font Cartridge**

You may wish to purchase downloadable fonts from other sources or create your fonts. There are special commands available to you in the ANSI programming language that

download or create fonts. See the *ANSI X3.64 Programming Manual* for more information.

**NOTE:** The printer's memory can store 64 fonts at one time (standard and download) depending on the number of "bytes available" for fonts and overlays. The charts at the beginning of this appendix and the status summary sheet list the number of bytes that each font uses in memory and the total available number of bytes. If either the maximum number of fonts or the total available number of bytes is exceeded, no more fonts or overlays will be accepted into memory.

You may purchase download fonts from other computer software sources. To download fonts to the printer means transmitting data from your computer that includes "bitmaps" for a character set. The printer stores the data in its memory as a font. A font number is included in the data that you transmit from your computer. Once stored in the printer's memory, the font may be recalled by issuing a font selection command for that font number.

You may also create your own download fonts. Commands in the ANSI command mode, Epson, Proprinter, and LaserJet emulation modes are used as "font headers" (data that alerts the printer to a download font transmission and assigns a font number). Refer to the Epson, Proprinter, and LaserJet sections of this manual or to the *ANSI X3.64 Programming Manual* for more information.

## B.4 Using Multiple Cartridges

The printer's ANSI command mode provides a command that allows the copying of a font cartridge's contents into the printer's memory (depending on the space in memory available for fonts). Once a font cartridge's contents are copied into memory, the cartridge may be removed and another cartridge inserted in the font cartridge slot. You may continue copying font cartridges into memory

until the available memory is exhausted or the maximum number of fonts in memory is reached.

# C Character Widths

Each character in the fonts has a certain width. The character width is expressed in "dots" (300 dots = 1" or 2,54cm). In the following fonts, the character widths are the same for all characters in the font.

| Font Number | Character Width |
|---|---|
| 383 | 17 |
| 384 | 25 |
| 385 | 30 |
| 941 | 18 |
| 942 | 23 |
| 950 | 43 |
| 958 | 18 |
| 7504 | 30 |
| 7505 | 25 |
| 7506 | 25 |

The tables on the following pages list the character widths for those fonts whose characters have different widths.

Font Number 824
Hamilton Medium SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 13 | 0 26 | @ 35 | P 28 | ` 15 | p 27 |
| 1 | 0 | 0 | ! 13 | 1 26 | A 29 | Q 32 | a 25 | q 27 |
| 2 | 0 | 0 | " 16 | 2 26 | B 29 | R 28 | b 27 | r 19 |
| 3 | 0 | 0 | # 26 | 3 26 | C 32 | S 27 | c 25 | s 23 |
| 4 | 0 | 0 | $ 27 | 4 26 | D 31 | T 29 | d 27 | t 18 |
| 5 | 0 | 0 | % 32 | 5 26 | E 27 | U 31 | e 25 | u 26 |
| 6 | 0 | 0 | & 31 | 6 26 | F 27 | V 26 | f 18 | v 22 |
| 7 | 0 | 0 | ' 13 | 7 26 | G 33 | W 41 | g 27 | w 34 |
| 8 | 0 | 0 | ( 14 | 8 26 | H 31 | X 28 | h 25 | x 23 |
| 9 | 0 | 0 | ) 14 | 9 26 | I 11 | Y 29 | i 11 | y 21 |
| A | 0 | 0 | * 26 | : 13 | J 25 | Z 29 | j 13 | z 22 |
| B | 0 | 0 | + 26 | ; 13 | K 28 | [ 16 | k 23 | { 18 |
| C | 0 | 0 | , 13 | < 26 | L 24 | \ 26 | l 11 | \| 13 |
| D | 0 | 0 | - 26 | = 26 | M 37 | ] 16 | m 37 | } 18 |
| E | 0 | 0 | . 13 | > 26 | N 29 | ^ 23 | n 26 | ~ 20 |
| F | 0 | 0 | / 26 | ? 23 | O 32 | _ 28 | o 27 | 0 |

Font Number 824
Hamilton Medium SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 27 | 0 | 0 | ° 13 | À 29 | Đ 31 | à 25 | đ 27 |
| 1 | š 23 | 0 | ¡ 13 | ± 26 | Á 29 | Ñ 29 | á 25 | ñ 26 |
| 2 | Ÿ 29 | 0 | ¢ 25 | ² 13 | Â 29 | Ò 32 | â 25 | ò 27 |
| 3 | ■ 26 | 0 | £ 27 | ³ 13 | Ã 29 | Ó 32 | ã 25 | ó 27 |
| 4 | 0 | 0 | ¤ 27 | ´ 15 | Ä 29 | Ô 32 | ä 25 | ô 27 |
| 5 | 0 | 0 | ¥ 29 | µ 26 | Å 29 | Õ 32 | å 25 | õ 27 |
| 6 | 0 | 0 | ¦ 13 | ¶ 28 | Æ 35 | Ö 32 | æ 35 | ö 27 |
| 7 | 0 | 0 | § 23 | · 13 | Ç 32 | Œ 43 | ç 25 | œ 40 |
| 8 | 0 | ƒ 18 | ¨ 29 | ¸ 13 | È 27 | Ø 32 | è 25 | ø 27 |
| 9 | 0 | ₧ 26 | © 26 | ¹ 13 | É 27 | Ù 31 | é 25 | ù 26 |
| A | 0 | ₲ 26 | ª 13 | º 13 | Ê 27 | Ú 31 | ê 25 | ú 26 |
| B | 0 | £ 27 | « 26 | » 26 | Ë 27 | Û 31 | ë 25 | û 26 |
| C | 0 | 0 | ¬ 26 | ¼ 26 | Ì 15 | Ü 31 | ì 15 | ü 26 |
| D | 0 | 0 | 0 | ½ 26 | Í 15 | Ý 29 | í 15 | ý 21 |
| E | 0 | 0 | ® 26 | ¾ 26 | Î 15 | Þ 28 | î 15 | þ 27 |
| F | 0 | 0 | ¯ 28 | ¿ 23 | Ï 20 | ß 26 | ï 18 | ÿ 21 |

Font Number 1104
Q–Roman Medium SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 8 | 0 22 | @ 42 | P 23 | ` 22 | p 20 |
| 1 | 0 | 0 | ! 10 | 1 22 | A 32 | Q 32 | a 19 | q 21 |
| 2 | 0 | 0 | " 12 | 2 22 | B 25 | R 27 | b 22 | r 15 |
| 3 | 0 | 0 | # 22 | 3 22 | C 27 | S 22 | c 17 | s 16 |
| 4 | 0 | 0 | $ 22 | 4 22 | D 29 | T 27 | d 22 | t 12 |
| 5 | 0 | 0 | % 36 | 5 22 | E 27 | U 29 | e 18 | u 22 |
| 6 | 0 | 0 | & 36 | 6 22 | F 24 | V 30 | f 13 | v 20 |
| 7 | 0 | 0 | ' 10 | 7 22 | G 30 | W 38 | g 19 | w 31 |
| 8 | 0 | 0 | ( 22 | 8 22 | H 30 | X 31 | h 21 | x 19 |
| 9 | 0 | 0 | ) 22 | 9 22 | I 13 | Y 28 | i 12 | y 21 |
| A | 0 | 0 | * 22 | : 10 | J 15 | Z 27 | j 11 | z 17 |
| B | 0 | 0 | + 27 | ; 10 | K 31 | [ 22 | k 23 | { 22 |
| C | 0 | 0 | , 10 | < 27 | L 26 | \ 23 | l 12 | \| 10 |
| D | 0 | 0 | - 27 | = 27 | M 36 | ] 22 | m 34 | } 22 |
| E | 0 | 0 | . 10 | > 27 | N 29 | ^ 22 | n 23 | ~ 22 |
| F | 0 | 0 | / 27 | ? 22 | O 32 | _ 22 | o 21 | 0 |

Font Number 1104
Q–Roman Medium SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 23 | 0 | 0 | ° 20 | À 32 | Đ 29 | à 19 | đ 22 |
| 1 | š 16 | 0 | ¡ 10 | ± 23 | Á 32 | Ñ 31 | á 19 | ñ 23 |
| 2 | Ÿ 32 | 0 | ¢ 22 | ² 22 | Â 32 | Ò 31 | â 19 | ò 21 |
| 3 | ■ 22 | 0 | £ 22 | ³ 22 | Ã 32 | Ó 31 | ã 19 | ó 21 |
| 4 | 0 | 0 | ¤ 22 | ´ 22 | Ä 32 | Ô 31 | ä 20 | ô 21 |
| 5 | 0 | 0 | ¥ 22 | µ 22 | Å 32 | Õ 31 | å 19 | õ 21 |
| 6 | 0 | 0 | ¦ 10 | ¶ 23 | Æ 40 | Ö 31 | æ 27 | ö 21 |
| 7 | 0 | 0 | § 22 | · 10 | Ç 28 | Œ 40 | ç 17 | œ 32 |
| 8 | 0 | *f* 22 | ¨ 23 | ¸ 14 | È 27 | Ø 32 | è 18 | ø 22 |
| 9 | 0 | ₧ 22 | © 36 | ¹ 22 | É 27 | Ù 31 | é 18 | ù 23 |
| A | 0 | ª 22 | ª 12 | º 10 | Ê 27 | Ú 31 | ê 20 | ú 23 |
| B | 0 | £ 22 | « 22 | » 22 | Ë 27 | Û 31 | è 20 | û 23 |
| C | 0 | 0 | ¬ 27 | ¼ 36 | Ì 14 | Ü 31 | ì 13 | ü 23 |
| D | 0 | 0 | 0 | ½ 36 | Í 14 | Ý 28 | í 13 | ý 21 |
| E | 0 | 0 | ® 36 | ¾ 36 | Î 15 | Þ 23 | î 13 | þ 22 |
| F | 0 | 0 | ¯ 22 | ¿ 22 | I 14 | ß 23 | ì 12 | ÿ 23 |

Font Number 1144
Q–Roman Medium Italic SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 16 | 0 23 | @ 40 | P 25 | ` 23 | p 21 |
| 1 | 0 | 0 | ! 14 | 1 23 | A 27 | Q 28 | a 20 | q 22 |
| 2 | 0 | 0 | " 14 | 2 23 | B 28 | R 29 | b 21 | r 17 |
| 3 | 0 | 0 | # 23 | 3 23 | C 27 | S 23 | c 18 | s 16 |
| 4 | 0 | 0 | $ 23 | 4 23 | D 31 | T 26 | d 21 | t 14 |
| 5 | 0 | 0 | % 36 | 5 23 | E 26 | U 34 | e 18 | u 21 |
| 6 | 0 | 0 | & 36 | 6 23 | F 26 | V 26 | f 13 | v 19 |
| 7 | 0 | 0 | ' 10 | 7 23 | G 32 | W 35 | g 19 | w 29 |
| 8 | 0 | 0 | ( 23 | 8 23 | H 31 | X 27 | h 20 | x 21 |
| 9 | 0 | 0 | ) 23 | 9 23 | I 21 | Y 27 | i 12 | y 20 |
| A | 0 | 0 | * 23 | : 10 | J 20 | Z 25 | j 13 | z 18 |
| B | 0 | 0 | + 27 | ; 10 | K 30 | [ 23 | k 21 | { 23 |
| C | 0 | 0 | , 10 | < 27 | L 26 | \ 23 | l 11 | \| 10 |
| D | 0 | 0 | - 27 | = 27 | M 35 | ] 23 | m 31 | } 23 |
| E | 0 | 0 | . 10 | > 27 | N 30 | ^ 23 | n 22 | ~ 23 |
| F | 0 | 0 | / 23 | ? 23 | O 28 | _ 23 | o 20 | 0 |

Font Number 1144
Q–Roman Medium Italic SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 23 | 0 | 0 | · 11 | À 27 | Ð 31 | à 20 | đ 23 |
| 1 | š 16 | 0 | ¡ 14 | ± 24 | Á 27 | Ñ 30 | á 20 | ñ 21 |
| 2 | Ÿ 27 | 0 | ¢ 24 | ² 24 | Â 27 | Ò 28 | â 20 | ò 20 |
| 3 | ■ 24 | 0 | £ 24 | ³ 24 | Ã 27 | Ó 28 | ã 20 | ó 20 |
| 4 | 0 | 0 | ¤ 24 | ´ 23 | Ä 27 | Ô 28 | ä 20 | ô 20 |
| 5 | 0 | 0 | ¥ 24 | µ 24 | Å 27 | Õ 28 | å 20 | õ 20 |
| 6 | 0 | 0 | ¦ 10 | ¶ 24 | Æ 40 | Ö 28 | æ 32 | ö 19 |
| 7 | 0 | 0 | § 24 | · 11 | Ç 27 | Œ 43 | ç 18 | œ 33 |
| 8 | 0 | ƒ 13 | ¨ 23 | ¸ 23 | È 26 | Ø 33 | è 18 | ø 22 |
| 9 | 0 | ℞ 23 | © 37 | ¹ 24 | É 26 | Ù 34 | é 18 | ù 21 |
| A | 0 | ℊ 23 | ª 11 | º 11 | Ê 26 | Ú 34 | ê 18 | ú 21 |
| B | 0 | ℓ 24 | « 24 | » 24 | Ë 26 | Û 34 | ë 18 | û 21 |
| C | 0 | 0 | ¬ 27 | ¼ 28 | Ì 21 | Ü 34 | ì 12 | ü 21 |
| D | 0 | 0 | 0 | ½ 28 | Í 21 | Ý 27 | í 14 | ý 20 |
| E | 0 | 0 | ® 37 | ¾ 28 | Î 21 | Þ 25 | î 12 | þ 21 |
| F | 0 | 0 | ¯ 23 | ¿ 23 | Ï 21 | ß 32 | ï 13 | ÿ 19 |

Font Number 3104
Hamilton Medium Italic SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 13 | 0 30 | @ 39 | P 32 | ` 16 | p 29 |
| 1 | 0 | 0 | ! 17 | 1 26 | A 26 | Q 35 | a 27 | q 30 |
| 2 | 0 | 0 | " 22 | 2 30 | B 33 | R 32 | b 29 | r 23 |
| 3 | 0 | 0 | # 31 | 3 31 | C 36 | S 30 | c 27 | s 25 |
| 4 | 0 | 0 | $ 28 | 4 29 | D 34 | T 35 | d 32 | t 22 |
| 5 | 0 | 0 | % 34 | 5 31 | E 33 | U 35 | e 27 | u 29 |
| 6 | 0 | 0 | & 31 | 6 29 | F 33 | V 33 | f 24 | v 27 |
| 7 | 0 | 0 | ' 17 | 7 34 | G 36 | W 48 | g 30 | w 40 |
| 8 | 0 | 0 | ( 20 | 8 30 | H 36 | X 35 | h 27 | x 28 |
| 9 | 0 | 0 | ) 16 | 9 30 | I 16 | Y 36 | i 16 | y 27 |
| A | 0 | 0 | * 27 | : 14 | J 30 | Z 36 | j 19 | z 27 |
| B | 0 | 0 | + 29 | ; 14 | K 34 | [ 22 | k 28 | { 24 |
| C | 0 | 0 | , 13 | < 26 | L 24 | \ 26 | l 16 | \| 13 |
| D | 0 | 0 | - 28 | = 28 | M 41 | ] 21 | m 39 | } 20 |
| E | 0 | 0 | . 13 | > 26 | N 33 | ^ 28 | n 28 | ~ 23 |
| F | 0 | 0 | / 29 | ? 27 | O 35 | _ 28 | o 28 | 0 |

Font Number 1144
Q–Roman Medium Italic SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 23 | 0 | 0 | · 11 | À 27 | Đ 31 | à 20 | đ 23 |
| 1 | š 16 | 0 | ¡ 14 | ± 24 | Á 27 | Ñ 30 | á 20 | ñ 21 |
| 2 | Ÿ 27 | 0 | ¢ 24 | ² 24 | Â 27 | Ò 28 | â 20 | ò 20 |
| 3 | ▪ 24 | 0 | £ 24 | ³ 24 | Ã 27 | Ó 28 | ã 20 | ó 20 |
| 4 | 0 | 0 | ¤ 24 | ´ 23 | Ä 27 | Ô 28 | ä 20 | ô 20 |
| 5 | 0 | 0 | ¥ 24 | µ 24 | Å 27 | Õ 28 | å 20 | õ 20 |
| 6 | 0 | 0 | ¦ 10 | ¶ 24 | Æ 40 | Ö 28 | æ 32 | ö 19 |
| 7 | 0 | 0 | § 24 | • 11 | Ç 27 | Œ 43 | ç 18 | œ 33 |
| 8 | 0 | ƒ 13 | ¨ 23 | ¸ 23 | È 26 | Ø 33 | è 18 | ø 22 |
| 9 | 0 | ℞ 23 | © 37 | ¹ 24 | É 26 | Ù 34 | é 18 | ù 21 |
| A | 0 | ª 23 | ª 11 | º 11 | Ê 26 | Ú 34 | ê 18 | ú 21 |
| B | 0 | £ 24 | « 24 | » 24 | Ë 26 | Û 34 | ë 18 | û 21 |
| C | 0 | 0 | ¬ 27 | ¼ 28 | Ì 21 | Ü 34 | ì 12 | ü 21 |
| D | 0 | 0 | 0 | ½ 28 | Í 21 | Ý 27 | í 14 | ý 20 |
| E | 0 | 0 | ® 37 | ¾ 28 | Î 21 | Þ 25 | î 12 | þ 21 |
| F | 0 | 0 | ¯ 23 | ¿ 23 | Ï 21 | ß 32 | ï 13 | ÿ 19 |

Font Number 3104
Hamilton Medium Italic SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 13 | 0 30 | @ 39 | P 32 | ` 16 | p 29 |
| 1 | 0 | 0 | ! 17 | 1 26 | A 26 | Q 35 | a 27 | q 30 |
| 2 | 0 | 0 | " 22 | 2 30 | B 33 | R 32 | b 29 | r 23 |
| 3 | 0 | 0 | # 31 | 3 31 | C 36 | S 30 | c 27 | s 25 |
| 4 | 0 | 0 | $ 28 | 4 29 | D 34 | T 35 | d 32 | t 22 |
| 5 | 0 | 0 | % 34 | 5 31 | E 33 | U 35 | e 27 | u 29 |
| 6 | 0 | 0 | & 31 | 6 29 | F 33 | V 33 | f 24 | v 27 |
| 7 | 0 | 0 | ' 17 | 7 34 | G 36 | W 48 | g 30 | w 40 |
| 8 | 0 | 0 | ( 20 | 8 30 | H 36 | X 35 | h 27 | x 28 |
| 9 | 0 | 0 | ) 16 | 9 30 | I 16 | Y 36 | i 16 | y 27 |
| A | 0 | 0 | * 27 | : 14 | J 30 | Z 36 | j 19 | z 27 |
| B | 0 | 0 | + 29 | ; 14 | K 34 | [ 22 | k 28 | { 24 |
| C | 0 | 0 | , 13 | < 26 | L 24 | \ 26 | l 16 | \| 13 |
| D | 0 | 0 | - 28 | = 28 | M 41 | ] 21 | m 39 | } 20 |
| E | 0 | 0 | . 13 | > 26 | N 33 | ^ 28 | n 28 | ~ 23 |
| F | 0 | 0 | / 29 | ? 27 | O 35 | _ 28 | o 28 | 0 |

Font Number 1144
Q–Roman Medium Italic SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 23 | 0 | 0 | · 11 | À 27 | Ð 31 | à 20 | ð 23 |
| 1 | š 16 | 0 | ¡ 14 | ± 24 | Á 27 | Ñ 30 | á 20 | ñ 21 |
| 2 | Ÿ 27 | 0 | ¢ 24 | ² 24 | Â 27 | Ò 28 | â 20 | ò 20 |
| 3 | ■ 24 | 0 | £ 24 | ³ 24 | Ã 27 | Ó 28 | ã 20 | ó 20 |
| 4 | 0 | 0 | ¤ 24 | ´ 23 | Ä 27 | Ô 28 | ä 20 | ô 20 |
| 5 | 0 | 0 | ¥ 24 | µ 24 | Å 27 | Õ 28 | å 20 | õ 20 |
| 6 | 0 | 0 | ¦ 10 | ¶ 24 | Æ 40 | Ö 28 | æ 32 | ö 19 |
| 7 | 0 | 0 | § 24 | · 11 | Ç 27 | Œ 43 | ç 18 | œ 33 |
| 8 | 0 | ƒ 13 | ¨ 23 | ¸ 23 | È 26 | Ø 33 | è 18 | ø 22 |
| 9 | 0 | ₧ 23 | © 37 | ¹ 24 | É 26 | Ù 34 | é 18 | ù 21 |
| A | 0 | ª 23 | ª 11 | º 11 | Ê 26 | Ú 34 | ê 18 | ú 21 |
| B | 0 | £ 24 | « 24 | » 24 | Ë 26 | Û 34 | ë 18 | û 21 |
| C | 0 | 0 | ¬ 27 | ¼ 28 | Ì 21 | Ü 34 | ì 12 | ü 21 |
| D | 0 | 0 | 0 | ½ 28 | Í 21 | Ý 27 | í 14 | ý 20 |
| E | 0 | 0 | ® 37 | ¾ 28 | Î 21 | Þ 25 | î 12 | þ 21 |
| F | 0 | 0 | ¯ 23 | ¿ 23 | Ï 21 | ß 32 | ï 13 | ÿ 19 |

Font Number 3104
Hamilton Medium Italic SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 13 | *0* 30 | *@* 39 | *P* 32 | ` 16 | *p* 29 |
| 1 | 0 | 0 | *!* 17 | *1* 26 | *A* 26 | *Q* 35 | *a* 27 | *q* 30 |
| 2 | 0 | 0 | *"* 22 | *2* 30 | *B* 33 | *R* 32 | *b* 29 | *r* 23 |
| 3 | 0 | 0 | *#* 31 | *3* 31 | *C* 36 | *S* 30 | *c* 27 | *s* 25 |
| 4 | 0 | 0 | *$* 28 | *4* 29 | *D* 34 | *T* 35 | *d* 32 | *t* 22 |
| 5 | 0 | 0 | *%* 34 | *5* 31 | *E* 33 | *U* 35 | *e* 27 | *u* 29 |
| 6 | 0 | 0 | *&* 31 | *6* 29 | *F* 33 | *V* 33 | *f* 24 | *v* 27 |
| 7 | 0 | 0 | *'* 17 | *7* 34 | *G* 36 | *W* 48 | *g* 30 | *w* 40 |
| 8 | 0 | 0 | *(* 20 | *8* 30 | *H* 36 | *X* 35 | *h* 27 | *x* 28 |
| 9 | 0 | 0 | *)* 16 | *9* 30 | *I* 16 | *Y* 36 | *i* 16 | *y* 27 |
| A | 0 | 0 | * 27 | *:* 14 | *J* 30 | *Z* 36 | *j* 19 | *z* 27 |
| B | 0 | 0 | *+* 29 | *;* 14 | *K* 34 | *[* 22 | *k* 28 | *{* 24 |
| C | 0 | 0 | *,* 13 | *<* 26 | *L* 24 | ** 26 | *l* 16 | *\|* 13 |
| D | 0 | 0 | *-* 28 | *=* 28 | *M* 41 | *]* 21 | *m* 39 | *}* 20 |
| E | 0 | 0 | *.* 13 | *>* 26 | *N* 33 | *^* 28 | *n* 28 | *~* 23 |
| F | 0 | 0 | */* 29 | *?* 27 | *O* 35 | *_* 28 | *o* 28 | 0 |

Font Number 1144
Q–Roman Medium Italic SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 23 | 0 | 0 | · 11 | À 27 | Đ 31 | à 20 | đ 23 |
| 1 | š 16 | 0 | ¡ 14 | ± 24 | Á 27 | Ñ 30 | á 20 | ñ 21 |
| 2 | Ÿ 27 | 0 | ¢ 24 | ² 24 | Â 27 | Ò 28 | â 20 | ò 20 |
| 3 | ▪ 24 | 0 | £ 24 | ³ 24 | Ã 27 | Ó 28 | ã 20 | ó 20 |
| 4 | 0 | 0 | ¤ 24 | ´ 23 | Ä 27 | Ô 28 | ä 20 | ô 20 |
| 5 | 0 | 0 | ¥ 24 | µ 24 | Å 27 | Õ 28 | å 20 | õ 20 |
| 6 | 0 | 0 | ¦ 10 | ¶ 24 | Æ 40 | Ö 28 | æ 32 | ö 19 |
| 7 | 0 | 0 | § 24 | · 11 | Ç 27 | Œ 43 | ç 18 | œ 33 |
| 8 | 0 | ƒ 13 | ¨ 23 | ¸ 23 | È 26 | Ø 33 | è 18 | ø 22 |
| 9 | 0 | ℞ 23 | © 37 | ¹ 24 | É 26 | Ù 34 | é 18 | ù 21 |
| A | 0 | ℊ 23 | ª 11 | º 11 | Ê 26 | Ú 34 | ê 18 | ú 21 |
| B | 0 | £ 24 | « 24 | » 24 | Ë 26 | Û 34 | ë 18 | û 21 |
| C | 0 | 0 | ¬ 27 | ¼ 28 | Ì 21 | Ü 34 | ì 12 | ü 21 |
| D | 0 | 0 | 0 | ½ 28 | Í 21 | Ý 27 | í 14 | ý 20 |
| E | 0 | 0 | ® 37 | ¾ 28 | Î 21 | Þ 25 | î 12 | þ 21 |
| F | 0 | 0 | ¯ 23 | ¿ 23 | Ï 21 | ß 32 | ï 13 | ÿ 19 |

Font Number 3104
Hamilton Medium Italic SML [10 Point, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 13 | 0 30 | @ 39 | P 32 | ` 16 | p 29 |
| 1 | 0 | 0 | ! 17 | 1 26 | A 26 | Q 35 | a 27 | q 30 |
| 2 | 0 | 0 | " 22 | 2 30 | B 33 | R 32 | b 29 | r 23 |
| 3 | 0 | 0 | # 31 | 3 31 | C 36 | S 30 | c 27 | s 25 |
| 4 | 0 | 0 | $ 28 | 4 29 | D 34 | T 35 | d 32 | t 22 |
| 5 | 0 | 0 | % 34 | 5 31 | E 33 | U 35 | e 27 | u 29 |
| 6 | 0 | 0 | & 31 | 6 29 | F 33 | V 33 | f 24 | v 27 |
| 7 | 0 | 0 | ' 17 | 7 34 | G 36 | W 48 | g 30 | w 40 |
| 8 | 0 | 0 | ( 20 | 8 30 | H 36 | X 35 | h 27 | x 28 |
| 9 | 0 | 0 | ) 16 | 9 30 | I 16 | Y 36 | i 16 | y 27 |
| A | 0 | 0 | * 27 | : 14 | J 30 | Z 36 | j 19 | z 27 |
| B | 0 | 0 | + 29 | ; 14 | K 34 | [ 22 | k 28 | { 24 |
| C | 0 | 0 | , 13 | < 26 | L 24 | \ 26 | l 16 | \| 13 |
| D | 0 | 0 | - 28 | = 28 | M 41 | ] 21 | m 39 | } 20 |
| E | 0 | 0 | . 13 | > 26 | N 33 | ^ 28 | n 28 | ~ 23 |
| F | 0 | 0 | / 29 | ? 27 | O 35 | _ 28 | o 28 | 0 |

Font Number 3104
Hamilton Medium Italic SML [10 Point, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 27 | 0 | 0 | ° 13 | À 26 | Ð 31 | à 27 | ð 31 |
| 1 | š 25 | 0 | ¡ 15 | ± 29 | Á 34 | Ñ 31 | á 27 | ñ 26 |
| 2 | Ÿ 36 | 0 | ¢ 25 | ² 14 | Â 31 | Ò 32 | â 27 | ò 28 |
| 3 | ▪ 26 | 0 | £ 28 | ³ 14 | Ã 32 | Ó 32 | ã 27 | ó 28 |
| 4 | 0 | 0 | ¤ 30 | ´ 16 | Ä 32 | Ô 32 | ä 27 | ô 28 |
| 5 | 0 | 0 | ¥ 36 | µ 28 | Å 29 | Õ 32 | å 27 | õ 28 |
| 6 | 0 | 0 | ¦ 13 | ¶ 29 | Æ 42 | Ö 32 | æ 36 | ö 28 |
| 7 | 0 | 0 | § 24 | · 13 | Ç 32 | Œ 49 | ç 25 | œ 41 |
| 8 | 0 | ƒ 21 | ¨ 30 | ¸ 13 | È 33 | Ø 32 | è 27 | ø 27 |
| 9 | 0 | A 27 | © 26 | ¹ 14 | É 33 | Ù 31 | é 27 | ù 29 |
| A | 0 | C 26 | ª 14 | º 14 | Ê 33 | Ú 31 | ê 27 | ú 29 |
| B | 0 | £ 28 | « 26 | » 26 | Ë 33 | Û 31 | ë 27 | û 29 |
| C | 0 | 0 | ¬ 28 | ¼ 26 | Ì 21 | Ü 31 | ì 18 | ü 29 |
| D | 0 | 0 | 0 | ½ 26 | Í 21 | Ý 29 | í 19 | ý 27 |
| E | 0 | 0 | ® 26 | ¾ 26 | Î 21 | Þ 28 | î 19 | þ 28 |
| F | 0 | 0 | ¯ 28 | ¿ 23 | Ï 23 | ß 27 | ï 21 | ÿ 27 |

Font Number 7525
Letter Gothic Italic 12 SML [12 CPI, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 25 | 0 29 | @ 29 | P 28 | ` 25 | p 26 |
| 1 | 0 | 0 | ! 25 | 1 25 | A 25 | Q 29 | a 25 | q 28 |
| 2 | 0 | 0 | " 27 | 2 29 | B 28 | R 27 | b 26 | r 29 |
| 3 | 0 | 0 | # 31 | 3 29 | C 29 | S 28 | c 27 | s 26 |
| 4 | 0 | 0 | $ 28 | 4 26 | D 28 | T 30 | d 29 | t 26 |
| 5 | 0 | 0 | % 30 | 5 29 | E 30 | U 30 | e 26 | u 27 |
| 6 | 0 | 0 | & 26 | 6 29 | F 30 | V 31 | f 31 | v 28 |
| 7 | 0 | 0 | ' 25 | 7 29 | G 29 | W 32 | g 27 | w 30 |
| 8 | 0 | 0 | ( 27 | 8 29 | H 30 | X 30 | h 26 | x 28 |
| 9 | 0 | 0 | ) 27 | 9 29 | I 26 | Y 31 | i 25 | y 28 |
| A | 0 | 0 | * 30 | : 25 | J 28 | Z 31 | j 26 | z 28 |
| B | 0 | 0 | + 28 | ; 25 | K 31 | [ 30 | k 26 | { 29 |
| C | 0 | 0 | , 25 | < 30 | L 25 | \ 29 | l 25 | \| 26 |
| D | 0 | 0 | - 25 | = 26 | M 31 | ] 29 | m 30 | } 29 |
| E | 0 | 0 | . 25 | > 30 | N 30 | ^ 29 | n 26 | ~ 27 |
| F | 0 | 0 | / 29 | ? 28 | O 29 | _ 27 | o 26 | 0 |

Font Number 7525
Letter Gothic Italic 12 SML [12 CPI, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 28 | 0 | 0 | ° 25 | À 25 | Ð 28 | à 25 | ð 32 |
| 1 | š 26 | 0 | ¡ 25 | ± 29 | Á 32 | Ñ 31 | á 28 | ñ 28 |
| 2 | Ÿ 32 | 0 | ¢ 27 | ² 26 | Â 29 | Ò 29 | â 25 | ò 26 |
| 3 | ■ 29 | 0 | £ 31 | ³ 26 | Ã 31 | Ó 29 | ã 27 | ó 30 |
| 4 | 0 | 0 | ¤ 29 | ´ 28 | Ä 31 | Ô 29 | ä 27 | ô 26 |
| 5 | 0 | 0 | ¥ 31 | µ 27 | Å 28 | Õ 31 | å 25 | õ 30 |
| 6 | 0 | 0 | ¦ 25 | ¶ 32 | Æ 35 | Ö 32 | æ 32 | ö 30 |
| 7 | 0 | ƒ 34 | § 33 | • 25 | Ç 29 | Œ 35 | ç 27 | œ 32 |
| 8 | 0 | ₧ 33 | ¨ 30 | ¸ 25 | È 30 | Ø 33 | è 26 | ø 29 |
| 9 | 0 | © 35 | © 30 | ¹ 25 | É 30 | Ù 30 | é 28 | ù 27 |
| A | 0 | € 31 | ª 25 | º 25 | Ê 30 | Ú 30 | ê 26 | ú 27 |
| B | 0 | 0 | « 29 | » 29 | Ë 32 | Û 30 | ë 29 | û 27 |
| C | 0 | 0 | ¬ 25 | ¼ 28 | Ì 26 | Ü 32 | ì 25 | ü 29 |
| D | 0 | 0 | 0 | ½ 29 | Í 31 | Ý 31 | í 26 | ý 30 |
| E | 0 | 0 | ® 30 | ¾ 28 | Î 28 | Þ 28 | î 25 | þ 26 |
| F | 0 | 0 | ¯ 25 | ¿ 28 | Ï 31 | ß 28 | ï 28 | ÿ 30 |

Font Number 7525
Letter Gothic Italic 12 SML [12 CPI, Version 1]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 25 | 0 29 | @ 29 | P 28 | ` 25 | p 26 |
| 1 | 0 | 0 | ! 25 | 1 25 | A 25 | Q 29 | a 25 | q 28 |
| 2 | 0 | 0 | " 27 | 2 29 | B 28 | R 27 | b 26 | r 29 |
| 3 | 0 | 0 | # 31 | 3 29 | C 29 | S 28 | c 27 | s 26 |
| 4 | 0 | 0 | $ 28 | 4 26 | D 28 | T 30 | d 29 | t 26 |
| 5 | 0 | 0 | % 30 | 5 29 | E 30 | U 30 | e 26 | u 27 |
| 6 | 0 | 0 | & 26 | 6 29 | F 30 | V 31 | f 31 | v 28 |
| 7 | 0 | 0 | ' 25 | 7 29 | G 29 | W 32 | g 27 | w 30 |
| 8 | 0 | 0 | ( 27 | 8 29 | H 30 | X 30 | h 26 | x 28 |
| 9 | 0 | 0 | ) 27 | 9 29 | I 26 | Y 31 | i 25 | y 28 |
| A | 0 | 0 | * 30 | : 25 | J 28 | Z 31 | j 26 | z 28 |
| B | 0 | 0 | + 28 | ; 25 | K 31 | [ 30 | k 26 | { 29 |
| C | 0 | 0 | , 25 | < 30 | L 25 | \ 29 | l 25 | \| 26 |
| D | 0 | 0 | - 25 | = 26 | M 31 | ] 29 | m 30 | } 29 |
| E | 0 | 0 | . 25 | > 30 | N 30 | ^ 29 | n 26 | ~ 27 |
| F | 0 | 0 | / 29 | ? 28 | O 29 | _ 27 | o 26 | 0 |

Font Number 7525
Letter Gothic Italic 12 SML [12 CPI, Version 1]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | Š 28 | 0 | 0 | ° 25 | À 25 | Ð 28 | à 25 | đ 32 |
| 1 | š 26 | 0 | ¡ 25 | ± 29 | Á 32 | Ñ 31 | á 28 | ñ 28 |
| 2 | Ÿ 32 | 0 | ¢ 27 | ² 26 | Â 29 | Ò 29 | â 25 | ò 26 |
| 3 | ■ 29 | 0 | £ 31 | ³ 26 | Ã 31 | Ó 29 | ã 27 | ó 30 |
| 4 | 0 | 0 | ¤ 29 | ´ 28 | Ä 31 | Ô 29 | ä 27 | ô 26 |
| 5 | 0 | 0 | ¥ 31 | µ 27 | Å 28 | Õ 31 | å 25 | õ 30 |
| 6 | 0 | 0 | ¦ 25 | ¶ 32 | Æ 35 | Ö 32 | æ 32 | ö 30 |
| 7 | 0 | ƒ 34 | § 33 | · 25 | Ç 29 | Œ 35 | ç 27 | œ 32 |
| 8 | 0 | ₧ 33 | ¨ 30 | ¸ 25 | È 30 | Ø 33 | è 26 | ø 29 |
| 9 | 0 | © 35 | © 30 | ¹ 25 | É 30 | Ù 30 | é 28 | ù 27 |
| A | 0 | £ 31 | ª 25 | º 25 | Ê 30 | Ú 30 | ê 26 | ú 27 |
| B | 0 | 0 | « 29 | » 29 | Ë 32 | Û 30 | ë 29 | û 27 |
| C | 0 | 0 | ¬ 25 | ¼ 28 | Ì 26 | Ü 32 | ì 25 | ü 29 |
| D | 0 | 0 | 0 | ½ 29 | Í 31 | Ý 31 | í 26 | ý 30 |
| E | 0 | 0 | ® 30 | ¾ 28 | Î 28 | Þ 28 | î 25 | þ 26 |
| F | 0 | 0 | ¯ 25 | ¿ 28 | Ï 31 | ß 28 | ï 28 | ÿ 30 |

This font included ONLY in Epson Emulation models.

Font Number 380
Epson Compressed [10 Point, Version 2, 17.6 CPI]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | à 17 | § 17 | 17 | 0 17 | @ 17 | P 17 | ` 12 | p 17 |
| 1 | è 17 | ß 17 | ! 9 | 1 17 | A 17 | Q 17 | a 17 | q 17 |
| 2 | ù 17 | Æ 17 | " 15 | 2 17 | B 17 | R 17 | b 17 | r 15 |
| 3 | ò 17 | æ 17 | # 17 | 3 17 | C 17 | S 17 | c 17 | s 17 |
| 4 | ì 11 | Ø 17 | $ 17 | 4 17 | D 17 | T 17 | d 17 | t 16 |
| 5 | ˙ 12 | ø 17 | % 17 | 5 17 | E 16 | U 17 | e 17 | u 17 |
| 6 | £ 17 | ¨ 18 | & 17 | 6 17 | F 16 | V 17 | f 16 | v 17 |
| 7 | ì 9 | Ä 17 | ' 12 | 7 17 | G 17 | W 17 | g 17 | w 17 |
| 8 | ¿ 17 | ò 17 | ( 16 | 8 17 | H 17 | X 17 | h 17 | x 17 |
| 9 | Ñ 17 | Ü 17 | ) 16 | 9 17 | I 9 | Y 17 | i 9 | y 17 |
| A | ñ 17 | ä 17 | * 17 | : 11 | J 17 | Z 17 | j 12 | z 17 |
| B | Ù 17 | ö 17 | + 17 | ; 12 | K 17 | [ 16 | k 17 | { 16 |
| C | ₧ 17 | ü 17 | , 12 | < 17 | L 16 | \ 17 | l 9 | ¦ 9 |
| D | Å 17 | É 17 | - 17 | = 17 | M 17 | ] 16 | m 17 | } 16 |
| E | à 17 | é 17 | . 11 | > 17 | N 17 | ^ 17 | n 17 | ~ 17 |
| F | ç 17 | ¥ 17 | / 17 | ? 17 | O 17 | _ 17 | o 17 | Ø 17 |

**This font included ONLY in Epson Emulation models.**

Font Number 380
Epson Compressed [10 Point, Version 2, 17.6 CPI]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | à 17 | § 17 | 17 | 0 17 | @ 17 | P 17 | ` 12 | p 17 |
| 1 | è 17 | ß 17 | ! 13 | 1 17 | A 17 | Q 17 | a 17 | q 17 |
| 2 | ù 17 | Æ 17 | " 16 | 2 17 | B 17 | R 17 | b 17 | r 17 |
| 3 | ò 17 | æ 17 | # 17 | 3 17 | C 17 | S 17 | c 17 | s 17 |
| 4 | ì 10 | Ø 17 | $ 17 | 4 17 | D 17 | T 16 | d 17 | t 15 |
| 5 | · 12 | ø 17 | % 17 | 5 17 | E 17 | U 17 | e 17 | u 17 |
| 6 | £ 17 | ¨ 15 | & 17 | 6 17 | F 17 | V 17 | f 16 | v 17 |
| 7 | ı 13 | Ä 17 | ' 10 | 7 17 | G 17 | W 17 | g 17 | w 17 |
| 8 | ¿ 17 | ö 17 | ( 17 | 8 17 | H 17 | X 17 | h 17 | x 17 |
| 9 | Ñ 17 | ü 17 | ) 17 | 9 17 | I 12 | Y 17 | i 13 | y 17 |
| A | ñ 17 | ä 17 | * 17 | : 12 | J 17 | Z 17 | j 17 | z 17 |
| B | Ø 17 | o 16 | + 17 | ; 12 | K 17 | [ 17 | k 17 | { 17 |
| C | Ŕ 17 | ù 17 | , 11 | < 17 | L 16 | \ 17 | l 12 | ¦ 17 |
| D | Å 17 | É 17 | - 17 | = 17 | M 17 | ] 17 | m 17 | } 17 |
| E | a 16 | é 17 | . 10 | > 17 | N 17 | ^ 16 | n 17 | ~ 17 |
| F | ç 17 | ¥ 17 | / 17 | ? 17 | O 17 | _ 17 | o 17 | Ø 17 |

**This font included ONLY in Epson Emulation models.**

Font Number 381
Epson Elite [10 Point, Version 2, 12 CPI]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | à 23 | § 23 | 20 | 0 25 | @ 25 | P 22 | ` 11 | p 23 |
| 1 | è 24 | ß 24 | ! 10 | 1 25 | A 25 | Q 25 | a 23 | q 23 |
| 2 | ù 23 | Æ 25 | " 17 | 2 25 | B 24 | R 22 | b 23 | r 18 |
| 3 | ò 25 | æ 25 | # 24 | 3 25 | C 25 | S 23 | c 23 | s 23 |
| 4 | ì 11 | Ø 25 | $ 25 | 4 25 | D 24 | T 24 | d 23 | t 18 |
| 5 | ° 11 | ø 25 | % 25 | 5 25 | E 21 | U 23 | e 24 | u 24 |
| 6 | £ 25 | ¨ 19 | & 25 | 6 25 | F 21 | V 25 | f 19 | v 23 |
| 7 | ì 10 | Ä 23 | ' 11 | 7 25 | G 25 | W 25 | g 24 | w 25 |
| 8 | ¿ 23 | ö 25 | ( 15 | 8 25 | H 23 | X 24 | h 21 | x 20 |
| 9 | Ñ 24 | Ü 23 | ) 15 | 9 25 | I 10 | Y 24 | i 9 | y 23 |
| A | ñ 23 | ä 23 | * 25 | : 11 | J 20 | Z 21 | j 14 | z 21 |
| B | Ω 25 | ö 25 | + 25 | ; 13 | K 25 | [ 15 | k 23 | { 18 |
| C | ₧ 25 | ü 23 | , 13 | < 23 | L 22 | \ 22 | l 9 | ¦ 8 |
| D | Å 23 | É 21 | − 25 | = 25 | M 25 | ] 15 | m 25 | } 18 |
| E | å 23 | é 24 | . 11 | > 23 | N 25 | ^ 19 | n 23 | ~ 22 |
| F | ç 23 | ¥ 25 | / 22 | ? 21 | O 25 | _ 25 | o 25 | Ø 25 |

This font included ONLY in Epson Emulation models.

Font Number 381
Epson Elite [10 Point, Version 2, 12 CPI]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | à 25 | § 25 | 20 | 0 25 | @ 25 | P 25 | ` 12 | p 25 |
| 1 | è 25 | ß 25 | ! 15 | 1 25 | A 25 | Q 25 | a 25 | q 25 |
| 2 | ù 25 | Æ 25 | " 19 | 2 25 | B 25 | R 25 | b 25 | r 21 |
| 3 | ò 25 | æ 25 | # 25 | 3 25 | C 25 | S 25 | c 24 | s 24 |
| 4 | ì 15 | Ø 25 | $ 25 | 4 25 | D 25 | T 25 | d 25 | t 20 |
| 5 | ° 13 | ø 25 | % 25 | 5 25 | E 25 | U 25 | e 25 | u 25 |
| 6 | £ 25 | ¨ 20 | & 25 | 6 25 | F 25 | V 25 | f 23 | v 25 |
| 7 | ì 14 | Ä 25 | ' 12 | 7 25 | G 25 | W 25 | g 25 | w 25 |
| 8 | ¿ 22 | ö 25 | ( 21 | 8 25 | H 25 | X 25 | h 25 | x 25 |
| 9 | Ñ 25 | Ü 25 | ) 21 | 9 25 | I 16 | Y 25 | i 15 | y 25 |
| A | ñ 25 | ä 25 | * 25 | : 15 | J 25 | Z 25 | j 22 | z 25 |
| B | Ò 25 | ö 24 | + 25 | ; 16 | K 25 | [ 25 | k 23 | { 22 |
| C | ₧ 25 | Ü 25 | , 13 | < 25 | L 22 | \ 20 | l 14 | / 24 |
| D | Å 25 | É 25 | - 25 | = 25 | M 25 | ] 25 | m 25 | } 22 |
| E | à 25 | é 25 | . 11 | > 25 | N 25 | ^ 21 | n 25 | ~ 22 |
| F | ç 25 | ¥ 25 | / 22 | ? 23 | O 25 | _ 25 | o 25 | Ø 25 |

This font included ONLY in Epson Emulation models.

Font Number 382
Epson Pica [10 Point, Version 2, 10 CPI]

| | 0x | 1x | 2x | 3x | 4x | 5x | 6x | 7x |
|---|---|---|---|---|---|---|---|---|
| 0 | à 30 | § 25 | 25 | 0 30 | @ 30 | P 30 | ` 13 | p 28 |
| 1 | è 30 | ß 28 | ! 13 | 1 20 | A 30 | Q 30 | a 30 | q 28 |
| 2 | ù 28 | Æ 30 | " 20 | 2 30 | B 30 | R 30 | b 28 | r 28 |
| 3 | ò 25 | æ 30 | # 30 | 3 30 | C 30 | S 30 | c 28 | s 30 |
| 4 | ì 15 | Ø 30 | $ 30 | 4 30 | D 30 | T 30 | d 28 | t 28 |
| 5 | · 20 | ø 30 | % 30 | 5 30 | E 30 | U 30 | e 30 | u 28 |
| 6 | £ 30 | ¨ 20 | & 30 | 6 30 | F 30 | V 30 | f 25 | v 30 |
| 7 | ¡ 13 | Ä 30 | ' 13 | 7 30 | G 30 | W 30 | g 28 | w 30 |
| 8 | ¿ 30 | Ö 30 | ( 15 | 8 30 | H 30 | X 25 | h 28 | x 25 |
| 9 | Ñ 30 | Ü 30 | ) 15 | 9 30 | I 20 | Y 30 | i 20 | y 30 |
| A | ñ 28 | ä 30 | * 30 | : 15 | J 28 | Z 25 | j 23 | z 25 |
| B | Ö 30 | ö 25 | + 30 | ; 15 | K 30 | [ 20 | k 25 | { 23 |
| C | ₧ 30 | ü 28 | , 18 | < 25 | L 30 | \ 25 | l 20 | ¦ 13 |
| D | Å 30 | É 30 | – 30 | = 30 | M 30 | ] 20 | m 30 | } 23 |
| E | å 30 | é 30 | . 15 | > 25 | N 30 | ^ 30 | n 28 | ~ 30 |
| F | ç 28 | ¥ 30 | / 25 | ? 30 | O 30 | _ 30 | o 30 | Ø 30 |

**This font included ONLY in Epson Emulation models.**

Font Number 382
Epson Pica [10 Point, Version 2, 10 CPI]

| | 8x | 9x | Ax | Bx | Cx | Dx | Ex | Fx |
|---|---|---|---|---|---|---|---|---|
| 0 | à 28 | Ś 30 | | O 30 | @ 30 | P 30 | ` 13 | p 28 |
| 1 | è 28 | ß 28 | ! 25 | 1 23 | A 30 | Q 30 | a 28 | q 28 |
| 2 | ù 28 | Æ 30 | " 25 | 2 30 | B 30 | R 30 | b 28 | r 25 |
| 3 | ò 28 | æ 30 | # 30 | 3 30 | C 30 | S 30 | c 28 | s 28 |
| 4 | ì 20 | Ø 30 | $ 28 | 4 30 | D 30 | T 30 | d 30 | t 25 |
| 5 | · 20 | ø 28 | % 30 | 5 30 | E 30 | U 30 | e 28 | u 28 |
| 6 | £ 30 | ¨ 23 | & 30 | 6 28 | F 30 | V 28 | f 30 | v 25 |
| 7 | ì 25 | Ä 30 | ' 13 | 7 30 | G 30 | W 30 | g 28 | w 30 |
| 8 | ¿ 28 | Ö 30 | ( 20 | 8 30 | H 30 | X 30 | h 28 | x 30 |
| 9 | Ñ 30 | Ü 30 | ) 20 | 9 28 | I 25 | Y 30 | i 23 | y 28 |
| A | ñ 30 | ä 28 | * 30 | : 20 | J 30 | Z 30 | j 25 | z 30 |
| B | Ö 30 | ö 28 | + 30 | ; 23 | K 30 | [ 28 | k 28 | { 25 |
| C | ₧ 30 | ü 30 | , 20 | < 25 | L 25 | \ 18 | l 23 | / 23 |
| D | Å 30 | É 30 | - 30 | = 28 | M 30 | ] 28 | m 28 | } 25 |
| E | à 28 | é 28 | . 18 | > 23 | N 30 | ^ 25 | n 25 | ~ 30 |
| F | ç 28 | ¥ 30 | / 25 | ? 28 | O 30 | _ 30 | o 28 | Ø 30 |

# Appendix B
# Conversion Table

| ASCII CONVERSION TABLE | | | | |
|---|---|---|---|---|
| ASCII | HEX | DECIMAL | OCTAL | BINARY |
| | | | | BIT 8 7 6 5 4 3 2 1 |
| NUL | 00 | 0 | 00 | 0000 0000 |
| SOH | 01 | 1 | 01 | 0000 0001 |
| STX | 02 | 2 | 02 | 0000 0010 |
| ETX | 03 | 3 | 03 | 0000 0011 |
| EOT | 04 | 4 | 04 | 0000 0100 |
| ENQ | 05 | 5 | 05 | 0000 0101 |
| ACK | 06 | 6 | 06 | 0000 0110 |
| BEL | 07 | 7 | 07 | 0000 0111 |
| BS | 08 | 8 | 10 | 0000 1000 |
| HT | 09 | 9 | 11 | 0000 1001 |
| LF | 0A | 10 | 12 | 0000 1010 |
| VT | 0B | 11 | 13 | 0000 1011 |
| FF | 0C | 12 | 14 | 0000 1100 |
| CR | 0D | 13 | 15 | 0000 1101 |
| SO | 0E | 14 | 16 | 0000 1110 |
| SI | 0F | 15 | 17 | 0000 1111 |
| DLE | 10 | 16 | 20 | 0001 0000 |
| DC1 | 11 | 17 | 21 | 0001 0001 |
| DC2 | 12 | 18 | 22 | 0001 0010 |
| DC3 | 13 | 19 | 23 | 0001 0011 |
| DC4 | 14 | 20 | 24 | 0001 0100 |
| NAK | 15 | 21 | 25 | 0001 0101 |
| SYN | 16 | 22 | 26 | 0001 0110 |
| ETB | 17 | 23 | 27 | 0001 0111 |
| CAN | 18 | 24 | 30 | 0001 1000 |
| EM | 19 | 25 | 31 | 0001 1001 |
| SUB | 1A | 26 | 32 | 0001 1010 |
| ESC | 1B | 27 | 33 | 0001 1011 |
| FS | 1C | 28 | 34 | 0001 1100 |
| GS | 1D | 29 | 35 | 0001 1101 |
| RS | 1E | 30 | 36 | 0001 1110 |
| US | 1F | 31 | 37 | 0001 1111 |
| SP | 20 | 32 | 40 | 0010 0000 |
| ! | 21 | 33 | 41 | 0010 0001 |
| " | 22 | 34 | 42 | 0010 0010 |
| # | 23 | 35 | 43 | 0010 0011 |
| $ | 24 | 36 | 44 | 0010 0100 |
| % | 25 | 37 | 45 | 0010 0101 |
| & | 26 | 38 | 46 | 0010 0110 |
| ' | 27 | 39 | 47 | 0010 0111 |
| ( | 28 | 40 | 50 | 0010 1000 |
| ) | 29 | 41 | 51 | 0010 1001 |
| * | 2A | 42 | 52 | 0010 1010 |

(Continued on the next page)

## ASCII CONVERSION TABLE

| ASCII | HEX | DECIMAL | OCTAL | BINARY |
|---|---|---|---|---|
| | | | | BIT 8 7 6 5 4 3 2 1 |
| + | 2B | 43 | 53 | 0010 1011 |
| , | 2C | 44 | 54 | 0010 1100 |
| - | 2D | 45 | 55 | 0010 1101 |
| . | 2E | 46 | 56 | 0010 1110 |
| / | 2F | 47 | 57 | 0010 1111 |
| 0 | 30 | 48 | 60 | 0011 0000 |
| 1 | 31 | 49 | 61 | 0011 0001 |
| 2 | 32 | 50 | 62 | 0011 0010 |
| 3 | 33 | 51 | 63 | 0011 0011 |
| 4 | 34 | 52 | 64 | 0011 0100 |
| 5 | 35 | 53 | 65 | 0011 0101 |
| 6 | 36 | 54 | 66 | 0011 0110 |
| 7 | 37 | 55 | 67 | 0011 0111 |
| 8 | 38 | 56 | 70 | 0011 1000 |
| 9 | 39 | 57 | 71 | 0011 1001 |
| : | 3A | 58 | 72 | 0011 1010 |
| ; | 3B | 59 | 73 | 0011 1011 |
| < | 3C | 60 | 74 | 0011 1100 |
| = | 3D | 61 | 75 | 0011 1101 |
| > | 3E | 62 | 76 | 0011 1110 |
| ? | 3F | 63 | 77 | 0011 1111 |
| ` | 40 | 64 | 100 | 0100 0000 |
| A | 41 | 65 | 101 | 0100 0001 |
| B | 42 | 66 | 102 | 0100 0010 |
| C | 43 | 67 | 103 | 0100 0011 |
| D | 44 | 68 | 104 | 0100 0100 |
| E | 45 | 69 | 105 | 0100 0101 |
| F | 46 | 70 | 106 | 0100 0110 |
| G | 47 | 71 | 107 | 0100 0111 |
| H | 48 | 72 | 110 | 0100 1000 |
| I | 49 | 73 | 111 | 0100 1001 |
| J | 4A | 74 | 112 | 0100 1010 |
| K | 4B | 75 | 113 | 0100 1011 |
| L | 4C | 76 | 114 | 0100 1100 |
| M | 4D | 77 | 115 | 0100 1101 |
| N | 4E | 78 | 116 | 0100 1110 |
| O | 4F | 79 | 117 | 0100 1111 |
| P | 50 | 80 | 120 | 0101 0000 |
| Q | 51 | 81 | 121 | 0101 0001 |
| R | 52 | 82 | 122 | 0101 0010 |
| S | 53 | 83 | 123 | 0101 0011 |
| T | 54 | 84 | 124 | 0101 0100 |
| U | 55 | 85 | 125 | 0101 0101 |

(Continued on the next page)

## ASCII CONVERSION TABLE

| ASCII | HEX | DECIMAL | OCTAL | BINARY (BIT 8 7 6 5 4 3 2 1) |
|---|---|---|---|---|
| V | 56 | 86 | 126 | 0101 0110 |
| W | 57 | 87 | 127 | 0101 0111 |
| X | 58 | 88 | 130 | 0101 1000 |
| Y | 59 | 89 | 131 | 0101 1001 |
| Z | 5A | 90 | 132 | 0101 1010 |
| [ | 5B | 91 | 133 | 0101 1011 |
| BACKSLASH | 5C | 92 | 134 | 0101 1100 |
| ] | 5D | 93 | 135 | 0101 1101 |
| ^ | 5E | 94 | 136 | 0101 1110 |
| _ | 5F | 95 | 137 | 0101 1111 |
| ACCENT | 60 | 96 | 140 | 0110 0000 |
| a | 61 | 97 | 141 | 0110 0001 |
| b | 62 | 98 | 142 | 0110 0010 |
| c | 63 | 99 | 143 | 0110 0011 |
| d | 64 | 100 | 144 | 0110 0100 |
| e | 65 | 101 | 145 | 0110 0101 |
| f | 66 | 102 | 146 | 0110 0110 |
| g | 67 | 103 | 147 | 0110 0111 |
| h | 68 | 104 | 150 | 0110 1000 |
| i | 69 | 105 | 151 | 0110 1001 |
| j | 6A | 106 | 152 | 0110 1010 |
| k | 6B | 107 | 153 | 0110 1011 |
| l | 6C | 108 | 154 | 0110 1100 |
| m | 6D | 109 | 155 | 0110 1101 |
| n | 6E | 110 | 156 | 0110 1110 |
| o | 6F | 111 | 157 | 0110 1111 |
| p | 70 | 112 | 160 | 0111 0000 |
| q | 71 | 113 | 161 | 0111 0001 |
| r | 72 | 114 | 162 | 0111 0010 |
| s | 73 | 115 | 163 | 0111 0011 |
| t | 74 | 116 | 164 | 0111 0100 |
| u | 75 | 117 | 165 | 0111 0101 |
| v | 76 | 118 | 166 | 0111 0110 |
| w | 77 | 119 | 167 | 0111 0111 |
| x | 78 | 120 | 170 | 0111 1000 |
| y | 79 | 121 | 171 | 0111 1001 |
| z | 7A | 122 | 172 | 0111 1010 |
| { | 7B | 123 | 173 | 0111 1011 |
| \| | 7C | 124 | 174 | 0111 1100 |
| } | 7D | 125 | 175 | 0111 1101 |
| ~ | 7E | 126 | 176 | 0111 1110 |
| DEL | 7F | 127 | 177 | 0111 1111 |

(Continued on the next page)

## ASCII CONVERSION TABLE

| ASCII* | HEX | DECIMAL | OCTAL | BINARY |
|---|---|---|---|---|
| | | | | BIT 8 7 6 5 4 3 2 1 |
| | 80 | 128 | 200 | 1000 0000 |
| | 81 | 129 | 201 | 1000 0001 |
| | 82 | 130 | 202 | 1000 0010 |
| | 83 | 131 | 203 | 1000 0011 |
| | 84 | 132 | 204 | 1000 0100 |
| | 85 | 133 | 205 | 1000 0101 |
| | 86 | 134 | 206 | 1000 0110 |
| | 87 | 135 | 207 | 1000 0111 |
| | 88 | 136 | 210 | 1000 1000 |
| | 89 | 137 | 211 | 1000 1001 |
| | 8A | 138 | 212 | 1000 1010 |
| | 8B | 139 | 213 | 1000 1011 |
| | 8C | 140 | 214 | 1000 1100 |
| | 8D | 141 | 215 | 1000 1101 |
| | 8E | 142 | 216 | 1000 1110 |
| | 8F | 143 | 217 | 1000 1111 |
| | 90 | 144 | 220 | 1001 0000 |
| | 91 | 145 | 221 | 1001 0001 |
| | 92 | 146 | 222 | 1001 0010 |
| | 93 | 147 | 223 | 1001 0011 |
| | 94 | 148 | 224 | 1001 0100 |
| | 95 | 149 | 225 | 1001 0101 |
| | 96 | 150 | 226 | 1001 0110 |
| | 97 | 151 | 227 | 1001 0111 |
| | 98 | 152 | 230 | 1001 1000 |
| | 99 | 153 | 231 | 1001 1001 |
| | 9A | 154 | 232 | 1001 1010 |
| | 9B | 155 | 233 | 1001 1011 |
| | 9C | 156 | 234 | 1001 1100 |
| | 9D | 157 | 235 | 1001 1101 |
| | 9E | 158 | 236 | 1001 1110 |
| | 9F | 159 | 237 | 1001 1111 |
| | A0 | 160 | 240 | 1010 0000 |
| | A1 | 161 | 241 | 1010 0001 |
| | A2 | 162 | 242 | 1010 0010 |
| | A3 | 163 | 243 | 1010 0011 |
| | A4 | 164 | 244 | 1010 0100 |
| | A5 | 165 | 245 | 1010 0101 |
| | A6 | 166 | 246 | 1010 0110 |
| | A7 | 167 | 247 | 1010 0111 |
| | A8 | 168 | 250 | 1010 1000 |
| | A9 | 169 | 251 | 1010 1001 |
| | AA | 170 | 252 | 1010 1010 |

* The ASCII value varies

(Continued on the next page)

## ASCII CONVERSION TABLE

| ASCII* | HEX | DECIMAL | OCTAL | BINARY |
|---|---|---|---|---|
| | | | | BIT 8 7 6 5 4 3 2 1 |
| | D6 | 214 | 326 | 1101 0110 |
| | D7 | 215 | 327 | 1101 0111 |
| | D8 | 216 | 330 | 1101 1000 |
| | D9 | 217 | 331 | 1101 1001 |
| | DA | 218 | 332 | 1101 1010 |
| | DB | 219 | 333 | 1101 1011 |
| | DC | 220 | 334 | 1101 1100 |
| | DD | 221 | 335 | 1101 1101 |
| | DE | 222 | 336 | 1101 1110 |
| | DF | 223 | 337 | 1101 1111 |
| | E0 | 224 | 340 | 1110 0000 |
| | E1 | 225 | 341 | 1110 0001 |
| | E2 | 226 | 342 | 1110 0010 |
| | E3 | 227 | 343 | 1110 0011 |
| | E4 | 228 | 344 | 1110 0100 |
| | E5 | 229 | 345 | 1110 0101 |
| | E6 | 230 | 346 | 1110 0110 |
| | E7 | 231 | 347 | 1110 0111 |
| | E8 | 232 | 350 | 1110 1000 |
| | E9 | 233 | 351 | 1110 1001 |
| | EA | 234 | 352 | 1110 1010 |
| | EB | 235 | 353 | 1110 1011 |
| | EC | 236 | 354 | 1110 1100 |
| | ED | 237 | 355 | 1110 1101 |
| | EE | 238 | 356 | 1110 1110 |
| | EF | 239 | 357 | 1110 1111 |
| | F0 | 240 | 360 | 1111 0000 |
| | F1 | 241 | 361 | 1111 0001 |
| | F2 | 242 | 362 | 1111 0010 |
| | F3 | 243 | 363 | 1111 0011 |
| | F4 | 244 | 364 | 1111 0100 |
| | F5 | 245 | 365 | 1111 0101 |
| | F6 | 246 | 366 | 1111 0110 |
| | F7 | 247 | 367 | 1111 0111 |
| | F8 | 248 | 370 | 1111 1000 |
| | F9 | 249 | 371 | 1111 1001 |
| | FA | 250 | 372 | 1111 1010 |
| | FB | 251 | 373 | 1111 1011 |
| | FC | 252 | 374 | 1111 1100 |
| | FD | 253 | 375 | 1111 1101 |
| | FE | 254 | 376 | 1111 1110 |
| | FF | 255 | 377 | 1111 1111 |

* The ASCII value varies

## ASCII CONVERSION TABLE

| ASCII* | HEX | DECIMAL | OCTAL | BINARY |
|---|---|---|---|---|
| | | | | BIT 8 7 6 5 4 3 2 1 |
| | AB | 171 | 253 | 1010 1011 |
| | AC | 172 | 254 | 1010 1100 |
| | AD | 173 | 255 | 1010 1101 |
| | AE | 174 | 256 | 1010 1110 |
| | AF | 175 | 257 | 1010 1111 |
| | B0 | 176 | 260 | 1011 0000 |
| | B1 | 177 | 261 | 1011 0001 |
| | B2 | 178 | 262 | 1011 0010 |
| | B3 | 179 | 263 | 1011 0011 |
| | B4 | 180 | 264 | 1011 0100 |
| | B5 | 181 | 265 | 1011 0101 |
| | B6 | 182 | 266 | 1011 0110 |
| | B7 | 183 | 267 | 1011 0111 |
| | B8 | 184 | 270 | 1011 1000 |
| | B9 | 185 | 271 | 1011 1001 |
| | BA | 186 | 272 | 1011 1010 |
| | BB | 187 | 273 | 1011 1011 |
| | BC | 188 | 274 | 1011 1100 |
| | BD | 189 | 275 | 1011 1101 |
| | BE | 190 | 276 | 1011 1110 |
| | BF | 191 | 277 | 1011 1111 |
| | C0 | 192 | 300 | 1100 0000 |
| | C1 | 193 | 301 | 1100 0001 |
| | C2 | 194 | 302 | 1100 0010 |
| | C3 | 195 | 303 | 1100 0011 |
| | C4 | 196 | 304 | 1100 0100 |
| | C5 | 197 | 305 | 1100 0101 |
| | C6 | 198 | 306 | 1100 0110 |
| | C7 | 199 | 307 | 1100 0111 |
| | C8 | 200 | 310 | 1100 1000 |
| | C9 | 201 | 311 | 1100 1001 |
| | CA | 202 | 312 | 1100 1010 |
| | CB | 203 | 313 | 1100 1011 |
| | CC | 204 | 314 | 1100 1100 |
| | CD | 205 | 315 | 1100 1101 |
| | CE | 206 | 316 | 1100 1110 |
| | CF | 207 | 317 | 1100 1111 |
| | D0 | 208 | 320 | 1101 0000 |
| | D1 | 209 | 321 | 1101 0001 |
| | D2 | 210 | 322 | 1101 0010 |
| | D3 | 211 | 323 | 1101 0011 |
| | D4 | 212 | 324 | 1101 0100 |
| | D5 | 213 | 325 | 1101 0101 |

* The ASCII value varies

(Continued on the next page)

Appendix C

# Printer Setup

## *Summary of Printer Setup Options*

The following pages summarize the groups and options used to configure the printer. The set of Printer Setup Options is comprised of the following:

| | | |
|---|---|---|
| **Group A Options** | - | ANSI Command Mode |
| **Group C Options** | - | Change Current Font |
| **Group D Options** | - | Diablo Emulation Mode |
| **Group E Options** | - | Epson Emulation Mode |
| **Group I Options** | - | Proprinter Emulation Mode |
| **Group L Options** | - | Change Default Landscape Font |
| **Group P Options** | - | Change Default Portrait Font |
| **Group Q Options** | - | Qume Emulation Mode |
| **Group 0 Options** | - | System Functions |
| **Group 1 Options** | - | Page Settings |
| **Group 2 Options** | - | Copy Count (1-9) |
| **Group 3 Options** | - | Copy Count (multiples of 10) |
| **Group 4 Options** | - | Margin Settings |
| **Group 5 Options** | - | Common Interface Options |
| **Group 6 Options** | - | Serial Interface Options |
| **Group 7 Options** | - | Parallel Interface Options |
| **Group 8 Options** | - | Alignment Margin Settings |
| **Group 9 Options** | - | Factory Options |

Factory default settings are noted with an *

## Group A - ANSI Emulation Options

| 1 | 2 | Unit of Measure to be used |
|---|---|---|
| disabled | disabled | Unit of Measure is in dots |
| enabled | disabled | Unit of Measure is in decipoints |
| disabled | enabled | Unit of Measure is in centimeters |
| *enabled | enabled | Unit of Measure is in inches |

| 3 | ANSI Character Spacing |
|---|---|
| *enabled | Fixed spacing from font |
| disabled | Proportional spacing from font |

| 4 | 5 | Line Spacing |
|---|---|---|
| disabled | disabled | Font Fixed Line Spacing |
| enabled | disabled | 4 lines per inch |
| *disabled | enabled | 6 lines per inch |
| enabled | enabled | 8 lines per inch |

| 6 | Print Line Overflows |
|---|---|
| *disabled | Print data extending past right margin |
| enabled | Absorb data that extends past right margin |

| 7 | Carriage Returns |
|---|---|
| *disabled | Carriage Return only |
| enabled | Carriage Return plus Line Feed |

| 8 | Line Feeds |
|---|---|
| *disabled | Line Feed only |
| enabled | Line Feed plus Carriage Return |

| 9 | Line Feeds |
|---|---|
| *disabled | Line Feed only |
| enabled | 2 Line Feeds |

# *Group C - Change Current Font*

This Group is used to select a new font. Each of the five options are used to enter a digit of the desired font number.

**1** Ten thousands digit of new font number
**2** Thousands digit of new font number
**3** Hundreds digit of new font number
**4** Tens digit of new font number
**5** Units digit of new font number

# *Group D - Diablo Emulation Options*

| 1 | 2 | **Proportional/Fixed Character Spacing** |
|---|---|---|
| off | off | Proportional Character Spacing |
| *on | off | 10 cpi Fixed Character Spacing |
| off | on | 12 cpi Fixed Character Spacing |
| on | on | 15 cpi Fixed Character Spacing |

**3 Carriage Returns**

| | |
|---|---|
| *off | Carriage Return only |
| on | Carriage Return plus Line Feed |

**4 Line Feeds**

| | |
|---|---|
| *off | Line Feed = Line Feed |
| on | Line Feed = Double Line Feed |

**5 Upper Case/Lower Case**

| | |
|---|---|
| *off | No characters are altered for printing. |
| on | Lower case characters "a" through "z" print in upper case. |

## Group D Options (cont.)

### 6 Font Table Proportional Spacing

*off Use the Font Table for character spacing when in proportional spacing

on Do not use Font Table for character spacing when in proportional spacing

# *Group E - Epson Emulation Options*

### 1 Epson Print Mode

*off Pica printing on

on Compressed Format on

### 2 Pica Print Quality

*off Normal pica printing on

on Emphasized pica printing on

### 3 4 5 International Character Sets

| | | | |
|---|---|---|---|
| *on | on | on | U.S.A. |
| off | on | on | France |
| on | off | on | Germany |
| off | off | on | England |
| on | on | off | Denmark |
| off | on | off | Sweden |
| on | off | off | Italy |
| off | off | off | Spain |

### 6 Carriage Returns

*off Carriage Return = Carriage Return

on Carriage Return = Carriage Return + Line Feed

### 7 Printing Zeros

*off Print zeros without slashes

on Print zeros with slashes

### 8 Pica Default Font

*off Carriage Return = Use default Pica font as Pica Mode font

on Use the Current font as the Pica Mode font

# *Group I - Proprinter Emulation Options*

### 1 Printing Zeros

*off Print zeros without slashes.

on Print zeros with slashes.

### 2 Auto Carriage Return

*off No auto carriage return after line feed.

on Auto carriage return after line feed.

### 3 Character Set

*off Select character set 1.

on Select character set 2.

### 4 Auto Carriage Return

*off No automatic carriage return after line feed, vertical tab, or <ESC>J

on Automatic carriage return after line feed, vertical tab, or <ESC>J

### 5 Pica Mode Font

*off Use the default Pica Mode font as the default when entering Proprinter emulation.

on Use the current font as the default font when entering Proprinter emulation.

# *Group L - Change Default Landscape Font*

1 Ten thousands digit of new font number

2 Thousands digit of new font number

3 Hundreds digit of new font number

4 Tens digit of new font number

5 Units digit of new font number

# *Group P - Change Default Portrait Font*

| | |
|---|---|
| **1** | Ten thousands digit of new font number |
| **2** | Thousands digit of new font number |
| **3** | Hundreds digit of new font number |
| **4** | Tens digit of new font number |
| **5** | Units digit of new font number |

# *Group Q - Qume Emulation Mode*

| **1** | **2** | **Proportional/Fixed Spacing** |
|---|---|---|
| off | off | Proportional character spacing |
| *on | off | 10 cpi fixed character spacing |
| off | on | 12 cpi fixed character spacing |
| on | on | 15 cpi fixed character spacing |

| **3** | **Line Spacing** |
|---|---|
| *off | 6 lines per inch |
| on | 8 lines per inch |

| **4** | **Carriage Returns** |
|---|---|
| *off | Carriage Return = Carriage Return |
| on | Carriage Return = Carriage Return + Line Feed |

## Group Q Options (cont.)

### 5 Automatic Carriage Return/Line Feed

*off No automatic carriage return/line feed at right margin

on Perform automatic carriage return/line feed at right margin

### 6 Font Table Proportional Spacing

*off Use Font Table for character spacing when in proportional spacing

on Do not use Font Table for character spacing when in proportional spacing

# *Group 0 - System Function Options*

### 1 Copy Count Reset

toggle Abort the current copy count sequence and reset to zero

### 2 Clear Print Buffer

toggle Clear Print Buffer

### 3 Hex Dump

*off Normal operation

on Hex dump mode operation

### 4 Form Feed/Carriage Return

*off Form Feed + Carriage Return = Form Feed + Carriage Return

on Form Feed + Carriage Return = Form Feed

### 5 Printer Setup Reset

toggle Re-initialize options to factory settings

## Group 0 Options (cont.)

### 6 Reset Command/Font Translation Tables

| | |
|---|---|
| *off | Reset Command and Font Translation Tables when entering new emulation mode or after warm boot |
| on | Do not reset Command and Font Translation Tables |

### 7 Suppress Blank Pages

| | |
|---|---|
| off | Form Feed always ejects page |
| *on | Form Feed does not eject page if print buffer is empty |

### 8 Suppress Status Summary Sheet

| | |
|---|---|
| *off | Print Status Summary Sheet at warm boot |
| on | Do not print Status Summary Sheet at warm boot |

### 9 Immediate Command Table Reset

| | |
|---|---|
| toggle | Reset Command Translation Table |

### A Immediate Font Table Reset

| | |
|---|---|
| toggle | Reset Font Translation Table |

# *Group 1 - Emulation Mode and Page Size/Orientation*

### 1 2 3 Select Emulation Mode

| | | | |
|---|---|---|---|
| off | off | off | ANSI Command Mode |
| on | off | off | Diablo Emulation Mode |
| *off | on | off | Proprinter Emulation Mode |
| *off | on | off | Epson Emulation Mode |
| on | on | off | Qume Emulation Mode |
| off | off | on | Laserjet Emulation Mode |

## Group 1 Options (cont.)

| 4 | 5 | 6 | Paper Size |
|---|---|---|---|
| *off | off | off | A4 paper size |
| on | off | off | B5 paper size |
| off | on | off | Legal page size |
| on | on | off | Letter page size |
| off | off | on | Mini page size |

| 7 | 8 | Delay before Form Feed |
|---|---|---|
| off | off | No Form Feed |
| on | off | Delay 15 seconds before Form Feed |
| off | on | Delay 30 seconds before Form Feed |
| *on | on | Delay 60 seconds before Form Feed |

| 9 | Page Orientation at Power-Up |
|---|---|
| *off | Portrait Page Orientation |
| on | Landscape Page Orientation |

| A | ESC Character |
|---|---|
| *off | Tilde = Tilde |
| on | Tilde = ESC |

# *Group 2 - Copy Count (1 - 9 Copies)*

| | |
|---|---|
| 1 | Print 1 copy of each page + Group 3 setting |
| 2 | Print 2 copies of each page + Group 3 setting |
| 3 | Print 3 copies of each page + Group 3 setting |
| 4 | Print 4 copies of each page + Group 3 setting |
| 5 | Print 5 copies of each page + Group 3 setting |
| 6 | Print 6 copies of each page + Group 3 setting |
| 7 | Print 7 copies of each page + Group 3 setting |
| 8 | Print 8 copies of each page + Group 3 setting |
| 9 | Print 9 copies of each page + Group 3 setting |

# *Group 3 - Copy Count (Multiples of 10)*

**1** Print 10 copies of each page + Group 2 setting
**2** Print 20 copies of each page + Group 2 setting
**3** Print 30 copies of each page + Group 2 setting
**4** Print 40 copies of each page + Group 2 setting
**5** Print 50 copies of each page + Group 2 setting
**6** Print 60 copies of each page + Group 2 setting
**7** Print 70 copies of each page + Group 2 setting
**8** Print 80 copies of each page + Group 2 setting
**9** Print 90 copies of each page + Group 2 setting

# *Group 4 - Power-Up Page Margin Settings*

| 1 | 2 | 3 | 4 | Left Margin | |
|---|---|---|---|---|---|
| *off | off | off | off | 0.00" | 0,00 cm |
| on | off | off | off | 0.25" | 0,64 cm |
| off | on | off | off | 0.50" | 1,27 cm |
| on | on | off | off | 0.75" | 1,91 cm |
| off | off | on | off | 1.00" | 2,54 cm |
| on | off | on | off | 1.25" | 3,18 cm |
| off | on | on | off | 1.50" | 3,81 cm |
| on | on | on | off | 1.75" | 4,45 cm |
| off | off | off | on | 2.00" | 5,08 cm |
| on | off | off | on | 2.25" | 5,72 cm |
| off | on | off | on | 2.50" | 6,35 cm |
| on | on | off | on | 2.75" | 6,90 cm |
| off | off | on | on | 3.00" | 7,62 cm |
| on | off | on | on | 3.25" | 8,26 cm |
| off | on | on | on | 3.50" | 8,89 cm |
| on | on | on | on | 3.75" | 9,53 cm |

## Group 4 Options (cont.)

| 5 | 6 | 7 | 8 | Right Margin | |
|---|---|---|---|---|---|
| *off | off | off | off | 0.00" | 0,00 cm |
| on | off | off | off | 0.25" | 0,64 cm |
| off | on | off | off | 0.50" | 1,27 cm |
| on | on | off | off | 0.75" | 1,91 cm |
| off | off | on | off | 1.00" | 2,54 cm |
| on | off | on | off | 1.25" | 3,18 cm |
| off | on | on | off | 1.50" | 3,81 cm |
| on | on | on | off | 1.75" | 4,45 cm |
| off | off | off | on | 2.00" | 5,08 cm |
| on | off | off | on | 2.25" | 5,72 cm |
| off | on | off | on | 2.50" | 6,35 cm |
| on | on | off | on | 2.75" | 6,90 cm |
| off | off | on | on | 3.00" | 7,62 cm |
| on | off | on | on | 3.25" | 8,26 cm |
| off | on | on | on | 3.50" | 8,89 cm |
| on | on | on | on | 3.75" | 9,53 cm |

| 9 | A | B | C | Top Margin | |
|---|---|---|---|---|---|
| *off | off | off | off | 0.00" | 0,00 cm |
| on | off | off | off | 0.25" | 0,64 cm |
| off | on | off | off | 0.50" | 1,27 cm |
| on | on | off | off | 0.75" | 1,91 cm |
| off | off | on | off | 1.00" | 2,54 cm |
| on | off | on | off | 1.25" | 3,18 cm |
| off | on | on | off | 1.50" | 3,81 cm |
| on | on | on | off | 1.75" | 4,45 cm |
| off | off | off | on | 2.00" | 5,08 cm |
| on | off | off | on | 2.25" | 5,72 cm |
| off | on | off | on | 2.50" | 6,35 cm |
| on | on | off | on | 2.75" | 6,90 cm |
| off | off | on | on | 3.00" | 7,62 cm |
| on | off | on | on | 3.25" | 8,26 cm |
| off | on | on | on | 3.50" | 8,89 cm |
| on | on | on | on | 3.75" | 9,53 cm |

**Group 4 Options** (cont.)

| D | E | F | Bottom Margin | |
|---|---|---|---|---|
| *off | off | off | 0.00" | 0,00 cm |
| on | off | off | 0.25" | 0,64 cm |
| off | on | off | 0.50" | 1,27 cm |
| on | on | off | 0.75" | 1,91 cm |
| off | off | on | 1.00" | 2,54 cm |
| on | off | on | 1.25" | 3,18 cm |
| off | on | on | 1.50" | 3,81 cm |
| on | on | on | 1.75" | 4,45 cm |

# *Group 5 - Common Interface Options*

### 1 Interface Selected

*off Parallel (Centronics) interface selected

on RS232 Serial interface selected

### 2 Select on-line/off-line power-up

off Power up off-line

*on Power up on-line

## Group 5 Options (cont.)

| 3 | 4 | 5 | 6 | 7 | Set Buffer Size |
|---|---|---|---|---|---|
| off | off | off | off | off | 132 bytes |
| on | off | off | off | off | 256 bytes |
| off | on | off | off | off | 512 bytes |
| on | on | off | off | off | 1k |
| off | off | on | off | off | 4k |
| *on | off | on | off | off | 8k |
| off | on | on | off | off | 16k |
| on | on | on | off | off | 32k |
| off | off | off | on | off | 48k |
| on | off | off | on | off | 64k |
| off | on | off | on | off | 80k |
| on | on | off | on | off | 96k |
| off | off | on | on | off | 112k |
| on | off | on | on | off | 128k |
| off | on | on | on | off | 144k |
| on | on | on | on | off | 160k |
| off | off | off | off | on | 176k |
| on | off | off | off | on | 192k |
| off | on | off | off | on | 208k |
| on | on | off | off | on | 224k |
| off | off | on | off | on | 240k |
| on | off | on | off | on | 256k |
| off | on | on | off | on | 272k |
| on | on | on | off | on | 288k |
| off | off | off | on | on | 304k |
| on | off | off | on | on | 320k |
| off | on | off | on | on | 336k |
| on | on | off | on | on | 352k |
| off | off | on | on | on | 368k |
| on | off | on | on | on | 384k |
| off | on | on | on | on | 400k |
| on | on | on | on | on | 432k |

| 8 | Increase Buffer Size |
|---|---|
| *off | Multiply Buffer Size setting x 1 |
| on | Multiply Buffer Size setting x 2 |

## Group 5 Options (cont.)

| 9 | A | Bit 8 Status |
|---|---|---|
| *off | off | Pass bit 8 unchanged |
| off | on | Strip bit 8 on input |
| on | off | Give bit 8 a value of "1" |
| on | on | Reverse the value of bit 8 |

# *Group 6 - Serial Interface Options*

### 1 Parity Checking

| | |
|---|---|
| *off | No parity checking performed |
| on | Perform parity checking |

### 2 3 Type of Parity Checking

| | | |
|---|---|---|
| *off | off | Odd parity checking |
| on | off | Even parity checking |
| off | on | Mark parity checking |
| on | on | Space parity checking |

## Group 6 Options (cont.)

### 4 Stop Bits

| | |
|---|---|
| *off | One stop bit |
| on | Two stop bits |

### 5 Data Bits

| | |
|---|---|
| *off | Eight data bits |
| on | Seven data bits |

| 6 | 7 | 8 | 9 | Bit Rate/Second |
|---|---|---|---|---|
| off | off | off | off | 9600 |
| on | off | off | off | 50 |
| off | on | off | off | 75 |
| on | on | off | off | 110 |
| off | off | on | off | 134.58 |
| on | off | on | off | 150 |
| off | on | on | off | 300 |
| on | on | on | off | 600 |
| off | off | off | on | 1200 |
| on | off | off | on | 1800 |
| *off | on | off | on | 2400 |
| on | on | off | on | 3600 |
| off | off | on | on | 4800 |
| on | off | on | on | 7200 |
| off | on | on | on | 9600 |
| on | on | on | on | 19200 |

## Group 6 Options (cont.)

### A DTR Use

off Do not use DTR data throttle

*on Use DTR data throttle

### B RTS Use

*off Do not use RTS data throttle

on Use RTS data throttle

### C XON/XOFF Use

off Do not use XON/XOFF protocol

*on Use XON/XOFF protocol

# *Group 7 - Parallel Interface Options*

### 1 Printer Error

*off Do not "go busy" on printer error

on "Go busy" on printer error

### 2 Set Printer Error

*off Do not "set printer error" on printer error

on "Set printer error" on printer error

## Group 7 Options (cont.)

### 3 Set Fault Bit

*off Do not "set fault" on printer error

on "Set Fault" on printer error

### 4 Off-line on Error

*off Do not go "off-line" on printer error

on Go "off-line" on printer error

### 5 Busy on Off-Line

off Do not "go busy" on off-line

*on "Go busy" on off-line

### 6 Data Flow Control

off Do not use "busy bit"

*on Use "busy bit"

# *Group 8 - Printer Alignment*

| 1 | 2 | 3 | 4 | Horizontal Distance | |
|---|---|---|---|---|---|
| off | off | off | off | 0.00" | 0,00 cm |
| on | off | off | off | 0.05" | 0,127 cm |
| *off | on | off | off | 0.10" | 0,254 cm |
| on | on | off | off | 0.15" | 0,381 cm |
| off | off | on | off | 0.20" | 0,508 cm |
| on | off | on | off | 0.27" | 0,69 cm |
| off | on | on | off | 0.32" | 0,813 cm |
| on | on | on | off | 0.37" | 0,94 cm |
| off | off | off | on | 0.43" | 1,09 cm |
| on | off | off | on | 0.48" | 1,22 cm |
| off | on | off | on | 0.53" | 1,35 cm |
| on | on | off | on | 0.59" | 1,5 cm |
| off | off | on | on | 0.64" | 1,63 cm |
| on | off | on | on | 0.69" | 1,75 cm |
| off | on | on | on | 0.75" | 1,91 cm |
| on | on | on | on | 0.80" | 2,03 cm |

## Group 8 Options (cont.)

| 5 | 6 | 7 | 8 | Vertical Distance | |
|---|---|---|---|---|---|
| off | off | off | off | 0.00" | 0,00 cm |
| on | off | off | off | 0.05" | 0,127 cm |
| *off | on | off | off | 0.10" | 0,254 cm |
| on | on | off | off | 0.15" | 0,381 cm |
| off | off | on | off | 0.20" | 0,508 cm |
| on | off | on | off | 0.27" | 0,69 cm |
| off | on | on | off | 0.32" | 0,813 cm |
| on | on | on | off | 0.37" | 0,94 cm |
| off | off | off | on | 0.43" | 1,09 cm |
| on | off | off | on | 0.48" | 1,22 cm |
| off | on | off | on | 0.53" | 1,35 cm |
| on | on | off | on | 0.59" | 1,5 cm |
| off | off | on | on | 0.64" | 1,63 cm |
| on | off | on | on | 0.69" | 1,75 cm |
| off | on | on | on | 0.75" | 1,91 cm |
| on | on | on | on | 0.80" | 2,03 cm |

# *Group 9 - Diagnostic Options*

### D Debugger Use

*off Do not scan Debugger address for fonts

on Scan Debugger address for fonts

### E Diagnostic Page

*off Do not print diagnostic page

on Print the diagnostic page

### F Enter Debugger Mode

*off Initialize debugger only

on Initialize debugger at power-up

Appendix D

# Diablo 630 Emulation Mode

## *Introduction*

The QMS laser printer emulates the Xerox® 1730/Diablo® 630 model letter-quality printers. References made in this manual to the Diablo 630 also apply to the Xerox 1730. This appendix covers commands supported by the QMS printer whenever it is in Diablo Emulation Mode.

If you are using a word processor, you do not need to read this section. Once your word processor is correctly installed and is configured to work with a printer that emulates a Diablo 630, you may use your **word processor commands** to edit and send your files to the QMS printer.

The explanations of the supported Diablo commands are given for those of you who may be writing computer programs and must actually use these commands. Diablo commands which are not supported by the printer generally are required for the Diablo 630 printer to overcome certain hardware limitations.

In addition to the commands explained in this section, there are Printer Software Commands that are also honored when in Diablo Emulation Mode. These are software commands which allow you to change fonts, change emulation modes, change page orientation, change paper source, change the copy count, access the Extended Printer Control or redefine the command or font translation tables. The software commands are a special feature of the QMS printer and are very useful. These commands are covered in Part IV of this manual.

# A Summary of Supported Diablo Commands

There are five categories of Diablo Emulation commands: Single Character, Formatting, Print Position, Special Feature, and Word Processing Sequences. The supported commands are listed on the next few pages as a means of quick reference. The meanings of the categories and the commands will be explained later in this appendix.

### Single Character Commands

| | |
|---|---|
| <BS> | Backspace |
| <CR> | Carriage Return |
| <FF> | Form Feed |
| <HT> | Horizontal Tab |
| <LF> | Line Feed |
| <SP> | Space |
| <VT> | Vertical Tab |
| <SI> | Shift-In |
| <SO> | Shift-Out |

### Formatting Commands

| | |
|---|---|
| <ESC>T | Set Top Margin to Current Line |
| <ESC>L | Set Bottom Margin to Current Line |
| <ESC>9 | Set Left Margin |
| <ESC>0 | Set Right Margin |
| <ESC><RS> | * Set Vertical Motion Index (n+1) |
| <ESC><US> | * Set Horizontal Motion Index (n+1) |
| <ESC>1 | Set Horizontal Tab Stop |
| <ESC>- | Set Vertical Tab Stop |
| <ESC>8 | Clear Horizontal Tab at Current Position |
| <ESC>2 | Clear all Horizontal and Vertical Tab Stops |
| <ESC>C | Clear Top and Bottom Margins |

### Print Position Commands

| | |
|---|---|
| <ESC><HT> | * Absolute Horizontal Tab to Position 'n'. |
| <ESC><VT> | * Absolute Vertical Tab to Line 'n'. |
| <ESC>D | Reverse Line Feed |
| <ESC>U | Forward 1/2 Line Feed |

* These commands have variable parameters.

### Special Printer Features

| | |
|---|---|
| <ESC><CR>P | Total Reset |
| <ESC>7 | Print Suppression "ON" (Convert Characters to Spaces until <CR>) |
| <ESC>3 | Graphics "ON" (Clear with <CR>) |
| <ESC>4 | Graphics "OFF" |
| <ESC>5 | Forward Printing |
| <ESC>6 | Reverse Printing |
| <ESC>S | Return HMI to Keypad Option Value |
| <ESC>Y | Print Special Character (cent) |
| <ESC>Z | Print Special Character (apostrophe) |

### Word Processing Command Sequences

| | |
|---|---|
| <ESC>P | Proportional Spacing "ON" |
| <ESC>Q | Proportional Spacing "OFF" |
| <ESC>X | Cancel all WP Options Except Proportional Spacing |
| <ESC><DC1> | * Offset Selection set to 'n' until <CR> |
| <ESC><BS> | * Backspace 1/120 inch |
| <ESC>= | Automatic Line Centering "ON" |
| <ESC>M | Automatic Margin Justification (until <CR> or vertical motion) |
| <ESC>E | Underscore "ON" |
| <ESC>R | Underscore "OFF" |
| <ESC>O | Bold Print "ON" until <CR> |
| <ESC>& | Bold/Shadow Print "OFF" |
| <ESC>W | Shadow Print "ON" until <CR> |

**Remote Diagnostic Options**

<ESC><SUB>1 Request Status Byte 1

* These commands have variable parameters.

**When using the supported commands, refer to the ASCII conversion table in Appendix B at the back of this manual to determine the value for "n" in those commands which require variable parameters. Use the appropriate conversion value (ASCII, Hex, Decimal, etc.) required by your computer system and the programming language being used.**

# *B Unsupported Diablo Commands*

These commands are not supported by your QMS printer. If these commands are used, they will simply be absorbed and will not affect printing.

**Diablo Printer Features**

| | |
|---|---|
| <ESC>A | Print in Secondary Color (red) |
| <ESC>B | Print in Primary Color (black) |
| <ESC>/ | Enable Auto Backward Printing |
| <ESC>\ | Disable Auto Backward Printing |
| <ESC><SYN> | Select Foreign Language and/or Print Wheel size |
| <ESC>> | Normal Printing Mode |
| <ESC>< | Reverse Printing Mode |
| <ESC>( | Enter program "Here is ..." mode |
| <ESC>) | Exit program "Here is ..." mode |
| <ESC><FF> | Set Lines per Page to 'n' |

**HyPlot Options**

| | |
|---|---|
| <ESC>G | HyPlot ON – Absolute Move (cleared by <CR>) |
| <ESC>G<BEL> | HyPlot ON – Absolute Plot (cleared by <CR>) |
| <ESC>V | HyPlot ON – Relative Move (cleared by <CR>) |
| <ESC>V<BEL> | HyPlot ON – Relative Plot (cleared by <CR>) |
| <ESC>. | Change Plot Character to (character) |
| <ESC>, | Set Plot Precision |

**Word Processing Option**

| | |
|---|---|
| <ESC>% | Increase Carriage Settling Time to 20ms (cleared by <ESC>N) |
| <ESC><SO>M | Program Mode ON |
| <ESC>$ | Margin Control ON |
| <ESC>* | Margin Control Mode determined by MARG CONT key setting |

**Remote Diagnostic Options**

| | |
|---|---|
| <ESC><SUB>I | Initialize the Printer |
| <ESC><SUB>R | Remote Error Reset |
| <ESC><SUB>2 | Request Status Byte 2 |
| <ESC><SUB>U | Enter User (programmable) Test Mode |
| <ESC><SUB>W | Enter Wrap-around (Echo) Test Mode |
| <ESC><SUB>X | Exit Test Mode |
| <DEL> | Error Correct Backspace (User Test Mode Only) |
| <STX> | Print Contents of Print Buffer once (User Test Mode Only) |
| <SOH> | Print Contents of Print Buffer repeatedly (User Test Mode Only) |

# *C Supported Diablo Commands*

The commands which are supported by the printer are described on the following pages. If you have files that already contain Diablo commands, you need not make any changes to these files before sending them to the laser printer. Any Diablo commands that are not supported by the printer will be absorbed and will not interrupt printing.

## C.1 Single Character Commands

Single character commands consist of only one control character. The commands in "<>" are ASCII control characters. You must refer to "Software Commands" in Section 4 for information on embedding control characters.

- BACKSPACE (<BS>) moves the current position one space in the opposite direction of printing.
- CARRIAGE RETURN (<CR>) moves the current position to the Left Margin.
- FORM FEED (<FF>) ejects the current page from the

printer.

- HORIZONTAL TAB (<HT>) moves the current position to the next horizontal tab stop.
- LINE FEED (<LF>) moves the current position down one line without affecting the horizontal position.
- SPACE (<SP>) moves the current position one space in the direction of printing.
- VERTICAL TAB (<VT>) moves the current position to the next vertical tab stop.
- SHIFT-IN (<SI>) accesses the Primary Character Set.
- SHIFT-OUT (<SO>) accesses the Secondary Character Set.

## <BS> BACKSPACE

This command (decimal 8) will cause a backward (right to left) movement of one print position. The width of the print position is determined by the Horizontal Motion Index (HMI). If "Backward Printing" is on, the <BS> command will actually move the print position from left to right.

## <CR> CARRIAGE RETURN

This command (decimal 13) causes the print position to move to the left margin. The <CR> command terminates these Diablo features: Graphics Mode, Print Suppression, Automatic Margin Justification, Bold Print (does not change the Current Font), and Shadow Print.

**If you have enabled Group D Option 3, this command will move the print position to the left margin and down one line.**

## <FF> FORM FEED

This command (decimal 12) causes the current print page to be ejected from the printer. Printing will continue at the top and left margins of the next page.

## <HT> HORIZONTAL TAB

This command (decimal 9) causes the print position to move to the first set Tab Stop to the right of the current position. If no tabs have been set, or if none were set beyond the current print position, an <HT> command will not change the current print position.

## <LF> LINE FEED

This command (decimal 10) moves the print position down one line. The actual distance of the vertical movement is determined by the Vertical Motion Index (VMI).

**If Group D Option 3 is enabled, the printer will automatically attach this command to every <CR> command. If Group D Option 4 is enabled, the printer will perform two line feeds for every <LF>.**

## <SP> SPACE

This command (decimal 32) causes the current print position to move to the right one print position. The width of the print position is determined by the Horizontal Motion Index (HMI) or the "pitch" selected in Group D Options 1 and 2. If "Backward Printing" is on, movement will actually be one print position to the left.

## <VT> VERTICAL TAB

This command (decimal 11) causes the current print position to move down the page to the first set Vertical Tab. If no tabs are set beyond the current print position, the current print position will not change.

## <SI> SHIFT-IN

The Shift-In control character (decimal 15) accesses the Primary Character Set in both ECS 7-Bit and ECS 8-Bit ASCII Modes. The Extended Character Set (ECS) is explained later in this appendix.

## <SO> SHIFT-OUT

The Shift-Out control character (decimal 14) accesses the Secondary Character Set in both ECS 7-Bit and ECS 8-Bit ASCII Modes. The Extended Character Set (ECS) is explained later in this appendix.

## C.2 Formatting Commands

The following commands are used to define the format of printed material on a page.

- SET TOP MARGIN
- SET BOTTOM MARGIN
- SET LEFT MARGIN
- SET RIGHT MARGIN
- SET VERTICAL MOTION INDEX is used to established the line spacing value.
- SET HORIZONTAL MOTION INDEX is used to establish the character spacing value.
- SET HORIZONTAL TAB AT CURRENT POSITION
- SET VERTICAL TAB AT CURRENT POSITION
- CLEAR HORIZONTAL TAB is used to clear all horizontal tab stops.
- CLEAR ALL VERTICAL AND HORIZONTAL TABS
- CLEAR TOP AND BOTTOM MARGINS

## <ESC>T SET TOP MARGIN

Use this command to set the Top Margin. The Top Margin may not be set below the Bottom Margin. The default Top Margin is the top of the page.

Set the Top Margin by issuing the <LF> command for each line down from the top of the page until you reach the point of the desired Top Margin. **The actual distance represented by a line feed is determined by the Vertical Motion Index.** After the desired number of line feeds have been issued, enter an <ESC>T command to set the margin.

For example, sending the following commands would set the top margin at the fourth line from the top of the page:

**<LF><LF><LF><LF><ESC>T**

The Top Margin may also be set by using the keypad to configure Group 4 Options 9, A, B, and C.

## <ESC>L SET BOTTOM MARGIN

Use this command to set the Bottom Margin. The Bottom Margin may not be set above the Top Margin. The default Bottom Margin is the bottom of the page as defined by the Lines per Page command or the current paper size.

Setting the Bottom Margin is similar to setting the top margin. The Bottom Margin is measured off the top of the page. Issue the desired number of <LF> commands from the top of the page. After reaching the desired bottom margin, issue the <ESC>L command. **The actual distance represented by each <LF> command is determined by the Vertical Motion Index.**

The Bottom Margin may also be set by using the keypad to configure Group 4 Options D, E, and F.

## <ESC>9 SET LEFT MARGIN

The default left margin is the left edge of the page. The left margin setting is measured from the left edge of the page and may not be set beyond the Right Margin.

Issue <SP> commands until you reach the desired Left Margin. **The actual distance represented by each <SP> command is determined by the Horizontal Motion Index or by the "pitch" set in Group D Options 1 and 2.** When you have reached the desired Left Margin, issue the <ESC>9 command.

For example, the following sequence of commands would establish a Left Margin three "print positions" from the left edge of the page:

**<SP><SP><SP><ESC>9**

Once a left margin is set it remains in effect until you issue a Diablo Total Reset command (<ESC><CR>P), establish a new left margin, or leave Diablo Emulation Mode and perform a reset of the printer.

Setting a new left margin to the *right* of the existing left margin requires issuing the additional number of <SP> commands to bring the cursor to the desired position. Once there, issue the <ESC>9 command to establish the new margin. For example, if the existing left margin is 10 spaces from the left edge of the paper and you wish to establish a new left margin 15 spaces from the left edge, position the cursor at the existing left margin and issue 5 space commands followed by the <ESC>9 command.

If you wish to set a new left margin to the *left* of the existing left margin, issue the correct number of <BS> (Backspace) commands to bring the cursor to the desired position followed by the <ESC>9 command. For example, if the existing left margin is 10 spaces from the left edge of the paper and you wish to establish a new left margin 5 spaces from the left edge of the paper, position the cursor at the existing left margin and issue 5 backspace commands followed by the <ESC>9 command.

The Left Margin may also be set by using the keypad to configure Group 4 Options 1, 2, 3, and 4.

## <ESC>0 SET RIGHT MARGIN

Setting the Right Margin is similar to setting the Left Margin. The Right Margin is also measured from the left edge of the page.

Issue <SP> commands until you reach the desired Right Margin. **The actual distance represented by each <SP> command is determined by the Horizontal Motion Index or by the "pitch" established in Group D Options 1 and 2.** When you reach the desired Right Margin, issue the <ESC>0 command to set the Right Margin.

The Right Margin may also be set by using the keypad to configure Group 4 Options 5, 6, 7, and 8.

## <ESC><RS><n> SET VERTICAL MOTION INDEX

Use this command (also known as VMI) to set the Line Spacing value. Values for the most common VMI settings are given below. To compute a value for the VMI not given, use the formula below. "LPI" is your desired number of lines per inch.

**VMI = (48÷LPI) + 1**

Once you have arrived at a VMI value, locate this number in the Decimal column of the ASCII table in Appendix B. Depending on your computer system, this Decimal value or the Hex or Octal equivalent of this value is what you substitute for "n" in the command.

The range for VMI is 0 to 125. The most common settings for "n" in the VMI command sequence are: 13 (4 lines per inch), 9 (6 lines per inch), and 7 (8 lines per inch).

**Examples:**

<ESC><RS><CR> 4 lines per inch.
<ESC><RS><BEL> 8 lines per inch.

Refer to your terminal's documentation for instructions on embedding the Hex, Octal, or Decimal values of control characters in the command sequence.

## <ESC><US><n> SET HORIZONTAL MOTION INDEX

Use this command (also known as HMI) to set the Character Spacing value. Values for the most common HMI settings are given below. To compute a value for the HMI not given, use the formula below. "CPI" refers to the desired characters per inch setting.

**HMI = (120÷CPI) + 1**

Once you have arrived at a HMI value, locate this number in the Decimal column of the ASCII table in Appendix B. Depending on your computer system, this Decimal value or the Hex or Octal equivalent of this value is what you substitute for "n" in the command.

The range for HMI is 1 to 125. The most common settings for "n" in the HMI command sequence are: 9 (15 characters per inch), 10 (13 characters per inch), 11 (12 characters per inch), 12 (11 characters per inch), 13 (10 characters per inch), 25 (5 characters per inch). The 10, 12, and 15 characters per inch values can be set through the printer keypad (Group D Options 1 and 2).

**Examples:**

<ESC><US><CR> 10 characters per inch.
<ESC><US><VT> 12 characters per inch.

Refer to your terminal's documentation for instructions on embedding the Hex, Octal, or Decimal values of control characters in the command sequence.

## <ESC>1 SET HORIZONTAL TAB AT CURRENT POSITION

This command is used to set individual tab stops. Move the current position to the desired tab position by issuing the proper number of <SP> commands. The actual distance represented by a <SP> is determined by the HMI. Issue the above command at the current position to set the tab stop. To determine the desired tab stop positions, use the following formula:

**Horizontal Tab = (Horizontal Position÷HMI) + 1**

The "Horizontal Tab" will be the number of the tab stop (1 - 160). "Horizontal Position" is a whole number expressing the number of 1/120 inch increments from the left edge of the page.

## <ESC>– SET VERTICAL TAB AT CURRENT POSITION

This command is used to set the individual vertical tab stops. Move the current position to the desired tab position by issuing the required number of <LF> commands. The height of each line is determined by the VMI. Issue the above command at the current position to set the tab stop. To determine the desired tab stop positions, use the following formula:

**Vertical Tab = (Vertical Position÷VMI)+1**

The "Vertical Tab" will be the number of the vertical tab stop (1 - 126). "Vertical Position" is a whole number expressing the number of 1/48 inch increments from the top edge of the page.

## <ESC>8 CLEAR HORIZONTAL TAB

This command is used to clear a tab stop at the current position.

## <ESC>2 CLEAR ALL VERTICAL AND HORIZONTAL TABS

When this command is issued, all vertical and horizontal tab stops will be cleared.

## <ESC>C CLEAR TOP AND BOTTOM MARGINS

Use this command to clear the Top and Bottom Margins and return them to the default margins.

## C.3 Print Position Commands

Use the following commands to move the print position to any point on the page. These commands provide added flexibility by allowing Reverse Line Feeds and special usage Vertical and Horizontal Tab commands.

- ABSOLUTE HORIZONTAL TAB is used to move the current position anywhere within the first 126 horizontal print positions within the current line.
- ABSOLUTE VERTICAL TAB is used to move the current line anywhere within the first 126 lines.
- REVERSE LINE FEED moves the current position one line above the current line.
- REVERSE HALF LINE FEED moves the current position one half line above the current line.
- FORWARD HALF LINE FEED moves the current position one half line below the current line.

### <ESC><HT><n> ABSOLUTE HORIZONTAL TAB

Use this command to move the current print position anywhere within the first 126 horizontal print positions regardless of margin settings. The leftmost print position (left edge of the page) is position 1. The actual amount of space to be moved will vary with the setting of the HMI. Locate the print position to be moved to in the Decimal column of the ASCII table in Appendix B. Enter this decimal value (or Hex or Octal, depending on your computer system) in place of "n" in the above command sequence. The actual horizontal position moved to after the Absolute Tab operation has been completed may be calculated as follows:

**Horizontal Position = (Horizontal Tab Stop - 1)×HMI**

The Absolute Horizontal Tab command value is not stored in memory. The command sequence must be sent whenever you wish to use it.

**Examples:**

| | |
|---|---|
| <ESC><HT><SUB> | Tab to position 26. |
| <ESC><HT>& | Tab to position 38. |

## <ESC><VT><n> ABSOLUTE VERTICAL TAB

Use this command to move the current print position anywhere within the first 126 possible lines on the page regardless of margin settings. The topmost print position (top edge of the page) is position 1. The actual amount of space to be moved will vary with the setting of the VMI. Locate the line number to be moved to in the Decimal column of the ASCII table in Appendix B. Enter this decimal value (or Hex or Octal, depending on your computer system) in place of "n" in the above command sequence. The actual vertical position moved to after the Absolute Tab operation has been completed may be calculated as follows:

**Vertical Position = (Vertical Tab Stop - 1)×VMI**

The Absolute Vertical Tab command value is not stored in memory. The command sequence must be sent whenever you wish to use it.

**Examples:**

| | |
|---|---|
| <ESC><VT><DC4> | Tab to line 20. |
| <ESC><VT><US> | Tab to line 31. |

### <ESC><LF> REVERSE LINE FEED

This command is used to return to the print line above the current line. The actual backward distance will depend on the current setting of the VMI. This command cannot be used to move backward beyond the Top Margin.

### <ESC>D REVERSE HALF LINE FEED

This command is used to move one-half line above the current print line. The actual backward distance will depend on the current setting of the VMI. This command cannot be used to move backward beyond the Top Margin.

### <ESC>U FORWARD HALF LINE FEED

This command is used to move one-half line below the current print line. The actual forward distance will vary with the current setting of the VMI.

## C.4 Special Printer Features

The escape sequence commands in this appendix allow access to special Diablo features such as Graphics Mode, Forward and Backward Printing, Print Suppression and Printer Reset Commands.

- TOTAL RESET TO POWER-UP DEFAULTS returns the Diablo Emulation Mode conditions to power-up status.

- PRINT SUPPRESSION ON replaces all printable characters with spaces.

- GRAPHICS ON places the printer in "Graphics Mode."

- GRAPHICS OFF causes the printer to resume normal printing.
- FORWARD PRINTING causes printing from left to right.
- REVERSE PRINTING causes printing from right to left.
- RETURN HMI TO KEYPAD OPTION VALUE resets HMI to the value selected in the Group D Options.
- PRINT SPECIAL CHARACTER allows access to the Hex 9E and Hex 9F characters (cent sign and apostrophe).

## <ESC><CR>P TOTAL RESET TO POWER-UP DEFAULTS

Using this command will cause the printer to be returned to ALL the default conditions. It has the same results as turning the printer "OFF" and, then, back "ON" except that no data will be lost by using the Reset command. The default conditions that are reset are as follows:

Primary Character Set <SI>.
Margins set to their default value.
Bold and Shadow print disabled.
Character Spacing set to keypad selection.
Offset Selection is cleared.
Auto Underscore is turned "OFF."
Forward Print Mode enabled.
Line Spacing set to keypad selection.
All Horizontal and Vertical Tabs cleared.
Print Position set to Top and Left Margins of next page.
Graphics Mode disabled.
Print Suppression cleared.

## <ESC>7 PRINT SUPPRESSION "ON"

When Print Suppression is "ON" all printable characters are replaced by spaces. This command does not affect ESCape and Control sequences. It is cleared with a <CR>.

## <ESC>3 GRAPHICS "ON"

This command is used to enter Graphics Mode. Once in Graphics Mode, certain conditions change. The print position does not automatically move after each character is printed when in Graphics Mode. Space, Back space and Tab commands cause movement of the print position in increments of 1/60 inch. The Line Feed command causes movement in 1/48 inch increments. Vertical Tab, Form Feed, Top-of-Form, Forward and Reverse 1/2 Line Feed and margin commands are unchanged by Graphics Mode. A Carriage Return as well as the Graphics "OFF" command will exit Graphics Mode.

## <ESC>4 GRAPHICS "OFF"

Either this command or a Carriage Return will exit you from Graphics Mode and return you to the normal operating mode.

## <ESC>5 FORWARD PRINTING

This command is used to return character printing to the forward direction. Forward Printing is the default condition so the command is actually used to discontinue Reverse Printing.

## <ESC>6 REVERSE PRINTING

This command is used to reverse character printing from left-to-right to right-to-left. It also causes the effects of the Space and Backspace commands to be reversed.

## <ESC>S RETURN HMI TO KEYPAD OPTION VALUE

This command returns the control of the Horizontal Motion Index or character spacing to the value which you selected using the front panel keypad. (Refer to the Group D Options in the Section 6 of this manual.)

## <ESC>Y PRINT SPECIAL CHARACTER

This command prints the Print Wheel Character under ASCII Hex 9E which is the cent character for the "non-Epson" resident Fonts.

## <ESC>Z PRINT SPECIAL CHARACTER

This command prints the Print Wheel Character under ASCII Hex 9F which is the apostrophe character for the "non-Epson" resident Fonts.

## C.5 Word Processing Command Sequences

The Word Processing (WP) commands facilitate word processing applications for the Diablo communications terminal. All Word Processing features in this section are disabled when Graphics Mode is on.

- PROPORTIONAL SPACING ON
- PROPORTIONAL SPACING OFF
- OFFSET SELECTION allows modification of character spacing when in Proportional Spacing.
- BACKSPACE 1/120" moves the current position back 1/120 inch.
- AUTO LINE CENTERING
- AUTO MARGIN JUSTIFY
- UNDERSCORE ON
- UNDERSCORE OFF
- BOLD PRINT ON
- BOLD/SHADOW PRINT OFF
- SHADOW PRINT ON
- CANCEL ALL WP OPTIONS EXCEPT PS

### <ESC>P PROPORTIONAL SPACING "ON"

This command provides you with the equivalent of the proportionally spaced character print wheels (PS) available for Diablo printers. Proportionally spaced characters

are assigned a width value according to the actual width of the character. Wide characters such as "w" and "m" are assigned a greater width value than narrow characters such as "i" and "l". The HMI is not changed when in Proportional Spacing Mode. The HMI only affects tabbing and the blank space between words.

All numeric characters on the PS print wheels have the same width value. This allows numerical data to be printed in straight columns even while in Proportional Spacing Mode. (Use the same HMI and Tab command for each line of numerical data when printing in columns.)

## <ESC>Q PROPORTIONAL SPACING "OFF"

Use this command to turn Proportional Spacing Mode off.

**Examples:**

The following are examples of proportional spacing using font 382, "Epson Pica."

```
Proportional spacing takes effect
after the <ESC>P.  Proportionally
spaced characters are closer together
than fixed spaced characters.  This
may or may not be the appearance you
desire.

The proportional spacing has been
turned off for this sentence.
```

## <ESC><DC1>n OFFSET SELECTION

This command allows you to modify character spacing for fixed and proportional space printing. The usual way to modify character spacing for fixed or monospaced characters is to adjust the HMI value. However, the HMI command is ignored when in Proportional Space printing. This command may be used to add or subtract space between characters in increments of 1/120 inch. Valid values for increasing space range from 1 to 64. Valid values for decreasing space range from 0 to 63.

Once you have determined the amount of space to add or subtract, convert the amount to a binary number that uses bit 7 as the positive or negative sign.

**Bits 1-6** Amount of space to add/subtract (1/120 inch increments)
**Bit 7** 0 (positive) or 1 (negative)

Locate this number in the Binary column of the ASCII Conversion Table in APPENDIX B at the back of this manual. Then, substitute the equivalent Hex, Decimal, or Octal value (as required by your system) for "n" in the command above.

## <ESC><BS> BACKSPACE 1/120"

If you send this command, the print position is moved backward 1/120 inch.

## <ESC>= AUTO LINE CENTERING

The Auto Line Centering command is used to center titles or other lines of data. The command must be sent first. The data which is to be centered should then be entered and followed by a Carriage Return or a Line Feed command. The words will be centered between the margins, or, if the line is long, they will be centered beyond the Right and Left Margins. This command will override Auto Justify if the Auto Justify command is on. The Auto Line Centering command is turned off by a carriage return or line feed.

**Examples:**

```
This input

<ESC>=Always center your titles.

generated this example:

          Always center your titles.
```

## <ESC>M AUTO MARGIN JUSTIFY

This command is used to provide even Right and Left Margins using either fixed space characters or Proportional Space Mode. Each line of data is stored until a Carriage Return or Line Feed is received. The Carriage Return or Line Feed causes the data in that line to be printed between the two margin settings. Auto Justify remains in effect for subsequent lines until an <ESC>X is received.

Auto Justify will begin after the first Carriage Return following the Auto Justify command. If too many or too few characters are sent for the amount of space available, the line will not be justified.

**Examples:**

The following passage uses font 380, "Epson Compressed."

```
Justification causes the right and left mar-
gins to be "even" or "flush." Justified
margins will only occur when enough characters
appear on the line and the number of char-
acters does not exceed the right margin. If
too many or too few characters are on the line,
the line will not justify.

Justification is turned off by the
<ESC>X command.
```

### <ESC>E UNDERSCORE "ON"

This command is used to indicate where you want Underscoring to begin. An <ESC>R indicates where the Underscoring should end. Underscore will continue on subsequent lines until you send the <ESC>R command. The Total Reset command will also terminate Underscoring.

### <ESC>R UNDERSCORE "OFF"

This command terminates the Underscore Mode. An <ESC>X also terminates the Underscoring command; however, this command will also cancel all other word processing commands except Proportional Spacing at the same time.

### <ESC>O BOLD PRINT "ON"

The Bold Print "ON" command causes each printable character to be printed twice. The print position is moved 1 dot down for the second printing of the character. A Carriage Return, <ESC>& or <ESC>X will exit the Bold Print Mode. Remember, <ESC>X will cancel all other word processing options except Proportional Spacing.

### <ESC>& BOLD/SHADOW PRINT "OFF"

This command may be used to terminate both Bold and Shadow Print Modes.

### <ESC>W SHADOW PRINT "ON"

The Shadow Print "ON" command causes each printable character to be printed twice. The print position is moved 1 dot horizontally for the second printing of the character. This results in a slightly wider or thicker character. A Carriage Return, <ESC>& or <ESC>X will terminate Shadow Print Mode. Remember, <ESC>X will cancel all other word processing options except Proportional Spacing.

### <ESC>X CANCEL ALL WP OPTIONS EXCEPT PS

This command cancels all word processing options except Proportional Spacing. It may be used to cancel a particular command if no other word processing features are being used or if you no longer need the word processing features that were selected.

**Examples:**

```
The example below was generated by the
following output:

<ESC>EDiablo Emulation allows you
to underline,<ESC>R <ESC>Oembolden,
<ESC>& or print in <ESC>W"shadow
print."<ESC>&
```

```
Diablo Emulation allows you to
underline, embolden, or print in
"shadow print."
```

## C.6 Extended Character Set (ECS)

The Extended Character Set contains a full range of special mathematical and scientific symbols in addition to the normal or Primary Character Set (Hex 00 to 7F). The ECS may be accessed with either the Standard ECS 7-Bit ASCII Mode or the Standard ECS 8-Bit ASCII Mode. The ECS fonts are available as options for your printer.

### ECS 7-Bit ASCII Mode

For those systems which use a 7-Bit ASCII Mode of operation, the Primary Character Set codes 00-7F are in effect at power-up. To access the Secondary Character Set, send the Shift-Out <SO> command to the printer. Once this <SO> command has been sent, the only commands which will be recognized are the Shift-In <SI> and Space <SP> commands. All other control codes are used to address Secondary Characters. The <SI> character will return you to use of the Primary Character Set.

### ECS 8-Bit ASCII Mode

For those systems which use an 8-Bit ASCII Mode of operation, the Primary Character Set codes 00-7F are in effect at power-up. To access the Secondary Character Set, send the Shift-Out <SO> command to the printer. Once this <SO> command has been sent, all codes 00-9F are accessible. The Shift-In <SI> character will return you to use of only the Primary Character Set. The software power-up Reset command, <ESC><CR> P, will also return you to just the Primary Character Set.

Appendix E

# Epson Emulation Mode

## *Introduction*

This appendix covers the commands supported by the printer whenever it is in Epson Emulation Mode. **This appendix applies to your printer only if it emulates the Epson FX-80. (See the status summary sheet.)**

If you are using a word processor, you do not need to read this appendix. Once your word processor is correctly installed and is configured to work with a printer that emulates an Epson FX-80, you may use your **word processor commands** to edit and send your files to the printer.

The explanations of the supported Epson commands are given for those who may be writing computer programs and must actually use these commands. Epson commands which are not supported by the printer generally are required for the Epson FX-80 printer to overcome certain hardware limitations.

In addition to the commands explained in this section, there are Seven Special Commands that are also honored when in Epson Emulation Mode. These are software commands which allow you to change fonts, change emulation modes, change page orientation, change paper source, change the copy count, access the Extended Printer Control or redefine the command or font translation tables. The software commands are a special feature of the printer and are very useful. One especially useful command allows you to redefine the translation tables may be used to change the <ESC> character to a printable equiv-

alent. This simplifies the entering of the special ESCape sequences required for accessing the software commands. These software commands are explained in detail in *Part IV* of this manual.

# A Summary of Supported Epson Commands

There are eight categories of supported Epson Emulation Mode commands: Print Width, Print Quality, Print Modes, Paper Feed, Forms Control, Formatting, Special Features, and Graphics. The supported commands are listed on the next few pages as a means of quick reference. The meanings of the categories and the commands will be explained later in this section.

When using the supported commands, refer to the ASCII conversion table in Appendix B at the back of this manual to determine the value for "n" in those commands which require variable parameters. Use the appropriate conversion value (ASCII, Hex, Decimal, etc.) required by your computer system and the programming language being used.

**Print Width Commands**

| | |
|---|---|
| <ESC>M | Enable Elite Mode |
| <ESC>P | Disable Elite Mode |
| <ESC><SI> | Enable Compressed Mode |
| <SI> | Enable Compressed Mode (decimal 15) |
| <DC2> | Disable Compressed Mode (decimal 18) |

**Print Quality Commands**

| | |
|---|---|
| <ESC>E | Enable Emphasized Mode |
| <ESC>F | Disable Emphasized Mode |
| <ESC>G | Enable Double-Strike Mode |
| <ESC>H | Disable Double-Strike Mode |
| <ESC>S0 | Enable Superscript |
| <ESC>S1 | Enable Subscript |
| <ESC>T | Disable Superscript and Subscript |
| <ESC>p1 | Enable Proportional Mode |
| <ESC>p0 | Disable Proportional Mode |
| <ESC>-1 | Enable Underline Mode |
| <ESC>-0 | Disable Underline Mode |
| <ESC>4 | Enable Italic Character Set |
| <ESC>5 | Disable Italic Character Set |

**Selecting Print Modes**

| | |
|---|---|
| <ESC>! | Master Print Mode Select |
| <ESC>@ | Master Reset Code |

**Paper Feed Commands**

| | |
|---|---|
| <LF> | Line Feed (decimal 10) |
| <ESC>0 | Sets Line Spacing to 1/8 inch |
| <ESC>1 | Sets Line Spacing to 7/72 inch |
| <ESC>2 | Sets Line Spacing to 1/6 inch |
| <ESC>A | Sets Line Spacing to n/72 inch |
| <ESC>3 | Sets Line Spacing to n/216 inch |
| <ESC>J | Perform immediate one-time line feed of n/216th inch without carriage return |
| <ESC>j | Perform immediate one-time reverse line feed of n/216th line feed without carriage return |

**Forms Control Commands**

| | |
|---|---|
| <FF> | Form Feed (decimal 12) |
| <CR> | Carriage Return (decimal 13) |
| <ESC>C<NUL> | Sets Forms Length to "n" inches |
| <ESC>C | Sets Forms Length to "n" lines |

**Special Printer Features**

| | |
|---|---|
| <BS> | Backspace |
| <ESC>> | Set High-Order Bit "ON" |
| <ESC>= | Set High-Order Bit "OFF" |
| <ESC># | Accept High-Order "as is" from computer |
| <ESC>R | Select International Character Set |

**Formatting Commands**

| | |
|---|---|
| <ESC>l | Set Left Margin |
| <ESC>Q | Set Right Margin |
| <ESC>D | Set Horizontal Tabs |
| <HT> | Horizontal Tab |
| <ESC>B | Set Vertical Tabs |
| <VT> | Vertical Tab |
| <ESC>bx | Define Vertical Tab Channels |
| <ESC>/ | Select Vertical Tab Channel |

**Graphics Modes**

| | |
|---|---|
| <ESC>K | Selects Single-Density Graphics Mode |
| <ESC>L | Selects Double-Density Graphics Mode |
| <ESC>Y | Selects High Speed Double-Density Mode |
| <ESC>Z | Selects Quadruple-Density Graphics Mode |
| <ESC>* | Selects Graphics Density "n" |
| <ESC>% | Select Character Set |
| <ESC>& | Define Characters in RAM Area (Download Font) |
| <ESC>: | Copy ROM Characters to User RAM Area |
| <ESC>I1 | Enable Printing of the Symbols that are not stored in 0-31 decimal which are not used as Control Codes. |
| <ESC>I0 | Disable Printing of the Symbols that are not stored in 0-31 decimal which are not used as Control Codes. |
| <ESC>6 | Enables Printing Codes 128 - 159 decimal |
| <ESC>7 | Disable Printing Codes 128 - 159 decimal |

# B Unsupported Epson Commands

The following Epson commands are not supported by the printer. If these commands are sent to the printer, they will be absorbed and will not affect printer operation.

**Print Width Commands**

| | |
|---|---|
| <SO> | Enable One-Line Expanded Mode (decimal 14) |
| <ESC><SO> | Enable One-Line Expanded Mode (decimal 14) |
| <ESC><DC4> | Disable One-Line Expanded Mode (decimal 20) |
| <ESC>W1 | Enable Continuous Expanded Mode |
| <ESC>W0 | Disable Expanded Mode |

**Forms Control Commands**

| | |
|---|---|
| <ESC>N | Produces a Variable Skip-Over-Perforation |
| <ESC>O | Disable Skip-Over-Perforation |
| <ESC>8 | Disabled Paper-Out Sensor |
| <ESC>9 | Enable Paper-Out Sensor |

**Formatting Commands**

| | |
|---|---|
| <ESC>U1 | Enable Continuous Unidirectional Mode |
| <ESC>U0 | Disable Continuous Unidirectional Mode |
| <ESC>< | Enable One-Line Unidirectional Mode |

**Special Printer Features**

| | |
|---|---|
| <CAN> | Cancels the Text in the Print Buffer (decimal 24) |
| <DEL> | Deletes the Most Recent Text Character in the Print Buffer |
| <ESC>i1 | Enable Immediate Mode |
| <ESC>i0 | Disable Immediate Mode |
| <ESC>s1 | Enable Half-Speed Mode |
| <ESC>s0 | Disable Half-Speed Mode |

**Graphics Modes**

<ESC>^0 Select Single-Density Nine-Pin Graphics Mode

<ESC>^1 Select Double-Density Nine-Pin Graphics Mode

# C Supported Epson Commands

The commands which are supported by the printer are described on the following pages. If you have files that already contain Epson commands, you need not make any changes to these files before sending them to the laser printer. Any Epson commands that are not supported by the printer will be absorbed and will not interrupt printing.

# D Print Width Commands

The Print Width Commands are used to change character and line spacing.

- ENABLE ELITE MODE causes printing at 12 characters per inch.
- DISABLE ELITE MODE allows a different Print Width Command to be selected or returns the printer to Pica Mode.
- ENABLE COMPRESSED MODE causes printing at 17 characters per inch.
- DISABLE COMPRESSED MODE allows a different Print Width Command to be selected or returns the printer to Pica Mode.

The printer emulates the Pica, Elite and Compressed print widths of the Epson FX-80. Like the FX-80, only one Print Width can be used at a time. Pica Mode is the factory default power-up Print Width. In Pica Mode, you can print 10 characters per inch (cpi). Unlike the Epson printer, the printer has no limit on the number of characters per line that you may print. The number of characters that will fit on a line is determined by the font size, the print mode (cpi) selected, the page size, and the page orientation.

Selecting a new Print Width may not be honored at all

times. Certain Print Widths take priority over others as shown in Table 1 (Pica is the default and has the lowest priority). When using Elite or Compressed Mode, a Width Statement may be required to enable more than 80 characters per line to be sent before a <CR> is automatically inserted into the data stream. Refer to your computer system's documentation to determine the correct format needed to do this.

**Elite**

**Proportional**

**Compressed**

**Pica**

**Table 1 Mode Priorities**

| Typeface | Spacing |
|---|---|
| Roman (default) | Monospaced (default) |
| Italic | Proportional |
| **Pitch** | **Quality** |
| Pica (default) | Single-Strike (default) |
| Elite | Double-Strike |
| Compressed | Emphasized |

**Table 2 Print Defaults Summarized**

### <ESC>M ENABLE ELITE MODE

Elite Mode prints at 12 cpi. This Mode takes priority over all other Print Widths. You may access Single-Strike, Double-Strike, Italic, Superscript, and Subscript Print Qualities when in Elite Mode. **You may not use Pica, Proportional, Emphasized, or Compressed Modes when in Elite Mode. If the command to access any of these modes is sent before Elite Mode is disabled, the command will be ignored. Printing will continue in Elite Mode.**

### <ESC>P DISABLE ELITE MODE

This command turns Elite Mode off and allows a different Print Width to be selected. If no other Print Width is specified, printing will resume in Pica Mode.

### <ESC><SI> or <SI> ENABLE COMPRESSED MODE

This command (decimal 15) turns on Compressed Mode. Compressed Mode prints at 17 cpi and will take priority over Pica Print Width. Any of the Print Quality commands may be used when in this Mode. Compressed Mode may be set as the default printing mode for Epson Emulation by using the keypad to configure Group E Option 1.

### <DC2> DISABLE COMPRESSED MODE

This command (decimal 11) turns Compressed Mode off. If no other Print Width is specified, printing will resume in Pica Mode.

**Examples:**

```
This is Pica Mode (10 cpi).

This is Elite Mode (12 cpi).

This is Compressed Mode (17 cpi).
```

# *E Print Quality Commands*

The Epson FX-80 Print Qualities that are emulated by the printer are: Single-Strike, Emphasized, Double-Strike, Superscript, Subscript, Proportional, and Italic. The underlining capability is also considered a print quality and may be combined with any of the other print qualities. As in Print Width Commands, some Print Quality Commands take priority over others. Additionally, some Print Width Commands take priority over some Print Quality Commands. Table 3 defines the different Print Width/Print

Quality combinations.

Unlike the FX-80, Print Quality Commands for Emphasized Mode, Double-Strike Mode, and Underline Mode will not reduce the printer's print speed. All Print Quality Commands will remain on until they are disabled by the appropriate command or until the printer is powered-off.

**Due to the greater dot resolution of the laser printer, characters are always solid lines and will never appear to be constructed of dots.**

| | PICA PRINT | SUPER SCRIPT | SUB SCRIPT | ITALICS | UNDER LINE | SUPER SCRIPT ITALICS | SUPER SCRIPT UNDER LINE | SUB SCRIPT ITALICS | SUB SCRIPT UNDER LINE | ITALICS UNDER LINE | SUPER SCRIPT ITALICS UNDER LINE | SUB SCRIPT ITALICS UNDER LINE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SINGLE-STRIKE PICA | XXX | | | XXX | XXX | | | | | XXX | | |
| SINGLE-STRIKE ELITE | XXX | | | XXX | XXX | | | | | XXX | | |
| SINGLE-STRIKE COMPRESSED | XXX | | | XXX | XXX | | | | | XXX | | |
| SINGLE-STRIKE EMP PICA | XXX | | | XXX | XXX | | | | | XXX | | |
| DOUBLE-STRIKE PICA | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX |
| DOUBLE-STRIKE ELITE | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX |
| DOUBLE-STRIKE COMPRESSED | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX |
| DOUBLE-STRIKE EMPHASIZED PICA | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX |

POSSIBLE PRINT COMBINATIONS

- EMPHASIZED MODE causes characters to be printed slightly darker and wider than normal.
- DISABLE EMPHASIZED MODE returns the printer to single-strike printing.
- DOUBLE-STRIKE MODE causes characters to be printed slightly darker but no wider than normal.
- DISABLE DOUBLE-STRIKE MODE returns the printer to single-strike printing.
- SUPERSCRIPT causes characters to be printed slightly above the normal baseline.
- SUBSCRIPT causes characters to be printed slightly below the normal baseline.
- DISABLE SUPERSCRIPT/SUBSCRIPT MODE disables the above two commands.
- PROPORTIONAL MODE causes proportional character spacing in Emphasized Pica Mode.
- DISABLE PROPORTIONAL MODE returns the printer to the mode in effect prior to entering Proportional Mode.
- UNDERLINE MODE causes characters to be printed with underscoring.
- DISABLE UNDERLINE MODE terminates the Underline Mode.
- ITALIC MODE causes printing in a slanted typeface.
- DISABLE ITALIC MODE terminates Italic Mode.

## <ESC>E EMPHASIZED MODE

In Emphasized Mode, characters are printed twice with the second printing of the character being slightly offset horizontally. Characters printed in Emphasized Mode will appear slightly darker than Single-Strike and slightly wider than Double-Strike. **This mode can only be combined with Pica Mode.** Emphasized Pica Mode may be set as the default printing mode for Epson Emulation by using the keypad to configure Group E Option 2.

## <ESC>F DISABLE EMPHASIZED MODE

Turns Emphasized Mode off and returns printer to Single-Strike.

## <ESC>G DOUBLE-STRIKE MODE

Double-Strike characters appear darker but no wider than Single-Strike characters.

## <ESC>H DISABLE DOUBLE-STRIKE MODE

Turns Double-Strike Mode off and returns printer to Single-Strike.

**Examples:**

```
This is normal Pica Mode.

This is Emphasized Pica Mode.

This is Double-Strike Pica.
```

## <ESC>S0 SUPERSCRIPT

When Superscript Mode is enabled, characters will be printed full-size but raised above the normal print line. **Superscript characters are always printed in Double-Strike. Superscript cannot be used with Proportional Mode.** Superscript Mode stays on until the command to terminate is received.

## <ESC>S1 SUBSCRIPT

When Subscript Mode is enabled, characters will be printed full-size but lowered below the normal print line. This differs slightly from the FX-80 which prints subscript characters at half the size of normal characters. **Subscript characters are always printed in Double-Strike. Subscript cannot be used with Proportional Mode.** Subscript Mode stays on until the command to terminate is received.

## <ESC>T DISABLE SUPERSCRIPT/SUBSCRIPT MODE

This command terminates either Superscript or Subscript Mode. This command returns the printer to Single-Strike unless Double-Strike was enabled before entering Superscript or Subscript Mode. In that case, the printer will be returned to Double-Strike Mode.

**Examples:**

The example below was generated by the following input:

```
E = mc<ESC>S02

<ESC>TH<ESC>S12<ESC>TO
```

$E = mc^2$

$H_2O$

## <ESC>p1 PROPORTIONAL MODE

Proportional Mode allots space to each character according to the width of that character. The space allotted to "i" will be less than that allotted to "m". This results in more natural looking spacing within words. **Proportional Mode may not be used in Elite, Compressed, Superscript, Subscript, or Double-Strike Mode. Proportional Mode automatically uses Emphasized Pica and, therefore appears to be darker and bolder than Single-Strike.** Printing speed is not affected.

## <ESC>p0 DISABLE PROPORTIONAL MODE

This command terminates Proportional Mode and returns the printer to the Mode that was in effect before entering Proportional Mode.

**Examples:**

```
Proportional spacing takes effect
after the <ESC>p1. Proportionally
spaced characters are closer together
than fixed spaced characters. This may
or may not be the appearance you
desire.


The proportional spacing has been
turned off for this sentence.
```

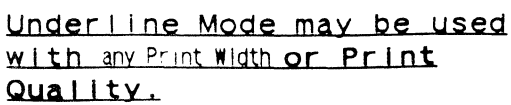
## <ESC>-1 UNDERLINE MODE

The Underlining facility may be used with any Print Width or Print Quality. Underline Mode is also turned on by "-CHR$<SOH>".

## <ESC>-0 DISABLE UNDERLINE MODE

This command terminates the Underline Mode.

**Examples:**




## <ESC>4 ITALIC MODE

Italic Mode causes printing in slanted typeface. This mode may be used with Pica, Elite, or Compressed Modes and with Single-Strike, Double-Strike, Emphasized, Proportional, Underlining, Superscript, or Subscript Print Qualities.

### <ESC>5 DISABLE ITALIC MODE

This command terminates Italic Mode.

**Examples:**

```
This is font 382 in Italic Mode.

This is superscript Italic Mode
```

# F Selecting Print Modes

The two Print Mode Commands affect multiple conditions with one command. The Select command will be used frequently. The Reset command should be invoked with care.

- MASTER PRINT MODE SELECT allows you to access any of eight different print mode combinations in one command.
- MASTER RESET CODE resets the printer to its power-up default conditions.

## <ESC>!n MASTER PRINT MODE SELECT

The Master Print Mode is a powerful command that provides a convenient way to access any of the eight Print Mode combinations listed below. A Master Print Mode command will take priority over any existing Print Mode. There is no command to disable a Master Print Mode command. Exiting from the Master Print Mode requires that either a new Master Print Mode command or a specific Print Mode command be sent.

**Master Print Mode Command**

| *n* | *Combination* |
|---|---|
| @ | Single-Strike Pica |
| A | Single-Strike Elite |
| D | Single-Strike Compressed |
| H | Single-Strike Emphasized Pica |
| P | Double-Strike Pica |
| Q | Double-Strike Elite |
| T | Double-Strike Compressed |
| X | Double-Strike Emphasized Pica |

The decimal, hex, or octal values of these printable characters may also be sent in place of "n."

**Examples:**

```
You can use the Master Print Mode
Select command to choose between
many different print combinations
which would normally require
several keystrokes.
```

### <ESC>@ MASTER RESET CODE

This command resets the printer to its power-up default conditions. All text and control codes will be cleared from the print buffer and all download fonts will be deleted. **Use this command with extreme caution!**

# *G Paper Feed Commands*

The Paper Feed Commands control movement of the paper through the printer. These commands include changing line spacing values and reverse line feeds.

- LINE FEED advances the current position one line in the direction of printing.
- SET LINE SPACING TO 1/8 INCH establishes a line spacing value of 8 lines per inch.
- SET LINE SPACING TO 7/72 INCH establishes a line spacing value of "7-dot spacing."
- SET LINE SPACING TO 1/6 INCH establishes a line spacing value of 6 lines per inch.
- SET LINE SPACING TO n/72 INCH allows you to establish your own line spacing value in 1/72" increments.
- SET LINE SPACING TO n/216 INCH allows you to establish your own line spacing value in 1/216" increments.
- SINGLE n/216 <LF> WITHOUT <CR> causes an immediate line feed of n/216".
- SINGLE n/216 REVERSE <LF> WITHOUT <CR> causes an immediate reverse line feed of n/216".

### <LF> LINE FEED

This command (decimal 10) causes the printer to execute a line feed. The following Line Spacing values and Reverse and Half-Line Feed commands determine the distance and direction of paper movement when the Line Feed command is received. The <LF> will not be executed until the end of the print line regardless of where the command is entered on the line. (See <ESC>J and <ESC>j commands for immediate line feeds.)

### <ESC>0 SET LINE SPACING TO 1/8 INCH

This command sets the Line Spacing to 8 lines per inch. Whenever a <LF>command is received, the paper will move 1/8 inch. This line spacing increment is also referred to as 9-dot spacing.

### <ESC>1 SET LINE SPACING TO 7/72 INCH

This command will cause the paper to move 7/72 inch whenever a <LF> command is received. This line spacing increment is also referred to as 7-dot spacing.

### <ESC>2 SET LINE SPACING TO 1/6 INCH

This command is used to return the printer to the default Line Spacing of 6 lines per inch. Whenever a <LF> command is received, the paper will move 1/6 inch. This line spacing increment is also referred to as 12-dot spacing.

### <ESC>A<n> SET LINE SPACING TO n/72 INCH

This command allows you to establish your own line spacing in 1/72 inch increments. The range of values for 'n' in the command are 0-85. If your computer has difficulty with values below 13, use "0+128" for 0, "1+129" for 1, "2+130" for 2, etc.

**Examples:**

<ESC>A<EM> Set line spacing to 25/72"
<ESC>A<VT> Set line spacing to 11/72"

## <ESC>3<n> SET LINE SPACING TO n/216 INCH

This command allows you to establish your own line spacing in 1/216 inch increments. This is a very fine spacing which closes the dot-gaps in Graphics Mode. The range of values for 'n' in the command are 0-255.

**Examples:**

<ESC>3B Set line spacing to 66/216"
<ESC>3<CR> Set line spacing to 13/216"

## <ESC>J<n> SINGLE n/216 <LF> WITHOUT <CR>

This command causes an IMMEDIATE line feed of n/216 inch. The command is only executed if the "<ESC>A" command (described above) for variable line spacing is controlling line spacing. The <ESC>J command is valid for one line only. The printer is returned to the current line spacing after the command is acted on.

## <ESC>j<n> SINGLE n/216 REVERSE <LF> WITHOUT <CR>

This command causes an IMMEDIATE line feed of n/216 inch "up" the page. The command is only executed if the <ESC>A command for variable line spacing is controlling line spacing. The <ESC>j command is valid for one line only. The printer is returned to the current line spacing after the command is acted on. Unlike the FX-80, this command may be used when printing mailing labels.

# *H Forms Control Commands*

The Forms Control Commands allow you to place the current print position almost anywhere on the page. These commands will be most useful when printing on preprinted forms. Remember, paper size and orientation must be considered when using these commands.

- FORM FEED ejects the current page from the printer.
- CARRIAGE RETURN moves the current position to the Left Margin depending on the status of Group E Option 2.
- SET FORMS LENGTH TO 'n' INCHES establishes a value in inches for the length of the page to be printed.
- SET FORMS LENGTH TO 'n' LINES establishes a value in lines for the length of the page to be printed.

### <FF> FORM FEED

This command (decimal 12) allows you to execute a Form Feed without having to take the printer off-line and use the FORM FEED key. If a Top-of-Form has been set, the print position will advance to that point. If no Top-of-Form is set, advance will be to the top of the page.

### <CR> CARRIAGE RETURN

This command (decimal 13) causes the printer to execute a carriage return. The status of Group E Option 2 affects how a <CR> is interpreted.

### <ESC>C<NUL><n> SET FORMS LENGTH TO 'n' INCHES

This command is used to set Forms Length in terms of the desired number of inches per page. The valid range for 'n' in the command depends on the size of paper being used. For letter size paper, the range is 1-11. For legal size paper, the range is 1-14. If this command is sent at the Top Margin, it will establish a Bottom Margin and act as a Skip-over-Perforation command.

**Examples:**

| | |
|---|---|
| <ESC>C<NUL><VT> | Set Forms Length to 11" |
| <ESC>C<NUL><ENQ> | Set Forms Length to 5" |

### <ESC>C<n> SET FORMS LENGTH TO 'n' LINES

This command is used to set Forms Length in terms of the desired number of lines per page. The number of lines per page combines with the number of lines per inches to determine the number of lines per inch. The valid range for 'n' in the command is 0-127. If the number of lines per page exceeds the size of the paper, the forms length will automatically be set at the bottom of the paper. If this command is sent at the Top Margin, it will establish a Bottom Margin and act as a Skip-over-Perforation command.

**Examples:**

| | |
|---|---|
| <ESC>CB | Set Forms Length to 66 lines |
| <ESC>C<CAN> | Set Forms Length to 24 lines |

# *I Formatting Commands*

The Formatting Commands are used to position the printed material on the page as desired. Remember that Pica Mode (10 CPI) is the default Print Width. Elite Print Mode has 12 CPI and Compressed Print Mode has 17 CPI.

- SET LEFT MARGIN
- SET RIGHT MARGIN
- SET HORIZONTAL TABS establishes up to 32 different horizontal tab stops in one command.
- HORIZONTAL TAB moves the current position to the next horizontal tab stop.
- SET VERTICAL TABS establishes up to 16 different vertical tab stops in one command.
- VERTICAL TAB moves the current position to the next vertical tab stop.
- DEFINE VERTICAL TAB CHANNELS establishes up to 16 different vertical tab stops in each of eight different channels.
- SELECT VERTICAL TAB CHANNEL 'x' selects the vertical tab channel to be used.

### <ESC>l<n> SET LEFT MARGIN

The <ESC>l (*lower-case "L"*) establishes the left margin at the column number specified by 'n'. The valid values for 'n' in the command depend on the Print Mode in use. If Pica Print Mode is used, the range of values for 'n' are 0-78. In Elite Mode, the values for 'n' are 0-93. In Compressed Mode, the values for 'n' are 0-133. Any other values are ignored. New margins do not go into effect until after the next <CR>. Once the left margin is established, it remains in effect until changed by a new Set Left Margin command or until the printer is powered-off. The left margin setting is not affected by the Print Width.

The Set Left Margin command clears the printer buffer when it is received. Do not issue the Set Left Margin command at the END of a line.

Changing the left margin will affect the horizontal tab

settings. Tabs should be set after the left margin is established. The Master Reset Code (<ESC>@) will reset the left margin to the power-up default (0).

**Examples:**

| | |
|---|---|
| <ESC>l<FF> | Set Left Margin at column 12. |
| <ESC>l<DC4> | Set Left Margin at column 20. |

The Left Margin may also be set by using the keypad to configure Group 4 Options 1, 2, 3, and 4. Refer to Section 9 for details of these Options.

## <ESC>Q<n> SET RIGHT MARGIN

This command establishes the right margin at the column number specified by 'n'. The valid values for 'n' depend on the Print Mode in use. If Pica Print Mode is used, the range of values for 'n' are 2-80. In Elite Mode, the values for 'n' are 3-96. In Compressed Mode, the values for 'n' are 4-137. The right margin must always be greater than the left margin or the printer will ignore the right margin. Changing the Print Width may require changing the right margin in order to maintain an even right hand edge. The Set Right Margin command should be sent AFTER changing or selecting Elite or Compressed Print Widths.

**Examples:**

<ESC>QF Set Right Margin at column 70.
<ESC>QP Set Right Margin at column 80.

The Right Margin may also be set by using the keypad to configure Group 4 Options 5, 6, 7, and 8. Refer to Section 9 for details of these Options.

## <ESC>D<$n_1$><$n_2$>...<$n_{32}$><NUL> SET HORIZONTAL TABS

This command is used to specify up to 32 columns for setting horizontal tabs. This command does not move the current print position. The valid values for 'n' in the command are: 0-79 in Pica Mode, 0-95 in Elite Mode, and 0-131 in Compressed Mode. In the command, $n_1$ represents the column location for the first tab stop, $n_2$ represents the column location for the second tab stop, etc.

A horizontal tab cannot be larger than the maximum column for the Print Width being used. Tabs will remain in effect until changed by a new <ESC>D command or until the printer is powered-off. A Master Reset Code will delete existing tabs and establish the default tabs which are located every eight Pica columns.

**Examples:**

| | |
|---|---|
| <ESC>D<ENQ><LF><NUL> | Set tabs at columns 5 and 10. |
| <ESC>D<RS>(2=<NUL> | Set tabs at columns 30, 40, 50, and 61. |

## <HT> HORIZONTAL TAB

This command (decimal 9) moves the current print position to the next horizontal tab. Tabs may be skipped over by sending the <HT> commands with no text until the desired tab stop is reached.

## <ESC>B<$n_1$><$n_2$>...<$n_{16}$><NUL> SET VERTICAL TABS

This command is used to specify up to 16 vertical tab stops. The command does not move the current print position. The valid values for 'n' in the command are 1-255 but a tab stop cannot exceed the number of lines per page (established by <ESC>C command). In the command, $n_1$ represents the line number for the first tab stop, $n_2$ represents the line number for the second tab stop, etc.

Vertical tabs remain in effect until changed by a new <ESC>B command or until the printer is powered-off. A Master Reset Code (<ESC>@) will reset the vertical tabs to default power-up conditions. The default tab stops are located at every other line beginning at line 1 (Top-of-Form = 0) and ending at line 65. Changing the Line Spacing value does not change the vertical tab stop settings.

**Examples:**

| | |
|---|---|
| <ESC>B<ENQ><SP> | Set Vertical Tabs at lines 5 and 32. |
| <ESC>B<SI><RS>-=<NUL> | Set Vertical Tabs at lines 15, 30, 45, and 61. |

## <VT> VERTICAL TAB

This command (decimal 11) moves the current print position to the next vertical tab stop. You can skip over tab stops by sending <VT> commands with no text until the desired tab stop is reached.

## <ESC>b$x$<$n_1$><$n_2$>...<$n_{16}$><NUL> DEFINE VERTICAL TAB CHANNELS

This command establishes up to 16 vertical tab stops in up to eight different channels. The different channels may be accessed as necessary to use in different situations. The <ESC>b command does not move the current print position. This command is useful for jobs needing multiple sets of tab stops. In the command, $x$ is any number from 0-7 and defines the channel being set, $n_1$ is a number representing the line location of the first tab stop, $n_2$ is the line number of the second tab stop, etc. The command must be terminated by "<NUL>".

**Examples:**

| | |
|---|---|
| <ESC>b0<VT><SYN><NUL> | Define Vertical Tab Channel 0 to have Vertical Tabs at lines 11 and 22. |
| <ESC>b3<VT><SYN>!,<NUL> | Define Vertical Tab Channel 3 to have Vertical Tabs at lines 11, 22, 33, and 44. |

## <ESC>/ <n> SELECT VERTICAL TAB CHANNEL "n"

This command selects one of the eight vertical tab channels established by the <ESC>b command. In the command, "n" is the number of the desired channel.

| | |
|---|---|
| <ESC>/<NUL> | Select Vertical Tab Channel 0. |
| <ESC>/<ETX> | Select Vertical Tab Channel 3. |

# J Special Printer Features

Three of the four special features below allow High-Order Bit Control to enable users of either seven-bit or eight-bit systems to operate effectively with the printer. The first two commands, <ESC>> and <ESC>=, may be used for special situations. The third command, <ESC>#, is the command which should be used in most cases.

- SET HIGH-ORDER CONTROL AND HIGH-ORDER BIT ON
- SET HIGH-ORDER BIT OFF
- SET HIGH-ORDER CONTROL TO "OFF"
- SELECT INTERNATIONAL CHARACTER SET allows you to access up to nine different character sets for international use.

### <ESC>> SET HIGH-ORDER CONTROL AND HIGH-ORDER BIT ON

This command sets the High-Order Control and High-Order Bit to "ON". When the High-Order Bit is "ON", the eighth or "Most Significant Bit" (MSB) is always read as "ON". This command will remain in effect until changed by one of the other two High-Order Bit Control commands or until a "warm restart" or complete power-off/power-on is performed. The <ESC>> command will not affect interpretation of the ESCape codes by the printer.

### <ESC>= SET HIGH-ORDER BIT OFF

This command sets the High-Order Bit to "OFF" after an <ESC>> command has been sent. When the High-Order Bit is "OFF", the eighth or "Most Significant Bit" (MSB) is always read as "OFF". This command will remain in ef-

fect until changed by one of the other two High-Order Bit Control commands or until a "warm restart" or complete power-off/power-on is performed. The <ESC>= command will not affect interpretation of the ESCape codes by the printer.

### <ESC># SET HIGH-ORDER CONTROL TO "OFF"

This command sets the High-Order Control to "OFF" so that the eighth or Most Significant Bit (MSB) can be interpreted "as is" (either off or on). This command will remain in effect until changed by one of the other two High-Order Bit Control commands or until a "warm restart" or complete power-off/power-on is performed.

### <ESC>Rn SELECT INTERNATIONAL CHARACTER SET

The printer allows access to special characters for nine different countries through this command. The values for 'n' in the command are:

| | | | | | |
|---|---|---|---|---|---|
| <NUL> | USA | <ETX> | England | <ACK> | Italy |
| <SOH> | France | <EOT> | Denmark | <BEL> | Spain |
| <STX> | Germany | <ENQ> | Sweden | <BS> | Japan |

Refer to your host computer or word processor documentation for instructions on embedding the ASCII control characters in the place of 'n' in the above command.

The International Character Set may also be accessed through Group E Options 3 through 5. If you are using a word processor, type the visible equivalents of the decimal values at the top of each column. The character that prints will be the character associated with that value in the selected character set. The international character sets (see Table 4) will also print in italics if Italic Mode is selected.

**Examples:**

<ESC>R<STX> Selects German character set
<ESC>R<BEL> Selects Spanish character set

# Table 4 International Characters

| | 35 | 36 | 64 | 91 | 92 | 93 | 94 | 96 | 123 | 124 | 125 | 126 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USA | # | $ | @ | [ | \ | ] | ^ | ` | { | ¦ | } | ~ |
| FRANCE | # | $ | à | ° | ç | § | ^ | ` | é | ù | è | ¨ |
| GERMANY | # | $ | § | Ä | Ö | Ü | ^ | ` | ä | ö | ü | ß |
| U.K. | £ | $ | @ | [ | \ | ] | ^ | ` | { | ¦ | } | ~ |
| DENMARK | # | $ | @ | Æ | Ø | Å | ^ | ` | æ | ø | å | ~ |
| SWEDEN | # | O | É | Ä | Ö | Å | Ù | é | ä | ö | å | ü |
| ITALY | # | $ | @ | ° | \ | é | ^ | ù | à | o | è | ì |
| SPAIN | ₧ | $ | @ | ¡ | Ñ | ¿ | ^ | ` | ° | ñ | } | ~ |
| JAPAN | # | $ | @ | [ | ¥ | ] | ^ | ` | { | ¦ | } | ~ |

INTERNATIONAL CHARACTER SETS

You may also print the International Character Set using the Italic Mode as shown in the table below.

| | 35 | 36 | 64 | 91 | 92 | 93 | 94 | 96 | 123 | 124 | 125 | 126 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USA | # | $ | @ | [ | \ | ] | ^ | ` | { | ¦ | } | ~ |
| FRANCE | # | $ | à | ° | ç | § | ^ | ` | é | ù | è | ¨ |
| GERMANY | # | $ | § | Ä | Ö | Ü | ^ | ` | ä | ö | ü | ß |
| U.K. | £ | $ | @ | [ | \ | ] | ^ | ` | { | ¦ | } | ~ |
| DENMARK | # | $ | @ | Æ | Ø | Å | ^ | ` | æ | ø | å | ~ |
| SWEDEN | # | O | É | Ä | Ö | Å | Ü | é | ä | ö | å | ü |
| ITALY | # | $ | @ | ° | \ | é | ^ | ù | à | o | è | ì |
| SPAIN | ₧ | $ | @ | ¡ | Ñ | ¿ | ^ | ` | ° | ñ | } | ~ |
| JAPAN | # | $ | @ | [ | ¥ | ] | ^ | ` | { | ¦ | } | ~ |

ITALIC INTERNATIONAL CHARACTER SETS

# K Graphics Mode

The printer supports the Epson FX-80 Single, Double, and Quadruple Density Graphics. It does not emulate the FX-80 consecutive-dot or slower speed with increased density limitations. A unique <ESC>command is used to enter each graphics density. In each density, two additional parameters in the command specify the number of horizontal dot columns to reserve for graphics data. The number of vertical dot rows per column that will be reserved for graphics data is determined by the type of computer system you are using (7-bit or 8-bit). Figure 10.1 shows how the different systems plot dots in a column. Notice that 7-bit systems do not use the top and bottom dot rows while 8-bit systems use the top row.

**Figure 1**

Dot positions 1-8 correspond to the 8 bits in a binary number. The ASCII equivalent of a binary bit pattern is sent to the system to tell which dots to print. A "1" means "ON" or "print" and "0" means "OFF" or "don't print." Since ASCII values are used, there is a single, unique decimal number (0-255) assigned for each possible combination of the "ON" and "OFF" bits. This means there is a unique number for each possible combination of dot patterns.

For most graphics, you will want to change to 7-dot line spacing if you are using a 7-bit system and 8-dot line spacing if you are using an 8-bit system. Refer to the Paper Feed Commands explained earlier in this section.

To enter Graphics Mode using any of the command sequences, the high-order bit must be "OFF." For 7-bit systems, this means sending the <ESC>= command if you encounter difficulty in entering Graphics Mode.

Any "Enter Graphics Mode" command causes a buffer dump to the printer so that any text is not lost. The Master Reset Code, if issued at the end of a graphics program, will not affect the graphics data but may cause any text following the graphics program to be lost. **Plot mode data and print data will not print on the same line accurately.**

Some systems may not allow use of low ASCII codes 0-31. You will need to design around this problem, use other numbers with similar dot patterns or POKE codes directly to the printer. Check your system documentation for assistance.

A command called Variable-Density Graphics Mode is provided to switch from one dot density to another while remaining in Graphics Mode.

A Width Statement may be required by some computer systems to prevent the printer from sending a <CR> before a graphics line is completed (especially if it is wide graphics pattern such as Double or Quadruple-Density dot patterns). Consult your system documentation for the appropriate Width Statement format for your computer.

**NOTE: The difference in dot size and density between the Epson printer and the laser printer will condense graphics. Circular shapes will appear slightly elongated when printed on the laser printer.**

- SELECT SINGLE-DENSITY GRAPHICS MODE places the printer in Graphics Mode and specifies the number of columns to be reserved for graphics data.

- SELECT HIGH-SPEED DOUBLE-DENSITY MODE places the printer in Graphics Mode and specifies the number of columns to be reserved for graphics data.

- SELECT LOW-SPEED DOUBLE-DENSITY MODE places the printer in Graphics Mode and specifies the number of columns to be reserved for graphics data. There is no restriction on speed with the laser printer.

- SELECT QUADRUPLE-DENSITY MODE places the printer in Graphics Mode and specifies the number of columns to be reserved for graphics data.

- SELECT VARIABLE DENSITY MODE places the printer in Graphics Mode and allows you to change densities as necessary.

- DEFINE CHARACTER IN RAM AREA allows you to create download fonts or single characters.

- SELECT CHARACTER SET allows you to print with user-defined characters.

- COPY ROM CHARACTERS TO USER RAM will access characters that have not been defined in RAM from the printer ROM when printing with user-defined character sets.

- ENABLE PRINTING OF CODES (DECIMAL 0 - 31) causes certain control codes in the decimal 0-31 range to be printed.

- DISABLE PRINTING OF CODES (DECIMAL 0 - 31) disables printing of control codes in the decimal 0-31 range.

- ENABLE PRINTING OF CODES (DECIMAL 128 - 159) allows you to redefine the "High-Order Control Codes" (decimal 128-159).

- DISABLE PRINTING OF CODES (DECIMAL 128 - 159) disables printing of control codes in the decimal 128-159 range.

## <ESC>K<$n_1$><$n_2$> SELECT SINGLE-DENSITY GRAPHICS MODE

This command places the printer in Single-Density Graphics Mode and identifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 480. In the command, $n_1$ is the number of single dot columns to be reserved for graphics data and $n_2$ represents the number of 'groups' of dot columns to be reserved for graphics data (each group = 256 single dot columns).

Seven-bit system users may need to enter Single-Density Graphics Mode twice in the same line if the full page width is needed for graphics data. Reserve 383 columns for graphics data the first time and then reserve 97 columns the second time.

**Examples:**

| | |
|---|---|
| <ESC>K<224><SOH> | Reserve 480 dot columns. |
| <ESC>K<DEL><SOH> | Reserve 383 dot columns. |
| <ESC>Ka<NUL> | Reserve 97 dot columns. |

## <ESC>Y<$n_1$><$n_2$> SELECT HIGH-SPEED DOUBLE-DENSITY MODE

This command places the printer in Double-Density Graphics Mode and identifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 960 (480 x 2 = 960). Unlike the FX-80, there is no restriction on any dot-combination in this speed and density. You may print the same dot-combination in consecutive columns.

**Examples:**

| | |
|---|---|
| <ESC>Y<192><ETX> | Reserve 960 dot columns. |
| <ESC>Y<140><SOH> | Reserve 500 dot columns. |

## <ESC>L<$n_1$><$n_2$> SELECT LOW-SPEED DOUBLE-DENSITY MODE

This command is treated the same as an <ESC>Y. Unlike the FX-80, there is no restriction on speed in this density. See the <ESC>Y command for values of $n_1$ and $n_2$.

## <ESC>Z<$n_1$><$n_2$> SELECT QUADRUPLE-DENSITY MODE

This command places the printer in Quadruple-Density Graphics Mode and indentifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 1920 (480 x 4 = 1920). To reserve the maximum number of dot columns (1920) for graphics data, send <ESC>Z<128><BEL>(128 + [7 x 256] = 1920).

## <ESC>*$x$<$n_1$><$n_2$> SELECT VARIABLE DENSITY MODE

This command places the printer in Graphics Mode and allows you to change densities (Single, Double, Quadruple) as necessary without exiting Graphics Mode. The values for $x$ in the command are:

| | |
|---|---|
| <NUL> | Single Density |
| <SOH> | Low-Speed Double-Density |
| <STX> | High-Speed Double-Density |
| <ETX> | Quadruple-Density |

The values for $n_1$ and $n_2$ specify the dot columns to be reserved for graphics data. Refer to the <ESC>K, <ESC>Y, and <ESC>Z commands for details of maximum dot columns for each density.

## K.1 Graphics Pin Combination Patterns

Once decimal numbers for the various pin-combination patterns have been calculated, you can store these numbers in DATA statements separating each decimal value with a comma. A READ (n) statement in a program LOOP simplifies the process of sending pin patterns for each column of dots to be printed. A RESTORE statement can be used to repeat a pattern a variable number of times. These statements are standard BASIC commands.

Graphics software packages are available for the Epson which automatically generate the graphics, like bar graphs, that are usually used with personal computers. These packages eliminate the need for all the programming mentioned in the above paragraph and are also supported by the printer.

## K.2 Plotter Graphics

Your printer has the capability to operate as a "plotter." Entire manuals have been written explaining how to send dot-patterns for plotting using BASIC or any other language normally used. Consult one of these. Here again, software packages are available.

## K.3 User-Defined Characters

In addition to the standard fonts or character sets, the laser printer, like the FX-80, can be used to create you own special letters, numbers and symbols. Standard character sets are stored in ROM whereas user-defined characters must be created and stored in RAM. RAM is generally used as a text buffer but because the laser printer has more memory than the FX-80, it may usually be used simultaneously for user-defined characters. However, a special command must be sent to print user-defined characters and override

the ROM fonts.

### <ESC>&<r><$n_1$><$n_2$> DEFINE CHARACTER IN RAM AREA

This command is used to create download fonts. It may be used when creating an entire character set or just a single letter or character. (Beware that download fonts are deleted if the Master Reset Code is used.) In the command, *r* = RAM area to be used (in most cases '0') and $n_1$ and $n_2$ indicate the range of characters to be defined. For example, the following command would indicate that the characters A through E were about to be defined:

<ESC>& 0<65><69>

The visible equivalents of <65> and <69> (A and E) could have also been substituted in the command. If only one character were to be defined, then the value in $n_1$ and $n_2$ would be the same.

The valid range of values for $n_1$ and $n_2$ is 0-255 (except values 0-31, 127-259, and 255 which are control codes and may only be used after sending a special ESCape sequence explained in "Control Codes Redefined" later in this section).

After receiving the above command, the printer expects 12 data numbers; one attribute and 11 dot pattern numbers (separated by commas). The user-defined character must fit into the same 9-dot high by 11-dot wide matrix as the standard ROM characters. Only 7 or 8 dots of the 9-dot matrix are actually used depending on whether you have a 7 or 8-bit system. Only 9 dots of the 11-dot wide matrix is used for defining characters. This allows for space between printed characters. Remember, the printer will still expect values for all spaces. Adjacent (or overlapping) dots are not permitted.

The first or "attribute" byte tells whether the top 7 or 8 dots (most cases) are to be printed or whether it will be

the bottom 7 or 8 dots (for lowercase descenders). If the High-Order Bit is "ON" (= 1) then the top dots are printed. If the High-Order Bit is "OFF" (= 0) then the bottom dots are printed. The printer checks the attribute byte before printing each character. Seven-bit sytem users should refer to the <ESC>> and <ESC>= commands explained previously in this section.

The attribute byte is also used if proportional characters are desired. Remember that proportional means that space is allotted according to the width of each character. The attribute byte indicates where, in the 11-dot matrix, to begin and where to end printing of each letter. In addition, proportional characters require 12 values to define them rather than 11 since Proportional automatically means Emphasized characters. A total of 13 values, counting the attribute byte, are necessary to define each character.

### <ESC>%<$n_1$><$n_2$> SELECT CHARACTER SET

This command overrides the standard ROM characters in order to print user-defined characters. In the command, $n_1$ may be "0" (select ROM characters) or "1" (select RAM characters) and $n_2$ is usually "0" (area available).

To activate the user-defined RAM characters:

**<ESC>%<SOH><NUL>**

To return to the ROM standard fonts:

**<ESC>%<NUL><NUL>**

### <ESC>:<NUL><NUL><NUL> COPY ROM CHARACTERS TO USER RAM

If you activate the user-defined RAM character set and attempt to print a number, letter or symbol which has not been defined, the printer will print blank spaces. The ROM characters will not override. Using the above command will, however, copy the ROM characters down to

the RAM area. This will avoid having to switch back and forth between the two areas.

## K.4 Graphics Using 7-Bit Systems

If you have a 7-bit system, there are some problems in Graphics Mode which you must get around. The Enter Graphics Mode <ESC> commands use the $n_1$ and $n_2$ parameters. Seven-bit users, however, cannot use these parameters alone to access the full 8-inch page width. In 7-bit systems, the $n_1$ range is 0-127 instead of 0-255. (The $n_2$ parameter range is not affected in 7-bit systems.)

The following table lists the available ranges of $n_1$ and $n_2$ for different widths.

| | | | | |
|---|---|---|---|---|
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 0)** | **=** | **widths of 0-127 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 1)** | **=** | **widths of 256-383 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 2)** | **=** | **widths of 512-639 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 3)** | **=** | **widths of 768-895 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 4)** | **=** | **widths of 1024-1151 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 5)** | **=** | **widths of 1280-1407 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 6)** | **=** | **widths of 1536-1663 dots** |
| **($n_1$ = 0-127)** | **+** | **($n_2$ = 7)** | **=** | **widths of 1792-1919 dots** |

For example, Single Density has 480 dot columns in the full 8 inches. However, 383 is the maximum available to 7-bit system users (512, the next lowest number, is too much). The only way around this is to send two Single Density Graphics Mode commands in the same line–one for 383 columns and one for 97 columns.

## K.5 Control Codes Redefined

In the command for user-defined characters, the ASCII characters 0-31, 127-159, and 255 cannot be used to redefine characters. These slots are generally reserved for control codes (used to give directions to the printer). If you need the additional space for user-defined characters, the

commands explained here are available to redefine these codes.

### <ESC>I1 ENABLE PRINTING OF CODES (decimal 0-31)

This command enables printing of many of the codes in the decimal 0-31 range. However, not all of the control codes will be printable in spite of this command. For example, <ESC>27 is the control code for the Escape character. This should never be disabled. Codes which access special modes or send directions to the printer cannot be printed as normal characters. These include 7-15, 17-20, 24, and 27.

A printable equivalent of all other characters in the 0-31 range will print when this command is used. The Hex values for decimal 0-31 are X'00' through X'1F'.

The control code locations (7-15, 17-20, 24, and 27) can still be used by also sending <ESC>R when using the International Character Set. Some of this will not work with 7-bit systems.

### <ESC>I0 DISABLE PRINTING OF CODES (decimal 0-31)

This command disables printing of all decimal 0-31 control codes.

### <ESC>6 ENABLE PRINTING OF CODES (decimal 128-159)

This command allows you to redefine the "High-Order Control Codes" (decimal 128-159).

**WARNING: Do not use this command when the High-Order Bit Control command is "ON" (<ESC>>). The High-Order Bit Control command must be set to read the High-Order Bit "as is" (<ESC>#).**

**<ESC>7 DISABLE PRINTING OF CODES (decimal 128-159)**

This command disables printing of all High-Order Control Code equivalents of the Low-Order Control Codes (decimal 7-15, 17-20, 24, and 27). All other control codes in this range will print.

## K.6 Mode Strings

If you have user-defined all 256 available spaces in RAM for special symbols, you may wish to easily access the standard characters in ROM so that you can switch back and forth. To do this, define each character set (ROM and RAM) as a character string and use them in your program to switch access.

# *L Double-High, Double-Wide Letters*

Use two 9 x 11 matrices to define an extra wide character. However, you should be careful to define the first half in Proportional (Emphasized Mode) in order to take care of the column with no printed dots. Seven-bit system users should refer to "Core Characters" below.

The same technique with line spacing adjustments can be used to define double-high or double-wide/double-high characters. A little experimentation can produce some very interesting results. The logical ASCII numbers to use for defining an extra large letter would be the ASCII equivalent of the Upper and Lowercase Roman and the Upper and Lowercase Italic of that character (T and t and *T and t*).

## L.1 Core Characters

Defining large letters can very quickly use up all available

ASCII values. It might be desirable to design some basic curved and straight line patterns which can be mixed and matched to "form" letters or logos. This is the only way a 7-bit system can handle extra large characters.

Appendix F

# Proprinter Emulation Mode

## *Introduction*

This section covers the commands supported by the QMS printer whenever it is in Proprinter Emulation Mode. **This section applies to your printer only if it emulates the IBM Proprinter. (See the status summary sheet.)**

If you are using a word processor, you do not need to read this section. Once your word processor is correctly installed and is configured to work with a printer that emulates an IBM Proprinter, you may use your **word processor commands** to edit and send your files to the printer.

The explanations of the supported Proprinter commands are given for those of you who may be writing computer programs and must actually use these commands. Proprinter commands which are not supported by the QMS printer generally are required for the Proprinter to overcome certain hardware limitations.

In addition to the commands explained in this section, there are Seven Special Commands that are also honored when in Proprinter Emulation Mode. These are software commands which allow you to change fonts, change emulation modes, change page orientation, change paper source, change the copy count, access the Extended Printer Control or redefine the command or font translation tables. The software commands are a special feature of the printer and are very useful. One especially useful command allows you to redefine the translation tables may be used to change the <ESC> character to a printable equivalent. This simplifies the entering of the special ESCape sequences required for accessing the software commands.

These software commands are explained in detail in *Part IV* of this manual.

When using the supported commands, refer to the ASCII conversion table in Appendix B at the back of this manual to determine the value for "n" in those commands which require variable parameters. Use the appropriate conversion value (ASCII, Hex, Decimal, etc.) required by your computer system and the programming language being used.

# A Supported Proprinter Command Summary

There are ten categories of supported Proprinter Emulation Mode commands: Print Modes, Horizontal Movement, Vertical Movement, Tabs, Page Format, Line Spacing, Bit Image Graphics, Printer Control, Character Selection, and Download Fonts. The supported commands are listed on the next few pages as a means of quick reference. The meanings of the categories and the commands will be explained later in this section.

**Print Mode Commands**

| | | |
|---|---|---|
| <SI> | or | Condensed Mode ON |
| <ESC><SI> | | |
| <DC2> | | Condensed Mode OFF (return to 10 Characters Per Inch) |
| <ESC>-1 | | Begin Continuous Underscore |
| <ESC>-0 | | Cancel Continuous Underscore |
| <ESC>: | | Set 12 CPI |
| <ESC>E | | Start Emphasised Printing |
| <ESC>F | | Cancel Emphasised Printing |
| <ESC>G | | Begin Double Strike Printing (NLQ) |
| <ESC>H | | Cancel Double Strike Printing (NLQ) |
| <ESC>S0 | | Begin Superscript Printing |
| <ESC>S1 | | Begin Subscript Printing |
| <ESC>T | | Cancel Subscript or Superscript Printing |
| <ESC>_1 | | Begin Continuous Overscore |
| <ESC>_0 | | Cancel Continuous Overscore |

**Horizontal Movement Commands**

| | |
|---|---|
| <BS> | Backspace |
| <HT> | Horizontal Tab |
| <CR> | Carriage Return |
| <SP> | Space |

**Tab Commands**

| | |
|---|---|
| <HT> | Horizontal Tab |
| <ESC>B<n> to <$n_{64}$><NUL> | Set Vertical Tabs |
| <ESC>B<NUL> | Clear All Vertical Tabs |
| <ESC>D<n> to <$n_{28}$><NUL> | Set Horizontal Tabs |
| <ESC>D<NUL> | Clear All Horizontal Tabs |
| <ESC>R | Set All tabs to Power On Defaults |

**Vertical Movement Commands**

| | |
|---|---|
| <LF> | Line Feed |
| <VT> | Vertical Tab |
| <FF> | Form Feed |
| <ESC>2 | Start Text Line Spacing |
| <ESC>J<n> | Variable Line Space (n/216 inch) |

**Page Format Commands**

| | |
|---|---|
| <ESC>C0<m> | Set Form Length (m inches) |
| <ESC>C<n> | Set Form Length (n lines) |

**Line Spacing Commands**

| | |
|---|---|
| <ESC>0 | 1/8 Inch Line Spacing |
| <ESC>1 | 7/72 Inch Line Spacing |
| <ESC>3<n> | Graphics Line Spacing |
| <ESC>A<n> | Store Text Line Spacing |
| <ESC>2 | Start Text Line Spacing (set by <ESC>A) |

**Bit Image Graphics Commands**

| | |
|---|---|
| <ESC>K<$n_1$><$n_2$> ... <$n_{480}$> | 480 Bit-Image Graphics |
| <ESC>L<$n_1$><$n_2$> ... <$n_{960}$> | 960 Bit-Image Graphics (half-speed) |
| <ESC>Y<$n_1$><$n_2$> ... <$n_{960}$> | 960 Bit-Image Graphics (full speed) |
| <ESC>Z<$n_1$><$n_2$> ... <$n_{1920}$> | 1920 Bit-Image Graphics |

**Printer Control Commands**

| | |
|---|---|
| <ESC> | Escape |
| <ESC>5<n> | Begin Automatic Line Feed (n = 1) |
| <ESC>5<n> | Cancel Automatic Line Feed (n = 0) |
| <NUL> | Null |

**Character Selection Commands**

| | |
|---|---|
| <ESC>6 | Select Character Set 2 |
| <ESC>7 | Select Character Set 1 |
| <ESC>\<n> | Print Continuous from All Characters |
| <ESC>^ | Print One Character from All Characters |

**Download Fonts Commands**

| | |
|---|---|
| <ESC>= | Character Font Image Download |
| <ESC>I0 | Begin Normal Quality (not downloaded) |
| <ESC>I2 | Begin Near Letter Quality (not downloaded) |
| <ESC>I4 | Begin Normal Quality (downloaded) |
| <ESC>I6 | Begin Near Letter Quality (downloaded) |
| <ESC>I0 | Cancel Download Mode |
| <ESC>I2 | Cancel Download Mode |

# B Unsupported Proprinter Commands

The following Proprinter commands are not supported by the printer. If these commands are sent to the printer, they will be absorbed and will not affect printer operation.

**Print Mode Commands**

| | |
|---|---|
| <SO> or <ESC><SO> | Double Wide Printing by Line |
| <ESC>W0 | Double Wide Printing OFF (set by <SO>) |
| <DC4> | Double Wide Printing OFF (set by <SO>) |
| <ESC>U1 | Print in One Direction (left to right) |
| <ESC>U0 | Print in Two Directions |
| <ESC>W1 | Begin Continuous Double Wide Printing |
| <ESC>W0 | Cancel Continuous Double Wide Printing |

**Page Format Commands**

| | |
|---|---|
| <ESC>4 | Set Top of Form |
| <ESC>N<n> | Set Automatic Perforation Skip (n lines) |
| <ESC>0 | Cancel Automatic Perforation Skip |

**Printer Control Commands**

| | |
|---|---|
| <BEL> | Sound Beeper |
| <CAN> | Cancel Data |
| <DC3> | Ignored (same as <NUL>) |
| <ESC>Q3 | Deselect Printer |
| <DC1> | Select Printer |
| <DC3> | Deselect Printer |

# C Supported Proprinter Commands

The commands which are supported by the printer are described on the following pages. If you have files that already contain Proprinter commands, you need not make any changes to these files before sending them to the laser printer. Any Proprinter commands that are not supported by the printer will be absorbed and will not interrupt printing.

## C.1 Print Modes

The Print Modes Commands are used to change character modes and spacing.

The printer emulates the 10 CPI, 12 CPI, and Compressed print widths of the IBM Proprinter. Like the Proprinter, only one Print Width can be used at a time. The number of characters that will fit on a line is determined by the font size, the print mode (CPI) selected, the page size, and the page orientation.

The IBM Proprinter Print Qualities that are emulated by the printer are: Normal, Emphasized, Double-Strike, Superscript, Subscript, Condensed, and Near Letter Quality. The underscore and overscore capability may be combined with any of the other print qualities.

Unlike the Proprinter, Print Quality Commands for Emphasized Mode, Double-Strike Mode, and Underline Mode will not reduce the printer's print speed. All Print Quality Commands will remain on until they are disabled by the appropriate command or until the printer is powered-off.

All combinations of Print Modes are valid with the following exceptions:

| Combinations | Results |
|---|---|
| Condensed, Emphasized | Emphasized |
| Condensed, 12 CPI | 12 CPI |
| Condensed, Near Letter Quality | Condensed |
| Condensed, Near Letter Quality, Emphasized | Near Letter Quality, Emphasized |
| 10 CPI, 12 CPI | Last Mode Selected |
| Superscript, Subscript | Last Mode Selected |

**Due to the greater dot resolution of the QMS printer, characters are always solid lines and will never appear to be constructed of dots.**

- CONDENSED MODE ON causes printing at 17.1 CPI.
- SET 12 CPI PRINTING causes printing at 12 CPI.
- 10 CPI PRINTING returns the printer to 10 CPI.
- BEGIN EMPHASIZED PRINTING causes the characters to be printed slightly darker and wider than normal.
- CANCEL EMPHASIZED PRINTING ends emphasized printing.
- BEGIN DOUBLE STRIKE PRINTING causes characters to be printed slightly darker but no wider than normal.
- CANCEL DOUBLE STRIKE PRINTING returns the printer to single strike printing.
- SELECT PRINT MODE selects the print quality: Normal (standard or download font); Near Letter Quality (standard or download font).
- SUPERSCRIPT causes the characters to be printed slightly above the normal baseline.
- SUBSCRIPT causes characters to be printed slightly below the normal baseline.
- CANCEL SUPERSCRIPT/SUBSCRIPT cancels the above two commands.
- BEGIN CONTINUOUS UNDERSCORE underlines all following data and spaces.

- CANCEL CONTINUOUS UNDERSCORE ends the continuous underscore.

- BEGIN CONTINUOUS OVERSCORE causes characters to be printed with overscoring.

- CANCEL CONTINUOUS OVERSCORE ends continuous overscore.

### <SI> or <ESC><SI> CONDENSED MODE ON

Condensed printing has a character spacing of 17.1 Characters Per Inch.

### <ESC>: 12 CPI PRINTING

Sets the character spacing at 12 Characters Per Inch.

### <DC2> 10 CPI PRINT

Cancels Condensed Mode and 12 CPI Printing and sets the print at 10 Characters Per Inch.

### <ESC>E EMPHASIZED MODE

In Emphasized Mode, characters are printed twice with the second printing of the character being slightly offset horizontally. Characters printed in Emphasized Mode will appear slightly darker than Normal and slightly wider than Double-Strike.

### <ESC>F DISABLE EMPHASIZED MODE

Turns Emphasized Mode off and returns printer to Normal.

## <ESC>G DOUBLE-STRIKE MODE

Double-Strike (Near Letter Quality) characters appear darker but no wider than Normal characters.

## <ESC>H DISABLE DOUBLE-STRIKE MODE

Turns Double-Strike Mode off and returns printer to Normal print.

## <ESC>I<n> SELECT PRINT QUALITY

This command selects the print quality.

**n = 0** Produces Normal Quality (standard font).

**n = 2** Produces Near Letter Quality (standard font).

**n = 4** Produces Normal Quality (download font).

**n = 6** Produces Near Letter Quality (download font).

## <ESC>S0 SUPERSCRIPT

When Superscript Mode is enabled, characters will be raised above the normal print line. Superscript Mode stays on until the command to terminate is received.

## <ESC>S1 SUBSCRIPT

When Subscript Mode is enabled, characters will be lowered below the normal print line. Subscript Mode stays on until the command to terminate is received.

## <ESC>T CANCEL SUPERSCRIPT/SUBSCRIPT MODE

This command terminates either Superscript or Subscript Mode.

### <ESC>-1 CONTINUOUS UNDERSCORE

Underlines all data and spaces that follow. Underscore may be used with any Print Width or Print Quality.

### <ESC>-0 CANCEL CONTINUOUS UNDERSCORE

This command terminates the Continuous Underscore.

### <ESC>_1 CONTINUOUS OVERSCORE

Overscores all data and spaces that follow. Overscore may be used with any Print Width or Print Quality.

### <ESC>_0 CANCEL CONTINUOUS OVERSCORE

This command terminates the Continuous Underscore.

## C.2 Horizontal Movement Commands

The Horizontal Movement Commands control horizontal movement of the print position on the paper. These commands include Backspace, Horizontal Tab, Form Feed, Carriage Return, and Space. Remember, paper size and orientation must be considered when using these commands.

- BACKSPACE moves the current print position one character width to the left.
- HORIZONTAL TAB moves the current position to the next horizontal tab stop.
- FORM FEED ejects the current page from the printer.
- CARRIAGE RETURN moves the current position to

the Left Margin depending on the status of Group E Option 2.

- SPACE moves the current print position one character width to the right.

## <BS> BACKSPACE

This command (decimal 8) moves the current print position to the left. The exact movement caused by the Backspace is dependent upon the character spacing selected. If the current print position is at the left margin, the Backspace is ignored.

## <HT> HORIZONTAL TAB

This command (decimal 9) moves the current print position to the next horizontal tab. Tabs may be skipped over by sending the <HT> commands with no text until the desired tab stop is reached.

### <FF> FORM FEED

This command (decimal 12) allows you to execute a Form Feed without having to take the printer off-line and use the FORM FEED key.

### <CR> CARRIAGE RETURN

This command (decimal 13) causes the printer to execute a carriage return. The status of Group E Option 2 affects how a <CR> is interpreted.

### <SP> SPACE

This command (decimal 32) moves the current print position one character width to the right.

## C.3 Vertical Movement Commands

The Vertical Movement Commands control vertical movement of the print position on the paper. These commands include Line Feed, Vertical Tab, Form Feed, Text Line Spacing, and Variable Line Space. Remember, paper size and orientation must be considered when using these commands.

- LINE FEED advances the current position one line in the direction of printing.
- VERTICAL TAB moves the current position to the next vertical tab stop.
- FORM FEED ejects the current page from the printer.
- START TEXT LINE SPACING begins line spacing at 6 lines per inch or as set by <ESC>A.

- VARIABLE LINE SPACE causes a line feed of n/216 inches.

### <VT> VERTICAL TAB

This command (decimal 11) moves the current print position to the next vertical tab stop. You can skip over tab stops by sending <VT> commands with no text until the desired tab stop is reached.

### <FF> FORM FEED

This command (decimal 12) allows you to execute a Form Feed without having to take the printer off-line and use the FORM FEED key.

### <LF> LINE FEED

This command (decimal 10) causes the printer to execute a line feed.

### <ESC>2 START TEXT LINE SPACING

Begins line spacing at the value set by <ESC>A (see "Line Spacing Commands"). If no <ESC>A sequence has been entered, line spacing will be 6 LPI (lines per inch).

### <ESC>J<n> VARIABLE LINE FEED (n/216)

This command causes an line feed of n/216 inch (n x 0.12 mm). The value of n must be between 1 and 255. Use a line spacing of 24/216 inch for bit-image graphics, using eight bits. Use exact multiples of 3 to move the print position exactly n/216 inch. The <ESC>J command is valid for one line only. The printer is returned to the current line spacing after the command is acted on.

## C.4 Tab Commands

The Tab Commands are used to position the printed material on the page as desired.

- SET VERTICAL TABS establishes up to 64 different vertical tab stops in one command.
- VERTICAL TAB moves the current position to the next vertical tab stop.
- CLEAR ALL VERTICAL TABS cancels the set vertical tabs.
- SET HORIZONTAL TABS establishes up to 28 different horizontal tab stops in one command.
- HORIZONTAL TAB moves the current position to the next horizontal tab stop.
- CLEAR ALL HORIZONTAL TABS cancels the set horizontal tabs.

### <ESC>B<$n_1$><$n_2$>...<$n_{64}$><NUL> SET VERTICAL TABS

Sets the vertical tab stop positions in lines. At power up the printer has no vertical tabs set. <$n_1$> through $n_{64}$ represent tab stop positions by line number. (The line at the top of the form is line 1.) This sequence cancels all previous tab settings. The printer recognizes up to 64 positions in ascending order. Once tab stops are set, they remain in effect until new tab stops are specified.

**Examples:**

| | |
|---|---|
| <ESC>B<ENQ><SP><NUL> | Set Vertical Tabs at lines 5 and 32. |
| <ESC>B<SI><RS>-=<NUL> | Set Vertical Tabs at lines 15, 30, 45, and 61. |

## <VT> VERTICAL TAB

This command (decimal 11) moves the current print position to the next vertical tab stop. You can skip over tab stops by sending <VT> commands with no text until the desired tab stop is reached. If no vertical stops are specified, the vertical tab command acts the same as a line feed. Note: The Vertical Tab command will also cause a Carriage Return if Group I Option 4 is enabled.

## <ESC>B<NUL> CANCEL ALL VERTICAL TAB STOPS

This command cancels all vertical tab stops. (All vertical tabs are returned to their power up values by <ESC>R.)

## <ESC>D<$n_1$><$n_2$>...<$n_{28}$><NUL> SET HORIZONTAL TABS

This command sets up to 28 horizontal tab stop positions (represented by <$n_1$> through $n_{28}$). The tab stops must be in ascending order and followed by <NUL>. The power up setting is a tab stop every eight positions beginning at column 9, but tabs can be set beginning at position 1.

## <ESC>D<NUL> CLEAR ALL HORIZONTAL TABS

All horizontal tab stops are cancelled by <ESC>D<NUL>. (All horizontal tabs are returned to their power up values by <ESC>R.)

**Examples:**

| | |
|---|---|
| <ESC>D<ENQ><LF><NUL> | Set tabs at columns 5 and 10. |
| <ESC>D<RS>(2=<NUL> | Set tabs at columns 30, 40, 50, and 61. |

### <HT> HORIZONTAL TAB

This command (decimal 9) moves the current print position to the next horizontal tab. Tabs may be skipped over by sending the <HT> commands with no text until the desired tab stop is reached.

### <ESC>R SET ALL TABS TO POWER ON DEFAULTS

This command returns all tabs (horizontal and vertical) to their power up settings.

## C.5 Page Format Commands

These commands are used to set form length in lines or inches.

- SET FORMS LENGTH IN INCHES establishes a value in inches for the length of the page to be printed.
- SET FORMS LENGTH IN LINES establishes a value in lines for the length of the page to be printed.

### <ESC>C0<m> SET FORMS LENGTH IN INCHES

This command is used to set Forms Length in terms of the desired number of inches per page. The valid range for 'n' in the command depends on the size of paper being used. For letter size paper, the range is 1-11. For legal size paper, the range is 1-14. If this command is sent at the Top Margin, it will establish a Bottom Margin.

**Examples:**

| | |
|---|---|
| <ESC>C0<VT> | Set Forms Length to 11" |
| <ESC>C0<ENQ> | Set Forms Length to 5" |

### <ESC>C<n> SET FORMS LENGTH IN LINES

This command is used to set Forms Length in terms of the desired number of lines per page. The valid range for <n> in the command is 0-255. The printer converts the number of lines specified by <n> to inches using the current line spacing. The printer saves the form length in inches and does not change the form length if line spacing is changed.

**Examples:**

| | |
|---|---|
| <ESC>CB | Set Forms Length to 66 lines |
| <ESC>C<CAN> | Set Forms Length to 24 lines |

## C.6 Line Spacing Commands

These commands set line spacing.

- SET LINE SPACING TO 1/8 INCH establishes a line spacing value of 8 lines per inch.
- SET LINE SPACING TO 7/72 INCH establishes a line spacing value 7 lines per inch.
- SET LINE SPACING TO n/72 INCH allows you to establish your own line spacing value in 1/72" increments.
- SET GRAPHICS LINE SPACING (n/216 INCH) allows you to establish a line spacing value in 1/216" increments.

### <ESC>0 SET LINE SPACING TO 1/8 INCH

This command sets the Line Spacing to 8 lines per inch. Whenever a <LF>command is received, the paper will move 1/8 inch.

## <ESC>1 SET LINE SPACING TO 7/72 INCH

This command will cause the paper to move 7/72 inch whenever a <LF> command is received.

## <ESC>3<n> SET LINE SPACING TO n/216 INCH

This command allows you to establish your own line spacing in 1/216 inch increments. This is a very fine spacing which closes the dot-gaps in Graphics Mode. The range of values for 'n' in the command are 1-255. Use exact multiples of 3 to move exactly n/216 inch.

| Spacing | n/216 |
|---|---|
| 8 LPI | 27/216 |
| 6 LPI | 36/216 |
| 8-DOT | 24/216 |
| 7-DOT | 21/216 |

**Examples:**

<ESC>3B Set line spacing to 66/216"
<ESC>3<CR> Set line spacing to 13/216"

## <ESC>A<n> SET LINE SPACING TO n/72 INCH

This command stores a line spacing value of n x 0.3528 mm (n/72 inch). <ESC>2 (Start Text Line Spacing) must be sent to start the line spacing. This command determines the amount the print position moves for a line feed.

**Examples:**

<ESC>A<EM> Set line spacing to 25/72"
<ESC>A<VT> Set line spacing to 11/72"

## <ESC>2 START TEXT LINE SPACING

Begins line spacing at the value set by <ESC>A If no <ESC>A sequence has been entered, line spacing will be 6 LPI (lines per inch).

## C.7 Bit Image Graphics

The printer supports the IBM Proprinter Single, Double, and Quadruple Density Graphics. It does not emulate the Proprinter consecutive-dot or slower speed with increased density limitations. A unique <ESC> command is used to enter each graphics density. In each density, two additional parameters in the command specify the number of horizontal dot columns to reserve for graphics data.

Dot positions 1-8 correspond to the 8 bits in a binary number. The ASCII equivalent of a binary bit pattern is sent to the system to tell which dots to print. A "1" means "ON" or "print" and "0" means "OFF" or "don't print." Since ASCII values are used, there is a single, unique decimal number (0-255) assigned for each possible combination of the "ON" and "OFF" bits. This means there is a unique number for each possible combination of dot patterns.

**NOTE:** 480 Bit-Image Graphics produces graphics images up to 8" x 10". 960 Bit-Image Graphics and 1920 Bit-Image Graphics produce graphics images up to 8" x 5.5".

- 480 BIT-IMAGE GRAPHICS places the printer in Graphics Mode and specifies up to 480 columns to be reserved for graphics data.

- 960 BIT-IMAGE GRAPHICS (FULL SPEED) places the printer in Graphics Mode and specifies up to 960 columns to be reserved for graphics data.

- 960 BIT-IMAGE GRAPHICS (HALF SPEED) places the printer in Graphics Mode and specifies up to 960 columns to be reserved for graphics data. There is no restriction on speed with the QMS printer.

- 1920 BIT-IMAGE GRAPHICS places the printer in Graphics Mode and specifies up to 1920 columns to be reserved for graphics data.

## <ESC>K<$n_1$><$n_2$> 480 BIT-IMAGE GRAPHICS

This command places the printer in 480 Bit Graphics Mode and identifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 480 on an 8 inch line.

In the command, $n_2$ represents the number of 'groups' of dot columns to be reserved for graphics data (each group = 256 single dot columns) and $n_1$ is the number of single dot columns to be reserved for graphics data.

For example, 356 dot columns would be comprised of 1 'group' of 256 and 100 single dot columns, so <$n_1$> would be 100 and <$n_2$> would be 1. The printer ignores all data bytes over 480.

**Examples:**

| | |
|---|---|
| <ESC>K<224><SOH> | Reserve 480 dot columns. |
| <ESC>K<DEL><SOH> | Reserve 383 dot columns. |
| <ESC>Ka<NUL> | Reserve 97 dot columns. |

Each byte represents a set of eight dots in a vertical column. The horizontal position of this column is determined by its placement within the series of data bytes ($v_1$ through $v_{480}$). The vertical position of the dots within this columnn is determined by the value of the data byte. The eight dots of the column are a visual representation of the binary value of the data byte with the lowest value (bit 0) in the bottom dot position and the highest value (bit 7) in the top dot position.

| Bit | | Value |
|---|---|---|
| 7 | ● | 128 |
| 6 | ● | 64 |
| 5 | ● | 32 |
| 4 | ● | 16 |
| 3 | ● | 8 |
| 2 | ● | 4 |
| 1 | ● | 2 |
| 0 | ● | 1 |

For example, if decimal 128 (binary 10000000) is sent, only the top dot prints. If decimal 1 (binary 00000001) is sent, only the bottom dot prints. If decimal 255 (binary 11111111) is sent, all eight dots print.

## <ESC>L<$n_1$><$n_2$> 960 BIT-IMAGE GRAPHICS (FULL SPEED)

This command places the printer in 960 Bit Image Graphics and identifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 960. Unlike the Proprinter, there is no restriction on any dot-combination in this speed and density. You may print the same dot-combination in consecutive columns.

**Examples:**

<ESC>Y<192><ETX> Reserve 960 dot columns.
<ESC>Y<140><SOH> Reserve 500 dot columns.

## <ESC>L<$n_1$><$n_2$> 960 BIT IMAGE GRAPHICS (HALF-SPEED)

This command is treated the same as an <ESC>Y. Unlike the Proprinter, there is no restriction on speed in this density. See the <ESC>Y command for values of $n_1$ and $n_2$.

## <ESC>Z<$n_1$><$n_2$> 1920 BIT-IMAGE GRAPHICS

This command places the printer in 1920 Bit-Image Graphics and identifies which columns are to be reserved for graphics data. The maximum number of dots per row in this density is 1920 (480 x 4 = 1920). To reserve the maximum number of dot columns (1920) for graphics data, send <ESC>Z<128><BEL>(128 + [7 x 256] = 1920).

## C.8 Graphics Pin Combination Patterns

Once decimal numbers for the various pin-combination patterns have been calculated, you can store these numbers in DATA statements separating each decimal value with a comma. A READ (n) statement in a program LOOP simplifies the process of sending pin patterns for each column of dots to be printed. A RESTORE statement can be used to repeat a pattern a variable number of times. These statements are standard BASIC commands.

Graphics software packages are available for the Proprinter which automatically generate the graphics, like bar graphs, that are usually used with personal computers. These packages eliminate the need for all the programming mentioned in the above paragraph and are also supported by the printer.

## C.9 Plotter Graphics

Your printer has the capability to operate as a "plotter." Entire manuals have been written explaining how to send dot-patterns for plotting using BASIC or any other language normally used. Consult one of these. Here again, software packages are available.

## C.10 Printer Control Commands

These commands control certain basic functions of the printer.

- ESCAPE begins each printer command.
- START AUTOMATIC LINE FEED adds a Line Feed to each Carriage Return.
- CANCEL AUTOMATIC LINE FEED stops the Automatic Line Feed function.

- NULL control code is ignored by the printer.

### <ESC> ESCAPE

Sets the printer to accept the next data sent as a printer command.

### <ESC>5<n> AUTOMATIC LINE FEED

This command causes the printer to perform a line feed for each Carriage Return when n = 1. This command overrides the Group E Option 2. When n = 0, the Automatic Line Feed function stops.

### <NUL> NULL

The printer ignores a Null control code.

## C.11 Character Selection

This group of commands selects the character set to be used.

- SELECT CHARACTER SET 2 allows the use of the characters in Character Set 2.
- SELECT CHARACTER SET 1 allows the use of the characters in Character Set 1.
- PRINT CONTINUOUS FROM ALL CHARACTERS CHART allows the use of all of the characters in the All Characters Chart.
- PRINT ONE CHARACTER FROM ALL CHARACTERS CHART prints one character from the All Characters Chart.

## <ESC>6 SELECT CHARACTER SET 2

This command selects Character Set 2. Character Set 2 contains characters and symbols used in non-English languages. <ESC>6 overrides Group E Option 3.

## <ESC>7 SELECT CHARACTER SET 1

This command selects Character Set 1. Character Set 2 contains characters and symbols commonly used in English. <ESC>6 overrides Group E Option 3.

## <ESC>\<$n_1$><$n_2$> PRINT CONTINUOUSLY FROM ALL CHARACTERS CHART

This command allows the printing of all characters, including special symbols assigned to ASCII values below decimal 32 (normally recognized as control codes). This command can also be used to print characters between 128-159 (for Character Set 1). A Space character prints for each unassigned character sent.

<$n_2$> = number of 'groups' of 256 characters
<$n_1$> = number of single characters

Total number of characters = <$n_1$> + (<$n_2$> x 256).

## <ESC>^ PRINT SINGLE CHARACTER FROM ALL CHARACTERS CHART

This command prints one character from the All Characters Chart. This command can be used to print characters assigned to ASCII values normally recognized as control codes. (See <ESC>\)

## C.12 Download Fonts

These commands allow fonts to be downloaded and accessed in Normal or Near Letter Quality.

- CHARACTER FONT IMAGE DOWNLOAD allows a font to be downloaded.
- BEGIN NORMAL QUALITY – DOWNLOADED selects the downloaded font and prints it in Normal quality.
- BEGIN NEAR LETTER QUALITY – DOWNLOADED selects the downloaded font and prints it in Near Letter quality.
- CANCEL DOWNLOAD MODE returns the printer to a standard font.

### <ESC>= CHARACTER FONT IMAGE DOWNLOAD

This command begins a character font image download. A maximum of 94 characters may be loaded. If less than 94 are loaded, all character codes must be continuous from the first character code.

The <ESC>= command is in two parts:

1. Part one includes **Count 1**, **Count 2**, and **Code**. This part is used once for each <ESC>= command.
2. Part two includes the **Attribute** and **Column 1** through **Column 11**. This part is repeated for each character downloaded.

**Count 1** and **Count 2** indicate how many characters to download.

To find Count 1 and Count 2:

1. Calculate the **total count** as follows:

   **Total count = (number of characters x 13) + 2**

2. If the total count is less than 256, then **Count 1** = **Total count** and **Count 2 = 0**.

3. If the **Total count** is greater than or equal to 256, then divide the number of bytes by 256. **Count 2** = the integer part of the result. **Count 1** = the remainder.

**Examples**

If the number of characters is 2:

Total count = (2 x 13) + 2 = 28

Count 1 = 28

Count 2 = 0

If the number of characters is 94:

Total count = (94 x 13) + 2 = 1224

Count 1 = 200

Count 2 = 4

**Code** is the ASCII decimal value for the first downloaded character. The downloaded characters will replace normal characters beginning at that point.

**Attribute** indicates whether the character is ascending or descending.

**Attribute = 0**, character is ascending.

**Attribute = 1**, character is descending.

**Column 1** through **Column 11** are the values of the vertical columns of dots in each character.

## <ESC>I<n> SELECT PRINT MODE

This command begins or cancels printing in a downloaded font.

**n = 4** Begin printing a downloaded font in Normal Quality.

**n = 6** Begin printing a downloaded font in Near Letter Quality.

**n = 0** Cancel printing in a downloaded font (begin printing a standard font in Normal Quality).

**n = 2** Cancel printing in a downloaded font (begin printing a standard font in Near Letter Quality).

Appendix G

# Qume Emulation Mode

## *Introduction*

The QMS laser printer emulates the Qume®Sprint 9/45, Sprint 9/55, and the Sprint 11 Plus letter-quality printers. This section covers the commands that are supported whenever the QMS printer is in Qume Emulation Mode.

If you are using a word processor, you do not need to read this section. Once your word processor is correctly installed and is configured to work with a printer that emulates a Qume printer, you may use your **word processor commands** to edit and send your files to the QMS printer.

The explanations of the supported Qume commands are given for those of you who may be writing computer programs and must actually use these commands. Qume commands which are not supported by the QMS printer generally are required for the Qume printer to overcome certain hardware limitations.

In addition to the commands explained in this section, there are Printer Software Commands that are also honored when in Qume Emulation Mode. These are software commands which allow you to change fonts, change emulation modes, change page orientation, change paper source, change the copy count, access the Extended Printer Control or redefine the command or font translation tables. The software commands are a special feature of the QMS printer and are very useful. These commands are explained in Part IV of this manual.

# A *Summary of Supported Qume Commands*

There are five categories of supported Diablo Emulation Commands: Single Character, Formatting, Print Position, Print Quality, and Special Printer Features. The supported commands are listed on the next few pages as a means of quick reference. The meanings of the categories and the commands will be explained later in this section.

**Single Character Commands**

| | |
|---|---|
| <BS> | Backspace |
| <CR> | Carriage Return |
| <FF> | Form Feed |
| <HT> | Horizontal Tab |
| <LF> | Line Feed |
| <SP> | Space |

**Formatting Commands**

| | |
|---|---|
| <ESC>+ | Set Top Margin |
| <ESC>– | Set Bottom Margin |
| <ESC>9 | Set Left Margin |
| <ESC>0 | Set Right Margin |
| <ESC>L | *Set Vertical Motion Index |
| <ESC><RS> | *Set Vertical Motion Index |
| <ESC>E | *Set Horizontal Motion Index |
| <ESC><US> | *Set Horizontal Motion Index |
| <ESC>1 | Set Horizontal Tab Stop |
| <ESC>( | Tab Set List |
| <ESC>) | Tab Clear List |
| <ESC>8 | Clear Individual Tab Stops |
| <ESC>2 | Clear all Horizontal Tab Stops |

* These commands have variable parameters.

### Print Position Commands

| | |
|---|---|
| <ESC><BS> | Backspace |
| <ESC>C | *Absolute Horizontal Tab to a Column Number |
| <ESC><HT> | Absolute Horizontal Tab to a Column Number |
| <ESC>P | *Absolute Vertical Tab to a Line Number |
| <ESC><VT> | *Absolute Vertical Tab to a Line Number |
| <ESC>LF | Negative Line Feed |
| <ESC>D | Negative 1/2 Line Feed |
| <ESC>U | Positive 1/2 Line Feed |
| <ESC>H | *Relative Horizontal Motion |
| <ESC>V | *Relative Vertical Paper Motion |
| <ESC>, | Auto Line Feed "ON" |
| <ESC>. | Auto Line Feed "OFF" |
| <ESC>5 | Turn "OFF" Programmed Backward Printing |
| <ESC>6 | Turn "ON" Programmed Backward Printing |
| <ESC>W | Auto Carriage Return/Line Feed "ON" |
| <ESC>Z | Auto Carriage Return/Line Feed "OFF" |

### Print Quality Commands

| | |
|---|---|
| <ESC>$ | WPS "ON" |
| <ESC>% | WPS "OFF" |
| <ESC>I | Auto Underscore Mode "ON" |
| <ESC>J | Auto Underscore Mode "OFF" |
| <ESC>K | *Bold Overprint Mode "ON" |
| <ESC>M | Bold Overprint Mode "OFF" |
| <ESC>Q | Shadow Print "ON" |
| <ESC>R | Shadow Print "OFF" |
| <ESC>N | No Escapement/Motion to be performed after printing next immediate character. |

* These commands have variable parameters.

**Special Printer Features**

| | |
|---|---|
| <ESC><SUB>I | Total Reset/Restore |
| <ESC><CR>P | Alternate Total Reset/Restore |
| <ESC>S | No Print "ON" |
| <ESC>T | No Print "OFF" |
| <ESC>3 | Graphics "ON" 1/60" |
| <ESC>G | Graphics "ON" 1/120" |
| <ESC>4 | Graphics "OFF" |
| <ESC>/ | Print Character located at Wheel Position 002 |
| <ESC><SP> | Print Character located at Wheel Position 004 |

When using the supported commands, refer to the ASCII conversion table in Appendix B at the back of this manual to determine the value for "n" in those commands which require variable parameters. Use the appropriate conversion value (ASCII, Hex, Decimal, etc.) required by your computer system and the programming language being used.

# *B Unsupported Qume Commands*

The following commands are not supported by the printer. If these commands are sent, they will be absorbed by the printer and will not affect printing.

**Qume Printer Features**

| | |
|---|---|
| <ESC>F | Set Form Length |
| <ESC>O | Right Margin Control "ON" |
| <ESC>Y | Right Margin Control "OFF" |
| <ESC>> | Auto Bidirectional Printing "ON" |
| <ESC>< | Auto Bidirectional Printing "OFF" |

**Program Mode Commands**

| | |
|---|---|
| <ESC><SO> | Shift to Program Mode |
| <ESC># | Enter Secondary Mode |
| <ESC><SI> | Return to Normal Mode |
| <ESC>ae | Enable Twintellect Download Table |
| <ESC>ad | Disable Twintellect Download Table |
| <ESC>a | Download or Modify Twintellect Table |

**Printer Commands**

| | |
|---|---|
| <BEL> | Bell |
| <ESC>X | Force Execution |

**Sheet Feeder Commands**

| | |
|---|---|
| <ESC>i | Sheet Insert from Tray One |
| <ESC>e | Sheet Eject |

**Test Commands**

| | |
|---|---|
| <ESC><SUB><SO> | Terminal Self-Test |
| <ESC>@T | Enter User Test Mode |
| <STX> | Perform User Test Once |
| <SOH> | Perform User Test Continuously |
| <ENQ> | Halt Continuous User Test |
| <ESC><SI> | Return to Normal Mode |

# *C Supported Qume Commands*

The Qume commands which are supported by the printer are described on the following pages. If you have files that already contain Qume commands, you need not make any changes to these files before sending them to the printer. Any Qume commands that are not supported by the printer will be absorbed and will not interrupt printing.

## C.1 Single Character Commands

The following commands require only a single character or keystroke in order to access the various features.

- BACKSPACE (<BS>) moves the current position one print position in the opposite direction of printing.
- CARRIAGE RETURN (<CR>) moves the current position to the Left Margin.
- FORM FEED (<FF>) ejects the current page from the printer.
- HORIZONTAL TAB (<HT>) moves the current position to the next horizontal tab stop.
- VERTICAL TAB (<VT>) moves the current position to the next vertical tab stop.
- LINE FEED (<LF>) moves the current position down one line without affecting the horizontal position.
- SPACE (<SP>) moves the current position one print position in the direction of printing.

### <BS> BACKSPACE

This command will cause a backward (usually) movement of one column width. The column width depends on the current pitch (10, 12, or 15) and the current setting of the Horizontal Motion Index. If Backward Print is "ON," the Backspace movement will actually be forward.

### <CR> CARRIAGE RETURN

Sending this command causes the print position to move all the way to the Left Margin. The command terminates both Graphics Modes and Backward Printing.

This command also affects or is affected by the following commands:

| | |
|---|---|
| Auto Line Feed "ON" | May get a <LF> depending upon this setting. |
| Right Margin Setting | Reaching Right Margin generates a <CR>. |
| Underscoring "ON" | Terminated by <CR>. |

## <FF> FORM FEED

This command will cause the current print page to be ejected from the printer so that printing may begin on the next page. The print position will be at the Top and Left Margin of the new page. Issuing a Form Feed command will terminate Underscore Mode if it is "ON".

## <HT> HORIZONTAL TAB

This command will cause the print position to move to the first set tab stop to the right. If no tabs have been set, the print position will move to the right edge of the page. If tabs were set but none were set beyond the current print position, a tab command will cause the print position to move to the leftmost tab stop in addition to an automatic Line Feed.

## <VT> VERTICAL TAB

This command will cause the print position to move to the first set tab stop down the page. If no vertical tab stops have been set, the print position will move to the next top-of-form.

### <LF> LINE FEED

This command moves the print position down one Line Space. The actual distance of the Line Space is established by setting the Vertical Motion Index or the Alternate Vertical Motion Index. The Line Spacing will also be affected if Graphics Mode is "ON". Line Spacing will then be either 1/60 inch or 1/120 inch. If Underscore Mode is "ON", the Line Feed command will turn it "OFF".

### <SP> SPACE

Using the Space Command will move the print position one column width, usually, to the right. The width of the column will depend on the current pitch (10, 12, or 15), the Horizontal Motion Index or its Alternate command, the Right Margin setting and Graphics Mode "ON" (1/60 inch or 1/120 inch). If Backward Printing is "ON", a Space command will actually cause the print position to move one column width to the left.

## C.2 Formatting Commands

The Formatting Commands are used to define the parameters of printed material on a page. Be sure to consider the current paper size and page orientation when you establish these parameters.

- SET TOP MARGIN
- SET BOTTOM MARGIN
- SET LEFT MARGIN
- SET RIGHT MARGIN
- VERTICAL MOTION INDEX is used to establish the line spacing value.

- ALTERNATE VERTICAL MOTION INDEX provides an alternate method of establishing the line spacing value.
- HORIZONTAL MOTION INDEX is used to establish the character spacing.
- ALTERNATE HORIZONTAL MOTION INDEX provides an alternate method of establishing the character spacing value.
- SET HORIZONTAL TAB STOP
- TAB SET LIST allows you to set all horizontal tabs with one command.
- CLEAR INDIVIDUAL TAB STOP clears the tab at the current position.
- CLEAR ALL HORIZONTAL TAB STOPS

## <ESC>+ SET TOP MARGIN

Use this **<ESC>+ (plus sign)** command to set the Top Margin anywhere within the page length except below the Bottom Margin or the bottom edge of the page. Use Line Feed commands until the desired Top Margin is reached and then issue the Top Margin command. For example, the following sequence of commands would establish a top margin four lines from the top of the page:

**<LF><LF><LF><LF><ESC>+**

**The actual physical distance represented by a <LF> command depends on the Vertical Motion Index or the lines per inch selected in Group Q Option 3.** Once set, all subsequent pages will begin at this Top Margin until the value is changed. The default Top Margin is the Top-of-Form.

The Top Margin may also be set by using the keypad to configure Group 4 Options 9, A, B, and C.

## <ESC>- SET BOTTOM MARGIN

Use this **<ESC>- (minus sign)** command to set the Bottom Margin anywhere within the Form Length except above the Top Margin or below the bottom edge of the page. Send Line Feed commands until the desired line is reached and then issue the Set Bottom Margin command. **The actual physical distance represented by each <LF> command depends on the Vertical Motion Index or the lines per inch selected in Group Q Option 3.** This Bottom Margin will remain in effect for all subsequent pages until you change it or send a Reset/Restore command. The default is the bottom of the form as defined by the Form Length command or the last line on the page depending on your current paper size.

The Bottom Margin may also be set by using the keypad to configure Group 4 Options D, E, and F.

## <ESC>9 SET LEFT MARGIN

This command is used to set the Left Margin. Space over to the desired column using the required number of <SP> commands and issue the Set Left Margin command. For example, the following sequence of commands will establish the Left Margin at the fourth column from the left edge of the page:

**<SP><SP><SP><SP><ESC>9**

A subsequent Carriage Return will position you at the specified Left Margin. A Backspace, however, can be used to move outside the Left Margin if desired. **The actual physical distance represented by a <SP> command depends on the Horizontal Motion Index or by the character spacing selected in Group Q Options 1 and 2.**

If a second Left Margin is set, it will be relative to the first Left Margin setting, i.e., the second value is added to

the ASCII CONVERSION TABLE in Appendix B. The decimal value 97 represents the lowercase "a" character. This "a" can then be substituted for *n* in the Alternate Absolute Horizontal Tab command.

### <ESC>Pn$_1$n$_2$ ABSOLUTE VERTICAL TAB TO A LINE

This command slews or skips down a specified number of lines (from 00 to 127) in one movement. The values 0-127 are represented by two-digit ASCII values.

Values from 1-99 are represented as 1-99. For example, if you wish to skip down 85 Line Spaces, the command is <ESC>P85. Values from 100-127 are represented as follows:

| Left two digits | Right digit |
|---|---|
| A = 10<br>B = 11<br>C = 12<br>D = 13 | 0-9<br>For all (A - D) |

For example, a skip of 113 Line Spaces would require an <ESC>PB3. The maximum number of line skips (127) would require the command <ESC>PC7.

This command is affected by the Top Margin, Bottom Margin, Form Length, and Vertical Motion Index commands.

### <ESC><VT><n> ALTERNATE ABSOLUTE VERTICAL TAB

This is an alternate command to the one above. It allows you to skip down a specified number of lines using one two-digit ASCII value. Values may be from 0-125. De-

termine the number of lines to skip and then locate this number in the Decimal column of the ASCII Conversion Table in Appendix B at the back of this manual. Use the appropriate Hex, Decimal, etc., equivalent that is required by your system.

This command is affected by the same commands as the above.

**Examples:**

<ESC><VT><DC1> Tab down 17 lines.
<ESC><VT><US> Tab down 31 lines.

## <ESC><LF> NEGATIVE LINE FEED

A Negative Line Feed command will cause the print position to return to the previous line. The actual backward distance will depend on the setting of the Line Spacing value i.e., 1/48 - 159/48.

## <ESC>D NEGATIVE 1/2 LINE FEED

This command will cause the print position to go back 1/2 of the Line Spacing value as set in the Vertical Motion Index. If the value is an odd number, such as 9/48, the distance will be rounded down to the nearest 1/48 inch.

## <ESC>U POSITIVE 1/2 LINE FEED

The positive 1/2 Line Feed command will cause the print position to move forward 1/2 the Line Spacing value as determined by the setting of the Vertical Motion Index. Again, an odd number will be rounded down to the nearest 1/48 inch.

- ALTERNATE ABSOLUTE VERTICAL TAB provides an alternate method of moving down a specific number of lines.
- NEGATIVE LINE FEED moves the current position to the previous line without affecting the horizontal position.
- NEGATIVE HALF LINE FEED moves the current position halfway to the previous line without affecting the horizontal position.
- POSITIVE HALF LINE FEED moves the current position halfway to the next line.
- RELATIVE HORIZONTAL MOTION allows you to move the current position in any horizontal direction.
- RELATIVE VERTICAL MOTION allows you to move the current position in any vertical direction.
- AUTOMATIC LINE FEED "ON" causes the printer to execute a line feed whenever a carriage return (<CR>) is received.
- AUTOMATIC LINE FEED "OFF" disables the AUTOMATIC LINE FEED.
- BACKWARD PRINTING causes the printer to print from right to left.

### <ESC><BS> BACKSPACE 1/120"

This command causes a backward (usually) movement of 1/120 inch. If Backward Printing is "ON", the movement will actually be forward or to the right.

## <ESC>Cn$_1$n$_2$ ABSOLUTE HORIZONTAL TAB TO COLUMN

This command moves the print position to a specific column using a two-digit ASCII value to represent the column number. For columns 1-99, use 01-99. For columns 100-159, use the following to determine the ASCII value:

| **n$_1$(Left two digits)** | **n$_2$(Right digit)** |
|---|---|
| A = 10<br>B = 11<br>C = 12<br>D = 13<br>E = 14<br>F = 15 | 0-9<br>For all (A - F) |

## <ESC><HT>*n* ALTERNATE ABSOLUTE HORIZONTAL TAB

This command moves the print position to a specific column (within the first 125 columns) using a single ASCII value (*n*) to determine the movement.

To arrive at a value for *n* in the command above, use this formula:

$$n = x + 1$$

*x* = **Decimal value (from Appendix B) representing the column to which the print position will move.**

The range of valid values for *x* is 1 to 125.

For example, moving the print position to column 96 would require issuing this command: **<ESC><HT>a**. To arrive at "**a**" as a value for *n* in the command, you would add 1 to 96 (the column where the print position will move to) and then locate 97 in the "Decimal" column of

15 pitch = 198 tab stops or columns

Once set, tab stops are absolute and changing pitch without readjusting tab stop locations will cause undesired results. In other words, since pitch determines column width, a tab stop at column 10 would be located in three different places on the page depending on a pitch of 10, 12 or 15.

## <ESC>( TAB SET LIST

This command allows you to set all tabs with one command. Each column where a tab is desired is represented by a two-digit ASCII value. Up to 159 Tabs may be set. Values from 1-99 are represented as 01-99. Values from 100-159 are represented as follows:

| Left two digits | Right digit |
|---|---|
| A = 10<br>B = 11<br>C = 12<br>D = 13<br>E = 14<br>F = 15 | 0-9<br>For all |

Each two-digit ASCII value must be separated with a comma, and the command must be terminated with a period. The actual command syntax is:

**<ESC>($n_1$,$n_2$,...$n_{159}$.**

For example, <ESC>(05,25,B0. would establish tab stops at positions 5, 25, and 110. Since each ASCII value is unique, tabs may be set in any order.

### <ESC>) TAB CLEAR LIST

This command may be used to clear up to 159 tabs using one command. The format and rules are the same as for the Tab Set List, above.

### <ESC>8 CLEAR INDIVIDUAL TAB STOPS

This command will clear the Tab at the current print position. Remember, changing pitch will cause a Tab setting to "shift" location on the page.

### <ESC>2 CLEAR ALL HORIZONTAL TAB STOPS

This command will clear all Horizontal Tab stops without having to identify the particular column numbers. Both Reset/Restore commands and a power ON/OFF cycle will also clear all Tab stops.

## C.3 Print Position Commands

Use the following commands in order to locate printed material in the desired area anywhere on the page.

- BACKSPACE 1/120" moves the current position 1/120 inch in the opposite direction of printing.
- ABSOLUTE HORIZONTAL TAB TO COLUMN moves the current position to a specific column number.
- ALTERNATE ABSOLUTE HORIZONTAL TAB TO COLUMN provides an alternate method of moving to a specific column.
- ABSOLUTE VERTICAL TAB TO LINE moves the current position down a specific number of lines.

The most common settings of the VMI are:

4 lpi **<ESC><RS><CR>**
6 lpi **<ESC><RS><HT>**
8 lpi **<ESC><RS><BEL>**

## <ESC>En$_1$n$_2$ HORIZONTAL MOTION INDEX

This command (also known as HMI) sets the number of characters per inch (cpi) which the printer will print. Characters are spaced in increments of 1/120 inch. The valid range of values for the HMI is 1-159 (120 cpi - .75 cpi). In the command above, "$n_1$" represents the "tens" digit of the HMI values below 100. For HMI values above 100, $n_1$ will be a letter from the table below. For all HMI values, $n_2$ is always the units digit (0-9).

| HMI | $n_1$ | $n_2$ |
|---|---|---|
| 100-109 | A | 0-9 |
| 110-119 | B | 0-9 |
| 120-129 | C | 0-9 |
| 130-139 | D | 0-9 |
| 140-149 | E | 0-9 |
| 150-159 | F | 0-9 |

For example, 10 cpi means that there will be a character every 12/120 inch. Therefore, the command to establish character spacing of 10 cpi would be **<ESC>E12**. The command for 1 cpi (1 inch column width) would be **<ESC>EC0**.

Some common settings for HMI are:

<ESC>E08 15 cpi
<ESC>E09 13 cpi
<ESC>E10 12 cpi
<ESC>E11 11 cpi
<ESC>E12 10 cpi

Invalid parameters are ignored. Zero digits MUST be entered, i.e., both $n_1$ and $n_2$ must have values entered whether the HMI value is "9" (<ESC>E09) or "120" (<ESC>EC0).

Character spacing of 10 cpi, 12 cpi, or 15 cpi may also be set by using the keypad to configure Group Q Options 1 and 2.

## <ESC><US><n> ALTERNATE HMI

This command is an alternate method of establishing Character Spacing. Use the following formula to arrive at a value for HMI (**cpi** in the command refers to the desired characters per inch):

$$\mathbf{HMI = (120 \div cpi) + 1}$$

Enter the value for HMI as a Hex, Decimal, or Octal value in place of "n" in the command above. For example, to establish character spacing of 10 cpi, the HMI value would be 13 (HMI=120÷10+1) and the command would be **<ESC><US> <CR>** (<CR> is the ASCII character equivalent to decimal 13).

The most common settings of the HMI are:

| | |
|---|---|
| 15 cpi | **<ESC><US><HT>** |
| 13 cpi | **<ESC><US><LF>** |
| 12 cpi | **<ESC><US><VT>** |
| 11 cpi | **<ESC><US><FF>** |
| 10 cpi | **<ESC><US><CR>** |
| 5 cpi | **<ESC><US><EM>** |

## <ESC>1 SET HORIZONTAL TAB STOP

This command may be used to set individual tab stops by issuing the required number of Space commands to the position of the desired tab stop and then issuing the tab command. The number of tab stops on a physical page will depend upon the current pitch as follows:

10 pitch = 132 tab stops or columns
12 pitch = 154 tab stops or columns

first value. A Reset/Restore command will return the Left Margin setting to column 0.

The Left Margin may also be set by using the keypad to configure Group 4 Options 1, 2, 3, and 4.

## <ESC>0 SET RIGHT MARGIN

The Right Margin setting is measured from the left edge of the page. Issue the required number of <SP> commands to reach the desired Right Margin and issue the <ESC>0 command. **The physical distance represented by each <SP> command depends on the Horizontal Motion Index or the character spacing selected in Group Q Options 1 and 2.** For example, if the Horizontal Motion Index is set for 10 characters per inch and the page orientation is portrait, issuing 80 <SP> commands and the <ESC>O command would set a Right Margin of one-half inch.

The default Right Margin is the right-most print column of the page depending on the current paper size.

The Right Margin may also be set by using the keypad to configure Group 4 Options 5, 6, 7, and 8.

## <ESC>L$n_1$$n_2$ VERTICAL MOTION INDEX

This command (also known as VMI) sets the number of lines per inch (lpi) which the printer will print. Lines are spaced in increments of 1/48 inch. The valid range of values for the VMI is 1-159 (48 lpi - .3 lpi). In the command above, "$n_1$" represents the "tens" digit of the VMI values below 100. For VMI values above 100, $n_1$ will be a letter from the table below. For all VMI values, $n_2$ is always the units digit (0-9).

| VMI | $n_1$ | $n_2$ |
|---|---|---|
| 100-109 | A | 0-9 |
| 110-119 | B | 0-9 |
| 120-129 | C | 0-9 |
| 130-139 | D | 0-9 |
| 140-149 | E | 0-9 |
| 150-159 | F | 0-9 |

For example, 4 lpi means that there will be a line of text every 1/4 inch or, in other words, every 12/48 inch. Therefore, the command to establish a line spacing of 4 lpi would be **<ESC>L12**. The command to establish line spacing of 1 line every 3 inches (144/48 inch or .33 lpi) would be **<ESC>LE4**.

Some common settings for VMI are <ESC>L12 (4 LPI), <ESC>L08 (6 LPI), and <ESC>L06 (8 LPI). Vertical line spacing of 6 LPI or 8 LPI may also be set by using the keypad to configure Group Q Option 3.

Invalid parameters are ignored. Zero digits MUST be entered, i.e., both $n_1$ and $n_2$ must have values entered whether the number is "6" (<ESC>L06) or "130" (<ESC>LD0).

## <ESC><RS><n> ALTERNATE VMI

This command is an alternate method of establishing Line Spacing. Use the formula below to find a value for VMI (**lpi** refers to the desired lines per inch):

$$\mathbf{VMI = (48 \div lpi) + 1}$$

Enter the VMI value as a Hex, Decimal, or Octal value (depending on your system) for "n" in the command above. For example, if you wish to establish a line spacing of 4 lpi, the VMI value would be 13 (48÷4+1) and the command would be **<ESC><RS><CR>** (<CR> is the ASCII character equivalent to decimal 13).

## <ESC>Hn$_1$n$_2$n$_3$ RELATIVE HORIZONTAL MOTION

This command allows the print position to be moved 1/120 inch to 1584/120 inch, either left or right, of the current position. The values in $n_1$, $n_2$ and $n_3$ indicate how far and in which direction the print position is to be moved. Determine how many 1/120th inches you wish to move and if the move is to be left or right of the current position.

Use Table 11.1 to find the values for **$n_1$**, **$n_2$**, and **$n_3$** the following example.

To move 3 inches to the right = 360/120 inch

Take the highest value from the "1st Character" chart (below) that can be subtracted from 360 for the "$n_1$" value. (360-256 = 104, 256 = A because movement is to the right, $n_1$ = A)

Take the the highest value in the "2nd Character" chart that can be subtracted from the above remainder. (104-96 = 8, 96 = F = $n_2$)

Take the the highest value in the "3rd Character" chart that can be subtracted from the above remainder. (8-8 = 0, 8 = H = $n_3$)

Therefore, the command to move 3 inches to the right would be <ESC>HAFH. Values must be given for $n_1$, $n_2$ and $n_3$ even if the second and third values are zeroes.

| $n_1$ | | |
|---|---|---|
| DISTANCE | RIGHT/BELOW | LEFT/ABOVE |
| 0 | @ | P |
| 256 | A | Q |
| 512 | B | R |
| 768 | C | S |
| 1024 | D | T |
| 1280 | E | U |
| 1536 | F | V |

| $n_2$ | |
|---|---|
| DISTANCE | |
| 0 | @ |
| 16 | A |
| 31 | B |
| 48 | C |
| 64 | D |
| 80 | E |
| 96 | F |
| 112 | G |
| 128 | H |
| 144 | I |
| 160 | J |
| 176 | K |
| 192 | L |
| 208 | M |
| 224 | N |
| 240 | O |

| $n_3$ | |
|---|---|
| DISTANCE | |
| 0 | @ |
| 1 | A |
| 2 | B |
| 3 | C |
| 4 | D |
| 5 | D |
| 6 | F |
| 7 | G |
| 8 | H |
| 9 | I |
| 10 | J |
| 11 | K |
| 12 | L |
| 13 | M |
| 14 | N |
| 15 | O |

**Table 11.1. Values for Relative Horizontal Motion Command**

## <ESC>Vn$_1$n$_2$n$_3$ RELATIVE VERTICAL MOTION

This command allows the print position to be moved 1/48 inch to 1791/48 inch, either above or below, the current position. The values in $n_1$, $n_2$ and $n_3$ indicate how far and in which direction the print position is to be moved. Determine how many 1/48th inches you wish to move and if the move is to be above or below the current position.

Determine the values for $n_1$, $n_2$ and $n_3$ in the same manner as for "Relative Horizontal Motion" using the three charts on the previous page.

## <ESC>, AUTOMATIC LINE FEED "ON"

This command is used if you want an Automatic Line Feed whenever a Carriage Return is executed. This function may also be set by using the keypad to configure Group Q Option 4.

## <ESC>. AUTOMATIC LINE FEED "OFF"

This command turns the Automatic Line Feed Mode "OFF". The default for this feature is "OFF". This command does not affect the setting of Group Q Option 4.

## <ESC>6 BACKWARD PRINTING

This command reverses the normal print position movement of left-to-right to right-to-left. It also causes the Backspace command to be reversed. Horizontal Tab commands are not affected.

## <ESC>5 BACKWARD PRINTING "OFF"

This command causes Backward Printing Mode to be terminated. A Carriage Return command will also return printing to forward motion.

### <ESC>W AUTO CARRIAGE RETURN/LINE FEED ON

This command causes an automatic carriage return and line feed whenever printing reaches the right margin. This movement is ignored when the printer is in Graphics Mode. The Auto Carriage/Line Feed may also be set by using the keypad to configure Group Q Option 5.

### <ESC>Z AUTO CARRIAGE RETURN/LINE FEED OFF

This command turns off the automatic carriage return and line feed (<ESC>W). The setting of Group Q Option 5 will not be affected by this command.

## C.4 Print Quality Commands

The commands explained in this section cause the quality or characteristics of printing to be altered.

- WPS "ON" implements proportional character spacing.
- WPS "OFF" disables proportional character spacing.
- UNDERSCORE MODE "ON"
- UNDERSCORE MODE "OFF"
- BOLD OVERPRINT "ON"
- BOLD OVERPRINT "OFF"
- SHADOW PRINT "ON"
- SHADOW PRINT "OFF"

- NO ESCAPEMENT/PRINT POSITION MOVE allows two different characters to be printed in the same position.

### <ESC>$ WPS "ON"

This command implements Proportional Character Spacing. That means that each character is assigned a print space (in 1/120th inch increments) according to the width of the character. Wide characters such as "w" or "m" are allotted more space than narrow characters such as "l" or "i." Proportional spacing may also be enabled by using the keypad to configure Group Q Options 1 and 2.

### <ESC>% WPS "OFF"

This command terminates WPS Mode. Positioning returns to fixed character spacing. The settings of Group Q Options 1 and 2 are not affected by this command.

**Examples:**

```
Proportional spacing takes effect
after the <ESC>$.  Proportionally
spaced characters are closer together
than fixed spaced characters. This may
or may not be the appearance you
desire.


The proportional spacing has been
turned off for this sentence.
```

## <ESC>I UNDERSCORE MODE "ON"

This command will cause Underscoring of characters, words, phrases, sentences or whole paragraphs beginning at the point where this command is received. Underscore Mode continues for subsequent lines until it is terminated by the Underscore Mode "OFF" command described next. Spaces which have been Tabbed over will be Underscored.

## <ESC>J UNDERSCORE MODE "OFF"

This command causes the Underscore Mode to be turned "OFF".

## <ESC>Kn BOLD OVERPRINT "ON"

The Bold Overprint command will cause each character that follows to be printed a second time after a 1 dot move Vertically. The Qume values from 1 to 4 (n) for this parameter will actually only cause each character to be printed twice. The character will appear to be darker or bolder. Bold Overprint will continue until it is turned "OFF" using the command below.

## <ESC>M BOLD OVERPRINT "OFF"

This command turns Bold Overprint "OFF".

## <ESC>Q SHADOW PRINT "ON"

Shadow Printing causes each character to be printed twice, with the second printing being moved 1 dot Horizontally to the right of the first printing. If WPS Mode is "ON", Shadow Print will also be Proportionally Spaced. Shadow Print will cause a line of text to be slightly longer than the same line printed with Shadow Print "OFF". If WPS Mode

is "OFF", character widths are slightly reduced to maintain column widths for Tabbing. Bold Overprint Mode may be used with this command to achieve both a Vertical and Horizontal emboldening of the characters.

### <ESC>R SHADOW PRINT "OFF"

Shadow Print is terminated by this command.

**Examples:**

The example below was generated by the following output:

```
<ESC>IQume Emulation allows you to
underline,<ESC>J <ESC>Klembolden,
<ESC>Mor print in<ESC>Q"shadow
print."<ESC>R
```

```
Qume Emulation allows you to
underline, embolden,
or print in"shadow
print."
```

### <ESC>N NO ESCAPEMENT/PRINT POSITION MOVE

This command may be used to print two different characters in the same print position. The command actually causes the print position to remain stationary after printing the character immediately following the command so that a second character may be over-printed on the first. Zeroes with slashes and special symbols may be printed in this manner. This command is affected by Graphics

Mode "ON" and "OFF" commands.

**Example:**

```
The example below was generated by the
following output:

El Ni<ESC>Nn~o     2<ESCN0/<ESC>N0/
```

## C.5 Special Printer Features

The ESCape sequence commands in this section allow access to special printer features such as Graphics Mode and Printer Reset Commands.

- TOTAL RESET/RESTORE causes the printer to return to ALL default conditions.
- ALTERNATE TOTAL RESET/RESTORE provides an alternate method of returning the printer to its default conditions.
- NO PRINT "ON" allows commands to be entered but not printed.
- NO PRINT "OFF" causes printing to resume.
- PRINTWHEEL POSITION 002 (and) 004 allows you

to access two special character codes which cannot normally be printed.

- GRAPHICS "ON" 1/60" cause the Space and Backspace commands to move the current position 1/60 inch.
- GRAPHICS "ON" 1/120" causes the Space and Backspace commands to move the current position 1/120 inch.
- GRAPHICS "OFF" disables the above two commands.

### <ESC><SUB>I TOTAL RESET/RESTORE

Using this command will cause the printer to be returned to ALL the default conditions. It has the same results as turning the printer "OFF" and then back "ON" except that no data is lost by using the Reset command. Subsequent printing will begin on the next page.

### <ESC><CR>P ALTERNATE TOTAL RESET/RESTORE

This command may be used as an alternate to the above command. The results are the same. ALL the default conditions are reset.

### <ESC>S NO PRINT "ON"

This command allows words, such as passwords, to be entered but not printed (masked).

### <ESC>T NO PRINT "OFF"

This command turns No Print "OFF".

**Example:**

```
The example below was generated by the
following output:

<ESC>SThis will not print.<ESC>TThis will.

                    This will.
```

## <ESC>/ PRINTWHEEL POSITION 002

The ASCII Character Code provides a unique code for 94 of the 96 characters (21-7E Hex) on the print wheel. Issuing this command allows you to access the character defined by Hex 20 in the current font you are using. (This corresponds to position 002 on a print wheel.) This character may not always be the same character in all fonts.

## <ESC><SP> PRINTWHEEL POSITION 004

The ASCII Character Code provides a unique code for 94 of the 96 characters (21-7E Hex) on the print wheel. Issuing this command allows you to access the character defined by Hex 7F in the current font you are using. (This corresponds to position 004 on a print wheel.) This character may not always be the same character in all fonts.

## <ESC>3 GRAPHICS "ON" - 1/60"

Graphics Mode commands affect print position movement or spacing. When this Graphics command is used, the Space and Backspace commands move the print position 1/60 inch. Line Feed and Negative Line Feed commands cause the print position to move 1/48 inch and the Automatic Line Feed command is ignored altogether. Any Character Printing command will cause no change in print position after the character is printed.

The Graphics Mode may be terminated by any of the following:

Graphics Mode "OFF"
Carriage Return
Either Reset/Restore Command
Power the printer OFF/ON

## <ESC>G GRAPHICS "ON" – 1/120"

Like the Graphics command above, this command affects the movement and spacing of the print position. The only difference between the two commands is that this command causes the Space and Backspace commands to move the print position 1/120 inch. All other conditions are the same as indicated above.

## <ESC>4 GRAPHICS "OFF"

This command may be used to terminate both of the above Graphics Mode "ON" commands.

Appendix H

# HP LaserJet PLUS Emulation Mode

## *Introduction*

This appendix covers the commands supported by the QMS printer whenever it is in HP LaserJet PLUS Emulation Mode.

If you are using a word processor, you do not need to read this section. Once your word processor is correctly installed and is configured to work with a printer that emulates a LaserJet PLUS printer, you may use your **word processor commands** to edit and send your files to the QMS printer.

The explanations of the supported LaserJet commands are given for those of you who may be writing computer programs and must actually use these commands.

In addition to the commands explained in this section, there are Printer Software Commands that are also honored when in LaserJet PLUS Emulation Mode. With these software commands you may change fonts, change emulation modes, change page orientation, change paper source, change the copy count, access the Extended Printer Control or redefine the command or font translation tables. The software commands are a special feature of the QMS printer and are very useful. These commands are explained in Part IV of this manual.

# A Page Processing

Unlike conventional impact printers, your QMS laser printer processes an entire page of text and/or graphics before feeding a sheet of paper through the machine and printing the accumulated image. During LaserJet emulation, the following conditions will cause the current page to be fed from the current paper source, printed and ejected into the output tray:

1. You send the printer a form feed command;
2. The current print position advances off the end of the page;
3. You send the printer a **Reset Printer** command;
4. You send the printer an **Orientation**, **Page Length**, **Page Source** command.
5. You manually eject the current page by pressing the FORM FEED key; or
6. The complexity of the current page causes your printer's memory capacity to be exceeded.

Conditions (3) and (4) do **not** print pages on which nothing has been printed and no vertical moves have occurred.

## A.1 Memory Utilization

Your printer divides memory into a 180K-byte **download area** for storing macros and downloaded fonts, and a 256K-byte **page description memory** for buffering page images (text and graphics).

The printer can hold up to 64 fonts (including resident fonts) depending on the space available in memory. The

available number of bytes are shown on the status summary sheet. Each macro counts as one font.

**NOTE:** The LaserJet Plus printer has 395K-bytes of memory available for downloading fonts and buffering page images. It also limits the number fonts used per page to sixteen.

# *B Printer Control Language*

The HP LaserJet printer command set is based on Hewlett-Packard's Printer Control Language (PCL), common to a wide variety of printers manufactured by HP and others. In LaserJet emulation mode, your QMS printer meets the requirements of Level IV PCL (Page Formatting) printers, which provide the highest performance available under the language. The LaserJet command set is in fact a superset of Level IV PCL, because of non-PCL features such as portrait/landscape orientation, multiple copy control and paper source control.

PCL includes commands of two types:

- **Control characters**, which are single-character commands with ASCII values of 32 or less. Examples include the **Shift In** (**SI**) and **Shift Out** (**SO**) commands used to switch between primary and secondary fonts, respectively.[1]

- **Escape sequences**, which are multiple-character commands beginning with an **<ESC>** character (ASCII 27). Most LaserJet commands fall into this category.

A control character sent in the middle of an escape sequence causes the latter to be discarded, and the control character is executed. Similarly, an **<ESC>** character causes a partial escape sequence to be discarded, and a new sequence is started.

[1]The space character (ASCII 32) is treated as a control character, so it does not have to be included in each font's character set.

The following conventions are used when describing printer commands:

1. The values given for ASCII codes are in decimal notation. For example, the "line feed" character is ASCII 10. A complete ASCII table is provided in Appendix B.

2. Numeric values (parameters) needed by printer commands are designated $n_1$, $n_2$, etc. You substitute the value you want for each of the parameters shown. For example, the command **<ESC>&l$n_1$P** sets the page length, and you would send **<ESC>&l66P** to set the page length to 66 lines.

3. Non-printing ASCII codes, used in some printer commands, are shown in angular brackets. For example, **<ESC>** represents the ASCII "escape" code (27).

4. Text parameters which you must provide are also printed in angular brackets. For example, **<filename>** means "enter the name of the file you want to use".

   Brackets must **never** be typed around the values you provide. They simply indicate that some sort of substitution or decision is required on your part.

The remainder of this manual describes the commands in detail. Examples are provided in the text and a summary of all commands begins on the next page.

## B.1 Supported PCL Commands

**Page Layout Commands**

| | |
|---|---|
| <ESC>&l$n_1$O | Page Orientation |
| <ESC>&l$n_1$P | Page Length |
| <ESC>&l$n_1$E | Top Margin |
| <ESC>&l$n_1$F | Text Length |
| <ESC>&l$n_1$L | Perforation Skip Mode |
| <ESC>&a$n_1$L | Left Margin |
| <ESC>&a$n_1$M | Right Margin |
| <ESC>9 | Clear Side Margins |

**Print Spacing Commands**

| | |
|---|---|
| <ESC>&l$n_1$D | Set Lines/Inch |
| <ESC>&l$n_1$C | Set VMI |
| <ESC>&k$n_1$M | Set HMI |

**Print Position Commands**

| | |
|---|---|
| <SP> | Space |
| <BS> | Backspace |
| <CR> | Carriage Return |
| <LF> | Line Feed |
| <FF> | Form Feed |
| <ESC>&a$n_1$R | Vertical Position (lines) |
| <ESC>&a$n_1$V | Vertical Position (decipoints) |
| <ESC>*p$n_1$Y | Vertical Position (dots) |
| <ESC>= | Half Line Feed |
| <ESC>&a$n_1$C | Horizontal Position (columns) |
| <ESC>&a$n_1$H | Horizontal Position (decipoints) |
| <ESC>*p$n_1$X | Horizontal Position (dots) |
| <ESC>&f$n_1$S | Push/Pop Position |

**Font Definition Commands**

| | |
|---|---|
| <ESC>(8U | Select Char. Set (primary) |
| <ESC>)8U | Select Char. Set (secondary) |
| <ESC>(s$n_1$P | Proportional Spacing (primary) |
| <ESC>)s$n_1$P | Proportional Spacing (secondary) |
| <ESC>(s$n_1$H | Print Pitch (primary) |
| <ESC>)s$n_1$H | Print Pitch (secondary) |
| <ESC>&k$n_1$S | Compressed Print |
| <ESC>(s$n_1$V | Character Size (primary) |
| <ESC>)s$n_1$V | Character Size (secondary) |
| <ESC>(s$n_1$S | Character Style (primary) |
| <ESC>)s$n_1$S | Character Style (secondary) |
| <ESC>(s$n_1$B | Character Weight (primary) |
| <ESC>)s$n_1$B | Character Weight (secondary) |
| <ESC>(s$n_1$T | Typeface (primary) |
| <ESC>)s$n_1$T | Typeface (secondary) |

**Font Switching Commands**

| | |
|---|---|
| <ESC>$n_1$ | Switch Primary/Secondary Fonts |
| <ESC>*c$n_1$D | Font ID |
| <ESC>*($n_1$X | Select Primary Font ID |
| <ESC>*)$n_1$X | Select Secondary Font ID |
| <ESC>*4F | Font Temporary |
| <ESC>*5F | Font Permanent |
| <ESC>*6F | Copy/Assign Font |
| <ESC>($n_1$@ | Font Defaults (primary) |
| <ESC>)$n_1$@ | Font Defaults (secondary) |
| <ESC>*c0F | Delete All Fonts |
| <ESC>*c1F | Delete Temporary Fonts |
| <ESC>*c2F | Delete Current Font |
| <ESC>)s$n_1$W$n_2$ | Font Header |
| <ESC>*$n_1$E | Character Code |
| <ESC>(s$n_1$W$n_2$ | Download Character |
| <ESC>*c3F | Delete Character Code |

**Raster Graphics Commands**

| | |
|---|---|
| <ESC>*$tn_1$R | Graphics Resolution |
| <ESC>*$rn_1$A | Start Raster Graphics |
| <ESC>*$bn_1Wn_2$ | Transfer Raster Graphics |
| <ESC>*rB | End Raster Graphics |

**Rule and Pattern Commands**

| | |
|---|---|
| <ESC>*$cn_1$B | Pattern Height (dots) |
| <ESC>*$cn_1$A | Pattern Width (dots) |
| <ESC>*$cn_1$V | Pattern Height (decipoints) |
| <ESC>*$cn_1$H | Pattern Width (decipoints) |
| <ESC>*$cn_1$G | Select Pattern |
| <ESC>*$cn_1$P | Print Pattern |

**Macro Commands**

| | |
|---|---|
| <ESC>&$fn_1$Y | Macro ID |
| <ESC>&f0X | Define Macro |
| <ESC>&f1X | End Macro |
| <ESC>&f2X | Execute Macro |
| <ESC>&f3X | Call Macro |
| <ESC>&f4X | Enable Overlay |
| <ESC>&f5X | Disable Overlay |
| <ESC>&f6X | Delete All Macros |
| <ESC>&f7X | Delete Temporary Macros |
| <ESC>&f8X | Delete Current Macro |
| <ESC>&f9X | Macro Temporary |
| <ESC>&f10X | Macro Permanent |

**Paper Handling Commands**

| | |
|---|---|
| <ESC>&$ln_1$X | Select Number of Copies |
| <ESC>&$ln_1$H | Paper Source |
| <ESC>&$ln_1$T | Job Offset |

**Miscellaneous Commands**

| | |
|---|---|
| <ESC>&d$n_1$ | Automatic Underlining |
| <ESC>Y | Enable Display Mode |
| <ESC>Z | Disable Display Mode |
| <ESC>&p$n_1$X$n_2$ | Transparent Print Data |
| <ESC>&k$n_1$G | Line Termination |
| <ESC>&s$n_1$C | End-of-Line Wrap |
| <ESC>E | Reset Printer |
| <ESC>z | Printer Self-Test |

# *C Escape Sequence Syntax*

All escape sequence commands observe the following structure:

**<ESC><cc>[<gc>][$n_1$<$c_1$>] [...$n_x$<$c_x$>][<data>]**

with the component parts described below. Parts enclosed in square brackets ( [ and ] ) do not occur in all commands.

If the **command code** character **<cc>** falls between **0** and **~** in the ASCII table (usually an alphanumeric character), the command is a two-character sequence comprising the initial **<ESC>** character and the code **<cc>**. An example is the **<ESC>E** command for **Reset Printer**.

If the command code character **<cc>** falls between **!** and **** in the ASCII table (a non-alphanumeric character), the command takes additional **parameters**, which means that one or more of the remaining command parts must be included.

In commands that take parameters, the **group code** character **<gc>** indicates the command group or the type of printer control being performed. For example, page layout commands have a group code of **l**.

Parameter **$n_1$** is a numeric value needed by the command. Valid symbols in **$n_1$** include:

1. An optional leading + or - sign;

2. An integer part comprising one or more digits **0** through **9**;

3. An optional decimal point; and

4. An optional fractional part of one or more digits after the decimal point.

If parameter $n_1$ is omitted, the value defaults to zero.

Most parameters are absolute values, but in some cases a + or - prefix can be used to specify a relative value (see for example the **Horizontal Position** later in this appendix). If a command only accepts absolute values, a + or - sign is ignored.

Terminating character $c_1$ specifies which formatting variable the preceding parameter applies to. If <$c_1$> is an uppercase letter, this also terminates the escape sequence. If <$c_1$> is a lowercase letter, this indicates that more parameter-terminator pairs (<$n_x$><$c_x$>) follow which fall under the same command group (see **Command Compression Techniques**).

The optional **<data>** part is needed with those commands which involve sending binary data to the printer, such as a raster graphic image. In these cases, parameter $n_1$ indicates the number of bytes of data appended to the command in **<data>**.[2]

All commands continue in effect until cancelled by a subsequent command which affects the same printing variables.

Commands which are invalid, either because they are not supported by your printer or because they contain syntactical errors, are ignored.

---

[2]If a large amount of data is sent to the printer in error, there may be no way to flush it from the printer's memory except to turn the printer off and on again.

**NOTE:** Take care to avoid confusing lowercase "ell" (**l**) with the numeral one (**1**), or uppercase "oh" (**O**) with the numeral zero (**0**).

## C.1 Dimensional Units

Horizontal and vertical dimensions in command parameters must be provided in one of the following dimensional units:

| Unit | Definition |
|---|---|
| Column | Width of space character of current font |
| Line | Height of one line at current spacing |
| Point | Basic printing industry unit (1/72-inch) |
| Decipoint | Tenths of a point (1/720-inch) |
| Dot | Basic resolution of printer (1/300-inch) |
| HMI | Horizontal motion increment (1/120-inch) |
| VMI | Vertical motion increment (1/48-inch) |

Where a choice of units is available for specifying a printer function, separate commands are provided for each unit. For example, **<ESC>&a$n_1$C**, **<ESC>&a$n_1$H** and **<ESC>&a$n_1$X** set the horizontal print position in columns, decipoints and dots, respectively.

Some commands accept dimensions in fractional units such as **14.4** points.

## C.2 Command Compression Techniques

In order to minimize the number of characters which must be sent to the printer to accomplish desired functions, printer commands may be compressed according to the rules below.

If an escape sequence with parameters is followed by one or more additional sequences falling under the same command group, you only need to send the parameter value and terminating character for escape sequences after the first. All terminating characters must be lowercase, except for the last one which must be uppercase to indicate the end of the combined escape sequence. For example, the sequence **<ESC>&l10e70F** is equivalent to **<ESC>&l10E<ESC>&l70F**. Combined commands of this form can be sent to the printer whenever two successive commands have the same command code and group code (see previous section). There is no practical limit to the number of commands which can be combined in this fashion.

An invalid command in a compressed group of escape sequences is discarded by the printer, but the remaining escape sequences are executed normally.

Leading zeros in parameter values can be discarded. This includes omitting a parameter completely if its value is zero.

# D Page Layout

Setting the basic layout parameters for each page involves manipulation of the following printer parameters:

Page orientation
Left margin
Right margin
Page length
Top margin
Text length
Perforation skip mode

These parameters are defined in Figure H.1.

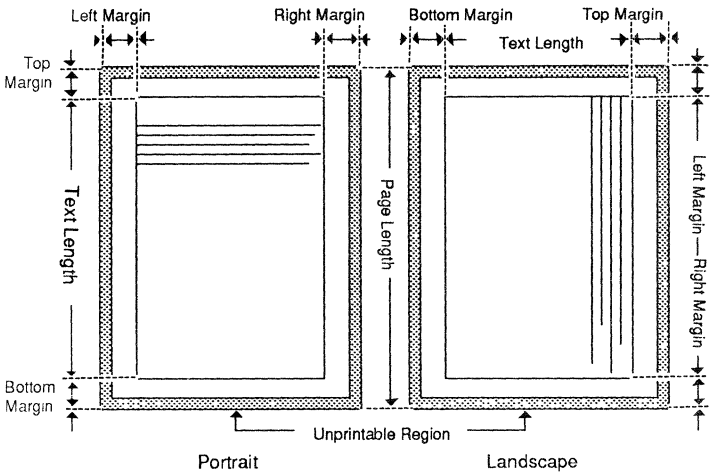



**Figure H.1 Definition of Page Layout Parameters**

The bottom margin is also known as the perforation skip zone.

**NOTE:** There is an unprintable region approximately 0.25-inch wide around the outside edge of each page. Any part of a text character or graphic image falling into this area will be discarded. The unprintable region affects the top

and bottom two lines on the page, in both portrait and landscape orientation, except that landscape mode printing at 8 lines/inch affects the first **three** lines on the page.

The addressable and printable areas on each page are listed in a table in Appendix I.

The following defaults apply to the page layout parameters:

| Parameter | Default Value |
|---|---|
| Orientation | Portrait |
| Line spacing | 6 lines/inch |
| Top margin | 0.5 inches |
| Bottom margin | 0.5 inches |
| Perforation skip mode | On |

With letter size paper, the text length therefore defaults to:

| Orientation | Text Length |
|---|---|
| Portrait | 6 × (11 - (2 × 0.5)) = 60 lines |
| Landscape | 6 × (8.5 - (2 × 0.5)) = 45 lines |

## D.1 Page Layout Commands

When multiple page layout commands are to be executed, they should be sent to the printer in the order presented here, to avoid interactions between commands. For example, page orientation should be set before text length, otherwise a later **Orientation** command will restore the default text length.

## <ESC>&l$n_1$O Orientation

This command prints the current page (if any), then selects the orientation for printing on subsequent pages, depending on the value of parameter $n_1$:

| | |
|---|---|
| **<ESC>&l0O** | Portrait |
| **<ESC>&l1O** | Landscape |

This command defaults the following parameters: top margin, text length, left and right margins, horizontal spacing and vertical spacing.

The **Orientation** command has important implications in font definition, because the current font orientation must match the page orientation.

Your QMS printer rotates landscape printing in the opposite direction to HP LaserJet printers. That is, QMS landscape printing is rotated 180 degrees with respect to HP LaserJet landscape printing. Note, however, that fonts are rotated 180 degrees in printer software, so this change is essentially transparent.[3]

## <ESC>&l$n_1$P Page Length

This command prints the current page (if any), then specifies the length of each page from the current paper source. Parameter $n_1$ is the page length in lines, based on the current line spacing. For example, the command **<ESC>&l84P** would specify legal-size paper at a current line spacing of 6 lines/inch (14 inches times 6 lines/inch).

The page length is always specified as the physical length of the sheet, regardless of whether you are using portrait or landscape orientation. Changes to page orientation should be made **after** specifying the page length.

---

[3]**Envelopes must be loaded differently in the manual feed tray (see "Paper Handling Commands" later in this section).**

**Recommended Page Lengths:**

| Page Size | Portrait Lines/Inch 6 | 8 | Landscape Lines/Inch 6 | 8 |
|---|---|---|---|---|
| Letter | 66 | 88 | 51 | 68 |
| Legal | 84 | 112 | 51 | 68 |
| A4 | 70 | 93 | 49 | 66 |
| B5 | 60 | 80 | 43 | 57 |

The default page length is the length of the paper tray installed in the printer, or regular letter size (11 inches) if no tray is installed. Specifying a page length of zero also defaults to the installed paper tray. In manual feed mode, specifying a page length of zero will default to the tray size set before entering the manual feed mode.

## <ESC>&ln$_1$E Top Margin

This command sets the top margin, where $n_1$ is the number of lines to skip at the top of each page. For example:

| Top Margin | Escape Sequence |
|---|---|
| 3 lines | <ESC>&l3E |
| 6 lines | <ESC>&l6E |

The minimum top margin is zero lines, but values of two or less may cause printing to be lost in the unprintable area at the top of each page. The maximum top margin is the current page length.

The top margin height is determined by the current line spacing, and is not affected by subsequent changes to the line spacing.

If the current print position is below the new top margin, the command has no effect until the following page, unless you move the print position up to the top margin with the **Vertical Position** command **<ESC>&a0R.**

Use of this command causes the text length to be defaulted to the value given by:

(page length) - (top margin) - (0.5" bottom margin)

The top margin command is ignored if the current vertical motion index is zero or if the specified top margin is beyond the current page length.

## <ESC>&l$n_1$F Text Length

This command sets the text length in lines, measured from the top margin, via parameter $n_1$. For example:

| Text Length | Escape Sequence |
|---|---|
| 60 lines | <ESC>&l60F |
| 55 lines | <ESC>&l55F |

The command is ignored if the text length plus the top margin exceeds the current page length.

If a text length of zero lines is specified, the text length defaults to the value given by:

(page length) - (top margin) - (0.5" bottom margin)

Note that there is no command which explicitly sets the bottom margin. Instead the bottom margin is the space left on the page after subtracting the current top margin and text length. That is:

(bottom margin) = (page length) - (top margin) - (text length)

## <ESC>&l$n_1$L Perforation Skip Mode

This command controls automatic skipping over the bottom margin of each page. The feature is enabled by the command <ESC>&l1L and disabled by <ESC>&l0L.

If perforation skip is ON, the current page is printed whenever a vertical move command causes the current print position to enter the bottom margin area. This is the default condition.

If the feature is **OFF**, printing is permitted in the bottom margin area. Note that attempting to print in the unprintable region at the very bottom of a page will result in characters being lost.

### <ESC>&a$n_1$L Left Margin

### <ESC>&a$n_1$M Right Margin

These commands set the left and right margins, respectively, for printing text. The margin is set to the column number specified in parameter $n_1$, with the first column in a line being column zero, not one. For example:

| Command | Action |
|---|---|
| **<ESC>&a12L** | Set left margin to column 12 |
| **<ESC>&a72M** | Set right margin to column 72 |

The width of each column depends on the current font pitch. If the current font is proportionally spaced, the column width is set to the default for the font.[4] Normally you would select a font and set the horizontal spacing before setting the margins.

The left margin is set to the **left** edge of the specified column; the right margin to the **right** side.

Attempts to set the left margin to the right of the right margin, or vice-versa, default to the margin setting exceeded.

The alignment of the printer affects the page margins. Refer to Part III, *Printer Setup*, for information on adjusting the horizontal and vertical alignment through the Group 8 Options.

---

[4]The default column width for a proportionally spaced font defines the distance moved in response to "space" (ASCII 32) and "backspace" (ASCII 8) commands. The default can be overridden by the 'Set HMI' command. Switching fonts invokes the default for the new font.

### <ESC>9 Clear Side Margins

This command sets the left and right margins to the defaults listed previously. The current print position is not affected.

# *E Print Position*

## E.1 Print Spacing Commands

Vertical line spacing can be specified in either lines per inch or vertical motion index (VMI). The first method is easier to calculate, but the second method permits the fine control of line spacing needed in typesetting applications. Regardless of which method is used, the vertical line spacing affects the following actions:

Line feed
Half line feed

including line feeds introduced by the current **Line Termination** mode.

The default horizontal spacing for the current font can be over-ridden by changing the horizontal motion index or HMI (see **Horizontal Spacing**).

### <ESC>&l$n_1$D Set Lines/Inch

This command sets the vertical spacing in lines per inch, where $n_1$ is the desired value. The command is ignored unless this value is one of those supported by the printer:

1, 2, 3, 4, 6, 8, 12, 16, 24 or 48.

For example:

| Line Spacing | Escape Sequence |
|---|---|
| 6 lines/inch | <ESC>&l6D |
| 8 lines/inch | <ESC>&l8D |

### <ESC>&l$n_1$C Set VMI

This command is identical to the previous one, except that the line spacing is specified in units of 1/48-inch. Parameter $n_1$ is the desired value, in the range **0** through **126**. You can specify up to four decimal places of precision. For example, the command **<ESC>&l4.8C** would set the line spacing to 0.1 inches.

### <ESC>&k$n_1$H Set HMI

This commands changes the horizontal space allocated to each printed character (including spaces). Parameter $n_1$ specifies the desired spacing in units of 1/120-inch. This value must be in the range **0** to **126**, and may have up to four decimal places of precision. For example:

| Pitch | Escape Sequence |
|---|---|
| 10 chars/inch | <ESC>&k12H |
| 12 chars/inch | <ESC>&k10H |
| 15 chars/inch | <ESC>&k8H |
| 17 chars/inch | <ESC>&k7.0588H |

This command can be used to print a 10 char/inch font at 12 char/inch, or vice versa.

If the current font is proportionally spaced, this command only affects the width of the space character.

Horizontal spacing is defaulted to the current font pitch when any of the following print parameters are changed:

Page orientation
Character set
Print pitch
Proportional spacing

Font height
Primary vs. secondary font

## E.2 Print Position Commands

This set of commands is used to change the current print position.

### <SP> Space

This control code causes the print position to move right one column at the current print pitch. The distance moved is the default pitch for the current font, unless this has been superceded by a **Set HMI** command.

### <BS> Backspace

This control code causes the print position to move left one column at the current print pitch. The distance moved is the default pitch for the current font, unless this has been superceded by a **Set HMI** command.

### <CR> Carriage Return

This control code causes the print position to move back to the left text margin on the current line. A line feed may also be carried out, depending on the most recent **Line Termination** command.

### <LF> Line Feed

This control code causes the print position to move down to the next line without changing the horizontal position. A carriage return may also be carried out, depending on the most recent **Line Termination** command.

### <FF> Form Feed

This control code prints the current page, and causes the print position to advance to the top of the next page, without changing the current horizontal position. A carriage return may also be carried out, depending on the most recent **Line Termination** command.

### <ESC>&an$_1$R Vertical Position (Lines)

### <ESC>&an$_1$V Vertical Position (Decipoints)

### <ESC>*pn$_1$Y Vertical Position (Dots)

These commands move the current vertical print position to the location specified in lines (at the current line spacing), decipoints (1/720-inch) or dots (1/300-inch), respectively. The horizontal print position is unaffected.

For example, any one of the following commands will move the print position to two inches from the top of the page (assuming a line spacing of six lines/inch):

| Command | Vertical Position |
|---|---|
| **<ESC>&a12R** | 12 lines |
| **<ESC>&a1440V** | 1440 decipoints |
| **<ESC>*p600Y** | 600 dots |

**NOTE:** The **Vertical Position (Lines)** command can be used to move directly to any line on the next (or subsequent) page. This is **not** true of the other **Vertical Position** commands.

### <ESC>= Half Line Feed

This command causes the current vertical position to move down by one half of a current line spacing. It is helpful when using super- and sub-scripts.

A half line feed can be cancelled with a reverse half line feed via the command **<ESC>&a-.5R.**

**<ESC>&an$_1$C Horizontal Position (Columns)**

**<ESC>&an$_1$H Horizontal Position (Decipoints)**

**<ESC>*pn$_1$X Horizontal Position (Dots)**

These commands move the current horizontal print position to the position specified by parameter $n_1$. The units of measure for the three commands are summarized below:

| Command | Units of $n_1$ |
|---|---|
| **<ESC>&an$_1$C** | Column number (current pitch) |
| **<ESC>&an$_1$H** | Decipoints (1/720-inch) |
| **<ESC>*pn$_1$X** | Dots (1/300-inch) |

The command **<ESC>&a-1C** can be used to backup and overstrike one character with another. For example, **0<ESC>&a-1C/** will print a slashed zero from an unslashed one.

**NOTE:** The **Horizontal Position** commands are constrained by the physical limits of the current page.

## E.3 Saving and Restoring Print Position

The printer maintains a first-in/first-out (FIFO) stack of print positions, so that print positions can be restored after other operations which cause the position to move. The stack of print positions can be up to 20 levels deep. Attempts to use more than 20 levels of stack, or to pop non-existent values off the stack, are ignored.

**<ESC>&fn$_1$S Push/Pop Position**

The command **<ESC>&f0S** pushes the current print position onto the stack. Any positions already on the stack are pushed one level further down the stack.

The command **<ESC>&f1S** pops the most recently saved

print position off the top of the stack. Any other positions on the stack are popped one level further up the stack.

Each print position saved on the stack contains both the vertical and horizontal location of the current position.

# *F Font Definition*

Fonts are available from three sources:

1. Resident fonts internal to your printer;

2. Optional **cartridge fonts** which plug into your printer front panel; and

3. **Downloadable fonts,** which are transferred from disk files to your printer.

By using the supported font definition and selection commands explained here and the Printer Software Commands explained in Part IV you may use up to 64 different fonts per page.[5]

NOTE: Font cartridges designed for LaserJet printers will not work with your QMS laser printer. However, download fonts for LaserJet printers are compatible with your QMS printer.

## F.1 Font Description

LaserJet Emulation Mode uses a technique for font selection, whereby the printer selects the font which is closest to the specification you provide. Font characteristics are

[5]Use of the Printer Software command to select fonts will introduce compatibility problems if you attempt to print files using the command on an HP LaserJet printer.

assigned relative priorities which define how the closest font is selected from those available. Attempts to specify a font which is unavailable will result in the closest fitting font being selected.[6] Below are the font characteristics in descending order of priority:

Orientation
Character set
Proportional vs fixed spacing
Pitch (fixed spacing fonts only)
Size (points)
Style (upright vs italic)
Weight (light/medium/bold)
Typeface (Courier, Line Printer, etc.)

The printer maintains a table of available fonts and their characteristics. Whenever you specify a new characteristic (or use the **Default Font** command described in the next chapter), this table is used to select the font having characteristics closest to the newly revised set. Conceptually, the selection process works as follows:

For each font characteristic, the printer scans through the font table and marks as "bad" those fonts having a mismatch. The printer then scans through the table for the first "good" font, starting with the downloaded fonts (if any), and proceeding through the resident and cartridge fonts. The first "good" font becomes the newly selected font. The definition of a mismatch varies from one font characteristic to another (see details under the commands in this section).

Any font characteristic not specified when defining a font will remain set to its previous value. For example, you can switch from upright to italic style without re-specifying the font size or typeface.

**NOTE:** The printer will only select fonts whose orientation

[6]Note that it is possible to have two fonts with identical selection characteristics loaded into the printer at the same time. Downloaded fonts have priority over resident or cartridge fonts during font selection.

matches the current page orientation. Use the **Orientation** command to switch from portrait to landscape fonts.

To ensure that the correct font is selected, it is recommended to specify **all** font parameters, rather than depending on the fuzzy font selection process. For example, the command sequence

**<ESC>&l0O<ESC>(8U<ESC>(s0P<ESC>(s10H**
**<ESC>(s12V<ESC>s0S<ESC>(s0B<ESC>(s3T**

will select the resident Courier portrait font. This can be compressed into

**<ESC>&l0O<ESC>(8U<ESC>(sp10h12vsb3T**

While the printer is in LaserJet emulation mode you cannot select fonts with QMS-ML, Epson, or Proprinter character sets by using the LaserJet font description escape sequences. Fonts with these character sets may be selected by using the Printer Software Command to change fonts (see Part IV of this manual for details). The printer disregards font selections made through the keypad during LaserJet emulation mode.

## F.2 Font Definition Commands

NOTE:In the font definition commands, the first parameter $n_1$ defines whether the command applies to the primary or secondary font:

| Value | Applicable Font |
|---|---|
| ( | Primary |
| ) | Secondary |

### <ESC>$n_1n_2$ Character Set

This group of commands selects the character set for the

primary or secondary font. Parameter $n_1$ selects the primary or secondary font, and $n_2$ defines the character set itself, according to the table below:

| Character Sets | Command for Font: Primary | Secondary |
|---|---|---|
| **8-bit Character Sets** | | |
| ANSI-8 | <ESC>(9U | <ESC>)9U |
| Kana-8 | <ESC>(8K | <ESC>)8K |
| Math-8 | <ESC>(8M | <ESC>)8M |
| Math-8a | <ESC>(0Q | <ESC>)0Q |
| Math-8b | <ESC>(1Q | <ESC>)1Q |
| Roman-8 | <ESC>(8U | <ESC>)8U |
| **7-bit Character Sets** | | |
| ISO Denmark/Norway | <ESC>(0D | <ESC>)0D |
| ISO France | <ESC>(0F | <ESC>)0F |
| ISO Germany | <ESC>(0G | <ESC>)0G |
| ISO Italy | <ESC>(0I | <ESC>)0I |
| ISO Sweden/Finland | <ESC>(0S | <ESC>)0S |
| ISO Spain | <ESC>(1S | <ESC>)1S |
| ISO United Kingdom | <ESC>(1E | <ESC>)1E |
| Line Draw | <ESC>(0B | <ESC>)0B |
| Math-7 | <ESC>(0A | <ESC>)0A |
| PiFont | <ESC>(15U | <ESC>)15U |
| PiFonta | <ESC>(2Q | <ESC>)2Q |
| Roman Extension | <ESC>(0E | <ESC>)0E |
| US-ASCII | <ESC>(0U | <ESC>)0U |
| US Legal | <ESC>(1U | <ESC>)1U |

Special purpose character sets are available beyond those shown in this table.

The printable characters in 7- and 8-bit character sets are summarized below:

| Bits | Printable Characters (ASCII Values) |
|---|---|
| 7 | 33-127 |
| 8 | 33-127 and 160-255 |

**NOTE:** The default character set (Roman-8) is selected whenever none of the resident fonts or cartridge fonts

scanned by the printer have the character set you specify through this command.

## <ESC>$n_1$s$n_2$P Proportional Spacing

This command selects either proportional spacing or fixed pitch (parameter $n_2$) for the primary or secondary font ($n_1$), according to the table below:

| | Command for Font: | |
|---|---|---|
| **Spacing** | **Primary** | **Secondary** |
| Fixed | **<ESC>(s0P** | **<ESC>)s0P** |
| Proportional | **<ESC>(s1P** | **<ESC>)s1P** |

If proportional spacing is selected with no such font available, the printer defaults to the closest fixed pitch font with the current pitch value.

## <ESC>$n_1$s$n_2$H Print Pitch (Chars/Inch)

This command defines the print pitch for use with fixed spacing fonts. Parameter $n_1$selects the primary or secondary font, and $n_2$ is the desired spacing in characters per inch, with up to two decimal places of precision. Examples are provided in the table below:

| | Command for Font: | |
|---|---|---|
| **Print Pitch** | **Primary** | **Secondary** |
| 10-pitch | **<ESC>(s10H** | **<ESC>)s10H** |
| 12-pitch | **<ESC>(s12H** | **<ESC>)s12H** |
| 16.66-pitch | **<ESC>(s16.66H** | **<ESC>)s16.66H** |

In order to print in the specified pitch, a font must be available for that pitch. If a non-existent print pitch is specified, the printer defaults to the next greater pitch, or if none, the next lower pitch.

The **Set HMI** command can be used to override this command.

## <ESC>&k$n_1$S Compressed Print

This command switches both primary and secondary fonts between available standard and compressed fonts. For example, if you have 12 and 16.66 pitch fonts available, the command is used as follows:

| Command | Action |
|---|---|
| <ESC>&k0S | Select standard pitch (12 cpi) |
| <ESC>&k2S | Select compressed pitch (16.66 cpi) |

## <ESC>$n_1$s$n_2$V Character Size

This command sets the size of the primary or secondary font. Parameter $n_1$selects the primary or secondary font, and $n_2$ is the desired character size in points (1/72-inch), with up to two decimal places of precision. Examples are provided in the table below:

| | Command for Font: | |
|---|---|---|
| Character Size | Primary | Secondary |
| 8-point | <ESC>(s8V | <ESC>)s8V |
| 10-point | <ESC>(s10V | <ESC>)s10V |
| 14.4-point | <ESC>(s14.4V | <ESC>)s14.4V |

If none of the available fonts has the specified character size, the font with the closest size will be substituted.

## <ESC>$n_1$s$n_2$S Character Style

This command specifies upright or italic printing for the primary or secondary font. Parameter $n_1$ selects the primary or secondary font, and $n_2$ is the desired character style, according to the table below:

| | Command for Font: | |
|---|---|---|
| Character Style | Primary | Secondary |
| Upright | <ESC>(s0S | <ESC>)s0S |
| Italic | <ESC>(s1S | <ESC>)s1S |

If none of the available fonts has the specified character style, the command is ignored. Note that an italic font must be available to print in italics (the printer will not slant upright fonts into pseudo-italics).

## <ESC>$n_1$s$n_2$B Character Weight

This command specifies light, medium or bold weight for the primary or secondary font. Parameter $n_1$ selects the primary or secondary font, and $n_2$ is the desired character weight, coded as follows:

| Value Range | Character Weight |
|---|---|
| -1 to -7 | Light |
| 0 | Medium |
| 1 to 7 | Bold |

Each font has an exact weight in the range -7 to +7. If none of the available fonts has the weight you specify, the printer defaults to the font with the closest weight.

Examples are provided in the table below:

| | Command for Font: | |
|---|---|---|
| Character Style | Primary | Secondary |
| Light | <ESC>(s-3B | <ESC>)s-3B |
| Medium | <ESC>(s0B | <ESC>)s0B |
| Bold | <ESC>(s3B | <ESC>)s3B |

## <ESC>$n_1$s$n_2$T Typeface

This command selects the typeface for subsequent printing. Parameter $n_1$ selects the primary or secondary font, and $n_2$ is the desired typeface from the following list.

| Value | Typeface |
|---|---|
| 0 | Line Printer |
| 1 | Pica |
| 2 | Elite |
| 3 | Courier |
| 4 | Helv |
| 5 | Tms Rmn |
| 6 | Gothic |
| 7 | Script |
| 8 | Prestige |
| 9 | Caslon |
| 10 | Orator |

**NOTE:** Typefaces in this table are not necessarily available for your printer. Also, additional typefaces not listed in this table are available from independent suppliers.

## F.3 Font Switching Commands

### <ESC>$n_1$ Primary & Secondary Fonts

These control codes are used to switch between the primary and secondary fonts, as shown below:

| Code | ASCII Value | Font Selected |
|---|---|---|
| <SI> | 15 | Primary |
| <SO> | 14 | Secondary |

The table shows the ASCII value of the character which must be sent to the printer in each case.

This command sets the horizontal motion index (HMI) to that for the selected font.

The orientation of both primary and secondary fonts must match the current page orientation.

NOTE: Since most applications use more than two fonts per page, it is recommended to select fonts by their ID number instead of using the primary/secondary designation (see **Font ID** command).

### <ESC>*$n_1$D Font ID

This command defines the active font ID number for reference by other font management commands. For example, the command **<ESC>*c18D** assigns the ID "18" to the current font. Font management commands will operate on font **18** until changed by another **Font ID** command. Font ID's can have any value between **0** and **32767** inclusive.

The ID number is used to select the font via the **Select Primary Font** or **Select Secondary Font** command. The command is also used after either (a) specifying a font as described in the previous chapter; or (b) downloading a new font (next chapter).

### <ESC>*$n_1n_2$X Select Font

This command is used to select a primary or secondary font by its ID number. Parameter $n_1$specifies primary or secondary font, and $n_2$is the font ID number. For example:

| Command | Action |
|---|---|
| <ESC>*(10X | Font 10 becomes primary font |
| <ESC>*)15X | Font 15 becomes secondary font |

This command is the preferred method of switching between fonts, especially when several fonts are used on each page.

### <ESC>*c4F Font Temporary

### <ESC>*c5F Font Permanent

These commands define the font under the current ID as temporary or permanent, respectively. Permanent fonts are not deleted by resetting the printer.

### <ESC>*c6F Copy/Assign Font

This command assigns the currently selected font to the current font ID. Its primary purpose is to assign a font ID number to a resident or cartridge font.

### <ESC>$n_1n_2$@ Font Defaults

This command establishes the characteristics of the current primary font, as specified by parameter $n_1$( ( = primary; ) = secondary). Parameter $n_2$ acts according to the options below.

A value of **0** or **1** sets the character set for the primary font to the default character set (Roman-8).

A value of **2** sets the character set for the specified font to that of the current primary font. (This forces the printer to re-select the font closest to the current font specification.)

A value of **3** sets the selected font to the default font for the current orientation, and invokes its default characteristics.

The above actions operate within the constraints of the current orientation.

### <ESC>)$n_1$@ Secondary Font Defaults

This command establishes the characteristics of the current secondary font. Parameter $n_1$acts according to the options below.

A value of **0** sets the character set for the secondary font to the default character set.

A value of **1** sets the character set for the secondary font to that of the default primary font.

A value of **2** sets the secondary font character set to that of the current primary font.

A value of **3** sets the secondary font to the default secondary font, and invokes its default characteristics. If the new font is proportionally spaced, the pitch is not changed.

The above actions operate within the constraints of the current orientation.

### <ESC>*c0F Delete All Fonts

This command deletes all downloaded fonts - temporary and permanent - from printer memory. That is, all previously assigned font ID's are made unassigned.

### <ESC>*c1F Delete Temporary Fonts

This command deletes all downloaded temporary fonts from printer memory. That is, font ID's previously assigned to temporary fonts are made unassigned.

### <ESC>*c2F Delete Current Font

This command deletes from printer memory the most recently selected downloaded font.

**NOTE:** All pages buffered in the printer will be printed before font deletion actially occurs. If a font used on the current page is deleted, the default font last entered from the printer keypad will be substituted.

# G *Font Downloading*

In addition to selecting resident fonts in your printer or fonts provided via plug-in cartridges, you can download a wide variety of fonts to improve your choices for each print job. The data sent to the printer to download a new font includes:

Font specification information
Bit maps for each character in the font

With downloadable fonts obtained from third-party sources, all this information resides in a single disk file. These fonts are downloaded simply by copying the file to your QMS printer. Some applications automatically download fonts as needed.

The more general method of font downloading involves separately sending to the printer the font specifications and the bit map for each individual character in the font's character set. This gives you the flexibility to download individual characters from any font you desire.

**NOTE:** Download fonts designed for use with LaserJet printers may NOT be used while the printer is in any emulation mode other than LaserJet Emulation Mode.

## G.1 Downloading Fonts in LaserJet Emulation Mode

The procedure for downloading a font involves three steps:

1. Specify the font ID number for the font to be downloaded, using the **Font ID** command;

2. Copy the font file to the printer; and

3. Specify the font as permanent (optional).

There are several methods for copying the file to the printer, including:

1. Write a simple utility program for downloading the font file you specify by name.

2. Incorporate automatic font downloading in the program which will be driving your QMS printer.

## G.2 Writing a Downloading Program

With MS-DOS systems, downloading can be accomplished by a batch file which (a) executes a BASIC program to send a font ID number to the printer, then (b) sends the corresponding font file to the printer.

Your batch file would contain the following commands:

```
BASIC SENDFONT.BAS COPY \B %1 PRN:
```

Be sure to include the \B option, since font files contain binary data with each byte having any value between **0** and **255**.

The BASIC program might look like this:

```
10 PRINT "ENTER FONT ID"
20 INPUT ID
30 LPRINT CHR$(27);"*c";ID;"D";
40 SYSTEM
```

Name the file **SENDFONT.BAS**.

To download a font, type **SENDFONT** and the name of the font file, then press RETURN. The file name you enter is substituted for the **%1** in your batch file.

A second program would be needed to send the **Font Permanent** command to the printer, for those fonts you want to make permanent.

The following commands provide a general method for font downloading.

## G.3 Font Downloading Commands

The general procedure for downloading a font comprises the following steps:

1. Establish the ID for the font about to be downloaded by the **Font ID** command;

2. Specify the font characteristics via the **Font Header** command; and

3. Download the bit images for the characters to occupy the desired locations in the ASCII table, using the **Character Code** and **Download Character** commands.

### <ESC>)sn$_1$W<n$_2$ Font Header

This command is used to describe the characteristics of the font about to be downloaded by a sequence of **Download Character** commands. This header information includes font characteristics similar to those described in the **Font Definition** chapter, plus additional information unique to downloaded fonts.

A valid **Font Header** command causes the existing font with the current ID (if any) to be deleted. Invalid commands leave the existing font untouched.

The font header contains 26 bytes of information, organized as shown in the following table:

acter header parameters are described in the next section.

1. **Font type** is set to **0** for 7-bit character sets, or **1** for 8-bit character sets (see following table).

2. **Baseline height** is the distance in dots between the top of the cell and the character baseline, between zero and one dot less than the cell height.

3. **Cell width** and **height** are the width and height, respectively, of the basic cell within which all character definitions fall, between **1** and **255**.

4. **Orientation** is set to **0** for portrait mode, or **1** for landscape mode.

5. **Fixed/Proportional** is set to **0** for fixed spaced fonts, or **1** for proportionally spaced fonts.

6. **Character Set** is a code computed from the escape sequence which would be used to specify the same font (see below).

7. **Pitch** is computed as the desired horizontal spacing in dots, multiplied by four. For example, a 10-pitch font would have a value of **120** (4 x 300 / 10). The range of valid values is **2** to **1260**, including those values representing fractional dots.

8. **Height** is computed as the font height in dots, multiplied by four, in the range **0** to **10922**. Values representing fractional dots are valid. This height should approximately equal the point size of the font, since the height is compared with size parameters during font definition.

9. **Style** is set to **0** for upright fonts, or **1** for italic fonts.

10. **Weight** defines the boldness of the font, with a range of **-7** (light) to **+7** (bold).[7] Medium weight fonts have a value of zero. Values of **-3** and **+3** are typical for light and bold fonts, respectively.

11. **Typeface** selects the typeface from those available (see **Typeface** command explained earlier).

## G.4 Computing Character Set Codes

To calculate the value of the **Character set** field of the font header, follow these steps:

1. Get the last two characters of the **Character Set** command which would be used to access the desired character set. For example, the Math-8 set has **8M**.

2. Multiply the numeric part by 32, in this case 8 x 32 = 256.

3. Look up the ASCII value of the second character, in this case 77. (ASCII are provided in Appendix B.)

4. Add these two results together, and subtract 64, in this case yielding a character set code of **269**.

For your convenience, the codes for commonly used character sets are provided in the following table:

---

[7]**Negative numbers are represented by its 16-bit 2's complement value. For example, a value of -3 would be sent to the printer as CHR$(255);CHR$(253);, which represents 65,533.**

| Character Set | Code |
|---|---|
| **8-bit Character Sets** | |
| ANSI-8 | 309 |
| Kana-8 | 267 |
| Math-8 | 269 |
| Roman-8 | 277 |
| **7-bit Character Sets** | |
| ISO Denmark/Norway | 4 |
| ISO France | 6 |
| ISO Germany | 7 |
| ISO Italy | 9 |
| ISO Spain | 51 |
| ISO Sweden/Finland | 19 |
| ISO United Kingdom | 37 |
| Line Draw | 2 |
| Math Symbols | 1 |
| Roman Extension | 5 |
| US-ASCII | 21 |
| US Legal | 53 |

## <ESC>*cn$_1$E Character Code

This command specifies the ASCII value of the character about to be downloaded, in the range **0** to **255**. For example, the command **<ESC>*c65E** would preceed the downloading of the bit image for an uppercase 'A' (or whatever character is to occupy A's place in the ASCII table for the current font).

The next downloaded character will be assigned to the specified place in the ASCII table for the current font, replacing any character assigned earlier.

## <ESC>(sn$_1$Wn$_2$ Download Character

This command sends the bit image of one character of a downloadable font to the printer. $n_1$ specifies how many

bytes of data are being sent in $n_2$, including the 16-byte character header described below.

Each valid downloaded character is assigned to the character code of the most recent **Character Code** command, unless there is insufficient memory space, in which case the current font will be deleted.

The character header contains information organized as shown in the following table:

| Bytes | Contents |
|---|---|
| 0 | (4) |
| 1 | (0) |
| 2 | (14) |
| 3 | (1) |
| 4 | Orientation |
| 5 | (0) |
| 6-7 | Left offset |
| 8-9 | Top offset |
| 10-11 | Character width |
| 12-13 | Character height |
| 14-15 | HMI |
| 16... | Bit Image |

The character header fields are defined as follows:

1. **Orientation** is set to **0** for portrait mode, or **1** for landscape mode. A character is ignored if its orientation does not match the orientation given in the font header.

2. **Left offset** is the difference in dots between the left edge of the glyph cell and the left edge of the character, in the range **-128** to **+127**.

3. **Top offset** is the difference in dots between the baseline and the top edge of the character, in the range **-128** to **+127**.

4. **Character width** and **height** are the width and height of the character in dots, respectively, from **0** to **128**.

5. **HMI** is the horizontal distance moved by the current print position after printing the character, multiplied by four. Values must be multiples of four, and negative values are defaulted to zero. This field is ignored in fixed space fonts. The starting position is always on the left edge of the cell boundary (see figure).

6. **Character Data** is the bit image of the character itself. Data is organized in words of two bytes each sent left-to-right, top-to-bottom, with each bit representing one dot or pixel of the image. Row boundaries are aligned with word boundaries, so the last word in each row may include unused bits. The number of bytes per character is the words per row times two, times the character height in dots.

### <ESC>*c3F Delete Character Code

This command deletes from printer memory the bit image for the character specified by the most recent **Character Code** command.

# *H Raster Graphics*

Raster graphic images can be printed by sending binary data files to the printer. Each page can contain one or more graphic images. The maximum graphic image area on a page depends on the current resolution, as follows:

| Resolution | Maximum Area |
|---|---|
| 300×300 | 22.76 sq.in. |
| 150×150 | 91.04 sq.in. |
| 100×100 | Whole page |
| 75×75 | Whole page |

To print a raster image, the graphics commands must be

sent to the printer in the order shown:

Set graphics resolution
Start raster graphics
Transfer raster graphics
End raster graphics

Under certain circumstances, most of these commands are optional. Refer to details in the following descriptions of the commands.

**NOTE:** The third command actually comprises a separate command *for each row of the graphics image.* Rows of raster graphic images can be interspersed with text or rules and patterns. Most other commands are also valid between rows, including changes in print position.

Graphics printing ignores the text margins and perforation skip mode associated with printing text. The only constraint on graphics is the printable area and the page length.

It is helpful to set the VMI and HMI to one dot so that all vertical and horizontal moves fall "on-grid". Since each dot corresponds to 0.16 VMI's or 0.4 HMI's, this is achieved as follows:

| Command | Action |
|---|---|
| **<ESC>&I.16C** | Set VMI to 1/300-inch |
| **<ESC>&k.4H** | Set HMI to 1/300-inch |

## H.1 Page Orientation

We recommend using the portrait orientation when printing graphic images. If you use the landscape orientation, remember that the "left" graphics margin is actually the margin at the top of the page.

## H.2 Raster Graphics Commands

### <ESC>*$n_1$R Graphics Resolution

This command sets the graphics resolution in dots per inch to one of the four available values, depending on the value of parameter $n_1$. Valid value for $n_1$ are:

75, 100, 150 and 300.

For example:

| Resolution | Escape Sequence |
|---|---|
| 75 dpi | **<ESC>*t75R** |
| 100 dpi | **<ESC>*t100R** |
| 150 dpi | **<ESC>*t150R** |
| 300 dpi | **<ESC>*t300R** |

The command is only needed in front of downloading a raster image if the current resolution is incorrect or unknown.

The default resolution is 75 dots/inch. If the command is sent between **Start Raster Graphics** and **End Raster Graphics** commands, it does not take effect until the next raster image download.

At resolutions below 300 dots/inch, each dot sent to the printer is internally converted and printed as a block of normal dots, as shown below:

| 300 | 150 | 100 | 75 dots/inch |
|---|---|---|---|
| | | | OOOO |
| | | OOO | OOOO |
| | OO | OOO | OOOO |
| O | OO | OOO | OOOO |

As a result, changing the resolution has a proportionate effect on the size of the printed graphics image. For example, an image printed at 100 dots/inch will be three times larger in each direction as the same image printed at 300 dots/inch.

## <ESC>*rn$_1$A Start Raster Graphics

This command is used immediately before sending a raster image to the printer. Parameter $n_1$ defines the starting position of the image:

| Value | Starting Position |
|---|---|
| 0 | Left-most printable position |
| 1 | Current horizontal position |

In both cases the current vertical position defines the distance of the printed image from the top of the page. You can of course move the current print position before using this command, in order to place the graphic image at the desired location on the page.

If the current resolution and graphics left margin is correct, this command is in fact unnecessary.

## <ESC>*n$_1$Wn$_2$ Transfer Raster Graphics

This command sends one dot row of a graphics image to the printer, with $n_1$ bytes of data contained in parameter $n_2$.

Each byte in $n_2$ contains eight bits, each reresenting the value of one dot. A bit set to 1 indicates that the dot is present. The eight bits are printed from left to right on the page, with the most significant bit first.

## <ESC>*rB End Raster Graphics

This command indicates the end of the dot rows being sent to the printer as part of a raster graphics image. The printer is now ready to receive another sequence of raster graphics commands.

The current print position is set to the bottom left-hand corner of the graphics image just printed.

## H.3 Example

Figure H.3 shows how to prepare a raster image for sending to the printer.

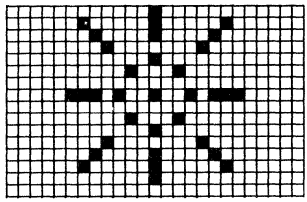


**Figure H.3. Raster Image Format**

This small sample raster image is 24 dots wide and 16 dots high. Each of the 16 raster lines requires three data bytes (characters). The following is the raster data (in **decimal**) required to print this bitmap.[8]

[8] We do not mean to suggest it's practical to prepare raster image data by hand calculations.

| Raster Line | Data byte 1 | Data Byte 2 | Data Byte 3 |
|---|---|---|---|
| 1 | 0 | 16 | 0 |
| 2 | 4 | 16 | 64 |
| 3 | 2 | 16 | 128 |
| 4 | 1 | 1 | 0 |
| 5 | 0 | 16 | 0 |
| 6 | 0 | 68 | 0 |
| 7 | 0 | 0 | 0 |
| 8 | 14 | 146 | 224 |
| 9 | 0 | 0 | 0 |
| 10 | 0 | 68 | 0 |
| 11 | 0 | 16 | 0 |
| 12 | 1 | 1 | 0 |
| 13 | 2 | 16 | 128 |
| 14 | 4 | 16 | 64 |
| 15 | 0 | 16 | 0 |
| 16 | 0 | 0 | 0 |

## H.4 Rule and Pattern Commands

### <ESC>*cn$_1$B Pattern Height (Dots)

### <ESC>*cn$_1$A Pattern Width (Dots)

These commands define the height and width, respectively, of the patterned area to be printed, in dots (1/300-inch). The default values after a power-up or **Reset Printer** command are zero. Values larger than the page size are valid, but the printed image will be constrained to the printable area of the page.

### <ESC>*cn$_1$V Pattern Height (Decipoints)

### <ESC>*cn$_1$H Pattern Width (Decipoints)

These commands are identical to the previous two commands, except that dimensions are specified in decipoints (1/720-inch) instead of dots (1/300-inch). Dimensions are converted from decipoints to dots, with non-integer values being rounded up to the next whole number.

### <ESC>*cn$_1$G Select Pattern

This command is not necessary to print a solid rule.

To select gray scale shading, parameter $n_1$ must be between **1** (prints a solid white pattern) and **100** (prints a solid black pattern). Commands with invalid parameters are ignored.

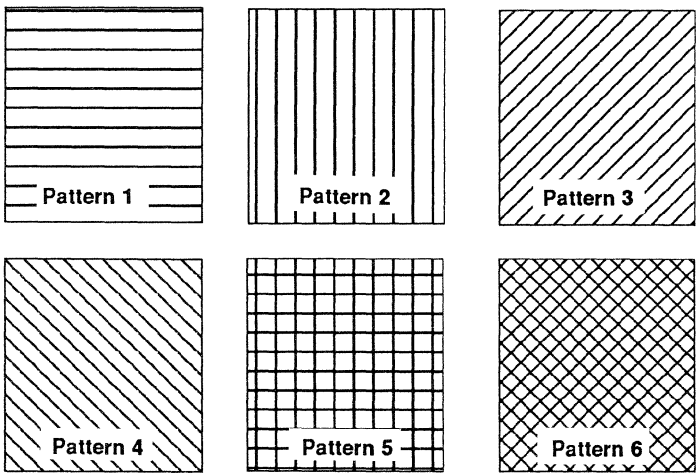



**Figure H.4. Line Pattern Examples**

To select a predefined line pattern, parameter $n_1$ must be between **1** and **6** (see Figure H.4). These patterns are internally stored in the printer.

### <ESC>*$n_1$P Print Pattern

This command causes the most recently defined pattern to be printed in the most recently defined pattern area.

Parameter $n_1$ is selected from the table below:

| Value | Pattern Description |
|---|---|
| 0 | Solid black rule |
| 2 | Gray scale pattern |
| 3 | Line graphic pattern |

Patterns are not affected by margins, perforation skip mode or end-of-line wrap. Printing a pattern does not change the current print position.

## H.5 Examples

The commands below print a solid black rectangle (rule) 1/10-inch high by 3 inches wide, starting one inch from the left and two inches from the right of the top corner of the page.

**<ESC>&a720h1440V**
**<ESC>*c2160h72V**
**<ESC>*c0P**

The commands below fill an 8-inch high by 10-inch wide area with a 25 percent gray scale pattern.

**<ESC>*c5760h7200V**
**<ESC>*c25G**
**<ESC>*c2P**

The commands below fill an 8-inch high by 10-inch wide area with a horizontal bar pattern.

**<ESC>*c5760h7200V**
**<ESC>*c1G**
**<ESC>*c3P**

# *I Macros and Page Overlays*

A macro is a sequence of formatting commands which you download to the printer for future use. You assign an ID number to each macro which uniquely identifies it. Macros are normally associated with command sequences which are used frequently, such as letterhead designs. By storing these commands as macros in the printer, the amount of data sent to the printer is reduced and throughput is increased.

In practice, most macros are used as "overlays", which are printed automatically on each page. This provides a convenient way to overlay a form on printed variable information (see **Overlay Macro** commands).

The printer will store a maximum of 32 macros. However, macros and downloaded fonts compete for the same memory area in the printer. Individual macros can have voluminous definitions, because printer memory is dynamically allocated as it is needed.

Macros can be either temporary or permanent. **Temporary macros** are deleted by a printer reset or power-down; **permanent macros** are only deleted by a power-down.

NOTE: The Printer Software Commands described in Part IV cannot be called from within a macro.

## I.1 Nested Macros

Macros can be nested. That is, any macro may include calls to other macros. Up to three levels of nesting are permitted. Macro calls which would result in more than three levels of nesting are ignored.

Note that a macro cannot call a "parent macro", that is, another macro which directly or indirectly called the cur-

rent macro. This rule also prevents a macro calling itself recursively. For example, if macro 3 calls macro 4, then macro 4 cannot call macro 3 or 4. It can call other macros, because one more level of nesting is available.

Commands within a macro which attempt to delete a parent macro are ignored. However, a **Reset Printer** command within a macro will delete all temporary macros - even parents of the current macro - but not the current macro itself.

## I.2 Macro Commands

### <ESC>&fn$_1$Y Macro ID

This command defines the current macro ID for reference by other macro management commands.

### <ESC>&f0X Define Macro

This command creates a new temporary macro and assigns to it the current macro ID. All downloaded commands and data through the next **End Macro** command are stored in the macro definition.

### <ESC>&f1X End Macro

This command terminates the current macro definition and saves it in memory.

### <ESC>&f2X Execute Macro

This command executes in sequence the commands stored under the current macro ID, using the current values of the following variables:

| | |
|---|---|
| Page length | Character code |
| Orientation | Macro ID |
| Paper source | VMI/line spacing |
| Copy count | Horizontal rule spacing |
| Margins (top, left, right) | Vertical rule size |
| Perforation skip mode | Underline mode |
| Line termination | Graphics resolution |
| End-of-line wrap | Graphics mode |
| Font attributes | Graphics left margin |
| HMI | Pattern ID |
| Text length | Font ID |

Any changes made to the current environment during macro execution remain in effect after the macro is completed.

### <ESC>&f3X Call Macro

This command is identical to **Execute Macro**, except that the current environment is restored after the macro is completed, and any changes to the environment made during macro execution are discarded. Note that the cursor position will have been moved in response to the macro commands.

### <ESC>&f4X Enable Overlay

This command causes the currently identified macro to be automatically executed at the end of each printed page. The specified macro supercedes any previously enabled macro overlay.

The overlay environment comprises the current values of the following variables:

Overlay
Page length
Orientation
Input control
Copy count

Position stack
Job offset position

and these default values:

| Variable | Default Value |
|---|---|
| Top margin | 0.5" |
| Bottom margin | 0.5" |
| Left margin | Left-most printable position |
| Right margin | Right-most printable position |
| Perforation skip mode | On |
| Line termination mode | 0 |
| End-of-line wrap | Off |
| Font attribute | Default |
| HMI | Default |
| Primary font | Default |
| Secondary font | Default |
| Font ID | 0 |
| Character code | 0 |
| Macro ID | 0 |
| Current print position | Top left margin |
| VMI/line spacing | 6 lines/inch |
| Horizontal rule size | 0 |
| Vertical rule size | 0 |
| Underline mode | Off |
| Graphics resolution | 75 dots/inch |
| Graphics mode | Off |
| Pattern ID | 0 |

Before execution of an overlay macro, the current environment is saved. It is restored after overlay execution, replacing the overlay environment.

An automatic macro overlay is disabled by either:

A **Disable Overlay** command;
Deleting the overlay macro;
Changing the page length; or
Changing the orientation.

### <ESC>&f5X Disable Overlay

This command discontinues the automatic execution of the current overlay macro, effective with the current page.

### <ESC>&f6X Delete All Macros

This command deletes both temporary and permanent macros, including the current overlay macro, if any.

### <ESC>&f7X Delete Temporary Macros

This command deletes all temporary macros, including the current overlay macro if it is temporary.

### <ESC>&f8X Delete Current Macro

This command deletes the macro last referenced by a **Macro ID** command.

### <ESC>&f9X Macro Temporary

This command cause the macro last referenced by a **Macro ID** command to be made temporary. Temporary macros are deleted by a **Reset Printer** command.

### <ESC>&f10X Macro Permanent

This command cause the macro last referenced by a **Macro ID** command to be made permanent. Permanent macros are not deleted by a **Reset Printer** command.

## I.3 Example

The example below shows how to download a macro containing the commands for printing a company letterhead. It assumes you have available the binary data for a raster image of the company logo.

| Command | Explanation |
|---|---|
| **<ESC>&f1Y** | Specify macro ID as 1 |
| **<ESC>&f0X** | Start macro definition |
| **<ESC>&a540h360V** | Top left corner of logo |
| **<ESC>*t150R** | Set 150 dpi resolution |
| **<ESC>*r1A** | Start raster image of logo |
| **<ESC>*b60W<data>** | Send first raster line |
| ... | |
| **<ESC>*b60W<data>** | Send last raster line |
| **<ESC>*rB** | End raster graphics |
| **<ESC>&a540h780V** | Position for lettering |
| **The Smith Company** | First line of lettering |
| ... | |
| **Tel: (206) 123-4567** | Last line of lettering |
| **<ESC>&a540h960V** | Position for rule |
| **<ESC>*c10v4680H** | Set rule height and width |
| **<ESC>*c0P** | Print rule |
| **<ESC>&a1200V<cr>** | Position for start of text |
| **<ESC>*f1X** | Stop macro definition |

To execute the macro, you would send the command **<ESC>&f1y2X**. To execute the macro automatically on every page, for example during a run of form letters, the command **<ESC>&f1y4X** specifies the macro as an overlay.

# J Paper Handling

## J.1 Paper Handling Commands

### <ESC>&$n_1$X Select Number of Copies

This command specifies how many copies of each page are to be printed. Parameter $n_1$ defines the number of pages, with a value between **1** and **99** inclusive. Values greater than **99** are interpreted as **99**, and a value of zero defaults to **1**.

This command affects the current page and all subsequent pages. All copies of each page are printed together, before any copies of the subsequent page.

This command raises the printer throughput on copies after the first to eight pages/minute, instead of the throughput achieved when each page has to be individually processed. This has a major impact on the net throughput of pages with complex layouts.

### <ESC>&$n_1$H Paper Source

This command prints the current page (if any) and defines the source of subsequent sheets. Parameter $n_1$ has the effect listed in the table below.

| Value | Paper Source |
|---|---|
| 0 | Unchanged |
| 1 | Paper from tray #1 |
| 2 | Paper from manual feed |
| 3 | Envelope from manual feed |
| 4 | Paper from tray #2 |
| 5 | Paper from tray #3 |

The default value is **1**. Any invalid parameter value will cause the current page to be printed and the paper source is unchanged.

Values of **4** or **5** are only applicable to printers equipped with multiple paper trays, with the trays enabled from the front-panel keypad. Trays are numbered from top to bottom, starting with the standard printer tray.[9]

These commands always cause the current page to be printed by executing a carriage return and form feed. The selected paper source continues in effect until changed.

If manual feed is selected, the indicator in the MANUAL FEED key will light and the display on the printer's front panel will read P O.

A value of **3** in the paper source command results in the same display as manual feed.

## J.2 Printing Envelopes

The following sequence is recommended when printing envelopes:

1. Send **<ESC>&l1O** to select landscape orientation.

2. Send **<ESC>&l3H** to select envelope feed.

[9]Trays #2 and #3 do not support paper tray sizing, so paper size commands are ignored.

# *J Paper Handling*

## J.1 Paper Handling Commands

### <ESC>&$n_1$X Select Number of Copies

This command specifies how many copies of each page are to be printed. Parameter $n_1$ defines the number of pages, with a value between **1** and **99** inclusive. Values greater than **99** are interpreted as **99**, and a value of zero defaults to **1**.

This command affects the current page and all subsequent pages. All copies of each page are printed together, before any copies of the subsequent page.

This command raises the printer throughput on copies after the first to eight pages/minute, instead of the throughput achieved when each page has to be individually processed. This has a major impact on the net throughput of pages with complex layouts.

### <ESC>&$n_1$H Paper Source

This command prints the current page (if any) and defines the source of subsequent sheets. Parameter $n_1$ has the effect listed in the table below.

| Value | Paper Source |
|---|---|
| 0 | Unchanged |
| 1 | Paper from tray #1 |
| 2 | Paper from manual feed |
| 3 | Envelope from manual feed |
| 4 | Paper from tray #2 |
| 5 | Paper from tray #3 |

The default value is **1**. Any invalid parameter value will cause the current page to be printed and the paper source is unchanged.

Values of **4** or **5** are only applicable to printers equipped with multiple paper trays, with the trays enabled from the front-panel keypad. Trays are numbered from top to bottom, starting with the standard printer tray.[9]

These commands always cause the current page to be printed by executing a carriage return and form feed. The selected paper source continues in effect until changed.

If manual feed is selected, the indicator in the **MANUAL FEED** key will light and the display on the printer's front panel will read **P O**.

A value of **3** in the paper source command results in the same display as manual feed.

## J.2 Printing Envelopes

The following sequence is recommended when printing envelopes:

1. Send **<ESC>&l1O** to select landscape orientation.

2. Send **<ESC>&l3H** to select envelope feed.

[9] Trays #2 and #3 do not support paper tray sizing, so paper size commands are ignored.

# J Paper Handling

## J.1 Paper Handling Commands

### <ESC>&$n_1$X Select Number of Copies

This command specifies how many copies of each page are to be printed. Parameter $n_1$defines the number of pages, with a value between **1** and **99** inclusive. Values greater than **99** are interpreted as **99**, and a value of zero defaults to **1**.

This command affects the current page and all subsequent pages. All copies of each page are printed together, before any copies of the subsequent page.

This command raises the printer throughput on copies after the first to eight pages/minute, instead of the throughput achieved when each page has to be individually processed. This has a major impact on the net throughput of pages with complex layouts.

### <ESC>&$n_1$H Paper Source

This command prints the current page (if any) and defines the source of subsequent sheets. Parameter $n_1$has the effect listed in the table below.

| Value | Paper Source |
|---|---|
| 0 | Unchanged |
| 1 | Paper from tray #1 |
| 2 | Paper from manual feed |
| 3 | Envelope from manual feed |
| 4 | Paper from tray #2 |
| 5 | Paper from tray #3 |

The default value is **1**. Any invalid parameter value will cause the current page to be printed and the paper source is unchanged.

Values of **4** or **5** are only applicable to printers equipped with multiple paper trays, with the trays enabled from the front-panel keypad. Trays are numbered from top to bottom, starting with the standard printer tray.[9]

These commands always cause the current page to be printed by executing a carriage return and form feed. The selected paper source continues in effect until changed.

If manual feed is selected, the indicator in the **MANUAL FEED** key will light and the display on the printer's front panel will read **P O**.

A value of **3** in the paper source command results in the same display as manual feed.

## J.2 Printing Envelopes

The following sequence is recommended when printing envelopes:

1. Send **<ESC>&l1O** to select landscape orientation.

2. Send **<ESC>&l3H** to select envelope feed.

[9]Trays #2 and #3 do not support paper tray sizing, so paper size commands are ignored.

# *J Paper Handling*

## J.1 Paper Handling Commands

### <ESC>&$n_1$X Select Number of Copies

This command specifies how many copies of each page are to be printed. Parameter $n_1$ defines the number of pages, with a value between **1** and **99** inclusive. Values greater than **99** are interpreted as **99**, and a value of zero defaults to **1**.

This command affects the current page and all subsequent pages. All copies of each page are printed together, before any copies of the subsequent page.

This command raises the printer throughput on copies after the first to eight pages/minute, instead of the throughput achieved when each page has to be individually processed. This has a major impact on the net throughput of pages with complex layouts.

### <ESC>&$n_1$H Paper Source

This command prints the current page (if any) and defines the source of subsequent sheets. Parameter $n_1$ has the effect listed in the table below.

| Value | Paper Source |
|---|---|
| 0 | Unchanged |
| 1 | Paper from tray #1 |
| 2 | Paper from manual feed |
| 3 | Envelope from manual feed |
| 4 | Paper from tray #2 |
| 5 | Paper from tray #3 |

The default value is **1**. Any invalid parameter value will cause the current page to be printed and the paper source is unchanged.

Values of **4** or **5** are only applicable to printers equipped with multiple paper trays, with the trays enabled from the front-panel keypad. Trays are numbered from top to bottom, starting with the standard printer tray.[9]

These commands always cause the current page to be printed by executing a carriage return and form feed. The selected paper source continues in effect until changed.

If manual feed is selected, the indicator in the MANUAL FEED key will light and the display on the printer's front panel will read P O.

A value of **3** in the paper source command results in the same display as manual feed.

## J.2 Printing Envelopes

The following sequence is recommended when printing envelopes:

1. Send **<ESC>&l1O** to select landscape orientation.

2. Send **<ESC>&l3H** to select envelope feed.

[9]**Trays #2 and #3 do not support paper tray sizing, so paper size commands are ignored.**

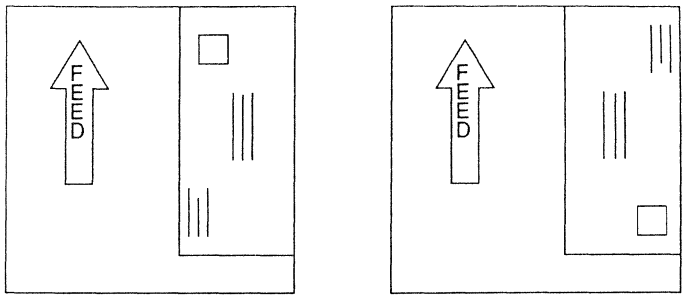
3. Send <ESC>&l$n_1$E to set the top margin.

4. Send <ESC>&l$n_2$L to set the left-hand margin.

5. Send the address.

6. Send a form feed (ASCII 12 or FORM FEED on keypad) command to print the "page".

7. When PO appears in the display, feed an envelope face up into the manual feed slot, with the **top** edge of the envelope against the left-hand guide (see Figure H.5).




LaserJet Printer QMS Printer

**Figure H.5. Feeding Envelopes**

You need to select the $n_1$ and $n_2$ parameters for the size of envelope used. You could also add printing of the return address and a logo if so desired.

## J.3 Output Tray Offset

### <ESC>&ln$_1$T Job Offset

This command is recognized by the printer, but has no effect. It is included for software compatibility reasons.

# *K Miscellaneous Features*

## K.1 Miscellaneous Commands

### <ESC>&dn$_1$ Automatic Underlining

This command enables or disables automatic underlining, depending on the value of $n_1$:

| Command | Action |
|---|---|
| <ESC>&dD | Enable underlining |
| <ESC>&d@ | Disable underlining |

Automatic underlining is continuous; that is both spaces and printable characters are underlined. The underlining produced this way is just below the main body of the text, and the line passes through descenders in lowercase characters like **g**. Internally, the printer remembers the left- and right-most extent of each underline, and prints them before executing the next vertical position command.

Alternative methods for underlining include:

1. Use of rule/pattern (or raster) graphics. This method

will take longer to execute, but it provides complete flexibility in setting the underline height. It is also recommended when double underlining is required.

2. Restoring the horizontal position to the beginning of the text to be underlined, and printing an underscore character for each character to be underlined. The underlining produced this way is lower than with automatic underlining (the line passes below descenders in lowercase characters such as **g**). This method is impractical with proportionally spaced fonts, because the width of the characters underlined will normally be different to the width of the underscore character.

### <ESC>Y Enable Display Mode

This command enables the display mode, whereby all printer commands are printed as blanks instead of being executed, except that <CR>executes as a <CR>followed by a <LF>.

### <ESC>Z Disable Display Mode

This command disables the display mode (see previous command). If the printer is in the display mode when this command is sent, the command is printed as a blank plus a **Z**.

## <ESC>&pn$_1$Xn$_2$ Transparent Print Data

This command causes the printer to ignore any commands in the following $n_1$ bytes of data $n_2$.

This command is helpful when sending a screen dump to the printer which contains ASCII control codes. For example, MS-DOS systems use control codes to represent certain line drawing symbols.

## <ESC>&kn$_1$G Line Termination

This command determines how the printer responds to <CR>, <LF> and <FF> commands. The table below lists the valid values of parameter $n_1$ and the effect on the three printer control codes.

| | | | |
|---|---|---|---|
| **0** | <CR> | <LF> | <FF> |
| **1** | <CR><LF> | <LF> | <FF> |
| **2** | <CR> | <CR><LF> | <CR><FF> |
| **3** | <CR><LF> | <CR><LF> | <CR><FF> |

## <ESC>&sn$_1$C End-of-Line Wrap

This command enables or disables line wrap, depending on the value of parameter $n_1$:

| Command | Action |
|---|---|
| **<ESC>&s0C** | Enable line wrap |
| **<ESC>&s1C** | Disable line wrap |

With line wrap enabled, a carriage return/line feed sequence is automatically executed whenever the character about to be printed will fall to the right of the current right-hand margin.

## <ESC>E Reset Printer

This command causes the printer to print the current page (if any) and reset all programmable features to their default values. It is useful for restoring the printer to a known state after each job, but can also be used between pages of the same job.

The reset command affects the following aspects of the current environment:

Printer stays on-line
Print position set to top left margin
Parameters set to default values
Temporary macros are deleted
Temporary fonts are deleted

## <ESC>z Printer Self-Test

This command causes the printer to test its own interface circuits. The current page is printed, and the self-test is run without losing data or the current environment. If an interface problem is detected, the printer is automatically placed off-line, otherwise the printer is ready to proceed with the next page.

Appendix I

# Printer Specifications

- **Type:** Desk-top page printer.
- **Printing Method:** Electrophotography (single component-dry process), laser beam scanning.
- **Optical System:**
  - Laser: Semiconductor laser.
  - Scanning System: rotating six-faced mirror.
  - Scanning Pitch:
    * Horizontal – selectable (0-300 dots per inch)
    * Vertical – 300 raster lines per inch.
- **Printing System:**
  - 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.
  - Toner Supply: Replaceable EP cartridge.
  - Paper: Plain paper; cassette feed – 16-21 lb. (60g-80g); manual feed – 11-33 lb. (40g-120g)

- Cassette Feed: Maximum paper load – .4in (1cm) maximum (approx. 100 sheets) for A4, B5, legal, and letter sizes.
- Manual Feed: Maximum sizes – 3.9"(100mm)×5.5" (140mm) to 8.5"(216mm)×14"(356mm).
- Output Stacker Tray Capacity: approximately 20 sheets.
- Power Consumption:
  * Print Engine:
    - Operating – Max 690W (115V); 750W (220/240V).
    - Standby – Typical average 120W.
- Environment:
  * Temperature – 10 to 32.5 degrees Celsius (50 to 90 degrees Fahrenheit)
  * Humidity – 20% to 80% RH
  * Noise Level – under 55db (A) during printing, under 45db (A) during standby.
  * Dimensions –
    - 475mm (w) 285.75mm (h) 533.4mm (d);
    - 18.7in (w) 11.25in (h) 21.0in (d)
  * Line Voltage Requirements
    - 115V ±10%, 60Hz (USA, Canada)
    - 220V ±10% 50Hz (Europe).

    (*Recommended fuse for Europe: 13 amp or 15 amp*)

- **System Memory:**
  - 2.5M Total Dynamic RAM
  - 1.5M Page Description Memory
  - 825K Font Download Memory Area/Input Buffer

| | | ADDRESSABLE AREAS | | | | |
|---|---|---|---|---|---|---|
| | | LINES | | COLUMNS | | |
| Paper Size | Orient. | 6 lpi | 8 lpi | 10 cpi | 12 cpi | 16.66 cpi |
| A4 | Port. | 70 | 93 | 77 | 93 | 129 |
| | Land. | 49 | 66 | 112 | 135 | 188 |
| B5 | Port. | 60 | 93 | 66 | 80 | 111 |
| | Land. | 42 | 57 | 97 | 116 | 162 |
| Letter | Port. | 66 | 88 | 80 | 96 | 132 |
| | Land. | 51 | 68 | 106 | 127 | 176 |
| Legal | Port. | 84 | 112 | 80 | 96 | 132 |
| | Land. | 51 | 68 | 136 | 163 | 227 |
| Mini | Port. | 33 | 44 | 34 | 40 | 56 |
| | Land. | 23 | 31 | 50 | 60 | 83 |

| | | PRINTABLE AREAS | | | | |
|---|---|---|---|---|---|---|
| | | LINES | | COLUMNS | | |
| Paper Size | Orient. | 6 lpi | 8 lpi | 10 cpi | 12 cpi | 16.66 cpi |
| A4 | Port. | 67 | 89 | 77 | 93 | 129 |
| | Land. | 46 | 61 | 112 | 135 | 188 |
| B5 | Port. | 57 | 76 | 66 | 80 | 111 |
| | Land. | 39 | 52 | 97 | 116 | 162 |
| Letter | Port. | 63 | 84 | 80 | 96 | 132 |
| | Land. | 48 | 63 | 106 | 127 | 176 |
| Legal | Port. | 81 | 108 | 80 | 96 | 132 |
| | Land. | 48 | 63 | 136 | 163 | 227 |
| Mini | Port. | 30 | 40 | 34 | 40 | 56 |
| | Land. | 20 | 27 | 50 | 60 | 83 |

Addressable areas are lines and columns where it is possible to locate the current print position. Printable areas are the lines and columns on the page where it is possible to actually print a character.

## Parallel Interface Cable Specification

The table on the following page describes the parallel interface cable that should be used with the QMS printer.

NOTES TO THE TABLE:

- **"Direction" refers to the direction of signal flow as viewed from the printer.**
- **"Return" denotes "Twisted-pair Return" and is to be connected at signal-ground level. When wiring the interface, be sure to use a twisted-pair cable for each signal and never fail to complete connection on the return side. To effectively prevent noise, these cables should be shielded and connected to the chassis of the system unit and printer, respectively.**
- **All interface conditions are based on TTL level. Both the rise and fall times of each signal must be less than 0.2 us.**
- **Data transfer must be carried out by ignoring the ACKNLG or BUSY signal.**
- **The cable must be of the type with an overall braided shield similar to Belden 8345.**
- **Connectors must have shielded housings.**
- **The overall shield must be bonded to the shielded housings at both ends of the cable.**

| Signal Pin No. | Return Pin No. | Signal | Direction | Description |
|---|---|---|---|---|
| 1 | 19 | *STROBE | In | STROBE pulse to read data in. Pulse width must be more than 100 nsec at receiving terminal. The signal level is normally "high"; read-in of data is performed at the "low" level of this signal. |
| 2 | 20 | DATA 1 | In | These signals represent information of the 1st to 8th bits or parallel data respectively. Each signal is at "high" level when data is logical "1" and "low" when data is logical "0". |
| 3 | 21 | DATA 2 | In | |
| 4 | 22 | DATA 3 | In | |
| 5 | 23 | DATA 4 | In | |
| 6 | 24 | DATA 5 | In | |
| 7 | 25 | DATA 6 | In | |
| 8 | 26 | DATA 7 | In | |
| 9 | 27 | DATA 8 | In | |
| 10 | 28 | *ACKNLG | Out | Approx. 4$\mu$s pulse; "low" indicates that data has been received and the printer is ready to accept other data. |
| 11 | 29 | BUSY | Out | A "high" signal indicates that the printer cannot receive data. The signal becomes "high" in the following cases: 1) Character received that corresponds to setting in S1; 2) FIFO full condition reached; 3) In "offline" state; 4) During printer error status. |
| 12 | 30 | PE | Out | A "high" signal indicates that the printer is out of paper. |
| 13 | – | SLCT | Out | This signal indicates that the printer is in the selected state. |
| 14 | – | NC | – | Not Used. |

Continued on next page.

| Signal Pin No. | Return Pin No. | Signal | Direction | Description |
|---|---|---|---|---|
| 15 | – | NC | – | Not Used. |
| 16 | – | GND | – | Logic GND level. |
| 17 | – | CHASSIS GND | – | Printer chassis GND. |
| 18 | – | NC | – | Not Used. |
| 19-30 | – | GND | – | "Twisted-pair Return" signal; GND level. |
| 31 | – | NC | – | Not Used. |
| 32 | – | NC | – | Not Used. |
| 33 | – | GND | – | Same as with pin numbers 19-30. |
| 34 | – | NC | – | Not Used. |
| 35 | – | NC | – | Not Used. |
| 36 | – | NC | – | Not Used. |

## Serial Interface Cable Specifications

An RS-232C 25-pin cable may be purchased from your dealer. This cable should have the following EIA standard pin arrangement on the end that will connect to your QMS printer serial interface port:

| Pin # | Description |
|---|---|
| 1 | Chassis Ground |
| 2 | Transmit Data |
| 3 | Receive Data |
| 4 | Request to Send |
| 6 | Data Set Ready |
| 7 | Logic Ground |
| 20 | Data Terminal Ready |

# Glossary

**Application Software**
Computer programs and their documentation. See COMPUTER PROGRAMS.

**ASCII**
An acronym for American Standard Code for Information Exchange. It is a 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.

**Baseline**
An imaginary line upon which the letters in a line sit.

**BASIC**
A programming language designed for IBM computers.

**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.

**Binary**
A base 2 number system written with the digits "0" or "1". See BIT.

**Bit**
An acronym for binary digit. The bit is the most funda-

mental unit of information that a computer can accept. It has two states called "1" (one) and "0" (zero), or "on" and "off", and can be used to represent a yes/no type of statement. Groups of bits are used to represent more complex statements such as a character (see ASCII). The most common grouping of bits is called a byte, consisting of eight bits.

**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.

**Centronics**

An industry-standard parallel interface.

**Character**

A single letter, number, symbol, space, or punctuation mark. Printable characters are those normally associated with a typewriter. Unprintable characters are special characters normally used by a computer to control a system, e.g. line feed, backspace, carriage return, escape, bell, start of text, etc.

**Column**

This usually refers to the position of a character on a page or on a computer display, Column 1 being the left hand character position irrespective of margin, Column 2 the one next to it, and on many computer displays Column 80 being the right hand one. It does not refer to a column in the sense used by a typist or a typesetter.

**Command**

An instruction comprised of a specific sequence of control characters and/or printable characters which enables a computer or printer to peform a specific task.

**Computer Program**
A set of computer commands which translates data entered by an operator into a sequence of instructions suitable for processing by the computer.

**Control Codes**
Non-printable characters used to control the position of printed or displayed data. See LINE FEED, FORM FEED, and CHARACTER.

**Copy Count**
A feature which allows multiple copies of each page to be printed.

**Decimal**
The number system with a base of 10.

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

**Diagnostic Page**
A page ejected by the printer following a serious error listing the problem or problems which caused the error condition.

**Differential Spacing**
Differential spacing is synonymous with proportional spacing.

**Dot Patterns**
A sequence of "on" or "off" dots defined by the user to generate graphics.

**Download Font**

A set of font data which is provided from outside the printer, as opposed to a resident font. They can be bought and kept on floppy discs, or the user can make up his own, if he knows how.

**Emulation**

In this manual, emulation refers to the ability of the printer to respond to commands that are intended for a different type of printer. For example, when the printer is configured in the Qume Emulation Mode, it will respond to the same commands as a Qume printer would.

**Error Code**

A two character code appearing in the display window of the control panel indicating an error condition in the printer.

**Escape**

A non-printable control character (usually abbreviated ESC) used with specific sequences of characters to define commands.

**Form Feed**

A control character which causes the print or display position to move to the next page.

**Forms Length**

The length, in lines, of printed page. The number of lines which may be printed before a Form Feed will be invoked. See Addressable Area and Printable Area Tables in the "Printer Specifications" section.

**Font**
A complete character set in one size and style.

**Graphics**
Printing, through special software commands, of graphs, diagrams, or other pictoral images.

**Group**
The major classification of configuration parameters.

**Hex**
An abbreviation of hexadecimal, a number system with the base 16. The hexadecimal system uses sixteen number symbols (0 through 9, and A through F) and is used as a simple way to represent binary numbers.

**Host Computer**
A computer transmitting data to a printer or other peripheral device.

**Image**
The representation on the printed page of the data sent to the printer. It is formed of closely placed dots of toner which are placed on the page electrostatically and fused.

**Interface**
A hardware component which allows two devices to communicate.

**Interface Cable**
A special cable used to connect the printer to the computer so they can communicate.

**Invalid**
Not understood by the printer. Refers to hardware or software communication.

**Keypad**
A pressure-sensitive panel on the front of the printer used to place the printer on or off line, toggle the Manual Feed, invoke a Form Feed, and configure the printer.

**Landscape**
A page orientation in which printing is done along the long dimension of the page. See PORTRAIT.

**Line Feed**
A character which causes the print position to move to the corresponding position on the next line. See CHARACTER.

**Memory**
Data storage capacity of a computer or printer controller.

**Mode**
One of several alternative conditions or methods of operation of a device, such as Qume Emulation Mode, Epson Emulation Mode, or Diablo Emulation Mode.

**Monospacing**
Same as unit spacing or standard spacing. Ordinary typewriter spacing.

**Numeric Characters**
Characters represented by the digits 0-9.

**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.

**Option**

The "sub-classification" of Groups. Each Option controls a different printer default condition.

**Page Orientation**

The relationship of the printed data to the long or short dimensions of the page. See PORTRAIT and LANDSCAPE.

**Parameter**

The variables within a command that determine the action which the command will initiate.

**Parallel**

A means of transferring data where the data bits representing each character are sent simultaneously along parallel lines or wires. See SERIAL.

**Pitch**

Characters per inch.

**Point Size**

The height of a font expressed in points, where a point is 1/72 inch. Also called type size.

**Portrait**

A page orientation in which printing is done along the short dimension of the page.

**Print Engine**

The "non-intelligent" portion of the printer including the laser, print drum, and paper feeding mechanism.

**Print Cartridge**
A disposable cartridge containing dry toner and a print drum.

**Print Position**
The position on the page where the next printed character will appear, determined by software commands, control codes, and text length.

**Print Quality**
A general measure of the appearance and readability of a printed page. Criteria of print quality include the darkness, clearness, and sharpness of the printed image.

**Print Wheel**
A rotating disk containing a type font which rotates to present a specified character to the print position.

**Printable Characters**
Characters representing letters (a-z), numbers (0-9), or punctuation (? : ; " . , etc.).

**Proportional Characters**
Characters assigned various widths according to their letterforms.

**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.

**RAM**
Random Access Memory.

**Raster Line**
One horizontal line of dots of a laser-printed page.

**Resolution**
The degree to which detail is displayed; the smoothness of the edges of characers. It depends to a large extent on the dot spacing, that of the QMS laser printer being 300 dots per inch compared to about 70 for a typical 'dot matrix' impact printer.

**ROM**
Read Only Memory.

**Serial**
A method of transferring data where the data bits representing each character are sent sequentially along a single line or wire. See PARALLEL.

**Specifications**
A written description listing requirements and specific technical information.

**Standard Spacing**
Ordinary typewriter spacing, also known as unit spacing or mono-spacing, in which each character occupies the same space. As opposed to proportional spacing.

**Status Code**
A two digit code appearing in the display window of the printer's control panel indicating an error condition or change of mode or status.

**Status Summary Sheet**
A page generated by the printer which shows the current fonts and selected printer options. This page is automati-

cally printed each time the printer is powered up.

**Support**
Ablity to comply with software commands or produce specific results. The QMS printer supports features and software commands of Qume, Diablo, and Epson.

**Test Page**
The page generated by the print engine to show the density of the image.

**Toggle**
To turn either on or off with the same action.

**Toner**
A powdered ink which is electrostatically applied to the paper and then fused to form the image on the page.

**Top-Of-Form**
The first line of a page.

**Warm Restart**
The QMS printer feature which causes setup changes to take effect. It also allows the printer controller to be reset without a power off / power on cycle.

**Word Processing Package**
A software program which provides the ability to add, change, move, and delete text.

# Index

## A


Addressable vs. Printable Areas ..... I-3
Alignment, Printer (Group 8) ..... 3-62
Horizontal ..... 3-62
Vertical ..... 3-63
ANSI Command Mode, selecting ..... 2-19
Group A Options ..... 3-12
Carriage Returns ..... 3-14
Character Spacing ..... 3-12, 3-13
Double-spaced Lines ..... 3-14
Line Spacing ..... 3-13
Line Overflows ..... 3-13
Line Feeds ..... 3-14
Measurement units ..... 3-12
ASCII characters ..... B-1
Automatic Paper Feed ..... 2-10, 4-6, 4-7


## B


Bit, 7-/8- considerations ..... 3-53, 3-54, D-29, D-30
Bit Rate ..... see "Interface Options, Serial"
Blank pages, suppression of ..... 3-37
Bold printing ..... D-28, E-14, G-26, H-29
Bottom Page Margin ..... 3-49, D-11, G-10, H-16


## C


Cable, Printer Interface ..... 1-3
parallel specifications ..... I-4, I-5, I-6
serial specifications ..... I-7
Cancel printing ..... 3-34
Care of printer ..... see "Maintenance"
Cartridge, font ..... A-11

Cartridge, print ..... 1-2, 5-2, 5-3
How to Replace the Print Cartridge ..... 5-3
When to Replace the Print Cartridge ..... 5-2
Centering, Automatic Line ..... D-26
Centronics ..... 3-50
Character set ..... A-2, A-3, A-4, A-5, A-6
selecting (HP) ..... H-25, H-26
Epson international ..... 3-25, E-31, E-32
Character Spacing, fixed ..... 3-13, 3-21, 3-22, D-14, E-7, E-8, E-9, E-10, F-7, F-8, F-9, G-13, G-14, H-27
Character Spacing, proportional ..... 3-13, 3-21, 3-30, D-23, D-24, D-25, G-25, H-27
Cleaning the Fixing Roller ..... 5-5
Cleaning the Primary Corona Wire ..... 5-5, 5-6
Cleaning the Separation Belt ..... 5-9
Cleaning the Transfer Corona Wire ..... 5-7
Cleaning the Transfer Guide ..... 5-8
Clearing a Paper Jam ..... 5-11
Clearing the Print Buffer ..... see "Cancel Printing"
Command translation table ..... 3-37, 4-12, 4-13, 4-15, 4-16
Common Interface Options ..... 3-50
Compressed Mode (Epson) ..... 3-24, E-9, E-10
Compressed Print (HP) ..... H-28
Compression, Command (HP) ..... H-10, H-11
Condensed Mode (Proprinter) ..... F-9
Contrast, Adjusting Print ..... 1-7
Control Characters ..... 4-12, 4-13, 4-16
Copies, Number of ..... 2-28, 2-29, 3-44, 4-7, 4-8, H-57
Copies, Number of (multiples of 10) ..... 3-45
Corona Wires ..... 5-5
Cleaning the Primary Corona Wire ..... 5-5, 5-6
Cleaning the Transfer Corona Wire ..... 5-7
CPI ..... see "Character Spacing, fixed"

# D

Debugger options ..... 3-64
Default settings ..... C-1
Deleting fonts ..... 4-3
Density, Epson Graphics Mode ..... E-33

Single, Epson ..... E-36
Double, Epson ..... E-36, E-37
Quadruple, Epson ..... E-37
Variable, Epson ..... E-37
Diablo 630 Emulation Mode ..... D-1
Extended Character Set (ECS) ..... D-29, D-30
Options ..... see "Setup, Printer"
Proportional Spacing ..... 3-21, 3-22, D-23, D-24, D-25
Summary of Supported Diablo Commands ..... D-2
Supported Diablo Commands ..... D-6
Formatting Commands ..... D-10
Print Position Commands ..... D-17
Single Character Commands ..... D-6
Special Printer Features ..... D-19
Word Processing Command Sequences ..... D-23
Unsupported Diablo Commands ..... D-4
Diablo Emulation Options ..... 3-20
Diagnostic Options (Group 9) ..... 3-63
Diagnostic Page ..... 3-64, 5-16
Display Window ..... 1-5, 2-1, 2-2, 2-4
Double-Strike ..... E-14, F-10
Download Command (Epson) ..... E-38, E-39, E-40
Download Fonts ..... 2-28, 4-3
DTR ..... see "Interface Options, Serial"

# E

Elite Mode (Epson) ..... E-9
Eight Bit considerations ..... 3-53, D-29, D-30
Emphasized Mode (Epson) ..... E-14
Emphasized Mode (Proprinter) ..... F-9
Emulation, defined ..... 2-18
Emulation mode, selecting ..... 2-18, 2-19, 2-20, 3-41, 4-9, 4-10
Envelopes ..... 2-10, H-58, H-59
Environment ..... I-2
Epson FX-80 Emulation ..... E-1
Options (Group E) ..... see "Setup, Printer"
Control Codes Redefined ..... E-41
Core Characters ..... E-43

Double-High, Double-Wide Letters ..... E-43
Formatting Commands ..... E-24
Forms Control Commands ..... E-23
Graphics Modes ..... E-33
Graphics Pin Combination Patterns ..... E-38
Graphics Using 7-Bit Systems ..... E-41
Plotter Graphics ..... E-38
Summary of Supported Epson Commands ..... E-2
Paper Feed Commands ..... E-20
Print Quality Commands ..... E-10
Print Width Commands ..... E-7
Selecting Print Modes ..... E-18
Special Printer Features ..... E-30
Unsupported Epson Commands ..... E-5
User-Defined Characters ..... E-38
Error Codes ..... 5-15
ESCape character ..... 4-1, 4-2
ESCape sequences ..... see "Software Commands"
Extended Printer Control ..... 4-10, 4-11

# F

Factory settings, reset to ..... 3-36
Feeding Paper ..... see "Paper Source"
Fixed Character Spacing ..... 3-21, 3-22, D-14, E-7, E-8, E-9, E-10, G-13, G-14, H-27
Fixing Assembly Cleaner ..... 5-4
Cleaning the Fixing Roller ..... 5-5
Replacing the Fixing Assembly Cleaner ..... 5-4
Font (Typeface) ..... A-1
Cartridges ..... A-11
Changing 2-22, 2-23, 3-15, 3-16, 3-19, 3-20, 4-3, 4-4, A-9, H-23, H-24, H-30
Character sets ..... A-2
Copying into memory ..... E-40, A-12
Deleting download ..... 4-3, H-33
Download ..... 2-28, A-11, A-12, H-33, H-34, H-35, H-36 ff.
Epson Default ..... 2-18, 3-24, 3-26
Landscape, Power-Up Default ..... 3-29
Orientation ..... A-7

Portrait, Power-Up Default ..... 3-29
Proprinter Default ..... 2-18, 3-27
Size ..... A-7, A-8
Style ..... A-7
Test Pages ..... 1-6
Translation Table ..... 4-12, 4-13, 4-14, 4-15, 4-16
What is a Font? ..... A-1
Width Tables ..... A-13
Form Feed/Carriage Return interpretation ..... 3-35, H-62
Form Feed Key ..... 1-5, 2-27, H-2
Forms LengthE-23, E-24, F-17, F-18, H-14 (see also "lines per inch" or "margins")
Function Keys ..... 2-3

# G

Graphics (Diablo) ..... D-23
Graphics Mode (Epson) ..... E-33
Graphics Mode (Proprinter) ..... F-21
Graphics, Raster (HP) ..... H-43
format ..... H-47, H-48
resolution ..... H-45
Group Key ..... 1-5, 2-2, 2-4, 3-6

# H

HMI ..... D-14, G-13, G-14, H-19
HP Emulation Mode ..... see "LaserJet"
Handles ..... 1-3
Hex Dump ..... 3-35, 4-11
Horizontal Position (HP) ..... H-22
Horizontal Tab command ..... D-8, E-28, F-12, F-17, G-7
Absolute ..... D-17, D-18, G-18, G-19
Setting tab stops ..... D-15, E-27, F-16, G-15

# I


Input buffer setup ..... 3-51, 3-53
Installation ..... 1-1
Interface cable, specifications ..... I-4, I-5, I-6, I-7
Interface Options, Common (Group 5) ..... 3-50
    Eighth Bit ..... 3-53
    Input buffer setup ..... 3-51, 3-53
    Interface Type ..... 3-50
    Online/Offline ..... 3-50
Interface Options, Parallel (Group 7) ..... 3-59
    Busy on Off-Line ..... 3-61
    Busy on printer error ..... 3-61
    Data Flow Control ..... 3-61
    Off-Line on Error ..... 3-61
    Set Fault Bit ..... 3-60
    Set printer error ..... 3-60
Interface Options, Serial (Group 6) ..... 3-54
    Bit Rate ..... 3-57
    Data Bits ..... 3-56
    DTR ..... 3-57
    Parity Checking ..... 3-54
    Parity Type ..... 3-55
    RTS ..... 3-58
    Stop Bits ..... 3-56
    XON/XOFF ..... 3-58
Interface type, setting ..... 3-50
International Character Set (Epson) ..... 3-25, E-30, E-31
Italic Mode (Epson) ..... E-17, E-18
    (HP) ..... H-28


# J


Justify, Auto Margin ..... D-27

# K

Keypad ..... 2-2

# L

Landscape Font, Power-Up Default ..... 2-25, 3-26
Landscape Page Orientation ..... 2-13, 2-14, 2-15, 3-10, 3-41, 3-43, H-14
LaserJet Emulation Mode ..... 2-22, 3-41, 4-9, H-1
Layout Commands, Page (HP) ..... H-12, H-13
defaults ..... H-13
LED ..... see "Display Window"
Left Page Margin ..... 3-43, D-12, E-25, G-10, G-11, H-17
Line Spacing ..... 3-13, 3-27, 3-28, D-14, E-21, E-22, F-18, F-19, F-20, G-11, G-12, G-13, H-18
Line Termination (HP) ..... H-62
Lines per page ..... see "Forms Length"
Loading Paper ..... 1-4
Lost Data Upon Power-Up ..... 1-5
LPI ..... see "Line Spacing"

# M

Macro Commands (HP) ..... H-51, H-52, H-53, H-54, H-56
Maintenance and Troubleshooting ..... 5-1
Cleaning the Transfer Guide ..... 5-8
Clearing a Paper Jam ..... 5-11
Corona Wires ..... 5-5
Cleaning the Primary Corona Wire ..... 5-5
Cleaning the Transfer Corona Wire ..... 5-7
Fixing Assembly Cleaner ..... 5-4
Cleaning the Fixing Roller ..... 5-5
Replacing the Fixing Assembly Cleaner ..... 5-4
Placing a Service Call ..... 5-21
Print Cartridge ..... 5-2
How to Replace the Print Cartridge ..... 5-3

When to Replace the Print Cartridge ..... 5-2
The Separation Belt ..... 5-9
Cleaning the Separation Belt ..... 5-9
Replacing the Separation Belt ..... 5-9
Troubleshooting ..... 5-14
Error Codes ..... 5-16
Print Quality Problems ..... 5-18
Status Codes ..... 5-15
The Diagnostic Page ..... 5-17
Manual Feed ..... 2-10
Key ..... 1-5, 2-3
Software command for ..... 4-6, 4-7
Tray, installing ..... 1-3
Margins, Page ..... 2-15, 2-16, 2-17, 3-46, 3-47, 3-48, 3-49
Diablo ..... D-11, D-12, D-13
Epson ..... E-25, E-26, E-27
LaserJet ..... H-15, H-16, H-17, H-18
Proprinter ..... F-17, F-18
Qume ..... G-9, G-10, G-13
Multiple copies ..... 3-44, 3-45, 4-7, 4-8

## O

Online Key ..... 1-5, 2-3
Option Key ..... 1-5, 2-4, 3-8
Orientation, Page ..... 2-13, 2-14, 2-15, 3-10, 3-41, 3-43, H-14
Output Stacker Tray, installing ..... 1-3
Overlay Commands (HP) ..... H-53, H-54, H-56, H-57, H-58
Overscore ..... F-11

## P

Page Length ..... see "Forms Length"
Page Description Memory ..... 2-30
Page Margin Settings ..... see "Margins, page"
Page Orientation ..... see "Orientation, page"
Paper Cassette, loading ..... 1-4

Paper Jams ..... 2-36, 5-11
Paper size, selecting ..... 2-7, 2-8, 2-9, 3-42, 4-6
Paper Source ..... 2-10, H-57, H-58
Automatic Paper Feed ..... 2-11, 4-6, 4-7
Manual Feed ..... 2-11, 2-12, 4-6, 4-7
Paper specifications ..... I-2
Paper Trays, installing ..... 1-3
Parallel Interface Cable Specification ..... I-4, I-5, I-6
Parallel Interface Options ..... see "Interface Options, Parallel"
Patterns, Line/Gray Scale (HP) ..... H-48, H-49, H-50
Pause command ..... 4-10, 4-11
Perforation Skip Zone (HP) ..... H-12, H-16
Pica Mode (Epson) ..... 3-24, 3-26, E-7, E-8, E-9, E-10
Pitch ..... see "Character Spacing"
Portrait Font, Selecting Power-Up Default ..... 2-25, 3-29
Portrait Page Orientation ..... 3-41, 3-43, H-14
Power Requirements ..... I-2
Print Cartridge ..... 5-2
Installation ..... 1-2
How to Replace the Print Cartridge ..... 5-3
When to Replace the Print Cartridge ..... 2-35, 2-36, 5-2
Print Contrast ..... 1-7
Print Position Commands (HP) ..... H-20
Print Spacing Commands (HP) ..... H-18
Printable areas of page ..... I-3
Printer Alignment ..... 3-62
Printer Control Language (HP) ..... H-3
Printer Emulation ..... see "Emulation"
Printer Interface Cable ..... 1-3, I-4, I-5, I-6, I-7
Printer Set-Up ..... 3-1
Printer Specifications ..... I-1
Addressable Areas ..... I-3
Parallel Interface Cable Specification ..... I-4, I-5, I-6
Printable Areas ..... I-3
Serial Interface Cable Specifications ..... I-7
Proportional spacing ..... 3-13, 3-18, 3-27, D-23, D-24, D-25, G-25, H-27
Proprinter Emulation Mode ..... F-1
Options (Group I) ..... see "Setup, Printer"
Summary of Supported Commands ..... F-2
Supported Commands ..... F-6

Bit Image Graphics ..... F-21
Character Selection ..... F-25
Download Fonts ..... F-27
Graphics Pin Combination Features ..... F-24
Horizontal Movement Commands ..... F-11
Line Spacing Commands ..... F-18
Plotter Graphics ..... F-24
Print Modes ..... F-7
Printer Control Commands ..... F-24
Tab Commands ..... F-15
Vertical Movement Commands ..... F-13
Unsupported Commands ..... F-5
Push/Pop Position (HP) ..... H-22

# Q

Qume Emulation Mode ..... G-1
Options (Group Q) ..... see "Setup, Printer"
Formatting Commands ..... G-8
Print Position Commands ..... G-16
Print Quality Commands ..... G-24
Single Character Commands ..... G-5
Special Printer Features ..... G-28
Summary of Supported Qume Commands ..... G-2
Unsupported Qume Commands ..... G-4

# R

Redefining characters ..... 4-12, 4-13, 4-14, 4-15, 4-16
Reset, Epson Master ..... E-20
Reset Printer (HP) ..... H-63
Reset, Setup ..... 3-36
Reset, Translation tables ..... 3-37, 3-39, 3-40
Right Page Margin ..... 3-39, D-13, E-25, G-11, H-17
RTS ..... see "Interface Options, Serial"

# S


Safety, Laser ..... ii
Separation Belt ..... 5-9
Cleaning the Separation Belt ..... 5-9
Replacing the Separation Belt ..... 5-9, 5-10
Serial Interface Cable Specifications ..... I-7
Serial Interface Options ..... see "Interface Options, Serial"
Service Call ..... 5-21
Setup Keys ..... 2-4, 2-5
Setup, Printer ..... 3-1
Alignment, Printer (Group 8) ..... 3-62
Horizontal ..... 3-62
Vertical ..... 3-63
ANSI Command Mode Options (Group A) ..... 3-12
Carriage Returns ..... 3-14
Character Spacing ..... 3-12, 3-13
Double-spaced Lines ..... 3-14
Line Spacing ..... 3-13
Line Overflows ..... 3-13
Line Feeds ..... 3-14
Measurement units ..... 3-12
Copies, Number of (Group 2) ..... 3-44
Copy Count ..... 3-45
Copies, Number of (Group 3) ..... 3-45
Copy Count ..... 3-45
Diablo Emulation Options (Group D) ..... 3-20
Carriage Returns ..... 3-21
Character Spacing, Diablo ..... 3-21
Character Spacing, Selecting ..... 3-22
Line Feeds ..... 3-22
Upper Case/Lower Case ..... 3-22
Diagnostic Options (Group 9) ..... 3-63
Debugger ..... 3-64
Debugger Mode ..... 3-64
Diagnostic Page ..... 3-64
Emulation Mode, Page Size/Orientation (Group 1) ..... 3-41
Delay Before Form Feed ..... 3-43
Emulation Mode ..... 3-41

Page Orientation ..... 3-43
Paper Size ..... 3-42
Epson Emulation Options (Group E) ..... 3-23
Carriage Returns ..... 3-26
Epson Print Mode ..... 3-24
International Characters ..... 3-25
Default Font ..... 3-26
Pica Print Quality ..... 3-24
Printing Zeros ..... 3-26
Fonts, Changing (Group C) ..... 3-15
Automatic Font Selection ..... 3-20
Font Numbers ..... 3-15
Procedure ..... 3-16, 3-17, 3-18, 3-19
Warm Restart ..... 3-19
Interface Options, Common (Group 5) ..... 3-50
Eigth Bit ..... 3-53
Interface Type ..... 3-50
Input Buffer Setup ..... 3-51, 3-52, 3-53
Online/Offline ..... 3-50
Interface Options, Parallel (Group 7) ..... 3-59
Busy on Off-Line ..... 3-61
Busy on Printer Error ..... 3-61
Data Flow Control ..... 3-61
Off-Line on Error ..... 3-61
Set Fault Bit ..... 3-60
Set Printer Error ..... 3-60
Interface Options, Serial (Group 6) ..... 3-54
Bit Rate ..... 3-57
Data Bits ..... 3-56
DTR ..... 3-57
Parity Checking ..... 3-54
Parity Type ..... 3-55
RTS ..... 3-58
Stop Bits ..... 3-56
XON/XOFF ..... 3-58
Landscape Font, Select Power-Up (Group L) ..... 3-29
Margins, Page (Group 4) ..... 3-46
Bottom Margin ..... 3-49
Left Margin ..... 3-46
Right Margin ..... 3-47

Top Margin ..... 3-48
Portrait Font, Select Power-Up (Group P) ..... 3-29
Proprinter Emulation Options (Group I) ..... 3-27
Automatic Line Feed ..... 3-27
Carriage Returns ..... 3-28
Character Set ..... 3-28
Pica Default Font ..... 3-28
Printing Zeros ..... 3-27
Qume Emulation Options (Group Q) ..... 3-30
Automatic Carriage Return/Line Feed ..... 3-31
Carriage Returns ..... 3-31
Line Spacing ..... 3-30
Character Spacing, Qume ..... 3-30
Character Spacing, Selecting ..... 3-32
Summary of ..... C-1
System Function Options (Group 0) ..... 3-32
Blank Page, Suppress ..... 3-37
Cancel Printing ..... 3-34
Copy Count Reset ..... 3-33
Form Feed/Carriage Return ..... 3-35
Hex Dump ..... 3-35
Reset, Immediate Command Table ..... 3-39
Reset, Immediate Font Table ..... 3-40
Reset, Printer Setup ..... 3-36
Reset Translation Tables ..... 3-37
Status Summary Sheet, Suppress ..... 3-38
Setup Reset ..... 3-36
Seven Bit System Considerations ..... see "Bit, 7/8"
Software Commands, Printer ..... 4-1
Copies, Selecting Number of ..... 4-7, 4-8
Diagrams, Command ..... 4-2
Emulation Mode, Selecting ..... 4-9, 4-10, 4-11
Extended Printer Control ..... 4-10, 4-11
Font test pages ..... 4-10, 4-11
Hex dump mode ..... 4-10, 4-11
Pause command ..... 4-10, 4-11
Status summary sheet ..... 4-10, 4-11
Fonts, Changing ..... 4-3, 4-4
Orientation, Changing Page ..... 4-5, 4-6, 4-7
Paper, Selecting Feed and Size ..... 4-6, 4-7, 4-8

Translation tables, redefining ..... 4-12
Command translation table ..... 4-12, 4-13
Font translation table ..... 4-14
Resetting tables ..... 4-15
Status Codes ..... 5-15
Status Summary Sheet ..... 1-5
Special Characters (Epson) ..... E-38
defining ..... E-38, E-39
downloading ..... E-40
Subscript ..... E-15, F-10
Superscript ..... E-15, F-10
System Function Options (Group 0) ..... 3-32
Blank Page, Suppress ..... 3-37
Cancel Printing ..... 3-34
Copy Count Reset ..... 3-33
Form Feed/Carriage Return ..... 3-35
Hex Dump ..... 3-35
Reset, Immediate Command Table ..... 3-39
Reset, Immediate Font Table ..... 3-40
Reset, Printer Setup ..... 3-36
Reset Translation Tables ..... 3-37
Status Summary Sheet, Suppress ..... 3-38

# T

Tabs ..... see "Horizontal" or "Vertical"
Termination, Line (HP) ..... H-62
Test Key ..... 1-5, 2-3
Text Length (HP) ..... H-16
Toggle Key ..... 1-5, 2-5, 3-7
Toner Cartridge ..... see "Print Cartridge"
Top Page Margin ..... 3-48, D-11, G-9, H-15
Transfer Guide, Cleaning ..... 5-8
Translation Tables ..... see "Software Commands, Printer"
Troubleshooting ..... 5-14
Diagnostic Page ..... 5-17
Error Codes ..... 5-16
Status Codes ..... 5-15
Print Quality Problems ..... 5-18

Typefaces ..... see "Fonts"

## U

Underlining ..... D-28, E-16, E-17, F-11, G-25, G-26, H-60, H-61

## V

VMI ..... D-14, G-11, G-12, H-19
Vertical Position (HP) ..... H-21
Vertical Tab Command ..... D-8, E-29, F-13, F-16, G-7
Absolute ..... D-18
Setting tab stops ..... D-16, E-29, F-15

## W

Warm Restart ..... 3-8, 3-11, 3-19

## X

XON/XOFF . . . . . 3-58

## Z

Zeros, slashes in . . . . . 3-26