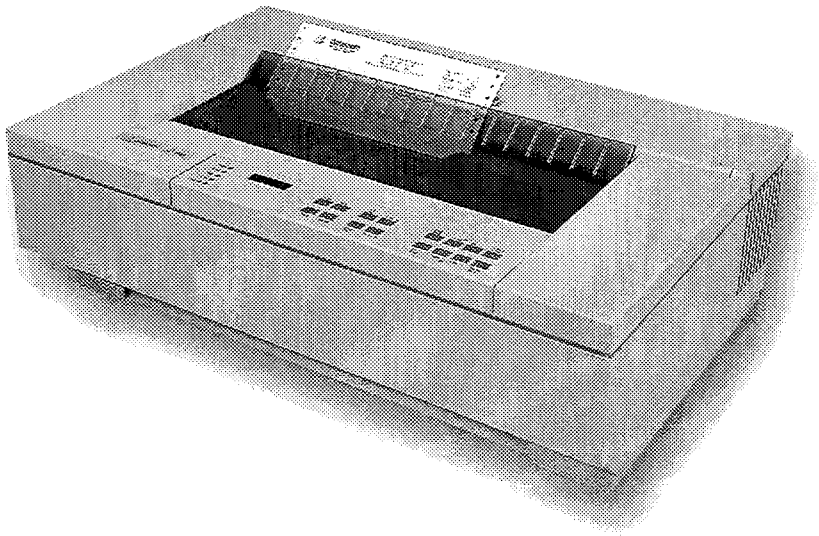
AMTDatasouth

XL 400 SERIES

User's Guide



PART NO. 105856 REV. D

INTRODUCTION

Your new multimode matrix printer offers bidirectional logic-seeking printing at 400 cps in draft mode, memo quality printing at 180 cps and up to 120 cps in near-letter-quality correspondence mode. Because of its multimode capabilities, this printer is suited for applications where multiple printers would otherwise be required. True lower case descenders and simultaneous underlining are possible. An adjustable printhead gap accommodates forms up to six parts in thickness. Fanfold forms from 3 to 15 inches may be fed through the front or bottom of the printer.

The programmable features of this printer may be configured from the control panel on the front of the printer or via the communication line. The LED indicators, digital display and custom keypad make format set up quick and simple. A non-volatile memory retains the settings when power is turned off, eliminating the need to reconfigure the printer before its next use.

Baud rates from 110-19.2K may be used over the RS-232 interface. A 16K character buffer and a choice of three handshaking protocols ensure optimum throughput. An 8-bit parallel interface is also provided.

The Supplier has made every effort to ensure that the contents of this document are complete and correct. Because of continuing product enhancements, we frequently update the manuals in this library. Your comments are welcome and any suggestions you have can help us improve the quality and usefulness of our publications. Comments may be addressed to place of purchase.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE

This equipment has been tested and found to comply with the limits for a Class A Digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE

When connecting the printer to a host computer system, always use shielded interface cables. The use of non-shielded interface cables is a violation of the FCC emissions limits for a Class A computing device. Do not leave unterminated interface cables connected to the printer.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Umstellung oder Abänderungen diese Gerätes dürfen nur mit ausdrücklicher Einwilligung der für die Zulassung verantwortlichen Partei geschehen und Verstöße dagegen könnten zur Folge haben, daß die Betriebserlaubnis für diese Ausrüstung widerrufen wird.

Los cambios o modificaciones a esta unidad no aprobados explicitamente por la parte responsable del cumplimiento podrían invalidar la autoridad del usuario para hacer funcionar el equipo.

Les changements et modifications faits à cet unité et pas explicitement approuvés par la partie responsable de la conformité peuvent annuler l'autorité de l'usager á opérer l'équipement.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Any alteration or modification to this equipment may cause non-compliance to:

Jegliche Umstellung oder Abänderung dieses Gerätes kann Zuwiderhandlung gegen:

Cualquier alteración o modificación a este equipo podría causar el incumplimiento con:

Le changement ou la modification quelconque à cet équipement peut causer non-conformité avec:

UL safety standard 1950
IEC safety standard 950
CSA safety standard C22.2 NO. 950
FCC Title 47, Part 15 regulations
for Class A Computing Devices
VDE EMI regulation Vfg 1046, Class B
EN55022 Class A limits
Canadian Radio Interference Regulations
CRC c.1374, Class A, Canada

zur Folge haben.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Connect 115V (230V) units to 115V (230V) outlets only!

115V (230V) Geräte nur an 115V (230V) Geräte anschließen!

¡Conectar unidades de 115V (230V) a tomas solamente de 115V (230V)!

Brancher les unités 115V (230V) avec seulement les prises 115V (230V)!

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

The printhead gets hot during use. Wait until the printhead is cool before handling the printhead.

Die Druckköpfe erhitzen sich, während das Gerät in Betrieb ist. Die Druckköpfe müssen erst ausgekühlt sein, bevor sie angefaßt werden dürfen.

La cabeza impresora se calienta con el uso. Esperar hasta que la cabeza impresora se enfríe antes de manipularla.

La tête d'impression se chauffe pendant l'usage. Attendre que la tête d'impression soit froide avant de la toucher.

CAUTION/VORSICHT/PRECAUCION/AVIS

If the power requirements are other than that indicated on the product label, the power selector switch must be set accordingly.

Wenn die Stromversorung eine andere als in der Produktbeschreibung ist, muß der Stromeinstell-Schalter entsprechend eingestellt werden.

Si las necesidades de potencia son diferentes a aquellas indicadas en la placa del producto, el selector de potencia tiene que ser debidamente ajustado.

Si les necesités de puissance sont autres que lesquelles indiquées sur l'etiquette du produit, il faut regler en conséquence la selectrice de puissance.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Connecting this equipment to an ungrounded power receptacle can result in the risk of electrical shock.

Der Anschluß dieses Gerät an einen ungeerdeten Kraftstrom-Behälter kann einen elektrischen Schock verursachen.

El conectar este equipo a una toma de corriente no conectada a tierra puede resultar en el riesgo de un corrientazo.

Branchant cet équipement à une prise pas connecté à terre peut résulter en risque de choc électrique.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Make certain the printer is disconnected from the AC power supply before reaching into the printer to perform any cleaning or maintenance task.

Der Drucker muß vom Stromnetz abgekuppelt sein, ehe irgend welche Wartungs- oder Reinigungsarbeiten vorgenommen werden können.

Asegurar que el impresor se desconecte de la corriente alterna AC antes de meter la mano dentro del impresor para cualquier labor de limpieza o mantenimiento.

Assurer que l'imprimante n'est pas brancher à la source de puissance AC avant de mettre la main dans l'imprimante pour nettoyage ou entretien.

CAUTION/VORSICHT/PRECAUCION/AVIS

The printer must have the correct line fuse installed for the selected input voltage.

Eine entsprechende Sicherung muß für die gewählte Voltzahl installiert werden.

El impresor tiene que tener instalado el fusible debido para el voltaje de entrada.

L'imprimante doit avoir installé la juste ligne de fusible pour le voltage d'entrée choisi.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

The operator must disconnect the printer from the AC power supply before performing any corrective action procedure that requires reaching into the printer.

Der Drucker muß von der Stromversorgung abgekuppelt werden, ehe irgend welche Berichtigungs-Maßnahmen durchgeführt werden, die es notwendig machen, in das Innere des Druckers zu langen.

El usario tiene que desconectar el impresor de la corriente alterna AC antes de hacer cualquier procedimiento de corección que requiera meter la mano dentro del impresor.

Il faut que l'usager débranche l'imprimante de la source de puissance AC avant de réaliser quelconque procédure rectificatif que oblige mettre la main dans l'imprimante.

Einhaltung mit betreffenden Bestimmungen kommt darauf an, dass geschirmte Ausfuhrungen gebraucht werden. Fur die Beschaffung richtiger Ausfuhrungen ist der Betreiber verantwortlich.

DIESES GERAET WURDE SOWOHL EINZELN ALS AUCH IN KINER ANLAGE, DIE EINEN NORMALEN ANWENDUNGSFALL NACHBILDET, AUF DIE EINHALTUNG DER FUNK-ENTSTOERBESTIMMUNGEN GEPRUEFT. ES IS JEDOCH MOEGLICH, DASS DIE FUNK-ENTSTOERBESTIMMUNGEN UNTER UNGUENSTIGEN UMSTAENDEN BEI ANDEREN GERAETEKOMBIKATIONEN NICHT EINGEHALTEN WERDEN. DER BETREIBER IST FUER DIE EINHALTUNG DER FUNK-EUTSTOERUNGS BESTIMMUNGEN SEIRER GESAMTEN ANLACE VERANTWORTLICH, IN DER DIESES GERAET BETRIFBEN WIRD.

BESCHEINIGUNG DES HERSTELLERS/IMPORTEURS

Hiermit wird bescheinight, dass der/die/das

Model XL400
(Gerat, Typ, Bezeichnung)

in Uebereinstimmung mit den Bestimmungen der

Vfg 1046/1984
(Amtsbkattverfugung)

funk-entstort ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerates angezeigt und die Berechtigung zur Ueberprufung der Serie auf Einhaltung der Bestimmungen eingeraumt.

Datasouth Computer Corporation
Name des Herstellers/Importeurs

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1 GENERAL INFORMATION

1.1 IN THIS CHAPTER

This chapter explains how to unpack, install, and start the printer. It includes step-by-step instructions for all procedures from unpacking through complete installation. This chapter also includes illustrations to familiarize you with the printer parts and to help you perform the procedures.

1.2 ABOUT THE PRINTER

The printer occupies a surface area 24.5" x 16". Provide at least two inches of clearance on all sides of the printer for adequate ventilation. Do not block the exhaust louvers on the side of the cover.

Forms can be either front-loaded or bottom-loaded. For front-loading, locate the printer near the front edge of the table so that forms will have a clear path into the front feed slot. For bottom-loading, place the printer on a stand or a slotted work table.

The printer will accommodate forms ranging in width from 3 through 15 inches. Forms must be the pin feed type. The printers also accommodate multiple-part forms with as many as six sheets and with a maximum recommended thickness of 0.021 inch.

Figure 1.1 represents a typical printer. As you study this illustration, compare all parts identified in the illustration to the printer itself. Being familiar with the printer parts will help you install and operate the printer.

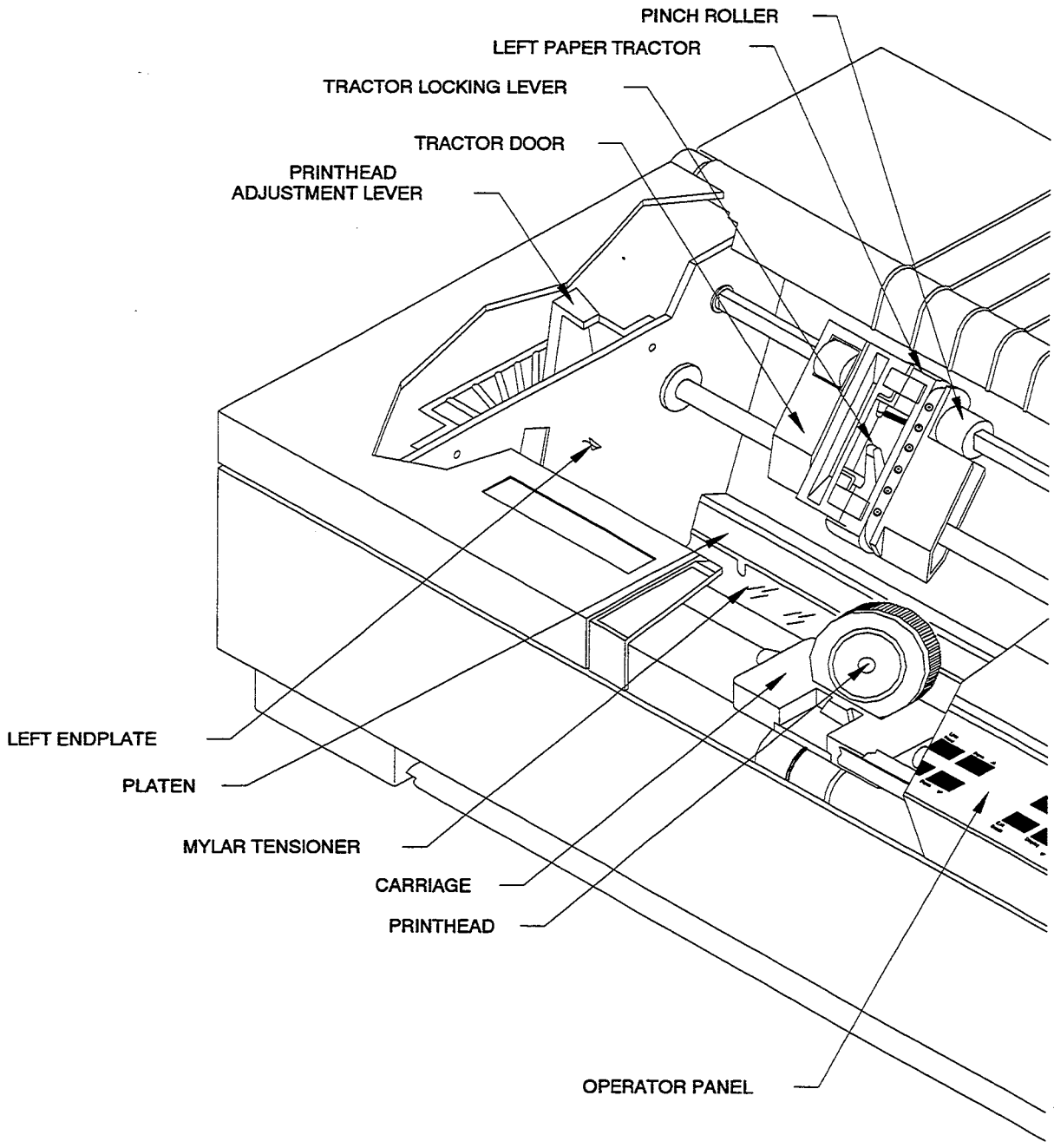
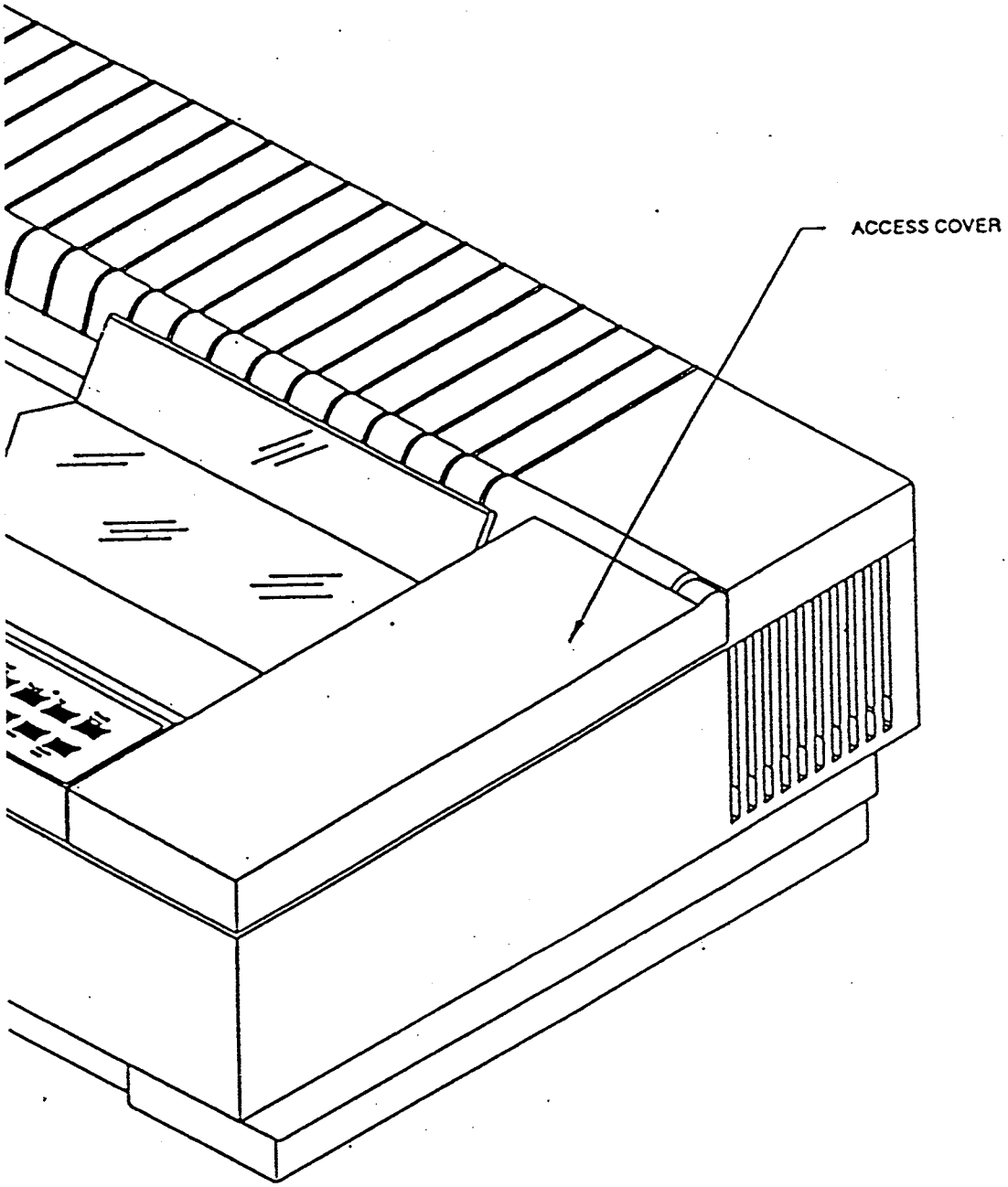


Figure 1.1 Printer



1.3 UNPACKING AND INSTALLATION

Perform the following steps:

1. Lift the printer from the box and place the printer on the stand or work table where it will operate.
2. Remove the following items from the box:

   printer
   power cord
   user documentation
   fuse kit
   quick reference card
   front panel

> **NOTE**
> Do not discard original packaging materials.
> Shipping the printer in any container other than
> its original packaging may cause damage during shipping
> and may void the warranty.

3. Lift the access cover and remove the shipping restraint from the carriage and right endplate. (To locate the carriage, see Figure 1.1.)
4. Manually move the carriage.
   Result: A noticeable degree of resistance occurs due to the motor, but the carriage should move smoothly without binding.

> If the carriage either does not move smoothly
> (because it is jammed or due to momentary binding),
> or moves with no resistance at all,
> then have the cable drive mechanism inspected
> by a service technician before operating the printer.

1.4 HOW TO INSTALL AND POWER ON THE PRINTER

The power cord input connector and power switch are located on the left rear of the printer, (see Figure 1.2).

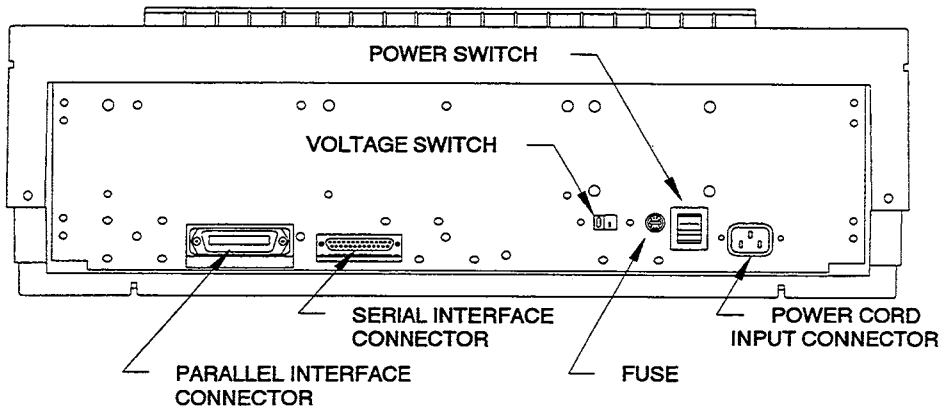


Figure 1.2 Power and Interface Connections

1.4.1 Procedure

To install the power cord and apply power to the printer proceed as follows:

1. Set power switch to off.
2. Observe the input voltage setting label on the rear of the printer. Make sure th this voltage is correct for the installation. If not, proceed as follows:

   Set the voltage select switch to the proper input voltage.

   Install the proper fuse as directed by the voltage setting label.
3. Remove the label and install the end of the power cord into the power cord input connector. Make certain the power cord is properly seated.
4. Plug the other end of the power cord into a grounded AC outlet (115 volts for United States users).

> **NOTE**
> Plugging the printer into an outlet which is not grounded will result in increased radio frequency noise generation (see FCC Testing note in front of manual) and may also cause erratic printer operation.

5. To send power to the printer, set the power switch to ON.
   Result: The carriage automatically resets to the left margin, the Paper out indicator on the operator panel flashes continuously, and an audio alarm sounds three short tones. This simply indicates there is no paper in the printer.

6. Perform a default reset (as explained in Chapter 5, Paragraph 5.3).
Result: A default reset loads a known set of parameters (default values) into the non-volatile memory.

1.5 HOW TO INSTALL THE RIBBON CARTRIDGE

1. Press Off line key to take printer off line.
2. Raise access cover.
3. Use the printhead adjustment lever to move the printhead away from platen.
4. Remove ribbon cartridge from box and polyethylene bag.
5. Remove rubber band from ribbon guide to release it from the cartridge body. See Figure 1.3.

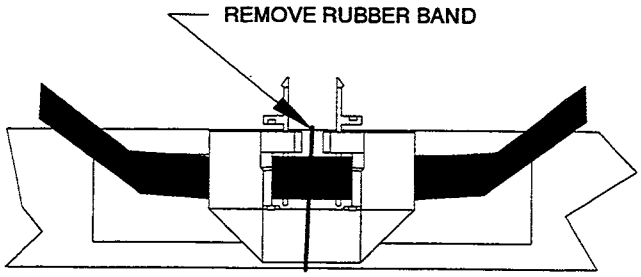


Figure 1.3 Ribbon Guide

6. Turn the ribbon advance knob in the direction of the arrow on the ribbon cartridge to take up slack in the ribbon.
7. Move the printhead to the center of the printer away from the paper tractors.
8. Lower the ribbon cartridge into the printer.

9. Lift the rear of the cartridge over the drive blade and move the cartridge back into the ribbon clips and then down on the ribbon plate. It may be necessary to turn the ribbon advance knob to allow the drive blade on the ribbon plate to engage the ribbon cartridge. See Figure 1.4.

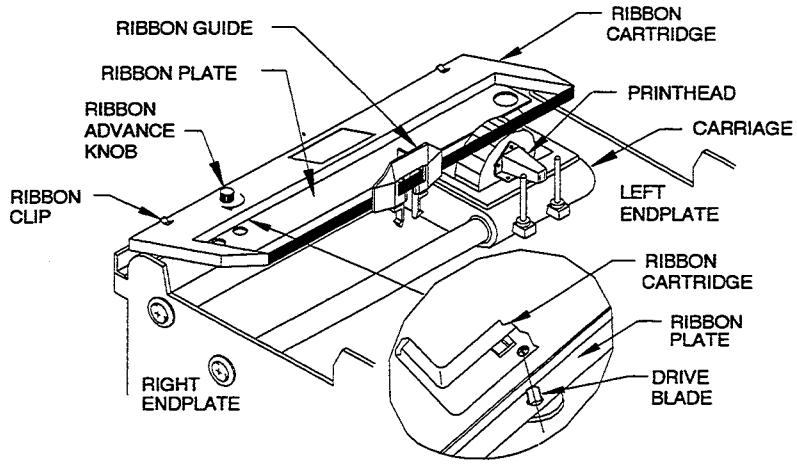


Figure 1.4 Ribbon Cartridge

10. Make certain the ribbon is located with ribbon guide as shown. Using the finger hold, place the lower ribbon guide holes on the pins located on either side of the printhead nose. See Figure 1.5.

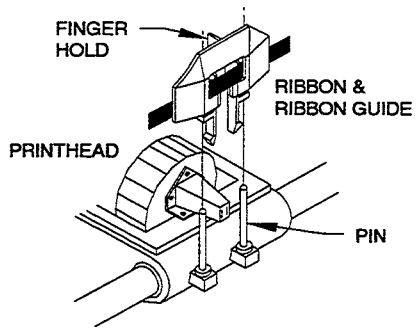


Figure 1.5 Ribbon Guide Installation

11. Move the ribbon guide down between the platen and the printhead until the snaps on the ribbon guide lock into place. To prevent the ribbon from bunching in the ribbon guide, move the printhead left and right turning the ribbon advance knob. See Figure 1.6.

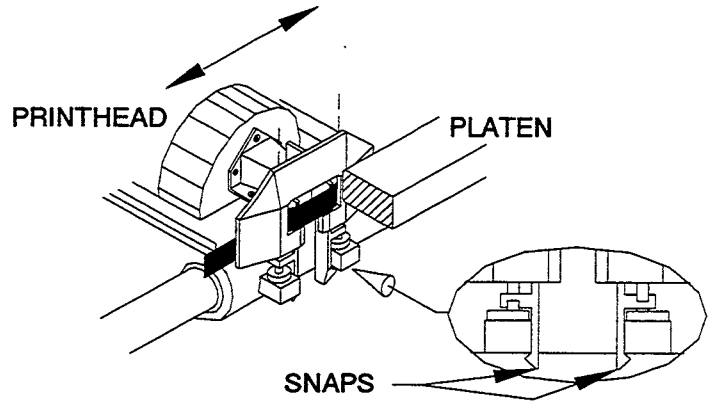


Figure 1.6 Ribbon Guide And Platen

12. Check to ensure that the ribbon guide snaps are locked, the pins pass through the top ribbon guide holes, and the ribbon is in front of the pins, as shown in Figure 1.7.

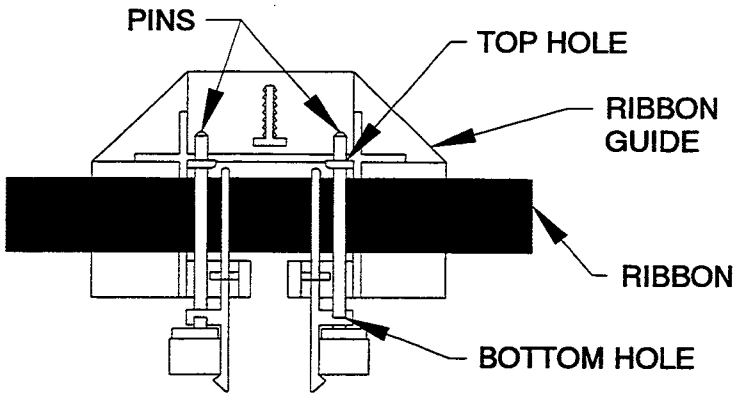


Figure 1.7 Ribbon Guide Tool

13. Adjust printhead-to-platen gap before operating printer as described in Paragraph 1.7.

1.6 HOW TO LOAD FORMS

As stated earlier, the standard printer accommodates forms ranging in width from 3 to 15 inches. Forms must be of the pin feed type. You can use multiple part forms with as many as six sheets, and with a maximum recommended thickness of 0.021 inch.

If you use a form with card stock, the card must be the last part and entry into the printer must be through the bottom feed slot.

1.6.1 LOADING METHODS

As shown in Figure 1.8, you can load forms into the printer either through:

- The front of the printer when the printer is mounted on a desktop (front loading)
- The bottom of the printer when the printer is mounted on a stand (bottom loading)

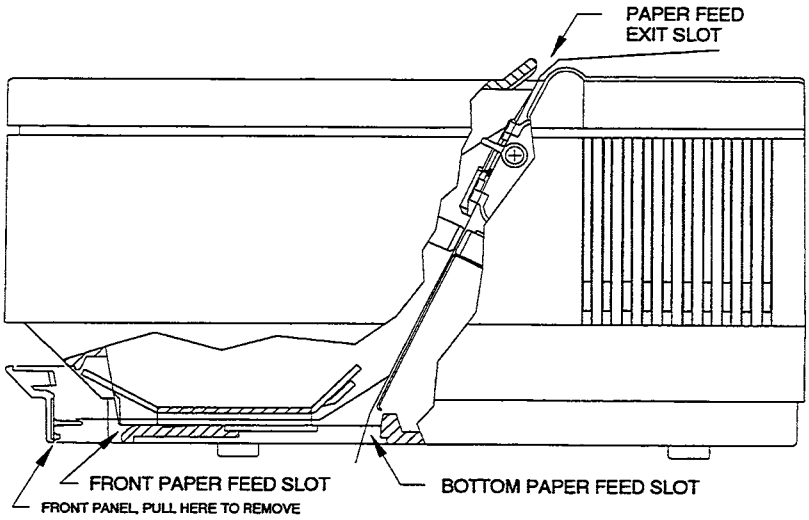


Figure 1.8 Form Loading Slots

1.6.2 FRONT LOADING

The following procedure gives step-by-step instructions for loading a one part, pin-feed form:

1. Make certain the printer is off line (the "On line" light is off).
2. If your printer is equipped with a front panel, (See Figure 1.8) it must first be removed by pulling forward on the bottom edge.
3. Raise access cover.
4. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last detent position.

> **WARNING**
> **The printhead gets hot during use. Wait until the printhead is cool before handling the printhead.**

5. To set the left margin of the paper, manually move the printhead to the far left of the printer and align the left tractor with the printhead as shown in Figure 1.9. Use tractor locking lever to lock the tractor in this position.

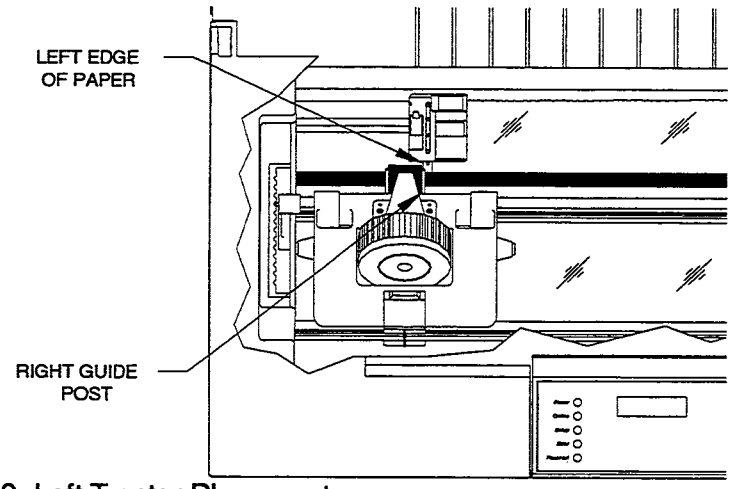


Figure 1.9 Left Tractor Placement

6. Manually move the printhead to the center of the printer.
7. Push paper into the front feed slot and continue to feed paper in until it advances past the mylar tensioner.
8. Pull top of paper up level with top of tractors.
9. Place left side of paper in left tractor.
10. Align the right tractor with the right side of the paper and lock it into position. Place the paper into the tractor.

11. Set the top of form as follows:

    Advance the form into the required position by using the Line feed, Form ▲, and Form ▼ keys.

    Press the Set key so that the digital readout displays 1, indicating line 1.

    Press the Form Feed key.
    Result: The paper advances by one sheet and stops at the preset top-of-form position.

12. If necessary, readjust the printhead-to-platen gap (described in Paragraph 1.7.1).

13. As a final check, make certain the paper is properly aligned and is resting flat against the platen with no wrinkling or buckling. The paper path to the printer must be unrestricted (paper should not travel across desk corners or other objects).

> **NOTE:**
> To determine if the form is correctly positioned, you can run the print-test procedure which prints test data. This procedure is described in Paragraph 1.8.1.

1.6.3 PROCEDURE FOR BOTTOM-LOADING THE FORMS

The procedure for loading paper through the bottom of the printer is similar to the previous procedure. To bottom-load the forms, perform the following steps:

1. Make certain the printer is in the Off line condition (the On line light is off).
2. Raise the access cover.
3. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last position.
4. To help set the left margin of the paper, manually move the printhead to the fa left of the printer and align the left tractor with the printhead. Use the tractor locking lever to lock the tractor in this position.

> **WARNING**
> **The printhead gets hot during use. Wait until the printhead is cool before handling it.**

5. Manually move the printhead to the center of the printer.
6. Feed the paper through the bottom feed slot and continue to feed paper in until it advances past the mylar tensioner. Make certain the paper path is unrestricted.
7. Pull the top of the paper up until it is level with the top of the tractors.
8. Place the left side of the paper in the left tractor.

9. Align the right tractor with the right side of the paper and lock it into position. Place the paper into the tractor.

10. Set the top of form as follows:

    Advance the form into the required position by using the Line Feed, Form ▲, and Form ▼ keys.

    Press the Set key so that the digital readout displays 1, indicating line 1.

    Press the Form Feed key.
    Result: The paper advances by one sheet and stops at the preset top-of-form position.

11. If necessary, readjust the printhead-to-platen gap (described in Paragraph 1.7.1).

12. As a final check, make certain the paper is properly aligned and is resting flat against the platen with no wrinkling or buckling. The paper path to the printer must be unrestricted (paper should not travel across desk corners or other objects).

> **NOTE:**
> To determine if the form is correctly positioned, you can run the print-test procedure which prints test data. This procedure is described in Paragraph 1.8.

1.7 HOW TO READJUST THE PRINTHEAD

As stated earlier in this chapter, you can achieve the optimum print quality for the thickness of the form by adjusting the printhead-to-platen gap. You do this using the printhead adjustment lever.

1.7.1 PROCEDURE

After installing the ribbon cartridge and loading the forms, perform the following procedure to readjust the printhead-to-platen gap.

1. Move the printhead to the approximate center position.
2. Run a print sample (as explained in Paragraph 1.8). If the print quality is not acceptable (that is, dots are missing from characters), move the printhead closer by one position and run another print sample.
   Result: As the printhead moves closer, the impact force of the print wires increases, thus causing the print quality to improve. However, this also increases the likelihood of ribbon smearing.
3. Continue to move the printhead closer and run print samples until an acceptable print quality is produced.

> **NOTE**
> There is no direct correlation between printhead position and paper type (that is, the printhead adjustment lever is not set to the fourth position for a four-part form).

1.8 HOW TO VERIFY PRINTER OPERATION

After setting the printer up and loading the paper, perform a print-test. The print-test is a preprogrammed routine that verifies proper printer operation.

Although the print-test requires limited use of the operator panel, it is not necessary to fully understand the operator panel at this time. The operator panel is discussed in greater detail in the next chapter.

Figure 1.10 illustrates the steps in this procedure.

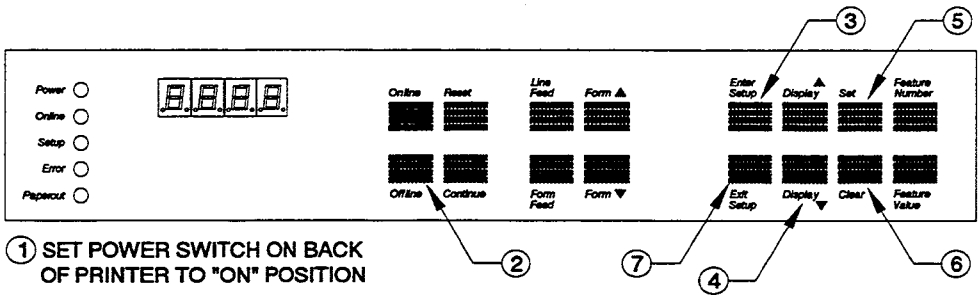


Figure 1.10 Initiating Print Test

1.8.1 PROCEDURE

Before you begin, make sure the printer is loaded with paper which is 10 inches wide or wider. Otherwise, reduce the right margin using Feature Number 6 to match the paper width.

To start the print-test, perform the following steps:

1. Set the power switch to the ON position.
2. Press the Off line key.
3. Press the Enter Setup key.
4. Press the Display ▼ key until the number 99 is displayed. If the display advances past 99, use the Display ▲ key to return the display to 99, or continue to hold the Display ▼ key and the display will "wrap around" to 99 after it reaches 1.
5. Press the Set key to start the print-test.
   Result: The printer begins printing the programmed pattern.

6. To stop the printer, press the Clear key. Figure 1.11 is a sample of the first ten lines of the printout. After the printer stops, check the printout for errors by comparing it to Figure 1.11.

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
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'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abc
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcd
```

Figure 1.11 Test Pattern

7. To restore the printer to normal after print-test, press the Exit Setup key.
8. Place printer in ready condition by pressing the On line key.

1.9 PRINTER INTERFACE TYPES

Because the printer acts as an output device for another device such as a computer, it must have a communications interface to enable data to be transmitted between the two devices.

This printer has two types of communications interfaces:

- EIA RS-232-C serial interface
- TTL level 8-bit Centronics parallel interface

These types of interfaces are industry standards which allow compatibility with a large number of other products. For more detailed information about interfacing, see Chapter 3.

2 OPERATION

2.1 INTRODUCTION

This chapter contains sections which describe how the operator may set the various programmable features and gain the most efficient use of the printer.

2.2 OPERATOR PANEL

The operator panel allows programming of the various features of the printer. The operator can change communications, printing, and forms-handling features. A functional description of the operator panel controls and indicators is given in Table 2.1.

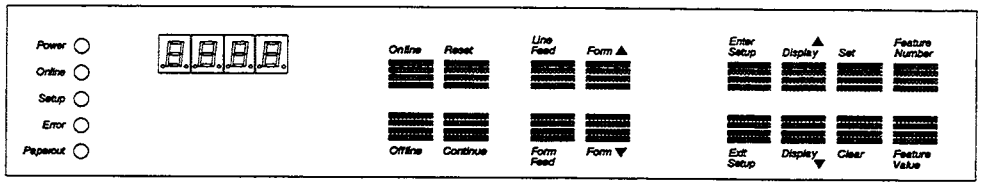


Figure 2.1 Operator Panel

Table 2.1 Operator Panel Controls and Indicators	
Key or Indicator	**Function**
Power Indicator	LED (Light Emitting Diode) glows steadily when power is on.
On line Indicator	LED glows steadily when the printer is on line.
Setup Indicator	Flashes while printer is in setup mode.
Error Indicator	LED blinks when an error condition occurs.
Paper out Indicator	LED blinks when paper-out condition occurs.
Digital Display	Displays feature numbers
On line Key	Press this key to place the printer on line.
Off line Key	Press this key to place the printer in the local or off line condition. The local condition will signal BUSY on the communications interface.
Reset Key	Press this key to restore the carriage to the left most position and clear the buffer.
Continue Key	Press this key to resume operation after an error or paper-out condition has been corrected. Do not press the Continue key until after the error has been corrected.
Line Feed Key	Press this key to generate a line feed. If the key is depressed for more than .5 seconds, the paper will advance continuously until the key is released. This paper movement is registered electronically in the forms control program.
Form Feed Key	Press this key to generate a paper movement to the top of the next form. This key operates in either the off line or on line condition. This paper movement is registered electronically in the forms control program.
Form ▲ Key	Press this key to move the form upward 1/144 inch for precise form alignment. This paper movement does not register electronically in the forms control program. This key may be used while the printer is operating.

Table 2.1 Operator Panel Controls and Indicators	
Key or Indicator	**Function**
Form ▼ Key	Press this key to move the form downward 1/144 inch for precise form alignment. Do not reverse the paper more than one line. This paper movement does not register electronically in the forms control program. This key may be used while the printer is operating.
Enter Setup Key	Press this key to enter setup mode.
Exit Setup Key	Press this key to exit setup mode.
Display ▲ Key	Press this key to increase digital display value when in Setup mode.
Display ▼ Key	Press this key to decrease digital display value when in Setup mode.
Set Key	When in Setup mode, pressing this key sets the numeric value of the parameter in the display (value features). It is also used to set the "ON" or "ENABLED" condition on features 27 through 99 (discrete features). When the printer is not in set up mode, the Set key is used to set the top of form. (See Setting Top of Form).
Clear Key	Press this key to set an "OFF" or "DISABLED" condition on discrete features. It also terminates self-test.
Feature Value Key	Press this key to display the value of the parameter currently addressed.
Feature Number Key	Press this key then press the Display ▲ or Display ▼ key to select the desired feature number.

2.3 USING THE OPERATOR PANEL

As mentioned in Paragraph 2.2, the purpose of the operator panel is to allow the operator to configure all programmable features of the printer. By specifying these features (such as baud rate, left and right margins, communications protocol, etc.) the printer can be adapted to best suit the operator's needs. Once set, the values are retained in a non-volatile memory and will not be lost when power is turned off. When powered on, the printer resumes operation with all user-programmable features configured as they were when the printer was last powered off.

The programmable features are divided into two main categories; value features and discrete features. Value features are those features which require a numeric value. Discrete features are those features which require only an on/off setting. Descriptions of all features and examples of how to set both types are given in the following paragraphs.

2.4 SETTING VALUE FEATURES

The following example shows how to use the operator panel to program the right margin.

1. Press the Off line key to take the printer off line.
2. Press the Enter Setup key to enter the setup mode.
3. Press the Display ▲ until 6 (the feature we wish to change) shows in the display.
4. Press Feature Value to display the current right margin setting.
5. Use the Display ▲ or Display ▼ keys to select the value required for your application. For example, Display ▼ from the default value of 132 to 85 for 8.5 inch paper if you are using a 10 CPI font.
6. Press Set to save the value you have selected.
7. If you wish to change another feature, press the Feature Number key and follow steps 3 through 7 for each value feature to be changed.
8. Press the Exit Setup key to exit Setup mode.
9. Press On line or the Continue key to resume normal operation.

The above example depicts the appropriate procedure for programming features 1 through 26. A description of all value features and instruction on how to program each are given below.

NOTE
For future reference, record the setting of each value feature in Appendix E and F, or print a feature listing via Feature 98.

NOTE
To view or change any feature, the printer must be off line and in Setup mode.

2.4.1 Feature 01 - BAUD RATES

Baud rates from 110 baud to 19.2K baud may be selected on the printer. The baud rate must be programmed from the control panel on the printer. Baud rates cannot be programmed via the communications line.

2.4.2 Feature 02 - FORM LENGTH

The form length on the printer may be programmed for lengths of 1 through 217 lines.

> NOTE
> If changing Feature 11 (vertical pitch)
> or Feature 39 (⅙ lines per inch)
> they must be set *before* changing Feature 2 (form length).

Example with form length set to 66 lines:

1. Enter setup mode as described in Paragraph 2.4 and advance the display to "02" (the feature number for the form length feature).
2. Press the Feature Value key and then advance the display to "66" (the desired value for form length).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Exit Setup key to exit setup mode.

Changing form length clears top and bottom margins and sets the top of form at the current line. Form length of 66 lines is the default value for this feature.

2.4.3 Feature 03 AND 04 - TOP AND BOTTOM FORM MARGINS, (PERFORATION SKIPOVER)

The feature number for the top margin (first line of print) is 03. The feature number for the bottom margin (last line of print) is 04. When the printer reaches the bottom margin of a page and receives a vertical paper movement command (such as Line Feed, Form Feed, or Vertical Tab) the paper will automatically slew to the top margin of the next page.

Example with top margin at line 6 and the bottom margin at line 60:

1. Enter setup mode as described in Paragraph 2.4 and advance the display to "03" (the feature number for the top margin).
2. Press the Feature Value key and then advance the display to "05" (the desired value for the top margin).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Feature Number key to return to feature mode.
5. Advance the display to "04" (the feature number for the bottom margin).
6. Press the Feature Value key and advance the display to "60" (the desired value for the bottom margin).
7. Press the Set key to enter the value in the non-volatile memory.
8. Press the Exit Setup key to exit setup mode.

2.4.4 Features 05 AND 06 - LEFT AND RIGHT MARGINS

The left margin is the first printable column and the right margin is the last printable column. These may be set in any of the following columns:

1-132 at 10 cpi

1-163 at 12 cpi

1-203 at 15 cpi

1-217 at 16 cpi

However, the left margin must always be set to a value less than the right margin. The feature number for the left margin is 05 and the right margin is 06.

Example with left margin at column 10 and right margin at column 80:

1. Enter setup mode as described in Paragraph 2.4 and advance the display to "05" (the feature margin for left margin).
2. Press the Feature Value key and then advance the display to "10" (the desired value for the left margin).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Feature Number key to return to feature mode.
5. Advance the display to "06" (the feature number for the right margin).
6. Press the Feature Value key and advance the display to "80" (the desired valu for the right margin).
7. Press the Set key to enter the value in the non-volatile memory.
8. Press the Exit Setup key to exit setup mode.

NOTE
The left margin must have a lower value than the right margin. If an illegal command is entered, the "BELL" will sound indicating that the command has not been accepted.

CAUTION
Margins must be set properly to avoid printing off the form, which can damage the printhead.

2.4.5 Feature 07 - HORIZONTAL TABS

Up to 32 horizontal tabs may be set in the printer. When a horizontal tab is received from the communications line, the printhead advances to the next column at which a horizontal tab stop has been set.

To set, clear, or view the tab status, enter setup mode and advance the display to "07". Press the Feature Value key, and the display will indicate up to a four-digit number. The left-most digit will show a "1" if a tab is set, or a "0" if no tab is set. The right-most three digits indicate the column corresponding to the tab status. For example, the display will show a value of 1106 if a tab is set in column 106. A value of 0106 will be seen if no tab is set at column 106. The Display keys are used to cycle the column number.

> **NOTE**
> The display will always indicate a tab is set at column 1 unless all 32 tabs are set.

2.4.6 Feature 08 - VERTICAL TABS

Up to 32 vertical tabs may be set in the printer. When a vertical tab code is received from the communications line, the paper advances to the next line at which a vertical tab stop has been set. To set, clear, or view the tab status, enter setup mode and advance the display to "08". Press the Feature Value key, and the display will indicate up to a four-digit number. The left-most digit will show a "1" if a tab is set, or a "0" if no tab is set. The right-most three digits indicate the line corresponding to the tab status. For example, the display will show a value of 1 26 if a tab is set at line 26. A value of 0 26 will be seen if no tab is set at line 26. The Display keys are used to cycle the line number. The display will always indicate a tab is set at line 1 unless all 32 tabs are set.

2.4.7 Feature 09 - CHARACTER PITCH AND FONT

The printer offers a selection of multiple character pitches and fonts for all modes of operation. The setting of Feature 09 determines the font and pitch for the primary character set. These can be selected at the operator panel or via the communications line by using escape sequences. The default value for this feature is 10 pitch draft. Fonts and pitches can also be changed via the communications line by using escape sequences. The printer will indicate an illegal setting by sounding the bell.

Font and Pitch	Front Panel Value	*Escape Sequence	Escape Sequence
Draft 10 cpi	10	ESC$10M	ESC$F9;10.
Draft 12 cpi	12	ESC$12M	ESC$F9;12.
Draft 15 cpi	15	ESC$15M	ESC$F9;15.
Draft 16 cpi	16	ESC$16M	ESC$F9;16.
Draft 13.2 cpi (LA-120 mode only)	15	ESC$15M	ESC$F9;15.
Draft 16.5 cpi (LA-120 mode only)	16	ESC$16M	ESC$F9;16.
Draft (9 X 9) 10 cpi	17	ESC$17M	ESC$F9;17.
Draft (9 X 9) 12 cpi	18	ESC$18M	ESC$F9;18.
Draft (9 X 9) 15 cpi	19	ESC$19M	ESC$F9;19.
Draft (9 X 9) 16 cpi	20	ESC$20M	ESC$F9;20.
Memo 10 cpi	13	ESC$13M	ESC$F9;13.
Memo 12 cpi	14	ESC$14M	ESC$F9;14.
NLQ Courier 10 cpi	1	ESC$1M	ESC$F9;1.
NLQ Helvetica 12 cpi	4	ESC$4M	ESC$F9;4.
OCR A	5	ESC$5M	ESC$F9;5.
OCR B	6	ESC$6M	ESC$F9;6.
NLQ Elite 12	7	ESC$7M	ESC$F9;7.
*Not available in DS-180 mode.			

Only draft (9 x 9) 10 cpi, NLQ fonts and OCR fonts may be selected when operating in Diablo mode. Width tables for the NLQ fonts are provided in Appendix G.

2.4.8 Feature 10 - NATIONALITY (Primary Character Set)

The printer offers ten resident character sets which can be selected either at the operator panel or via the communications line. The default character set is U.S. ASCII. The following is a table of the character sets, the front panel value and the escape sequences to select each.

Character Set	Front Panel Value	Escape Sequence	Escape Sequence
U.S. ASCII	1	ESC (B	ESC$F10;1.
U.K. ASCII	2	ESC (A	ESC$F10;2.
German	3	ESC (K	ESC$F10;3.
French	4	ESC (R	ESC$F10;4.
Swedish/Finnish	5	ESC (C	ESC$F10;5.
Norwegian/Danish	6	ESC (E	ESC$F10;6.
Greek	7	ESC (G	ESC$F10;7.
Spanish I	8	ESC (D	ESC$F10;8.
Spanish II (draft print only)	11	ESC (J	ESC$F10;11.

The escape sequences listed in the first column above may be used to select the desired character set only when the primary character set is "active" (the character set being printed).

2.4.9 Feature 11 - VERTICAL PITCH SELECTION

For maximum flexibility, the printer offers programmable vertical pitch selection. The value shown in the digital display determines the number of half-dot increments (.007 inches per step) of vertical paper motion that will occur upon receipt of a line feed code. The default value for this feature is 24 steps (or 6 lines per inch). To half-step a line the value should be set to 12 which would yield 12 lines per inch. The value for vertical pitch is determined as follows; vertical pitch = n/144 lines per inch. Feature 39 may be used to select either 6 or 8 lines per inch.

2.4.10 Feature 13 - EMULATION MODE

By setting Feature 13 to the desired value, the operator may set the printer to DS-180, IBM Graphics Printer, Epson MX 80/100 or Diablo 630 mode.

Mode	Front Panel Value	Escape Sequence
Datasouth printer	1	ESC$F13;1.
IBM Graphics Printer	2	ESC$F13;2.
IBM Twinaxial Emulation	(Available on TX models only)	
IBM Coaxial Emulation	(Available on CX models only)	
Datasouth DS-180	5	ESC$F13;5.
Epson MX 80/100	6	ESC$F13;6.
Diablo 630	7	ESC$F13;7.
LA-120	8	ESC$F13;8.

2.4.11 Feature 15 - NATIONALITY (Secondary Character Set)

The printer offers ten resident character sets which can be selected either at the operator panel or via the communications line. The default character set is IBM PC Compatible. The following is a table of the character sets, the front panel value and the escape sequences to select each.

Character Set	Front Panel Value	Escape Sequence	Escape Sequence
U.S. ASCII	1	ESC(B	ESC$F15;1.
U.K. ASCII	2	ESC(A	ESC$F15;2.
German	3	ESC(K	ESC$F15;3.
French	4	ESC(R	ESC$F15;4
Swedish/Finnish	5	ESC(C	ESC$F15;5
Norwegian/Danish	6	ESC(E	ESC$F15;6
Greek	7	ESC(G	ESC$F15;7
Spanish I	8	ESC(D	ESC$F15;8
IBM PC Compatible	10	ESC(I	ESC$F15;10
Spanish II (draft print only)	11	ESC(J	ESC$F15;11.

The escape sequences listed in the first column above may be used to select the desired character set only when the secondary character set is "active" (the character set being printed).

2.4.12 Feature 24 - PAPER FEED SPEED

The amount of torque provided by the paper feed motor may be increased by feeding the paper at a slower speed. The setting of Feature 24 controls the paper feed speed and therefore the amount of torque provided by the paper feed motor. Increased paper feed torque is sometimes needed when heavy forms are used. Feature 24 may be set to a value of 1 through 14. Setting Feature 24 to a value of 1 provides maximum torque (slow feed rate), and setting Feature 24 to a value of 14 provides minimum torque (fastest feed rate).

2.4.13 DOWNLINE PROGRAMMING OF FEATURE VALUE FEATURES

The user may change the value of features 2 through 24 via the communications line by using an escape sequence. The format of the escape sequence is ESC$Fn1;n2. where n1 is the feature number and n2 is the value. For example, ESC$F9;12. will set Feature 9 to a value of 12.

> **NOTE**
> Baud rate and tabs may not be set with this escape sequence.

2.5 SETTING DISCRETE FEATURES

Features 27 through 99 require an on/off or enable/disable condition setting. These are referred to as Discrete features. The programming procedure is basically the same as that for value features except no numeric value is required. Instead, an on or enable condition is selected by pressing the Set key.
A "1" displayed in the digital display indicates an on condition. An off or disable condition is selected by pressing the Clear key. A "0" displayed in the digital display indicates an off condition. The following example shows how to use the operator panel to enable the Bar Code Enable (Feature 70) and to clear Power up on line (Feature Number 42).

1. Press the Off line key to take the printer off line.
2. Press the Enter Setup key to enter the setup mode.
3. Press the Display ▲ key until the display shows "70 0" (the feature we wish to change).

> **NOTE**
> If the user inadvertently advances beyond the desired number, the digital display may be decremented by pressing the Display ▼ key.

4. Press the Set key. The display will show "70 1". This means that this feature is enabled.
5. If you wish to change another feature, press Display ▲ or Display ▼ until the desired feature number is displayed. In this example, press Display ▼ until the display shows "42 1". Press the Clear key. The display will show "42 0". This means that the feature is disabled.
6. Press Exit Setup to exit setup mode.
7. Press On Line to continue normal operation.

The above example depicts the appropriate procedure for programming features 27 through 99. Not all features are implemented at this time. A description of all discrete features which are available and instructions on how to program each follows.

> **NOTE**
> For future reference, record the setting for each discrete feature in Appendix F or print a feature listing via Feature 98.

2.5.1 Feature 28 - PRINT INHIBIT

In certain applications, the user may wish to selectively enable or disable the printing of data received by the printer. This capability may be selected by enabling Feature 28. When enabled, a CONTROL S received by the printer via the communications line will inhibit the printing of received data. A CONTROL Q received via the communications line signals the printer to resume printing received data.

To disable the print inhibit capability, enter setup mode, advance to Feature 28, and press Clear key. A "0" will be shown in the right-most column of the display.

To enable the print inhibit capability, press the Set key. A "1" will then be shown.

2.5.2 Feature 29 - EXPANDED CHARACTER PRINTING

The printer is capable of printing expanded characters at 5, 6, 6.6, 7.5, 8, and 8.25 characters per inch. The expanded characters may be used to highlight certain portions of the text such as titles or headings.

This feature determines the capability to select between character sizes and not the actual selection of the character itself. The selection of normal or expanded print is determined by a CONTROL Code. A CONTROL N (shift-out) selects expanded print when Feature 29 is enabled. A CONTROL O (shift-in) selects normal print when Feature 29 is enabled. If Feature 29 is disabled, expanded print cannot be selected. If Feature 41 is enabled, CONTROL N and CONTROL O are used to select the primary and secondary character set (printer mode only).

> **NOTE**
> If Feature 45 is enabled, the print will automatically revert to normal size at the end of a line.

2.5.3 Feature 30 - X-ON, X-OFF SYNCHRONIZATION PROTOCOL

X-on, X-off is a synchronization protocol for communications between the printer and computer. This feature allows the printer to control the data transmission from the computer through software codes in order to maximize throughput without overflowing the print buffer.

The X-on, X-off control will also stop transmissions when an Error or Paper out condition has occurred. An X-off command will also be sent in the event of an error, setting the printer to local condition or a paper-out condition. If Feature 30 is disabled, the X-on, X-off synchronization is inactive.

2.5.4 Feature 31 - DTR SYNCHRONIZATION PROTOCOL

Data Terminal Ready (DTR) restraint mode is a synchronization protocol between the printer and computer. This feature allows the printer to control the data transmission from the computer by monitoring the status of the DTR line on the RS232 interface. This enables the printer to maximize throughput without overflowing the print buffer. The DTR line will also go busy in the event of an error, setting the printer to local condition or a paper-out condition.

2.5.5 Feature 32 - PARITY (EIGHTH BIT CONTROL)

> **NOTE**
> Eighth bit control (Features 32 and 33) is in effect only when the printer is transmitting.

Feature 32 is used in conjunction with Feature 33. When Feature 32 is enabled, Feature 33 is used to select even or odd parity. When Feature 32 is disabled, Feature 33 is used to set eighth bit marking or spacing.

2.5.6 Feature 33 - ODD/EVEN PARITY SELECTION/EIGHTH BIT MARKING

Parity Selection (Feature 32 enabled): To select even parity, Feature 33 should be disabled. To select odd parity, Feature 33 should be enabled.

Eighth bit marking (Feature 32 disabled): To select eighth bit spacing (eighth bit always set low) Feature 33 should be disabled. To select eighth bit marking (eighth bit always set high) Feature 33 should be enabled.

2.5.7 Feature 34 - AUTO WRAP

The printer may be configured to automatically execute a carriage return and line feed when the printhead reaches the right margin. To enable this capability, Feature 34 should be set to 1. If Feature 34 is set to 0, any data after the right margin is not printed.

2.5.8 Feature 35 - PRINT ON RECEIPT OF CARRIAGE RETURN

The printer normally begins printing data upon receipt of a paper movement command (such as line feed, form feed, vertical tab). In some cases, the user may wish to initiate printing without advancing the paper as in the case of "prompt" characters transmitted from the computer.

When Feature 35 is set to 1, the printer will begin printing upon receipt of a carriage-return command and does not require receipt of a paper-movement command.

2.5.9 Feature 36 - AUTOMATIC LINE FEED

The printer may be configured to automatically perform a line feed upon receipt of a carriage return command.

To enable Auto Line Feed, Feature 36 should be set to 1.

2.5.10 Feature 37 - AUTOMATIC CARRIAGE RETURN

The printer may be configured to automatically perform a carriage return upon receipt of a paper movement command (such as Line Feed, Form Feed, or Vertical Tab).

To enable Auto Carriage Return, Feature 37 should be set to 1.

2.5.11 Feature 38 - FORM FEED DEFEAT

The printer normally performs a form feed upon receipt of a CONTROL L command from the communications line. In some cases, the user may wish to defeat this capability.

To enable the Form Feed Defeat, Feature 38 should be set to 1.

> **NOTE**
> The form feed defeat is sensitive only to the CONTROL L command received from the communications line. The Form Feed key on the front panel will still generate a form feed.

2.5.12 Feature 39 - 6/8 LINES PER INCH

The vertical pitch on the printer may be set at either 6 or 8 lines per inch. To select a vertical pitch of 8 lines per inch, set Feature 39 to 1. To select a vertical pitch of 6 lines per inch, set Feature 39 to 0. Other vertical pitches may selected with Feature 11.

2.5.13 Feature 40 - PAPER OUT DETECTION OVERRIDE

A photo sensor is embedded in the paper guide below the print line. When a paper-out condition occurs, a stop transmission command will be sent to the computer via the synchronization protocol currently programmed into the printer. In addition, the paper-out indicator on the front panel will flash continuously and an audio alarm will sound three short tones. When the forms have been reloaded and aligned in the printer, press the Continue key. The paper-out indicator will cease to flash and printing will resume. Since the content of the buffer is retained and then printed when operation is resumed, no data is lost during a paper-out condition. The paper-out detection may be overridden by setting Feature 40 to 1.

2.5.14 Feature 41 - SHIFT OUT SELECTS DOUBLE WIDE PRINT (PRINTER MODE ONLY)

The function of SHIFT OUT, SHIFT IN is controlled by the setting of Feature 41 as follows:

With Feature 41 set to 0:
SHIFT OUT selects double wide print
SHIFT IN selects normal print

With Feature 41 set to 1:
SHIFT OUT selects secondary character set
SHIFT IN selects primary character set

2.5.15 Feature 42 - ON LINE/OFF LINE POWER-UP

A special feature has been added which provides the capability to power-up in either on line or off line condition depending on user preference. When Feature 42 is enabled, the printer will power-up in the on line condition. When Feature 42 is disabled, the printer will power-up in the off line condition.

This setting also governs the status of the machine if the Reset key is pressed. If Feature 42 is enabled, pressing the Reset key will restore the printer to the left margin and place it on line.

2.5.16 Feature 43 - SERIAL INTERFACE DISABLE

When set to 1, Feature 43 causes the printer to ignore any data sent to it over the serial interface. If both the parallel interface and serial interface are connected this feature may be set to prevent the possibility of erroneous characters entering the FIFO buffer.

2.5.17 Feature 44 - AUTOMATIC PRINT DISABLE

The printer uses Feature 44 to allow the user to enable (or disable) an automatic print feature.

When Feature 44 is set to 0, the printer will automatically print any characters which have accumulated in the print buffer after a one-second delay period. Note that the one-second timer is reset upon the receipt of each new character. Thus, the auto-print feature will not activate a print cycle unless there is more than one second between two characters. Further, the logical position of the printer is not disturbed; no paper motion occurs and any characters sent later will be printed in their proper column.

2.5.18 Feature 45 - EXIT DOUBLE WIDE PRINT ON LINE TERMINATOR

When Feature 45 is enabled, the printer will automatically drop out of expanded print and begin printing normal print upon receiving any valid line terminator (carriage return, line feed, form feed or vertical tab).

2.5.19 Feature 46 - ESCAPE SEQUENCE DISABLE

Escape sequence sensitivity may be disabled by setting Feature 46 to 1. This may be required should the printer be used on a system which uses escape sequences for purposes other than printer control.

2.5.20 Feature 47 - DISPLAY MODE

When Feature 47 is set to 1 the printer will print 255 distinct display mode characters to represent incoming data. All display mode characters are given in Appendix C. (Defaults to 10 pitch draft). Feature 61 must be set to 1 to access characters 127-255.

> **NOTE**
> Once Feature 47 has been set to 1, do not attempt to re-enter setup mode and set Feature 47 again. This will cause erratic printer operation.

The user may print IBM PC display mode characters by setting Feature 10 to a value of 1 after setting Feature 47 to 1.

2.5.21 Feature 48 - SECONDARY CHARACTER SET ENABLE

Setting Feature 48 to 1 selects the secondary character set (as defined by Feature 15), as the character set to be printed.

2.5.22 Feature 49 - DS-180 GRAPHICS (ANADEX 9500/9501 COMPATIBLE)

Feature 49 determines the capability to select between graphics or character mode. The actual entry into graphics printing is controlled by the codes described in Chapter 4. This feature must be enabled in order to enter DS-180 graphics.

2.5.23 Feature 51 - UNIDIRECTIONAL TEXT PRINTING

When Feature 51 is enabled, all text will be printed unidirectionally (left to right).

2.5.24 Feature 59 - HANDSHAKE ON BUSY

This feature allows the printer to be compatible with a variety systems using the centronics standard. When Feature 59 is set to 1 the host must honor the BUSY signal. When Feature 59 is set to 0, buffer control may be accomplished with the ACK signal.

When Feature 59 is set to 0, the last character to cause BUSY to go high is not acknowledged (see Figure 2.2).

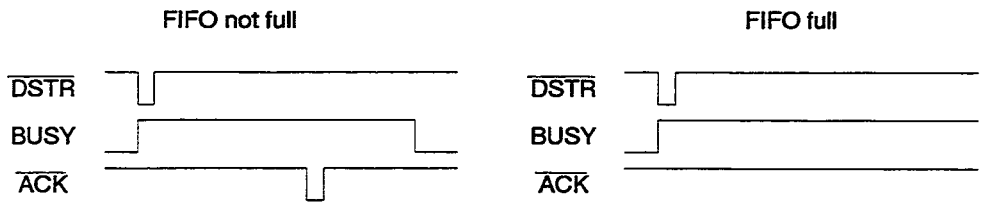


Figure 2.2 Handshake on ACK

When Feature 59 is set to 1, the last character to cause BUSY to go high is acknowledged (see Figure 2.3). In this case the host must honor BUSY.

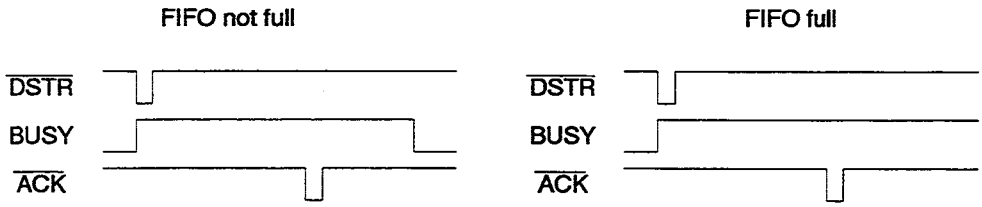


Figure 2.3 Handshake on BUSY

2.5.25 Feature 61 - EIGHTH BIT ENABLE

When Feature 61 is set to 1, the printer will process the eighth bit when communicating with an 8-bit device. When Feature 61 is set to 0, the printer will ignore the eighth bit.

2.5.26 Feature 63 - ETX/ACKNOWLEDGE HANDSHAKING

When communicating over the serial interface the operator may set Feature 63 to enable an ETX/ACKNOWLDGE handshaking. When Feature 63 is set to 1, handshaking will occur as follows: The host will end each series of data sent to the printer with ETX. When the printer detects ETX in the First-In First-Out buffer, it sends acknowledge to the host.

2.5.27 Feature 66 - PARALLEL INTERFACE DISABLE

When set to 1, Feature 66 causes the printer to ignore any data sent to it over the parallel interface. If both the parallel interface and serial interface are connected this feature may be set to prevent the possibility of erroneous characters entering the FIFO buffer.

2.5.28 Feature 69 - DOWNLOADABLE CHARACTER ENABLE

When Feature 69 is set to 1, the printer will print any user defined characters that have been downloaded to the printer. When Feature 69 is set to 0, the printer will print standard ROM based characters.

2.5.29 Feature 70 - BAR CODE ENABLE

Feature 70 is set to 1 to enable bar code printing capabilities. Setting Feature 70 to 0 will disable bar code capabilities. Feature 70 must be set to 0 for normal printing operations.

2.5.30 Feature 76 - MICRO MODE

When Feature 76 is set to 1, all printed characters will be vertically condensed. All fonts may be printed in micro mode.

2.5.31 Feature 96 - HIGH SPEED DOUBLE STRIKE PRINT

Feature 96 enables high speed double strike mode. When in this mode, the printer will strike each character twice in order to improve the print quality when using multipart forms. Each line of print is printed in one pass at 3/4 print speed. High speed double strike is enabled when Feature 96 is set to 1. This feature acts only on draft and memo fonts.

2.5.32 Feature 97 - BELL OVERRIDE

The operator may set Feature 97 to override the printer bell so it does not sound. When Feature 97 is set to 0, the bell will sound. When Feature 97 is set to 1, the bell will not sound.

2.5.33 Feature 98 - FEATURE LISTING

Feature 98 is a useful diagnostic tool which allows the operator to check the status of all discrete and value features. When Feature 98 is set, the printer will produce a two-column printout which identifies each feature by the feature number and the present setting of each feature. The default value for this feature is 0. The sample printout of a feature listing in Figure 2.4 gives the default value for each feature in the printer. To perform a feature listing:

Step 1. Press the Off line key.

Step 2. Press the Enter Setup key.

Step 3. Press the Display ▼ key so the number 98 is displayed.

Step 4. Press the Set key to start the feature listing.

Upon completion of Step 4, the printer will begin printing the feature listing and will automatically stop after completing the printout. The feature listing may be stopped by pressing the Clear key.

2.5.34 Feature 99 - PRINT-TEST/ASCII RIPPLE PATTERN

A preprogrammed print routine may be activated to verify proper operation of the printer. A rotating or "ripple" pattern of the 94 ASCII characters will be printed during the test. To initiate the feature:

Step 1. Press the Off line key.

Step 2. Press the Enter Setup key.

Step 3. Press the Display ▼ key so the number 99 is displayed.

Step 4. Press the Set key to start the print-test.

The printer will generate a continuous ripple pattern. The print-test may be terminated earlier by pressing the Clear key.

2.5.35 DOWNLINE PROGRAMMING OF DISCRETE FEATURES

Discrete features can be enabled or disabled via the communications line by using an escape sequence. The format of the escape sequence is:

ESC $ <Feature Number> s	(sets the feature)
ESC $ <Feature Number> c	(clears the feature)

For example, to enable Feature 29 (expanded print), the following escape sequence would be sent: ESC$29s

To disable the expanded print capability ESC$29c would be sent.

```
FTN 1  = 9600
FTN 2  = 66
FTN 3  = 1
FTN 4  = 66
FTN 5  = 1
FTN 6  = 132
FTN 7  = 1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
         9   17  25  33
         41  49  57  65
         73  81  89  97
         105 113 121 129
FTN 8  = 1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
         1   1   1   1
FTN 9  = 10
FTN 10 = 1
FTN 11 = 24
FTN 12 = 1
FTN 13 = 1
FTN 14 = 1
FTN 15 = 10
FTN 16 = 0
FTN 17 = 0
FTN 18 = 0
FTN 19 = 132
FTN 20 = 2
FTN 21 = 1
FTN 22 = 120
FTN 23 = 90
FTN 24 = 14
FTN 25 = 0
FTN 26 = 0
FTN 27 = 0
FTN 28 = 0
FTN 29 = 1
FTN 30 = 1
FTN 31 = 1
FTN 32 = 0
FTN 33 = 0
FTN 34 = 1
FTN 35 = 1
FTN 36 = 0
FTN 37 = 0
FTN 38 = 0
FTN 39 = 0
FTN 40 = 0
FTN 41 = 0
FTN 42 = 1
FTN 43 = 0
FTN 44 = 0
FTN 45 = 1
FTN 46 = 0
FTN 47 = 0
FTN 48 = 0
FTN 49 = 0
FTN 50 = 0
FTN 51 = 0
FTN 52 = 0
FTN 53 = 1
FTN 54 = 1
FTN 55 = 1
FTN 56 = 0
FTN 57 = 0
FTN 58 = 0
FTN 59 = 0
FTN 60 = 0
FTN 61 = 0
FTN 62 = 0
FTN 63 = 0
FTN 64 = 0
FTN 65 = 0
FTN 66 = 0
FTN 67 = 0
FTN 68 = 0
FTN 69 = 0
FTN 70 = 0
FTN 71 = 0
FTN 72 = 0
FTN 73 = 0
FTN 74 = 0
FTN 75 = 0
FTN 76 = 0
FTN 77 = 0
FTN 78 = 0
FTN 79 = 0
FTN 80 = 0
FTN 81 = 0
FTN 82 = 0
FTN 83 = 0
FTN 84 = 0
FTN 85 = 0
FTN 86 = 0
FTN 87 = 0
FTN 88 = 0
FTN 89 = 0
FTN 90 = 0
FTN 91 = 0
FTN 92 = 0
FTN 93 = 0
FTN 94 = 0
FTN 95 = 0
FTN 96 = 0
FTN 97 = 0
FTN 98 = 0
FTN 99 = 0
```

Figure 2.4 Feature Listing

3 INTERFACING

3.1 INTRODUCTION

Interfacing with the printer may be accomplished by either of the following two methods: EIA RS-232-C serial interface or TTL level 8-bit parallel interface. Connectors for both types of interface are located on the back of the printer as shown in Figure 1.2.

The first attempt at interfacing should be made by determining the interface needed, acquiring the correct cable (either serial or parallel) and plugging it into the correct connector on the printer and the host device. Test data should then be sent to the printer to see if the interface is complete. If this does not produce the required results it may be necessary to pursue interfacing at a more detailed level. In-depth descriptions of serial and parallel interfacing are provided in this chapter. If interfacing cannot be accomplished by the simpler method described above, proceed to the applicable paragraph below for more detailed information.

> **NOTE**
> When connecting the printer to a host computer system, always use shielded cables to comply with FCC rules governing a Class A computing device.

3.2 SERIAL INTERFACE

The printer features an EIA RS-232-C serial interface which is accessed through the 15-pin D-connector on the back of the printer (see Figure 1.2). Although the RS-232-C interface is considered to be an industry standard, there exists different connector pin assignment conventions. For example, pin 2 may not always be designated serial data out. Because of such variations it may be necessary to connect the interface on a pin-by-pin basis. The technician must compare the connector pin assignments of the host to the printer and make certain the interface is made by connector pin assignment and not by pin number.

If it is necessary to construct an interface cable, the length of the cable should not exceed 15 feet. On the printer end of the cable use a TRW CINCH (housing no. DB-51226-1-A, connect no. DB-25P) or an AMP (housing no. 206478-3, pin no. 66505-4, connector no. 205208). The connector pin assignment configuration for the printer serial interface is given in Table 3.1.

Table 3.1 Serial Interface Connector-Pin Assignment	
PIN	ASSIGNMENT
1 Chassis Ground	
2 Serial Data Out	Asynchronous output data line
3 Serial Data In	Asynchronous input data line
7 Signal Ground	
11 Data Terminal Ready (DTR) 20 Data Terminal Ready (DTR)	Indicates the printer is open for communication and can accept or transmit data

3.3 PARALLEL INTERFACE

The printer features a TTL level 8-bit parallel interface which can be accessed through the 36-pin female connector on the back of the printer (see Figure 1.2).

The parallel interface provides the user with a simple, high speed interface for communications with a CPU or host system. Operating with parallel data in lieu of serial offers several advantages. Among them are:

1. elimination of serial encoders and decoders
2. no requirement for a BAUD rate clock
3. inherent synchronization (such as no loss of data due to buffer overflow).

For proper operation, the printer and host must exchange information on a character-by-character basis. The host initiates the action by presenting to the printer a character. After a brief setting time, a data strobe is issued by the host. The printer takes the character from its interface circuitry and puts it into the FIFO buffer. Then a ready signal is sent to the host indicating that another character may be sent. The protocol may be summarized by the following flowcharts:

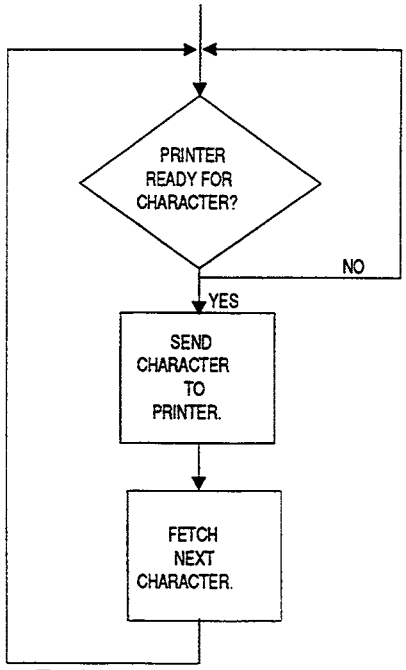


Figure 3.1 At The Host End

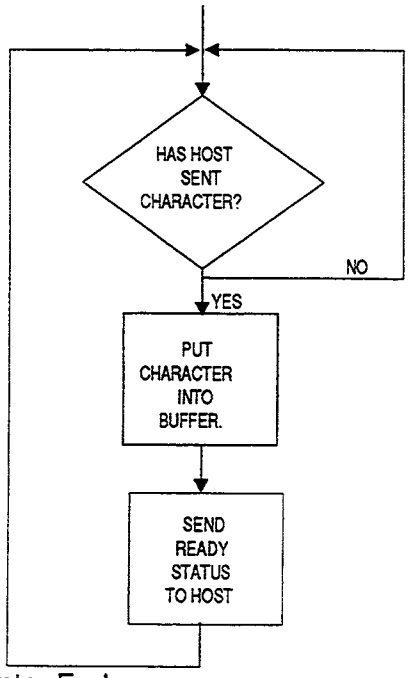


Figure 3.2 At The Printer End

As already mentioned, the printer must signal to the host when it is ready to receive another character. This is an extremely important task, and most compatibility problems center around this function. Garbling or loss of data will occur if the host does not honor the ready status or if the printer does not transmit it.

Two signals on the interface are associated with the printer-ready status. They are referred to as BUSY and ACKNOWLEDGE and are described below:

ACKNOWLEDGE: This signal is a pulse (normally negative going) which is sent to the host when the printer is ready to accept a new character. It is often referred to as the handshake signal since it is the signal that the host is expected to await before sending more data. The electrical characteristics and timing of this pulse are described later.

BUSY: The BUSY line is provided to indicate to the host when the printer is performing an operation such as printing or moving paper. BUSY is asserted upon receipt of a character. After processing the character, BUSY is removed unless the FIFO is full.

The printer parallel interface was designed around the Centronics standard since most systems in use today are compatible with the Centronics specifications. Unfortunately, there exist many interpretations as to what the Centronics specifications actually are. The following variations have been observed:

IGNORING HANDSHAKE: Many designers take advantage of the hard-wired input circuitry of some printers by sending data without regard to the ACKNOWLEDGE or BUSY signals until a complete line has been sent. Although this is strictly against the specification, it works fine as long as the printer can accept data as fast as the host can send it.

Printers which utilize microprocessors (with software driven data acquisition) cannot accept data at an arbitrary rate and will lose data unless the host honors the handshake signal.

HANDSHAKE ON BUSY: A look at the Centronics specification will show that BUSY is not raised on a character-by-character basis. Thus, a system designed to look at BUSY (for a ready condition) after transmission of each character, may cause loss of data unless the printer has a fast front-end. Being microprocessor controlled, the printer cannot accept data at a rate equal to printers with a hard-wired front end. This makes it imperative that the host honor the ready status sent by the printer. Since many systems want to handshake using BUSY, the printer manipulates the BUSY signal on a character-by-character basis. The ACKNOWLEDGE signal is also issued just as before. This enables the printer to operate with more systems without sacrificing compatibility with others complying with the strict Centronics specifications.

POLLING ACKNOWLEDGE: A few designers have attempted to handshake by polling the ACKNOWLEDGE pulse with a software routine at the host end. This will not work because the ACK pulse is too fast. The ACK pulse should be used to set a latch whose output can be "READ" by the host, then reset.

The printer parallel interface is a TTL type with the receiver and driver configuration shown in Figure 3.3.

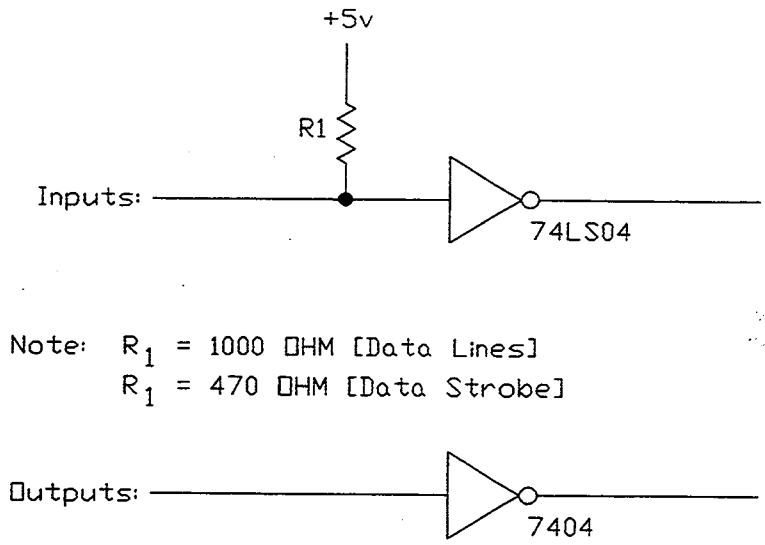


Figure 3.3 Printer Receiver and Driver Configuration

Figure 3.4 shows the timing diagram for the printer.

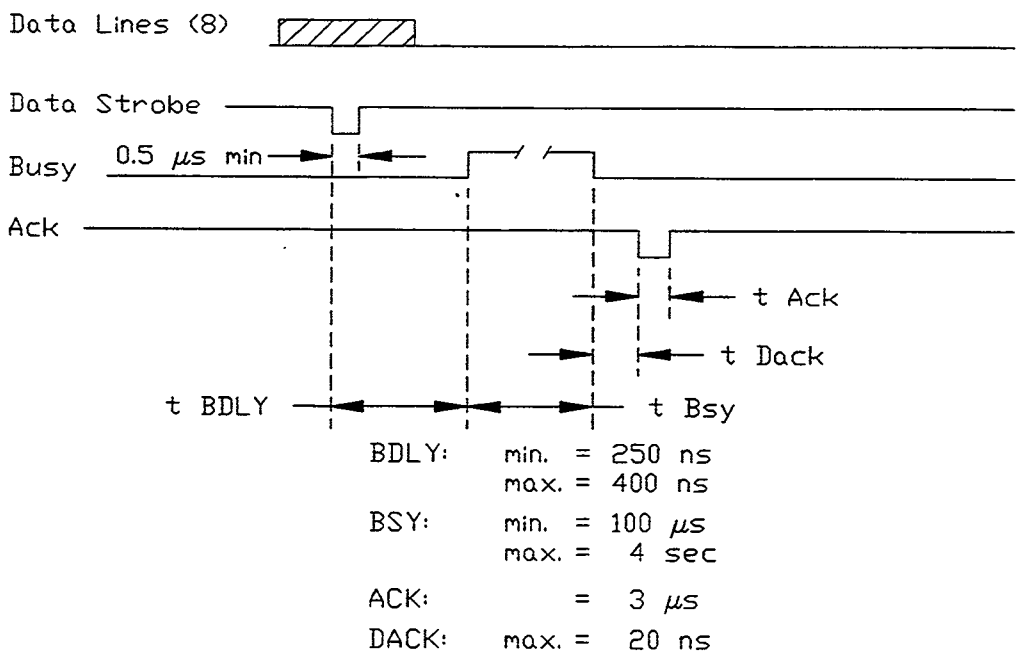


Figure 3.4 Parallel Data Timing (upwards Centronics Compatible)

Along with different interpretations of the Centronics Specifications, parallel interface connectors also have different connector pin assignment conventions. For example, pin 11 may not always be assigned Busy. Because of such variations, it may be necessary to connect the interface on a pin-by-pin basis. The technician must compare the connector-pin assignments of the host to those of the printer and make certain the interface is made by connector-pin assignment and not by pin number. The connector-pin assignment configuration for the printer parallel interface is given in Table 3.2.

If it is necessary to construct an interface cable, the length of the cable should not exceed 10 feet. On the printer end of the cable use a micro ribbon connector, part no. 57-30360 for round cable or part no. 57F-30360 for flat cable.

Table 3.2 Parallel Interface Connector Pin Assignment	
Pin Number	**Assignment**
1	Data Strobe
2	Data Bit 1
3	Data Bit 2
4	Data Bit 3
5	Data Bit 4
6	Data Bit 5
7	Data Bit 6
8	Data Bit 7
9	Data Bit 8
10	Acknowledge
11	Busy
12	Paper Out of Print Off
13	+5
14	Ground
15	—
16	Ground
17	Chassis Ground
18	+5V
19	*Twisted Pair Ground
20	*Twisted Pair Ground
21	*Twisted Pair Ground
22	*Twisted Pair Ground
23	*Twisted Pair Ground

Table 3.2 Parallel Interface Connector Pin Assignment	
Pin Number	**Assignment**
24	*Twisted Pair Ground
25	*Twisted Pair Ground
26	*Twisted Pair Ground
27	*Twisted Pair Ground
28	*Twisted Pair Ground
29	*Twisted Pair Ground
30	*Twisted Pair Ground
31	+5
32	+5
33	Ground
34	—
35	—
36	—
*Grounds are effective only if twisted pair cabling is used.	

4 PROGRAMMING

4.1 INTRODUCTION

This section describes printer graphics and the control codes and escape sequences that are used to control the printer through the communications interface.

4.2 CONTROL COMMANDS

Various features of the printer may be controlled using ASCII standard control commands, (see Table 4.1). These features may be controlled through the user program or the user may control these same features in real time from the terminal. For example, to command a line feed in a BASIC program the user would enter CHR$(10), where 10 is the decimal value for the ASCII character LF (Line Feed). To command a line feed in real time from the terminal, the user would enter CRTL J.

The characters shown in the control character column are what the user will see printed when the printer is in display mode.

Table 4.1 Control Commands

Control Code	Description	Control Character	Decimal Value
CTRL G	Bell		7
CRTL H	Back Space		8
CRTL I	Horizontal Tab		9
CRTL J	Line Feed		10
CRTL K	Vertical Tab		11
CRTL L	Form Feed		12
CRTL M	Carriage Return		13
CRTL N	Shift-out of normal print to double wide		14
CRTL O	Shift-in to normal print		15
CRTL Q	X-on		17
CRTL S	X-off		19

4.3 ESCAPE SEQUENCES

To allow remote control of certain user programmable functions, a downline load enhancement has been added to the printer firmware. This is accomplished through the use of escape sequences patterned after the convention set forth by ANSI (American National Standards Institute). The user may use escape sequences within a program to control certain printer functions and to modify certain operating parameters of the printer, such as tab stop and pitch. Tables 4.2 through 4.6 lists all the escape sequences which may be used in each mode of operation.

In the escape sequences listed in the following tables, n1 and <n1> are both used as a variable. The BASIC syntax for an escape sequence differs depending on which variable is used. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of an ASCII character and the value of <n1> is sent as a character string.

EXAMPLE:

ESC [n1 r Sets the top margin to line n1. To set the top margin to line 4 the BASIC syntax is CHR$(27);"[4r"

EXAMPLE:

ESC Q <n1> Sets the right margin to <n1>. To set the right margin to 4, the BASIC syntax is CHR$(27);"Q";CHR$(4)

Also, the user must distinguish between the characters O and 0 and the characters l and 1 when entering escape sequences:

O is ASCII code 4F HEX	0 is ASCII code 30 HEX
l is ASCII code 6C HEX	1 is ASCII code 31 HEX

Make certain the values that are entered for variables are not erroneous. Numbers which exceed the maximum or are below the minimum value will cause the printer to default. Certain conditions which may cause the printer to default when using escape sequences are given below.

1. No control codes are allowed in an escape sequence. The sequence is aborted if a control code is detected before the sequence is completed.
2. If n is set to zero or a negative number or if n is set too high (132 for 10 pitch, 217 for 16 pitch) n will default to 1.

3. A maximum of 15 vertical or 15 horizontal tabs per escape sequence are allowed. An attempt to set additional tabs will be rejected and the bell will sound once. It may be desirable to first clear all tabs before a sequence is sent to set additional ones. The maximum number of horizontal tabs is 32 tabs per line.

4. The programmer should not send any spaces in the escape sequences. The spaces shown in Table 4.2 through 4.6 are for readability only.

The negative paper motion commands listed in this chapter are for the support of superscripts and subscripts only. The user should not attempt to reverse the paper more than one line feed. Attempts to do so may result in loss of position on the form.

4.3.1 DATASOUTH PRINTER MODE ESCAPE SEQUENCES

In the escape sequences listed in Table 4.2, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of an ASCII character and the value of <n1> is sent as a character string. See Paragraph 4.3 for examples. Feature 13 must be set to a value of 1 in order to use the escape sequences listed in Table 4.2.

Table 4.2 DS-400 Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
HORIZONTAL PITCH	
ESC $ n1 M	Selects pitch and font where n1 is equal to the front panel value of the pitch and font as defined by Feature 9
ESC [1 w	Selects 10 cpi draft ESC [2 w Selects 12 cpi draft ESC [4 w
ESC [5 w	Selects 5 cpi draft
ESC [6 w	Selects 6 cpi draft
ESC [8 w	Selects 8 cpi draft
ESC SO	Same as SO
ESC SI	Same as SI
ESC W <n1>	Enable doublewide print n=1 or <1> Cancel doublewide print n=0 or <0>

Table 4.2 DS-400 Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
FEATURES	
ESC - <n1>	Enable continuous underline n=1 or <1> Disable continuous underline n=0 or <0>
ESC S <n1>	Enable superscript n=0 or <0> Enable subscript n=1 or <1>
ESC T	Cancel superscript and subscript
ESC $ n1 s	Set front panel feature number n1
ESC $ n1 c	Clear feature number n1
ESC $ F n1 ; n2 .	Sets any value feature except baud rate and vertical and horizontal tabs. n1 equals feature number and n2 equals value.
ESC $ @	Restore carriage
ESC @	Reset to start-up condition
ESC 8	Paper sensor off
ESC 9	Paper sensor on
ESC N <n1>	Enable perforation skip n1= number of lines
ESC O	Cancel perforation skip
CHARACTER SETS	
ESC (B	Selects US ASCII
ESC (A	Selects UK ASCII
ESC (K	Selects German
ESC (R	Selects French
ESC (H	Selects Swedish/Finnish
ESC (C	Selects Swedish/Finnish
ESC (E	Selects Norwegian/Danish

Table 4.2 DS-400 Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
ESC (G	Selects Greek
ESC (D	Selects Spanish I
ESC (I	Selects IBM compatible
ESC (J	Selects Spanish II
ESC % <1> <0>	Select downloaded characters
ESC % <0> <0>	Select ROM based characters
ESC & C	Clear downloaded characters
ESC & <0> <n1> <n2> <a> <p1> <p2>..<p11>	Download character definition
CARRIAGE CONTROL	
ESC <	Print 1 line from left to right
ESC U <n>	Enable unidirectional print n=1 or <1> Cancel unidirectional print n=0 or <0>
ESC [20 h	Enable carriage return on receipt of LF
ESC [20 l	Disable carriage return on receipt of LF
FORMAT CONTROL	
ESC [n1 '	Set active column to column n1
ESC [n1 a	Advance active column by n1 columns
ESC 0	1/8-inch line spacing
ESC [n1 d	Set active line to line n1
ESC [n1 e	Advance active line by n1 lines
ESC [1 z	Set vertical pitch to 6 lines per inch
ESC [2 z	Set vertical pitch to 8 lines per inch
ESC $ n1 V	Set line spacing to n/144 inch

Table 4.2 DS-400 Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
ESC A <n1>	Set line spacing to n/72 inch
ESC Q <n1>	Set right margin
ESC 1 <n1>	Set left margin to <n1>
ESC [n1 s	Set left margin to column n1
ESC [; n1 s	Set right margin to column n1
ESC [n1 ; n2 s	Set left margin to column n1 and set right margin to column n2
ESC [n1 r	Set top margin to line n1
ESC [; n1 r	Set bottom margin to line n1
ESC [n1 ; n2 r	Set top margin to line n1 and set bottom margin to n2
ESC [n1 u	Set horizontal tab stop at column n1
ESC [n1 ; n2 u	Set horizontal tab stop at column n1 and at column n2
ESC [n1 ; n2 ;	Set horizontal tab stop at column n1
ESC B <n1> <n2>...<0>	Set vertical tab (up to 32 tabs). This escape sequence also deletes all previously set tabs.
ESC 1	Set horizontal tab at active column
ESC 2	Clear all horizontal tabs
ESC [g	Clear horizontal tab at active column
ESC 3	Set vertical tab at active line
ESC [1 g	Clear vertical tab stop at active line
ESC 4	Clear all vertical tabs
ESC [n1 v	Set vertical tab stop at line n1
ESC [n1 ; n2 v	Set vertical tab stop at line n1 and line n2

Table 4.2 DS-400 Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC [n1 ; n2 ;...nx	Set vertical tab stop at n1, n2...nx x ≥15
ESC C <n1>	Set form length
ESC [n1 t	Set form length to n1 lines
EIGHTH BIT CONTROL	
ESC #	8th bit as is
ESC =	8th bit = 0
ESC >	8th bit = 1
GRAPHICS	
ESC K <n1> <n2>	Select single density EPSON MX-80 graphics
ESC L <n1> <n2>	Select double density EPSON MX-80 graphics
PAPER FEED COMMANDS	
ESC E	Line feed/carriage return
ESC D	Line feed
ESC J <n1>	Perform n/216 inch line feed for one line (rounded to nearest 1/144 inch)
ESC LF	Perform negative line feed

4.3.2 DATASOUTH DS-180 MODE ESCAPE SEQUENCES

In the escape sequences listed in Table 4.3, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of an ASCII character and the value of <n1> is sent as a character string. See Paragraph 4.3 for examples. Feature 13 must be set to a value of 5 in order to use the escape sequences listed in Table 4.3.

Table 4.3 DS-180 Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
HORIZONTAL PITCH	
ESC [1 w	Selects 10 cpi draft
ESC [2 w	Selects 12 cpi draft
ESC [4 w	Selects 16 cpi draft
ESC [5 w	Selects 5 cpi draft
ESC [6 w	Selects 6 cpi draft
ESC [8 w	Selects 8 cpi draft
ESC SO	Same as SO
ESC SI	Same as SI
ESC W <n1>	Enable doublewide print n=1 or <1> Cancel doublewide print n=0 or <0>
FEATURES	
ESC $ 1	Enable continuous underline mode
ESC $ 2	Cancel continuous underline mode
ESC - <n1>	Enable continuous underline n=1 or <1> Disable continuous underline n=0 or <0>
ESC S <n1>	Enable superscript n=0 or <0> Enable subscript n=1 or <1>
ESC T	Cancel superscript and subscript
ESC $ 3	Enable transparency mode
ESC $ 4	Disable transparency mode

Table 4.3 DS-180 Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC $ s n1	Set front panel feature number n1
ESC $ c n1	Clear feature number n1
ESC $ F n1 ; n2 .	Sets any value feature except baud rate and vertical and horizontal tabs. n1 equals feature number and n2 equals value.
ESC $ @	Restore carriage
ESC @	Reset to start-up condition
ESC 8	Paper sensor off
ESC 9	Paper sensor on
ESC N <n>	Enable perforation skip n = number of lines
ESC O	Cancel perforation skip
CHARACTER SETS	
ESC (B	Selects US ASCII
ESC (A	Selects UK ASCII
ESC (K	Selects German
ESC (R	Selects French
ESC (H	Selects Swedish/Finnish
ESC (C	Selects Swedish/Finnish
ESC (E	Selects Norwegian/Danish
ESC (G	Selects Greek
ESC (D	Selects Spanish I
ESC (I	Selects IBM compatible
ESC (J	Selects Spanish II
ESC $ 5	Select secondary character set

Table 4.3 DS-180 Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC $ 6	Select primary character set
ESC % <1> <0>	Select downloaded characters
ESC % <0> <0>	Select ROM based characters
ESC & C	Clear downloaded characters
ESC & <0> <n1> <n2> <a> <p1> <p2>..<p11>	Download character definition
CARRIAGE CONTROL	
ESC <	Print 1 line from left to right
ESC U <n>	Enable unidirectional print n=1 or <1> Cancel unidirectional print n=0 or <0>
ESC [20 h	Enable carriage return on receipt of LF, FF or VT
ESC [20 l	Disable carriage return on receipt of LF, FF or VT. Note: "l" is ASCII code 6CH.
FORMAT CONTROL	
ESC [n1 '	Set active column to column n1
ESC [n1 a	Advance active column by n1 columns
ESC 0	1/8-inch line spacing
ESC [n1 d	Set active line to line n1
ESC [n1 e	Advance active line by n1 lines
ESC [1 z	Set vertical pitch to 6 lines per inch
ESC [2 z	Set vertical pitch to 8 lines per inch
ESC A <n1>	Set line spacing to n/72 inch
ESC Q <n1>	Set right margin
ESC 1 <n1>	Set left margin to <n1>. Note: "l" is ASCII code 6CH.
ESC [n1 s	Set left margin to column n1

Table 4.3 DS-180 Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC [; n1 s	Set right margin to column n1
ESC [n1 ; n2 s	Set left margin to column n1 and set right margin to column n2
ESC [n1 r	Set top margin to line n1
ESC [; n1 r	Set bottom margin to line n1
ESC [n1 ; n2 r	Set top margin to line n1 and set bottom margin to n2
ESC [n1 u	Set horizontal tab stop at column n1
ESC [n1 ; n2 u	Set horizontal tab stop at column n1 and at column n2
ESC [n1 ; n2 ; .....nx u	Set horizontal tab stop at column n1, n2...nx (where x < 15)
ESC B <n1> <n2>...<0>	Set vertical tab (up to 32 tabs). This escape sequence also clears all previously set tabs.
ESC 1	Set horizontal tab at active column
ESC 2	Clear all horizontal tabs
ESC [g	Clear horizontal tab at active column
ESC 3	Set vertical tab at active line
ESC [1 g	Clear vertical tab stop at active line
ESC 4	Clear all vertical tabs
ESC [n1 v	Set vertical tab stop at line n1
ESC [n1 ; n2 v	Set vertical tab stop at line n1 and line n2
ESC [n1 ; n2 ; ....nx v	Set vertical tab stop at n1, n2....nx (where x < 15)
ESC C <n1>	Set form length
ESC [n1 t	Set form length to n1 lines
EIGHTH BIT CONTROL	

Table 4.3 DS-180 Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC #	8th bit as is
ESC =	8th bit = 0
ESC >	8th bit = 1
GRAPHICS	
ESC K <n1> <n2>	Select single density EPSON MX-80 graphics
ESC L <n1> <n2>	Select double density EPSON MX-80 graphics
PAPER FEED COMMANDS	
ESC E	Line feed/carriage return
ESC D	Line feed
ESC J <n1>	Perform n/216 inch line feed for one line (rounded to nearest 1/144 inch)
ESC CHR$(10)	Perform negative line feed
ESC $ 7	Execute positive half line feed
ESC $ 8	Execute negative half line feed

4.3.3 EPSON MODE ESCAPE SEQUENCES

In the escape sequences listed in Table 4.4, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of an ASCII character and the value of <n1> is sent as a character string. See Paragraph 4.3 for examples. Feature 13 must be set to a value of 6 in order to use the escape sequences listed in Table 4.4.

Table 4.4 Epson Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
HORIZONTAL PITCH	
ESC $ n1 M	Selects pitch and font where n1 is equal to the front panel value of the pitch and font as defined by Feature 9
ESC [1 w	Selects 10 cpi draft
ESC [2 w	Selects 12 cpi draft
ESC [4 w	Selects 16 cpi draft
ESC [5 w	Selects 5 cpi draft
ESC [6 w	Selects 6 cpi draft
ESC [8 w	Selects 8 cpi draft
ESC SO	Selects double-wide print
ESC SI	Selects condensed print (16 cpi)
DC2	Cancels condensed print
DC4	Cancels double-wide
ESC W <n1>	Enable doublewide print n=1 or <1> Cancel doublewide print n=0 or <0>
ESC E	Enable emphasized mode
ESC F	Disable emphasized mode
ESC G	Enable double strike
ESC H	Disable double strike

Table 4.4 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
FEATURES	
ESC - <n1>	Enable continuous underline n≥1 or <1> Disable continuous underline n=0 or <0>
ESC S <n1>	Enable superscript n=0 or <0> Enable subscript n=1 or <1>
ESC T	Cancel superscript and subscript
ESC $ n1 s	Set front panel feature number n1
ESC $ n1 c	Clear feature number n1
ESC $ F n1 n2 .	Sets any value feature except baud rate n2 and vertical and horizontal tabs. n1 equals feature number and n2 equals value.
ESC $ @	Restore carriage
ESC @	Reset to start-up condition
ESC 8	Paper sensor off
ESC 9	Paper sensor on
ESC N <n1>	Enable perforation skip n=number of lines
ESC 0	Cancel perforation skip
CHARACTER SETS	
ESC (B	Selects US ASCII
ESC (A	Selects UK ASCII
ESC (K	Selects German
ESC (R	Selects French
ESC (H	Selects Swedish/Finnish
ESC (C	Selects Swedish/Finnish
ESC (E	Selects Norwegian/Danish

Table 4.4 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC (C	Selects Greek
ESC (D	Selects Spanish I
ESC (I	Selects IBM compatible
ESC (J	Selects Spanish II
ESC % <1> <0>	Select downloaded characters
ESC % <0> <0>	Select ROM based characters
ESC & C	Clear downloaded characters
ESC & <0> <n1> <n2> <a> <p1> <p2>..<p11>	Download character definition
CARRIAGE CONTROL	
ESC <	Print 1 line from left to right
ESC U <n>	Enable unidirectional print n=1 or <1> Cancel unidirectional print n=0 or <0>
ESC [20 h	Enable carriage return on receipt of LF, FF or VT
ESC [20 l	Disable carriage return on receipt of LF, FF or VT. Note: "l" is ASCII code 6CH.
FORMAT CONTROL	
ESC [n1 '	Set active column to column n1
ESC [n1 a	Advance active column by n1 columns
ESC 0	1/8-inch line spacing
ESC [n1 d	Set active line to line n1
ESC [n1 e	Advance active line by n1 lines
ESC [1 z	Set vertical pitch to 6 lines per inch
ESC [2 z	Set vertical pitch to 8 lines per inch

Table 4.4 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC $ n1 V	Set line spacing to n/144 inch
ESC 1	7/72 inch line spacing (7 dots)
ESC 2	1/6 inch line spacing (12 dots)
ESC 3 <n1>	Set line spacing to n/216 inch
ESC A <n1>	Set line spacing at n/72 inch
ESC Q <n1>	Set right margin to <n1>
ESC l <n1>	Set left margin to <n1> Note: "l" is ASCII code 6CH.
ESC [n1 s	Set left margin to column n1
ESC [; n1 s	Set right margin to column n1
ESC [n1 ; n2 s	Set left margin to column n1 and set right margin to column n2
ESC [n1 r	Set top margin to line n1
ESC [; n1 r	Set bottom margin to line n1
ESC [n1 ; n2 r	Set top margin to line n1 and set bottom margin to n2
ESC D <n1> <n2>...<0>	Set horizontal tab (up to 15 tabs)
ESC [n1 u	Set horizontal tab stop at column n1
ESC [n1 ; n2 u	Set horizontal tab stop at column n1 and at column n2
ESC [n1 ; n2 ;..... nx u	Set horizontal tab stop at column n1, n2 ... nx (where x ≤ 15)
ESC B <n1> <n2>...<0>	Set vertical tab (up to 15 tabs)
ESC [g	Clear horizontal tab at active column
ESC [1 g	Clear vertical tab stop at active line

Table 4.4 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC [n1 v	Set vertical tab stop at line n1
ESC [n1 ; n2 v	Set vertical tab stop at line n1 and line n2
ESC [n1 ; n2 ; .... nx v	Set vertical tab stop at n1, n2 .... nx (where x ≤15)
ESC C <n1>	Set form length <n1> = number of lines
ESC [n1 t	Set form length to n1 lines
EIGHTH BIT CONTROL	
ESC #	8th bit as is
ESC =	8th bit = 0
ESC >	8th bit = 1
GRAPHICS	
ESC K <n1> <n2>	Select single density EPSON MX-80 graphics
ESC L <n1> <n2>	S double density EPSON MX-80 graphics
PAPER FEED COMMANDS	
ESC J <n1>	Perform n/216 inch line feed for one line
ESC LF	Perform negative line feed

4.3.4 IBM GRAPHICS PRINTER ESCAPE SEQUENCES

Feature 13 must be set to a value of 2 in order to use the IBM Graphics Printer escape sequences. The IBM escape sequences are exactly the same as the Epson escape sequences with the following two exceptions.

Table 4.5 IBM Graphics Escape Sequences

ESCAPE SEQUENCE	FUNCTION
HORIZONTAL PITCH	
ESC A <n1>	Specifies line space value of n1/72 inch. This value does not go into effect until an 'ESC 2' is received.
ESC 2	Set line feed to ESC A n1 value. If no value is specified then line feed equals 1/6 inch.

4.3.5 DIABLO ESCAPE SEQUENCES

In the escape sequences listed below, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of a ASCII character and the value of <n1> is sent as a character string. Feature 13 must be set to a value of 7 in order to use the escape sequences listed in Table 4.6.

NOTE
Only draft (9 X 9) 10 cpi, NLQ fonts and OCR fonts may be selected in Diablo mode.

Table 4.6 Diablo Escape Sequences

ESCAPE SEQUENCE	FUNCTION
FEATURES	
ESC $ n1 s	Set front panel feature number n1
ESC $ n1 c	Clear feature number n1
ESC $ F n1 ; n2 .	Sets any value feature except baud rate and vertical and horizontal tabs. n1 equals feature number and n2 equals value.
ESC $ @	Restore carriage
ESC @	Reset to start-up condition

Table 4.6 Diablo Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
CHARACTER SETS	
ESC (B	Selects US ASCII
ESC (A	Selects UK ASCII
ESC (K	Selects German
ESC (R	Selects French
ESC (H	Selects Swedish/Finnish
ESC (C	Selects Swedish/Finnish
ESC (E	Selects Norwegian/Danish
ESC (G	Selects Greek
ESC (D	Selects Spanish I
ESC (I	Selects IBM compatible
ESC (J	Selects Spanish II
CARRIAGE CONTROL	
ESC [20 h	Enable carriage return on receipt of LF, FF or VT
ESC [20 l	Disable carriage return on receipt of LF, FF or VT. "l" is ASCII code 6CH.
FORMAT CONTROL	
ESC [n1 '	Set active column to column n1
ESC [n1 a	Advance active column by n1 columns
ESC [n1 d	Set active line to line n1
ESC [n1 e	Advance active line by n1 lines
ESC [1 z	Set vertical pitch to 6 lines per inch
ESC [2 z	Set vertical pitch to 8 lines per inch
ESC $ n1 V	Set line spacing to n/144 inch

Table 4.6 Diablo Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC l <n1>	Set left margin to <n1> Note: "l" is ASCII code 6CH.
ESC [n1 s	Set left margin to column n1
ESC [; n1 s	Set right margin to column n1
ESC [n1 ; n2 s	Set left margin to column n1 and set right margin to column n2
ESC [n1 r	Set top margin to line n1
ESC [; n1 r	Set bottom margin to line n1
ESC [n1 ; n2 r	Set top margin to line n1 and set bottom margin to n2
ESC [n1 u	Set horizontal tab stop at column n1
ESC [n1 ; n2 u	Set horizontal tab stop at column n1 and at column n2
ESC [n1 ; n2 ; .....nx u	Set horizontal tab stop at column n1 n2....nx (where x≤15)
ESC [g	Clear horizontal tab at active column
ESC [1 g	Clear vertical tab stop at active line
ESC [n1 v	Set vertical tab stop at line n1
ESC [n1 ; n2 v	Set vertical tab stop at line n1 and line n2
ESC [n1 ; n2 ; ...nxv	Set vertical tab stop at n1, n2....nx (where x≤15)
ESC [n1 t	Set form length to n1 lines
EIGHTH BIT CONTROL	
ESC #	8th bit as is
PAPER OUT FEED COMMAND	
ESC J <n1>	Perform n/216 inch line feed for one line

Table 4.6 Diablo Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC CHR$(10)	Perform negative line feed
ESC D	Perform negative half line feed
ESC U	Perform positive half line feed
DIABLO FORMATTING FEATURES	
ESC 1	Set horizontal tab at current position
ESC 2	Clear all horizontal and vertical tabs
ESC 5	Enable forward printing
ESC 6	Enable backward printing
ESC 7	Enable print suppression
ESC 8	Clear horizontal tab at current position
ESC 9	Set left margin at active column
ESC 0	Set right margin at active column
ESC HT <n1>	Perform absolute horizontal tab to print position n1
ESC VT <n1>	Perform absolute vertical tab to line n1
ESC FF <n1>	Set lines per page to n1
ESC -	Set vertical tab to current paper position
ESC CR P	Remote reset
ESC RS <n1>	Set Vertical Motion Index (VMI) to (n1-1)/48
ESC US <n1>	Set Horizontal Motion Index (HMI) to (n1-1)/120
ESC C	Clear top and bottom margins
ESC L	Set bottom page margin to current position
ESC T	Set top page margin to current position
ESC S	Return HMI control to spacing switch

Table 4.6 Diablo Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC ?	Enable auto carriage return
ESC !	Disable auto carriage return
DIABLO WORD PROCESSING FEATURES	
ESC P	Enable proportional printing
ESC Q	Disable proportional printing
ESC E	Enable auto underscore
ESC R	Disable auto underscore
ESC O	Enable bold printing
ESC W	Enable shadow printing
ESC &	Disable bold/shadow printing
ESC <BS>	Backspace 1/120 inch. The user must set an HMI value before this escape sequence may be used.
ESC X	Cancel all word processing modes except proportional spacing
ESC H	Enable auto strikeout
ESC I	Disable auto strikeout

4.3.6 LA-120 ESCAPE SEQUENCES

In the escape sequences listed below, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of a ASCII character and the value of <n1> is sent as a character string. Feature 13 must be set to a value of 8 in order to use the escape sequences listed in Table 4.7.

Table 4.7 LA-120 Escape Sequences

ESCAPE SEQUENCE	FUNCTION
CHARACTER SETS	
ESC (A	Select U.K. character set
ESC (B	Select U.S. character set
ESC (C	Select Finland character set
ESC (E	Select Norway/Denmark character set
ESC (H	Select Sweden character set
ESC (K	Select German character set
ESC (R	Select French character set
ACTIVE COLUMN AND LINE	
ESC [n '	Set active column to n
ESC [n a	Advance active column by n
ESC E	Carriage return/line feed
ESC D	Line feed
ESC [n d	Set active line to n
ESC [n e	Advance active line by n
LINEFEED NEWLINE MODE	
ESC [20 h	Carriage return on LF, FF or VT
ESC [20 l	Disable carriage return on LF, FF or VT

Table 4.7 LA-120 Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
HORIZONTAL PITCH	
ESC [w	Selects 10 cpi
ESC [0 w	Selects 10 cpi
ESC [1 w	Selects 10 cpi
ESC [2 w	Selects 12 cpi
ESC [3 w	Selects 13.2 cpi
ESC [4 w	Selects 16.5 cpi
ESC [5 w	Selects 5 cpi
ESC [6 w	Selects 6 cpi
ESC [7 w	Selects 6.6 cpi
ESC [8 w	Selects 8.25 cpi
HORIZONTAL MARGINS	
ESC [n s	Set left margin to column n
ESC [n ; 0 s	Set left margin to column n
ESC [; n s	Set right margin to column n
ESC [0 ; n s	Set right margin to column n
ESC [n1 ; n2 s	Set left and right margins
HORIZONTAL TABS	
ESC H	Set horizontal tab at active column
ESC 1	Set horizontal tab at active column
ESC [g	Clear horizontal tab at active column
ESC [0 g	Clear horizontal tab at active column
ESC [2 g	Clear all horizontal tabs

Table 4.7 LA-120 Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC [3 g	Clear all horizontal tabs
ESC 2	Clear all horizontal tabs
ESC [n u	Set horizontal tab at n
ESC [n1 ; n2 u	Set horizontal tabs at n1 and n2
ESC [n1 ; nx u	Set horizontal tabs at n1 through nx
VERTICAL PITCH	
ESC [z	6 lines per inch
ESC [0 z	6 lines per inch
ESC [1 z	6 lines per inch
ESC [2 z	8 lines per inch
ESC [3 z	12 lines per inch
ESC [4 z	2 lines per inch
ESC [5 z	3 lines per inch
ESC [6 z	4 lines per inch
FORM LENGTH	
ESC [n t	Set form length in lines Set top margin to 1 Set bottom margin to n Set active line to 1
VERTICAL MARGINS	
ESC [n r	Set top margin to n
ESC [0 ; n r	Set bottom margin to n
ESC [n1 ; n2 r	Set top and bottom margin
VERTICAL TABS	
ESC J	Set vertical tab at active line

Table 4.7 LA-120 Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
ESC 3	Set vertical tab at active line
ESC [1 g	Clear vertical tab at active line
ESC [4 g	Clear all vertical tabs
ESC 4	Clear all vertical tabs
ESC [n v	Set vertical tab at n
ESC [n1 ; n2 v	Set vertical tabs at n1 and n2
ESC [n1 ; nx v	Set vertical tabs at n1 through nx x≥15
PRODUCT IDENTIFICATION	
ESC [c	Request for ID send ESC [?2c
ESC [0 c	Request for ID send ESC [?2c

4.4 DOWNLOADABLE CHARACTERS

User defined characters may be downloaded to the printer in the event the user needs to print a character that is not contained in the resident character sets. The downloadable character capabilities of the printer allow the user to define specific symbols and characters, and load them into memory in place of existing characters. For example, the user may wish to replace the "a" in the U.S. ASCII character set with the "Δ" symbol. Once the user defined characters are loaded into memory, the user may select the downloaded characters by setting Feature 69 to 1. The user defined characters will be printed until the user reverts to the standard characters of the U.S. ASCII character set by setting Feature 69 to 0. When Feature 69 is set to 0, the downloaded characters may be selected with escape sequences. The escape sequence "<ESC>%<SOH><NUL>" will select downloaded characters. The escape sequence "<ESC>%<NUL><NUL> selects the standard, ROM based characters.

> **NOTE**
> The user must have the optional RAM installed before downloadable character capabilities may be used.

4.4.1 HOW TO DEFINE AND LOAD CHARACTERS

The following escape sequence downloads a user defined character into a specific location in the active character set.

```
ESC "&" s n m a p1 p2...p11
```

Command Element	Definition
ESC "&"	Enters character generator mode.
s	Always null.
n m	n and m specify the location or locations of user defined characters. For example, to load a single character into the location occupied by the "a" in the U.S. ASCII table, n and m would both equal 97 (the Decimal value of an ASCII "a"). If more than one character is defined, n and m are used to specify a range. To load four characters into the locations occupied by "a", "b", "c" and "d", n would be equal to 97 and m would be equal to 100.
a	"a" is an attribute byte. The printer ignores all but the Most Significant Bit (MSB) of the attribute "a". The MSB provides descender data. If the MSB is 0, the user defined character will be shifted down by one dot. See Paragraph 4.4.2 for more information.
p1...p11	Horizontal positions p1 through p11 contain the data which define the character pattern.

The following example demonstrates how to complete the escape sequence which will download a character in 10 pitch draft. The character "Δ" will be downloaded into the U.S. ASCII character set in place of the existing "=" character.

The dot pattern for the "Δ" character must be defined in terms of an 8 X 11 matrix. See Figure 4.1. The matrix is divided into 11 columns, designated P1 through P11. Each column is divided into eight dot locations. Each dot location is assigned a decimal value. The decimal values for the printable dots in each column are added and this value is sent to the printer as character data (P1 - P11).

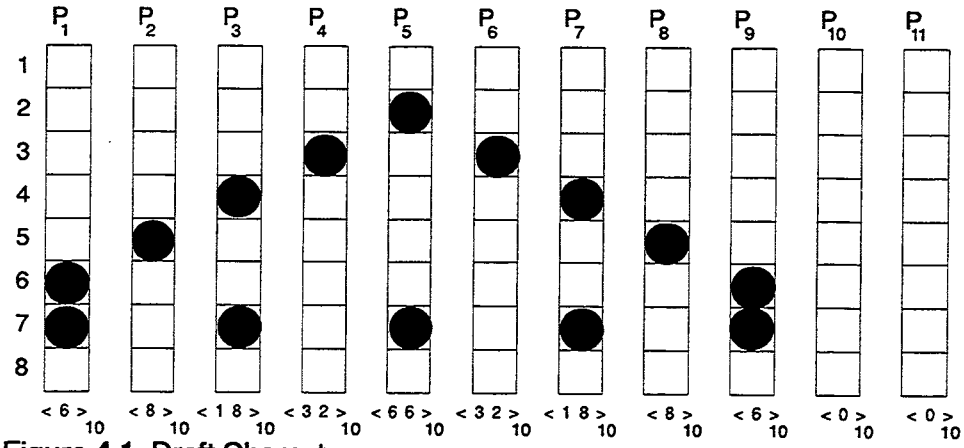


Figure 4.1 Draft Character

The first column (P1) of the "Δ" character has printable dots in the second and third dot locations. P1 therefore has a decimal value of 6. See Figure 4.2. This method for determining the character data is used for each column. In Figure 4.1, the decimal value for P1 through P11 is given directly under each column.

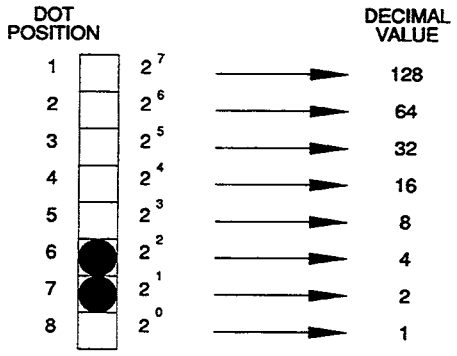
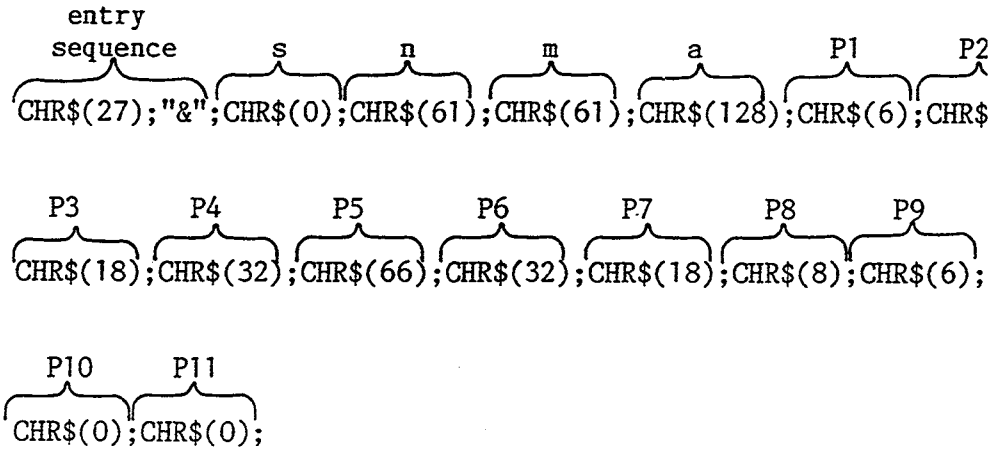


Figure 4.2 Dot Position Values

In the completed escape sequence given below:
The downloaded character is not descended so the attribute a is equal to 128.
n and m are both equal to 61, (Decimal value of the "=" character).



This escape sequence is found in the sample program given in Figure 4.3 lines 150 through 230.

The following rules must be observed when downloading user defined characters:

- When downloading a draft character, data bytes p10 and p11 are always ignored by the printer.
- When more than one character is sent in an escape sequence, each character must have an attribute byte.
- Dots may not be printed in adjacent columns of the same dot position.
- The type of character to be downloaded (pitch and font), must be the same as the active character set.

```
100 '       THIS PROGRAM DOWN-LOADS A USER DEFINED
110 '       DRAFT CHARACTER IN PLACE OF THE '=' CHARACTER
120 '
130 '
140 LPRINT CHR$(27);"$F9;10.";                    '   SET FTN 9 TO DRA
150 LPRINT CHR$(27);"&";CHR$(0);                  '   ENTRY ESCAPE SEQ
160 LPRINT CHR$(61);CHR$(61);                     '   "=="  RANGE
170 '
180 '
190 LPRINT CHR$(128);                             '   DESCENDER DATA
200 LPRINT CHR$(6);CHR$(8);CHR$(18);              '   COLUMNS 1-3   DA
210 LPRINT CHR$(32);CHR$(66);CHR$(32);            '   COLUMNS 4-6   DA
220 LPRINT CHR$(18);CHR$(8);CHR$(6);              '   COLUMNS 7-9   DA
230 LPRINT CHR$(0);CHR$(0);                       '   COLUMNS 10,11 DA
240 '
250 '
260 LPRINT CHR$(27);"%";CHR$(1);CHR$(0);          '   SELECT USER CHAR
270 LPRINT "USER DEFINED CHARACTERS.....";
280 LPRINT "= = = = = = = ="
290 LPRINT
300 LPRINT CHR$(27);"%";CHR$(0);CHR$(0);          '   SELECT ROM CHARA
310 LPRINT "STANDARD ROM CHARACTERS.....";
320 LPRINT "= = = = = = = ="
330 '
340 LPRINT CHR$(27);"&C";                         '   CLEAR USER CHARA
350 END
```

```
USER DEFINED CHARACTERS.....△ △ △ △ △ △ △

STANDARD ROM CHARACTERS.....= = = = = = =
```

Figure 4.3 Sample Program 1

4.4.2 DESCENDER DATA

The Most Significant Bit (MSB), of the attribute byte contains descender data. As stated earlier, when the MSB of the attribute byte is 0, the entire character is shifted down in the matrix by one dot. When the MSB is 1, the character occupies the top eight dot positions of the matrix. In Figure 4.4, the 8 X 11 matrix for a draft character has been expanded to show the ninth dot position. The character on the left demonstrates how the character is printed when the MSB of the attribute byte is 1. The character on the right demonstrates how the character is printed when the MSB of the attribute byte is 0.

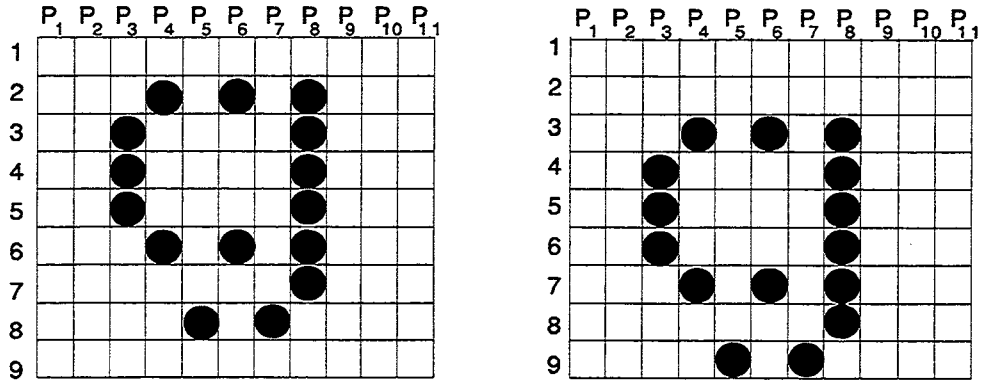


Figure 4.4 Descender Data

In the sample program in Figure 4.5, the "=" character and the ">" character are both replaced by the "Δ" character. Notice that the "Δ" character which replaces the ">" character is descended.

```
100 '       THIS PROGRAM DOWN-LOADS A USER DEFINED
110 '       DRAFT CHARACTER IN PLACE OF THE '=' CHARACTER
120 '
130 '       A DESCENDED VERSION OF THE SAME CHARACTER IS DOWN-LOADED
140 '       IN PLACE OF THE '>' CHARACTER.
150 '
160 LPRINT CHR$(27);"$F9;10.";                  '   SET FTN 9 TO DRAFT
170 LPRINT CHR$(27);"&";CHR$(0);                '   ENTRY ESCAPE SEQUENCI
180 LPRINT CHR$(61);CHR$(62);                   '   "=>"  RANGE
190 '
200 ' NON-DESCENDED CHARACTER
210 '
220 LPRINT CHR$(128);                           '   DESCENDER DATA
230 LPRINT CHR$(6);CHR$(8);CHR$(18);            '   COLUMNS 1-3   DATA
240 LPRINT CHR$(32);CHR$(66);CHR$(32);          '   COLUMNS 4-6   DATA
250 LPRINT CHR$(18);CHR$(8);CHR$(6);            '   COLUMNS 7-9   DATA
260 LPRINT CHR$(0);CHR$(0);                     '   COLUMNS 10,11 DATA
270 '
280 ' DESCENDED CHARACTER
290 '
300 LPRINT CHR$(0);                             '   DESCENDER DATA
310 LPRINT CHR$(6);CHR$(8);CHR$(18);            '   COLUMNS 1-3   DATA
320 LPRINT CHR$(32);CHR$(66);CHR$(32);          '   COLUMNS 4-6   DATA
330 LPRINT CHR$(18);CHR$(8);CHR$(6);            '   COLUMNS 7-9   DATA
340 LPRINT CHR$(0);CHR$(0);                     '   COLUMNS 10,11 DATA
350 '
360 '
370 '
380 LPRINT CHR$(27);"%";CHR$(1);CHR$(0);        '   SELECT USER CHARACTEI
390 LPRINT "USER DEFINED CHARACTERS.....";
400 LPRINT "   = > = > = >"
410 LPRINT
420 LPRINT CHR$(27);"%";CHR$(0);CHR$(0);        '   SELECT ROM CHARACTERS
430 LPRINT "STANDARD ROM CHARACTERS.....";
440 LPRINT "   = > = > = >"
450 '
460 LPRINT CHR$(27);"&C";                       '   CLEAR USER CHARACTERS
470 END

USER DEFINED CHARACTERS.....   △ △ △ △ △ △

STANDARD ROM CHARACTERS.....   = > = > = >
```

Figure 4.5 Sample Program 2

4.4.3 DOWNLOADING A MEMO CHARACTER

The mechanics for downloading a memo character are the same as those described in Paragraph 4.4.2. As seen in Figure 4.6, a memo character has a different dot matrix, (8 X 19). The escape sequence to download a memo character must therefore contain nineteen character data bytes, (P1 - P19). The escape sequence for downloading the character in Figure 4.6 is given in the sample program in Figure 4.7, lines 150 through 250.

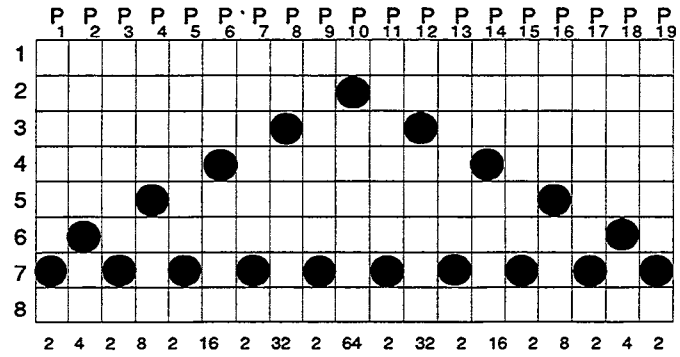


Figure 4.6 Memo Character

```
100 '       THIS PROGRAM DOWN-LOADS A USER DEFINED
110 '       MEMO CHARACTER IN PLACE OF THE '=' CHARACTER
120 '
130 '
140 LPRINT CHR$(27);"$F9;13.";                  '   SET FTN 9 TO MEM
150 LPRINT CHR$(27);"&";CHR$(0);                '   ENTRY ESCAPE SEQ
160 LPRINT CHR$(61);CHR$(61);                   '    "=="  RANGE
170 '
180 LPRINT CHR$(128);                           '   DESCENDER DATA
190 LPRINT CHR$(2);CHR$(4);CHR$(2);             '   COLUMNS 1-3    DA
200 LPRINT CHR$(8);CHR$(2);CHR$(16);            '   COLUMNS 4-6    DA
210 LPRINT CHR$(2);CHR$(32);CHR$(2);            '   COLUMNS 7-9    DA
220 LPRINT CHR$(64);CHR$(2);CHR$(32);           '   COLUMNS 10-12  DA
230 LPRINT CHR$(2);CHR$(16);CHR$(2);            '   COLUMNS 13-15  DA
240 LPRINT CHR$(8);CHR$(2);CHR$(4);             '   COLUMNS 16-18  DA
250 LPRINT CHR$(2);                             '   COLUMNS 19     DA
260 '
270 '
280 LPRINT CHR$(27);"%";CHR$(1);CHR$(0);        '   SELECT USER CHAR
290 LPRINT "USER DEFINED CHARACTERS.....";
300 LPRINT "  = = = = ="
310 LPRINT
320 LPRINT CHR$(27);"%";CHR$(0);CHR$(0);        '   SELECT ROM CHARA
330 LPRINT "STANDARD ROM CHARACTERS.....";
340 LPRINT "  = = = = ="
350 '
360 LPRINT CHR$(27);"&C";                       '   CLEAR USER CHARA
370 END
```

```
USER DEFINED CHARACTERS.....  Δ Δ Δ Δ Δ

STANDARD ROM CHARACTERS.....  = = = = =
```

Figure 4.7 Sample Program 3

4.4.4 ESCAPE SEQUENCE SUMMARY

SEQUENCE	BASIC SYNTAX	FUNCTION
ESC % SOH NUL	`CHR$(27);"%";CHR$(1);CHR$(0);`	Selects user defined characters to be printed.
ESC % NUL NUL	`CHR$(27);"%";CHR$(0);CHR$(0);`	Selects standard ROM based character to be printed.
ESC & C	`CHR$(27);"&C";`	Deletes all user defined characters.

ESC "&" s n m a p1 p2...p11	`CHR$(27);"&";CHR$(s);CHR$(n);`
	`CHR$(m);`
	`CHR$(a);CHR$(p1);CHR$(p2);...`
	`CHR$(p11);`
		Downloads a user defined draft character.*

ESC "&" s n m a p1 p2 ...p19	`CHR$(27);"&";CHR$(s);CHR$(n);`
	`CHR$(m);`
	`CHR$(a);CHR$(p1);CHR$(p2);...`
	`CHR$(p19);`
		Downloads a user defined memo character.*

*See Paragraph 4.4.1 for a detailed explanation of the variables in these escape sequences.

4.5 GRAPHICS

The printer offers dot-addressable raster-scan graphics : Epson MX 80 compatible and DS-180 (Anadex 9500/9501 compatible). This allows the user to print computer generated charts, graphs, maps and other pictorial images which help present data in a concise readable form. With Epson graphics the printer can produce single density graphics with a horizontal resolution of 60 dots per inch and double density graphics with a horizontal resolution of 120 dots per inch. Vertical resolution in Epson graphics is determined by the user to a maximum of 144 dots per inch. With DS-180 graphics , the printer can produce graphics with a horizontal resolution of 75 dots per inch and a maximum vertical resolution of 73 dots per inch (as determined by user).

As mentioned above, the graphics firmware is compatible with systems which have Epson or DS-180 graphics software. If the host system is not equipped with graphics software, the user must purchase or write a graphics driver program. The purpose of a graphics driver program is to convert information displayed on the screen to information the printer can use.

4.5.1 EPSON MX-80 GRAPHICS

The printer must be set to Epson mode or IBM Graphics Printer mode to utilize Epson MX-80 Graphics. When the printer is placed into the Epson graphics mode it no longer prints characters in predefined groups. In this mode of operation the user can control each print wire independently. This section will instruct the user on how to manipulate the print wires in order to "draw" a specific figure. The user should understand that the following instructions are intended only to describe the fundamentals of encoding, not to demonstrate the most efficient way of programming a particular figure. This is left to the programming expertise of the user.

The user can control the top eight print wires in Epson graphics. (See 4.8). A "column" is then eight dots high and one dot wide.

> **NOTE**
> The interfacing in some systems will not support eight bits. These systems can control only seven print wires, (numbers 2 through 8).

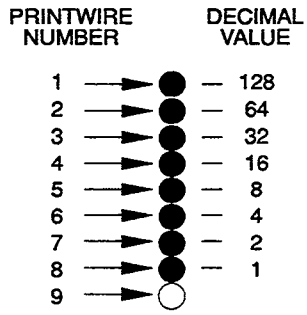


Figure 4.8 Print Wires (Epson Graphics)

As shown in Figure 4.8, each print wire has a decimal value assigned to it. A print wire is fired by sending the decimal value that corresponds to that print wire. For example, to fire print wire number 2, the user would send CHR$(64). If more than one print wire is to be fired, the decimal values of the print wires to be fired are added, and the sum is sent. For example, to fire print wires number 2 and number 4, CHR$(80) would be sent. Print wire number 2 has a decimal value of 64 and print wire number 4 has a decimal value of 16. The sum of the decimal values is 80.

In order to print a figure using the individual print wire control described above, the figure must first be plotted on graph paper as individual dots.

Because of the high resolution used in graphics, such as 72 dots per inch, it will be necessary to plot the figure at a scale greater than 1 to 1 in order to plot individual dot positions.

Figure 4.9 is an example of how to plot a figure as individual dots in single density Epson graphics. The figure at the tallest point is 36 dots high. With a vertical resolution of 72 dots per inch the printed figure will be 1/2 inch tall. At the widest point the figure is 35 dots wide. With a horizontal resolution of 60 dots per inch the printed figure will be just over 1/2 inch wide (by five dots). Notice also that the two smaller columns are 24 dots tall (1/3 inch) and 18 dots tall (1/4 inch).

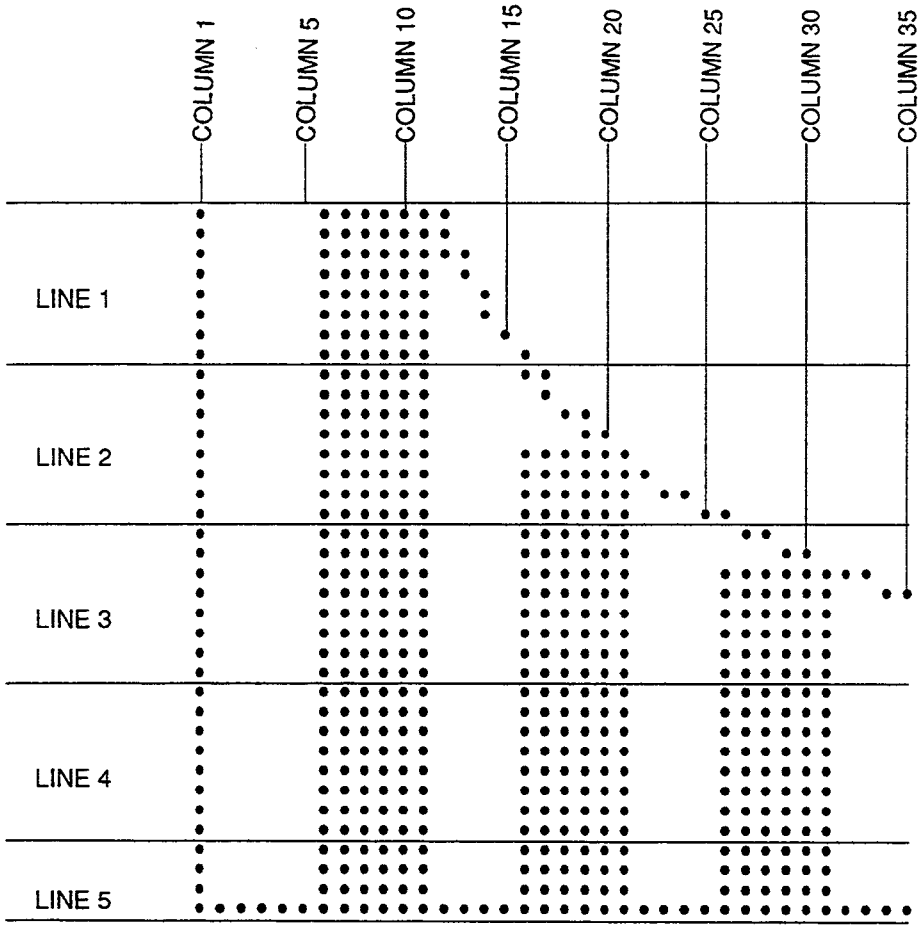


Figure 4.9 Graphics Figure (Epson Graphics)

Since eight print wires can be controlled in Epson graphics, the figure should be divided into lines (see 4.9), each eight dots tall (the height of one column). Notice, after dividing the figure, that the the printhead must make five passes to complete the figure with only four print wires being utilized on the fifth pass. The user must examine each line, beginning with line 1 and determine which print wires must be fired for each column. In column 1 of line 1, all eight print wires must be fired. Adding the decimal value of all eight wires (see 4.8 for the value of each wire), gives column 1 a value of 255. Column 2 has no dots and therefore column 2 has a value of 0. This is also true for columns 3, 4 and 5. In column 6 all eight print wires are fired so column 6 has a value of 255. Columns 7, 8, 9, 10 and 11 also have a value of 255. In column 12 only the top three wires are fired so column 12 has a value of 224. Column 13 has a value of 48 (print wires 3 and 4 are fired). Column 14 has a value of 12 (print wires 5 and 6 are fired). Column 15 has a value of 2 (print wire number 7 is fired). Column 16 has a value of 1 (print wire number 8 is fired).

The procedure of determining the value for every column must be performed for each of the five lines. It is also important to document the number of columns contained in each line. The number of columns contained in each line and the value for each column (in parenthesis) is given below.

Line 2 contains 26 columns. Column 1 (255); columns 2 through 5, (0); columns 6 through 11, (255); columns 12 through 15, (0); column 16, (143); column 17, (207); column 18, (47); column 19, (63); column 20, (31); column 21, (15); column 22, (4); columns 23 and 24, (2); columns 25 and 26, (1).

Line 3 contains 35 columns. Column 1, (255); columns 2 through 5, (0); columns 6 through 11, (255); columns 12 through 15, (0); columns 16 through 21 (255); columns 22 through 25, (0); column 26, (63); columns 27 and 28, (191); columns 29 and 30, (127); column 31, (63); columns 32 and 33, (32); columns 34 and 35, (16).

Line 4 contains 31 columns. Column 1, (255); columns 2 through 5, (0); columns 6 through 11, (255); columns 12 through 15, (0); columns 16 through 21, (255); columns 22 through 25, (0); columns 26 through 31, (255).

Line 5 contains 35 columns. Column 1, (240); columns 2 through 5, (16); columns 6 through 11, (240); columns 12 through 15, (16); columns 16 through 21, (240); columns 22 through 25, (16); columns 26 through 31, (240); columns 32 through 35, (16).

In order to send the value for each column and print the figure, the user must first enter Epson graphics mode. This is done by sending the printer a sequence of four codes.

FORMAT:

```
ESC "K" N1 N2
```

The ESC "K" instructs the printer to enter single density Epson graphics. N1 and N2 designate the number of graphics bytes (number of columns) that are to be sent to the printer.

NOTE

The printer will "hang-up" if the number of graphics bytes sent is less than that specified by N1 and N2. Also, the printer exits graphics mode after receiving the number of graphics bytes specified by N1 and N2. Any bytes the printer receives after exiting graphics mode will be printed as text mode characters.

The total number of graphics bytes specified by N1 and N2 is determined by the following equation:

N1 + (N2 X 256) = Total number of graphics bytes

N1 can range from 0 to 255. N2 can range from 0 to 7.

> **NOTE**
> N2 values greater than 7 are interpreted Modulo 8. The printer interprets them as the remainder after they are divided by 8. For example, 8, 16 and 24 each equal 0 (there is 0 remainder after any of them are divided by 8); 9, 17 and 25 each equal 1 (the remainder is 1 after any of them are divided by 8); 15, 23 and 31 each equal 7, etc.

Example:

```
CHR$(27); "K"; CHR$(7); CHR$(1)
```

CHR$(27) is the escape code and "K" specifies single density graphics. The number of graphics bytes specified by N1 and N2 is:

7 + (1 X 256) = 263 graphics bytes

To specify 100 graphics bytes N1 must have a value of 100 and N2 a value of 0.

100 + (0 X 256) = 100 graphics bytes

> **NOTE**
> For computers that will not send 0, an 8 or any multiple of 8 can be substituted.

To specify 300 graphics bytes N1 must have a value of 44 and N2 a value of 1.

44 + (1 X 256) = 300 graphics bytes

In single density graphics the maximum line width is 816 dots. To specify 816 graphics bytes N1 must have a value of 48 and N2 a value of 3.

The user may also choose double density Epson graphics by sending ESC "L" N1 N2. N1 and N2 have the same meaning as in the ESC "K" sequence. In double density graphics the printhead moves over only half the normal distance each time the printhead fires. This causes the dots to overlap on the horizontal plane producing a horizontal resolution of 120 dots per inch. In double density graphics the maximum line width is 1632 dots. To specify 1632 graphics bytes N1 must have a value of 96 and N2 a value of 6.

ESC "K" sets graphics mode to single density graphics (816 dots per 13.6 inch line).

Format: ESC "K" N1 N2
Line Length = N1 + (N2 X 256)
$0 \leq N1 \leq 255$
$0 \leq N2 \leq 7$ (Modulo 8, or 8 = 0)

ESC "L" sets graphics mode to double density graphics (1632 dots per 13.6 inch line).

Format: ESC "K" N1 N2
Line Length = N1 + (N2 X 256)
$0 \leq N1 \leq 255$
$0 \leq N2 \leq 7$ (Modulo 8, or 8 = 0)

ESC A CHR$ (n) - selects vertical line spacing in whole dot increments. Substituting an 8 for n will advance the paper 8/72 inch or by 8 dots.

ESC 3 CHR$ (n) - selects vertical line spacing in 1/3 dot increments rounded up to the nearest 1/2 dot. Substituting an 8 for n will advance the paper by 3 dots. (8/216 inch = 2 2/3 dots which is rounded up to 3 dots).

ESC$ N V - selects vertical line spacing in 1/2 dot increments. Substituting an 8 for N will advance the paper by 8/214 inch or by 4 dots.

The information to print Figure 4.9 can now be sent to the printer. The first line of Figure 4.9 contains 16 columns (or graphics bytes). therefore N1 will have a value of 16 and N2 a value of 0.

NOTE
Before sending the escape sequence to enter graphics, Feature Number 13 must be set to 6.

The sequence to enter single density graphics and specify 16 columns of graphics will be CHR$(27);"K";CHR$(16);CHR$(0);. The value of each of the 16 columns in line 1 will immediately follow this sequence. If the value for each column is entered individually it will appear as follows:

```
CHR$(255);CHR$(0);CHR$(0);CHR$(0);CHR$(0);CHR$(255);CHR$(255);CHR$(255);
CHR$(255);CHR$(255);CHR$(255);CHR$(192);CHR$(48);CHR$(12);CHR$(2);CHR$(1).
```

The graphics line is ended with a carriage return and line feed. Line 2 contains 26 columns so N1 would have a value of 26 and N2 a value of 0. To print line 2 the printer must be instructed to re-enter graphics mode by sending CHR$(27);"K";CHR$(26);CHR$(0); which is immediately followed by the graphics data for line 2. Line 2 is terminated with a carriage return and line feed and the procedure is repeated for lines 3, 4 and 5.

A sample graphics program is provided on page 4.38. Notice that the sample is made up of diamonds formed by the bit pattern sent to the printer in statement 230 of the program. The value for each column which makes up the diamond is shown in Figure 4.10.

NOTE

Some systems are designed to automatically perform a carriage return and line feed after receiving 132 bytes. In order to complete a full line of graphics, (which typically exceeds 132 bytes) this feature must be disabled.

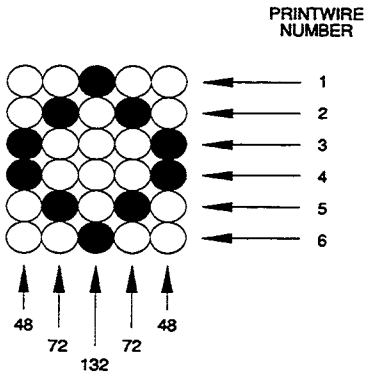


Figure 4.10 Diamond Pattern (Epson Graphics)

NOTE

To run the sample graphics program features 29 and 61 must be enabled. Features 36 and 47 must be disabled.

SAMPLE GRAPHICS PROGRAM (Epson Graphics)

```
20      OPEN "TT10:" FOR OUTPUT AS FILE #1
25      PRINT #1,CHR$(27);"A";CHR$(6);
30      GOSUB 200: REM DRAW TOP OF BOX
40      FOR P= 1 TO 8
50      GOSUB 300: REM DRAW LEFT & RIGHT SIDES
60      NEXT P
130     GOSUB 200: REM DRAW BOTTOM OF BOX
150     GOTO 500
200     REM THIS SUBROUTINE DRAWS TWO LINES OF DIAMONDS,
205     REM EACH LINE 36 DIAMONDS LONG.
210     FOR M = 1 TO 2
215     PRINT #1,CHR$(27);"K";CHR$(180);CHR$(0);
220     FOR N = 1 TO 36
230     PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
240     NEXT N
250     PRINT #1
260     NEXT M
270     RETURN
300     REM THIS SUBROUTINE DRAWS THE TWO DIAMONDS AT THE LEFT
305     REM AND RIGHT SIDES OF THE BOX
310     PRINT #1,CHR$(27);"K";CHR$(180);CHR$(0);
320     PRINT # 1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
325     PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
330     FOR I = 1 TO 160
340     PRINT #1,CHR$(0);
350     NEXT I
355     PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
360     PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
365     PRINT #1
370     RETURN
500     END
```

4.5.2 DS-180 GRAPHICS (ANADEX 9500/9501 COMPATIBLE)

When the printer is placed into the DS-180 graphics mode it no longer prints characters in predefined groups. In this mode of operation the user can control each print wire independently. This section will instruct the user on how to manipulate the print wires in order to "draw" a specific figure. The user should understand that the following instructions are intended only to describe the fundamentals of encoding, not to demonstrate the most efficient way of programming a particular figure. This is left to the programming expertise of the user.

The user can control the top six print wires in DS-180 graphics, (see Figure 4.11). A "column" is then six dots high and one dot wide.

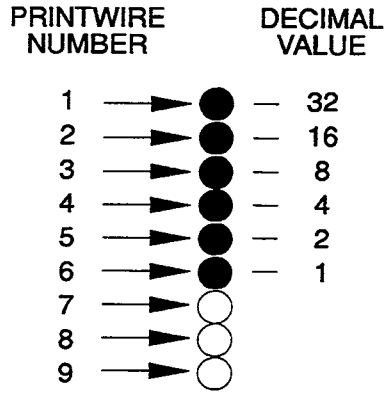


Figure 4.11 Print Wires (DS-180 Graphics)

As shown in Figure 4.11, each print wire has a decimal value assigned to it. A print wire is fired by sending the decimal value that corresponds to that print wire. For example, to fire print wire number 2, the user would send CHR$(16). If more than one print wire is to be fired, the decimal values of the print wires to be fired are added, and the sum is sent. For example, to fire print wires number 2 and number 4, CHR$(20) would be sent. Print wire number 2 has a decimal value of 16 and print wire number 4 has a decimal value of 4. The sum of the decimal values is 20.

In order to print a figure using the individual print wire control described above, the figure must first be plotted on graph paper as individual dots. Because of the high resolution used in graphics, such as 72 dots per inch it will be necessary to plot the figure at a scale greater than 1 to 1 in order to plot individual dot positions.

Figure 4.12 is an example of how to plot a figure as individual dots in DS-180 graphics. The figure at the tallest point is 36 dots high. With a vertical resolution of 72 dots per inch the printed figure will be 1/2 inch tall. At the widest point the figure is 35 dots wide. With a horizontal resolution of 75 dots per inch the printed figure will be just under 1/2 inch wide (by two and one/half dots). Notice also that the two smaller columns are 24 dots tall (1/3 inch) and 18 dots tall (1/4 inch).

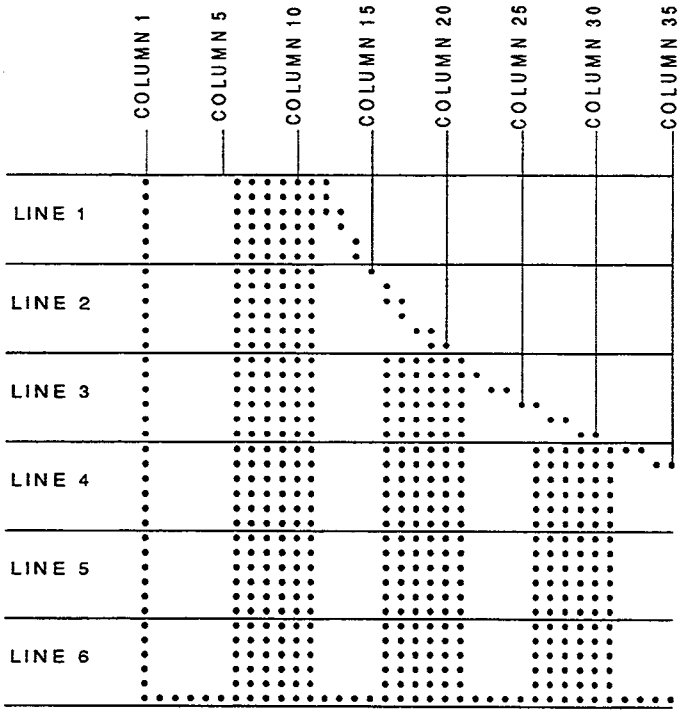


Figure 4.12 Graphics Figure (DS-180 Graphics)

Since six print wires can be controlled in DS-180 graphics , the figure should be divided into lines (see 4.12), each six dots tall (the height of one column). Notice, after dividing the figure, that the printhead must make six passes to complete the figure. The user must examine each line, beginning with line 1 and determine which print wires must be fired for each column. In column 1 of line 1, all six print wires must be fired. Adding the decimal value of all six wires (see 4.11 for the value of each wire), gives column 1 a value of 63.

NOTE

In DS-180 graphics mode, a graphics byte must have bit 7 set to 1 to be a legal graphics byte. Therefore, when calculating the value of each column of graphics the value of bit 7 (which is 64) must be added to the value of the print wires. The resulting value for column 1 is then 127 (63 plus the value of bit 7).

Column 2 contains no dots and therefore column 2 has a value of 64 (0 plus bit 7). This is also true for columns 3, 4 and 5. In column 6 all six print wires are fired so column 6 has a value of 127 (63 plus bit 7). Columns 7, 8, 9, 10 and 11 also have a value of 127. In column 12 only the top two print wires are fired so column 12 has a value of 112 (48 plus bit 7). Column 13 has a value of 76 (print wires 3 and 4 are fired). Column 14 has a value of 67 (print wires 1 and 2 are fired).

The procedure of determining the value for every column must be performed for each of the six lines. The value for each column (in parenthesis) in lines 2 through 6 is given below.

NOTE
The values given below include the value of bit 7.

Line 2. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12, 13 and 14, (64); column 15, (96); column 16, (88); column 17, (76); column 18, (66); column 19, (67); column 20, (65).

Line 3. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22, (80); column 23 and 24, (72); column 25 and 26, (68); column 27 and 28, (66); column 29 and 30, (65).

Line 4. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22 through 25, (64); column 26 through 31, (127); columns 32 and 33, (96); columns 34 and 35, (80).

Line 5. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22 through 25, (64); columns 26 through 31, (127).

Line 6. Column 1, (127); columns 2 through 5, (65); columns 6 through 11, (127); columns 12 through 15, (65); columns 16 through 21, (127); column 22 through 25, (65); columns 26 through 31, (127); columns 32 through 35, (65).

In order to send the value for each column of graphics and print the figure, the user must first enter DS-180 graphics mode.

NOTE
Feature Number 49 must be enabled in order to enter DS-180 graphics. See Paragraph 2.5.2

DS-180 graphics mode is entered by sending a CONTROL FS (CHR$(28) in BASIC) to the printer. The printer will remain in the graphics mode until commanded to exit. Except for FS, ETX, GS and the line terminator each byte must have bit 7 set to 1 to be a legal graphics byte. Each line of graphics is terminated by receipt of an ASCII number 0 through 9. This code terminates the graphics line and advances the paper "n" dot increments where "n" equals the single digit line terminator 0 through 9.

The forms control alignment may be maintained when in DS-180 graphics. Top-of-form, perforation skipover and vertical tabs will be executed as programmed.

A horizontal indent may be programmed by sending the sequence ;nnn where "nnn" equals an ASCII decimal number. The indent will be "nnn" horizontal dot positions from the left margin. Example: PRINT";25" causes an indent of 25 dot positions (1/3 inch). This sequence may be sent immediately after the FS code or after the line terminator. The indent command sequence must immediately precede a printable graphics byte.

To exit DS-180 graphics the user must send CONTROL GS or ONTROL ETX. Exiting graphics using the GS control code corrects for any variations in the line feed boundary caused by the graphics line terminator. Exiting graphics using the ETX control code does not correct the line feed boundary. The ETX control code must be used to print ASCII characters and graphics on the same line. (See sample program on page 43)

The information to print Figure 4.12 can now be sent to the printer. Make certain Feature Number 49 is enabled before attempting to enter graphics mode. Sending CHR$(28) instructs the printer to enter graphics. This is followed by the values for the columns in line 1. If the value for each column is entered individually it will appear as follows:

```
CHR$(127);CHR$(64);CHR$(64);CHR$(64);CHR$(64);CHR$(127);CHR$(127);
CHR$(127);CHR$(127);CHR$(127);CHR$(127);CHR$(112);CHR$(76);CHR$(67);
```

The graphics line is terminated with a "6" which advances the paper by 6 dot increments. The printer will automatically perform a carriage return. The graphics data for lines 2 through 6 is entered in the same manner.

A sample graphics program is provided on page 4.44. Notice that the sample is made up of diamonds formed by the bit pattern sent to the printer in statement 230 of the program. The value for each column which makes up the diamond is shown in Figure 4.13.

NOTE

Some systems are designed to automatically perform a carriage return and line feed after receiving 132 bytes. In order to complete a full line of graphics (which typically exceeds 132 bytes), this feature must be disabled.

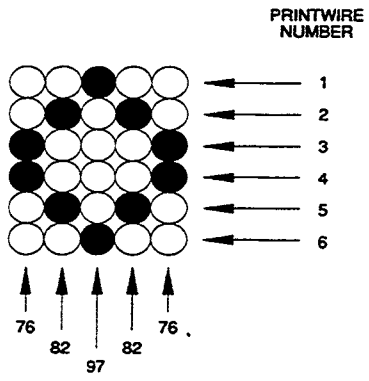


Figure 4.13 Diamond Pattern (DS-180 Graphics)

NOTE
To run the sample graphics program, features 29, 35 and 49 must be enabled. Features 36 and 47 must be disabled.

SAMPLE GRAPHICS PROGRAM (DS-180 GRAPHICS)

```
20      OPEN "TT10:" FOR OUTPUT AS FILE #1
25      PRINT #1,CHR$(28);: REM ENTER GRAPHICS
30      GOSUB 200: REM DRAW TOP OF BOX
40      FOR P=1 TO 7
50      GOSUB 300: REM DRAW LEFT & RIGHT SIDES
60      NEXT P
130     GOSUB 200: REM DRAW BOTTOM OF BOX
140     PRINT #1,CHR$(29);: REM EXIT GRAPHICS & CORRECT LINEFEED BOUNDARY
150     GOTO 500
200     REM THIS SUBROUTINE DRAWS TWO LINES OF DIAMONDS
205     REM EACH On line 36 DIAMONDS LONG
210     FOR M=1 TO 2
220     FOR N=1 TO 36
230     PRINT #1,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
240     NEXT N
250     PRINT #1,"6";
260     NEXT M
270     RETURN
300     REM THIS SUBROUTINE DRAWS THE TWO DIAMONDS AT THE LEFT
305     REM AND RIGHT SIDES OF THE BOX
320     PRINT #1,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
325     PRINT #1,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
330     PRINT #1,"0";
355     PRINT #1,"170";CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
360     PRINT #1,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
365     PRINT #1,"6";
370     RETURN
500     END
```

4.6 BAR CODE PRINTING

In order to use bar code printing capabilities, Feature 70 must be set to 1. Setting Feature 70 to 0 will disable bar code capabilities. Feature 70 should be set to 0 whenever the user is not printing bar codes. The command sequence to print Code 39 bar code is as follows:

^B a x d d d..... d ^G

The command sequence parameters are described below.

^B	The "caret" "B" is a required two character entry sequence. (Not Control B.)		
The "a" parameter determines what type of readable character is printed below the bar code.	Y turns on non-OCR printing (DRAFT)		
	0 turns on OCR-A printing. (If printer has OCR-A option)		
	B turns on OCR-B printing. (If printer has OCR-B option)		
	D defaults to font and nationality selected by Feature Number 9 and Feature Number 10.		
	Any other character produces no print under bar code.		
The "x" parameter determines what type of bar code to print.		TYPE	DENSITY
	A	CODE 39	LOW RESOLUTION
	B	CODE 39	MED. RESOLUTION
	C	CODE 39	HIGH RESOLUTION
	D	INTERLEAVED 2 OF 5	LOW RESOLUTION
	E	INTERLEAVED 2 OF 5	MED. RESOLUTION
ddd ... d	Bar code data to print. Characters other than those supported by a particular bar code type are ignored.		
^G	The "caret" "G" is a required two character sequence terminator. (Not Control G.)		

The printer automatically inserts a start and stop character when printing bar codes.

Interleaved 2 of 5 will print an even number of characters only. The printer will automatically insert a leading 0 if needed.

Various bar code print samples are provided below.

```
                                        CODE 39
LPRINT"^BOXCODE 39A^G"
```

```
          CODE 39A
LPRINT"^BYBCODE 39B^G"
```

```
          CODE 39B
LPRINT"^BBCCODE 39C^G"
```

```
          CODE 39C
                                  INTERLEAVED 2 OF 5
LPRINT"^BOD0123456789^G"
```

```
        0123456789
LPRINT"^BXD0123456789^G"
```

```
LPRINT"^BDE0123456789^G"
```

```
        0123456789
```

Figure 4.14 Various Bar Code Print Samples

4.6.1 SET BAR CODE HEIGHT

This command is used to set bar code height. The height of the bar code is determined by the most recent ^H command. The human readable portion of the bar code is not included in the height value. The command sequence is as follows:

^Hhh

The command sequence parameters are described below.

^H	"Caret H" is the required two-character sequence. (Not Control H.)
hh	Is used to set the bar code height (vertical dimension) in tenths of an inch. Values for "hh" can range from 00 to 99. If 00 is specified, a height value of 01 is used. The default value for bar code height is 0.5 inches. Note, the vertical tenth inch increment is only an approximation and is actually 7/72 inch. Specifying a height value of 99 yields an actual dimension of 9.6 inches.

```
10 LPRINT "^H01"
20 LPRINT "^BNB PRINTED 0.1 INCH^G"
30 '
40 '
50 LPRINT "^H11"
60 LPRINT "^BNB PRINTED 1.1 INCH^G"
70 END
```

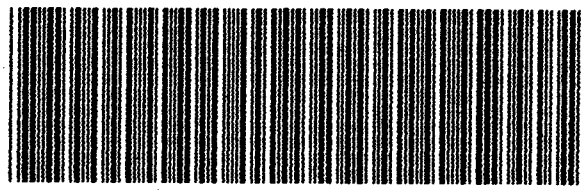


Figure 4.15 Bar Code Height Samples

4.6.2 SUPPORTED BAR CODE CHARACTERS

Each bar code symbology has a unique set of characters available to be printed. These sets are listed below:

Code 39 supported characters:

0-9
A-Z
[space] - . $ / + %

Interleaved 2 of 5 supported characters:

0-9

4.6.3 SAVE AND RESTORE VERTICAL POSITION

The escape sequences ESC $ 1 H and ESC $ 1 B, enable the user to print multiple bar codes on the same line. ESC $ 1 H stores the current vertical position. ESC $ 1 B backs the paper to the vertical position which was saved by ESC $ 1 H.

In order to print multiple bar codes on the same line, the escape sequences should be used as follows:

Send ESC $ 1 H
Send data for the first bar code.
Send ESC $ 1 B
Send data for next bar code.

A sample program and print out are provided below.

```
LPRINT CHR$(27);"$1H^BOABAR CODE
```

Figure 4.16 Bar Code Vertical Position Samples

5 OPERATOR MAINTENANCE AND TROUBLESHOOTING

5.1 INTRODUCTION

Before you call for service, read this section. It contains solutions that can save you down time and money. If you do need to contact someone for service, please have your printer model and serial number available.

This chapter gives helpful maintenance and troubleshooting procedures. These procedures require no special knowledge of electronics or printers. Any troubleshooting or maintenance beyond the level presented in this chapter should be performed by a qualified technician.

5.2 MAINTENANCE

WARNING
Disconnect the printer from the AC power supply before reaching into the printer to perform any cleaning task.

CAUTION
Do not use any cleaners, solvents, or lubricants on any of the working parts of the printer.

Clean your printer about every three months. To clean the printer, use a vacuum cleaner with a plastic nozzle to remove dirt from the carriage, paper guides and platen. As often as necessary, remove accumulated dirt from the carriage rods and the platen with a dry, lint-free cloth. Clean the printer cover with a commercial cleaner such as 409. To clean the access window, use a soft non-abrasive cloth rather than paper products.

5.3 TROUBLESHOOTING

If your printer is not working properly, please review the following procedures.

WARNING
Disconnect the printer from the AC power supply before performing any procedure that requires reaching into the printer.

5.3.1 CHECK FEATURES FIRST

To ensure proper feature settings:

1. Refer to the feature settings recorded in Appendix E and F.
2. Print a feature listing to verify that feature settings have not been reset by another operator or by software commands from the host computer.

   To print a feature listing:

   - Press the Off line key.
   - Press the Enter Setup key.
   - Press the Display ▼ key until the number 98 is displayed.
   - Press the Set key to start printing.

   NOTE: If the printer does not respond and no printing occurs, see Section 5.3.2.
3. Compare the two lists. If necessary, reset the feature settings to match those recorded in Appendix E and F. If the problem still exists, review the following.

Problem	Solution
Narrow column of print.	Verify the correct setting for margins. Check Feature 5 for the left margin. Check Feature 6 for the right margin.
Paper feeds through printer continuously.	Incorrect baud rate for serial connection. Check Feature 1.
Printer will not communicate when using parallel interface.	Check Features 59 and/or 66. See Appendix F for default feature settings.
Printer will not communicate when using serial interface.	Check Feature 43. See Appendix F for default feature settings.

Problem	Solution
Printer appears to print more slowly.	The following conditions can make the printer appear to be slower: Feature 9 (NLQ) is turned on. Feature 51 (Unidirectional) is turned on. Feature 96 (Doublestrike) is turned on.
Paper tearing on right or left side.	Reset the right margin using Feature 6. This ensures that the printhead does not move past the edge of the paper. Move form slightly to the left so edge of printhead does not leave the paper. This may require the user to reset the left margin with Feature 5.
Paper won't advance.	Verify the correct setting of Features 2, 3, 11 and 39. For information on how to set these features, see Chapter 2.
Error codes displaying on operator panel.	Error code 6508 is a non-volatile memory fault. Press the Continue key to load the default values in place of the programmed features settings. You will have to reload any Features that were programmed into the printer. If the error persists, contact the dealer. Error code 1111 can indicate some debris in the carriage path (paper) or broken cables. Check for and remove the debris. Check for broken cables. If damaged, contact the dealer.

5.3.2 Performing a Default Reset

If the printer continues to ignore data sent from the host computer, perform a default reset. Note that when you perform a default reset, the printer loads the factory-set features list. To reload your features, see the feature listing in Appendix E and F.

A default reset is performed as follows:

1. Press and hold the Clear key.
2. Press and release the Reset key.
3. Continue to hold the Clear key until the printhead resets to the left.

5.4 WHEN THE PROBLEM IS NOT RELATED TO FEATURES

The following errors are presented in four groups:

5.4.1 General Printer Operation
5.4.2 Print Format and Quality
5.4.3 Paper Feed Problems
5.4.4 Printer Connection Problems

Some of the following troubleshooting solutions request a default reset. While this will cure several problems, it also erases any settings programmed into the printer. As a precaution, first print a features list to list all the programmed values.

5.4.1 GENERAL PRINTER OPERATION

No printer movement, noise, or panel lights.	
Cause	*Solution*
Printer is not receiving power.	Check to see that the power switch is ON. Plug female end of power cord firmly into power cord receptacle on back of printer. Plug male end of power cord into grounded AC receptacle. Make certain there is power at the wall receptacle. Check printer line fuse. Note that a blown fuse typically indicates a more serious problem. Checking or changing the fuse requires a small flat blade screwdriver. For the location of the fuse, see Figure 1.2 on page 1-4.

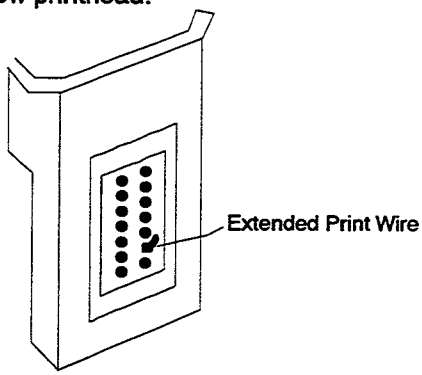
Printhead moves erratically, or not at all.	
Cause	*Solution*
Debris is clogging printer.	Look in printer and remove any foreign matter.
Interface cable is not properly attached.	Make certain the interface cable is securely attached to the printer and the host.
Drive cables may be damaged.	Manually move the printhead back and forth. Check that the drive cables are not damaged. If they are damaged, contact the dealer. If the printhead moves and the cables are not damaged, perform a default reset. See Section 5.3. To verify printer operation, perform a self-test. To perform a print-test: Press the Enter Setup key. Press the Display ▲ key or Display ▼ key until the number 99 is displayed. To start printing, press the Set key. To stop printing, press the Clear key.
Encoder may be defective.	Contact the dealer.

Printer does not print, but printhead moves.	
Cause	*Solution*
Faulty or missing ribbon cartridge.	If missing, install ribbon cartridge. Replace worn or broken ribbon. Remove the ribbon cartridge and try advancing the ribbon manually. If the ribbon does not move, replace it.
Faulty ribbon motor.	Contact the dealer.
Improper printhead position.	Adjust printhead adjustment lever.
Cable(s) disconnected.	Check to see that the printhead cables are attached to the printhead. If the cables are disconnected, contact the dealer.
Improper commands sent from host computer.	Perform a default reset. See Section 5.3.

Printer won't print and printhead won't move.	
Cause	*Solution*
Printer is off line.	Check to see if the On line light is on. If it is not, press the On line key to turn it on. It may also be necessary to perform a print-test. To perform a print-test: Press the Enter Setup key. Press the Display ▲ or Display ▼ until the number 99 is displayed. To start printing, press the Set key. To stop printing, press the Clear key. If the print-test performs properly, check the connections to the host computer. If the above solutions do not correct the problem(s), contact the dealer.

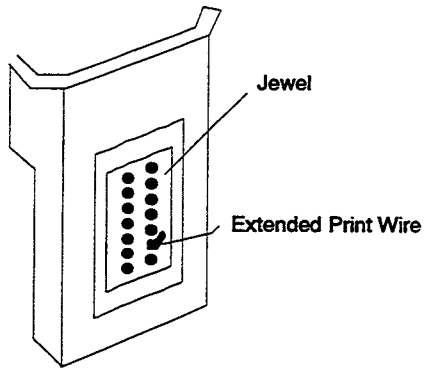
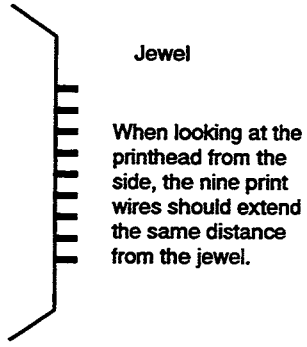
Printer doesn't print and Paper Out light blinks.	
Cause	*Solution*
Paper is too thin or back of paper is too dark.	The Paper Out sensor works by reflecting light off the print media. A too-thin media allows light to pass through instead of reflecting it, and a too-dark media absorbs light instead of reflecting it. This means that the printer cannot "see" that the paper is there. To stop the Paper Out light from blinking, use thicker paper, or paper of lighter color, or set Feature 40 (Paper-out disable) to 1. *CAUTION* *When Feature 40 is enabled, supply more forms than needed for the print job. This prevents the printhead from printing directly on the platen.*
Paper is not covering light sensor. Pin feed holes moving across light sensor.	Move paper to the left and reset left and right margins. Reset the margins using Features 5 and 6. **NOTE** After taking corrective action press Continue button. Do not perform a default reset. If the above solutions do not correct the problem(s), contact the dealer.
Faulty photosensor.	Contact the dealer.

Paper out light is off when there is no paper in the printer.	
Cause	*Solution*
Feature 40 set to 1.	Reset Feature 40 to 0. Feature 40 could have been set from control panel or by software from the host.
Paper trash or dust on Paper Out sensor.	Remove dust or trash. See Figure 1.1 on page 1-2 for location of the Paper Out sensor.

Printhead snags ribbon.	
Cause	*Solution*
Printhead is too close to or too far from paper.	Use printhead adjustment lever to move printhead away from or toward paper.
Ribbon path obstructed.	Check printhead for an extended print wire. If found, replace printhead. To replace printhead, see the instructions that accompany the new printhead. 

5.4.2 PRINT FORMAT AND QUALITY

Print is too light.	
Cause	*Solution*
Improper printhead position.	Adjust the printhead adjustment lever.
Faulty ribbon cartridge.	Replace worn ribbon.
Faulty ribbon drive motor.	Contact the dealer.

Printed dots that form characters are inconsistent: light, dark or randomly missing.	
Cause	*Solution*
Improper printhead adjustment.	Move the printhead closer to the paper with the printhead adjustment lever.
Printhead is worn or damaged.	Examine printhead to ensure that: •All printwires (18) extend evenly beyond the jewel. •The jewel that holds the wires is not cracked or missing. •A printwire does not extend beyond the others.  •A printwire is not recessed inside the jewel.  To replace printhead, see the instructions that accompany the new printhead.

Printer advances to wrong position on form.	
Cause	*Solution*
Top of form not set correctly.	Refer to Top of Form, Section 2.4.3 on page 2-5.
Features 2, 3, 11 and 39 are not set properly.	Verify the correct setting of Features 2, 3, 11 and 39. For information on how to set these features, see Chapter 2. Note: Features 39 and 11 must be set before 2.

Ink is smudging.	
Cause	*Solution*
Printhead is too close to paper.	Move printhead away from paper by moving the printhead adjustment lever toward the front of the printer one position.

5.4.3 PAPER FEED PROBLEMS

Printer occasionally misses a line feed, causing a printover.	
Cause	*Solution*
Restricted paper path.	Clear the paper path. Paper should not travel across desk corner, edge of paper box, etc. Ensure that paper has direct path into printer.

Paper won't advance.	
Cause	*Solution*
Form feed features 2, 3, 11 and 38 are not set properly.	Verify the correct setting of Features 2, 3, 11 and 38. For information on how to set these features, see Chapter 2.

Paper feeds through printer continuously.	
Cause	*Solution*
Incorrect baud rate for serial connection.	Verify the correct baud rate setting in Feature 1 and from the host.
Large number of form feeds sent to printer.	Press Reset key to clear the memory in the buffer and stop the paper. Check the host computer software.

Paper tearing on right or left side.	
Cause	*Solution*
Forms tractors are too close or too far apart.	Adjust tractors to fit form being used. See Section 1 for proper tractor setting.
Margin setting causes printhead to move beyond paper edge.	Reset the right margin using Feature 6. or reset the left margin using Feature 5. Move form slightly to the left so edge of printhead does not leave the paper.

Paper tearing at top or bottom.	
Cause	*Solution*
Paper not loaded properly.	See Section 1 on Forms Loading.
Paper is too thick.	Move printhead away from paper by moving the printhead adjustment lever toward the front of the printer. If using multipart paper, its thickness should not exceed 0.021 inches.

Paper will not thread properly when front-feeding.	
Cause	*Solution*
Paper has downward curl at edge (prevents paper from contacting paper-guide).	Curl the paper edge upward or start with new sheet.
Paper-feed slot is obstructed.	Remove any debris.
Paper path to printer is obstructed.	Paper should not travel across desk corner, edge of box, etc. Paper should be located directly under the printer paperfeed slot. See Chapter 1, *Printer Installation and Startup.*

Paper will not thread properly when bottom-feeding.	
Cause	*Solution*
Paper-feed slot is obstructed.	Remove any debris. Ensure that bottom Paper Guide strip is inside printer, flexed upward in direction of paper path. To prevent dislocation of the Paper Guide strip, be careful when pulling paper from bottom of printer. Paper perforations can catch on strip.

5.4.4 PRINTER CONNECTION PROBLEMS

Printer prints garbled data.	
Cause	*Solution*
Interface may be set incorrectly.	See Section 3 to set serial interface properly. See Section 3.4 to set parallel interface properly. Power printer OFF and ON.

Printer will not communicate when using parallel interface.	
Cause	*Solution*
Feature settings are incorrect.	Reset Features 59 and/or 66. See Appendix F for default feature settings.

Printer will not communicate when using serial interface.	
Cause	*Solution*
Feature settings are incorrect.	Reset Feature 43. See Appendix F for default feature settings.

Printer prints "Buffer overflows" on paper during print job.	
Cause	*Solution*
Incorrect interface settings.	Check interface settings. See Section 3.
Faulty interface cable or incorrect pin configuration of interface cable.	Check cables. May be wrong type of cable. For proper configuration of the interface cable pins, see Section 3. If cable appears damaged, contact the dealer.

APPENDIX A SPECIFICATIONS

PRINT AND FORMAT CHARACTERISTICS

PRINTHEAD:

18-wire ballistic-type matrix head

PRINT MODES:

9x7 matrix in draft mode at 400 CPS
9X9 matrix in draft mode at 325 CPS
9X15 matrix in memo mode at 180 CPS
18X20 matrix in NLQ mode at 120 CPS
18X24 matrix in NLQ mode at 100 CPS
High resolution dot addressable graphics

CHARACTER PITCH/MAXIMUM LINE LENGTH:

5 cpi / 66 columns
6 cpi / 79 columns
6.6 cpi / 87 columns
7.5 cpi / 99 columns
8.5 cpi / 109 columns
8.75 cpi / 115 columns
10 cpi / 132 columns
12 cpi / 158 columns
13.2 cpi / 175 columns
15 cpi / 198 columns
16.5 cpi / 219 columns
17.1 cpi / 231 columns *

VERTICAL PITCH:

6 or 8 lines per inch or programmable in half dot increments (up to 1 ½ inches)

CHARACTER SETS:

U.S. ASCII	Spanish I
U.K. ASCII	IBM PC
German	French
Spanish II	Swedish/Finnish
Norwegian/Danish	Greek

* Available with Proprinter option only

HORIZONTAL TABS:

Up to 32

VERTICAL TABS:

Up to 32

FORM LENGTH:

Up to 217 lines

MULTIPART FORM THICKNESS:

Up to 6 parts, adjustable; .021" maximum

CARRIAGE SLEW RATE:

40"/second maximum

TYPE FONTS:

Draft (9X7) - 10,12,15 and 16 CPI
Draft (9X9) - 10,12,15 and 16 CPI
Memo - 10 and 12 CPI
NLQ - Courier 10 CPI
NLQ - Helvetica 12 CPI
OCR A
OCR B
Elite 12

COLUMNS:

Up to 217

FORM WIDTH:

3"-15"

PAPER FEED:

Tractor for continuous forms (bottom or front feed)

PAPER SLEW RATE:

15 inches per second

ADDITIONAL FEATURES:

Perforation skipover
Paper out indicator
Line/local power up selection
Top of form
Carriage jam detection

APPENDIX A - CONTINUED

COMMUNICATIONS CHARACTERISTICS

INTERFACE:
RS 232 serial
Centronics-compatible parallel

HANDSHAKING PROTOCOLS:
X-On, X-Off, ETX/Acknowledge
Data Terminal Ready

COMMUNICATIONS RATE:
110-19.2K baud

BUFFER:
16K character FIFO on both serial and parallel interfaces

GENERAL CHARACTERISTICS

CASE:
High impact injection-molded thermoplastic

DISPLAY:
4-digit LED

RIBBON:
Cartridge
3/4"x25 yards continuous loop

MICROPROCESSOR:
Intel 8085

SIZE:
7.8"Hx24.5"Wx16"D

WEIGHT:
35 lbs./16 Kilos

ELECTRICAL REQUIREMENTS:
110/220VAC -50/60 Hz

ENVIRONMENTAL:
Operating
Temperature:
5 C - 40 C(41 F - 104 F)
Humidity:
15 to 90%(no condensation)
Shock:
0 g
Vibration:
1/2 g maximum with a frequency of 10 to 60 Hz
Altitude:
3048 meters (10,000 feet) above MSL, maximum. Derate maximum temperature linearly from 40 C at 1523 meters to 25 C at 3048 meters.

Non-Operating(In Shipping Container)
Temperature:
-30 C to +70 C (-24 F to +158 F)
Relative Humidity:
5% to 95% (no condensation)
Shock:
30 g maximum (1/2 sinewave with a duration of 11 milliseconds along any three perpendicular axes).
Vibration:
2 g maximum with frequency of 10 to 300 Hz 6 minute linear sweep.
Altitude:
15,240 meters (50,000 ft.) above MSL, maximum.

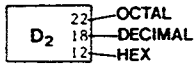
AGENCY COMPLIANCES

Safety:
UL1950
CSA C22.2 No. 950-M89
IEC 950
Electromagnetic Interference:
FCC Class A
EN55022 Class A
VDE Class B

APPENDIX B CHARACTER SETS

ASCII CHARACTER SETS
U.S. ASCII

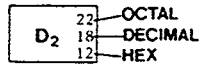
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	♤ 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	| 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⊠ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
U.K. ASCII

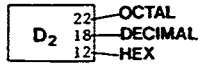
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SOH 1 1 1	DC1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	STX 2 2 2	DC2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	ETX 3 3 3	DC3 23 19 13	£ 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	EOT 4 4 4	DC4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	ENQ 5 5 5	NAK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	ACK 6 6 6	SYN 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	BEL 7 7 7	ETB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SUB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	| 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	▯ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
German

	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	§ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	Ä 133 91 5B	k 153 107 6B	ä 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ö 134 92 5C	l 154 108 6C	ö 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	Ü 135 93 5D	m 155 109 6D	ü 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	ß 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⊞ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
French

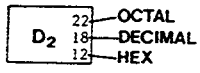
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	à 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	£ 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	🔔 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	° 133 91 5B	k 153 107 6B	é 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	ç 134 92 5C	l 154 108 6C	ù 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	§ 135 93 5D	m 155 109 6D	è 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	¨ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⊞ 177 127 7F

D_2 22 OCTAL, 18 DECIMAL, 12 HEX

APPENDIX B - CONTINUED

ASCII CHARACTER SETS
Swedish/Finnish

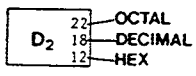
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	£ 100 64 40	P 120 80 50	é 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	$ 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	¤ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	🔔 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	Ä 133 91 5B	k 153 107 6B	ä 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ö 134 92 5C	l 154 108 6C	ö 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	Å 135 93 5D	m 155 109 6D	å 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	Ü 136 94 5E	n 156 110 6E	ü 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	▯ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
Norwegian/Danish

	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	Ä 100 64 40	P 120 80 50	ä 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	⌂ 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	Æ 133 91 5B	k 153 107 6B	æ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ø 134 92 5C	l 154 108 6C	ø 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	Å 135 93 5D	m 155 109 6D	å 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	Ü 136 94 5E	n 156 110 6E	ü 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⌧ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
Greek

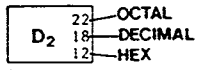
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	ο 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	A 141 97 61	∩ 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	B 142 98 62	ρ 162 114 72
0011	EX 3 3 3	D3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	Γ 143 99 63	Σ 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	Δ 144 100 64	τ 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	E 145 101 65	υ 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	Z 146 102 66	φ 166 118 76
0111	⌂ 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	H 147 103 67	ω 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	Θ 150 104 68	χ 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	I 151 105 69	ψ 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	ω 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	K 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	Λ 154 108 6C	| 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	M 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	N 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	≡ 157 111 6F	⊞ 177 127 7F

D_2 22 OCTAL, 18 DECIMAL, 12 HEX

APPENDIX B - CONTINUED

ASCII CHARACTER SETS
Spanish I

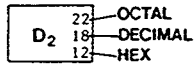
	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SH 1 1 1	D1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	SX 2 2 2	D2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	EX 3 3 3	D3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	ET 4 4 4	D4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	EQ 5 5 5	NK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	AK 6 6 6	SY 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	⌂ 7 7 7	EB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	EC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ñ 134 92 5C	l 154 108 6C	| 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⊠ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
IBM PC Compatible

	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SOH 1 1 1	DC1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	STX 2 2 2	DC2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	ETX 3 3 3	DC3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	EOT 4 4 4	DC4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	ENQ 5 5 5	NAK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	ACK 6 6 6	SYN 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	BEL 7 7 7	ETB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SUB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	| 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	⌂ 177 127 7F



APPENDIX B - CONTINUED

ASCII CHARACTER SETS
IBM PC Compatible (continued)

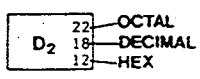
	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 Ç 128 80	220 £ 144 90	240 á 160 A0	260 ▒ 176 B0	300 └ 192 C0	320 ╨ 208 D0	340 α 224 E0	360 ≡ 240 F0
0001	201 ü 129 81	221 ƒ 145 91	241 í 161 A1	261 ▓ 177 B1	301 ┴ 193 C1	321 ╤ 209 D1	341 ß 225 E1	361 ± 241 F1
0010	202 é 130 82	222 Æ 146 92	242 ó 162 A2	262 ▓ 178 B2	302 ┬ 194 C2	322 ╥ 210 D2	342 Γ 226 E2	362 ≥ 242 F2
0011	203 â 131 83	223 ô 147 93	243 ú 163 A3	263 │ 179 B3	303 ├ 195 C3	323 ╙ 211 D3	343 π 227 E3	363 ≤ 243 F3
0100	204 ä 132 84	224 ö 148 94	244 ñ 164 A4	264 ┤ 180 B4	304 ─ 196 C4	324 ╘ 212 D4	344 Σ 228 E4	364 ⌠ 244 F4
0101	205 à 133 85	225 ò 149 95	245 Ñ 165 A5	265 ╡ 181 B5	305 ┼ 197 C5	325 ╒ 213 D5	345 σ 229 E5	365 ⌡ 245 F5
0110	206 å 134 86	226 û 150 96	246 ª 166 A6	266 ╢ 182 B6	306 ╞ 198 C6	326 ╓ 214 D6	346 µ 230 E6	366 ÷ 246 F6
0111	207 ç 135 87	227 ù 151 97	247 º 167 A7	267 ╖ 183 B7	307 ╟ 199 C7	327 ╫ 215 D7	347 τ 231 E7	367 ≈ 247 F7
1000	210 ê 136 88	230 ÿ 152 98	250 ¿ 168 A8	270 ╕ 184 B8	310 ╚ 200 C8	330 ╪ 216 D8	350 Φ 232 E8	370 ° 248 F8
1001	211 ë 137 89	231 Ö 153 99	251 ⌐ 169 A9	271 ╣ 185 B9	311 ╔ 201 C9	331 ┘ 217 D9	351 Θ 233 E9	371 ∙ 249 F9
1010	212 è 138 8A	232 Ü 154 9A	252 ¬ 170 AA	272 ║ 186 BA	312 ╩ 202 CA	332 ┌ 218 DA	352 Ω 234 EA	372 · 250 FA
1011	213 ï 139 8B	233 ¢ 155 9B	253 ½ 171 AB	273 ╗ 187 BB	313 ╦ 203 CB	333 ■ 219 DB	353 δ 235 EB	373 √ 251 FB
1100	214 î 140 8C	234 £ 156 9C	254 ¼ 172 AC	274 ╝ 188 BC	314 ╠ 204 CC	334 ▄ 220 DC	354 ∞ 236 EC	374 n 252 FC
1101	215 ì 141 8D	235 ¥ 157 9D	255 ¡ 173 AD	275 ╜ 189 BD	315 ═ 205 CD	335 ▌ 221 DD	355 Ø 237 ED	375 ² 253 FD
1110	216 Ä 142 8E	236 ₧ 158 9E	256 « 174 AE	276 ╛ 190 BE	316 ╬ 206 CE	336 ▐ 222 DE	356 ∈ 238 EE	376 ■ 254 FE
1111	217 Å 143 8F	237 ƒ 159 9F	257 » 175 AF	277 ┐ 191 BF	317 ╧ 207 CF	337 ▀ 223 DF	357 ∩ 239 EF	377 ⊟ 255 FF

Æ 222 (OCTAL) 146 (DECIMAL) 92 (HEX)

APPENDIX B - CONTINUED

ASCII CHARACTER SETS
Spanish II

	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL 0 0 0	DLE 20 16 10	40 32 20	° 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	SH 1 1 1	DC1 21 17 11	á 41 33 21	ü 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	STX 2 2 2	DC2 22 18 12	é 42 34 22	62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	ETX 3 3 3	DC3 23 19 13	í 43 35 23	63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	EOT 4 4 4	DC4 24 20 14	ó 44 36 24	64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	ENQ 5 5 5	NAK 25 21 15	ú 45 37 25	¨ 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	ACK 6 6 6	SYN 26 22 16	¿ 46 38 26	66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	BEL 7 7 7	ETB 27 23 17	¡ 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CAN 30 24 18	ñ 50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	EM 31 25 19	Ñ 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	SUB 32 26 1A	½ 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	ESC 33 27 1B	¼ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	FS 34 28 1C	¢ 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	¦ 174 124 7C
1101	CR 15 13 D	GS 35 29 1D	¥ 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	RS 36 30 1E	¤ 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	US 37 31 1F	ª 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	▒ 177 127 7F



APPENDIX C DISPLAY MODE CHARACTERS

Decimal Value	Character	Decimal Value	Character	Decimal Value	Character
0		50	2	100	d
1		51	3	101	e
2		52	4	102	f
3		53	5	103	g
4		54	6	104	h
5		55	7	105	i
6		56	8	106	j
7		57	9	107	k
8		58	0	108	l
9		59	;	109	m
10		60	<	110	n
11		61	=	111	o
12		62	>	112	p
13		63	?	113	q
14		64	@	114	r
15		65	A	115	s
16		66	B	116	t
17		67	C	117	u
18		68	D	118	v
19		69	E	119	w
20		70	F	120	x
21		71	G	121	y
22		72	H	122	z
23		73	I	123	{
24		74	J	124	¦
25		75	K	125	}
26		76	L	126	~
27		77	M	127	⌂
28		78	N	128	Ç
29		79	O	129	ü
30		80	P	130	é
31		81	Q	131	â
32		82	R	132	ä
33	!	83	S	133	à
34	"	84	T	134	å
35	#	85	U	135	ç
36	$	86	V	136	ê
37	%	87	W	137	ë
38	&	88	X	138	è
39	'	89	Y	139	ï
40	(	90	Z	140	î
41	)	91	[	141	ì
42	*	92	\	142	Ä
43	+	93	]	143	Å
44	,	94	^	144	É
45	-	95	_	145	æ
46	.	96	`	146	Æ
47	/	97	a	147	ô
48	0	98	b	148	ö
49	1	99	c	149	ò

APPENDIX C - CONTINUED

Decimal Value	Character	Decimal Value	Character	Decimal Value	Character
150	ü	200	╚	250	·
151	ù	201	╔	251	√
152	ÿ	202	╩	252	n
153	Ö	203	╦	253	2
154	Ü	204	╠	254	■
155	¢	205	═	255	⊞
156	£	206	╬		
157	¥	207	╧		
158	₧	208	╨		
159	ƒ	209	╤		
160	á	210	╥		
161	í	211	╙		
162	ó	212	╘		
163	ú	213	╒		
164	ñ	214	╓		
165	Ñ	215	╫		
166	ª	216	╪		
167	º	217	┘		
168	¿	218	┌		
169	⌐	219	▉		
170	¬	220	▄		
171	½	221	▌		
172	¼	222	▐		
173	¡	223	▀		
174	«	224	α		
175	»	225	ß		
176	▒	226	Γ		
177	▒	227	π		
178	▓	228	Σ		
179	│	229	σ		
180	┤	230	µ		
181	╡	231	τ		
182	╢	232	Φ		
183	╖	233	Θ		
184	╕	234	Ω		
185	╣	235	δ		
186	║	236	∞		
187	╗	237	ø		
188	╝	238	∈		
189	╜	239	∩		
190	╛	240	≡		
191	┐	241	±		
192	└	242	≥		
193	┴	243	≤		
194	┬	244	⌠		
195	├	245	⌡		
196	─	246	÷		
197	┼	247	≈		
198	╞	248	°		
199	╟	249	∙		

APPENDIX D CONTROL COMMANDS

CTRL G	Bell
CTRL H	Back Space
CTRL I	Horizontal Tab
CTRL J	Line Feed
CTRL K	Vertical Tab
CTRL L	Form Feed
CTRL M	Carriage Return
CTRL N	Shift-out of normal print to double wide
CTRL O	Shift-in to normal print
CTRL Q	X-on
CTRL S	X-off

APPENDIX E VALUE FEATURES

FEATURE NUMBER	FEATURE	DEFAULT VALUE	USER VALUE
01	Baud Rate	9600	_____
02	Form Length	66	_____
03	Top Margin	1	_____
04	Bottom Margin	66	_____
05	Left Margin	1	_____
06	Right Margin	132	_____
07	Horizontal Tabs	(The first 16 tabs are set to column 1) 9,17, 25, 33, 41, 49, 57, 65, 73, 81, 89, 97, 105, 113, 121, 129	_____
08	Vertical Tabs	1 01	_____
09	Character Pitch and Font	10 (Draft, 10 CPI)	_____
10	Nationality (Primary Character Set)	1 (U.S. ASCII)	_____
11	Vertical Pitch Selection	24	_____
13	Emulation Mode	1	_____
15	Nationallity Secondary Character Set	10 (IBM P.C.)	_____
24	Paper Feed Speed	14	_____

APPENDIX F DISCRETE FEATURES

FEATURE NUMBER	FEATURE	DEFAULT VALUE (1 = Enabled; 0 = Disabled)	USER VALUE
28	Print Inhibit	0	_____
29	Expanded Character Printing	1	_____
30	X-on, X-off Synchronization Protocol	1	_____
31	DTR Synchronization Protocol	1	_____
32	Parity (Eighth Bit Control)	0	_____
33	Even Parity Selection/ Even Parity Selection/Spacing	0	_____
34	Automatic New Line	1	_____
35	Print on Receipt of Carriage Return	1	_____
36	Automatic Line Feed	0	_____
37	Automatic Carriage Return	0	_____
38	Form Feed Defeat	0	_____
39	6/8 Lines per Inch	0	_____
40	Paper-Out Detection Override	0	_____
41	Shift-Out selects Double Wide Print	0	_____
42	Line/Local Power Up	0	_____
43	Serial Interface Disable	0	_____
44	Automatic Print Disable	0	_____
45	Exit Doublewide Print On Line Terminator	1	_____
46	Escape Sequence Disable	0	_____
47	Display Mode	0	_____
48	Secondary Character Set Enable	0	_____
49	DS-180 Graphics (Anadex 9500/9501 Compatible)	1	_____

APPENDIX F - CONTINUED

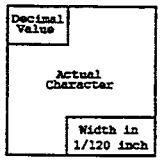
FEATURE NUMBER	FEATURE	DEFAULT VALUE (1 = Enabled; 0 = Disabled)	USER VALUE
51	Unidirectional Text printing	0	_____
59	Handshake on Busy	0	_____
61	Eighth Bit Enable	0	_____
63	ETX/ACKNOWLEDGE Handshaking	0	_____
66	Parallel Interface Disable	1	_____
69	Downloadable Character Enable	0	_____
70	Bar Code Enable	0	_____
76	Micro Mode	0	_____
96	High Speed Double Strike Print	0	_____
97	Bell Override	0	_____
98	Feature Dump	0	_____
99	Self-Test	0	_____

APPENDIX G NLQ FONTS WIDTH TABLES

WIDTH TABLES FOR
NEAR LETTER QUALITY FONTS

Courier 10

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0 NUL 12	16 DLE 12	32 SP 12	48 0 12	64 @ 12	80 P 12	96 ` 9	112 p 11	128	144	160	176 ▒ 12	192 └ 12	208 ╨ 12	224 α 12	240 ≡ 12
1	1 SOH 12	17 DC1 12	33 ! 9	49 1 11	65 A 12	81 Q 12	97 a 11	113 q 11	129	145	161 í 11	177 ▒ 12	193 ┴ 12	209 ╤ 12	225 β 12	241 ± 12
2	2 STX 12	18 DC2 12	34 " 9	50 2 12	66 B 12	82 R 12	98 b 11	114 r 11	130	146	162 ó 11	178 ▓ 12	194 ┬ 12	210 ╥ 12	226 Γ 12	242 ≥ 12
3	3 ETX 12	19 DC3 12	35 # 12	51 3 12	67 C 12	83 S 12	99 c 11	115 s 11	131	147	163 ú 11	179 │ 12	195 ├ 12	211 ╙ 12	227 π 12	243 ≤ 12
4	4 EOT 12	20 DC4 12	36 $ 12	52 4 12	68 D 12	84 T 12	100 d 11	116 t 11	132	148	164 ñ 11	180 ┤ 12	196 ─ 12	212 ╘ 12	228 Σ 12	244 ⌠ 12
5	5 ENQ 12	21 NAK 12	37 % 12	53 5 12	69 E 12	85 U 12	101 e 11	117 u 11	133	149	165 Ñ 12	181 ╡ 12	197 ┼ 12	213 ╒ 12	229 σ 12	245 ⌡ 12
6	6 ACK 12	22 SYN 12	38 & 12	54 6 12	70 F 12	86 V 12	102 f 11	118 v 11	134	150	166 ª 11	182 ╢ 12	198 ╞ 12	214 ╓ 12	230 μ 12	246 ÷ 12
7	7 BEL 12	23 ETB 12	39 ' 9	55 7 12	71 G 12	87 W 12	103 g 11	119 w 11	135	151	167 º 11	183 ╖ 12	199 ╟ 12	215 ╫ 12	231 τ 12	247 ≈ 12
8	8 BS 12	24 CAN 12	40 (12	56 8 12	72 H 12	88 X 12	104 h 11	120 x 11	136	152	168 ¿ 12	184 ╕ 12	200 ╚ 12	216 ╪ 12	232 Φ 12	248 ° 12
9	9 HT 12	25 EM 12	41) 12	57 9 12	73 I 12	89 Y 12	105 i 10	121 y 11	137	153	169 ⌐ 12	185 ╣ 12	201 ╔ 12	217 ┘ 12	233 Θ 12	249 • 12
A	10 LF 12	26 SUB 12	42 * 12	58 : 9	74 J 12	90 Z 12	106 j 11	122 z 11	138	154	170 ¬ 12	186 ║ 12	202 ╩ 12	218 ┌ 12	234 Ω 12	250 · 12
B	11 VT 12	27 ESC 12	43 + 12	59 ; 9	75 K 12	91 [12	107 k 11	123 { 12	139	155	171 ½ 11	187 ╗ 12	203 ╦ 12	219 ■ 12	235 δ 11	251 √ 12
C	12 FF 12	28 FS 12	44 , 9	60 < 12	76 L 12	92 \ 12	108 l 11	124 | 9	140	156	172 ¼ 11	188 ╝ 12	204 ╠ 12	220 ■ 12	236 ∞ 12	252 n 12
D	13 CR 12	29 GS 12	45 - 12	61 = 12	77 M 12	93] 12	109 m 11	125 } 12	141	157	173 ¡ 9	189 ╜ 12	205 ═ 12	221 ▌ 12	237 ø 11	253 ² 12
E	14 SO 12	30 RS 12	46 . 9	62 > 12	78 N 12	94 ^ 11	110 n 11	126 ~ 10	142	158	174 « 12	190 ╛ 12	206 ╬ 12	222 ▌ 12	238 ∈ 12	254 ■ 12
F	15 SI 12	31 US 12	47 / 12	63 ? 12	79 O 12	95 _ 12	111 o 11	127	143	159	175 » 12	191 ┐ 12	207 ╧ 12	223 ■ 12	239 ∩ 12	255 12

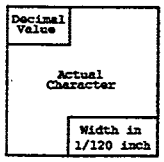


APPENDIX G - CONTINUED

WIDTH TABLES FOR
NEAR LETTER QUALITY FONTS

Helvetica 12

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0 NUL	16 DLE	32 SP 10	48 0 10	64 @ 10	80 P 10	96 ` 7	112 p 9	128	144	160	176 ⠿ 10	192 └ 10	208 ┴ 10	224 ∝ 10	240 ≡ 10
1	1 SOH	17 DC1	33 ! 7	49 1 10	65 A 10	81 Q 10	97 a 9	113 q 9	129	145	161 í 9	177 ▒ 10	193 ┴ 10	209 ╤ 10	225 β 10	241 ± 10
2	2 STX	18 DC2	34 " 7	50 2 10	66 B 10	82 R 10	98 b 9	114 r 9	130	146	162 ó 9	178 ▓ 10	194 ┬ 10	210 ╥ 10	226 Γ 10	242 ≥ 10
3	3 ETX	19 DC3	35 # 10	51 3 10	67 C 10	83 S 10	99 c 9	115 s 9	131	147	163 ú 9	179 │ 10	195 ├ 10	211 ╙ 10	227 π 10	243 ≤ 10
4	4 EOT	20 DC4	36 $ 10	52 4 10	68 D 10	84 T 10	100 d 9	116 t 9	132	148	164 ñ 9	180 ┤ 10	196 ─ 10	212 ╘ 10	228 Σ 10	244 ⌠ 10
5	5 ENQ	21 NAK	37 % 10	53 5 10	69 E 10	85 U 10	101 e 9	117 u 9	133	149	165 Ñ 10	181 ╡ 10	197 ┼ 10	213 ╒ 10	229 σ 10	245 ⌡ 10
6	6 ACK	22 SYN	38 & 10	54 6 10	70 F 10	86 V 10	102 f 9	118 v 9	134	150	166 ª 10	182 ╢ 10	198 ╞ 10	214 ╓ 10	230 µ 10	246 ÷ 10
7	7 BEL	23 ETB	39 ' 7	55 7 10	71 G 10	87 W 10	103 g 9	119 w 9	135	151	167 º 10	183 ╖ 10	199 ╟ 10	215 ╫ 10	231 τ 10	247 ≈ 10
8	8 BS	24 CAN	40 (9	56 8 10	72 H 10	88 X 10	104 h 9	120 x 9	136	152	168 ¿ 10	184 ╕ 10	200 ╚ 10	216 ╪ 10	232 Φ 10	248 ° 10
9	9 HT	25 EM	41) 9	57 9 10	73 I 9	89 Y 10	105 i 7	121 y 9	137	153	169 ⌐ 10	185 ╣ 10	201 ╔ 10	217 ┘ 10	233 Θ 10	249 • 10
A	10 LF	26 SUB	42 * 10	58 : 7	74 J 10	90 Z 10	106 j 7	122 z 9	138	154	170 ¬ 10	186 ║ 10	202 ╩ 10	218 ┌ 10	234 Ω 10	250 · 10
B	11 VT	27 ESC	43 + 10	59 ; 7	75 K 10	91 [10	107 k 9	123 { 9	139	155	171 ½ 10	187 ╗ 10	203 ╦ 10	219 ■ 10	235 δ 10	251 √ 10
C	12 FF	28 FS	44 , 7	60 < 10	76 L 10	92 \ 10	108 l 7	124 | 7	140	156	172 ¼ 10	188 ╝ 10	204 ╠ 10	220 ■ 10	236 ∞ 10	252 n 10
D	13 CR	29 GS	45 - 10	61 = 10	77 M 10	93] 10	109 m 9	125 } 9	141	157	173 ¡ 7	189 ╜ 10	205 ═ 10	221 ▌ 10	237 ø 10	253 2 10
E	14 SO	30 RS	46 . 7	62 > 10	78 N 10	94 ^ 9	110 n 9	126 ~ 7	142	158	174 « 10	190 ╛ 10	206 ╬ 10	222 ▌ 10	238 ∈ 10	254 ▪ 10
F	15 SI	31 US	47 / 10	63 ? 10	79 O 10	95 _ 10	111 o 9	127	143	159	175 » 10	191 ┐ 10	207 ╧ 10	223 ■ 10	239 ∩ 10	255 10



APPENDIX G - CONTINUED

WIDTH TABLES FOR
NEAR LETTER QUALITY FONTS

Elite 12

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0 NUL	16 DLE	32 SP 10	48 0 10	64 @ 10	80 P 10	96 ` 5	112 p 9	128	144	160	176 ⠿ 10	192 └ 10	208 ╨ 10	224 α 10	240 ≡ 10
1	1 SOH	17 DC1	33 ! 5	49 1 10	65 A 10	81 Q 10	97 a 10	113 q 9	129	145	161 ί 10	177 ⠾ 10	193 ┴ 10	209 ╤ 10	225 β 10	241 ± 10
2	2 STX	18 DC2	34 " 8	50 2 10	66 B 10	82 R 10	98 b 9	114 r 9	130	146	162 ό 10	178 ⠷ 10	194 ┬ 10	210 ╥ 10	226 Γ 10	242 ≥ 10
3	3 ETX	19 DC3	35 # 10	51 3 10	67 C 10	83 S 10	99 c 9	115 s 9	131	147	163 ύ 10	179 ⠇ 10	195 ├ 10	211 ╙ 10	227 π 10	243 · ≤ 10
4	4 EOT	20 DC4	36 $ 10	52 4 10	68 D 10	84 T 10	100 d 9	116 t 9	132	148	164 ή 10	180 ⠤ 10	196 ─ 10	212 ╘ 10	228 Σ 10	244 ⌠ 10
5	5 ENQ	21 NAK	37 % 10	53 5 10	69 E 10	85 U 10	101 e 9	117 u 10	133	149	165 Ñ 10	181 ⠽ 10	197 ┼ 10	213 ╒ 10	229 σ 10	245 ⌡ 10
6	6 ACK	22 SYN	38 & 10	54 6 10	70 F 10	86 V 10	102 f 9	118 v 10	134	150	166 ώ 10	182 ⠶ 10	198 ╞ 10	214 ╓ 10	230 μ 10	246 ÷ 10
7	7 BEL	23 ETB	39 ' 5	55 7 10	71 G 10	87 W 10	103 g 9	119 w 10	135	151	167 ο 10	183 ⠻ 10	199 ╟ 10	215 ╫ 10	231 τ 10	247 ≈ 10
8	8 BS	24 CAN	40 (7	56 8 10	72 H 10	88 X 10	104 h 10	120 x 10	136	152	168 ¿ 10	184 ⠱ 10	200 ╚ 10	216 ╪ 10	232 Φ 10	248 ° 10
9	9 HT	25 EM	41) 7	57 9 10	73 I 10	89 Y 10	105 i 9	121 y 10	137	153	169 ⌐ 10	185 ⠹ 10	201 ╔ 10	217 ┘ 10	233 Θ 10	249 • 10
A	10 LF	26 SUB	42 * 9	58 : 4	74 J 10	90 Z 10	106 j 9	122 z 10	138	154	170 ¬ 10	186 ⠸ 10	202 ╩ 10	218 ┌ 10	234 Ω 10	250 · 10
B	11 VT	27 ESC	43 + 10	59 ; 4	75 K 10	91 [5	107 k 10	123 { 7	139	155	171 ½ 10	187 ⠳ 10	203 ╦ 10	219 ▮ 10	235 δ 10	251 √ 10
C	12 FF	28 FS	44 , 4	60 < 9	76 L 10	92 \ 9	108 l 9	124 | 5	140	156	172 ¼ 10	188 ⠵ 10	204 ╠ 10	220 ▄ 10	236 ∞ 10	252 n 10
D	13 CR	29 GS	45 - 8	61 = 10	77 M 10	93] 5	109 m 10	125 } 5	141	157	173 ¡ 5	189 ⠯ 10	205 ═ 10	221 ▌ 10	237 ø 10	253 2 10
E	14 SO	30 RS	46 . 4	62 > 9	78 N 10	94 ^ 9	110 n 10	126 ~ 9	142	158	174 « 9	190 ⠽ 10	206 ╬ 10	222 ▐ 10	238 ∈ 10	254 ■ 10
F	15 SI	31 US	47 / 10	63 ? 7	79 O 10	95 _ 10	111 o 10	127 10	143	159	175 » 9	191 ⠷ 10	207 ⠩ 10	223 ▀ 10	239 ∩ 10	255 10

Decimal Value
Actual Character
Width in 1/120 inch

APPENDIX H PROPRINTER OPTION

The following features replace corresponding features in Chapter 2 if you have the proprinter option.

H.1 Feature Alterations

Table H.1 Feature Alterations

Feature Number	Feature Description	Possible Values or Information
8	Vertical Tab	64 possible tab settings
9	Character pitch and fonts	1 Courier 10 NLQ 4 Helvetica 12 NLQ 10 Draft 10 12 Draft 12 13 Memo 10 14 Memo 12 15 Draft 15 16 Draft 16 16 Draft 17.1 (IBM, FX emulations) 17 Draft 10 (12 cell) 18 Draft 12 (12 cell) 19 Draft 17.1 (12 cell)

APPENDIX H - CONTINUED

Table H.1 Feature Alterations

Feature Number	Feature Description	Possible Values or Information
10	Nationality Primary set	1 U.S. ASCII 2 U.K. ASCII 3 German 4 French 5 Swedish/Finnish 6 Norwegian/Danish 7 Greek 8 Spanish I 11 Spanish II (draft) Epson emulation character sets 17 US Lower 18 US Italics 19 French Lower 20 French Italics 21 Germany Lower 22 Germany Italics 23 UK Lower 24 UK Italics 25 Denmark Lower 26 Denmark Italics 27 Sweden Lower 28 Sweden Italics 29 Italy Lower 30 Italy Italics 31 Spain Lower 32 Spain Italics 33 Japan Lower 34 Japan Italics Proprinter emulation character sets 35 CSET 1 (Lower) 36 CSET 1 (Upper) 37 CSET 2 (Lower) 38 CSET 2 (Upper) 39 All Char (lower) 40 All Char (upper)
13	Emulation	1 DS 400 2 IBM Proprinter 5 DS 180 6 Epson FX-100 8 LA 120 (limited)

APPENDIX H - CONTINUED

Table H.1 Feature Alterations

Feature Number	Feature Description	Possible Values or Information
15	Nationality Secondary set	1 U.S. ASCII 2 U.K. ASCII 3 German 4 French 5 Swedish/Finnish 6 Norwegian/Danish 7 Greek 8 Spanish I 10 IBM PC Compatible 11 Spanish II (draft) Epson emulation character sets 17 US Lower 18 US Italics 19 French Lower 20 French Italics 21 Germany Lower 22 Germany Italics 23 UK Lower 24 UK Italics 25 Denmark Lower 26 Denmark Italics 27 Sweden Lower 28 Sweden Italics 29 Italy Lower 30 Italy Italics 31 Spain Lower 32 Spain Italics 33 Japan Lower 34 Japan Italics Proprinter emulation character sets 35 CSET 1 (Lower) 36 CSET 1 (Upper) 37 CSET 2 (Lower) 38 CSET 2 (Upper) 39 All Char (lower) 40 All Char (upper)
49	Anadex Graphics	Not available
70	Bar Code Enable	OCR characters not available

APPENDIX H - CONTINUED

Table H.1 Feature Alterations		
Feature Number	**Feature Description**	**Possible Values or Information**
95	High Quality Graphics	Enable - Uses only one printwire column when printing graphics Disable- Uses both printwire columns when printing graphics

> NOTE
> Default parameters may also be altered.

H.2 Proprinter Escape Sequences

Table H.2 Proprinter Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
NUL	End Tab Setting Control
BEL	Sound the printer buzzer
BS	Backspace
HT	Horizontal tab
LF	Line feed
VT	Vertical tab
FF	Form feed
CR	Carriage return
SO	Select double-width mode (by line)
SI	Select condensed printing
DC1	Enable the printer (x-on)
DC2	Select 10 characters per inch
DC3	Disable the printer

APPENDIX H - CONTINUED

Table H.2 Proprinter Escape Sequences	
ESCAPE SEQUENCE	**FUNCTION**
DC4	Cancel double-width mode (by line)
CAN	Cancel data
SP	Space
ESC - <n1>	n = 1 Turn continuous underlining on n = 0 Turn continuous underlining off
ESC 0	Set line spacing to 8 lines per inch
ESC 1	Set line spacing to 7/72 inch
ESC 2	Activate line spacing set by ESC A
ESC 3 <n>	Set line spacing to n/216 inch
ESC 4	Set top of form
ESC 5 n	n = 1 Automatic line feed on n = 0 Automatic line feed off
ESC 6	Select character set 2
ESC 7	Select character set 1
ESC 8	Disable paper-end detector
ESC 9	Enable paper-end detector
ESC :	Select 12-pitch characters
ESC <	Enable one line unidirectional printing
ESC =	Download characters ESC = n1 n2 dc4 p a1 a2 p1 p2 ... p11
ESC A <n>	Set line spacing to n/72 inch
ESC B	Set vertical tabs ESC B n1 n2 ... n64 <00>
ESC C <n>	Set form length (in lines)

APPENDIX H - CONTINUED

Table H.2 Proprinter Escape Sequences

ESCAPE SEQUENCE	FUNCTION
ESC C NUL <n>	Set form length (in inches)
ESC D	Set horizontal tabs ESC D n1 n2 ... n64 <00>
ESC E	Turn emphasized printing on
ESC F	Turn emphasized printing off
ESC G	Turn double-strike printing on
ESC H	Turn double-strike printing off
ESC I <n>	Select a print mode n = 0 Select Resident Draft n = 2 Select Resident NLQ n = 4 Select Download Draft n = 6 Select Download NLQ
ESC J <n>	Increment paper by n/216 inch foward
ESC K	Select normal density graphics
ESC L	Select double-density graphics (half-speed)
ESC N <n>	Enable auto perforation skip for 'n' lines.
ESC O	Disable auto perforation skip
ESC P <n>	n = 1 Proportional printing on n = 0 Proportional printing off
ESC Q	Disable the printer
ESC R	Reset tabs to default settings
ESC S <n>	n = 1 Select subscript printing n = 0 Select superscript printing
ESC T	Cancel subscript or superscript printing
ESC U <n>	n = 1 Selects unidirectional printing n = 0 Cancels unidirectional printing

APPENDIX H - CONTINUED

Table H.2 Proprinter Escape Sequences

ESCAPE SEQUENCE	FUNCTION
ESC W <n>	n = 1 Selects double-width mode n = 0 Cancels double-width mode
ESC X <n1><n2>	N1 = left margins N2 = Right margins
ESC Y	Select double-density graphics (normal speed)
ESC Z	Select high-density graphics
ESC \ <n1><n2>	Select characters from the all characters chart n1 * (n2*256) = number of characters selected to be printed from this chart.
ESC ^ <n>	Select a character from the all characters chart
ESC _ <n1>	n = 1 Continuous overlining on n = 0 Continuous overlining off

APPENDIX H - CONTINUED

Table H.2 Proprinter Escape Sequences

ESCAPE SEQUENCE	FUNCTION		
ESC [@	*Select double-width, double height or both		
	MODE	HEX VALUE	DESCRIPTION
	m1	0	Specifies the mode.
	m2	0	Specifies the mode.
	m3	0	No change.
		1	Line feeds unchanged, single-high character.
		2	Line feeds unchanged, double-high character.
		10	Single line feed, character height unchanged.
		11	Single line feed, single-high character.
		12	Single line feed, double-high character.
		20	Double line feed, character height unchanged.
		21	Double line feed, single-high character.
		22	Double line feed, double-high character.
	m4	1	Single wide-character
		2	Double-wide character.

ESC = N1 N2 DC4 p a1 a2 p1 p1 ... p11 Download characters

This command is used to download up to 256 consecutive characters into Random Access Memory. The user can overlay the entire character set or any portion of the character set; however, each download must be contiguous from the beginning character. Download characters are defined in terms of a 9 x 12 matrix; however, the 12th column is assumed to be blank.

The variables "n1" and "n2" are used to determine the number of bytes to be downloaded. In order to calculate values for "n1" and "n2", the total number of bytes must first be determined by the following formula:

total bytes = (number of characters to be downloaded x 13) +2

If the total bytes to be downloaded is less than 256, then "n1" is equal to the total bytes and "n2" is equal to 0. If the total bytes is greater than or equal to 256, divided the total bytes by 256. "n1" is equal to the remainder and "n2" is equal to the integer quotient. For example:

To download 14 characters:

total bytes = (14 x 13) +2
total bytes = 184

Since total bytes is less than 256;

n1 = 184
n2 = 0

To download 38 characters:

total bytes = (38 x 13) +2
total bytes = 496

Since total bytes is greater than or equal to 256;

total bytes = 496/256
n1 = 240
n2 = 1

After determining values for "n1" and "n2" always enter a DC4. DC4 is the value used to identify the printer.

The variable "p" is the decimal value of the first character to be downloaded. The starting character is determined by the programmer and can begin at any point; however, all characters must be contiguous from the start character. Values for "p" can range from 0 to 256.

APPENDIX H - CONTINUED

The dot pattern for each character must be defined in terms of an 8 x 11 dot matrix. That is, each character can be a maximum of 8 dots tall (See Figure H.1).

Thirteen bytes are used to define a character. The first two bytes are attribute bytes. Attribute byte one, represented by the variable "a1", specifies height and width characteristics of the character. The printer ignores all but the MSB of the attribute byte. The MSB provides descender data. If the MSB is 1, the user-defined character will be shifted down by one dot as shown in Figure H.1.

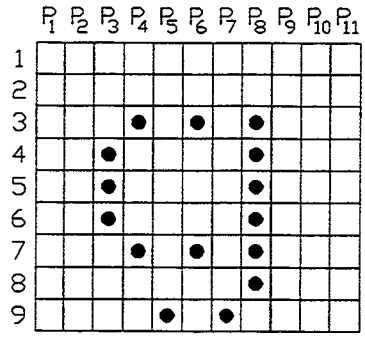


Figure H.1 Proprinter MSB Equal to 1

If the MSB is 0, the character occupies the top eight dot positions of the matrix as shown in Figure H.2.

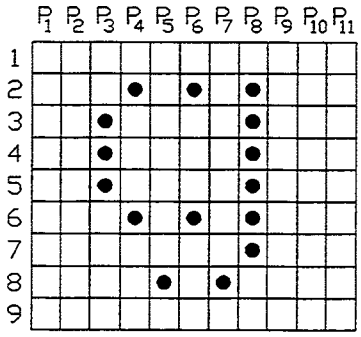
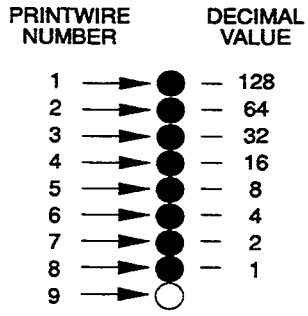


Figure H.2 Proprinter MSB Equal to 0

Attribute byte two, represented by the variable "a2", specifies proportion spacing information. Bits 1-4 specify the length of each character (number of columns to be printed). Bites 5-7 specify the number of blank columns to the left of the downloaded character. Up to 7 columns can be blank.

APPENDIX H - CONTINUED

The remaining eleven bytes specified by "p1" through "p11" contain the data which defines the character. Each dot location is assigned a decimal value as shown below.



The decimal values for the printable dots are added.

ESC \ n1 n2 Select characters from the all characters chart

This command allows the user to print any or all characters from the All Characters Chart. IBM control characters defined in ASCII codes 1 through 31 and international characters defined in ASCII codes 128 through 159 can be printed with this command. No control codes are valid with this command. The total number of characters to be printed is determined by the following equation:

n1 + (n2 x 256)

Where:

n1 Specifies the number of characters. Values for "n1" can range from 0 to 256.

n2 Specifies the number of 256-character blocks. Values for "n2" can range from 0 to 255.

Thus, a maximum of 65,535 characters can be printed with this command.

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences

ESCAPE SEQUENCE	FUNCTION
BEL	Sounds the print buzzer
BS	Backspace
HT	Horizontal tab
LF	Line feed
VT	Vertical tab
FF	Form feed
CR	Carriage return
SO	Select enlarged mode
SI	Select condensed printing
DC1	Enable printer
DC2	Cancel condensed printing
DC3	Disable printer
DC4	Cancel enlarged mode
CAN	Cancel data
ESC	Escape
ESC <SO>	Select enlarged mode
ESC <SI>	Select condensed printing

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences

ESCAPE SEQUENCE	FUNCTION	
ESC !	*Print mode selection	
	Decimal Value	**Description**
	0	Single-strike Pica
	1	Single-strike Elite
	4	Single-strike Condensed
	8	Single-strike Emphasize Elite
	16	Double-strike Pica
	17	Double-strike Elite
	20	Double-strike Condensed
	24	Double-strike Emphasize Elite
	32	Enlarged Single-strike Pica
	33	Enlarged Single-strike Elite
	36	Enlarged Single-strike Condensed
	40	Enlarged Single-strike Emphasize Elite
	48	Enlarged Double-strike Pica
	49	Enlarged Double-strike Elite
	52	Enlarged Double-strike Condensed
	56	Enlarged Double-strike Emphasize Elite
ESC #	Cancel MSB function	
ESC % <n>	n = 0 resident character set is selected. n = 1 Character set defined by ESC & is selected (User-Defined characters).	

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences

ESCAPE SEQUENCE	FUNCTION		
ESC &	User-defined characters ESC & c1 c2 a p1 p2 ... p11		
ESC * m	Select a graphic mode		
	Decimal Value	Description	Dot Density
	0	Single Density	60
	1	Double Density	120
	2	High Speed Double Density	120
	3	Quadruple Density	240
	4	CRT I	80
	5	1:1 Plotter Density	72
	6	CRT II	90
ESC - <n1>	n = 1 Turn continuous underlining on n = 0 Turn continuous underlining off		
ESC /	Select up to 8 VFU channels.		
ESC 0	Set line spacing to 1/8 inch		
ESC 1	Set line spacing to 7/72 inch		
ESC 2	Set line spacing to 1/6 inch		
ESC 3	Set line spacing to n/216 inch (nearest 1/144")		
ESC 4	Select italic character set		
ESC 5	Cancel italic character set		
ESC 6	Enable upper character set		
ESC 7	Enable extended control codes (Cancels ESC 6)		

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences

ESCAPE SEQUENCE	FUNCTION	
ESC 8	Disable paper-end detector	
ESC 9	Enable paper-end detector	
ESC :	Copy resident characters into RAM	
ESC <	Enable one line unidirectional printing	
ESC =	Set MSB to 0	
ESC >	Set MSB to 1	
ESC ? t <n1>	Reassign graphic code "t" represents the "K", "L", "Y" or, "Z" in their respective graphics commands.	
	<n1> Decimal Value	Description
	0	Single Density
	1	Double Density
	2	High Speed Double Density
	3	Quadruple Density
	4	CRT I
	5	1:1 Plotter Density
	6	CRT II
ESC @	Reset printer	
ESC A <n>	Set line spacing to n/72 inch	
ESC B	Set vertical tab ESC B n1 n2...n16 <null>	
ESC C <n>	Set form length	
ESC D	Set horizontal tab ESC D n1 n2...n32 <null>	

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences

ESCAPE SEQUENCE	FUNCTION	
ESC E	Select emphasized printing	
ESC F	Cancel emphasized printing	
ESC G	Select double-strike printing	
ESC H	Cancel double-strike printing	
ESC I <n>	n = 0 or 48 Control codes are selected n = 1 or 49 International codes are selected	
ESC J <n>	Advance paper by n/216 inch.	
ESC K	Select single-density graphics	
ESC L	Select double-density graphics	
ESC M	Select elite mode	
ESC N <n>	Enable perforation skip <n> lines between forms	
ESC O	Disable perforation skip	
ESC P	Select pica mode	
ESC Q	Set right margin	
ESC R	Select international character set	
	Decimal Value	Description
	0	USA
	1	France
	2	Germany
	3	England
	4	Denmark
	5	Sweden

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences		
ESCAPE SEQUENCE	**FUNCTION**	
	6	Italy
	7	Spain
	8	Japan
ESC S <n>	n = 1 Select subscript printing n = 0 Select superscript printing	
ESC T	Cancel Superscript/Subscript	
ESC U <n>	n = 1 Selects unidirectional printing n = 0 Cancels unidirectional printing	
ESC W <n>	n = 1 Selects double-width mode n = 0 Cancels double-width mode	
ESC Y	Select High Speed Double-Density Graphics	
ESC Z	Select Quadruple-Density Graphics	
ESC ^ <n>	n = 1	
ESC b	*Select VFU Position ESC b c m1...m16 <null> c=channel number (0-7) m1=tab position	
ESC l <n>	Set Left Margin	
ESC p <n>	n = 0 or 48 Cancel Proportional Printing n = 1 or 49 Select Proportional Printing	
ESC s <n>	n = 0 Cancel Half-speed Printing n = 1 Select Half-speed Printing	
DEL (7F hex)	Delete	

APPENDIX H - CONTINUED

Table H.3 Epson FX Escape Sequences		
ESCAPE SEQUENCE	**FUNCTION**	
	6	Italy
	7	Spain
	8	Japan
ESC S <n>	n = 1 Select subscript printing n = 0 Select superscript printing	
ESC T	Cancel Superscript/Subscript	
ESC U <n>	n = 1 Selects unidirectional printing n = 0 Cancels unidirectional printing	
ESC W <n>	n = 1 Selects double-width mode n = 0 Cancels double-width mode	
ESC Y	Select High Speed Double-Density Graphics	
ESC Z	Select Quadruple-Density Graphics	
ESC ^ <n>	n = 1	
ESC b	*Select VFU Position ESC b c m1...m16 <null> c=channel number (0-7) m1=tab position	
ESC l <n>	Set Left Margin	
ESC p <n>	n = 0 or 48 Cancel Proportional Printing n = 1 or 49 Select Proportional Printing	
ESC s <n>	n = 0 Cancel Half-speed Printing n = 1 Select Half-speed Printing	
DEL (7F hex)	Delete	

APPENDIX H - CONTINUED

ESC & User defined characters

This command is used to define downloadable characters in a 9 x 11 dot matrix. With this command, the programmer can define a single character or an entire font.

The variables "c1" and "c2" specify the character range to be defined. For example, to download four characters into the locations occupied by the letters "a", "b", "c" and "d", "c1" would equal 97 and "c2" would equal 100. Values for "c1" and "c2" can range from 0 to 255.

The dot pattern for each character must be defined in terms of an 8 x 11 dot matrix. That is, each character can be a maximum of 8 dots tall (See Figure H.1).

Twelve bytes are used to define a character. The first byte, the attribute byte, specifies height and width characteristics of the character. The variable "a" is used to specify the attribute byte. The printer ignores all but the MSB of the attribute byte. The MSB provides descender data. If the MSB is 0, the user-defined character occupies the bottom eight dot positions of the matrix as shown in Figure H.3.

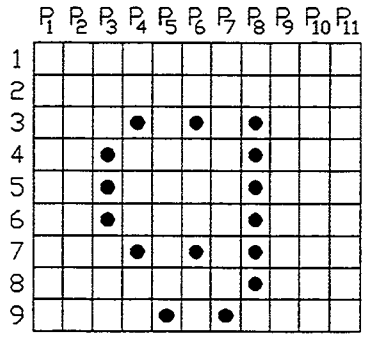


Figure H.3 Epson FX MSB Equal to 0

If the MSB is 1, the character occupies the top eight dot positions of the matrix as shown in Figure H.4.

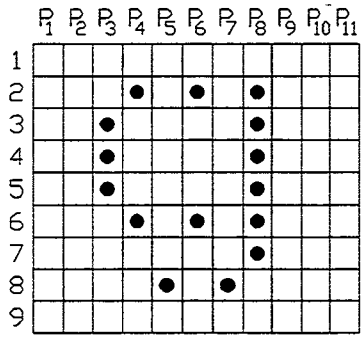
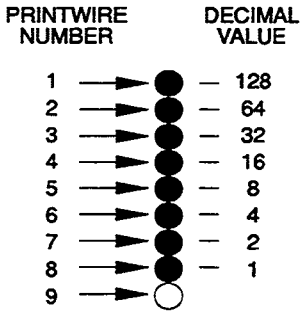


Figure H.4 Epson FX MSB Equal to 1

The remaining eleven bytes specified by "p1" through "p11" contain the data which defines the character. Each dot location is assigned a decimal value as shown below.



The decimal value for the printable dots in each column are added and this value is sent to the printer as character data.

ESC ^ n Select Single or Double Density 9-Pin Graphics

This command is used to select single or double density 9-pin graphics based on the value of "n".

If:

n = 0 Double-density 9-pin graphics is selected.
n = 1 Single-density 9-pin graphics is selected.

In this mode, two bytes are used to define each 9-dot bit pattern; however, only the top bit of the second byte is used, as shown in Figure H.5.

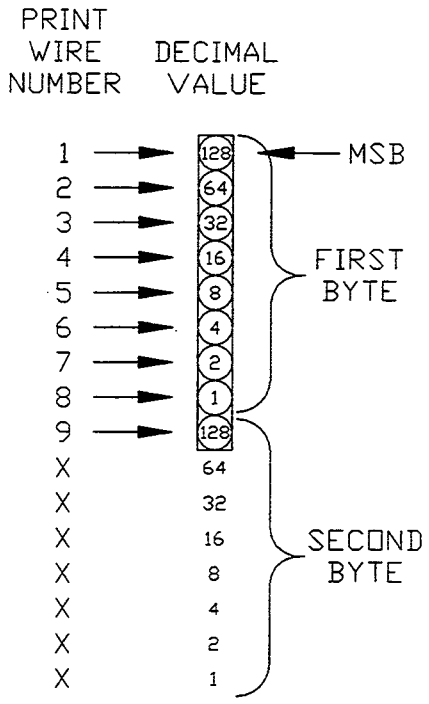


Figure H.5 9-Pin Graphics

APPENDIX H - CONTINUED

APPENDIX H - IBM CHARACTER SET

IBM CHARACTER SET 1 LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0 NUL	20 16 10	40 32 20 SP	60 48 30 0	100 64 40 @	120 80 50 P	140 96 60 `	160 112 70 p
0001	1 1 1	21 17 11 DC1	41 33 21 !	61 49 31 1	101 65 41 A	121 81 51 Q	141 97 61 a	161 113 71 q
0010	2 2 2	22 18 12 DC2	42 34 22 "	62 50 32 2	102 66 42 B	122 82 52 R	142 98 62 b	162 114 72 r
0011	3 3 3	23 19 13 DC3	43 35 23 #	63 51 33 3	103 67 43 C	123 83 53 S	143 99 63 c	163 115 73 s
0100	4 4 4	24 20 14 DC4	44 36 24 $	64 52 34 4	104 68 44 D	124 84 54 T	144 100 64 d	164 116 74 t
0101	5 5 5	25 21 15	45 37 25 %	65 53 35 5	105 69 45 E	125 85 55 U	145 101 65 e	165 117 75 u
0110	6 6 6	26 22 16	46 38 26 &	66 54 36 6	106 70 46 F	126 86 56 V	146 102 66 f	166 118 76 v
0111	7 7 7 BELL	27 23 17	47 39 27 '	67 55 37 7	107 71 47 G	127 87 57 W	147 103 67 g	167 119 77 w
1000	10 8 8 BS	30 24 18 CAN	50 40 28 (	70 56 38 8	110 72 48 H	130 88 58 X	150 104 68 h	170 120 78 x
1001	11 9 9 HT	31 25 19	51 41 29)	71 57 39 9	111 73 49 I	131 89 59 Y	151 105 69 i	171 121 79 y
1010	12 10 A LF	32 26 1A	52 42 2A *	72 58 3A :	112 74 4A J	132 90 5A Z	152 106 6A j	172 122 7A z
1011	13 11 B VT	33 27 1B ESC	53 43 2B +	73 59 3B ;	113 75 4B K	133 91 5B [	153 107 6B k	173 123 7B {
1100	14 12 C FF	34 28 1C	54 44 2C ,	74 60 3C <	114 76 4C L	134 92 5C \	154 108 6C l	174 124 7C |
1101	15 13 D CR	35 29 1D	55 45 2D -	75 61 3D =	115 77 4D M	135 93 5D]	155 109 6D m	175 125 7D }
1110	16 14 E SO	36 30 1E	56 46 2E .	76 62 3E >	116 78 4E N	136 94 5E ^	156 110 6E n	176 126 7E ~
1111	17 15 F SI	37 31 1F	57 47 2F /	77 63 3F ?	117 79 4F O	137 95 5F _	157 111 6F o	177 127 7F

Octal	30
Dec.	24
Hex	18

APPENDIX H - IBM CHARACTER SET

IBM CHARACTER SET 1 UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 NUL 128 80	220 144 90	240 á 160 A0	260 ▒ 176 B0	300 └ 192 C0	320 ╨ 208 D0	340 α 224 E0	360 ≡ 240 F0
0001	201 129 81	221 DC1 145 91	241 í 161 A1	261 ▓ 177 B1	301 ┴ 193 C1	321 ╤ 209 D1	341 ß 225 E1	361 ± 241 F1
0010	202 130 82	222 DC2 146 92	242 ó 162 A2	262 ▓ 178 B2	302 ┬ 194 C2	322 ╥ 210 D2	342 Γ 226 E2	362 ≥ 242 F2
0011	203 131 83	223 DC3 147 93	243 ú 163 A3	263 │ 179 B3	302 ├ 195 C3	323 ╙ 211 D3	343 π 227 E3	363 ≤ 243 F3
0100	204 132 84	224 DC4 148 94	244 ñ 164 A4	264 ┤ 180 B4	304 ─ 196 C4	324 ╘ 212 D4	344 Σ 228 E4	364 ⌠ 244 F4
0101	205 133 85	225 149 95	245 Ñ 165 A5	265 ╡ 181 B5	305 ┼ 197 C5	325 ╒ 213 D5	345 σ 229 E5	365 ⌡ 245 F5
0110	206 134 86	226 150 96	246 ª 166 A6	266 ╢ 182 B6	306 ╞ 198 C6	326 ╓ 214 D6	346 µ 230 E6	366 ÷ 246 F6
0111	207 BEL 135 87	227 151 97	247 º 167 A7	267 ╖ 183 B7	307 ╟ 199 C7	327 ╫ 215 D7	347 τ 231 E7	367 ≈ 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 ¿ 168 A8	270 ╕ 184 B8	310 ╚ 200 C8	330 ╪ 216 D8	350 Φ 232 E8	370 ° 248 F8
1001	211 HT 137 89	231 153 99	251 ⌐ 169 A9	271 ╣ 185 B9	311 ╔ 201 C9	331 ┘ 217 D9	351 Θ 233 E9	371 • 249 F9
1010	212 LF 138 8A	232 154 9A	252 ¬ 170 AA	272 ║ 186 BA	312 ╩ 202 CA	332 ┌ 218 DA	352 Ω 234 EA	372 · 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 ½ 171 AB	273 ╗ 187 BB	313 ╦ 203 CB	333 ■ 219 DB	353 δ 235 EB	373 √ 251 FB
1100	214 FF 140 8C	234 156 9C	254 ¼ 172 AC	274 ╝ 188 BC	314 ╠ 204 CC	334 ▬ 220 DC	354 ∞ 236 EC	374 n 252 FC
1101	215 CR 141 8D	235 157 9D	255 ¡ 173 AD	275 ╜ 189 BD	315 ═ 205 CD	335 ▌ 221 DD	355 ø 237 ED	375 ² 253 FD
1110	216 SO 142 8E	236 158 9E	256 « 174 AE	276 ╛ 190 BE	316 ╬ 206 CE	336 ▐ 222 DE	356 ε 238 EE	376 ■ 254 FE
1111	217 SI 143 8F	237 159 9F	257 » 175 AF	277 ┐ 191 BF	317 ╧ 207 CF	337 ▀ 223 DF	357 ∩ 239 EF	377 SP 255 FF

Octal 30
Dec. 24
Hex 18

APPENDIX H - IBM CHARACTER SET

IBM CHARACTER SET 2 LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0 NUL	20 16 10	40 32 20 SP	60 48 30 0	100 64 40 @	120 80 50 P	140 96 60 `	160 112 70 p
0001	1 1 1	21 17 11 DC1	41 33 21 !	61 49 31 1	101 65 41 A	121 81 51 Q	141 97 61 a	161 113 71 q
0010	2 2 2	22 18 12 DC2	42 34 22 "	62 50 32 2	102 66 42 B	122 82 52 R	142 98 62 b	162 114 72 r
0011	3 3 3 ♥	23 19 13 DC3	43 35 23 #	63 51 33 3	103 67 43 C	123 83 53 S	143 99 63 c	163 115 73 s
0100	4 4 4 ♦	24 20 14 DC4	44 36 24 $	64 52 34 4	104 68 44 D	124 84 54 T	144 100 64 d	164 116 74 t
0101	5 5 5 ♣	25 21 15	45 37 25 %	65 53 35 5	105 69 45 E	125 85 55 U	145 101 65 e	165 117 75 u
0110	6 6 6 ♠	26 22 16	46 38 26 &	66 54 36 6	106 70 46 F	126 86 56 V	146 102 66 f	166 118 76 v
0111	7 7 7 BELL	27 23 17	47 39 27 '	67 55 37 7	107 71 47 G	127 87 57 W	147 103 67 g	167 119 77 w
1000	10 8 8 BS	30 24 18 CAN	50 40 28 (	70 56 38 8	110 72 48 H	130 88 58 X	150 104 68 h	170 120 78 x
1001	11 9 9 HT	31 25 19	51 41 29)	71 57 39 9	111 73 49 I	131 89 59 Y	151 105 69 i	171 121 79 y
1010	12 10 A LF	32 26 1A	52 42 2A *	72 58 3A :	112 74 4A J	132 90 5A Z	152 106 6A j	172 122 7A z
1011	13 11 B VT	33 27 1B ESC	53 43 2B +	73 59 3B ;	113 75 4B K	133 91 5B [	153 107 6B k	173 123 7B {
1100	14 12 C FF	34 28 1C	54 44 2C ,	74 60 3C <	114 76 4C L	134 92 5C \	154 108 6C l	174 124 7C ¦
1101	15 13 D CR	35 29 1D	55 45 2D -	75 61 3D =	115 77 4D M	135 93 5D]	155 109 6D m	175 125 7D }
1110	16 14 E SO	36 30 1E	56 46 2E .	76 62 3E >	116 78 4E N	136 94 5E ^	156 110 6E n	176 126 7E ~
1111	17 15 F SI	37 31 1F	57 47 2F /	77 63 3F ?	117 79 4F O	137 95 5F _	157 111 6F o	177 127 7F

Octal 30
Dec. 24
Hex 18

APPENDIX H - IBM CHARACTER SET

IBM CHARACTER SET 2 UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 Ç 128 80	220 É 144 90	240 á 160 A0	260 ▒ 176 B0	300 └ 192 C0	320 ╨ 208 D0	340 α 224 E0	360 ≡ 240 F0
0001	201 ü 129 81	221 æ 145 91	241 í 161 A1	261 ▓ 177 B1	301 ┴ 193 C1	321 ╤ 209 D1	341 ß 225 E1	361 ± 241 F1
0010	202 é 130 82	222 Æ 146 92	242 ó 162 A2	262 █ 178 B2	302 ┬ 194 C2	322 ╥ 210 D2	342 Γ 226 E2	362 ≥ 242 F2
0011	203 â 131 83	223 ô 147 93	243 ú 163 A3	263 ┃ 179 B3	302 ├ 195 C3	323 ╙ 211 D3	343 π 227 E3	363 ≤ 243 F3
0100	204 ä 132 84	224 ö 148 94	244 ñ 164 A4	264 ┤ 180 B4	304 ─ 196 C4	324 ╘ 212 D4	344 Σ 228 E4	364 ⌠ 244 F4
0101	205 à 133 85	225 ò 149 95	245 Ñ 165 A5	265 ╡ 181 B5	305 ┼ 197 C5	325 ╒ 213 D5	345 σ 229 E5	365 ⌡ 245 F5
0110	206 å 134 86	226 û 150 96	246 ª 166 A6	266 ╢ 182 B6	306 ╞ 198 C6	326 ╓ 214 D6	346 µ 230 E6	366 ÷ 246 F6
0111	207 ç 135 87	227 ù 151 97	247 º 167 A7	267 ╖ 183 B7	307 ╟ 199 C7	327 ╫ 215 D7	347 τ 231 E7	367 ≈ 247 F7
1000	210 ê 136 88	230 ÿ 152 98	250 ¿ 168 A8	270 ╕ 184 B8	310 ╚ 200 C8	330 ╪ 216 D8	350 Φ 232 E8	370 ° 248 F8
1001	211 ë 137 89	231 Ö 153 99	251 ⌐ 169 A9	271 ╣ 185 B9	311 ╔ 201 C9	331 ┘ 217 D9	351 Θ 233 E9	371 • 249 F9
1010	212 è 138 8A	232 Ü 154 9A	252 ¬ 170 AA	272 ║ 186 BA	312 ╩ 202 CA	332 ┌ 218 DA	352 Ω 234 EA	372 · 250 FA
1011	213 ï 139 8B	233 ¢ 155 9B	253 ½ 171 AB	273 ╗ 187 BB	313 ╦ 203 CB	333 ▀ 219 DB	353 δ 235 EB	373 √ 251 FB
1100	214 î 140 8C	234 £ 156 9C	254 ¼ 172 AC	274 ╝ 188 BC	314 ╠ 204 CC	334 ▄ 220 DC	354 ∞ 236 EC	374 ⁿ 252 FC
1101	215 ì 141 8D	235 ¥ 157 9D	255 ¡ 173 AD	275 ╜ 189 BD	315 ═ 205 CD	335 ▌ 221 DD	355 ø 237 ED	375 ² 253 FD
1110	216 Ä 142 8E	236 ₧ 158 9E	256 « 174 AE	276 ╛ 190 BE	316 ╬ 206 CE	336 ▐ 222 DE	356 ε 238 EE	376 ■ 254 FE
1111	217 Å 143 8F	237 ƒ 159 9F	257 » 175 AF	277 ┐ 191 BF	317 ╧ 207 CF	337 ▬ 223 DF	357 ∩ 239 EF	377 SP 255 FF

Octal	30
Dec.	24
Hex	18

APPENDIX H - IBM CHARACTER SET

IBM ALL CHARACTER SET LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	40 32 20	60 48 30	100 64 40	120 80 50	140 96 60	160 112 70
0001	1 1 1	21 17 11	41 33 21	61 49 31	101 65 41	121 81 51	141 97 61	161 113 71
0010	2 2 2	22 18 12	42 34 22	62 50 32	102 66 42	122 82 52	142 98 62	162 114 72
0011	3 3 3	23 19 13	43 35 23	63 51 33	103 67 43	123 83 53	143 99 63	163 115 73
0100	4 4 4	24 20 14	44 36 24	64 52 34	104 68 44	124 84 54	144 100 64	164 116 74
0101	5 5 5	25 21 15	45 37 25	65 53 35	105 69 45	125 85 55	145 101 65	165 117 75
0110	6 6 6	26 22 16	46 38 26	66 54 36	106 70 46	126 86 56	146 102 66	166 118 76
0111	7 7 7	27 23 17	47 39 27	67 55 37	107 71 47	127 87 57	147 103 67	167 119 77
1000	10 8 8	30 24 18	50 40 28	70 56 38	110 72 48	130 88 58	150 104 68	170 120 78
1001	11 9 9	31 25 19	51 41 29	71 57 39	111 73 49	131 89 59	151 105 69	171 121 79
1010	12 10 A	32 26 1A	52 42 2A	72 58 3A	112 74 4A	132 90 5A	152 106 6A	172 122 7A
1011	13 11 B	33 27 1B	53 43 2B	73 59 3B	113 75 4B	133 91 5B	153 107 6B	173 123 7B
1100	14 12 C	34 28 1C	54 44 2C	74 60 3C	114 76 4C	134 92 5C	154 108 6C	174 124 7C
1101	15 13 D	35 29 1D	55 45 2D	75 61 3D	115 77 4D	135 93 5D	155 109 6D	175 125 7D
1110	16 14 E	36 30 1E	56 46 2E	76 62 3E	116 78 4E	136 94 5E	156 110 6E	176 126 7E
1111	17 15 F	37 31 1F	57 47 2F	77 63 3F	117 79 4F	137 95 5F	157 111 6F	177 127 7F

Octal	30
Dec.	24
Hex	18

APPENDIX H - IBM CHARACTER SET

IBM ALL CHARACTER SET UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 Ç 128 80	220 É 144 90	240 á 160 A0	260 ▒ 176 B0	300 └ 192 C0	320 ╨ 208 D0	340 α 224 E0	360 ≡ 240 F0
0001	201 ü 129 81	221 æ 145 91	241 í 161 A1	261 ▓ 177 B1	301 ┴ 193 C1	321 ╤ 209 D1	341 ß 225 E1	361 ± 241 F1
0010	202 é 130 82	222 Æ 146 92	242 ó 162 A2	262 ▓ 178 B2	302 ┬ 194 C2	322 ╥ 210 D2	342 Γ 226 E2	362 ≥ 242 F2
0011	203 â 131 83	223 ô 147 93	243 ú 163 A3	263 │ 179 B3	302 ├ 195 C3	323 ╙ 211 D3	343 π 227 E3	363 ≤ 243 F3
0100	204 ä 132 84	224 ö 148 94	244 ñ 164 A4	264 ┤ 180 B4	304 ─ 196 C4	324 ╘ 212 D4	344 Σ 228 E4	364 ⌠ 244 F4
0101	205 à 133 85	225 ò 149 95	245 Ñ 165 A5	265 ╡ 181 B5	305 ┼ 197 C5	325 ╒ 213 D5	345 σ 229 E5	365 ⌡ 245 F5
0110	206 å 134 86	226 û 150 96	246 ª 166 A6	266 ╢ 182 B6	306 ╞ 198 C6	326 ╓ 214 D6	346 µ 230 E6	366 ÷ 246 F6
0111	207 ç 135 87	227 ù 151 97	247 º 167 A7	267 ╖ 183 B7	307 ╟ 199 C7	327 ╫ 215 D7	347 τ 231 E7	367 ≈ 247 F7
1000	210 ê 136 88	230 ÿ 152 98	250 ¿ 168 A8	270 ╕ 184 B8	310 ╚ 200 C8	330 ╪ 216 D8	350 Φ 232 E8	370 ° 248 F8
1001	211 ë 137 89	231 Ö 153 99	251 ⌐ 169 A9	271 ╣ 185 B9	311 ╔ 201 C9	331 ┘ 217 D9	351 Θ 233 E9	371 • 249 F9
1010	212 è 138 8A	232 Ü 154 9A	252 ¬ 170 AA	272 ║ 186 BA	312 ╩ 202 CA	332 ┌ 218 DA	352 Ω 234 EA	372 · 250 FA
1011	213 ï 139 8B	233 ¢ 155 9B	253 ½ 171 AB	273 ╗ 187 BB	313 ╦ 203 CB	333 ■ 219 DB	353 δ 235 EB	373 √ 251 FB
1100	214 î 140 8C	234 £ 156 9C	254 ¼ 172 AC	274 ╝ 188 BC	314 ╠ 204 CC	334 ▄ 220 DC	354 ∞ 236 EC	374 n 252 FC
1101	215 ì 141 8D	235 ¥ 157 9D	255 ¡ 173 AD	275 ╜ 189 BD	315 ═ 205 CD	335 ▌ 221 DD	355 ø 237 ED	375 ² 253 FD
1110	216 Ä 142 8E	236 ₧ 158 9E	256 « 174 AE	276 ╛ 190 BE	316 ╬ 206 CE	336 ▐ 222 DE	356 ε 238 EE	376 ■ 254 FE
1111	217 Å 143 8F	237 ƒ 159 9F	257 » 175 AF	277 ┐ 191 BF	317 ╧ 207 CF	337 ▀ 223 DF	357 ∩ 239 EF	377 SP 255 FF

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APPENDIX H - US EPSON

US. EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	SP 40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	1 1 1	DC1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	2 2 2	DC2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	3 3 3	DC3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	4 4 4	DC4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	7 BELL 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	10 BS 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	11 HT 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	12 LF 10 A	32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	13 VT 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	14 FF 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	¦ 174 124 7C
1101	15 CR 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	16 SO 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	17 SI 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

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APPENDIX H - US EPSON

US EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 [219 DB	353 k 235 EB	373 { 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 \ 220 DC	354 l 236 EC	374 | 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335] 221 DD	355 m 237 ED	375 } 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ~ 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - ENGLAND EPSON

ENGLAND EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	SP 40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	1 1 1	DC1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	2 2 2	DC2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	3 3 3	DC3 23 19 13	£ 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	4 4 4	DC4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	BELL 7 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	BS 10 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	HT 11 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	LF 12 10 A	32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	VT 13 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	[133 91 5B	k 153 107 6B	{ 173 123 7B
1100	FF 14 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	¦ 174 124 7C
1101	CR 15 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	m 155 109 6D	} 175 125 7D
1110	SO 16 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	~ 176 126 7E
1111	SI 17 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

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APPENDIX H - ENGLAND EPSON

ENGLAND EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 £ 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 [219 DB	353 k 235 EB	373 { 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 \ 220 DC	354 l 236 EC	374 | 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335] 221 DD	355 m 237 ED	375 } 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ~ 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - GERMANY EPSON

GERMANY EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	SP 40 32 20	0 60 48 30	§ 100 64 40	P 120 80 50	` 140 96 60	p 160 112 70
0001	1 1 1	DC1 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	2 2 2	DC2 22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	3 3 3	DC3 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	4 4 4	DC4 24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	7 BELL 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	10 BS 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	11 HT 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	12 LF 10 A	32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	13 VT 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	Ä 133 91 5B	k 153 107 6B	ä 173 123 7B
1100	14 FF 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ö 134 92 5C	l 154 108 6C	ö 174 124 7C
1101	15 CR 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	Ü 135 93 5D	m 155 109 6D	ü 175 125 7D
1110	16 SO 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	ß 176 126 7E
1111	17 SI 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

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APPENDIX H - GERMANY EPSON

GERMANY EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 § 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 Ä 219 DB	353 k 235 EB	373 ä 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 ö 220 DC	354 l 236 EC	374 ö 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 Ü 221 DD	355 m 237 ED	375 ü 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ß 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - FRANCE EPSON

FRANCE EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	40 SP 32 20	60 0 48 30	100 à 64 40	120 P 80 50	140 ` 96 60	160 p 112 70
0001	1 1 1	21 DC1 17 11	41 ! 33 21	61 1 49 31	101 A 65 41	121 Q 81 51	141 a 97 61	161 q 113 71
0010	2 2 2	22 DC2 18 12	42 " 34 22	62 2 50 32	102 B 66 42	122 R 82 52	142 b 98 62	162 r 114 72
0011	3 3 3	23 DC3 19 13	43 # 35 23	63 3 51 33	103 C 67 43	123 S 83 53	143 c 99 63	163 s 115 73
0100	4 4 4	24 DC4 20 14	44 $ 36 24	64 4 52 34	104 D 68 44	124 T 84 54	144 d 100 64	164 t 116 74
0101	5 5 5	25 21 15	45 % 37 25	65 5 53 35	105 E 69 45	125 U 85 55	145 e 101 65	165 u 117 75
0110	6 6 6	26 22 16	46 & 38 26	66 6 54 36	106 F 70 46	126 V 86 56	146 f 102 66	166 v 118 76
0111	7 BELL 7 7	27 23 17	47 ' 39 27	67 7 55 37	107 G 71 47	127 W 87 57	147 g 103 67	167 w 119 77
1000	10 BS 8 8	30 CAN 24 18	50 (40 28	70 8 56 38	110 H 72 48	130 X 88 58	150 h 104 68	170 x 120 78
1001	11 HT 9 9	31 25 19	51) 41 29	71 9 57 39	111 I 73 49	131 Y 89 59	151 i 105 69	171 y 121 79
1010	12 LF 10 A	32 26 1A	52 * 42 2A	72 : 58 3A	112 J 74 4A	132 Z 90 5A	152 j 106 6A	172 z 122 7A
1011	13 VT 11 B	33 ESC 27 1B	53 + 43 2B	73 ; 59 3B	113 K 75 4B	133 ° 91 5B	153 k 107 6B	173 é 123 7B
1100	14 FF 12 C	34 28 1C	54 , 44 2C	74 < 60 3C	114 L 76 4C	134 ç 92 5C	154 l 108 6C	174 ù 124 7C
1101	15 CR 13 D	35 29 1D	55 - 45 2D	75 = 61 3D	115 M 77 4D	135 § 93 5D	155 m 109 6D	175 è 125 7D
1110	16 SO 14 E	36 30 1E	56 . 46 2E	76 > 62 3E	116 N 78 4E	136 ^ 94 5E	156 n 110 6E	176 ~ 126 7E
1111	17 SI 15 F	37 31 1F	57 / 47 2F	77 ? 63 3F	117 O 79 4F	137 _ 95 5F	157 o 111 6F	177 DEL 127 7F

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APPENDIX H - FRANCE EPSON

FRANCE EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 à 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 ° 219 DB	353 k 235 EB	373 é 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 ç 220 DC	354 l 236 EC	374 ù 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 § 221 DD	355 m 237 ED	¨ 375 è 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	- 376 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - SWEDEN EPSON

SWEDEN EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	SP 40 32 20	0 60 48 30	é 100 64 40	P 120 80 50	é 140 96 60	p 160 112 70
0001	1 1 1	21 DC1 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	2 2 2	22 DC2 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	3 3 3	23 DC3 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	4 4 4	24 DC4 20 14	¤ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	7 BELL 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	10 BS 8 8	30 CAN 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	11 HT 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	12 LF 10 A	32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	13 VT 11 B	33 ESC 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	Ä 133 91 5B	k 153 107 6B	ä 173 123 7B
1100	14 FF 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	Ö 134 92 5C	l 154 108 6C	ö 174 124 7C
1101	15 CR 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	Å 135 93 5D	m 155 109 6D	å 175 125 7D
1110	16 SO 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	Ü 136 94 5E	n 156 110 6E	ü 176 126 7E
1111	17 SI 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

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APPENDIX H - SWEDEN EPSON

SWEDEN EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 É 192 C0	320 P 208 D0	340 é 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 ¤ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 Ä 219 DB	353 k 235 EB	373 ä 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 Ö 220 DC	354 l 236 EC	374 ö 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 Å 221 DD	355 m 237 ED	375 å 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 Ü 222 DE	356 n 238 EE	376 ü 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - DENMARK EPSON

DENMARK EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	40 SP 32 20	60 0 48 30	100 @ 64 40	120 P 80 50	140 ` 96 60	160 p 112 70
0001	1 1 1	21 DC1 17 11	41 ! 33 21	61 1 49 31	101 A 65 41	121 Q 81 51	141 a 97 61	161 q 113 71
0010	2 2 2	22 DC2 18 12	42 " 34 22	62 2 50 32	102 B 66 42	122 R 82 52	142 b 98 62	162 r 114 72
0011	3 3 3	23 DC3 19 13	43 # 35 23	63 3 51 33	103 C 67 43	123 S 83 53	143 c 99 63	163 s 115 73
0100	4 4 4	24 DC4 20 14	44 $ 36 24	64 4 52 34	104 D 68 44	124 T 84 54	144 d 100 64	164 t 116 74
0101	5 5 5	25 21 15	45 % 37 25	65 5 53 35	105 E 69 45	125 U 85 55	145 e 101 65	165 u 117 75
0110	6 6 6	26 22 16	46 & 38 26	66 6 54 36	106 F 70 46	126 V 86 56	146 f 102 66	166 v 118 76
0111	7 BELL 7 7	27 23 17	47 ' 39 27	67 7 55 37	107 G 71 47	127 W 87 57	147 g 103 67	167 w 119 77
1000	10 BS 8 8	30 CAN 24 18	50 (40 28	70 8 56 38	110 H 72 48	130 X 88 58	150 h 104 68	170 x 120 78
1001	11 HT 9 9	31 25 19	51) 41 29	71 9 57 39	111 I 73 49	131 Y 89 59	151 i 105 69	171 y 121 79
1010	12 LF 10 A	32 26 1A	52 * 42 2A	72 : 58 3A	112 J 74 4A	132 Z 90 5A	152 j 106 6A	172 z 122 7A
1011	13 VT 11 B	33 ESC 27 1B	53 + 43 2B	73 ; 59 3B	113 K 75 4B	133 Æ 91 5B	153 k 107 6B	173 æ 123 7B
1100	14 FF 12 C	34 28 1C	54 , 44 2C	74 < 60 3C	114 L 76 4C	134 Ø 92 5C	154 l 108 6C	174 ø 124 7C
1101	15 CR 13 D	35 29 1D	55 - 45 2D	75 = 61 3D	115 M 77 4D	135 Å 93 5D	155 m 109 6D	175 å 125 7D
1110	16 SO 14 E	36 30 1E	56 . 46 2E	76 > 62 3E	116 N 78 4E	136 ^ 94 5E	156 n 110 6E	176 ~ 126 7E
1111	17 SI 15 F	37 31 1F	57 / 47 2F	77 ? 63 3F	117 O 79 4F	137 _ 95 5F	157 o 111 6F	177 DEL 127 7F

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APPENDIX H - DENMARK EPSON

DENMARK EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 Æ 219 DB	353 k 235 EB	373 æ 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 Ø 220 DC	354 l 236 EC	374 ø 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 Å 221 DD	355 m 237 ED	375 à 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ~ 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - SPAIN EPSON

SPAIN EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	40 SP 32 20	60 0 48 30	100 @ 64 40	120 P 80 50	140 ` 96 60	160 p 112 70
0001	1 1 1	21 DC1 17 11	41 ! 33 21	61 1 49 31	101 A 65 41	121 Q 81 51	141 a 97 61	161 q 113 71
0010	2 2 2	22 DC2 18 12	42 " 34 22	62 2 50 32	102 B 66 42	122 R 82 52	142 b 98 62	162 r 114 72
0011	3 3 3	23 DC3 19 13	43 ₧ 35 23	63 3 51 33	103 C 67 43	123 S 83 53	143 c 99 63	163 s 115 73
0100	4 4 4	24 DC4 20 14	44 $ 36 24	64 4 52 34	104 D 68 44	124 T 84 54	144 d 100 64	164 t 116 74
0101	5 5 5	25 21 15	45 % 37 25	65 5 53 35	105 E 69 45	125 U 85 55	145 e 101 65	165 u 117 75
0110	6 6 6	26 22 16	46 & 38 26	66 6 54 36	106 F 70 46	126 V 86 56	146 f 102 66	166 v 118 76
0111	7 BELL 7 7	27 23 17	47 ' 39 27	67 7 55 37	107 G 71 47	127 W 87 57	147 g 103 67	167 w 119 77
1000	10 BS 8 8	30 CAN 24 18	50 (40 28	70 8 56 38	110 H 72 48	130 X 88 58	150 h 104 68	170 x 120 78
1001	11 HT 9 9	31 25 19	51) 41 29	71 9 57 39	111 I 73 49	131 Y 89 59	151 i 105 69	171 y 121 79
1010	12 LF 10 A	32 26 1A	52 * 42 2A	72 : 58 3A	112 J 74 4A	132 Z 90 5A	152 j 106 6A	172 z 122 7A
1011	13 VT 11 B	33 ESC 27 1B	53 + 43 2B	73 ; 59 3B	113 K 75 4B	133 ¡ 91 5B	153 k 107 6B	173 - 123 7B
1100	14 FF 12 C	34 28 1C	54 , 44 2C	74 < 60 3C	114 L 76 4C	134 Ñ 92 5C	154 l 108 6C	174 ñ 124 7C
1101	15 CR 13 D	35 29 1D	55 - 45 2D	75 = 61 3D	115 M 77 4D	135 ¿ 93 5D	155 m 109 6D	175 } 125 7D
1110	16 SO 14 E	36 30 1E	56 . 46 2E	76 > 62 3E	116 N 78 4E	136 ^ 94 5E	156 n 110 6E	176 ~ 126 7E
1111	17 SI 15 F	37 31 1F	57 / 47 2F	77 ? 63 3F	117 O 79 4F	137 _ 95 5F	157 o 111 6F	177 DEL 127 7F

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APPENDIX H - SPAIN EPSON

SPAIN EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 ₧ 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 ¡ 219 DB	353 k 235 EB	373 ¨ 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 Ñ 220 DC	354 l 236 EC	374 ñ 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 ¿ 221 DD	355 m 237 ED	375 } 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ~ 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - ITALY EPSON

ITALY EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	SP 40 32 20	0 60 48 30	@ 100 64 40	P 120 80 50	ù 140 96 60	p 160 112 70
0001	1 1 1	21 DC1 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0010	2 2 2	22 DC2 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0011	3 3 3	23 DC3 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0100	4 4 4	24 DC4 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0101	5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0110	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0111	7 BELL 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1000	10 BS 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1001	11 HT 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1010	12 LF 10 A	32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1011	13 VT 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	° 133 91 5B	k 153 107 6B	à 173 123 7B
1100	14 FF 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	l 154 108 6C	ü 174 124 7C
1101	15 CR 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	é 135 93 5D	m 155 109 6D	è 175 125 7D
1110	16 SO 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	n 156 110 6E	ñ 176 126 7E
1111	17 SI 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

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APPENDIX H - ITALY EPSON

ITALY EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ù 224 E0	360 p 240 - F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 ° 219 DB	353 k 235 EB	373 à 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 \ 220 DC	354 l 236 EC	374 ò 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335 é 221 DD	355 m 237 ED	375 è 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ì 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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APPENDIX H - JAPAN EPSON

JAPAN EPSON LOWER

	0000	0001	0010	0011	0100	0101	0110	0111
0000	0 0 0	20 16 10	40 SP 32 20	60 0 48 30	100 @ 64 40	120 P 80 50	140 ` 96 60	160 p 112 70
0001	1 1 1	21 DC1 17 11	41 ! 33 21	61 1 49 31	101 A 65 41	121 Q 81 51	141 a 97 61	161 q 113 71
0010	2 2 2	22 DC2 18 12	42 " 34 22	62 2 50 32	102 B 66 42	122 R 82 52	142 b 98 62	162 r 114 72
0011	3 3 3	23 DC3 19 13	43 # 35 23	63 3 51 33	103 C 67 43	123 S 83 53	143 c 99 63	163 s 115 73
0100	4 4 4	24 DC4 20 14	44 $ 36 24	64 4 52 34	104 D 68 44	124 T 84 54	144 d 100 64	164 t 116 74
0101	5 5 5	25 21 15	45 % 37 25	65 5 53 35	105 E 69 45	125 U 85 55	145 e 101 65	165 u 117 75
0110	6 6 6	26 22 16	46 & 38 26	66 6 54 36	106 F 70 46	126 V 86 56	146 f 102 66	166 v 118 76
0111	7 BELL 7 7	27 23 17	47 ' 39 27	67 7 55 37	107 G 71 47	127 W 87 57	147 g 103 67	167 w 119 77
1000	10 BS 8 8	30 CAN 24 18	50 (40 28	70 8 56 38	110 H 72 48	130 X 88 58	150 h 104 68	170 x 120 78
1001	11 HT 9 9	31 25 19	51) 41 29	71 9 57 39	111 I 73 49	131 Y 89 59	151 i 105 69	171 y 121 79
1010	12 LF 10 A	32 26 1A	52 * 42 2A	72 : 58 3A	112 J 74 4A	132 Z 90 5A	152 j 106 6A	172 z 122 7A
1011	13 VT 11 B	33 ESC 27 1B	53 + 43 2B	73 ; 59 3B	113 K 75 4B	133 [91 5B	153 k 107 6B	173 { 123 7B
1100	14 FF 12 C	34 28 1C	54 , 44 2C	74 < 60 3C	114 L 76 4C	134 ¥ 92 5C	154 l 108 6C	174 ¦ 124 7C
1101	15 CR 13 D	35 29 1D	55 - 45 2D	75 = 61 3D	115 M 77 4D	135] 93 5D	155 m 109 6D	175 } 125 7D
1110	16 SO 14 E	36 30 1E	56 . 46 2E	76 > 62 3E	116 N 78 4E	136 ^ 94 5E	156 n 110 6E	176 ~ 126 7E
1111	17 SI 15 F	37 31 1F	57 / 47 2F	77 ? 63 3F	117 O 79 4F	137 _ 95 5F	157 o 111 6F	177 DEL 127 7F

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APPENDIX H - JAPAN EPSON

JAPAN EPSON UPPER

	1000	1001	1010	1011	1100	1101	1110	1111
0000	200 128 80	220 144 90	240 SP 160 A0	260 0 176 B0	300 @ 192 C0	320 P 208 D0	340 ` 224 E0	360 p 240 F0
0001	201 129 81	221 DC1 145 91	241 ! 161 A1	261 1 177 B1	301 A 193 C1	321 Q 209 D1	341 a 225 E1	361 q 241 F1
0010	202 130 82	222 DC2 146 92	242 " 162 A2	262 2 178 B2	302 B 194 C2	322 R 210 D2	342 b 226 E2	362 r 242 F2
0011	203 131 83	223 DC3 147 93	243 # 163 A3	263 3 179 B3	302 C 195 C3	323 S 211 D3	343 c 227 E3	363 s 243 F3
0100	204 132 84	224 DC4 148 94	244 $ 164 A4	264 4 180 B4	304 D 196 C4	324 T 212 D4	344 d 228 E4	364 t 244 F4
0101	205 133 85	225 149 95	245 % 165 A5	265 5 181 B5	305 E 197 C5	325 U 213 D5	345 e 229 E5	365 u 245 F5
0110	206 134 86	226 150 96	246 & 166 A6	266 6 182 B6	306 F 198 C6	326 V 214 D6	346 f 230 E6	366 v 246 F6
0111	207 BEL 135 87	227 151 97	247 ' 167 A7	267 7 183 B7	307 G 199 C7	327 W 215 D7	347 g 231 E7	367 w 247 F7
1000	210 BS 136 88	230 CAN 152 98	250 (168 A8	270 8 184 B8	310 H 200 C8	330 X 216 D8	350 h 232 E8	370 x 248 F8
1001	211 HT 137 89	231 153 99	251) 169 A9	271 9 185 B9	311 I 201 C9	331 Y 217 D9	351 i 233 E9	371 y 249 F9
1010	212 LF 138 8A	232 154 9A	252 * 170 AA	272 : 186 BA	312 J 202 CA	332 Z 218 DA	352 j 234 EA	372 z 250 FA
1011	213 VT 139 8B	233 ESC 155 9B	253 + 171 AB	273 ; 187 BB	313 K 203 CB	333 [219 DB	353 k 235 EB	373 { 251 FB
1100	214 FF 140 8C	234 156 9C	254 , 172 AC	274 < 188 BC	314 L 204 CC	334 ¥ 220 DC	354 l 236 EC	374 | 252 FC
1101	215 CR 141 8D	235 157 9D	255 - 173 AD	275 = 189 BD	315 M 205 CD	335] 221 DD	355 m 237 ED	375 } 253 FD
1110	216 SO 142 8E	236 158 9E	256 . 174 AE	276 > 190 BE	316 N 206 CE	336 ^ 222 DE	356 n 238 EE	376 ~ 254 FE
1111	217 SI 143 8F	237 159 9F	257 / 175 AF	277 ? 191 BF	317 O 207 CF	337 _ 223 DF	357 o 239 EF	377 DEL 255 FF

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