

 Commodore®
AMIGA®

mps

1230™

DOT MATRIX PRINTER

user's guide

ENGLISH



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AMIGA®
mips **1230™**

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This equipment conforms to ECC Directive 82/499 regarding the prevention and elimination of radio frequency disturbances (D.M. 10 April 1984).

WARNING: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to subpart J of Part 15 of the Federal Communications Commissions rules. It also complies with Standard C108.8-M1983 of the Canadian Standards Association's regulations. These rules and regulations are designed to provide reasonable protection against radio and television interference in a residential installation. If not installed properly, in strict accordance with the manufacturer's instructions, it may cause interference. If you suspect interference, you can test this equipment by turning it off and on. If this equipment does cause interference, correct it by doing any of the following:

- Reorient the receiving antenna or AC plug.
- Change the relative positions of the computer and the receiver.
- Plug the computer into a different outlet so that the computer and receiver are on different circuits.

CAUTION: Only peripherals with shield-grounded cables (computer input-output devices, terminals, printers, etc.), certified to comply with Class B limits, can be attached to this device. Operation with non-certified equipment may result in communications interference.

Your house AC wall receptacle must be a three-pronged type (AC ground). If not, contact an electrician to install the proper receptacle. If a multi-connector box is used to connect the computer and peripherals to AC, the ground must be common to all units.

If necessary, contact your dealer or an experienced radio-television technician for additional suggestions. You may find the following FCC booklet helpful: "How to Identify and Resolve Radio-TV Interference Problems." The booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock no. 004-000-00345-4.

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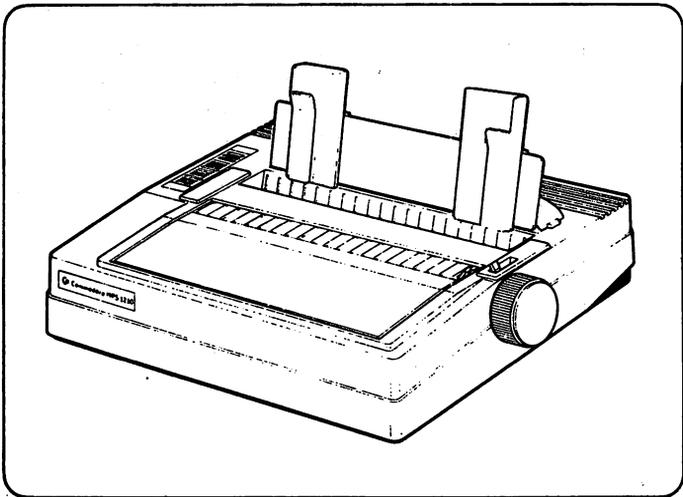
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Introduction to the MPS 1230 Printer

"Output" is an important part of any system. A computer system has three basic components: input, processing and output. The keyboard and disk drive supply the input to the system. The computer, or CPU does the processing. A printer outputs information. A computer is helpful in making you more productive in your work and a printer provides valuable hard copy. The MPS 1230 printer completes your computer system and is a valuable asset when presenting ideas or "output" to others. The MPS 1230 not only provides you with the valuable benefit of hard copy output, it does so with flexibility and high performance.



The MPS 1230 Printer

The Commodore® MPS 1230 is a compact, desktop, dot-matrix printer.

The printer operates at a speed of 120 characters per second and has a tabulation (tab) speed of 200 characters per second.

Uses and Benefits

You'll most likely be using your MPS 1230 printer to print letters, proposals and reports from your word processor. If you're in business, you'll be outputting figures from your spreadsheet or data base. If you're a student or avid computer hobbyist, the MPS 1230 comes in handy when printing your program listings from your computer. And, if you're an artist, the MPS 1230 provides the vehicle with which to print designs and ideas from painting or drawing programs, or images that you have created with your own programs.

Using Commercial Software

Since most of you will be using the MPS 1230 with commercial software packages, one fact should be clear. In order for the word processor, or any other package that processes text, to take advantage of the MPS 1230 special printing features, the designers of the program would have had to program these special features into the software when it was written. Otherwise, these features such as bold print, may not be supported.

Certain computers have special programs, called printer drivers, that allow you to select printers and certain characteristics outside of the application software package itself. The Amiga® for example, allows you to select a printer driver through Preferences, so that regardless of the application you are using, the Amiga usually knows how to take advantage of a printer's special output features. A printer driver, however, is not shipped with the MPS 1230.

Your Own Programs

You may take advantage of the MPS 1230 special features by specifying the command codes and escape sequences in the output commands of your own programs. See Chapter 7, MPS 1230 Control Codes and Escape Sequences, for more information.

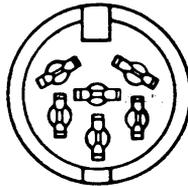
Selecting Printer Settings

Many printers require the user to do too much work, simply to print a document. The MPS 1230 removes much of the burden through the Set Up procedure. This interactive procedure prompts you to select settings and features of the MPS 1230. Once you enter this mode of operation, the printer prints a selection on the page, then scrolls the paper up so you can see it. It waits for you to confirm the selection by pressing the line feed (LF) key or decline the selection by pressing the form feed (FF) key on the printer. The printer continues to prompt you until all selections have been

satisfied. You may also exit the Set Up procedure at any time by pressing the Local key. Once you exit the Set Up procedure, the selections you have made take effect if you confirmed the parameters, otherwise they are cancelled. Any remaining unanswered prompts revert to the most recently saved values. See Chapter 5, Selecting Printer Settings for the Commodore 64/128 if you are using a Commodore 64/128 or Chapter 6, Selecting Printer Settings for the Amiga and Commodore PC, if you have an Amiga or Commodore PC (or compatible).

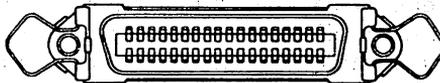
MPS 1230 Printer Ports

The MPS 1230 printer is equipped with two types of ports: serial and parallel. The serial port allows the MPS 1230 to connect to the Commodore 64 and Commodore 128. Here's what the serial port looks like:



Printer Serial Port

The parallel port enables the MPS 1230 to connect to the Amiga and Commodore PC. The parallel port looks like this:



Printer Parallel Port

The Commodore PC refers to the entire series of I.B.M.-compatible Commodore Personal Computers including the PC10, PC20, PC40, PC10-III, PC20-III, PC30-III, PC40-III, Colt and Colt 286.

Printer Features

The wide choice of printing features include Near Letter Quality (N.L.Q.) print modes, six different character pitches, bold and underline type, double width characters, superscripts and subscripts.

Here are some examples:

This is standard draft mode.

This is N.L.Q. mode.

This is double width mode.

This is reverse mode.

This is underline printing.

Special Print Features

The N.L.Q. print mode provides a noticeable improvement of print quality, in both alphanumeric and graphic modes. In N.L.Q. mode, the print matrix is effectively doubled, from 9 x 9 to 18 x 9 dots and the characters feature an almost continuous profile; however, the print speed is reduced.

The Draft print mode provides fast printouts of documents that do not require a particularly high quality of printing.

The MPS 1230 operates in one of two modes depending on which hardware interface is being used:

- Commodore 64/128 mode
- Amiga or Commodore PC mode

The selection of the two operating modes is performed during the Set Up procedure. The 1230 printer is connected to the Commodore 64/128 through the serial port and to the Amiga or Commodore PC (or PC compatible) through the parallel port.

The available command set provides easy handling of pagination, graphic image production and graphic output variation.

A long life black cartridge is available for this printer. It allows rapid, clean ribbon replacement.

Structure of the Manual

Chapter 1 describes the parts of the MPS 1230 Printer. Chapter 2 tells you how to install the printer ribbon cartridge, paper and the paper support and tractor feed mechanism. Chapter 3 shows you how to connect the MPS 1230 to your computer, whether it be the Commodore 64/128, Amiga or Commodore PC.

Chapter 4 gives an overview of the MPS 1230, telling you about the operation modes, the printer's ports and what you need to know to use the MPS 1230 with commercial software applications.

Chapters 5 and 6 take you through the Set Up procedure, which shows you how to select printer settings for the Commodore 64/128, Amiga and Commodore PC Series computers (and compatibles).

Chapter 7 explains the Control Code and Escape Sequences that allow you to program the MPS 1230 Printer.

Chapters 8 and 9 provide the Commodore Serial, I.B.M. and Epson National Character Tables.

Chapter 10 illustrates how to program graphics with the MPS 1230 Printer.

The Appendices provide quick reference material on the technical specifications, character tables and printer diagnostics.

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Chapter 1

Parts Description

This chapter describes the MPS 1230 printer parts and how they are used.

The figure below shows the parts that can be accessed from the front of the printer.

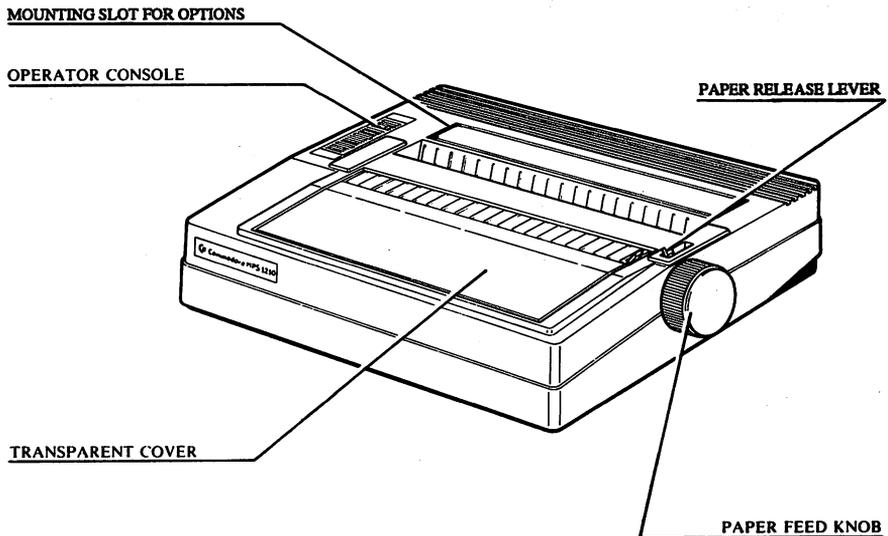


Figure 1-1 MPS 1230 Parts Description

After unpacking the printer, save the carton and packing material for future re-use.

Make sure all items are present, checking them against the figure below. If something is missing or damaged, contact your dealer.

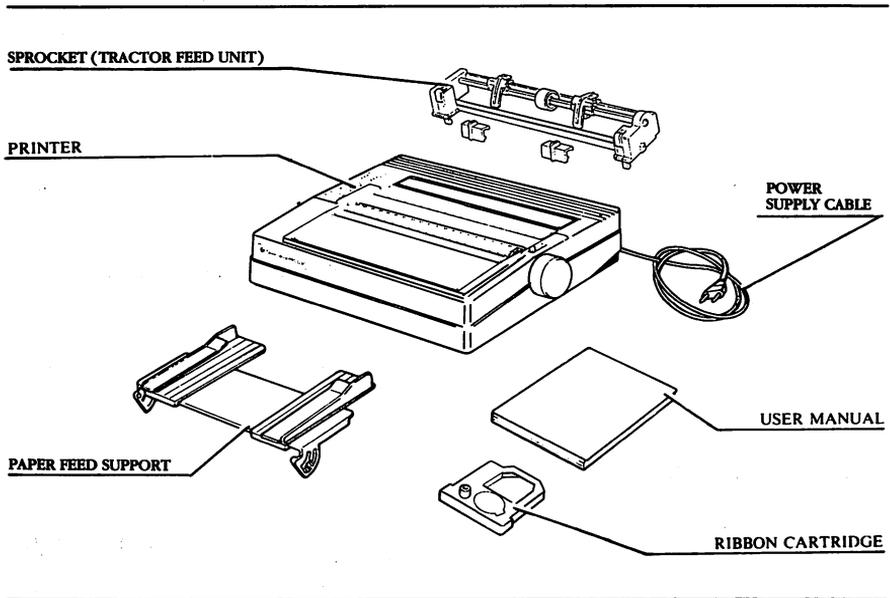


Figure 1-2 MPS 1230 Carton Contents

The printer is protected by a plastic bag which must be removed before installation.

Operating Console

On the operating console there are three membrane keys and three LED indicator lights.

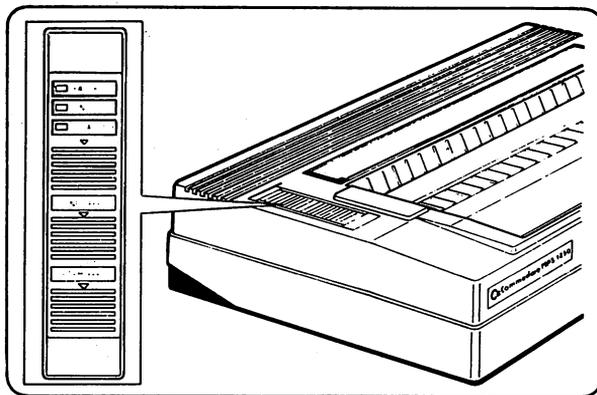


Figure 1-3 Operating Console

Indicator Lights

On

Lit: printer power is on.

Local

Lit: The printer is off-line (printer does not receive from the computer) or it is out of paper.

Off: The printer is on-line (under the computer's control).

Failure

Lit: The printer has a hardware problem that must be serviced by a technician.

Flashing: The printer has a minor mechanical problem that may require service.

Keys

Local

Alternatively selects or deselects the printer.

Line Feed

Advances the paper one line. If held down, the paper feed is continuous until the key is released.

The line feed key is enabled only when the printer is off-line.

If pressed during the Set Up procedure, the parameter proposed is selected. See Chapters 5 and 6 for information on the Set Up procedure for Commodore Serial and I.B.M. and Epson Emulation Modes, respectively.

If pressed and held down at printer power up, the print test is performed. See Appendix P, Printer Self Test (Auto-Diagnostics) for more information.

Form Feed

Advances the paper to the top of the next page.

The form feed key is enabled only when the printer is off-line.

If pressed during the Set Up procedure, the parameter proposed is cancelled, and an alternative is proposed. See Chapters 5 and 6 for information on the Set Up procedure for Commodore Serial and I.B.M. and Epson Emulation Modes, respectively.

If pressed and held down at power-on, the printer will operate in the DATA SCOPE print mode. See Appendix P, Printer Self Test (Auto-Diagnostics) for more information.

If the line feed and form feed keys are held down together at power up, the printer initiates the Set Up procedure.

Paper Release Lever

Push the lever towards the rear of the printer to set the paper pressure rollers against the platen. This allows printing of single sheets of paper.

Push the lever towards the front of the printer to raise the paper pressure rollers from the platen for printing on continuous feed paper (fed by the tractor feed mechanism).

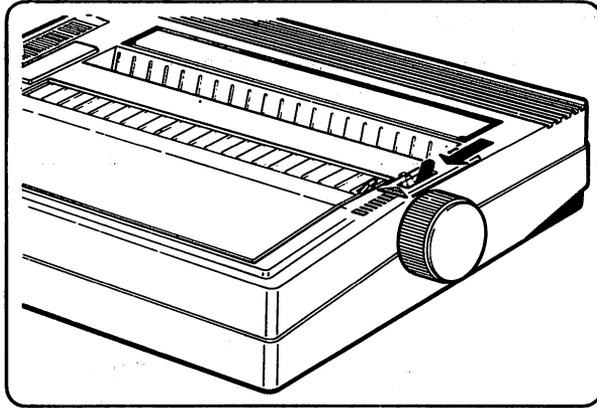


Figure 1-4 Paper Release Lever

Paper Feed Knob

The paper feed knob allows you to manually feed single sheets of paper in either the forward or reverse directions. The paper feed knob functions only if the paper release lever is pushed towards the rear of the printer.

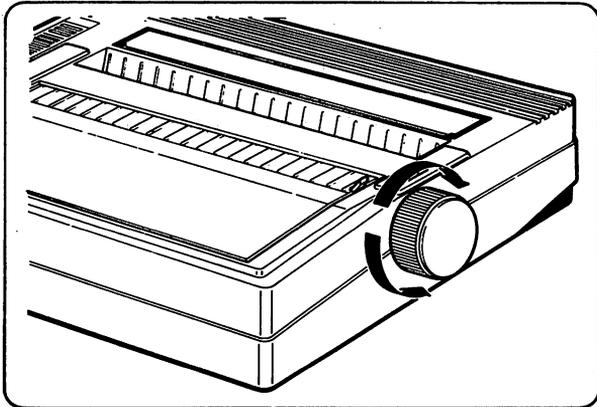


Figure 1-5 Paper Feed Knob

Rear Printer Panel

The following figure illustrates the main parts that are accessed from the rear of the printer.

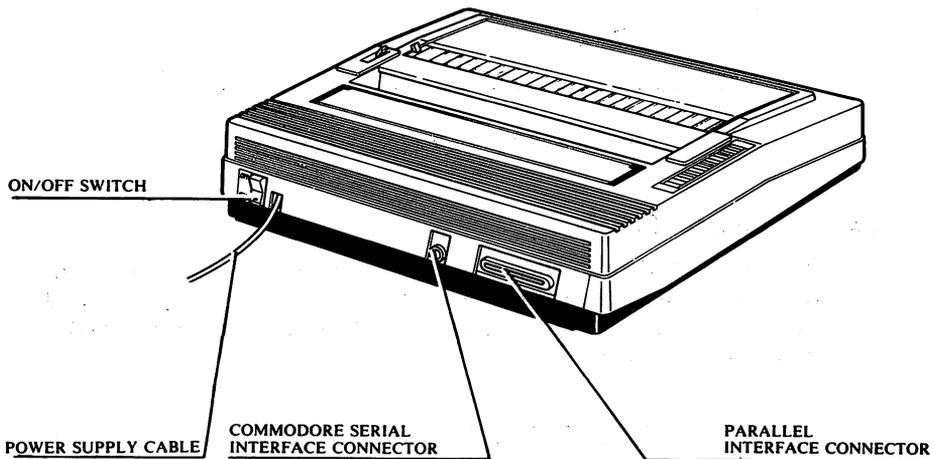


Figure 1-6 Rear View of Printer

Chapter 2

Installing the Ribbon, Paper and Paper Feed Mechanisms

This chapter explains how to install the ribbon cartridge, paper, paper support and the tractor feed mechanism for continuous fan fold paper.

First, place the printer on a flat surface so that you are facing the front of the printer. Place the printer where it will not be exposed to direct sunlight. Read this chapter carefully before connecting the printer to the main power supply. Failure to follow the instructions in this chapter could void your printer warranty.

Ribbon Cartridge Insertion

To insert the ribbon cartridge in the printer, raise the transparent cover to access the printer's internal parts.

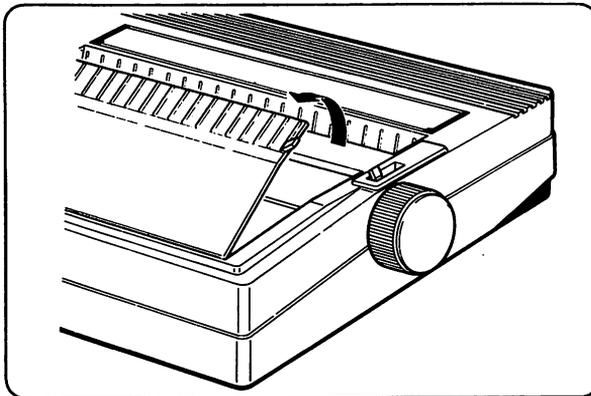


Figure 2-1 Opening the Transparent Cover

Position the print head by sliding it gently along its horizontal guides towards the physical left margin.

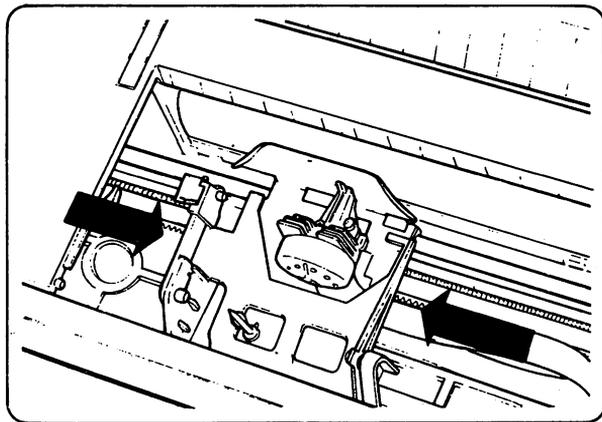


Figure 2-2 Positioning the Print Head

If you are replacing the ribbon cartridge, first remove the used cartridge by pulling it upward.

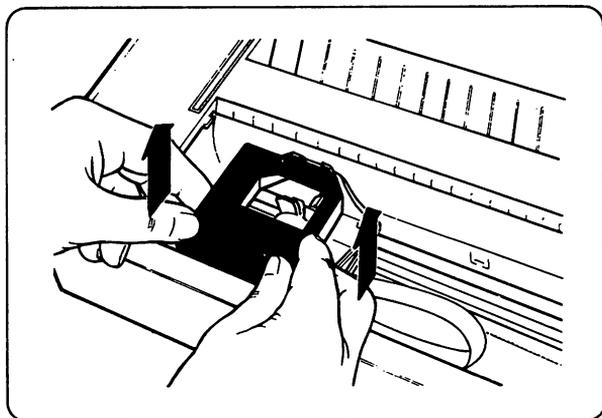


Figure 2-3 Removing the Used Cartridge

Fit the new ribbon cartridge around the print head, making sure that the cartridge is held firmly by the three stops and that the ribbon feed pin is inserted correctly.

Make sure the inked ribbon is towards the platen, and threaded between the print head and the paper guide that is fixed to the platen.

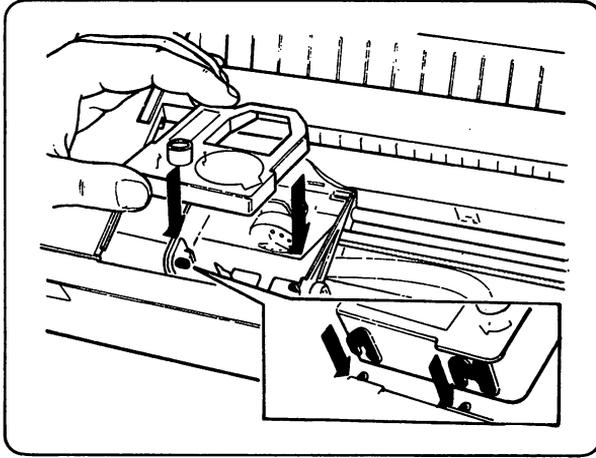


Figure 2-4 Positioning the Cartridge

Insert the cartridge by pressing it down gently but firmly on the mounting pins. If there is excessive resistance, reposition the cartridge and try again. Do not force the cartridge.

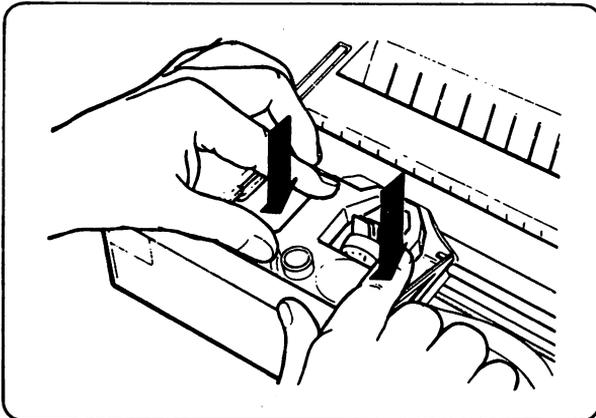


Figure 2-5 Placing the Cartridge in position

Turn the ribbon tension adjustment wheel on the cartridge clockwise to take up any ribbon slack that may have come out of the cartridge during insertion.

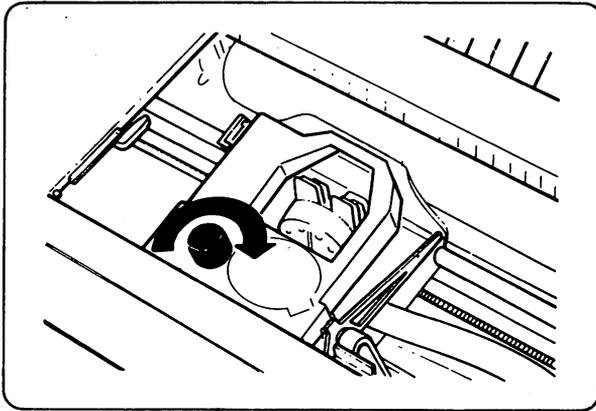


Figure 2-6 Adjusting the Ribbon Tension

Check that the cartridge is correctly aligned and firmly locked in place on the pins and that the ribbon is taut (both horizontally and vertically).

Close the transparent cover.

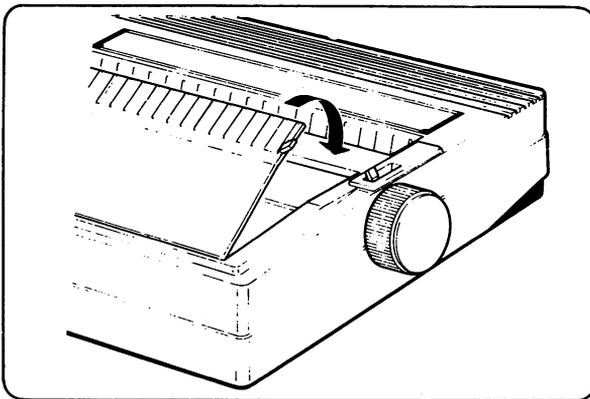


Figure 2-7 Closing the Transparent Cover

Loading Paper

The MPS 1230 may accept either single sheets, continuous fan fold paper or forms. Single sheets of paper should be between 5 and 9 inches (127 to 229 mm) wide and at least 4 inches long, with a minimum top of form of $1\frac{3}{8}$ inches and bottom of form length of $1\frac{3}{16}$ inches. The paper weight may vary between 60 and 80 lbs.

Continuous fan fold paper and forms should be between 5 and 9.5 inches (127 to 241.3 mm) wide. The paper weight (original only) may vary between 55 and 90 lbs. If an original plus one copy is used, the weight of the original may vary between 50 and 60 lbs., while that of the copy must be between 40 and 50 lbs. If carbon paper is used, it should be between 20 and 30 lbs.

Single Sheets

To use single sheets of paper, you must first mount the paper feed support on the printer.

Inserting the Paper Feed Support

Position the paper feed support vertically by inserting its pins on the rear of the printer in the appropriate slots in the printer casing. Push the paper feed support down until it rests against the stops.

While pressing the two flexible hooks on the paper feed support, insert the hooks into the grooves. Tip the paper feed support backward so that it rests against the grooves.

The paper feed support has two working positions:

1. Horizontal; obtained by pressing the sides inward.
2. Sloping; obtained by positioning it horizontally, and then pulling it forward until it clicks into place.

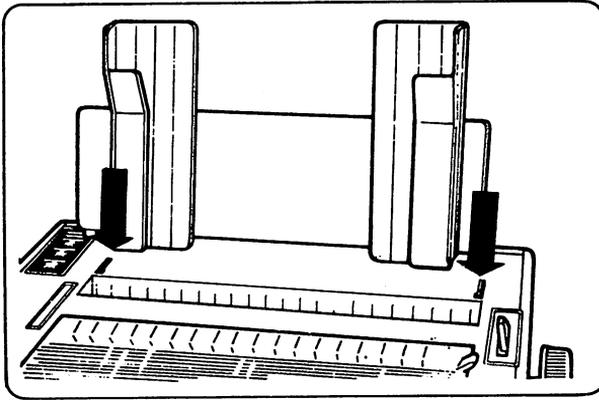


Figure 2-8 Inserting the Paper Feed Support

Check that the paper feed support is fixed firmly and correctly to the printer (and is in its sloping position for single sheet loading).

Set the paper release lever towards the rear of the printer, so that the paper is fed by the platen.

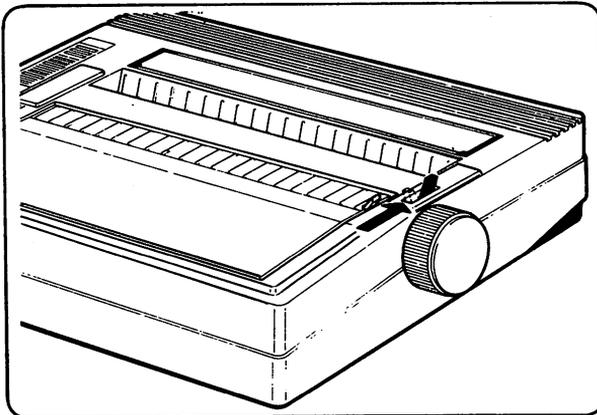


Figure 2-9 Positioning the Paper Release Lever

Manual Insertion of Single Sheets

Adjust the left hand guide of the paper feed support so that the left hand edge of the paper is to the left of the first character position on the print line.

Adjust the right hand guide so that the right hand edge of the paper is to the right of the "last" character position of the print line, according to the width of the paper.

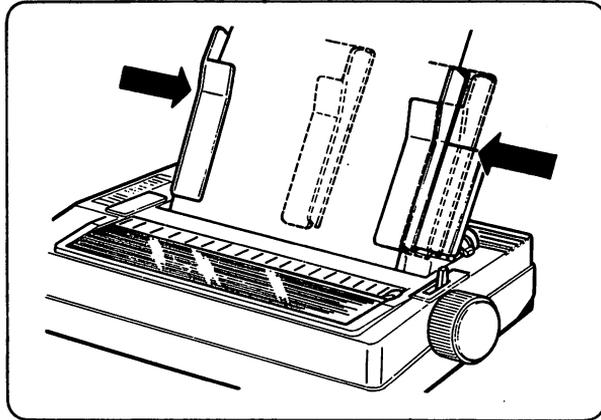


Figure 2-10 Adjusting the Guides

Insert the paper between the guides, pushing it into the slot that gives access to the platen. Turn the paper feed knob clockwise until the paper is correctly in position. The paper should be between the platen and the paper guide in front of it.

Automatic Insertion of Single Sheets

With the printer switched on, you can insert single sheets of paper automatically.

The procedure is the same as that described for manual insertion except that the paper is fed in by pressing the form feed key on the operating console.

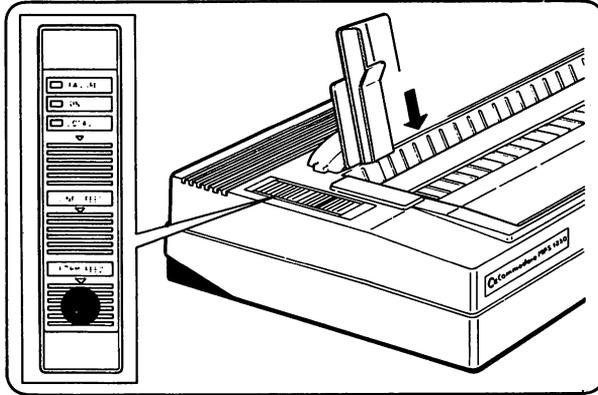


Figure 2-11 Automatic Insertion of Single Sheets

The form feed key operates only if the printer is in Local mode (off-line, the Local indicator light on). If the Local light is off, press the Local key.

Continuous Feed Paper and Forms

To use continuous feed paper or forms, you must first mount the Tractor Feed Unit (sprocket) on the printer.

Mounting the Tractor Feed Unit

The following figure shows the parts that you should be familiar with.

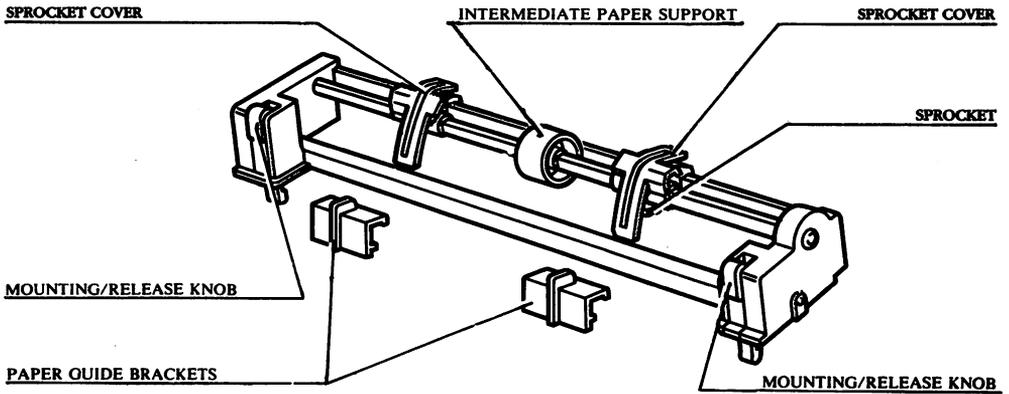


Figure 2-12 The Sprocket

To mount the tractor feed unit on the printer, proceed as follows:

Using a screwdriver or similar tool, remove the precut parts of the printer casing to access the points in which the tractor unit assembly is to be fixed.

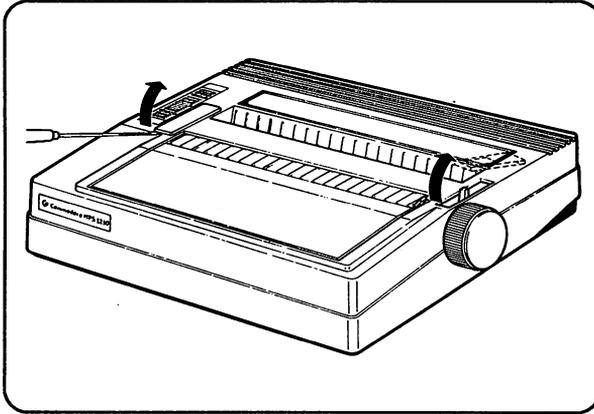


Figure 2-13 Removing the Precut Parts

Keep the precut parts to close the openings in the casing if you decide to remove the tractor assembly.

Position the friction control lever towards the front of the printer so that the tractor assembly can be mounted.

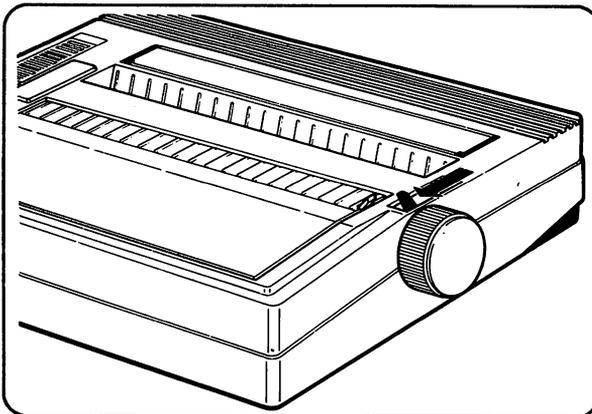


Figure 2-14 Positioning the Paper Release Lever

Insert the pins of the tractor assembly into the two rear slots, by sliding the pins into the guides provided.

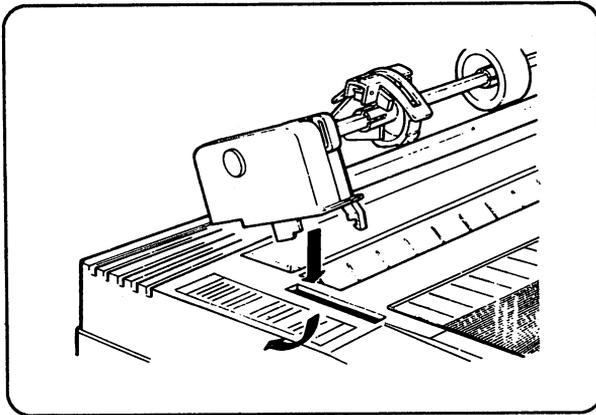


Figure 2-15 Mounting the Sprocket

While pressing the knobs on either side of the front of the tractor assembly, pull tractor forward until it is against the flexible front stops.

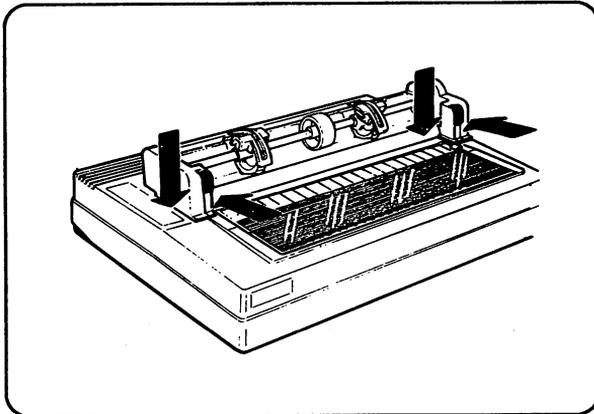


Figure 2-16 Placing the Sprocket in Position

Check that the tractor feed unit is mounted correctly. When you turn the paper feed knob, the metal shaft on which the sprockets are mounted should rotate.

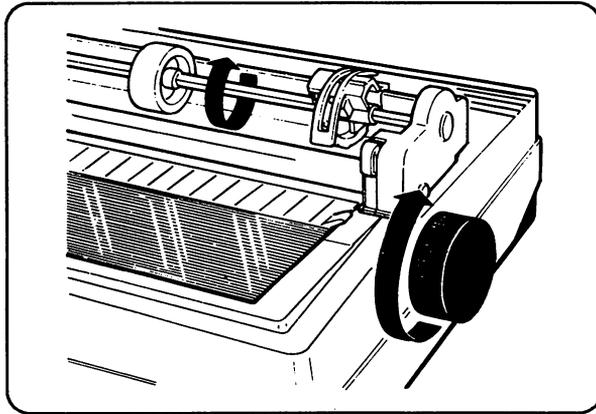


Figure 2-17 Checking the Sprocket

Press the two paper guide brackets into the groove on the rear of the printer casing.

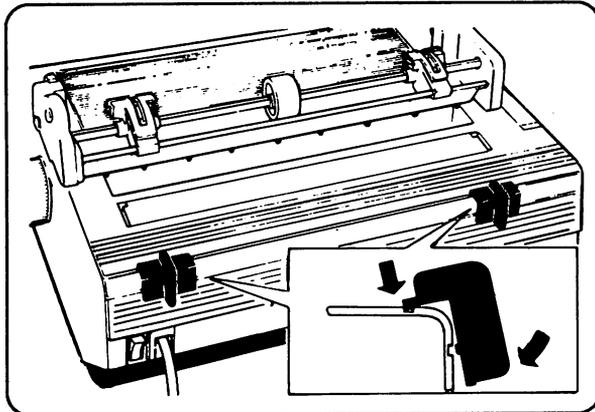


Figure 2-18 Inserting the Paper Guide Brackets

Loading Continuous Feed Paper & Forms

To load continuous feed (fan fold) paper, proceed as follows:

Insert the paper feed support (as described previously) and rotate it downwards to its horizontal position.

Insert the paper in the slot behind the platen and feed the paper under the tractor feed unit.

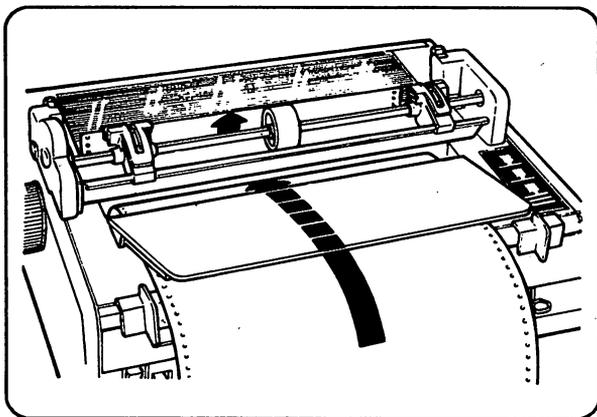


Figure 2-19 Inserting Continuous Feed Paper

Guide the paper by hand until the leading edge feeds out between the platen and the paper guide.

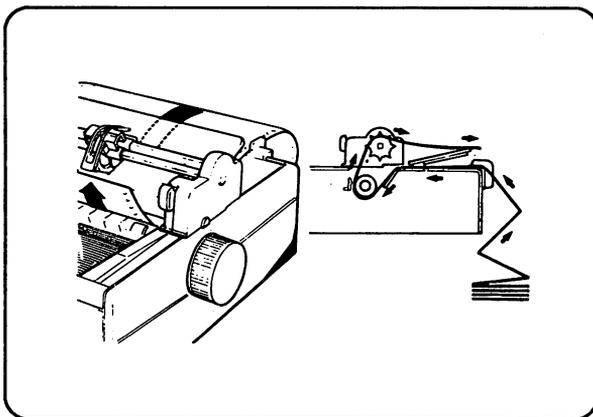


Figure 2-20 Feeding Continuous Feed Paper Around the Platen

Adjust the two sprockets and the intermediate paper supports according to the paper width.

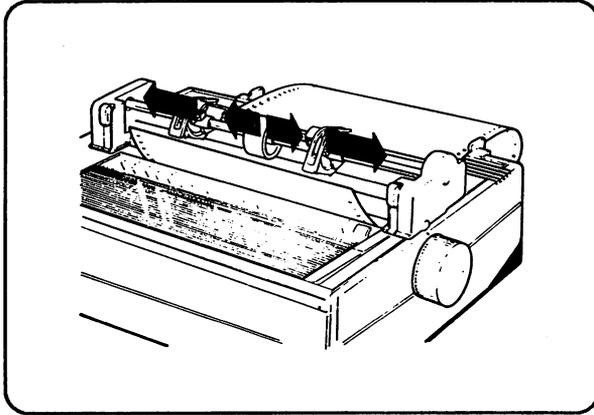


Figure 2-21 Adjusting the Sprocket

Open the two sprocket covers and thread the paper on to the feed pins.

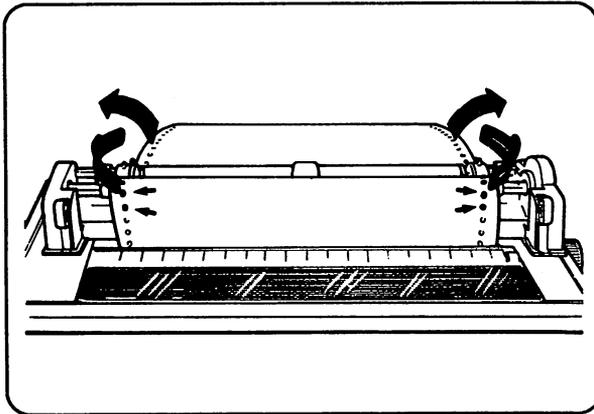


Figure 2-22 Threading the Paper through the Feed Pins

Close the sprocket covers.

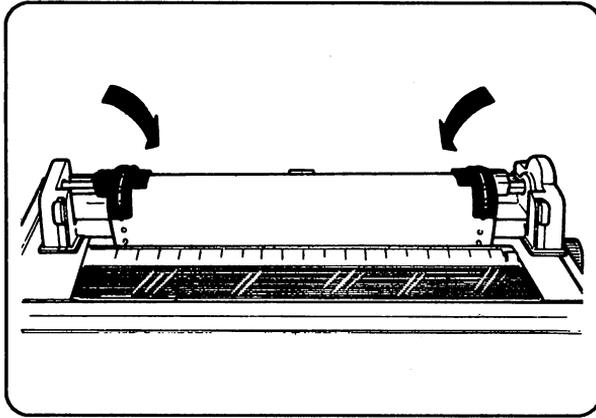


Figure 2-23 Closing the Tractor Covers

Position the paper guide brackets so that the paper feeds smoothly between them.

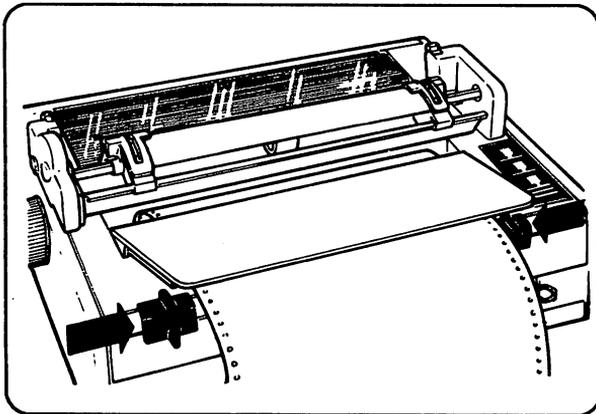


Figure 2-24 Adjusting the Paper Guide Brackets

Turn the paper feed knob to advance the paper and regulate the tension by adjusting the sprockets horizontally. Make sure that the paper path is free of obstacles.

Removing the Tractor Feed Unit

While pressing the knobs on both sides of the front of the tractor assembly, pull it firmly, but carefully, upward until it disengages, first from the front and then from the rear mounting pins.

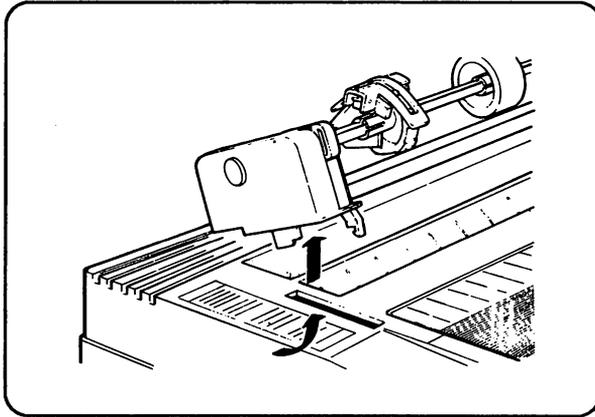


Figure 2-25 Removing the Sprocket

Pull the paper guide brackets upward to remove them from the printer casing.

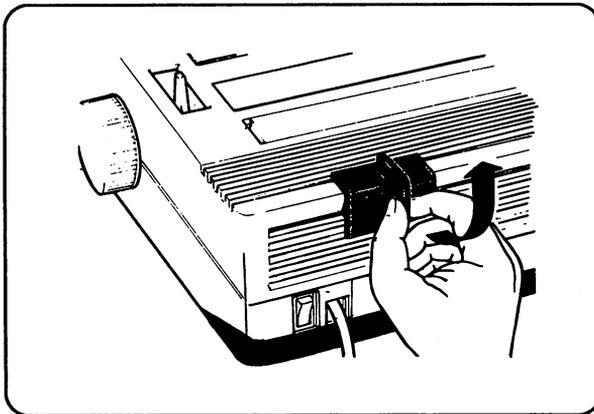


Figure 2-26 Removing the Paper Guide Brackets

Insert the two precut parts in the tractor feed openings of the casing.

Chapter 3

Connecting the MPS 1230 Printer to Your Computer

Connecting the MPS 1230 Printer to the Commodore 64/128

The MPS 1230 printer is connected to the Commodore 64/128 through the Commodore Serial port, located on the rear panel of the Commodore 64/128.

To connect the serial cable to the computer:

- 1) Make sure that the power to both devices is turned off.
- 2) If the printer is connected through the parallel port, unplug the printer's parallel port connector. Only one cable can be connected to the printer at any one time in order for the printer to work properly.
- 3) Insert the 6-pin DIN male connector on one end of the serial cable into the 6-pin DIN female connector located on the printer.
- 4) Connect the other end of the cable, also a 6-pin DIN male connector, to the serial port. See the Commodore 64/128 User's Guide for more information on the serial port.

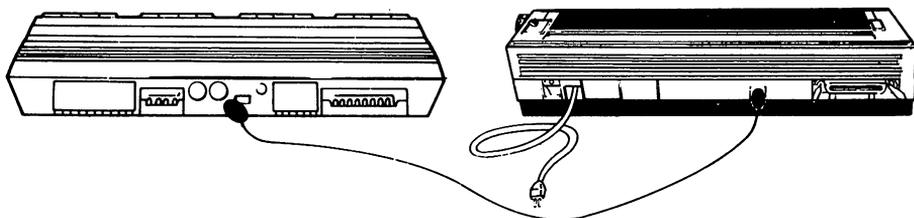


Figure 3-1 Connecting the MPS 1230 Serial Printer Cable

The printer is now ready to be used with your Commodore 64/128. The MPS 1230 is factory set to operate in Commodore Serial mode. The Set Up procedure is not necessary if used with the Commodore 64/128 provided that you did not select any settings in the Set Up procedure prior to using the printer with the Commodore 64/128.

For more information on the Commodore Serial Set Up procedure, see Chapter 5, Selecting Printer Settings for the Commodore 64/128.

If you plan to connect additional peripheral devices such as a disk drive to the Commodore 64/128, first connect the disk drive to the computer, then daisy chain (connect) the printer from the back of the disk drive to the printer, as shown in the following figure. For proper operation, the printer must be the last connected device in the chain.

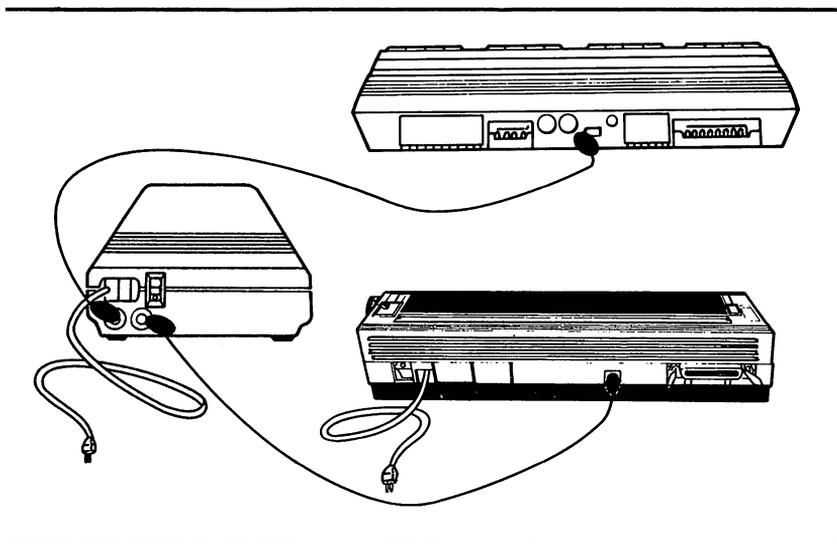


Figure 3-2 Daisy Chaining the Commodore 64/128, Disk Drive and Printer

Connecting the MPS 1230 to the Amiga or Commodore PC

The MPS 1230 printer is connected to the Amiga and Commodore PC through the parallel port, located at the rear panel of the Amiga and Commodore PC. See the user's guide that is shipped with your computer for pictures of the Amiga and Commodore PC parallel ports.

Note: The parallel cable is not included with the MPS 1230 printer. It is sold separately. Ask your dealer for a centronics parallel printer cable or a parallel printer interface cable. The cable may require an additional wiring modification. The maximum advised length of the connection cable is 10 feet (3 meters).

The parallel ports on the Amiga 2000 and 500 Series and Commodore PC are standard parallel interfaces. See Appendix B for technical information about the parallel and serial port signals and pin out descriptions.

To connect the parallel cable to the MPS 1230 and your computer:

- 1) Make sure that the power to both devices is turned off.
- 2) Unplug the printer's serial port connector if it is attached. Only one cable can be connected to the printer at any one time, in order for the printer to work properly.
- 3) Insert the male connector of the parallel cable into the printer's female connector.
- 4) Lock the cable in place with the side springs.
- 5) Now connect the other end of the parallel cable to the parallel port. See your computer's user's guide for more information on the parallel port.

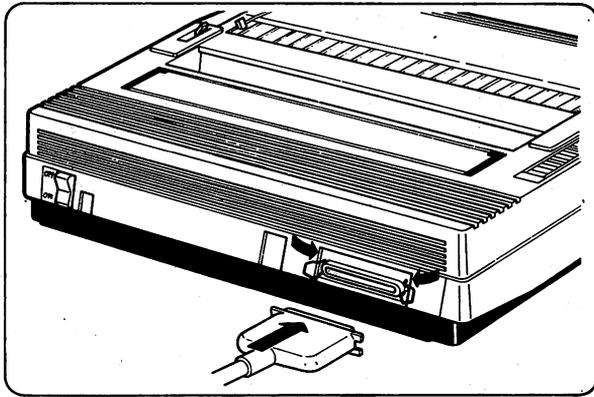


Figure 3-3 Connecting the MPS 1230 Parallel Printer Cable

The printer is nearly ready to be used with your Amiga or Commodore PC. However, before you print anything, you must perform the Set Up procedure as described in Chapter 6, *Selecting Printer Settings for the Amiga and Commodore PC*. If any problems arise, contact your dealer from whom you purchased the printer cable. Most problems arise from improper wiring within the connecting cable.

Plugging in the Printer's Power

Once all the connections described in the previous sections have been performed correctly, check the electrical data on the plate on the rear of the printer to ensure that the printer conforms to the proper electrical specifications for your country. The electrical specifications for the USA and Canada are:

**115 Volts
60 Hz**

for Europe are:

**220 Volts
50 Hz**

Whereas for U.K. and Australia are:

**240 Volts
50 Hz.**

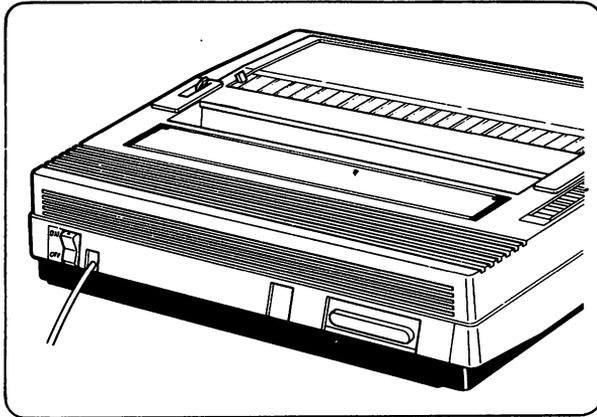


Figure 3-4 Electrical Data Plate

The electrical data plate indicates the printers required voltage. Make sure that the power from your electrical outlet agrees with that on the data plate. Also check that the socket used is compatible with the printer plug and conforms to local electrical standards. If the voltage listed on the electrical data plate does not agree with the electrical standards for your country, contact your dealer immediately. It is a good idea to use an outlet that is not controlled by a switch, and one that has no other electrical devices attached to it.

To connect the printer to the electrical outlet:

- 1) Check that the printer ON/OFF switch is in the "OFF" position.

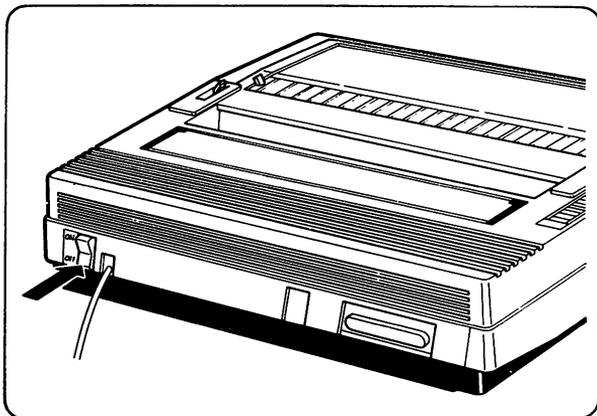


Figure 3-5 Switch in OFF position

- 2) Plug the printer power chord into the electrical outlet of the appropriate voltage.

Turning on the Printer's Power

Turn the printer on by pressing the ON/OFF switch on the rear of the printer.

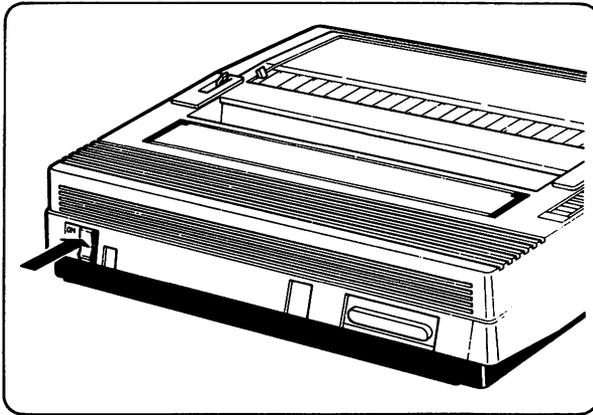


Figure 3-6 Switch in the ON Position

When the printer is turned on, the ON light indicator on the console lights up.

The printer performs the auto-diagnostics (described in Appendix P, Printer Self Test (Auto-Diagnostics)) and places the print head at the first column (physical left margin).

Chapter 4

MPS 1230 Printer Operations

This chapter describes the MPS 1230 operating modes and ports; tells you how to set up the printer to work with your commercial software programs; tells you how to choose a mode of operation (Commodore Serial, I.B.M. Proprinter, I.B.M. Graphics Printer, Epson FX-80); and, finally, gives instructions on selecting the appropriate national character set, device number and ASCII character set for the Commodore 64/128, Amiga or Commodore PC computer.

Printer Operating Modes

The MPS 1230 Printer has two types of interface connectors:

- Commodore Serial for the Commodore 64/128

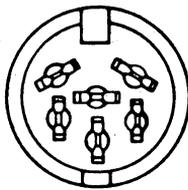


Figure 4-1 Commodore Serial Interface

- Centronics Parallel for the Amiga and Commodore PC (and PC compatibles)

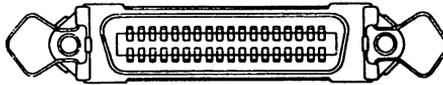


Figure 4-2 Parallel Interface

These two different hardware interfaces give the MPS 1230 flexibility in interfacing with a variety of computers including the Commodore 64/128, Amiga and Commodore PC (and PC compatibles).

The Commodore Serial Port (Interface)

Interfacing the MPS 1230 to the Commodore 64/128, through the serial port, provides four modes of operation:

- 1) Commodore Serial Emulation Mode (Commodore Command Codes & Epson FX 80 Escape Codes)
- 2) Epson FX 80 Emulation Mode
- 3) I.B.M. Proprinter Emulation Mode
- 4) I.B.M. Graphics Printer Emulation Mode

All four modes of operation can use one of the following Commodore Character Tables at a time: USA, France, Germany, UK, Denmark, Sweden, Italy, Commodore.

For more information on these character tables, see the Commodore Serial National Character Tables in Chapter 8.

Selection of one of the emulation modes and character sets is done through the MPS 1230 Set Up procedure which is described in Chapter 5.

In Commodore mode, the MPS 1230 supports the Commodore control codes and the Epson FX 80 escape sequences. This provides compatibility with Commodore MPS 801, MPS 1200 and MPS 1250 Printers. See the MPS 1230 Control Codes and Escape Sequences in Chapter 7 for more information. Also see Appendix D for a complete list of the Commodore Command Codes and Epson FX 80 escape sequences.

The MPS 1230 can also emulate the Epson FX 80, I.B.M. Proprinter and I.B.M. Graphics Printer command codes and escape sequences through the serial interface.

The Centronics Parallel Port (Interface)

When connected to the Amiga or Commodore PC through the centronics parallel port, the MPS 1230 can emulate one of the three following modes:

- 1) I.B.M. Proprinter
- 2) Epson FX 80
- 3) I.B.M. Graphics Printer

The I.B.M. Proprinter emulation mode uses these character sets: International 1, International 2, Spain, Portugal, Greece and Israel.

The Epson FX 80 emulation mode uses these character sets: USA, France, Germany, UK, Denmark, Sweden, Italy and Spain.

The I.B.M. Graphics Printer emulation mode uses these character sets: International 1, International 2, Greece, Israel, Portugal and Spain.

The above character tables are used one at a time. See the I.B.M. and Epson National Character Tables in Chapter 9 for more information.

Selection of one of the emulation modes and character tables is done through the MPS 1230 Set Up Procedure which is described in Chapter 6.

What You Need To Know to Use Commercial Software with the MPS 1230

You will most likely be using the MPS 1230 along with commercial software programs to print your word processing, data base or spreadsheet files.

The rest of this chapter tells you just what you need to know to use the MPS 1230 printer with commercial software applications. It takes you through a subset of the interactive Set Up procedure, and not all of the possible settings that can be selected through the entire Set Up mode.

If you are using a Commodore 64/128 (the serial interface), and you wish to see the entire Set Up procedure, see Chapter 5. If you are using the Amiga or Commodore PC (the parallel interface), see Chapter 6 for the entire Set Up procedure.

The MPS 1230 comes factory set for use with the Commodore 64/128 through the serial interface port with these selections:

Interface: Commodore Serial
Printer Emulated: Commodore
Device Selected: 4
ASCII Translation: PETASCII

If you are using the MPS 1230 with the Commodore 64/128, you DO NOT need to perform the Set Up procedure, since the printer is already shipped with these selections preset in the factory. In this case, you are ready to start using your MPS 1230 right away. Otherwise, see the following sections each explaining a step in how to set up the MPS 1230 for use with your commercial application software.

Selecting the Serial or Parallel Interface

To select the serial or parallel interface, enter the Set Up procedure by first turning off the printer. Insert the first sheet of continuous feed paper into the printer, however the paper feed mechanism cannot be attached during the Set Up procedure. While simultaneously pressing down on both the line feed and form feed keys, turn on the printer. The MPS 1230 responds by printing the following underlined prompt:

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

This shows that the MPS 1230 is now performing the Set Up procedure. A series of prompts will be printed on the page. To confirm a prompt, press the line feed (LF) key. To change selection options at a particular prompt, press the form feed (FF) key. To exit the Set Up procedure at any time, press the Local key.

In addition, the MPS 1230 prints the following prompt:

INTERFACE
SERIAL COMMODORE

If you intend to use the MPS 1230 with a Commodore 64/128, confirm that you want the Commodore Serial interface by pressing the line feed key. Now, skip to the next section, Selecting an MPS 1230 Operating Mode. The serial interface is the default, factory set interface.

Otherwise, if you are connecting the MPS 1230 to an Amiga or Commodore PC through the Centronics parallel interface, press the form feed key. The MPS 1230 responds by printing this prompt:

PARALLEL

To confirm that you want the parallel interface, press the line feed key, otherwise press the form feed key. Pressing the line feed key prompts you to select a printer operating mode, which is described in the next section, Selecting an MPS 1230 Printer Emulation Mode. Pressing the form feed key repeats the process again.

Selecting an MPS 1230 Printer Emulation Mode

Depending on whether you chose Commodore Serial or parallel, the MPS 1230 responds by prompting you to select an emulation mode. The default is Commodore Serial. If the Commodore Serial hardware interface was selected, the MPS 1230 responds with this prompt:

PRINTER EMULATED

COMMODORE

To choose the Commodore mode of operation, press the line feed key. The printer responds by prompting you to select a character set. Otherwise, press the form feed key and the printer responds with this prompt:

EPSON FX 80

Continue to confirm the prompted options by pressing the line feed key, or refuse an option by pressing the form feed key. If you have already chosen all of the desired options, you may exit the Set Up procedure, with your choices taking effect, by pressing the Local key. You are then asked to verify your selections.

To choose the Epson FX 80 mode of operation, press the line feed key. The printer responds by prompting you to select a character set. Otherwise, press the form feed key and the printer responds with this prompt:

PROPRINTER

Choose the I.B.M. Proprinter mode of operation by pressing the line feed key. The printer responds by prompting you to select a character set which is described in the next section. Otherwise, press the form feed key and the printer responds with this option:

I.B.M. G.P.

Choose the I.B.M. Graphics Printer mode of operation by pressing the line feed key. The printer responds by prompting you to select a character set. Otherwise, press the form feed key. The printer will continue to cycle through the series of emulation prompts listed above until an affirmative response is given. The printer will not continue to the next step of the Set Up procedure until the line feed key is pressed.

Provided the Centronics parallel interface was selected in the first printer prompt, the Set Up procedure behaves in the same manner while selecting a printer emulation mode as serial, except that the Commodore emulation mode is not available through the parallel interface.

You may exit Set Up mode at any time by pressing the Local key on the MPS 1230. The printer asks whether or not you want to store the selections that you have made so far. If so, press the line feed key, otherwise press the form feed key. Any selections that were not made in the Set Up mode, due to exiting Set Up mode before all choices were presented, resort to the factory set default values or the most recently stored values, whichever is most recent.

Selecting a Character Set

The third stage of the MPS 1230 Printer Set Up procedure is the selection of a character set. Do so with the prompted character sets until the one you need is displayed and confirm it. The printer will then prompt you to select a device number. The default is the USA/UK character set.

Selecting a Device Number

The Commodore Serial Set Up procedure gives you two options for printer device number, either 4 or 5. When device number 4 is prompted, confirm it with the line feed key, or refuse it with the form feed key. The same holds true when selecting device number 5. The default device number is 4.

In the parallel emulation modes, device number selection is not supported.

Selecting the Type of ASCII Translation

The Set Up procedure gives two ASCII translation options: PETASCII and ASCII. PETASCII is intended for use with the Commodore 64/128. ASCII is used with the Amiga, Commodore PC and virtually every computer. PETASCII gives you an extended version of ASCII and provides 128 additional graphics characters. The default ASCII translation is PETASCII. To select the PETASCII character set, press the line feed key when the MPS 1230 prints the PETASCII prompt. To select standard ASCII, press the form feed key at the PETASCII prompt, the printer then prompts you for the ASCII character set. Now press the line feed key to select the ASCII character set.

Continue Set Up Mode

The Set Up procedure continues by prompting you for additional features you may want to select such as:

- I.B.M. Character Chart (I.B.M. G.P. & Proprinter emulation only)
- Automatic Sheet Feeder
- Double Strike Printing
- Character Resolution
- Character Spacing
- Enable D.L.L. (Down Line Loading of special characters)
- Line Feed (parallel only)
- Carriage Return (I.B.M./Epson Printer Emulation Only)
- Paper End Detection
- Line Spacing (I.B.M./Epson Printer Emulation Only)
- Slashed Zero
- DC1/DC3 Procedure (I.B.M. & Epson Emulation Only)
- Form Length
- Skip Over Perforation (B.O.F.)
- Bidirectional B.I.M. (Bit Image Mode)
- Proportional Spacing
- Character Length (Parallel Interface Only)

Storing the Selected Settings

At the end of Set Up mode, the MPS 1230 prompts you whether or not you want to store the parameters that you selected. If so, press the line feed key when the printer displays the following:

WOULD YOU LIKE TO STORE THESE PARAMETERS?
YES

Otherwise, press the form feed key and the printer displays "NO". Now press the line feed key and the selected options are cancelled, and the most recently saved values take effect. See Chapters 5 and 6 for detailed information on the serial and parallel Set Up procedures (respectively).

Chapter 5

Selecting Printer Settings for the Commodore 64/128

The serial printer settings can be modified through the Set Up procedure. If you are using the MPS 1230 with a Commodore 64/128 software package, there is no need to access the Set Up procedure since the default settings are already factory set to work with the Commodore 64/128. For a summary of the Set Up procedure see Chapter 4, MPS 1230 Printer Operations. This chapter gives a detailed description of the Set Up procedure for use with the Commodore 64/128 via the serial interface port.

Set Up Procedure

With the printer turned off, manually insert the first sheet in a stack of continuous fan fold paper into the printer (as described in Chapter 2 "Installing the Ribbon Cartridge, Paper and Paper Feed Mechanisms").

Note: If the Sprocket devices are installed, they must be removed before the Set Up procedure is performed.

To access the Set Up procedure, first turn off the printer. While simultaneously holding down the printer's line feed and form feed keys, turn on the printer. The printer will now initiate the Set Up procedure.

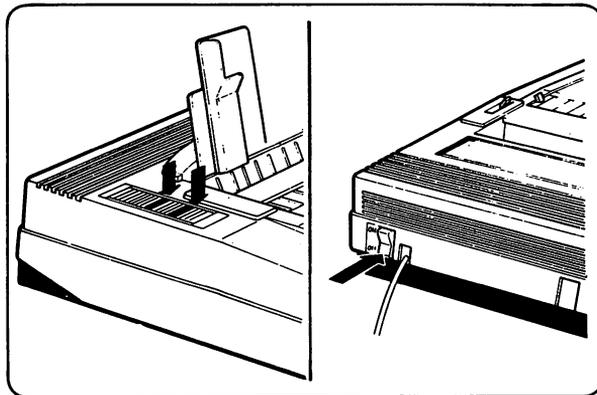


Figure 5-1 Accessing the Set Up Procedure

During the Set Up procedure, the MPS 1230 prints a series of selection prompts to which you respond by pressing the printer's line feed key to confirm an option or pressing the form feed key to refuse the option. Continue to confirm or deny selection options until the printer prompts you with:

**WOULD YOU LIKE TO STORE THESE PARAMETERS?
YES**

Press the line feed key to save your selections and the printer responds by printing this prompt:

CHANGES EXECUTED

To cancel the chosen options press the form feed key. In this case the printer responds with:

NO

Now press the line feed key to confirm that you **DO NOT** want the changes you have made to be saved. Now the printer responds with:

NO CHANGES EXECUTED

Otherwise, press the Local key at any time to exit the Set Up procedure. This also prompts you to store the chosen parameters as described above.

Note: If you turn off the printer during the Set Up procedure, the selected options that you had chosen prior to turning off the printer are cleared and the settings revert back to the most recently stored values or the default factory set values if the settings were never modified.

Default Settings

The printer default (factory-set) settings for the Commodore 64/128 are:

Interface	Commodore Serial
Printer emulated	Commodore
Commodore character set	USA
Device Selected	4
ASCII Translation	PETASCII
Double pass print	monodirectional
Character definition	Draft (normal)
Character spacing (print pitch)	1/10" (2.54 mm)
DLL for special character generation	enabled
Out of paper indicator	enabled
Slashed zero	disabled
Form length	11" (279.4 mm)
Bottom of form (BOF)	0
Bidirectional BIM printing	disabled
Proportional character spacing	disabled

Set Up Procedure Options for the Commodore 64/128

This section illustrates the entire Set Up procedure and all of the possible settings that can be selected for use with the Commodore 64/128.

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

INTERFACE

COMMODORE SERIAL

PRINTER EMULATED

COMMODORE

CHARACTER SET IN COMMODORE MODE

U.S.A.

DEVICE SELECTED

4

ASCII TRANSLATION

PETASCII

AUTOMATIC SHEET FEEDER

NO

DOUBLE STRIKE PRINTING

MONODIRECTIONAL

CHARACTER RESOLUTION

DRAFT

CHARACTER SPACING

10

ENABLE D.L.L.

YES 4K BYTE LINE BUFFER

LINE FEED (PARALLEL ONLY)

LF=LF+CR

CARRIAGE RETURN (IBM/EPSON ONLY)

CR = CR

PAPER END DETECTION

YES

LINE SPACING (IBM/EPSON ONLY)

1/6

SLASHED ZERO

NO

DC1/DC3 PROCEDURE (IBM/EPSON ONLY)

NO

FORM LENGTH

11

SKIP OVER PERFORATION (BOF)

0

BIDIRECTIONAL B.I.M.

NO

PROPORTIONAL SPACING

NO

CHARACTER LENGTH (PARALLEL ONLY)

8 BITS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?

YES

CHANGES EXECUTED

Figure 5-2 Commodore 64/128 Set Up Options

When the Set Up phase is accessed, the printer generates a sequence of prompts as follows:

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

Press the line feed key to confirm a prompted option, press the form feed key to refuse an option and press the Local key to exit the Set Up procedure.

Interface

Choose the type of interface: Commodore Serial or Parallel. For the Commodore 64/128, choose serial.

Printer Emulated

Choose the printer emulation mode. The choices are:

Commodore Serial
Epson FX 80
Proprinter
I.B.M. Graphics Printer

A Commodore PC (or compatible) command set can be used through the Commodore Serial interface. In this case, these printers can be emulated:

Epson FX 80
I.B.M. Graphics Printer
Proprinter

Character Set In Commodore Mode

The available Commodore character sets are: U.S.A., France, Germany, U.K., Denmark, Sweden, Italy, Commodore.

Device Selected

Either device 4 or 5 may be selected. The default device is number 4.

ASCII Translation

Either PETASCII or standard ASCII may be selected. When using the Commodore 64/128, select the PETASCII character set. It gives an additional set of 128 graphics characters in addition to the standard ASCII character set.

Double Strike Printing

The choices are:
Monodirectional
Bidirectional

Character Resolution

The choices are:
Draft (Normal resolution)
N.L.Q. (Near Letter Quality)

Character Spacing

Print pitch (number of characters per inch) can have these settings:
10, 12, 15, 17.1, 20, 24.

Enable D.L.L.

Down Line Loading enables special characters to be generated by the users.

A response of:

Yes 4K Byte Line Buffer
Enables D.L.L. and reduces the size of the print buffer to 4K bytes.

No 7K Byte Line Buffer
Disables D.L.L. and increases the print buffer capacity to 7K bytes.

Line Feed (Parallel Only)

The line feed option offers these settings:
Automatic carriage return is automatically added to a LF command (LF = LF + CR).

This is only applicable in parallel mode.

Carriage Return (I.B.M./Epson Printer Emulation Modes Only)

A carriage return is automatically added to a line feed (CR = CR + LF). This setting is fixed and cannot be changed by the user.

Paper End Detection

This selection can be enabled (YES) or disabled (NO); in the latter case, the complete sheet can be printed on, including the last line, but special care must be applied to avoid printing on the printer platen.

Line Spacing (I.B.M./Epson Printer Emulation Modes Only)

This option specifies vertical spacing (line feed length, in inches).

The 1/6" (4.23 mm) spacing is always assumed as a default value, even if the user has selected a different value. If the printer is operating in BIM Graphics Mode, the vertical spacing will always assume a value of 7/72".

Slashed Zero

Options available are 0 (YES) or 0 (NO).

DC1/DC3 Procedure (I.B.M./Epson Printer Emulation Modes Only)

The DC1/DC3 dialogue is disabled; this setting is fixed and cannot be changed by the user.

Form Length

The following form lengths are selectable: 5, 6, 7, 8, 9, 10, 11 and 12 (in inches).

Skip Over Perforation (BOF)

The following lengths are selectable for the space at the bottom of a page: 0, 1/3, 1/2, 2/3, 1 and 2 inches.

Bidirectional B.I.M.

Bidirectional Graphics Printing can be enabled (YES) or disabled (NO); in the latter case the monodirectional graphics printing is enabled.

Proportional Spacing

Proportional print pitch can be enabled (YES) or disabled (NO).

Character Length (Parallel Only)

Data byte length issued to the printer is 8 bits; this value is fixed and cannot be changed by the user.

Storing the Selected Settings

WOULD YOU LIKE TO STORE THESE PARAMETERS?

YES

If so press the printer's line feed key, otherwise press the form feed key.

CHANGES EXECUTED

is displayed if the line feed button was pressed. If not,

NO

is displayed. Press the line feed key to confirm that you **DO NOT** want the changes executed. Otherwise press the form feed key and you will be prompted to store the chosen parameters again.

Chapter 6: Selecting Printer Settings for the Amiga and Commodore PC

The parallel printer settings can be changed through the Set Up procedure. If you are using the MPS 1230 with an Amiga or Commodore PC software package, see Chapter 4, MPS 1230 Printer Operations for a summary of the Set Up procedure. This chapter gives a detailed description of the Set Up procedure for use with the Amiga or Commodore PC via the parallel interface port.

Set Up Procedure

With the printer turned off, manually insert the first sheet in a stack of continuous fan fold paper into the printer (as described in Chapter 2 "Installing the Ribbon Cartridge, Paper and Paper Feed Mechanisms"). The sheet must be at least 8 1/4" wide and 11" long.

Note: If the Sprocket device is installed, it must be removed before the Set Up procedure is performed.

To access the Set Up procedure, first turn off the printer. While simultaneously holding down the line feed and form feed keys, turn on the printer. The printer will now begin the Set Up procedure.

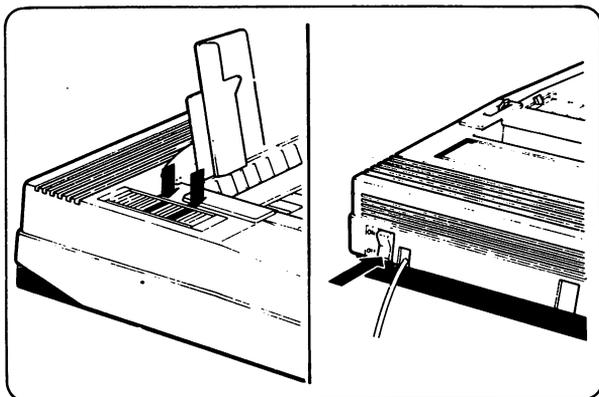


Figure 6-1 Accessing the Set Up Procedure

During the Set Up procedure, the MPS 1230 prints a series of selection prompts to which you respond by pressing the printer's line feed key to confirm an option or pressing the form feed key to refuse an option. Continue to confirm or decline selection options until the printer prompts you with:

WOULD YOU LIKE TO STORE THESE PARAMETERS?

YES

Press the line feed key to save your selections and the printer responds by printing this prompt:

CHANGES EXECUTED

Otherwise, press the form feed key to cancel the chosen options. In this case the printer responds with:

NO

Now press the line feed key to confirm that you **DO NOT** want the changes you have made to be saved. Now the printer responds with:

NO CHANGES EXECUTED

Press the Local key at any time to exit the Set Up procedure. This also prompts you to store the chosen parameters as described above.

Note: If you turn off the printer during the Set Up procedure, the selected options that you had chosen prior to turning off the printer are cleared and the settings revert back to the most recently saved values.

Default Settings

The printer default (factory-set) settings are as follows:

Interface	Commodore Serial
Printer emulated	Commodore
Commodore	USA
character set	
Device Selected	4
Character definition	Draft (normal)
Double pass print	monodirectional
Horizontal spacing (print pitch)	1/10" (2.54 mm)
DLL for special character generation	enabled
Out of paper indicator	enabled
Vertical spacing	1/6"
Slashed zero	disabled
DC1/DC 3 dialogue procedure	disabled
Form length	11" (279.4 mm)
Bottom of form (BOF)	0
Bidirectional BIM printing	disabled
Proportional character spacing	disabled

Set Up Procedure Options for the Amiga and Commodore PC

This section illustrates the entire Set Up procedure and all of the possible settings that can be selected for use with the Amiga and Commodore PC.

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

INTERFACE
PARALLEL

PRINTER EMULATED
IBM G. P.

CHARACTER SET IN PARALLEL MODE
INTERNATIONAL 1

IBM CHARACTER CHART
CHART 1

AUTOMATIC SHEET FEEDER
NO

DOUBLE STRIKE PRINTING
MONODIRECTIONAL

CHARACTER RESOLUTION
DRAFT

CHARACTER SPACING
10

ENABLE D.L.L.
YES 4K BYTE LINE BUFFER

LINE FEED (PARALLEL ONLY)
LF=LF+CR

CARRIAGE RETURN (IBM/EPSON ONLY)
CR = CR

PAPER END DETECTION
YES

LINE SPACING (IBM/EPSON ONLY)
1/6

SLASHED ZERO
NO

DC1/DC3 PROCEDURE (IBM/EPSON ONLY)
NO

FORM LENGTH
11

SKIP OVER PERFORATION (BOF)
0

BIDIRECTIONAL B.I.M.
NO

PROPORTIONAL SPACING
NO

CHARACTER LENGTH (PARALLEL ONLY)
8 BITS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED

Figure 6-2 Parallel Set Up Procedure

When the SET UP phase is accessed, the printer generates a set of prompts as follows:

TO CONFIRM PRESS LF, TO CHANGE PRESS FF, TO END PRESS LOCAL

Press the line feed switch to confirm, press the form feed switch to refuse and press the Local switch to end the programming phase.

Interface

Choose the type of interface: Commodore Serial or Parallel. If you are using an Amiga or Commodore PC (or compatible) select parallel.

Printer Emulated

Choose the printer emulation mode. The choices are:

Epson FX 80
Proprinter
I.B.M. Graphics Printer

Character Set In Parallel Mode

The emulated I.B.M. character sets are the following: International 1, International 2, Spain, Portugal, Greece and Israel.

The emulated Epson character sets are the following: USA, France, Germany, U.K. (United Kingdom), Denmark, Sweden, Italy, Spain.

IBM Character Chart

The available I.B.M. Character charts are Chart 1 and Chart 2. See Appendices K and L for more information.

Double Strike Printing

The choices are:
Monodirectional
Bidirectional

Character Resolution

The choices are:

Draft (Normal resolution)

N.L.Q. (High definition)

Character Spacing

Print pitch (number of characters per inch) can have these settings:
10, 12, 15, 17.1, 20, 24.

Enable D.L.L.

Down Line Loading enables special characters to be generated by the users.

A response of:

Yes 4K Byte Line Buffer

Enables D.L.L. and reduces the size of the print buffer to 4K bytes.

No 7K Byte Line Buffer

Disables D.L.L. and increases the print buffer capacity to 7K bytes.

Line Feed (Parallel only)

The line feed option offers these settings:

Automatic carriage return is added to a LF command
(LF = LF + CR).

No carriage return after the LF command (LF = LF).

Carriage Return (I.B.M./Epson Only)

A carriage return is automatically added to a line feed (CR = CR + LF).

Paper End Detection

This selection can be enabled (YES) or disabled (NO); in the latter case, the complete sheet can be printed on, including the last line, but special care must be applied to avoid printing on the printer platen.

Line Spacing (I.B.M./Epson Only)

This option specifies vertical spacing (line feed length, in inches).

The 1/6" (4.23 mm) spacing is always assumed as a default value, even if the user has selected a different value. If the printer is operating in BIM Graphics Mode, the vertical spacing will always assume a value of 7/72".

Slashed Zero

Options available are 0 (YES) or 0 (NO).

DC1/DC3 Procedure (I.B.M./Epson Only)

The DC1/DC3 dialogue is disabled.

Form Length

The following form lengths are selectable: 5, 6, 7, 8, 9, 10, 11 and 12 (in inches).

Skip Over Perforation (BOF)

The following lengths are selectable for the space at the bottom of a page: 0, 1/3, 1/2, 2/3, 1 and 2 inches.

Bidirectional B.I.M.

Bidirectional Graphics Printing can be enabled (YES) or disabled (NO); in the latter case the monodirectional graphics printing is enabled.

Proportional Spacing

Proportional print pitch can be enabled (YES) or disabled (NO).

Character Length (Parallel Only)

Data byte length issued to the printer is 8 bits; this value is fixed and cannot be changed by the user.

Storing the Selected Settings

WOULD YOU LIKE TO STORE THESE PARAMETERS?

YES

If so press the printers line feed key, otherwise press the form feed key.

CHANGES EXECUTED

is displayed if the line feed button was pressed. If not,

NO

is displayed. Press the line feed key to confirm that you **DO NOT** want the changes executed. Otherwise press the form feed key and you will be prompted to store the chosen parameters again.

Set Up Procedure for Epson FX80 Emulation

The Set Up procedure for the Epson FX80 is slightly different than the I.B.M. Graphics Printer and Proprinter. Here's how the Set Up procedure looks in Epson Emulation Mode:

TO CONFIRM PRESS LF. TO CHANGE PRESS FF. TO END PRESS LOCAL

INTERFACE
PARALLEL

PRINTER EMULATED
EPSON FX 80

CHARACTER SET IN PARALLEL MODE
U.S.A.

AUTOMATIC SHEET FEEDER
NO

DOUBLE STRIKE PRINTING
MONODIRECTIONAL

CHARACTER RESOLUTION
DRAFT

CHARACTER SPACING
10

ENABLE D.L.L.
YES 4K BYTE LINE BUFFER

LINE FEED (PARALLEL ONLY)
LF=LF+CR

CARRIAGE RETURN (SERIAL/EPSON ONLY)
CR = CR

PAPER END DETECTION
YES

LINE SPACING (SERIAL/EPSON ONLY)
1/6

SLASHED ZERO
NO

DC1/DC3 PROCEDURE (SERIAL/EPSON ONLY)
NO

FORM LENGTH
11

SKIP OVER PERFORATION (BOF)
0

BIDIRECTIONAL B.I.M.
NO

PROPORTIONAL SPACING
NO

CHARACTER LENGTH (PARALLEL ONLY)
8 BITS

WOULD YOU LIKE TO STORE THESE PARAMETERS ?
YES

CHANGES EXECUTED

Figure 6-3 Epson Emulation Set Up Procedure

In the Epson Emulation Mode Set Up procedure, the interface selected is Parallel. The printer emulated is the Epson FX80. The character set in parallel mode is the U.S.A. character set, as opposed to International 1 or International 2. Choose the appropriate character set for your country if you are operating outside of the U.S.A. The rest of the Set-Up procedure options are the same as the I.B.M. Graphics Printer and Proprinter, as described earlier in this chapter.

Chapter 7

MPS 1230 Control Codes and Escape Sequences

This chapter describes the MPS 1230 Printer command codes and escape sequences; the software instructions that allow you to program specific features of the MPS 1230 Printer. The beginning of the chapter provides a brief overview of command codes and escape sequences. Following this is a concise background of the Commodore BASIC language. Finally, a detailed description is given of the command codes and escape sequences that are available in all of the MPS 1230 operating modes.

Note: The information in this chapter is intended for programming hobbyists who will be writing their own programs, primarily in BASIC or another language, that take advantage of the MPS 1230 special print features. If you don't intend to program the MPS 1230, skip this section. If you are an experienced programmer skip to the Appendices E and F.

Overview of Control Codes and Escape Sequences

In Commodore mode, the Commodore 64/128 and MPS 1230 Printer interact using an extended version of the ASCII code, known as PETASCII. This version of the ASCII code includes additional graphics characters and control codes to the standard ASCII code. PETASCII is divided into two code tables: one for Upper case/Graphics and one for Upper/Lower case.

To use the Upper case/Graphics character set, a secondary address of "0" (default) is to be specified in the OPEN command. A secondary address of "7" specifies the Upper/Lower case character set. See your Commodore 64/128 User's Guide for more information on the BASIC language.

Chapters 8 and 9 include the national character tables represented in both Upper case/Graphics and Upper/Lower case modes. These tables are composed of 256 entries (in the decimal range 0 - 255) which represent the computer encoded data for each of the charac-

ters, such as letters, numbers and graphic symbols. The character tables also include ASCII data for control codes and escape sequences that act as instructions for the MPS 1230 Printer. These instructions are not printable characters, but are interpreted by the printer to carry out a specific function. For instance, the decimal code 14 is interpreted by the printer as a command to set double width printing.

Escape sequences increase the capability of interaction between the Commodore 64/128 and the MPS 1230 printer. The ESC code (decimal 27) indicates to the printer that the code following it is not a character to be printed, but a control code. For instance, when the printer receives the decimal code 45, the minus sign (-) is printed, but if the decimal code 45 is preceded by the decimal code 27, the "underline" print mode is set.

In the next section, you will learn how to send commands to the printer using the Commodore BASIC language. Since the BASIC language is the built in high level language in the Commodore 64/128, the examples in this Chapter are given in BASIC. However, these command codes and escape sequences can be sent to the printer in any language: Assembly Language, Pascal or C.

Notes on the Commodore BASIC Language

This section briefly reviews the Commodore BASIC commands used by the Commodore 64/128 to communicate with the MPS 1230 Printer.

Generally, three lines of BASIC are required to execute a command code or escape sequence from the Commodore 64/128 to the MPS 1230 Printer, as follows:

```
10 OPEN ...  
20 PRINT# ...  
30 CLOSE ...
```

with each line containing certain specific parameters.

The OPEN command allows the computer to access devices such as the disk drive, the video display unit, and in this case the printer. The OPEN keyword is followed by a logical file number, which is referred to by subsequent BASIC commands, and a device number (separated by a comma). The printer device number can be 4 or 5. For example,

```
10 OPEN 4,4
```

opens logical file number 4 on device number 4.

Note: The device number in the OPEN command must match the device number that was previously selected in the Set Up procedure.

An optional third parameter, called the secondary address, can also be included in the OPEN command. This parameter is discussed in the next section, Secondary Address.

The PRINT# command communicates command codes, escape sequences and ordinary characters from the computer to the printer. The PRINT# keyword is followed by the logical file number, which was opened by the preceding OPEN command, and a printer control code or escape sequence that specifies a special feature of the MPS 1230, such as vertical and horizontal spacing, tab stops or double width printing. The PRINT# command may also be followed by a series of ordinary characters to be printed. For example,

```
20 PRINT#4,CHR$(31);  
30 PRINT#4,"Hocus, Pocus, there's a ring around the moon"  
40 PRINT#4,CHR$(159);
```

Line 20 sends a command code to the MPS 1230, telling it to turn on Near Letter Quality (N.L.Q.) mode. Line 30 prints the string, "Hocus, Pocus, there's a ring around the moon" in Near Letter Quality mode. Line 40 commands the printer to turn off N.L.Q. mode.

Each open file must be closed after completion of the operations in the PRINT# commands. The CLOSE command closes a file. The CLOSE keyword is followed by the logical file number to be closed, as follows:

```
50 CLOSE4
```

The simple example below tells the printer to print the string "Good morning", first in normal characters, then in double width characters.

```
10 OPEN1,4
20 PRINT#1,"Good morning"
30 PRINT#1,CHR$(14);"Good morning"
40 CLOSE1
```

Secondary Address

The secondary address is an optional parameter of the OPEN command. It selects the character set to be used in subsequent PRINT# commands following the OPEN command.

n	Function
0	Upper case/Graphics character set selection
7	Upper/Lower case character set selection (see the "CRSR DWN" code further in this chapter)

If an OPEN command does not specify the secondary address, the default value "0" is automatically assumed.

The secondary address applies to Commodore BASIC only.

Notes on the GW BASIC Language

To apply these examples for use on the Amiga or Commodore PC, substitute the three lines of Commodore BASIC with one line of GW BASIC as follows:

```
LPRINT CHR$(27);CHR$( . . . );
```

For example, to set the MPS 1230 to Near Letter Quality (N.L.Q.) mode, use this line (escape sequence) in GW BASIC:

```
LPRINT CHR$(27);CHR$(71);
```

See the preceding section, Notes on the Commodore BASIC Language, to set the MPS 1230 in N.L.Q. mode in Commodore BASIC.

MPS 1230 Command Codes and Escape Sequences

The following section illustrates all of the command codes and escape sequences available on the MPS 1230 Printer. They apply to all of the modes of operation: Commodore Serial, I.B.M. Proprinter, I.B.M. Graphics Printer and Epson FX-80. The command codes and escape sequences are organized by function, as follows:

- Graphics Layout
- Vertical Space Setting
- Vertical Format Control
- Horizontal Space Settings
- Horizontal Format control
- Paper Feed
- National Character Sets
- Miscellaneous

Conventions

The description of each command includes:

- the character sequence according to the Upper/Lower case character tables (secondary address = 7)
- the function performed by the command
- an example in Commodore BASIC or PC (GW) BASIC (when applicable).

To the right of the escape code is a rectangle containing four squares. Above each square is an abbreviation that indicates the mode of operation in which the escape code works. The designations are as follows:

C.S.	P.P.	G.P.	E.P.
•	•	•	•

C.S. - Commodore Serial Printer
P.P. - Proprinter
G.P. - I.B.M. Graphics Printer
E.P. - Epson (FX-80) Printer

If a square within the rectangle contains a dot, the escape code listed is supported in that mode. If the square is empty, the listed escape code is not supported or is enacted in a different way than listed.

The examples in the following section are illustrated in the Commodore BASIC language for command and escape codes that are supported in Commodore Serial mode. For escape codes that are supported in more than one mode, one of which being Commodore Serial mode, the examples will also appear in Commodore BASIC. For codes that are not supported in Commodore Serial mode, the examples appear in GW BASIC.

Appendix D contains a summary table of all the printer control codes and escape sequences available on the MPS 1230 in all four operating modes: Commodore, Epson FX 80, Proprinter and I.B.M. Graphics Printer

Summary tables of command codes and escape sequences for each individual emulation mode are available in Appendix E.

NOTE: Assume that the Commodore Serial examples described in this chapter specify the secondary address "7" with the following OPEN command:

10 OPEN 1,4,7

so that characters are printed in Upper/Lower case. If the secondary address of "7" is not specified in the OPEN command, program listings are printed in Upper Case/Graphics mode, the secondary address default value "0". Also assume that the printer channel will be closed with this command:

30 CLOSE 1

Graphics Layout

Draft/N.L.Q. Printing

ESC G

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the MPS 1230 in Near Letter Quality (NLQ) or "Double Strike" mode. Printing is performed in two passes. After the first pass, the paper advances 1/216".

20 PRINT#1,CHR\$(27);CHR\$(71);

ESC H

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Clears the Near Letter Quality (NLQ) or "Double Strike" print mode, returning to the normal print mode.

20 PRINT#1,CHR\$(27);CHR\$(72);

NLQ ON

C.S.	P.P.	G.P.	E.P.
•			

Sets the "N.L.Q." print mode.

20 PRINT#1,CHR\$(31);

NLQ OFF

C.S.	P.P.	G.P.	E.P.
•			

Clears the "N.L.Q." print mode.

20 PRINT#1,CHR\$(159);

ESC X n

C.S.	P.P.	G.P.	E.P.
•		•	•

If n = 0, select the Draft print mode

If n = 1, select the NLQ print mode

20 PRINT#1,CHR\$(27);CHR\$(120);CHR\$(n);

Double Width Printing

EN ON

C.S.	P.P.	G.P.	E.P.
•			

Sets "Double Width" print mode ("Enhanced On"). It is cleared by EN OFF ("Enhanced Off").

20 PRINT#1,CHR\$(14);

EN OFF

C.S.	P.P.	G.P.	E.P.
•			

Clears the "Double Width" print mode ("Enhanced Off").

20 PRINT#1,CHR\$(15);

SO

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the "Double Width" print mode for a whole line. The character print width is twice as wide as normal, so that the number of characters per inch is divided in half. Each character occupies two tab stops. It is cleared by CR, CAN, LF or DC4.

LPRINT CHR\$(14);

ESC SO

C.S.	P.P.	G.P.	E.P.
			•

Same function as the command code SO.

LPRINT CHR\$(27);CHR\$(14);

DC4

C.S.	P.P.	G.P.	E.P.
	•	•	•

Clears the "Double Width" print mode set by the SO command and restores the printer to the previous spacing.

LPRINT CHR\$(20);

ESC W 1

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the "Double Width" print mode. The setting stays valid up to the reception of code ESC W 0.

LPRINT CHR\$(27);CHR\$(87);CHR\$(49);
or
LPRINT CHR\$(27);"W";CHR\$(49);

ESC W 0

C.S.	P.P.	G.P.	E.P.
	•	•	•

Clears the "Double Width" print mode set by ESC W 1.

LPRINT CHR\$(27);CHR\$(87);CHR\$(48);
or
LPRINT CHR\$(27);"W";CHR\$(48);

Reverse Printing

RVS ON

C.S.	P.P.	G.P.	E.P.
•			

Sets the "Reverse" print mode. Printed characters are white on a black background, instead of black on a white background.

20 PRINT#1,CHR\$(18);

RVS OFF

C.S.	P.P.	G.P.	E.P.
•			

Clears the "Reverse" print mode.

20 PRINT#1,CHR\$(146);

Underline Printing

ESC - 1

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the "Underline" print mode for all characters and blanks following the command. It is cleared by ESC - 0.

20 PRINT#1,CHR\$(27);CHR\$(45);CHR\$(49);

ESC - 0

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Clears the "Underline" print mode.

20 PRINT #1,CHR\$(27);CHR\$(45);CHR\$(48);

ESC - SOH

C.S.	P.P.	G.P.	E.P.
	•	•	

Same function as ESC - 1, sets "Underline" print mode.

LPRINT CHR\$(27);CHR\$(45);CHR\$(1);

ESC - NUL

C.S.	P.P.	G.P.	E.P.
	•	•	

Same function as ESC - 0, clears "Underline" print mode.

LPRINT CHR\$(27);CHR\$(45);CHR\$(0);

Emphasized Printing

ESC E

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the "Emphasized" print mode. Characters are printed twice and printing is performed at half speed.

20 PRINT #1,CHR\$(27);CHR\$(69);

ESC F

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Clears the "Emphasized" print mode set by ESC E.

20 PRINT #1,CHR\$(27);CHR\$(70);

ESC I n

C.S.	P.P.	G.P.	E.P.
•	•	•	

Selects the print definition according to parameter n:

- n = 0 Draft print definition and normal characters
- n = 2 High print definition (NLQ) and normal characters
- n = 4 Normal print definition and special characters generated by Down Line Loading (DLL) by means of the ESC = control code
- n = 6 High print definition (NLQ) and special characters generated by DLL

20 PRINT#1,CHR\$(27);CHR\$(73);CHR\$(n);

ESC [n

C.S.	P.P.	G.P.	E.P.
•		•	

Sets character printing with variable spacing according to the value "n", in the following table.

n	SPACING	
0	PICA	10 chars/inch
1	ELITE	12 chars/inch
2	MICRO	15 chars/inch
3	CONDENSED	17.1 chars/inch
4	COMPRESSED PICA	20 chars/inch
5	COMPRESSED ELITE	24 chars/inch
6	COMPRESSED MICRO	30 chars/inch

20 PRINT#1,CHR\$(27);CHR\$(91);CHR\$(n);

Condensed Printing

SI

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the "Condensed" print mode with a 17.1 character/inch spacing. It is cleared by DC2 after the printer restarts printing with the horizontal spacing selected during the Set Up procedure.

LPRINT CHR\$(15);

ESC SI

C.S.	P.P.	G.P.	E.P.
			•

Same function as code SI.

LPRINT CHR\$(27);CHR\$(15);

DC2

C.S.	P.P.	G.P.	E.P.
	•	•	•

Clears the "Condensed" print mode set by SI and also the 12 cpi print mode. It restores printing at the horizontal spacing selected during the Set Up procedure.

LPRINT CHR\$(18);

ESC :

C.S.	P.P.	G.P.	E.P.
	•		

Sets the print pitch at 12 chars/inch. This setting is cleared by the DC2 code that restores the horizontal spacing selected during the Set Up procedure.

LPRINT CHR\$(27);CHR\$(58);

or

LPRINT CHR\$(27);":";

SuperScripts

ESC S 0

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the "Superscript" print mode. Characters are half height with respect to normal printing and are printed in the upper half of the printed line.

20 PRINT #1,CHR\$(27);CHR\$(83);CHR\$(48);

Subscripts

ESC S 1

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the "Subscript" print mode. Characters are half height with respect to normal printing and are printed in the lower half of the printed line.

20 PRINT#1,CHR\$(27);CHR\$(83);CHR\$(49);

ESC T

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Clears the "Subscript" and "Superscript" print modes. If the printer had not been preset for these print modes, the command is ignored.

20 PRINT#1,CHR\$(27);CHR\$(84);

Upper/Lower Case Printing

CRSR DWN

C.S.	P.P.	G.P.	E.P.
•			

Sets the Upper/Lower case print mode for all characters. In this case, the number of available graphic characters is limited.

20 PRINT#1,CHR\$(17);

CRSR UP

C.S.	P.P.	G.P.	E.P.
•			

Sets the Upper case/Graphics print mode for all characters. In this case, a greater number of graphic characters is available for printing. The printer assumes this as a default value.

20 PRINT#1,CHR\$(145);

Overline Printing

ESC _ 1

C.S.	P.P.	G.P.	E.P.
	•		

Sets the "Overline" print mode for all characters and blanks following the command. It is cleared by ESC _ 0.

LPRINT CHR\$(27);CHR\$(95);CHR\$(49);
or
LPRINT CHR\$(27);"—";CHR\$(49);

ESC _ SOH

C.S.	P.P.	G.P.	EP.
	•		

Same function as ESC _ 1, sets "Overline" print mode.

LPRINT CHR\$(27);CHR\$(95);CHR\$(1);

ESC _ 0

C.S.	P.P.	G.P.	EP.
	•		

Clears the "Overline" print mode.

LPRINT CHR\$(27);CHR\$(95);CHR\$(48);

ESC _ NUL

C.S.	P.P.	G.P.	EP.
	•		

Same function as ESC _ 0, clears "Overline" print mode.

LPRINT CHR\$(27);CHR\$(95);CHR\$(0);

Italic Printing

ESC 4

C.S.	P.P.	G.P.	EP.
			•

Sets the "Italic" print mode. Printing is possible only in Draft mode.

LPRINT CHR\$(27);CHR\$(52);

Note: In Proprinter emulation mode, ESC 4 has an entirely different function. See the next section, Vertical Space Settings for the function ESC 4 in Proprinter emulation mode.

ESC 5

C.S.	P.P.	G.P.	EP.
			•

Clears the "Italic" print mode, only in Draft mode.

LPRINT CHR\$(27);CHR\$(53);

Variable Pitch Printing

ESC M

C.S.	P.P.	G.P.	E.P.
		•	•

Sets the "Elite" print pitch (12 chars/inch). Cleared by ESC P.

LPRINT CHR\$(27);CHR\$(77);

ESC P

C.S.	P.P.	G.P.	E.P.
			•

Clears the "Elite" print pitch (12 chars/inch), restoring the "Pica" print pitch (10 chars/inch). ESC P does not clear the Double Width, Condensed, etc., print modes.

LPRINT CHR\$(27);CHR\$(80);

ESC p 1

C.S.	P.P.	G.P.	E.P.
			•

Sets the character proportional print pitch. It is cleared by ESC p 0.

LPRINT CHR\$(27);CHR\$(112);CHR\$(49);

ESC p 0

C.S.	P.P.	G.P.	E.P.
			•

Clears the character proportional print pitch, restoring the normal spacing.

LPRINT CHR\$(27);CHR\$(112);CHR\$(48);

ESC ! n

C.S.	P.P.	G.P.	E.P.
			•

Selects various combinations of graphics layout that can be performed simultaneously, according to the value of parameter "n", in the following table.

LPRINT CHR\$(27);CHR\$(33);CHR\$(0-63);

The ESC ! n command has higher priority with respect to the other setting commands for graphics layout (ESC 4, ESC 5, etc.).

If n = 0, any previously set print mode is cleared.

n(dec.)	DW	D	Em	C	El
0					
1					o
2					
3					o
4				o	
5					o
6				o	
7					o
8			o		
9					o
10			o		
11					o
12			o		
13					o
14			o		
15					o
16		o			
17		o			o
18		o			
19		o			o
20		o		o	
21		o			o
22		o		o	
23		o			o
24		o	o		
25		o			o
26		o	o		
27		o			o
28		o	o		
29		o			o
30		o	o		
31		o			o

n(dec.)	DW	D	Em	C	El
32	o				
33	o				o
34	o				
35	o				o
36	o			o	
37	o				o
38	o			o	
39	o				o
40	o		o		
41	o				o
42	o		o		
43	o				o
44	o		o		
45	o				o
46	o		o		
47	o				o
48	o	o			
49	o	o			o
50	o	o			
51	o	o			o
52	o	o		o	
53	o	o			o
54	o	o		o	
55	o	o			o
56	o	o	o		
57	o	o			o
58	o	o	o		
59	o	o			o
60	o	o	o		
61	o	o			o
62	o	o	o		
63	o	o			o

DW = Double Width
 D = Double Strike
 Em = Emphasized
 C = Condensed - 17.1 chars/inch
 El = Elite - 12 chars/inch

Figure 7-1 ESC ! n Command

Vertical Space Settings

Vertical Spacing

ESC 0

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the vertical spacing at 1/8" (3.175 mm).

LPRINT CHR\$(27);CHR\$(48);
or
LPRINT CHR\$(27);"0";

ESC 1

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the vertical spacing at 7/72" (2.47 mm).

LPRINT CHR\$(27);CHR\$(49);
or
LPRINT CHR\$(27);"1";

ESC 2

C.S.	P.P.	G.P.	E.P.
	•	•	•

This is the executive command for ESC A. If not preceded by ESC A, this sets the vertical spacing at 1/6" (4.23 mm).

LPRINT CHR\$(27);CHR\$(50);
or
LPRINT CHR\$(27);"2";

ESC 3 n

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the vertical spacing at n/216" (0.1176xn mm). To move exactly n/216", the value "n" must be a multiple of 3, in the range 1-255.

For BIM 8-bit printing, this sets vertical spacing at 24/216".

LPRINT CHR\$(27);CHR\$(51);CHR\$(n);
or
LPRINT CHR\$(27);"3";CHR\$(n);

ESC A n
ESC 2

C.S.	P.P.	G.P.	E.P.
	•	•	•

Sets the vertical spacing at n/72" (0.3528 x n mm). ESC 2 is the executive command of ESC A and starts the new vertical spacing.

The value "n" can be any number in the range 1-85 (from 1/72 to 85/72). If n=0, the previous spacing set by ESC A remains valid. The default value is 6 lines per inch (12/72).

For example, to set vertical spacing at 24/72" (8.47 mm), use the ESC A 24 code.

```
LPRINT CHR$(27);CHR$(65);CHR$(n);
or
LPRINT CHR$(27);"A";CHR$(n);
```

Form Length

ESC C n

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the form length in number of vertical spaces (lines).

```
20 PRINT#1,CHR$(27);CHR$(67);CHR$(h);
```

ESC C NUL n

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the form length in number of inches (from 1 to 22). At power up, the form length is the one selected during the Set Up procedure. The skiping of pages is performed according to this value. This command also selects the current line as the first print line (Top Of Form) when enacted.

```
20 PRINT#1,CHR$(27);CHR$(67);CHR$(0); CHR$(n)
```

Vertical Format Control

ESC N m

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Sets the number of "m" lines to be skipped at the bottom of a page Bottom of Form (BOF) which will not be used for printing.

```
20 PRINT#1,CHR$(27);CHR$(78);CHR$(m);
```

The paper must be properly positioned at the beginning of a page otherwise this command will not be executed correctly.

The command will have to be reissued in case the page length is modified by means of the ESC c sequence.

ESC O

C.S.	P.P.	G.P.	EP.
•	•	•	•

Clears the bottom of form (BOF).

20 PRINT#1,CHR\$(27);CHR\$(79);

VT

C.S.	P.P.	G.P.	EP.
	•	•	•

Advances the print head to the next vertical tab stop. If the next vertical tab stop exceeds the form length, this command advances the paper one vertical space like a line feed (LF). If no vertical tab stops have been set, (or at power up), this command prints the characters in the buffer and advances the paper one vertical space.

LPRINT CHR\$(11);

ESC B n1
n2..
nk NUL

C.S.	P.P.	G.P.	EP.
	•		•

Sets up to 64 vertical tab stops (k=64). Parameters n1...nk must be issued in ascending order (1-254), and indicate the line numbers with the tab stops (the first line has n1 = 1).

At power up, no vertical stops are present.

The programmed stops are cleared by issuing the "ESC R" or "ESC B NUL" escape sequences.

If no stops have been programmed, this command advances the paper one line, like the LF code.

LPRINT CHR\$(27);CHR\$(66);CHR\$(n1);
LPRINT CHR\$(n2);..
LPRINT CHR\$(nk);"0";

Note: In I.B.M. Proprinter emulation mode, k = 64. In Epson FX 80 emulation mode k = 16.

ESC b n1
n m1 mk

C.S.	P.P.	G.P.	EP.
			•

Sets up to 8 vertical tab stops (0-7). Each program can have a maximum of 16 tab stops (1-16).

Tab stops programmed by ESC b 0 are the same as the ones programmed by ESC B.

```
LPRINT CHR$(27);CHR$(98);
LPRINT CHR$(n);CHR$(m1);CHR$(mk);
LPRINT CHR$(0);
```

ESC / n

C.S.	P.P.	G.P.	EP.
			•

Sets the vertical tab stops according to the following table.

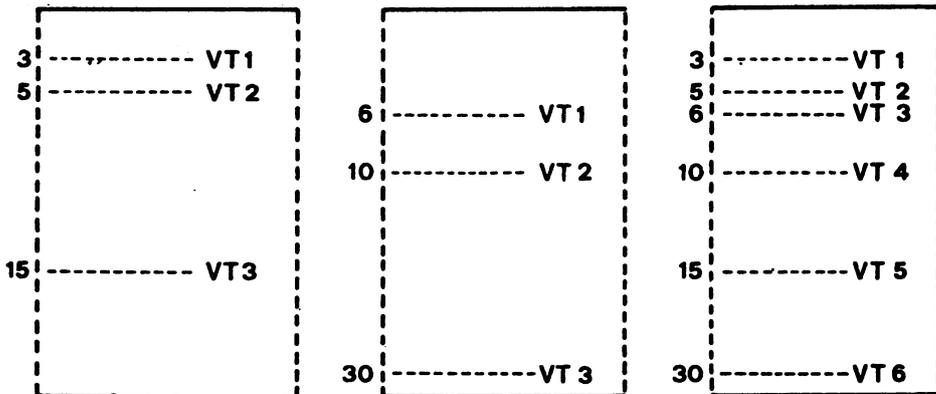


Figure 7-2 Example of tab stops programmed with the ESC / code

ESC R

C.S.	P.P.	G.P.	EP.
	•		

Clears all the tab stops:
 –the horizontal tab stops set by ESC D, restoring the default condition of one stop every 8 columns.
 –the vertical tab stops set by ESC B.

```
LPRINT CHR$(27);CHR$(82);
or
LPRINT CHR$(27);"R";
```

Note: In Commodore Serial (ie; Commodore/Epson) and Epson FX 80 emulation modes, ESC R is used to select national character sets for different countries. See the National Character Sets section in this chapter for more information.

ESC 4

C.S.	P.P.	G.P.	E.P.
	•		

Sets the current position as the first print line of the page (Top of Form).

LPRINT CHR\$(27);CHR\$(52);
or
LPRINT CHR\$(27);"4";

Note: In Epson FX 80 emulation mode, ESC 4 sets the MPS 1230 in italic print mode. See the section, Graphics Layout for more information.

Horizontal Space Setting

BS

C.S.	P.P.	G.P.	E.P.
	•	•	•

Outputs the characters in the printer's buffer and moves the print head one character pitch (or two if set for the "Double Width" mode) to the left. The selected horizontal spacing defines the print head movement. This code, BS (Backspace), is used to reprint a character by backing up a space and reprinting over a character that has already been printed.

LPRINT CHR\$(8);

HT

C.S.	P.P.	G.P.	E.P.
	•	•	•

Moves the print head to the next horizontal tab stop programmed by means of ESC D. The printing of subsequent characters starts at this point on the line. At power up, the tab stops are located 8 columns apart, starting at column 9.

LPRINT CHR\$(9);

Horizontal Format Control

ESC D n1
n2..nk

C.S.	P.P.	G.P.	EP.
			•

Sets up to 32 horizontal tab stops ($k = 32$). Parameters $n1 \dots nk$ must be issued in ascending order, and indicate the column number containing the tab stops (the first print column to the left is column 1) according to the following limits:

<u>Print Pitch</u>	<u>n1...nk Range</u>
10 chars/inch	1-79
12 chars/inch	1-95
17.1 chars/inch	1-136

At power up, tab stops are located every 8 columns.

LPRINT CHR\$(27);CHR\$(68);
LPRINT CHR\$(n1);CHR\$(n2);CHR\$(nk);
LPRINT CHR\$(0);

ESC D n1
n2..
nk NUL

C.S.	P.P.	G.P.	EP.
	•	•	

Sets up to 30 horizontal tab stops ($k = 30$). Parameters $n1 \dots nk$ must be issued in ascending order, and indicate the column number containing the tab stops (the first print column is column 0). Tab stops can be preset starting from column 1.

At power up, tab stops are located every 8 columns.

LPRINT CHR\$(27);CHR\$(68);CHR\$(n1);
LPRINT CHR\$(n2);
LPRINT CHR\$(nk);"0";

ESC Q n

C.S.	P.P.	G.P.	EP.
			•

Sets the right margin position:

for 10 chars/inch printing: $n = 2-80$
for 12 chars/inch printing: $n = 3-96$
for 17.1 chars/inch printing: $n = 4-137$

LPRINT CHR\$(27);CHR\$(81);CHR\$(n);

ESC 1 n

C.S.	P.P.	G.P.	E.P.
			•

Sets the left margin position:

for 10 chars/inch printing: n = 0-78

for 12 chars/inch printing: n = 0-93

for 17.1 chars/inch printing: n = 0-133

LPRINT CHR\$(27);CHR\$(108);CHR\$(n);

Paper Feed

LF

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Outputs the characters in the printer buffer (memory) and advances the print head to the first column of the following line.

20 PRINT #1,CHR\$(10);

CR

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Outputs the characters in the printer buffer (memory) and advances the print head to the first column of the following line.

20 PRINT #1,CHR\$(13);

FF

C.S.	P.P.	G.P.	E.P.
•	•	•	•

Outputs the characters in the printer buffer and advances the paper to the first line of the following page (Top of Form).The command must be sent within the printable field, otherwise (if sent in the BOF field), the printer will not supply a new sheet and will be set in the LOCAL status, as if the end-of-paper is detected before the FF command.

20 PRINT #1,CHR\$(12);

ESC j n

C.S.	P.P.	G.P.	E.P.
			•

Outputs the contents of the print buffer and moves the paper backwards by $n/216''$. This acts as a reverse line feed. The value n is in the range 0 to 255.

It DOES NOT change the vertical spacing value.

LPRINT CHR\$(27);CHR\$(106);CHR\$(n);

In case an out of paper condition is detected or the sprocket device is installed, the ESC j command is not performed.

ESC J n

C.S.	P.P.	G.P.	E.P.
			•

Moves the paper vertically by $n/216''$. This command does not execute a carriage return. The value n is in the range 0 to 255.

LPRINT CHR\$(27);CHR\$(74);CHR\$(n);

National Characters

ESC R n

C.S.	P.P.	G.P.	E.P.
•			•

Selects international character sets where "n" is one of the following values, depending on the hardware interface:

Serial Interface (Commodore/Epson)	Parallel Interface (Epson)
n = 0 USA/UK	USA
n = 1 Denmark	France
n = 2 Sweden	Germany
n = 3 Germany	UK
n = 4 France	Denmark 1
n = 5 Italy	Sweden
n = 6 Switzerland	Italy
n = 7 Spain	Spain
n = 8	Japan
n = 9	Norway
n = 10	Denmark 2

ESC 7

C.S.	P.P.	G.P.	E.P.
			•

Selects the basic national characters table (see Appendix J).

LPRINT CHR\$(27);CHR\$(55);

ESC I n

C.S.	P.P.	G.P.	E.P.
			•

Performs character printing according to the following table.

DECIMAL CODE	CAR.	DECIMAL CODE	CAR.	DECIMAL CODE	CAR.	DECIMAL CODE	CAR.
0	à	22	.	128	á	150	
1	é	23	Λ	129	ê	151	À
2	ú	24	Ó	130	û	152	Ó
3	ó	25	Û	131	ô	153	Û
4	ì	26	á	132	í	154	á
5	ç	28	u	133	°	156	u
6	£	29	E	134	£	157	E
16	§	30	é	144	§	158	é
17	ß	31	γ	145	ß	159	γ
21	ø			149	ø		

Figure 7-3 Printable Characters by means of ESC I 1 Code

LPRINT CHR\$(27);CHR\$(73);CHR\$(49);

ESC I 0

C.S.	P.P.	G.P.	E.P.
			•

Clears the function sent by the ESC I 1 escape sequence.

LPRINT CHR\$(27);CHR\$(73);CHR\$(48);

ESC 6

C.S.	P.P.	G.P.	E.P.
			•

Sets the Italic print mode for the characters listed in the following table.

DECIMAL CODE	CAR.	DECIMAL CODE	CAR.	DECIMAL CODE	CAR.	DECIMAL CODE	CAR.
128	à	137	ñ	145	ß	153	ç
129	á	136	ñ	146	Æ	154	à
130	â	139	Ÿ	147	ø	156	â
131	ã	140	µ	148	Ø	156	ä
132	ä	141	À	149	ø	157	É
133	å	142	á	150	•	158	è
134	£	143	ç	151	À	159	ÿ
135	î	144	§	152	Ó	255	ø
136	é						

Figure 7-4 Printable Characters by means of ESC 6

```
LPRINT CHR$(27);CHR$(54);
```

Miscellaneous

CS

C.S.	P.P.	G.P.	E.P.
•			

Outputs the characters in the printer buffer and moves the print head to the first column of the current line.

```
20 PRINT#1,CHR$(141);
```

Out of Paper Controls

ESC 8

C.S.	P.P.	G.P.	EP.
•		•	•

Disables the “out of paper” mechanism. Printing continues to the last line of the page.

20 PRINT#1,CHR\$(27);CHR\$(56);

ESC 9

C.S.	P.P.	G.P.	EP.
•		•	•

Enables the “out of paper” mechanism, clearing the ESC 8 sequence.

20 PRINT#1,CHR\$(27);CHR\$(57);

Setting Print Position

POS n1 n2

C.S.	P.P.	G.P.	EP.
•	•	•	•

Sets the print position in the current line given by n1 and n2, expressed as an absolute value in number of characters. Both parameters may have a value between 0 and 9. The value 0 is assigned to the first print position.

20 PRINT#1,CHR\$(16);CHR\$(26);“This is print position 26”

ESC POS
n1 n2

C.S.	P.P.	G.P.	EP.
•			

Sets the print position in the current line given by n1 and n2, expressed as an absolute value in number of dots. The values n1 and n2 may range from 0 to 480.

Example:

n1	n2	Number of dots
CHR\$(0);	CHR\$(20)	0 + 20 = 20
CHR\$(1);	CHR\$(0)	256 + 0 = 256
CHR\$(1);	CHR\$(224)	256 + 224 = 480

20 PRINT#1,CHR\$(27);CHR\$(16);
CHR\$(1);CHR\$(6); “This position 262”

NUL

C.S.	P.P.	G.P.	E.P.
	•	•	•

NUL, a non operating command is assigned the value zero. It is used with ESC D to close the parameter list, or with other codes to define a possible selection (see, for instance, the codes ESC S NUL and ESC - NUL).

LPRINT CHR\$(0);

BEL

C.S.	P.P.	G.P.	E.P.
	•		

Command acknowledged by the printer, but not operative.

LPRINT CHR\$(7);

DC1

C.S.	P.P.	G.P.	E.P.
	•		•

If, during the Set Up procedure, the DC1/DC3 dialogue procedure had been selected, this code sets the printer for receiving data from the computer.

LPRINT CHR\$(17);

ESC Q 3D

C.S.	P.P.	G.P.	E.P.
	•		

If, during the Set Up procedure, the DC1/DC3 dialogue procedure had been selected, this code deselects the dialogue procedure so that the printer does not receive any more data from the computer.

LPRINT CHR\$(27);CHR\$(81);CHR\$(3);

or

LPRINT CHR\$(27);"Q";CHR\$(3);

DC3

C.S.	P.P.	G.P.	E.P.
	•	•	

This code is ignored by the printer.

SP

C.S.	P.P.	G.P.	E.P.
	•		

Advances the print position one space (current character pitch).

LPRINT CHR\$(32);

CAN

C.S.	P.P.	G.P.	E.P.
	•	•	•

Clears the contents of the print buffer (data contained in the buffer is lost) without changing the current print position and clears the print setting for "Double Width" selected by SO or ESC SO.

LPRINT CHR\$(24);

ESC 5 n

C.S.	P.P.	G.P.	E.P.
	•		

When $n = 1$, an automatic LF is performed after a carriage return.
($CR = CR + LF$);

When $n = 0$, no line feed is performed after a carriage return.

The request sent by this sequence clears any settings selected during the Set Up procedure.

LPRINT CHR\$(27);CHR\$(53);CHR\$(n);

ESC 6

C.S.	P.P.	G.P.	E.P.*
	•	•	•

Selects Character Table 2 (see Appendix M). This table contains characters and symbols in languages other than English.

LPRINT CHR\$(27);CHR\$(54);

or

LPRINT CHR\$(27);"6";

Note: This escape sequence behaves differently in Epson emulation mode than it does in the other modes.

ESC 7

C.S.	P.P.	G.P.	EP.*
	•	•	•

Selects Character Table 1 (see Appendix L). This table contains characters and symbols normally used in the English language.

Note: This command behaves differently in Epson emulation mode than it does in the other modes. See the National Characters section in this chapter.

ESC J n

C.S.	P.P.	G.P.	EP.
	•	•	•

Sets the vertical spacing at $n/216''$ ($0.1176 \times n$ mm). To move exactly $n/216''$, the value "n" must be a multiple of 3, in the range 1-255.

For BIM 8-bit printing, set vertical spacing at $24/216''$.

LPRINT CHR\$(27);CHR\$(74);CHR\$(n);
or
LPRINT CHR\$(27);"J";CHR\$(n55);

ESC U n

C.S.	P.P.	G.P.	EP.
	•	•	•

n = 1 Sets monodirectional printing;
n = 0 Restores bidirectional printing.

Monodirectional printing allows the improvement of print quality and vertical alignment of characters.

LPRINT CHR\$(27);CHR\$(85);CHR\$(n);
or
LPRINT CHR\$(27);"U";CHR\$(n);

ESC =

C.S.	P.P.	G.P.	EP.
			•

Clears the most significant bit (2^7) limiting the code range to 0 - 127. (See also ESC # and ESC >).

LPRINT CHR\$(27);CHR\$(61);

ESC >

C.S.	P.P.	G.P.	EP.
			•

Sets the most significant bit (2^7) limiting the code range to 128 - 255D. (See also ESC # and ESC =).

LPRINT CHR\$(27);CHR\$(62);

ESC #

C.S.	P.P.	G.P.	EP.
			•

Clears the forcing to "0" (by ESC =) or to 1 (by ESC >) of the most significant bit (MSB) of the 8 bit code.

LPRINT CHR\$(27);CHR\$(35);

ESC @

C.S.	P.P.	G.P.	EP.
			•

Initializes (resets) the printer, enacting the same conditions as power up. All data stored in the print buffer is lost. Settings selected during the Set Up procedure, other than the defaults, are also lost.

LPRINT CHR\$(27);CHR\$(64);

ESC <

C.S.	P.P.	G.P.	EP.
			•

Enables monodirectional printing of a single line of print (from left to right).

LPRINT CHR\$(27);CHR\$(60);

ESC U 1

C.S.	P.P.	G.P.	EP.
			•

Enables monodirectional printing (from left to right) to ensure better text alignment.

LPRINT CHR\$(27);CHR\$(85);CHR\$(49);

ESC U 0

C.S.	P.P.	G.P.	EP.
			•

Enables faster, bidirectional printing.

LPRINT CHR\$(27);CHR\$(85);CHR\$(48);

ESC i 1

C.S.	P.P.	G.P.	E.P.
			•

Sets the printer in an interactive mode of operation that prints the character last received (like a typewriter) and does not wait for the appropriate print command.

The ESC i 1 command cannot be performed if the sprocket device is installed.

LPRINT CHR\$(27);CHR\$(105);CHR\$(49);

ESC i 0

C.S.	P.P.	G.P.	E.P.
			•

Clears the print mode set by ESC i 1, restoring the normal print mode.

LPRINT CHR\$(27);CHR\$(105);CHR\$(48);

ESC s 1

C.S.	P.P.	G.P.	E.P.
			•

Reduces the print speed in half which results in quieter printing.

LPRINT CHR\$(27);CHR\$(115);CHR\$(49);

ESC s 0

C.S.	P.P.	G.P.	E.P.
			•

Clears the reduced print speed, restoring the normal print speed.

LPRINT CHR\$(27);CHR\$(115);CHR\$(48);

DEL

C.S.	P.P.	G.P.	E.P.
			•

Clears the last printable character from the print buffer.

LPRINT CHR\$(127);

Chapter 8

Commodore National Character Tables

This chapter contains the Commodore Serial national character tables, printed in N.L.Q. for the modes:

- Upper case/Graphics
(secondary address = 0)
- Lower/Upper case
(secondary address = 7)

ASCII CODE TABLE

				b ₇	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b ₆	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

				Ø	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b ₄	b ₃	b ₂	b ₁	Ø				Ø	@	P	-	7			r	-	7		r
0	0	0	0	1			1	1	A	Q	♠	●		1	1	♠	●	1	1
0	0	0	1	2			"	2	B	R	|	-		1	1	|	-	1	1
0	0	1	1	3			#	3	C	S	-	♥		1	1	-	♥	1	1
0	1	0	0	4			\$	4	D	T	-	|		1	1	-	|	1	1
0	1	0	1	5			%	5	E	U	-	/		1	1	-	/	1	1
0	1	1	0	6			&	6	F	V	-	x		1	1	-	x	1	1
0	1	1	1	7			'	7	G	W	|	o		1	1	|	o	1	1
1	0	0	0	8			(	8	H	X	|	♣		1	1	|	♣	1	1
1	0	0	1	9			)	9	I	Y	|	|		1	1	|	|	1	1
1	0	1	0	A			*	:	J	Z	|	♦		1	1	|	♦	1	1
1	0	1	1	B			+	;	K	E	|	+		1	1	|	+	1	1
1	1	0	0	C			,	<	L	£	|	£		1	1	|	£	1	1
1	1	0	1	D			-	=	M	J	|	|		1	1	|	|	1	1
1	1	1	0	E			.	>	N	↑	|	π		1	1	|	π	1	1
1	1	1	1	F			/	?	O	+	|	◀		1	1	|	◀	1	1

**Figure 8-1 Denmark National Character Table
(Uppercase/Graphics Mode)**

ascii code table

				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b ₇	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₆	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b ₃	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₂	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₀	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ø				Ø	@	p	·	P						r	-	P			r	
1			!	1	a	q	A	Q						ı	ı	A	Q	ı	ı	
2			"	2	b	r	B	R						ı	ı	B	R	ı	ı	
3			#	3	c	s	C	S						ı	ı	C	S	ı	ı	
4			\$	4	d	t	D	T						ı	ı	D	T	ı	ı	
5			%	5	e	u	E	U						ı	ı	E	U	ı	ı	
6			&	6	f	v	F	V						ı	ı	F	V	ı	ı	
7			'	7	g	w	G	W						ı	ı	G	W	ı	ı	
8			(	8	h	x	H	X						ı	ı	H	X	ı	ı	
9			)	9	i	y	I	Y						ı	ı	I	Y	ı	ı	
a			*	:	j	z	J	Z						ı	ı	J	Z	ı	ı	
b			+	;	k	Æ	K	æ						ı	ı	K	æ	ı	ı	
c			,	<	l	Ø	L	ø						ı	ı	L	ø	ı	ı	
d			-	=	m	Å	M	å						ı	ı	M	å	ı	ı	
e			.	>	n	^	N	~						ı	ı	N	~	ı	ı	
f			/	?	o	-	O	÷						ı	ı	O	÷	ı	ı	

Figure 8-2 Denmark National Character Table (Upper/Lowercase)

ascii code table

				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
b ₄	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₃	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₂	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₄	b ₃	b ₂	b ₁																	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
a	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
c	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
d	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
e	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
f	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Figure 8-4 France National Character Table (Upper/Lowercase)

ASCII CODE TABLE

				b ₇	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
				b ₆	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	
				b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	
				b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

				Ø	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b ₄	b ₃	b ₂	b ₁	Ø				Ø	@	P	-	7				r	-	7		r
0	0	0	0	1			!	1	A	Q	♠	●			▬	⊥	♠	●	▬	⊥
0	0	1	0	2			"	2	B	R	|	-			▬	⊥	|	-	▬	⊥
0	0	1	1	3			#	3	C	S	-	♥			▬	⊥	-	♥	-	⊥
0	1	0	0	4			\$	4	D	T	-	|			▬	|	-	|	-	|
0	1	0	1	5			%	5	E	U	-	✓			|	|	-	✓	|	|
0	1	1	0	6			&	6	F	V	-	×			▬	⊥	-	×	▬	⊥
0	1	1	1	7			'	7	G	W	|	0			|	-	|	0	|	-
1	0	0	0	8			(	8	H	X	|	♣			▬	-	|	♣	▬	-
1	0	0	1	9			)	9	I	Y	✓	|			▬	⊥	✓	|	▬	⊥
1	0	1	0	A			*	:	J	Z	✓	♦			|	⊥	✓	♦	|	⊥
1	0	1	1	B			+	;	K	[✓	+			⊥	⊥	✓	+	⊥	⊥
1	1	0	0	C			,	<	L	£	▬				▬	⊥	▬	▬	▬	⊥
1	1	0	1	D			-	=	M	J	✓	|			⊥	⊥	✓	|	⊥	⊥
1	1	1	0	E			.	>	N	↑	✓	π			⊥	⊥	✓	π	⊥	⊥
1	1	1	1	F			/	?	O	↑	▬	▬			▬	⊥	▬	▬	▬	π

**Figure 8-5 Germany National Character Table
(Uppercase/Graphics Mode)**

ascii code table

				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₇	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₆	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₅	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₄	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₃	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₂	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0				Ø	§	p	·	P						r	-	P		r	
1			!	1	a	q	A	Q						┆	┆	A	Q	┆	┆
2			"	2	b	r	B	R						■	■	B	R	■	■
3			#	3	c	s	C	S						┆	┆	C	S	┆	┆
4			\$	4	d	t	D	T						┆	┆	D	T	┆	┆
5			%	5	e	u	E	U						┆	┆	E	U	┆	┆
6			&	6	f	v	F	V						■	■	F	V	■	■
7			'	7	g	w	G	W						┆	┆	G	W	┆	┆
8			(	8	h	x	H	X						■	■	H	X	■	■
9			)	9	i	y	I	Y						▨	▨	I	Y	▨	▨
a			*	:	j	z	J	Z						┆	┆	J	Z	┆	┆
b			+	;	k	Ä	K	ä						┆	■	K	+	┆	■
c			,	<	l	ö	L	ö						■	■	L	■	■	■
d			-	=	m	Ü	M	ü						┆	┆	M	┆	┆	┆
e			.	>	n	^	N	ß						┆	■	N	■	┆	■
f			/	?	o	-	O	≃						┆	■	O	≃	┆	■

Figure 8-6 Germany National Character Table (Upper/Lowercase)

ASCII CODE TABLE

				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₂	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
b ₃	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b ₁	b ₂	b ₃	b ₄	N				0	@	P	-	7			r	-	7		r	
0	0	0	0	1			|	1	A	Q	♠	●		|	-	♠	●	|	-	
0	0	0	1	2			"	2	B	R	|	-		■	-	|	-	■	-	
0	0	1	1	3			#	3	C	S	-	♥		-	-	-	♥	-	-	
0	1	0	0	4			\$	4	D	T	-	|		-	|	-	|	-	|	
0	1	0	1	5			%	5	E	U	-	/		|	|	-	/	|	|	
0	1	1	0	6			&	6	F	V	-	×		■	|	-	×	■	|	
0	1	1	1	7			'	7	G	W	|	0		|	-	|	0	|	-	
1	0	0	0	8			(	8	H	X	|	♣		■	-	|	♣	■	-	
1	0	0	1	9			)	9	I	Y	|	~		■	-	|	~	■	-	
1	0	1	0	A			*	:	J	Z	|	♦		|	-	|	♦	|	-	
1	0	1	1	B			+	;	K	[	|	+		|	-	|	+	|	-
1	1	0	0	C			,	<	L	]	|	■		|	-	|	■	|	-
1	1	0	1	D			-	=	M	^	|	~		|	-	|	~	|	-	
1	1	1	0	E			.	>	N	^	|	/	π		|	-	π	|	-	
1	1	1	1	F			/	?	O	^	|	▾		|	-	|	▾	|	-	

Figure 8-7 Italy National Character Table (Uppercase/Graphics Mode)

ascii code table

b ₇	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b ₇	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1
b ₆	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	1
b ₅	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

b ₄	b ₃	b ₂	b ₁		0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	
0	0	0	0	0	0				0	@	p	ù	P			r	-	P		r	
0	0	0	1	1	1	1	!	1	a	q	A	Q			¡	±	A	Q	¡	±	
0	0	1	0	1	1	1	2		"	2	b	r	B	R		■	τ	B	R	■	τ
0	0	1	1	1	1	1	3		#	3	c	s	C	S		▬	†	C	S	▬	†
0	1	0	0	0	0	0	4		\$	4	d	t	D	T		▬	|	D	T	▬	|
0	1	0	1	1	1	1	5		%	5	e	u	E	U		|	|	E	U	|	|
0	1	1	0	1	1	1	6		&	6	f	v	F	V		■	■	F	V	■	■
0	1	1	1	1	1	1	7		'	7	g	w	G	W		|	-	G	W	|	-
1	0	0	0	0	0	0	8		(	8	h	x	H	X		■	-	H	X	■	-
1	0	0	1	1	1	1	9		)	9	i	y	I	Y		▨	■	I	Y	▨	■
1	0	1	0	0	0	0	a		*	:	j	z	J	Z		|	✓	J	Z	|	✓
1	0	1	1	1	1	1	b		+	;	k	°	K	à		†	■	K	†	†	■
1	1	0	0	0	0	0	c		,	<	l	\	L	ò		■	■	L	■	■	■
1	1	0	1	1	1	1	d		-	=	m	é	M	è		▬	▬	M	|	▬	▬
1	1	1	0	0	0	0	e		.	>	n	^	N	i		▬	■	N	▨	▬	■
1	1	1	1	1	1	1	f		/	?	o	-	O	∕		▬	▬	O	▨	▬	▨

Figure 8-8 Italy National Character Table (Upper/Lowercase)

ASCII CODE TABLE

				b ₇	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b ₆	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b ₄	b ₃	b ₂	b ₁	N				Ø	€	P	-	7			r	-	7		r	
0	0	0	0	1			!	1	A	Q	♠	●		▣	±	♣	●	▣	±	
0	0	0	1	2			"	2	B	R	|	-		▣	±	|	-	▣	±	
0	0	1	0	3			#	3	C	S	-	♥		▣	±	-	♥	▣	±	
0	0	1	1	4			\$	4	D	T	-	|		▣	±	-	|	▣	±	
0	1	0	0	5			%	5	E	U	-	/		|	|	-	/	|	|	
0	1	0	1	6			&	6	F	V	-	×		▣	±	-	×	▣	±	
0	1	1	0	7			'	7	G	W	|	o		|	-	|	o	|	-	
1	0	0	0	8			(	8	H	X	|	♣		▣	±	|	♣	▣	±	
1	0	0	1	9			)	9	I	Y	\	|		▣	±	\	|	▣	±	
1	0	1	0	A			*	:	J	Z	\	♦		|	┘	\	♦	|	┘	
1	0	1	1	B			+	;	K	[	/	+		|	┘	/	+	|	┘
1	1	0	0	C			,	<	L	£	L	⌘		▣	±	L	⌘	▣	±	
1	1	0	1	D			-	=	M	]	\	|		▣	±	\	|	▣	±
1	1	1	0	E			.	>	N	↑	/	π		▣	±	/	π	▣	±	
1	1	1	1	F			/	?	o	+	▣	▣		▣	±	▣	▣	▣	±	

**Figure 8-11 Sweden National Character Table
(Uppercase/Graphics Mode)**

ascii code table

b ₇	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b ₆	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1
b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	1
b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

b ₄	b ₃	b ₂	b ₁	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
0	0	0	0	0				0	é	p	é	P			r	-	P		r
0	0	0	1	1	1	!	1	a	q	A	Q			▮	▮	A	Q	▮	▮
0	0	1	0	1	1	”	2	b	r	B	R			▮	▮	B	R	▮	▮
0	0	1	1	1	1	#	3	c	s	C	S			▮	▮	C	S	▮	▮
0	1	0	0	1	1	ø	4	d	t	D	T			▮	▮	D	T	▮	▮
0	1	0	1	1	1	%	5	e	u	E	U			▮	▮	E	U	▮	▮
0	1	1	0	1	1	&	6	f	v	F	V			▮	▮	F	V	▮	▮
0	1	1	1	1	1	'	7	g	w	G	W			▮	▮	G	W	▮	▮
1	0	0	0	1	1	(	8	h	x	H	X			▮	▮	H	X	▮	▮
1	0	0	1	1	1	)	9	i	y	I	Y			▮	▮	I	Y	▮	▮
1	0	1	0	1	1	*	:	j	z	J	Z			▮	▮	J	Z	▮	▮
1	0	1	1	1	1	+	;	k	Ä	K	ä			▮	▮	K	+	▮	▮
1	1	0	0	1	1	,	<	l	ö	L	ö			▮	▮	L	▮	▮	▮
1	1	0	1	1	1	-	=	m	Å	M	å			▮	▮	M	▮	▮	▮
1	1	1	0	1	1	.	>	n	Ü	N	ü			▮	▮	N	▮	▮	▮
1	1	1	1	1	1	/	?	o	-	O	o			▮	▮	O	▮	▮	▮

Figure 8-12 Sweden National Character Table (Upper/Lowercase)

ascii code table

				0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₇	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1
b ₆	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1
b ₅	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
b ₄	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₃	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₂	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b ₁	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0			0	@	p	.	P							r	-	P		r	
1			!	1	a	q	A	Q						!	!	A	Q	!	!
2			"	2	b	r	B	R						"	"	B	R	"	"
3			£	3	c	s	C	S						£	£	C	S	£	£
4			\$	4	d	t	D	T						\$	\$	D	T	\$	\$
5			%	5	e	u	E	U						%	%	E	U	%	%
6			&	6	f	v	F	V						&	&	F	V	&	&
7			'	7	g	w	G	W						'	'	G	W	'	'
8			(	8	h	x	H	X						(	(	H	X	((
9			)	9	i	y	I	Y						)	)	I	Y))
a			*	:	j	z	J	Z						*	*	J	Z	*	*
b			+	;	k	[	K	{						+	+	K	{	+	+
c			,	<	l	\	L	|						,	,	L	|	,	,
d			-	=	m	]	M	}						-	-	M	}	-	-
e			.	>	n	^	N	~						.	.	N	~	.	.
f			/	?	o	-	O	∞						/	/	O	∞	/	/

Figure 8-14 United Kingdom National Character Table (Upper/Lowercase)

ascii code table

b ₇	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
b ₆	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1
b ₅	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1
b ₄	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

b ₄	b ₃	b ₂	b ₁	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
0	0	0	0	0				0	@	p	·	P			r	-	P		r
0	0	0	1	1	1	!	1	a	q	A	Q			▮	⊥	A	Q	▮	⊥
0	0	1	0	0		"	2	b	r	B	R			▮	⊥	B	R	▮	⊥
0	0	1	1	1		#	3	c	s	C	S			▮	⊥	C	S	▮	⊥
0	1	0	0	0		\$	4	d	t	D	T			▮	⊥	D	T	▮	⊥
0	1	0	1	1		%	5	e	u	E	U			▮	⊥	E	U	▮	⊥
0	1	1	0	0		&	6	f	v	F	V			▮	⊥	F	V	▮	⊥
0	1	1	1	1		'	7	g	w	G	W			▮	⊥	G	W	▮	⊥
1	0	0	0	0		(	8	h	x	H	X			▮	⊥	H	X	▮	⊥
1	0	0	1	1		)	9	i	y	I	Y			▮	⊥	I	Y	▮	⊥
1	0	1	0	0		*	:	j	z	J	Z			▮	⊥	J	Z	▮	⊥
1	0	1	1	1		+	;	k	l	K	L			▮	⊥	K	L	▮	⊥
1	1	0	0	0		,	<	l	\	L	!			▮	⊥	L	!	▮	⊥
1	1	0	1	1		-	=	m	]	M	}			▮	⊥	M	}	▮	⊥
1	1	1	0	0		.	>	n	^	N	~			▮	⊥	N	~	▮	⊥
1	1	1	1	1		/	?	o	-	O	~			▮	⊥	O	~	▮	⊥

Figure 8-16 U.S.A. National Character Table (Upper/Lowercase)

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Chapter 9

I.B.M. & Epson

National Character Tables

This chapter contains the national character tables for the I.B.M. Proprinter and Graphics Printer and the Epson FX 80 emulation modes. The characters appear in N.L.Q. print mode.

b ₃ b ₂ b ₁ b ₀				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	NUL	SP	0	@	P	`	p	Ç	É	á	␣	␣	␣	␣	␣	␣
0	0	0	1	DC ₁	!	1	A	Q	a	q	ü	æ	í	␣	␣	␣	␣	␣	␣
0	0	1	0	DC ₂	"	2	B	R	b	r	é	Æ	ó	␣	␣	␣	␣	␣	␣
0	0	1	1	♥ DC ₃	#	3	C	S	c	s	â	ô	ú	␣	␣	␣	␣	␣	␣
0	1	0	0	♦ DC ₄	\$	4	D	T	d	t	ä	ö	ñ	␣	␣	␣	␣	␣	␣
0	1	0	1	♣	§	%	5	E	U	e	u	à	ò	Ñ	␣	␣	␣	␣	␣
0	1	1	0	♠	&	6	F	V	f	v	å	û	ä	␣	␣	␣	␣	␣	␣
0	1	1	1		'	7	G	W	g	w	ç	ù	ó	␣	␣	␣	␣	␣	␣
1	0	0	0	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	␣	␣	␣	␣	␣
1	0	0	1	HT	)	9	I	Y	i	y	ë	Ö	␣	␣	␣	␣	␣	␣	␣
1	0	1	0	LF	*	:	J	Z	j	z	è	Ü	␣	␣	␣	␣	␣	␣	␣
1	0	1	1	VT	ESC	+	;	K	[	k	{	ï	ø	½	␣	␣	␣	␣	␣
1	1	0	0	FF	,	<	L	\	l	;	î	£	¼	␣	␣	␣	␣	␣	␣
1	1	0	1	CR	-	=	M	]	m	}	í	¥	ì	␣	␣	␣	␣	␣	␣
1	1	1	0	SO	.	>	N	^	n	~	Ä	Pt	«	␣	␣	␣	␣	␣	␣
1	1	1	1	SI	/	?	O	_	o		Å	f	»	␣	␣	␣	␣	␣	␣

Figure 9-2 I.B.M. International 1 Table 2

b ₃ b ₂ b ₁ b ₀				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0	NUL		SP	0	@	P	`	p	Ç	É	á	␣	␣	␣	␣	␣	␣	␣
0001	1			!	1	A	Q	a	q	ü	æ	í	␣	␣	␣	␣	␣	␣	␣
0010	2		DC ₂	"	2	B	R	b	r	é	Æ	ó	␣	␣	␣	␣	␣	␣	␣
0011	3		♥	#	3	C	S	c	s	â	ô	ú	␣	␣	␣	␣	␣	␣	␣
0100	4		♦	DC ₄	\$	4	D	T	d	t	ä	ö	ñ	␣	␣	␣	␣	␣	␣
0101	5		♣	§	%	5	E	U	e	u	à	ò	Ñ	␣	␣	␣	␣	␣	␣
0110	6		♠		&	6	F	V	f	v	å	û	õ	␣	␣	␣	␣	␣	␣
0111	7				'	7	G	W	g	w	ç	ù	Ö	␣	␣	␣	␣	␣	␣
1000	8		BS	CAN	(	8	H	X	h	x	ê	ÿ	ç	␣	␣	␣	␣	␣	␣
1001	9		HT		)	9	I	Y	i	y	ë	Ö	ã	␣	␣	␣	␣	␣	␣
1010	A		LF		*	:	J	Z	j	z	è	Ü	Ã	␣	␣	␣	␣	␣	␣
1011	B		VT	ESC	+	;	K	[	k	(	ï	ø	ł	␣	␣	␣	␣	␣	␣
1100	C		FF		,	<	L	\	l	|	î	£	'n	␣	␣	␣	␣	␣	␣
1101	D		CR		-	=	M	]	m	}	í	Ø	í	␣	␣	␣	␣	␣	␣
1110	E		SO		.	>	N	^	n	~	Ä	Ł	³	␣	␣	␣	␣	␣	␣
1111	F		SI		/	?	O	_	o		Å	ŀ	α	␣	␣	␣	␣	␣	␣

Figure 9-3 I.B.M. International 2 Table 2

b ₄	b ₃	b ₂	b ₁	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00	00	00	00	NUL		SP	0	@	P	`	p	A	P	i	⋮	L	I	ω	Ω
00	00	01	01			!	1	A	Q	a	q	B	Σ	κ	⋮	Γ	T	α	±
00	01	01	02		DC ₂	"	2	B	R	b	r	Γ	T	λ	⋮	T	T	ε	∇
00	01	01	03	♥		#	3	C	S	c	s	Δ	Υ	μ	⋮	T	T	η	≡
01	00	04	04	♦	DC ₄	\$	4	D	T	d	t	E	Φ	v	⋮	-	L	i	ρ
01	01	05	05	♣	§	%	5	E	U	e	u	Z	X	ξ	⋮	+	Γ	i	J
01	01	06	06	♠		&	6	F	V	f	v	H	Ψ	o	⋮	+	Γ	ó	+
01	01	07	07			'	7	G	W	g	w	Θ	Ω	π	⋮	+	+	U	≈
10	00	08	08	BS	CAN	(	8	H	X	h	x	|	α	ρ	⋮	+	+	U	°
10	00	09	09	HT		)	9	I	Y	i	y	K	β	σ	⋮	+	+	ω	ε
10	01	10	10	LF	ESC	+	:	J	Z	j	z	Λ	Υ	ς	⋮	+	+	A	·
11	01	11	11	VT		,	<	K	[	k	{	M	δ	τ	⋮	+	+	E	∇
11	00	12	12	FF		,	<	L	\	l	!	N	ε	u	⋮	+	+	H	∩
11	01	13	13	CR		-	=	M	]	m	}	Ξ	ζ	φ	⋮	+	+	I	2
11	01	14	14	SO		.	>	N	^	n	~	O	η	χ	⋮	+	+	O	■
11	01	15	15	SI		/	?	O	_	o		Π	θ	ψ	⋮	+	+	Υ	SP

Figure 9-5 I.B.M. Greece Table 2

b ₁	o	o	o	o	o	o	o	o	i	i	i	i	i	i	i	i	i				
b ₂	o	o	o	o	i	i	i	i	o	o	o	i	i	i	i	i	i				
b ₃	o	i	o	i	o	i	o	i	o	i	o	i	o	i	o	i					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15					
b ₁	b ₂	b ₃	b ₄																		
o	o	o	o	00	NUL		SP	0	@	P	`	p	Ç	É	á	⏏	L	⏏	d	≡	
o	o	o	o	01			!	1	A	Q	a	q	ü	æ	í	⏏	⏏	T	β	±	
o	o	o	o	02		DC ₂	"	2	B	R	b	r	é	Æ	ó	⏏	⏏	T	Γ	≥	
o	o	o	o	03	♥		#	3	C	S	c	s	ã	ô	ú	⏏	⏏	⏏	Π	≤	
o	o	o	o	04	♦	DC ₄	\$	4	D	T	d	t	ä	ö	ñ	⏏	⏏	⏏	Σ	ρ	
o	o	o	o	05	♣		§	%	5	E	U	e	u	à	ò	Ñ	⏏	⏏	⏏	σ	J
o	o	o	o	06	♠		&	6	F	V	f	v	å	ü	õ	⏏	⏏	⏏	μ	÷	
o	o	o	o	07			'	7	G	W	g	w	ç	ù	Ö	⏏	⏏	⏏	τ	≈	
o	o	o	o	08	BS	CAN	(	8	H	X	h	x	ê	ÿ	ç	⏏	⏏	⏏	ø	•
o	o	o	o	09	HT		)	9	I	Y	i	y	ë	Ö	ã	⏏	⏏	⏏	Θ	|	
o	o	o	o	10	LF		*	:	J	Z	j	z	è	Ü	Ã	⏏	⏏	⏏	Ω	|	
o	o	o	o	11	VT	ESC	+	;	K	[	k	]	ï	À	Ú	⏏	⏏	⏏	δ	√
o	o	o	o	12	FF		,	<	L	\	l	;	î	É	Í	⏏	⏏	⏏	∞	∩	
o	o	o	o	13	CR		-	=	M	]	m	{	ï	À	í	⏏	⏏	⏏	∅	2
o	o	o	o	14	SO		.	>	N	^	n	~	Ä	Ê	³	⏏	⏏	⏏	€	■	
o	o	o	o	15	SI		/	?	O	_	o		Â	Ô	Ó	⏏	⏏	⏏	∩	SP	

Figure 9-6 I.B.M. Portugal Table 2

				00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0	0	0	0	00	NUL		SP	0	@	P	˘	p	Ç	É	á	␣	␣	α	≡
0	0	0	1	01			!	1	A	Q	a	q	ü	í	í	␣	␣	β	±
0	0	1	0	02		DC ₂	"	2	B	R	b	r	é	Ó	ó	␣	␣	Γ	≥
0	0	1	1	03	♥		#	3	C	S	c	s	â	ô	ú	␣	␣	Π	≤
0	1	0	0	04	♦	DC ₄	\$	4	D	T	d	t	ä	ö	ñ	␣	␣	Σ	ƒ
0	1	0	1	05	♣		%	5	E	U	e	u	à	ò	Ñ	␣	␣	σ	J
0	1	1	0	06	♠		&	6	F	V	f	v	À	Ù	à	␣	␣	Η	÷
0	1	1	1	07			'	7	G	W	g	w	ç	ù	ó	␣	␣	Τ	≈
1	0	0	0	08	BS	CAN	(	8	H	X	h	x	è	Á	ç	␣	␣	ø	•
1	0	0	1	09	HT		)	9	I	Y	i	y	è	Ö	Ł	␣	␣	Θ	•
1	0	1	0	10	LF		*	:	J	Z	j	z	è	U	Ł	␣	␣	Ω	-
1	0	1	1	11	VT	ESC	+	;	K	[	k	!	ÿ	Ö	½	␣	␣	δ	√
1	1	0	0	12	FF		,	<	L	\	l	!	î	£	¼	␣	␣	∞	∞
1	1	0	1	13	CR		-	=	M	]	m	!	ï	Ú	ı	␣	␣	∅	2
1	1	1	0	14	SO		.	>	N	^	n	~	À	Þ	«	␣	␣	Ε	■
1	1	1	1	15	SI		/	?	O	_	o		È	ÿ	»	␣	␣	∅	SP

Figure 9-7 I.B.M. Spain Table 2

				0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0			SP	0	@	P		p			SP	0	@	P		p
0	0	0	1		DC ₁	!	1	A	Q	a	q		DC ₁	!	1	A	Q	a	q
0	0	0	2		DC ₂	"	2	B	R	b	r		DC ₂	"	2	B	R	b	r
0	0	0	3		DC ₃	#	3	C	S	c	s		DC ₃	#	3	C	S	c	s
0	0	0	4		DC ₄	\$	4	D	T	d	t		DC ₄	\$	4	D	T	d	t
0	0	0	5			%	5	E	U	e	u			%	5	E	U	e	u
0	0	0	6			&	6	F	V	f	v			&	6	F	V	f	v
0	0	0	7			'	7	G	W	g	w	BEL		'	7	G	W	g	w
0	0	0	8	BS	CAN	(	8	H	X	h	x	BS	CAN	(	8	H	X	h	x
0	0	0	9	HT		)	9	I	Y	i	y	HT		)	9	I	Y	i	y
0	0	0	A	LF		*	:	J	Z	j	z	LF		*	:	J	Z	j	z
0	0	0	B	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
0	0	0	C	FF		,	(	L	/	l	|	FF		,	(	L	\	l	|
0	0	0	D	CR		-	=	M	]	m	}	CR		-	=	M	]	m	}
0	0	0	E	SO		.	)	N	^	n	~	SO		.	)	N	^	n	~
0	0	0	F	SI		/	?	O	-	o	DEL	SI		/	?	O	-	o	DEL

National Character Variations

Figure 9-8 Epson National Character Table

NATIONAL CHARACTER VARIATIONS												
NATIONS	HEXADECIMAL CODE											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	#	\$	@	[	\	\]	^	`	{	|	}	~
FRANCE	#	\$	à	°	ç	§	^	`	é	ù	è	~
GERMANY	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	\$	@	[	\	\]	^	`	{	|	}	~
DENMARK	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	\$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	Pt	\$	@	í	Ñ	¿	^	`	ñ	}	}	~
JAPAN	#	\$	@	[	¥	]	^	`	{	|	}	~

Figure 9-9 Epson National Character Variations

Chapter 10

Graphics Printing on the MPS 1230 Printer

Commodore Serial Mode

When the MPS 1230 prints characters, the computer sends codes to the printer telling it which characters to print. Those characters are actually defined and stored in the printer's read only memory (ROM). The printer's ROM is a table of character definitions for the letters of the alphabet and special symbols.

When the computer sends codes to the printer telling it to print characters, those codes act as an index into the printer's ROM and the printer accesses the character definition in the table. You may store information in place of the character table, in order to define customized characters. This section describes how to create custom characters by redefining the original character table stored in the printer's ROM.

Bit Image Mode (BIM)

In Bit Image Mode (BIM), the MPS 1230 Printer has the ability to print any character image that can be defined in a 7 x 16 dot matrix. A Bit Image character is defined by means of a dot layout in a 7 x 16 matrix, which corresponds to the print head. The print head prints the selected graphic image by operating the 7 x 16 matrix of print pins according to the dots defined in the matrix.

The printer is therefore able to produce pictures, diagrams and any type of dot matrix image, provided that the dot position is correctly defined.

This sections describes the creation of a BIM graphic image and the commands required to enter graphics mode, set repetitive printing of bit image characters and exit the graphics mode.

Generating a BIM Graphic Image

To generate a BIM graphic image, perform the following steps:

1. On a sheet of paper, draw a grid similar to the one in figure 10-1 below and label the 7 row x 16 column matrix as shown:

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
32	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
64	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 10-1 Bit Image Matrix

2. Using a pencil, darken the dots according to the desired image, as shown in figure 10-2:

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
1	○	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○
2	○	○	●	○	●	○	○	○	○	●	○	●	○	○	○	○
4	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	○
8	●	○	○	○	○	○	●	●	○	○	○	○	○	●	●	●
16	○	●	○	○	○	●	○	○	●	○	○	○	●	○	○	○
32	○	○	●	○	●	○	○	○	○	●	○	●	○	○	○	○
64	○	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○

Figure 10-2 Defining a Graphic Image

3. For each column, add the row numbers corresponding to the dots to be printed. For instance, in the second column, two dots are present, one in the row defined as 4 and one in the row defined as 16. The column value is therefore 20 (4 + 16). By performing this computation for each column, 16 data values are obtained that will be used to print the graphic image.
4. Add the value 128 to each data value obtained in step 3. The value of the second column will now be 148 (20 + 128). The resulting values will be used to produce the graphics image in a program in the next section.

Entering Bit Image Mode

BIT IMG
(Chr\$(8))

Sets the MPS 1230 printer in Bit Image Mode (BIM). In Bit Image Mode, characters are printed twice as wide (7 x 16) as normal characters (7 x 8) and vertical spacing is automatically set at 7/72".

The following example prints the graphics image generated in the preceding section. The print loop is executed five times.

```
10 OPEN1,4,7
20 A$ = ""
30 FOR I= 1 TO 16
40 READ A:A$ = A$ + CHR$(A)
50 NEXT I
60 FOR J= 1 TO 5
70 PRINT#1,CHR$(8);A$: REM SETS BIM
80 NEXT J
90 FOR K= 1 TO 8:PRINT#1:NEXT K
100 CLOSE1
110 END
200 DATA 136, 148, 162, 193, 162, 148, 136, 136
210 DATA 148, 162, 193, 162, 148, 136, 136, 136
```

Figure 10-3 Bit Image Graphics Program

The program yields this result:



Figure 10-4 Bit Image Results from the Graphics Program

Repetitive Printing of a Bit Image Mode Graphic Image

BIT IMG SUB
n data
(Chr\$(8);
Chr\$(26))

Sets the repetitive printing of a BIM image. The variable, n, is a binary value (0 to 255) and indicates the number of times the printing is to be repeated. The variable, data, indicates the the number of BIM data elements that will be repeated.

If n = 0, the BIM data is repeated 256 times. To be able to repeat the image more than 256 times, repeat the sequence.

The following example program in figure 10-5 illustrates repetitive printing.

```
10 OPEN1,4,7
20 FOR I= 1 TO 6
30 READ N
40 PRINT#1,CHR$(8);CHR$(26);CHR$(N);
   CHR$(243);CHR$(15)
50 NEXT I
60 FOR J= 1 TO 8:PRINT#1:NEXT J
70 CLOSE1
100 DATA 34, 57, 75, 89, 123, 186
```

Figure 10-5 Repetitive Printing of a BIM Image

The program in figure 10-5 yields this result:

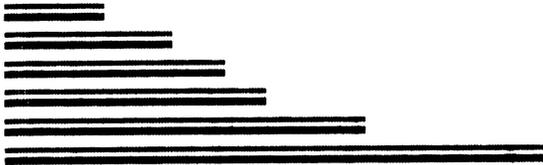


Figure 10-6 Result of the Bit Image Program

Exiting the Graphics Mode

EN ON Exits Bit Image Mode. The printer remains set in Double Width print mode.

```
10 OPEN1,4,7
20 PRINT#1,CHR$(14);
30 CLOSE1
```

Figure 10-7 Exiting Bit Image Mode

To clear Double Width print mode and to set normal printing in Draft mode, use the EN OFF command as shown in figure 10-8.

```
10 OPEN1,4,7
20 PRINT#1,CHR$(15);
30 CLOSE1
```

Figure 10-8 Clearing Double Width and Setting Draft Mode

Down Loading of Special Characters

(Commodore Serial, I.B.M. Proprinter and I.B.M. Graphics Printer Modes)

The user can create between 1 and 94 personalized characters which replace the normal printed characters.

The down loading of special characters to the printer's memory is performed through the ESC = code.

Note:

Turning off the printer, erases the stored characters from the printer's memory.

ESC = This code is followed by the parameters m, n, c, a, p1 ... p11, which are the decimal codes of variable bytes according to the characters to be loaded. Each ESC = command can load a maximum of 256 subsequent characters.

```
PRINT CHR$(27);CHR$(61);(followed by a parameter list)
```

The parameter list is as follows:

m and n Specify the total number of characters to be loaded into the printer's memory.

1. To compute the number of characters to be loaded (t), use the following formula:

$$t = (\text{number of characters} \times 13) + 2$$

2. If the number of characters to be loaded is less than 256, $m = t$ and $n = 0$

Example: For two characters:

$$t = (2 \times 13) + 2 = 28$$

$$m = 28$$

$$n = 0$$

3. If the number of characters to be loaded is greater than 256, $m = \text{remainder}$ and $n = \text{integral quotient}$.

Example: For 94 characters:

$$t = (94 \times 13) + 2 = 1224$$

$$1224/256 = 4$$

$$m = 200 \text{ (remainder obtained dividing 1224 by 256)}$$

$$n = 4 \text{ (quotient of division 1224 by 256)}$$

c

This is the decimal code of the first character to be loaded. Standard characters will be replaced by the personalized characters starting from this point.

Example: A character set is to be loaded to replace the characters starting from the upper case letter "A":

$$c = 65 \text{ (ASCII decimal code for letter A)}$$

Characters can be loaded starting from decimal code 33 up to and including 126. Subsequent characters are loaded starting at the 65th element (A) of the character table.

a

This parameter indicates if the character is ascending or descending:

If $a = 0$, printing is performed with the first 8 pins of the print head. The ninth pin, the lowest one toward the bottom of the character is not used.

If a = 1 printing is performed with the last 8 needles of the print head. The first needle, the upper one toward the top of the character is not used.

p1...p11

These are the values of the vertical columns of dots in each character. See figure 10-11 for a diagram of the vertical columns of dots.

An alphanumeric variable can contain up to 255 data elements. Use additional variables to define more than 256 data elements.

If the user wishes to down load 55 characters starting at character address @ (64 in decimal), line 60 becomes:

```
60 PRINT#1, CHR$(27);"=";CHR$(205);CHR$(2);CHR$(20);  
CHR$(64);A$;B$;C$.
```

where CHR\$(205);CHR\$(2) specify the value 715 which defines 55 characters (55 x 13).

The variable A\$, contains the first 255 data elements, B\$ contains the second 255, C\$ contains the other 205. Naturally, you must supply all of the necessary data in the program to define those 55 characters.

Figure 10-10 shows the 8 x 11 print matrix available for you to define characters for down loading to the printer's memory.

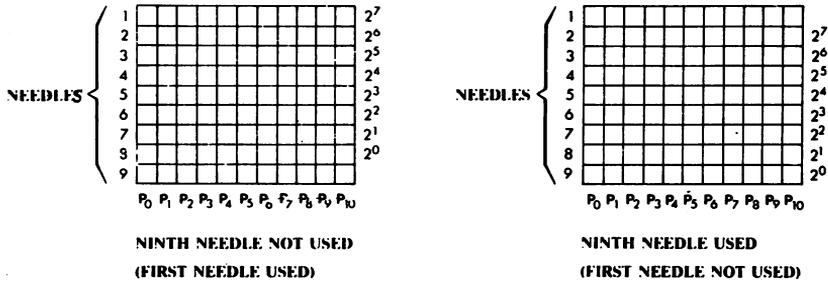


Figure 10-10 Print Matrix

A dot is printed if the corresponding bit in the encoded data value "p" is enabled.

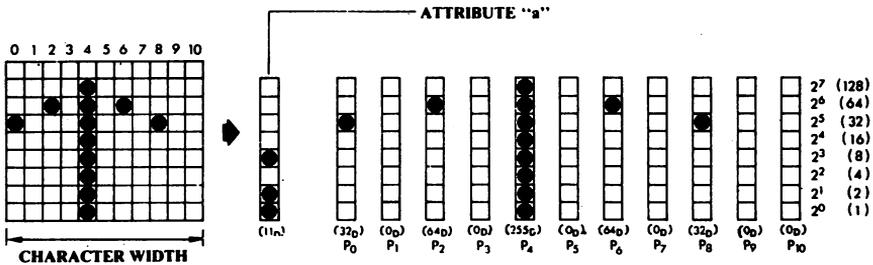


Figure 10-11 Example of Personalized Character Definition

IBM Proprinter and Graphics Printer Emulation Modes

The printer operates in Bit Image Mode where printing is performed with dots in vertical columns 8 dots high. A dot is printed if the corresponding bit in the data element is set (1). If the corresponding bit is clear (0), the dot is not printed.

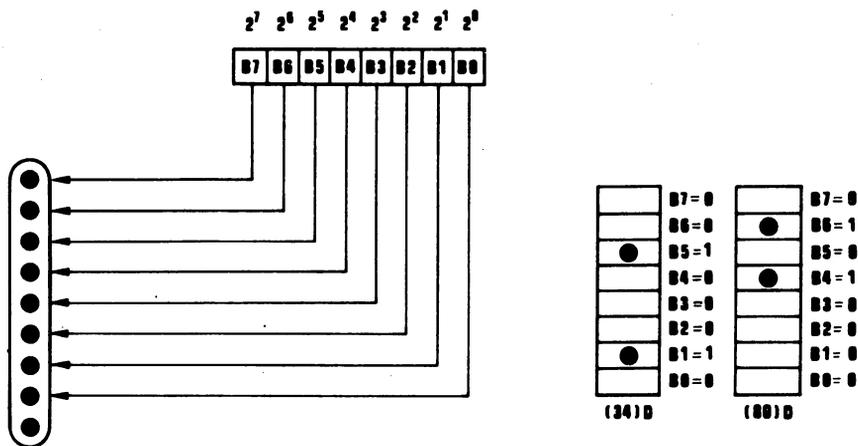


Figure 10-12 Correspondence Between Data Bits and Print Head Pins

Alphanumeric characters and BIM data can be printed on the same line. The graphics features are obtained by means of the four commands listed below.

ESC K
n1 n2 data

Sets Bit Image Mode (BIM) with horizontal density of 60 dots/inch. Parameters n1 and n2 indicate the number of BIM data elements that follow. To obtain n1 and n2 values, follow this example:

n2 = INTEGRAL quotient obtained by dividing the data number by 256

n1 = Data number - (n2 x 256)

Ex.: To print 263 data elements:

n2 = 1 (263/256 = 1.02734375; the INTEGRAL number is therefore 1)

n1 = 263 - (1 x 256) = 7

The maximum number of BIM data printable on one line is 480. If n1 and n2 define a number of data elements that exceed the limit, the exceeding part is ignored.

If alphanumeric characters are also printed on the same line, the maximum number of BIM data elements decreases according to the following table.

PRINT PITCH		BIM COLUMNS PER CHARACTER
PICA	10 chars/inch	6
ELITE	12 chars/inch	5
CONDENSED	17.1 chars/inch	3.5
PICA*	5 chars/inch	12
CONDENSED*	8.5 chars/inch	7
ELITE*	6 chars/inch	10

* = Double Width

LPRINT CHR\$(27);CHR\$(75)
LPRINT CHR\$(n1);CHR\$(n2);Data

ESC L
n1 n2 data

Sets BIM graphics printing with horizontal density 120 dots/inch. The maximum number of BIM data values per row is 960. For the other features, the same rules as ESC K apply.

LPRINT CHR\$(27);CHR\$(76);
LPRINT CHR\$(n1);CHR\$(n2);Data

ESC Y
n1 n2 data

Sets BIM graphics printing with horizontal density 120 dots/inch, with double the print speed. The maximum number of data values per row is 960, but adjacent horizontal dots are not printed. For the other features, the same rules as ESC K apply.

LPRINT CHR\$(27);CHR\$(89);
LPRINT CHR\$(n1);CHR\$(n2);Data

ESC Z
n1 n2 data

Sets BIM graphics printing with horizontal density 240 dots/inch. The maximum number of BIM data per row is 1920 bytes, but adjacent horizontal dots are not printed. For the other features, the same rules as ESC K apply.

LPRINT CHR\$(27);CHR\$(90);
LPRINT CHR\$(n1);CHR\$(n2);Data

ESC Z
n1 n2 data

Sets BIM graphics printing with horizontal density 240 dots/inch. The maximum number of BIM data per row is 1920 bytes, but adjacent horizontal dots are not printed. For the other features, the same rules as ESC K apply.

```
LPRINT CHR$(27);CHR$(90);
LPRINT CHR$(n1);CHR$(n2);Data
```

Note: See Down Loading of Special Characters in the Commodore Serial Section for information on down loading in the other emulation modes.

Printing a Character in the Extended Table

The following table includes normal I.B.M. characters, other characters and special symbols that replace the commands LF, CR, FF, etc.

				b ₀	b ₁	b ₂	b ₃	b ₄	b ₅	b ₆	b ₇	b ₈	b ₉	A	B	C	D	E	F	
b ₄	b ₃	b ₂	b ₁	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	0	0	0	0			SP	0	@	P	`	p	Ç	É	á	⋮	L	I	α	≡
0	0	0	1	1			!	1	A	Q	a	q	ü	æ	í	⋮	I	T	β	≡
0	0	1	0	2			"	2	B	R	b	r	é	Æ	ó	⋮	I	T	Γ	≡
0	0	1	1	3	♥		#	3	C	S	c	s	â	ô	ú	⋮	I	T	Π	≡
0	1	0	0	4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	⋮	I	T	Σ	↵
0	1	0	1	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⋮	I	T	σ	↵
0	1	1	0	6	♠		&	6	F	V	f	v	á	û	á	⋮	I	T	"	↵
0	1	1	1	7			'	7	G	W	g	w	ç	ù	ó	⋮	I	T	τ	≡
1	0	0	0	8			(	8	H	X	h	x	ê	ÿ	ç	⋮	I	T	ø	°
1	0	0	1	9			)	9	I	Y	i	y	ë	Ö	Γ	⋮	I	T	θ	■
1	0	1	0	A		→	*	:	J	Z	j	z	è	Ü	Γ	⋮	I	T	Ω	—
1	0	1	1	B		←	+	;	K	[	k	{	ï	ç	1/2	⋮	I	T	δ	√
1	1	0	0	C			,	<	L	\	l	l	î	É	1/4	⋮	I	T	∞	∩
1	1	0	1	D			-	=	M	]	m	}	ï	Y	i	⋮	I	T	φ	2
1	1	1	0	E			.	>	N	^	n	~	Ä	R	<<	⋮	I	T	€	■
1	1	1	1	F		Q	/	?	O	_	o		Á	f	>>	⋮	I	T	∩	SP

Figure 10-13 Extended IBM Proprinter Table

The user can print one or more characters taken from the “extended” table, by issuing one of the two following codes.

ESC \ m n

Sets the printing of a determined number of characters taken from the “extended” table, defined by parameters “m” and “n” and computed as follows: $m + (n \times 256)$.

If the printer receives a code not assigned to a character, it simply advances one character pitch. See Figure 10-13 Extended IBM Proprinter Table.

During the operation of the ESC \ all the control codes are not active. When the printing of the characters defined by parameters “n” and “m” is terminated, the Character Table previously selected (by means of ESC 6 or ESC 7) is restored, the ESC \ code becomes inactive and the control codes operate once again.

LPRINT

CHR\$(27);CHR\$(92);CHR\$(m);CHR\$(n);

or

LPRINT CHR\$(27);“-”;CHR\$(m);CHR\$(n);

ESC

Sets the printing of one character taken from the “extended” table. This sequence is normally used to print a control code. For further information, refer to ESC \.

Epson FX 80 Emulation Mode

Bit Image Mode behaves in the same manner as in the I.B.M. emulation modes with the additions in the following sections.

ESC * m
n1 n2 data

Sets graphics printing in the various density and speed combinations according to parameter “m”, in the table below:

m	MODE	dot/inch	dot/row
0	Normal density	60	480
1	Double density, half speed	120	960
2	Double density, normal speed	120	960
3	Four times density	240	1920
4	Graphics Video I	80	640
5	Plotter graphics (x:y = 1:1)	72	576
6	Graphics Video II	90	720

```
LPRINT CHR$(27);CHR$(42);CHR$(m);
LPRINT CHR$(n1);CHR$(n2);Data
```

ESC ? n m

Modifies the BIM commands. Parameter "m" varies in the range 0 - 6, while n = K, L, Y or Z. In BIM mode, the printer can operate at seven different print densities, assigned by commands ESC K, ESC L, ESC Y, ESC Z or ESC * m. The ESC ? command allows you to vary the selected density. For instance, to change the ESC K density from 60 dots/inch to 72 dots/inch, the following BASIC sequence is to be issued:

```
LPRINT CHR$(27);"?";"K";CHR$(5);
```

ESC ^ a
n1 n2 data

Sets BIM graphics printing (with normal or double density) in vertical columns 9 dots high, defined by 2 bytes. This BIM print mode allows you to use all 9 print pins of the print head.

a = 0 for 60 dots/inch density

a = 1 for 120 dots/inch density

n1 n2

Refer to ESC K to define the column length.

Data

The first, third and fifth byte determine the printing of the dots that correspond to the first 8 needles of the print head.

The second, fourth and sixth byte (and so on), determine the printing of the dot corresponding to the ninth print head pin (as by the following figure).

```
LPRINT CHR$(27);CHR$(94);CHR$(0-1);
LPRINT CHR$(n1);CHR$(n2);Data
```

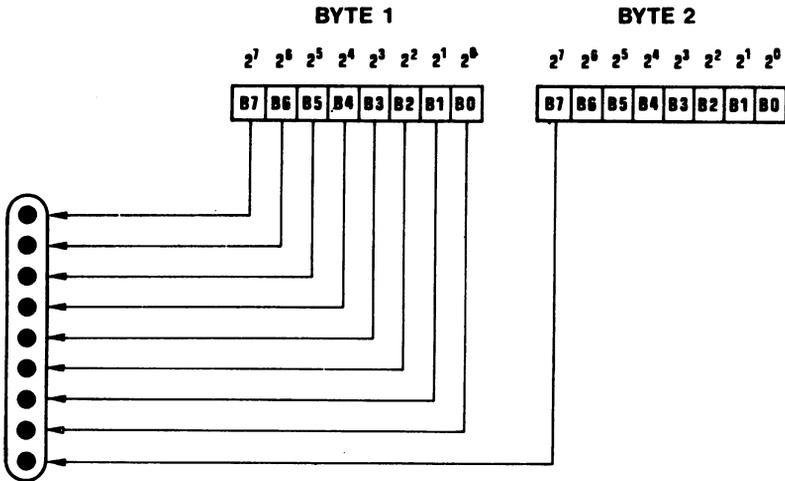


Figure 10-14 Correspondence Between Issued Bytes and Print Head Pins

Down Line Loading of Special Characters (DLL)

The user can create personalized characters which can be printed in the place of the normal characters. The characters can cover the whole set of the ASCII table (256 characters maximum, defined by codes in the range 0 to 255). As an alternative, only a few characters can be personalized, keeping the standard characters for the undefined ones. Thus the newly defined table is loaded into the printer's memory.

If you turn off the printer the stored characters are lost.

ESC & 0

This code must be followed by the parameters *m*, *n*, *a*, P0 ... P10. The code defines personalized characters and stores them in RAM. The parameter is specified as follows.

Parameters P0 ... P10 determine the dot map of the character to be defined, as shown below. The P0 ..P10 sequence must be repeated for each character to be personalized.

```
LPRINT CHR$(27);CHR$(38);
CHR$(48);parameters
```

n and m

These parameters specify the start code and the end of field for the character range to be personalized, respectively. The value can vary in the range 0 - 255. In case "m" = "n", only one character is personalized, the one specified by the two parameters m and n.

a

This attribute precedes the 11 bytes P0 ... P10 defining the character to be personalized. Its meaning varies according to the defined character spacing (fixed or proportional).

— Fixed spacing: only the value of bit 2^7 (MSB) is considered significant. This value is "0" if the ninth needle is used (and the first is not used) and is "1" if the first needle is used (and the ninth is not used).

— Proportional spacing: bit 2^7 has the same meaning described in the previous paragraph; the other 7 bits are also considered to define the (variable) length for the characters, as follows:

2^7 0 = ninth needle used
1 = ninth needle not used

2^6 }
 2^5 } start of character
 2^4 }

2^3 }
 2^2 } end of character
 2^1 }
 2^0 }

For proportional spaced characters, the print area of the matrix is therefore defined, starting from the beginning to the end of character, ignoring the bytes that come before the start of characters and the bytes that follow the end of character.

P0 ... P10

The values for these parameters define the character shape according to the correspondance between the character design and the binary value of parameter P_i .

Additional Epson Escape Sequences

ESC % 1 RAM selection (personalized characters previously defined by ESC &).

LPRINT CHR\$(27);CHR\$(37);CHR\$(49);

ESC % 0 ROM selection (personalized characters permanently stored in the printer).

LPRINT CHR\$(27);CHR\$(37);CHR\$(48);

ESC : 000 Copies the ROM character generator contents (normal characters). This is operational when the code is received in RAM.

**LPRINT CHR\$(27);CHR\$(58);CHR\$(48);
CHR\$(48);CHR\$(48);**

Appendices

- Appendix A** Technical Specifications
- Appendix B** Hardware Interfaces
- Appendix C** Graphics Layout Combinations
- Appendix D** Control Code and Escape Sequence Summary
- Appendix E** Individual Command Code and Escape Sequence Tables
- Appendix F** PETASCII Uppercase/Graphics Character Table
- Appendix G** PETASCII Upper/Lowercase Character Table
- Appendix H** ASCII Character Table
- Appendix I** Epson Standard Character Table
- Appendix J** Epson Graphics Character Table
- Appendix K** I.B.M. Graphics—Character Set 1
- Appendix L** I.B.M. Graphics—Character Set 2
- Appendix M** I.B.M. Graphics—All Characters
- Appendix N** International Character Sets
- Appendix O** Printer Self Test (Auto-Diagnostics)

Appendix A

Technical Specifications

Printing technique	Impact, dot-matrix (9-pin print head)
Normal definition printing (DRAFT)	<ul style="list-style-type: none"> ● Character matrix: 9 vertical dots x 9 horizontal dots ● print speed: 120 characters per second (cps) at 10 characters per inch
High definition printing (NLQ)	<ul style="list-style-type: none"> ● Character matrix: 18 vertical dots x 9 horizontal dots ● print speed: 25 characters per second at 10 characters per inch
Tab speed	200 characters per second
Print direction	Optimized bidirectional
Horizontal spacing	10/12/15/17.1/20/24 characters per inch. Can be selected during the Set Up procedure and through software control codes.
Vertical spacing	<ul style="list-style-type: none"> ● 1/6" (4.23 mm), 1/8" (3.175 mm) and 7/72" (2.47 mm) ● n/216" and n/72"
Character table	ASCII, PETASCII characters and special characters. See Chapters 8 and 9, Commodore Serial and I.B.M. and Epson National Character Tables. Also see Appendices F through N.
Print line capacity	Between 80 and 240 characters, depending on the selected horizontal spacing.
Bit Image Mode Graphics Printing	<ul style="list-style-type: none"> ● 7/8 vertical dots matrix: ● vertical definition: 72 dots/inch ● horizontal definition: 60 and 240 dots/inch (see Chapter 10, Graphics Printing on the MPS 1230 Printer)
Graphics Layout	See Appendix C for all the possible graphics layout combinations
Paper feed speed	1.692 in/sec. (42.3 mm/sec)
Line feed time	100 ms
Paper handling	See Chapter 2, Installing Ribbon, Paper and Paper Feed Mechanisms
Interfaces	Commodore Serial and Centronics Parallel

Ribbon

- black print cartridges (approx. 800K character life expectancy)
-

Environment requirements

- Temperature: from 50°F (10°C) to 104°F (40°C)
 - Relative Humidity: from 15% to 95% (noncondensing)
-

Electrical specifications

- USA 115-120V, 50-60 Hz (European 220, 240 V) + 10% - 15%; 50-60 Hz
- absorption: 25 W
-

Physical specifications

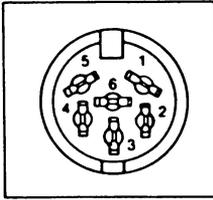
- Height: 3.76 in (94 mm)
 - Width: 14.8 in (370 mm)
 - Depth: 10.12 in (253 mm)
 - Weight: 4.2 lbs (1.89 kg)
-

Appendix B Hardware Interfaces

Serial Interface

The following figure shows the Commodore Serial interface connector and its pinout signals.

Connector



Pin No.	Signal
1	SERIAL SRQ (NC)
2	GND
3	SERIAL ATN
4	SERIAL CLK
5	SERIAL DATA
6	RES

Figure B-1 Commodore Serial Interface & Pinout

The Commodore Serial interface signal timing diagram is as follows:

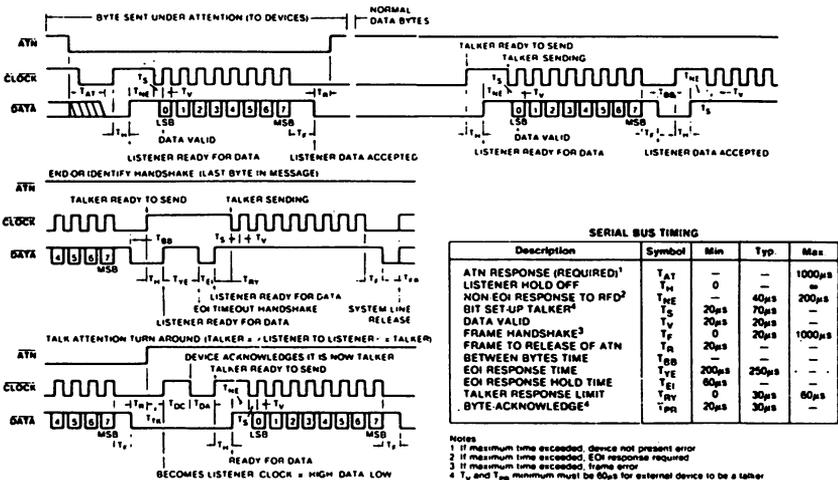


Figure B-2 Serial Port Timing

Parallel Interface

The printer interface for connections to the Commodore PC (or compatible) is a standard parallel Centronics interface.

The signals from printer to host computer, and in the opposite direction, are transmitted via the interface lines. A voltage level in the range $3 \div 5$ V (5.5 as max peak) is interpreted as a "1", while a voltage level in the range $0 \div 0.7$ V (-0.5 V as min peak) is interpreted as a "0".

The printer line buffer maximum capacity is 5.5K Byte.

The maximum data transmission speed is 5000 characters/sec.

The following computer generated signals are present at the interface output connector:

- DATA STROBE (connector pin 1)
- DATA LINES (from pin 2 to pin 9)
- INPUT PRIME (pin 31)

together with the following printer generated signals:

- ACKNOWLEDGE (pin 10)
- BUSY (pin 11)
- PAPER EMPTY (pin 12)
- SELECT (pin 13)
- FAULT (pin 32)

Signal Description

The DATA STROBE signal is a negative pulse that transfers data to the printer electronic circuits. The pulse duration must be longer than 800 ns. The circuit is terminated by a +5 V resistor.

The eight DATA LINE circuits transmit bytes (characters or control codes) from the computer to the printer, and are terminated by a +5 V resistor.

The INPUT PRIME signal (negative pulse) resets the printer. The pulse duration must be longer than 10 ms.

The ACKNOWLEDGE signal (negative pulse) indicates to the computer that one character transmission has been completed. The printer is ready to receive the subsequent character.

The BUSY signal (high level) indicates to the computer that the printer is not ready to receive data.

The PAPER EMPTY signal (high level) indicates to the computer that the printer is almost out of paper.

The SELECT signal (high level) indicates to the computer that the printer is capable of receiving data.

The FAULT signal (low level) indicates to the computer that the printer has a hardware malfunction.

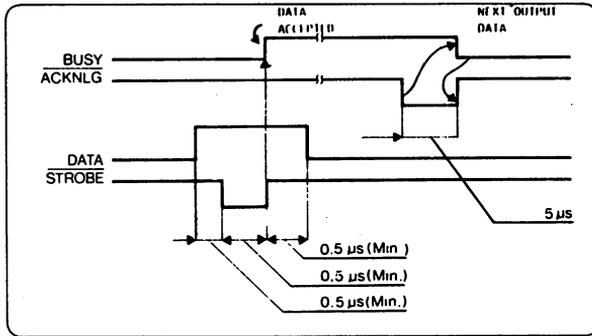


Figure B-3 Parallel Port Timing

Appendix C

Graphics Layout Combinations

The printer provides the following print mode features:

1. Draft
2. Near Letter Quality (N.L.Q.)

These print modes can be used with the following horizontal space settings (character pitches):

1. Pica	10 chars/inch
2. Elite	12 chars/inch
3. Micro	15 chars/inch
4. Condensed	17.1 chars/inch
5. Pica compressed	20 chars/inch
6. Elite compressed	24 chars/inch
7. Micro compressed	30 chars/inch

and in the following styles:

- emphasized
- double width
- superscript
- subscript
- double strike
- underline.

The following table shows the possible graphics layout combinations. The same character can be printed in 40 different modes, with the same spacing. The identical combination table can be repeated for other five programmable spacings, thus obtaining 200 different graphics layouts.

Possible Combinations

n	N	N.L.Q.	Em	DW	Sp	Sb	DS	Un
1	•							
2	•							•
3	•						•	
4	•						•	•
5	•					•		
6	•					•		•
7	•				•			
8	•				•			•
9	•			•				
10	•			•				•
11	•			•			•	
12	•			•			•	•
13	•			•		•		
14	•			•		•		•
15	•			•	•			
16	•			•	•			•
17	•		•					
18	•		•					•
19	•		•				•	
20	•		•				•	•
21	•		•			•		
22	•		•			•		•
23	•		•		•			
24	•		•		•			•
25	•		•	•				
26	•		•	•				•
27	•		•	•			•	
28	•		•	•			•	•
29	•		•	•		•		
30	•		•	•		•		•
31	•		•	•	•			
32	•		•	•	•			•
33		•						
34		•						•
35		•		•				
36		•		•				•
37		•	•					
38		•	•					•
39		•	•	•				
40		•	•	•				•

N = Normal (Draft)

NLQ = Near Letter Quality (N.L.Q.)

EM = Emphasized

DW = Double width

Sp = Superscript

Sb = Subscript

DS = Double Strike

Un = Underline

Appendix D

Control Code and Escape Sequence Summary

This appendix provides a quick reference to the MPS 1230's commands, in numerical order.

The MPS 1230 contains four printer command sets: Commodore, Epson FX-80, I.B.M. Proprinter and I.B.M. Graphics Printer.

The Commodore set is only available through the serial interface (Commodore 64/128).

Each command set is constituted from a list of commands:

- codes from 0 to 34 and from 127 to 159 (Decimal)
- Escape code, CHR\$(27), with different extensions: from 14 to 219 (Decimal)

In serial mode, many escape commands have two different codes for the extension: PETASCII or ASCII.

PETASCII escape sequences can be represented in two ways:

- 1) PRINT #1, CHR\$(27); (69);
- 2) PRINT #1, CHR\$(27); "E";

The first method represents the escape code sequence with two character codes, ESCAPE (27) and the ASCII value of the character "E". The second method allows the "E" to be represented as a string in quotes.

Printer control codes

Name	Dec	Hex	C	E	P	G	Function
NUL	0	00	s	■	■	■	Not operative when used alone
BEL	7	07				■	Not operative
BS	8	08		■	■	■	Print and backspace 1 character
BIM	8	08	s				Sets the BIM graphics printing
HT	9	09	s	■	■	■	Horizontal tab stops
LF	10	0A	s	■	■	■	Line Feed (Commodore: LF + CR fixed)
VT	11	0B	s	■	■	■	Vertical tab stops program
FF	12	0C	s	■	■	■	Form Feed
CR	13	0D		■	■	■	Carriage return
SO	14	0E		■	■	■	One-line Double width characters: ON
EN ON	14	0E	s				Double width characters: ON
SI	15	0F		■	■	■	Condensed (17.1 cpi): ON
EN OFF	15	0F	s				Double width characters: OFF
POS	16	10	s				Sets horiz. tab in n. of characters
DC1	17	11				■	Printer selection
CRSR DWN	17	11	s				Upper/lower case printing
DC2	18	12		■	■	■	Condensed (17.1 cpi): OFF
RVS ON	18	12	s				Reverse printing: ON
DC3	19	13				■	Printer de-selection
P OFF	19	13	s				Paging off
DC4	20	14		■	■	■	Double width characters: OFF
CAN	24	18		■	■	■	Clears print line buffer
SUB	26	1A	s				Bit Image repeat
ESC	27	1B	s	■	■	■	Escape
NLQ ON	31	1F	s				NLQ printing: ON
SP	32	20				■	Moves the print head one character pitch
" ON	34	22	s				Quote mode: ON
DEL	127	7F				■	Clear last character in print buffer
BS	136	88	s				Print and backspace 1 character
HT	137	89	s				Horizontal tab stops
LF	138	8A	s				Line Feed
FF	140	8C	s				Form Feed
CR	141	8D	s	s			Carriage return
SO	142	8E	s				One-line Double width char.: ON
SI	143	8F	s				Condensed (17.1 cpi): ON
CRSR UP	145	91	s				Upper case/graphics printing mode
DC2	146	92	s				Condensed (17.1 cpi): OFF
RVS OFF	146	92	s				Reverse printing: OFF
P ON	147	93	s				Paging on
DC4	148	94	s				Double width characters: OFF
CAN	152	98	s	s			Clears print buffer
ESC	155	9B	s	s			Escape
NLQ OFF	159	9F	s				NLQ printing: OFF

■ Command available with both the interfaces

s Command available only with the serial interface

C (Commodore set), E (Epson set), P (IBM P.P.set), G (IBM G.P. set)

Printer ESCAPE sequences (1)

Name	ASCII	PETASCII					
ESC	Hex	Hex	C	E	P	G	Function
CHR\$(27)	1B	1B					
ESC CHR\$(14)	0E	0E	s	■	■	■	One-line double width characters: ON
ESC CHR\$(15)	0F	0F	s	■	■	■	Condensed (17.1 cpi): ON
ESC CHR\$(16)	10	10	s				Sets horizontal tab in n. of dots
ESC CHR\$(18)	12	12	s	■	■	■	Condensed (17.1 cpi): OFF
ESC CHR\$(25)	19	19	s	■	■	■	Automatic sheet feeder (ON/OFF)
ESC !	21	21	s	■	■	■	Select graphics layout types
ESC #	23	23	s	■	■	■	Cancels bit code conversion
ESC \$	24	24	s	■	■	■	Absolute dot tab
ESC %	25	25	s	■			Select/cancels defined characters
ESC &	26	26	s	■			Define special characters (DLL Epson)
ESC *	2A	2A	s	■	■	■	Set graphics layout
ESC -	2D	2D	s	■	■	■	Underlined characters: ON/OFF
ESC /	2F	2F	s	■			Vertical tab stops program
ESC 0	30	30	s	■	■	■	Set 1/8" line spacing
ESC 1	31	31	s	■	■	■	Set 7/72" line spacing
ESC 2	32	32	s	■			Set 1/6" line spacing
ESC 2	32	32			■	■	Set 1/6" line spacing or execute ESC A
ESC 3	33	33	s	■	■	■	Set n/216 line spacing
ESC 4	34	34	s	■			Italic characters: ON
ESC 4	34	34			■	■	Set Top of Form
ESC 5	35	35	s	■			Italic characters: OFF
ESC 5	35	35			■	■	Automatic Line Feed: ON/OFF
ESC 6	36	36	s	■			Set extended Italic table
ESC 6	36	36			p	p	IBM Table 2 selection
ESC 7	37	37	s	■			Select basic national character table
ESC 7	37	37			p	p	IBM Table 1 selection
ESC 8	38	38	s	■	■	■	Disables paper out sensor
ESC 9	39	39	s	■	■	■	Enables paper out sensor
ESC :	3A	3A	s	■			Copy standard characters
ESC ;	3A	3A			■	■	Select elite pitch (12 cpi)
ESC <	3C	3C	s	■	■	■	Set one-line unidirectional printing
ESC =	3D	3D	s	■			Set low-bit
ESC =	3D	3D			■	■	Defines characters (DLL IBM)
ESC >	3E	3E	s	■	■	■	Set high-bit
ESC ?	3F	3F	s	■	■	■	Change graphic mode
ESC @	40	40	s	■	■	■	Resets printer to default settings
ESC A	41	C1	s	■	■	■	Set n/72" line spacing
ESC B	42	C2	s	■	■	■	Vertical tab stops program
ESC C	43	C3	s	■	■	■	Set page length to n lines
ESC C 0	43	C3	s	■	■	■	Set page length to n inches
ESC D	44	C4	s	■	■	■	Horizontal tab stops program
ESC E	45	C5	s	■	■	■	Emphasized printing: ON

Printer ESCAPE sequences (1)

Name	ASCII	PETASCII					
ESC	Hex	Hex	C	E	P	G	Function
CHR\$(27)	1B	1B					
ESC F	46	C6	s	■	■	■	Emphasized printing: OFF
ESC G	47	C7	s	■	■	■	Double strike printing: ON
ESC H	48	C8	s	■	■	■	Double strike printing: OFF
ESC I	49	C9	s	■	■	■	Select print definition
ESC J	4A	CA	s	■	■	■	One-time line feed n/216"
ESC K	4B	CB	s	■	■	■	Set single density graphic (60 dot")
ESC L	4C	CC	s	■	■	■	Set double density graphic (120 dot")

Printer ESCAPE sequences (2)

Name	ASCII	PETASCII								
ESC	Hex	Hex								
CHR\$(27)	1B	1B	C	E	P	G	Function			
ESC M	4D	CD	s	■	■	■	Select elite pitch (12 cpi)			
ESC N	4E	CE	s	■	■	■	Set Bottom of Form			
ESC O	4F	CF	s	■	■	■	Clear Bottom of Form			
ESC P	50	D0	s	■	■	■	Select pica pitch (10 cpi)			
ESC Q	51	D1	s	■	Set right margin					
ESC Q	51	D1		■	De-select printer					
ESC R	52	D2	s	■	Select national character set					
ESC R	52	D2		■	■	Clear all the tab stops				
ESC S 0	53	D3	s	■	■	■	Set Superscript printing			
ESC S 1	53	D3	s	■	■	■	Set Subscript printing			
ESC T	54	D4	s	■	■	■	Cancels super/subscript printing			
ESC U	55	D5	s	■	■	■	Mono/bidirectional printing			
ESC W	57	D7	s	■	■	■	Double width characters: ON/OFF			
ESC Y	59	D9	s	■	■	■	Set double density graphic (120 dot/i)			
ESC Z	5A	DA	s	■	■	■	Set quadruple density graphic (240 d/i)			
ESC [	5B	DB		■	Select horizontal spacing					
ESC &	5C	5C	s	Relative dot tab						
ESC \	5C	5C		■	Relative dot tab					
ESC \	5C	5C		■	■	Print n characters from extended table				
ESC ^	5E	5E	s	■	Set 9 dots graphics					
ESC ^	5E	5E		■	■	Print 1 char. from extended table				
ESC _	5F	5F		■	■	Overline: ON/OFF				
ESC b	62	42	s	■	■	■	Vertical tab stops program			
ESC e 0	65	45	s	■	■	■	Set htabs every n columns			
ESC e 1	65	45	s	■	■	■	Set vtabs every n lines			
ESC f 1	66	46	s	■	■	■	Advances the paper			
ESC i	69	49	s	■	Immediate character printing: ON/OFF					
ESC j	6A	4A	s	■	Reverse paper feed: n/216"					
ESC l	6C	4C	s	■	■	■	Set left margin			
ESC p	70	50	s	■	■	■	Proportional spacing: ON/OFF			
ESC r	72	52	s	■	■	■	Reverse printing: ON			
ESC s	73	53	s	■	■	■	Half speed printing: ON/OFF			
ESC t	74	54	s	■	■	■	Reverse printing: OFF			
ESC x	5F	5F	s	■	■	■	Select NLQ or Draft printing			
ESC ~ 2 n	7E	7E	s	■	■	■	Reverse printing: ON/OFF (n = 1/0)			
ESC ~ 3 n	7E	7E	s	■	■	■	Select master pitch (n = 0,1,2,5,6,7)			
ESC ~ 4 n	7E	7E	s	■	■	■	Slashed zero: ON/OFF (n = 1/0)			
ESC ~ 5 n	7E	7E	s	■	■	■	Switching: Epson, Commodore, IBM Proprinter, IBM Graphic Printer (n = 0,1,2,3)			

■ Command available with the parallel and serial interface

s Command available only with the serial interface

p Command available only with the parallel interface

C (Commodore set), E (Epson set), P (IBM P.P.set), G (IBM G.P. set)

Appendix E

Individual Command Code

and Escape Sequence

Tables

COMMODORE COMMANDS

Code			Description (Secondary Address = 7)
ASCII	Dec.	Hex.	
BIT IMG	8	08	Sets the BIM graphics printing
BIT IMG	8 26	08 1A	Sets the repeated printing of BIM data
SUB			
LF	10	0A	Line feed (plus a carriage return)
FF	12	0C	Sends a carriage return and advances the paper to top of form
CR	13	0D	Sends a carriage return and line feed
EN ON	14	0E	Double width printing: ON print output
EN OFF	15	0F	Double width printing: OFF
PQS	16	10	Sets the horizontal tab in number of characters
CRSR DWN	17	11	Upper/lower case printing
RVS ON	18	12	Reverse printing: ON
ESC	27	1B	ASCII code for Escape
NLQ ON	31	1F	NLQ printing: ON
ESC POS	16	10	Sets the horizontal tab in number of dots
ESC -	45	2D	Underline: ON/OFF
ESC 8	56	38	Out-of-paper: disabled
ESC 9	58	39	Out-of-paper: enabled
ESC =	61	3D	Down Line Loading of user characters
ESC c	67	43	Sets form length in number of lines
ESC c NUL	67 0	43 0	Sets form length in number of inches
ESC e	69	45	Emphasized printing: ON
ESC f	70	46	Emphasized printing: OFF
ESC g	71	47	Double strike printing: ON
ESC h	72	48	Double strike printing: OFF
ESC i	73	49	Selects print definition
ESC n	78	4E	Defines bottom of form (BOF)
ESC o	79	4F	Clear bottom of form (BOF)
ESC s	83	53	Superscript/subscript printing
ESC t	84	54	Clear superscript/subscript printing
ESC l	91	5B	Print style selection
ESC X	120	78	DRAFT/NLQ print mode selection
CS	141	8D	Print and perform a carriage return
CRSR UP	145	91	Upper case printing
RVS OFF	146	92	Reverse printing: OFF
NLQ OFF	159	9F	NLQ printing: OFF

Figure E-1 Commodore Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

IBM Proprinter

Code			Description
ASCII	Dec.	Hex.	
NUL	0	00	Not operative when used alone
BEL	7	07	Not operative
BS	8	08	Print and backspace 1 character
HT	9	09	Horizontal tab stops
LF	10	0A	Line feed
VT	11	0B	Line feed or next programmed tab stop
FF	12	0C	Form feed
CR	13	0D	Print buffer
SO	14	0E	Double width characters: ON
SI	15	0F	17.1 chars/inch (condensed): ON
DC1	17	11	Printer selection
DC2	18	12	17.1 chars/inch (condensed): OFF
DC3	19	13	No operation
DC4	20	14	Double width characters: OFF
CAN	24	18	Clears print buffer
ESC	27	1B	ASCII code for Escape
SP	32	20	Moves the print head one character pitch
ESC -	45	2D	Underline: ON/OFF
ESC 0	48	30	Spacing = 1/8" (3.175 mm)
ESC 1	49	31	Spacing = 7/72" (2.47 mm)
ESC 2	50	32	Spacing = 1/6" (4.23 mm)
ESC 2	50	32	ESC A execution command
ESC 3	51	33	Spacing = n/216" (n x 0.1176 mm)
ESC 4	52	34	Set Top of Form (TOF)
ESC 5	53	35	Automatic LF: ON/OFF (Toggle)
ESC 6	54	36	IBM Table 2 selection
ESC 7	55	37	IBM Table 1 selection
ESC :	58	3A	Print pitch = 1/12"

Figure E-2 I.B.M. Proprinter Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
ESC =	61	3D	Down Line Loading of user characters (DLL)
ESC A	65	41	Spacing = $n/72''$ ($n \times 0.3528$ mm)
ESC B	66	42	Vertical tab stops program
ESC C	67	43	Set form length in number of lines
ESC C NUL	67 0	43 00	Set form length in number of inches
ESC D	68	44	Horizontal tab stops program
ESC E	69	45	Emphasized printing: ON
ESC F	70	46	Emphasized printing: OFF
ESC G	71	47	Double strike printing: ON
ESC H	72	48	Double strike printing: OFF
ESC I	73	49	Select print definition
ESC J	74	4A	Paper skip = $n/216''$
ESC K	75	4B	60 dots/inch BIM selection
ESC L	76	4C	120 dots/inch BIM selection
ESC N	78	4E	Define bottom of form (BOF)
ESC O	79	4F	Clear bottom of form
ESC Q	81	51	De-select printer
ESC R	82	52	Clear tab stops
ESC S	83	53	Superscript/subscript printing
ESC T	84	54	Clear superscript/subscript printing
ESC U	85	55	Mono/bidirectional printing
ESC W	87	57	Double width characters: ON/OFF
ESC Y	89	59	120 dots/inch BIM selection, double speed
ESC Z	90	5A	240 dots/inch BIM selection
ESC \	92	5C	Print n characters from extended table
ESC ^	94	5E	Print one character from extended table
ESC _	95	5F	Overline: ON/OFF

Figure E-2 I.B.M. Proprinter Command Summary Table (con't.)

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
NUL	0	00	Not operative when used alone
BS	8	08	Print and backspace 1 character
HT	9	09	Horizontal tab stops
LF	10	0A	Line feed
VT	11	0B	Line feed
FF	12	0C	Paper skip at module beginning
CR	13	0D	Print buffer
SO	14	0E	Double width characters: ON
SI	15	0F	17.1 chars/inch (condensed): ON
DC2	18	12	17.1 chars/inch (condensed): OFF
DC4	20	14	Double width characters: OFF
CAN	24	18	Clears print buffer
ESC	27	1B	ASCII code for Escape
ESC SO	14	0E	Double width characters: ON
ESC -	45	2D	Underline: ON/OFF
ESC 0	48	30	Spacing = 1/8" (3.175 mm)
ESC 1	49	31	Spacing = 7/72" (2.47 mm)
ESC 2	50	32	Spacing = 1/6" (4.23 mm)
ESC 3	51	33	Spacing = n/216" (n x 0.1176 mm)
ESC 6	54	36	IBM Table 2 selection
ESC 7	55	37	IBM Table 1 selection
ESC 8	56	38	Out of paper microswitch: disabled
ESC 9	57	39	Out of paper microswitch: enabled
ESC =	61	3D	Down line loading of user characters (DLL)
ESC A	65	41	Spacing = n/72" (n x 0.3528 mm)
ESC C	67	43	Set form length in number of lines
ESC C NUL	67 0	43 00	Set form length in number of inches
ESC D	68	44	Horizontal tab stops program
ESC E	69	45	Emphasized printing: ON

Figure E-3 I.B.M. Graphics Printer Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
ESC F	70	46	Emphasized printing: OFF
ESC G	71	47	Double strike printing: ON
ESC H	72	48	Double strike printing: OFF
ESC I	73	49	Select print definition
ESC J	74	4A	Paper skip = n/216"
ESC K	75	4B	60 dots/inch BIM selection
ESC L	76	4C	120 dots/inch BIM selection
ESC M	77	4D	Print pitch = 1/12": ON
ESC N	78	4E	Define bottom of form (BOF)
ESC O	79	4F	Clear bottom of form
ESC S	83	53	Superscript/subscript printing
ESC T	84	54	Clear superscript/subscript printing
ESC U	85	55	Recognized, not operative
ESC W	87	57	Double width characters: ON/OFF
ESC Y	89	59	120 dots/inch BIM selection, double speed
ESC Z	90	5A	240 dots/inch BIM selection
ESC [	91	5B	Select horizontal spacing
ESC x	120	78	Print mode DRAFT/NLQ definition

Figure E-3 L.B.M. Graphics Printer Command Summary Table (con't.)

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
NUL	0	00	Not operative when used alone
BS	8	08	Print and backspace 1 character
HT	9	09	Horizontal tab stops
LF	10	0A	Line feed
VT	11	0B	Vertical tab stops program
FF	12	0C	Paper skip to top of form
CR	13	0D	Carriage return and print
SO	14	0E	Double width characters: ON
SI	15	0F	17.1 chars/inch (condensed): ON
DC1	17	11	Printer selection
DC2	18	12	17.1 chars/inch (condensed): OFF
DC3	19	13	Printer de-selection
DC4	20	14	Double width characters: OFF
CAN	24	18	Clears print buffer
ESC SO	14	0E	Same as SO
ESC SI	15	0F	Same as SI
ESC !	33	21	Select graphics layout types
ESC #	35	23	Clear bit 2 ⁷ forcing (MSB)
ESC %	37	25	Select RAM (special characters) and ROM (standard characters)
ESC &	38	26	Define special characters by charging in RAM
ESC *	42	2A	Set graphics layout in different density
ESC -	45	2D	Underline: ON/OFF
ESC /	47	2F	Vertical tab stops program
ESC 0	48	30	Spacing = 1/8" (3.175 mm)
ESC 1	49	31	Spacing = 7/72" (2.47 mm)
ESC 2	50	32	Spacing = 1/6" (4.23 mm)
ESC 3	51	33	Spacing = n/216" (n x 0.1176 mm)

Figure E-4 Epson Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
ESC 4	52	34	Italic characters: ON
ESC 5	53	35	Italic characters: OFF
ESC 6	54	36	Extend printable characters set
ESC 7	55	37	Select basic national characters table
ESC 8	56	38	Out of paper microswitch: disabled
ESC 9	57	39	Out of paper microswitch: enabled
ESC :	58	3A	Copy standard character generator (ROM) into RAM
ESC <	60	3C	Set left to right printing for one line
ESC =	61	3D	Force 2 ⁷ bit (MSB) to "0"
ESC >	62	3E	Force 2 ⁷ bit (MSB) to "1"
ESC ?	63	3F	Change BIM density selected by graphics commands
ESC @	64	40	Initialize printer (main reset)
ESC A	65	41	Spacing = $n/72$; (n x 0.3528 mm)
ESC B	66	42	Vertical tab stops program
ESC C	67	43	Set form length in number of lines
ESC C NUL	67 00	43 00	Set form length in number of inches
ESC D	68	44	Horizontal tab stops program
ESC E	69	45	Emphasized printing: ON
ESC F	70	46	Emphasized printing: OFF
ESC G	71	47	Double strike and NLQ printing: ON
ESC H	72	48	Double strike printing: OFF, normal printing (DRAFT): ON
ESC I	73	49	Extend printable characters set
ESC J	74	4A	Print buffer and skip $n/216$ of paper
ESC K	75	4B	Set normal density graphics
ESC L	76	4C	Set double density graphics, half speed

Figure E-4 (con't.) Epson Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Code			Description
ASCII	Dec.	Hex.	
ESC M	77	4D	Print pitch = 1/12" (Elite): ON
ESC N	78	4E	Define bottom of form (BOF) in lines
ESC O	79	4F	Clear bottom of form
ESC P	80	50	Print pitch = 1/12" (Elite): OFF
ESC Q	81	51	Define right margin
ESC R	82	52	Select national character set
ESC S	83	53	Superscript/subscript printing
ESC T	84	54	Clear superscript/subscript printing
ESC U	85	30	Mono/Bidirectional printing
ESC W	87	57	Double width characters: ON/OFF
ESC Y	89	59	Double density BIM selection, normal speed
ESC Z	90	5A	Four times density BIM selection
ESC ^	94	5E	9-dot high strips BIM printing
ESC b	98	62	Select up to 8 vertical tab stops programs
ESC i	105	69	Immediate character printing: ON/OFF
ESC j	106	6A	Reverse paper feed: n/216"
ESC l	108	6C	Define left margin
ESC p	112	70	Proportional spacing: ON/OFF
ESC s	115	73	Half speed printing: ON/OFF
ESC x	120	78	Print mode DRAFT/NLQ definition
DEL	127	7F	Clear last printable character in print buffer

Figure E-4 (con't.) Epson Command Summary Table

Note: All of the codes preceded by ESC (Escape) in the ASCII column in the above table should be preceded by 27 (decimal) or 1B (Hex.) in your program.

Appendix F: PETASCII Uppercase/ Graphics Character Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	space	64	40	@	96	60	—
1	01	none	33	21	!	65	41	A	97	61	■
2	02	none	34	22	"	66	42	B	98	62	|
3	03	none	35	23	#	67	43	C	99	63	—
4	04	none	36	24	\$	68	44	D	100	64	—
5	05	none	37	25	%	69	45	E	101	65	—
6	06	none	38	26	&	70	46	F	102	66	—
7	07	none	39	27	'	71	47	G	103	67	|
8	08	BS	40	28	(	72	48	H	104	68	|
9	09	HT	41	29	)	73	49	I	105	69	~
10	0A	LF	42	2A	*	74	4A	J	106	6A	~
11	0B	VT	43	2B	+	75	4B	K	107	6B	~
12	0C	FF	44	2C	,	76	4C	L	108	6C	L
13	0D	CR	45	2D	-	77	4D	M	109	6D	~
14	0E	SO	46	2E	.	78	4E	N	110	6E	~
15	0F	SI	47	2F	/	79	4F	O	111	6F	┘
16	10	POS	48	30	0	80	50	P	112	70	┘
17	11	CRSR DWN	49	31	1	81	51	Q	113	71	■
18	12	DC2	50	32	2	82	52	R	114	72	—
19	13	DC3	51	33	3	83	53	S	115	73	■
20	14	DC4	52	34	4	84	54	T	116	74	|
21	15	none	53	35	5	85	55	U	117	75	~
22	16	none	54	36	6	86	56	V	118	76	×
23	17	none	55	37	7	87	57	W	119	77	○
24	18	CAN	56	38	8	88	58	X	120	78	■
25	19	none	57	39	9	89	59	Y	121	79	|
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	■
27	1B	ESC	59	3B	;	91	5B	[	123	7B	+
28	1C	none	60	3C	<	92	5C	\	124	7C	■
29	1D	none	61	3D	=	93	5D	]	125	7D	|
30	1E	none	62	3E	>	94	5E	^	126	7E	π
31	1F	NLQ ON	63	3F	?	95	5F	_	127	7F	▼

Figure F-1 PETASCII Uppercase/Graphics Characters

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	SHT SP	192	C0	—	224	E0	space
129	81	none	161	A1	█	193	C1	█	225	E1	█
130	82	none	162	A2	█	194	C2	|	226	E2	█
131	83	none	163	A3	—	195	C3	—	227	E3	—
132	84	none	164	A4	|	196	C4	—	228	E4	—
133	85	none	165	A5	|	197	C5	—	229	E5	|
134	86	none	166	A6	█	198	C6	—	230	E6	█
135	87	none	167	A7	|	199	C7	|	231	E7	|
136	88	BS	168	A8	█	200	C8	|	232	E8	█
137	89	HT	169	A9	▾	201	C9	↘	233	E9	▾
138	8A	LF	170	AA	|	202	CA	↘	234	EA	|
139	8B	VT	171	AB	┆	203	CB	↘	235	EB	┆
140	8C	FF	172	AC	█	204	CC	L	236	EC	█
141	8D	CS	173	AD	L	205	CD	↘	237	ED	L
142	8E	SO	174	AE	┆	206	CE	↘	238	EE	┆
143	8F	SI	175	AF	—	207	CF	┆	239	EF	—
144	90	none	176	B0	┆	208	D0	┆	240	F0	┆
145	91	CRSR UP	177	B1	┆	209	D1	●	241	F1	┆
146	92	DC2	178	B2	T	210	D2	—	242	F2	T
147	93	DC3	179	B3	┆	211	D3	●	243	F3	┆
148	94	DC4	180	B4	|	212	D4	|	244	F4	|
149	95	none	181	B5	█	213	D5	↘	245	F5	█
150	96	none	182	B6	█	214	D6	×	246	F6	█
151	97	none	183	B7	—	215	D7	○	247	F7	—
152	98	CAN	184	B8	—	216	D8	█	248	F8	—
153	99	none	185	B9	█	217	D9	|	249	F9	█
154	9A	none	186	BA	┆	218	DA	⊕	250	FA	┆
155	9B	ESC	187	BB	█	219	DB	+	251	FB	█
156	9C	none	188	BC	█	220	DC	█	252	FC	█
157	9D	none	189	BD	┆	221	DD	|	253	FD	┆
158	9E	none	190	BE	█	222	DE	π	254	FE	█
159	9F	NLQ OFF	191	BF	█	223	DF	█	255	FF	π

Figure F-1 PETASCII Uppercase/Graphics Characters (cont.)

Appendix G: PETASCII Upper/ Lowercase Characters

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	space	64*	40	@	96*	60	-
1	01	none	33	21	!	65	41	a	97	61	A
2	02	none	34	22	"	66	42	b	98	62	B
3	03	none	35*	23	#	67	43	c	99	63	C
4	04	none	36*	24	\$	68	44	d	100	64	D
5	05	none	37	25	%	69	45	e	101	65	E
6	06	none	38	26	&	70	46	f	102	66	F
7	07	none	39	27	'	71	47	g	103	67	G
8	08	BS	40	28	(	72	48	h	104	68	H
9	09	HT	41	29	)	73	49	i	105	69	I
10	0A	LF	42	2A	*	74	4A	j	106	6A	J
11	0B	VT	43	2B	+	75	4B	k	107	6B	K
12	0C	FF	44	2C	,	76	4C	l	108	6C	L
13	0D	CR	45	2D	-	77	4D	m	109	6D	M
14	0E	SO	46	2E	.	78	4E	n	110	6E	N
15	0F	SI	47	2F	/	79	4F	o	111	6F	O
16	10	POS	48	30	0	80	50	p	112	70	P
17	11	CRSR DWN	49	31	1	81	51	q	113	71	Q
18	12	DC2	50	32	2	82	52	r	114	72	R
19	13	DC3	51	33	3	83	53	s	115	73	S
20	14	DC4	52	34	4	84	54	t	116	74	T
21	15	none	53	35	5	85	55	u	117	75	U
22	16	none	54	36	6	86	56	v	118	76	V
23	17	none	55	37	7	87	57	w	119	77	W
24	18	CAN	56	38	8	88	58	x	120	78	X
25	19	none	57	39	9	89	59	y	121	79	Y
26	1A	SUB	58	3A	:	90	5A	z	122	7A	Z
27	1B	ESC	59	3B	;	91*	5B	[	123*7B		+
28	1C	none	60	3C	<	92*	5C	]	124*7C		*
29	1D	none	61	3D	=	93*	5D	^	125*7D		!
30	1E	none	62	3E	>	94*	5E	_	126*7E		~
31	1F	NLQ ON	63	3F	?	95	5F	~	127	7F	~

Figure G-1 PETASCII Upper/Lower Case Characters

Note: These characters may be different if you are using an international character set other than the Commodore set. See Chapter 8, Commodore Serial National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	SHT SP	192	C0	—	224	E0	space
129	81	none	161	A1	█	193	C1	A	225	E1	█
130	82	none	162	A2	▀	194	C2	B	226	E2	▀
131	83	none	163	A3	▄	195	C3	C	227	E3	▄
132	84	none	164	A4	▀	196	C4	D	228	E4	▀
133	85	none	165	A5	|	197	C5	E	229	E5	|
134	86	none	166	A6	▒	198	C6	F	230	E6	▒
135	87	none	167	A7	|	199	C7	G	231	E7	|
136	88	BS	168	A8	▒	200	C8	H	232	E8	▒
137	89	HT	169	A9	▒	201	C9	I	233	E9	▒
138	8A	LF	170	AA	|	202	CA	J	234	EA	|
139	8B	VT	171	AB	┆	203	CB	K	235	EB	┆
140	8C	FF	172	AC	█	204	CC	L	236	EC	█
141	8D	CS	173	AD	└	205	CD	M	237	ED	└
142	8E	SO	174	AE	┌	206	CE	N	238	EE	┌
143	8F	SI	175	AF	▒	207	CF	O	239	EF	▒
144	90	none	176	B0	▒	208	D0	P	240	F0	▒
145	91	CRSR UP	177	B1	┆	209	D1	Q	241	F1	┆
146	92	DC2	178	B2	┆	210	D2	R	242	F2	┆
147	93	DC3	179	B3	┆	211	D3	S	243	F3	┆
148	94	DC4	180	B4	|	212	D4	T	244	F4	|
149	95	none	181	B5	█	213	D5	U	245	F5	█
150	96	none	182	B6	█	214	D6	V	246	F6	█
151	97	none	183	B7	▒	215	D7	W	247	F7	▒
152	98	CAN	184	B8	▒	216	D8	X	248	F8	▒
153	99	none	185	B9	▒	217	D9	Y	249	F9	▒
154	9A	none	186	BA	▒	218	DA	Z	250	FA	▒
155	9B	ESC	187	BB	█	219	DB	+	251	FB	█
156	9C	none	188	BC	█	220	DC	▒	252	FC	█
157	9D	none	189	BD	┆	221	DD	|	253	FD	┆
158	9E	none	190	BE	█	222	DE	▒	254	FE	█
159	9F	NLQ OFF	191	BF	▒	223	DF	▒	255	FF	▒

Figure G-1 PETASCII Upper/Lower Case Characters (cont.)

Appendix H: ASCII Character Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	space	64*	40	@	96*	60	—
1	01	none	33	21	!	65	41	A	97	61	a
2	02	none	34	22	"	66	42	B	98	62	b
3	03	none	35*	23	#	67	43	C	99	63	c
4	04	none	36*	24	\$	68	44	D	100	64	d
5	05	none	37	25	%	69	45	E	101	65	e
6	06	none	38	26	&	70	46	F	102	66	f
7	07	none	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	POS	48	30	0	80	50	P	112	70	p
17	11	CRSR DWN	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	none	53	35	5	85	55	U	117	75	u
22	16	none	54	36	6	86	56	V	118	76	v
23	17	none	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	none	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91*	5B	[	123*7B		+
28	1C	none	60	3C	<	92*	5C	£	124*7C		£
29	1D	none	61	3D	=	93*	5D	]	125*7D		|
30	1E	none	62	3E	>	94*	5E	†	126*7E		†
31	1F	NLQ ON	63	3F	?	95	5F	+	127 7F		⌘

Figure H-1 ASCII Character Set

Note: These characters may be different if you are using an international character set. See Chapter 9, I.B.M. and Epson National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	SHT SP	192	C0	—	224	E0	space
129	81	none	161	A1	█	193	C1	A	225	E1	█
130	82	none	162	A2	▣	194	C2	B	226	E2	▣
131	83	none	163	A3	▤	195	C3	C	227	E3	▤
132	84	none	164	A4	▥	196	C4	D	228	E4	▥
133	85	none	165	A5	▦	197	C5	E	229	E5	▦
134	86	none	166	A6	▧	198	C6	F	230	E6	▧
135	87	none	167	A7	▨	199	C7	G	231	E7	▨
136	88	BS	168	A8	▩	200	C8	H	232	E8	▩
137	89	HT	169	A9	▪	201	C9	I	233	E9	▪
138	8A	LF	170	AA	▫	202	CA	J	234	EA	▫
139	8B	VT	171	AB	▬	203	CB	K	235	EB	▬
140	8C	FF	172	AC	▭	204	CC	L	236	EC	▭
141	8D	CS	173	AD	▮	205	CD	M	237	ED	▮
142	8E	SO	174	AE	▯	206	CE	N	238	EE	▯
143	8F	SI	175	AF	▰	207	CF	O	239	EF	▰
144	90	none	176	B0	▱	208	D0	P	240	F0	▱
145	91	CRSR UP	177	B1	▲	209	D1	Q	241	F1	▲
146	92	DC2	178	B2	△	210	D2	R	242	F2	△
147	93	DC3	179	B3	▴	211	D3	S	243	F3	▴
148	94	DC4	180	B4	▵	212	D4	T	244	F4	▵
149	95	none	181	B5	▶	213	D5	U	245	F5	▶
150	96	none	182	B6	▷	214	D6	V	246	F6	▷
151	97	none	183	B7	▸	215	D7	W	247	F7	▸
152	98	CAN	184	B8	▹	216	D8	X	248	F8	▹
153	99	none	185	B9	►	217	D9	Y	249	F9	►
154	9A	none	186	BA	▻	218	DA	Z	250	FA	▻
155	9B	ESC	187	BB	▼	219	DB	+	251	FB	▼
156	9C	none	188	BC	▽	220	DC	×	252	FC	▽
157	9D	none	189	BD	▾	221	DD	|	253	FD	▾
158	9E	none	190	BE	▿	222	DE	⊗	254	FE	▿
159	9F	NLQ OFF	191	BF	⊘	223	DF	⊙	255	FF	⊙

Figure H-1 ASCII Character Set (cont.)

Appendix I: Epson Standard Character Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	space	64	40	@	96	60	`
1	01	none	33	21	!	65	41	A	97	61	a
2	02	none	34	22	"	66	42	B	98	62	b
3	03	none	35	23	#	67	43	C	99	63	c
4	04	none	36	24	\$	68	44	D	100	64	d
5	05	none	37	25	%	69	45	E	101	65	e
6	06	none	38	26	&	70	46	F	102	66	f
7	07	none	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	none	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	none	53	35	5	85	55	U	117	75	u
22	16	none	54	36	6	86	56	V	118	76	v
23	17	none	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	none	57	39	9	89	59	Y	121	79	y
26	1A	none	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	none	60	3C	<	92	5C	\	124	7C	|
29	1D	none	61	3D	=	93	5D	]	125	7D	}
30	1E	none	62	3E	>	94	5E	^	126	7E	~
31	1F	none	63	3F	?	95	5F	-	127	7F	DEL

Figure I-1 Epson Standard Characters

Note: These characters may be different if you are using an international character set. See Chapter 9, I.B.M. and Epson National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	space	192	C0	@	224	E0	`
129	81	none	161	A1	!	193	C1	A	225	E1	a
130	82	none	162	A2	"	194	C2	B	226	E2	b
131	83	none	163	A3	#	195	C3	C	227	E3	c
132	84	none	164	A4	\$	196	C4	D	228	E4	d
133	85	none	165	A5	%	197	C5	E	229	E5	e
134	86	none	166	A6	&	198	C6	F	230	E6	f
135	87	none	167	A7	'	199	C7	G	231	E7	g
136	88	BS	168	A8	(	200	C8	H	232	E8	h
137	89	HT	169	A9	)	201	C9	I	233	E9	i
138	8A	LF	170	AA	*	202	CA	J	234	EA	j
139	8B	VT	171	AB	+	203	CB	K	235	EB	k
140	8C	FF	172	AC	,	204	CC	L	236	EC	l
141	8D	CR	173	AD	-	205	CD	M	237	ED	m
142	8E	SO	174	AE	.	206	CE	N	238	EE	n
143	8F	SI	175	AF	/	207	CF	O	239	EF	o
144	90	none	176	B0	0	208	D0	P	240	F0	p
145	91	DC1	177	B1	1	209	D1	Q	241	F1	q
146	92	DC2	178	B2	2	210	D2	R	242	F2	r
147	93	DC3	179	B3	3	211	D3	S	243	F3	s
148	94	DC4	180	B4	4	212	D4	T	244	F4	t
149	95	none	181	B5	5	213	D5	U	245	F5	u
150	96	none	182	B6	6	214	D6	V	246	F6	v
151	97	none	183	B7	7	215	D7	W	247	F7	w
152	98	CAN	184	B8	8	216	D8	X	248	F8	x
153	99	none	185	B9	9	217	D9	Y	249	F9	y
154	9A	none	186	BA	:	218	DA	Z	250	FA	z
155	9B	ESC	187	BB	;	219	DB	[	251	FB	{
156	9C	none	188	BC	<	220	DC	\	252	FC	|
157	9D	none	189	BD	=	221	DD	]	253	FD	}
158	9E	none	190	BE	>	222	DE	^	254	FE	~
159	9F	none	191	BF	?	223	DF	_	255	FF	

Figure I-1 Epson Standard Characters (cont.)

Appendix J: Epson Graphics Character Table

N.B.: This table has not been implemented in our MPS 1230 printer.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00		32	20	space	64	40	@	96	60	,
1	01		33	21	!	65	41	A	97	61	a
2	02		34	22	"	66	42	B	98	62	b
3	03		35	23	#	67	43	C	99	63	c
4	04		36	24	\$	68	44	D	100	64	d
5	05		37	25	%	69	45	E	101	65	e
6	06		38	26	&	70	46	F	102	66	f
7	07		39	27	'	71	47	G	103	67	g
8	08		40	28	(	72	48	H	104	68	h
9	09		41	29	)	73	49	I	105	69	i
10	0A		42	2A	*	74	4A	J	106	6A	j
11	0B		43	2B	+	75	4B	K	107	6B	k
12	0C		44	2C	.	76	4C	L	108	6C	l
13	0D		45	2D	-	77	4D	M	109	6D	m
14	0E		46	2E	.	78	4E	N	110	6E	n
15	0F		47	2F	/	79	4F	O	111	6F	o
16	10		48	30	0	80	50	P	112	70	p
17	11		49	31	1	81	51	Q	113	71	q
18	12		50	32	2	82	52	R	114	72	r
19	13		51	33	3	83	53	S	115	73	s
20	14		52	34	4	84	54	T	116	74	t
21	15		53	35	5	85	55	U	117	75	u
22	16		54	36	6	86	56	V	118	76	v
23	17		55	37	7	87	57	W	119	77	w
24	18		56	38	8	88	58	X	120	78	x
25	19		57	39	9	89	59	Y	121	79	y
26	1A		58	3A	:	90	5A	Z	122	7A	z
27	1B		59	3B	;	91	5B	[	123	7B	{
28	1C		60	3C	<	92	5C	\	124	7C	|
29	1D		61	3D	=	93	5D	]	125	7D	}
30	1E		62	3E	>	94	5E	^	126	7E	~
31	1F		63	3F	?	95	5F	-	127	7F	

Figure J-1 Epson Graphics Characters

Note: These characters may be different if you are using an international character set other than the Commodore set. See Chapter 8, Commodore Serial National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	+	160	A0		192	C0	@	224	E0	'
129	81	⊥	161	A1	!	193	C1	A	225	E1	a
130	82	⊥	162	A2	"	194	C2	B	226	E2	b
131	83	⊥	163	A3	#	195	C3	C	227	E3	c
132	84	⊥	164	A4	\$	196	C4	D	228	E4	d
133	85	—	165	A5	%	197	C5	E	229	E5	e
134	86	|	166	A6	&	198	C6	F	230	E6	f
135	87	┌	167	A7	'	199	C7	G	231	E7	g
136	88	┐	168	A8	(	200	C8	H	232	E8	h
137	89	|	169	A9	)	201	C9	I	233	E9	i
138	8A	└	170	AA	*	202	CA	J	234	EA	j
139	8B	▣	171	AB	+	203	CB	K	235	EB	k
140	8C	▣	172	AC	,	204	CC	L	236	EC	l
141	8D	▣	173	AD	-	205	CD	M	237	ED	m
142	8E	▣	174	AE	.	206	CE	N	238	EE	n
143	8F	•	175	AF	/	207	CF	O	239	EF	o
144	90	◦	176	B0	0	208	D0	P	240	F0	p
145	91	♠	177	B1	1	209	D1	Q	241	F1	q
146	92	♥	178	B2	2	210	D2	R	242	F2	r
147	93	♦	179	B3	3	211	D3	S	243	F3	s
148	94	♣	180	B4	4	212	D4	T	244	F4	t
149	95	♠	181	B5	5	213	D5	U	245	F5	u
150	96	♠	182	B6	6	214	D6	V	246	F6	v
151	97	♠	183	B7	7	215	D7	W	247	F7	w
152	98	♠	184	B8	8	216	D8	X	248	F8	x
153	99	⊂	185	B9	9	217	D9	Y	249	F9	y
154	9A	♠	186	BA	:	218	DA	Z	250	FA	z
155	9B	↑	187	BB	;	219	DB	[	251	FB	{
156	9C	↓	188	BC	<	220	DC	\	252	FC	|
157	9D	×	189	BD	=	221	DD	]	253	FD	}
158	9E	÷	190	BE	>	222	DE	^	254	FE	
159	9F	±	191	BF	?	223	DF	—	255	FF	

Figure J-1 Epson Graphics Characters (cont.)

Appendix K: I.B.M. Graphics- Character Set 1

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	space	64	40	@	96	60	`
1	01	none	33	21	!	65	41	A	97	61	a
2	02	none	34	22	"	66	42	B	98	62	b
3	03	none	35	23	#	67	43	C	99	63	c
4	04	none	36	24	\$	68	44	D	100	64	d
5	05	none	37	25	%	69	45	E	101	65	e
6	06	none	38	26	&	70	46	F	102	66	f
7	07	none	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	none	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	none	53	35	5	85	55	U	117	75	u
22	16	none	54	36	6	86	56	V	118	76	v
23	17	none	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	none	57	39	9	89	59	Y	121	79	y
26	1A	none	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	none	60	3C	<	92	5C	\	124	7C	|
29	1D	none	61	3D	=	93	5D	]	125	7D	}
30	1E	none	62	3E	>	94	5E	^	126	7E	~
31	1F	none	63	3F	?	95	5F	-	127	7F	DEL

Figure K-1 I.B.M. Graphics Character Set 1

Note: These characters may be different if you are using an international character set. See Chapter 9, I.B.M. and Epson National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	á	192	C0	L	224	E0	α
129	81	none	161	A1	í	193	C1	⊥	225	E1	β
130	82	none	162	A2	ó	194	C2	⊥	226	E2	Γ
131	83	none	163	A3	ú	195	C3	⊥	227	E3	π
132	84	none	164	A4	ñ	196	C4	—	228	E4	Σ
133	85	none	165	A5	Ñ	197	C5	⊥	229	E5	σ
134	86	none	166	A6	à	198	C6	⊥	230	E6	μ
135	87	none	167	A7	ó	199	C7	⊥	231	E7	τ
136	88	BS	168	A8	ì	200	C8	⊥	232	E8	θ
137	89	HT	169	A9	˘	201	C9	⊥	233	E9	θ
138	8A	LF	170	AA	˘	202	CA	⊥	234	EA	ϰ
139	8B	VT	171	AB	½	203	CB	⊥	235	EB	ς
140	8C	FF	172	AC	¾	204	CC	⊥	236	EC	ø
141	8D	CR	173	AD	ı	205	CD	≡	237	ED	ø
142	8E	SO	174	AE	◀	206	CE	⊥	238	EE	€
143	8F	SI	175	AF	▶	207	CF	≡	239	EF	∩
144	90	none	176	B0	•••••	208	D0	≡	240	F0	≡
145	91	DC1	177	B1	•••••	209	D1	⊥	241	F1	±
146	92	DC2	178	B2	•••••	210	D2	⊥	242	F2	±
147	93	DC3	179	B3	•••••	211	D3	⊥	243	F3	±
148	94	DC4	180	B4	•••••	212	D4	⊥	244	F4	±
149	95	none	181	B5	⊥	213	D5	⊥	245	F5	±
150	96	none	182	B6	⊥	214	D6	⊥	246	F6	±
151	97	none	183	B7	⊥	215	D7	⊥	247	F7	±
152	98	CAN	184	B8	⊥	216	D8	⊥	248	F8	±
153	99	none	185	B9	⊥	217	D9	⊥	249	F9	±
154	9A	none	186	BA	⊥	218	DA	⊥	250	FA	±
155	9B	ESC	187	BB	⊥	219	DB	⊥	251	FB	±
156	9C	none	188	BC	⊥	220	DC	⊥	252	FC	±
157	9D	none	189	BD	⊥	221	DD	⊥	253	FD	±
158	9E	none	190	BE	⊥	222	DE	⊥	254	FE	±
159	9F	none	191	BF	⊥	223	DF	⊥	255	FF	space

Figure K-1 I.B.M. Graphics Character Set 1 (cont.)

Appendix L: I.B.M. Graphics- Character Set 2

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00		32	20	space	64	40	@	96	60	`
1	01		33	21	!	65	41	A	97	61	a
2	02		34	22	"	66	42	B	98	62	b
3	03	♥	35	23	#	67	43	C	99	63	c
4	04	♦	36	24	\$	68	44	D	100	64	d
5	05	♣	37	25	%	69	45	E	101	65	e
6	06	♠	38	26	&	70	46	F	102	66	f
7	07		39	27	'	71	47	G	103	67	g
8	08		40	28	(	72	48	H	104	68	h
9	09		41	29	)	73	49	I	105	69	i
10	0A		42	2A	*	74	4A	J	106	6A	j
11	0B		43	2B	+	75	4B	K	107	6B	k
12	0C		44	2C	,	76	4C	L	108	6C	l
13	0D		45	2D	-	77	4D	M	109	6D	m
14	0E		46	2E	.	78	4E	N	110	6E	n
15	0F		47	2F	/	79	4F	O	111	6F	o
16	10		48	30	0	80	50	P	112	70	p
17	11		49	31	1	81	51	Q	113	71	q
18	12		50	32	2	82	52	R	114	72	r
19	13		51	33	3	83	53	S	115	73	s
20	14		52	34	4	84	54	T	116	74	t
21	15	§	53	35	5	85	55	U	117	75	u
22	16		54	36	6	86	56	V	118	76	v
23	17		55	37	7	87	57	W	119	77	w
24	18		56	38	8	88	58	X	120	78	x
25	19		57	39	9	89	59	Y	121	79	y
26	1A		58	3A	:	90	5A	Z	122	7A	z
27	1B		59	3B	;	91	5B	[	123	7B	{
28	1C		60	3C	<	92	5C	\	124	7C	|
29	1D		61	3D	=	93	5D	]	125	7D	}
30	1E		62	3E	>	94	5E	^	126	7E	~
31	1F		63	3F	?	95	5F	_	127	7F	

Figure L-1 I.B.M. Graphics Character Set 2

Note: These characters may be different if you are using an international character set. See Chapter 9, I.B.M. and Epson National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	ç	160	A0	á	192	C0	Ł	224	E0	α
129	81	ü	161	A1	í	193	C1	Ł	225	E1	β
130	82	é	162	A2	ó	194	C2	Ŧ	226	E2	Γ
131	83	â	163	A3	ú	195	C3	Ŧ	227	E3	π
132	84	ä	164	A4	ñ	196	C4	—	228	E4	Σ
133	85	à	165	A5	N	197	C5	†	229	E5	σ
134	86	â	166	A6	ə	198	C6	‡	230	E6	μ
135	87	ç	167	A7	Ω	199	C7	‡	231	E7	τ
136	88	è	168	A8	¿	200	C8	‡	232	E8	ϙ
137	89	ë	169	A9	ƒ	201	C9	‡	233	E9	θ
138	8A	è	170	AA	ƒ	202	CA	‡	234	EA	Ω
139	8B	ï	171	AB	ƒ	203	CB	‡	235	EB	ε
140	8C	î	172	AC	ƒ	204	CC	‡	236	EC	ε
141	8D	ï	173	AD	ƒ	205	CD	‡	237	ED	ø
142	8E	À	174	AE	ƒ	206	CE	‡	238	EE	€
143	8F	À	175	AF	ƒ	207	CF	‡	239	EF	∩
144	90	É	176	B0	ƒ	208	D0	‡	240	F0	≡
145	91	æ	177	B1	ƒ	209	D1	‡	241	F1	±
146	92	Æ	178	B2	ƒ	210	D2	‡	242	F2	Σ
147	93	ö	179	B3	ƒ	211	D3	‡	243	F3	Σ
148	94	ö	180	B4	ƒ	212	D4	‡	244	F4	∩
149	95	ò	181	B5	ƒ	213	D5	‡	245	F5	∩
150	96	ù	182	B6	ƒ	214	D6	‡	246	F6	+
151	97	ù	183	B7	ƒ	215	D7	‡	247	F7	∩
152	98	ÿ	184	B8	ƒ	216	D8	‡	248	F8	°
153	99	Û	185	B9	ƒ	217	D9	‡	249	F9	∩
154	9A	Ü	186	BA	ƒ	218	DA	‡	250	FA	∩
155	9B	ϕ	187	BB	ƒ	219	DB	‡	251	FB	∩
156	9C	£	188	BC	ƒ	220	DC	‡	252	FC	∩
157	9D	¥	189	BD	ƒ	221	DD	‡	253	FD	∩
158	9E	℞	190	BE	ƒ	222	DE	‡	254	FE	∩
159	9F	ƒ	191	BF	ƒ	223	DF	‡	255	FF	space

Figure L-1 I.B.M. Graphics Character Set 2 (cont.)

Appendix M: I.B.M. Graphics- All Characters

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00		32	20	space	64	40	@	96	60	`
1	01		33	21	!	65	41	A	97	61	a
2	02		34	22	"	66	42	B	98	62	b
3	03	♥	35	23	#	67	43	C	99	63	c
4	04	♦	36	24	\$	68	44	D	100	64	d
5	05	♣	37	25	%	69	45	E	101	65	e
6	06	♠	38	26	&	70	46	F	102	66	f
7	07		39	27	'	71	47	G	103	67	g
8	08		40	28	(	72	48	H	104	68	h
9	09		41	29	)	73	49	I	105	69	i
10	0A		42	2A	*	74	4A	J	106	6A	j
11	0B		43	2B	+	75	4B	K	107	6B	k
12	0C		44	2C	,	76	4C	L	108	6C	l
13	0D		45	2D	-	77	4D	M	109	6D	m
14	0E		46	2E	.	78	4E	N	110	6E	n
15	0F		47	2F	/	79	4F	O	111	6F	o
16	10		48	30	0	80	50	P	112	70	p
17	11		49	31	1	81	51	Q	113	71	q
18	12		50	32	2	82	52	R	114	72	r
19	13		51	33	3	83	53	S	115	73	s
20	14	π	52	34	4	84	54	T	116	74	t
21	15	§	53	35	5	85	55	U	117	75	u
22	16		54	36	6	86	56	V	118	76	v
23	17		55	37	7	87	57	W	119	77	w
24	18		56	38	8	88	58	X	120	78	x
25	19		57	39	9	89	59	Y	121	79	y
26	1A	→	58	3A	:	90	5A	Z	122	7A	z
27	1B	←	59	3B	;	91	5B	[	123	7B	{
28	1C		60	3C	<	92	5C	\	124	7C	|
29	1D		61	3D	=	93	5D	]	125	7D	}
30	1E		62	3E	>	94	5E	^	126	7E	~
31	1F	∅	63	3F	?	95	5F	_	127	7F	

Figure M-1 I.B.M. Graphics—All Characters

Note: These characters may be different if you are using an international character set. See Chapter 9, I.B.M. and Epson National Character Tables, for more information.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	Ç	160	A0	á	192	C0	Ł	224	E0	α
129	81	ü	161	A1	í	193	C1	ł	225	E1	β
130	82	é	162	A2	ó	194	C2	Ŧ	226	E2	Γ
131	83	â	163	A3	ú	195	C3	Ŧ	227	E3	π
132	84	ä	164	A4	ñ	196	C4	—	228	E4	Σ
133	85	à	165	A5	Ñ	197	C5	†	229	E5	σ
134	86	â	166	A6	æ	198	C6	†	230	E6	μ
135	87	ç	167	A7	œ	199	C7	†	231	E7	τ
136	88	è	168	A8	ı	200	C8	†	232	E8	ϙ
137	89	ë	169	A9	ı	201	C9	†	233	E9	θ
138	8A	è	170	AA	ı	202	CA	†	234	EA	Ω
139	8B	ï	171	AB	ı	203	CB	†	235	EB	δ
140	8C	ı	172	AC	ı	204	CC	†	236	EC	ø
141	8D	ı	173	AD	ı	205	CD	†	237	ED	ø
142	8E	Ä	174	AE	«	206	CE	†	238	EE	€
143	8F	Å	175	AF	»	207	CF	†	239	EF	∩
144	90	É	176	B0	ı	208	D0	†	240	F0	≡
145	91	æ	177	B1	ı	209	D1	†	241	F1	±
146	92	Æ	178	B2	ı	210	D2	†	242	F2	≥
147	93	ö	179	B3	ı	211	D3	†	243	F3	≤
148	94	ö	180	B4	ı	212	D4	†	244	F4	ı
149	95	ò	181	B5	ı	213	D5	†	245	F5	ı
150	96	ù	182	B6	ı	214	D6	†	246	F6	ı
151	97	ù	183	B7	ı	215	D7	†	247	F7	ı
152	98	ÿ	184	B8	ı	216	D8	†	248	F8	ı
153	99	Û	185	B9	ı	217	D9	†	249	F9	ı
154	9A	Ü	186	BA	ı	218	DA	†	250	FA	ı
155	9B	ø	187	BB	ı	219	DB	†	251	FB	ı
156	9C	£	188	BC	ı	220	DC	†	252	FC	ı
157	9D	¥	189	BD	ı	221	DD	†	253	FD	ı
158	9E	℞	190	BE	ı	222	DE	†	254	FE	ı
159	9F	ƒ	191	BF	ı	223	DF	†	255	FF	space

Figure M-1 I.B.M. Graphics—All Characters (cont.)

Appendix N: International Character Sets

These are the international characters that are substituted for the ASCII code values with the sequence ESC R CHR\$(n) for each of the 11 international character sets.

n	Country	35	36	64	91	92	93	94	96	123	124	125	126
0	U.S.A.	#	\$	@	[	\	\]	^	`	(	|	)	~
1	France	#	\$	à	°	ç	ß	^	`	é	ù	è	¨
2	Germany	#	\$	ß	À	Ö	U	^	`	ä	ö	u	ß
3	England	£	\$	@	[	\	\]	^	`	(	|	)	~
4	Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	é	À	Ö	Å	U	é	æ	ö	å	U
6	Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain	R	\$	@	í	ñ	¿	^	`	¨	ñ)	~
8	Japan	#	\$	@	[	¥	]	^	`	(	|	)	~
9	Norway	#	¤	é	Æ	Ø	Å	U	é	æ	ø	å	U
10	Denmark II	#	\$	é	Æ	Ø	Å	U	é	æ	ø	å	U
11	Comodore	#	\$	@	[	£	]	↑	-	+	£	ì	¤

NOTE: ASCII 95 (the underline character) is redefined as a left arrow (←) when the Commodore standard character set (n=11) is selected.

Figure N-1 International Character Sets

Appendix O

Printer Self Test (Auto-Diagnostics)

PRINTING TEST

Execute the print test by pressing the LINE FEED key and simultaneously turning on the printer. The complete character set is printed in the layout shown in the figure below. The whole test covers about three sheets of 8½" by 11" paper. The test terminates automatically, the paper is positioned at the top of the page and the printer switches to "on line" mode ready to receive data from the computer.

To abort the printing test, turn off the printer.

The test is performed only if the paper is properly inserted.

The figure below shows a sample of the printing test in Epson FX80 DRAFT mode. To perform the printing test in N.L.Q. mode, select N.L.Q. mode in the Set Up procedure, then perform the printing test again.

The first line of the test indicates the printer emulation, while the second line Release n.nn (where n.nn varies in the range 0.00 - 9.99) indicates the firmware version present in the printer.

PRINTING IN HEXADECIMAL CODE (DATA SCOPE)

To print the data received from the computer in hexadecimal code, hold down the FORM FEED key and simultaneously turn the printer on.

Two printing samples (in hexadecimal code and in the two operating modes) are shown below.

1. Commodore Mode

READY

10 OPEN 1,4

15 FOR A = 1 TO 2

20 PRINT # 1, "1234567890 1234567890"

30 PRINT # 1, "ABCDEFGHIL ABCDEFGHIL"

35 NEXT A

40 CLOSE 1

1234567890
ABCDEFGHIL
1234567890
ABCDEFGHIL

1234567890
ABCDEFGHIL
1234567890
ABCDEFGHIL

24	31	32	33	34	35	36	37	38	39	30	20	20	20	20	20	20	20	20	31
32	33	34	35	36	37	38	39	30	0D	3E	24	41	42	43	44	45	46	47	48
49	4C	20	20	20	20	20	20	20	20	41	42	43	44	45	46	47	48	49	4C
0D	3E	24	31	32	33	34	35	36	37	38	39	30	20	20	20	20	20	20	20
20	31	32	33	34	35	36	37	38	39	30	0D	3E	24	41	42	43	44	45	46
47	48	49	4C	20	20	20	20	20	20	20	20	41	42	43	44	45	46	47	48
49	4C	0D	3E																

2. Amiga and Commodore PC Mode (or compatible)

If the user types the following data:

```
LPRINT CHR$(27);"A";CHR$(1);
```

the following characters will be printed:

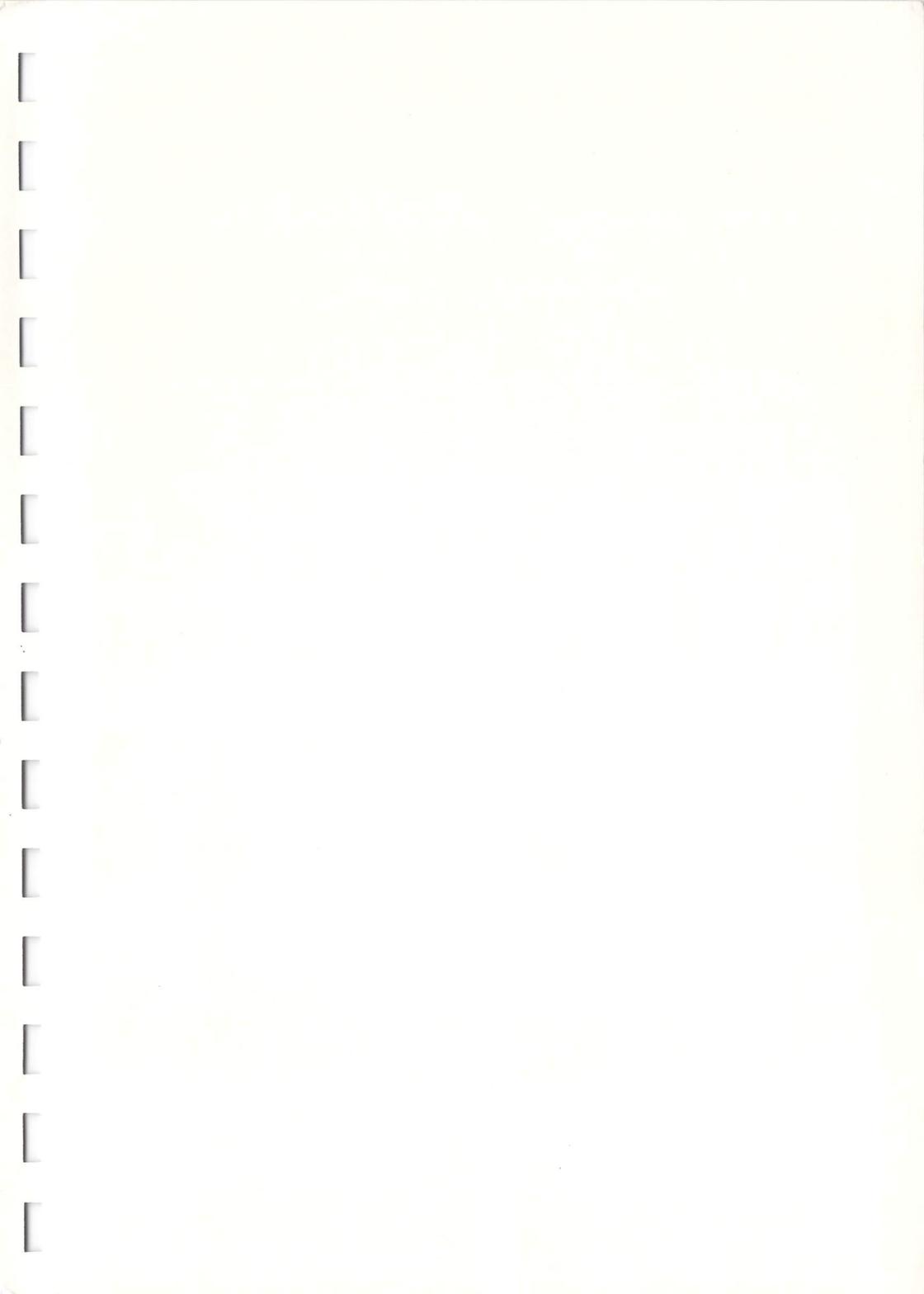
1B 41 01

Data is printed when the print line length is exceeded. Press the LOCAL switch to display any pending data.

To clear this setting, turn the printer OFF and then ON again.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Does not print. ON indicator is OFF.	Power supply missing.	Insert the printer plug in a working socket and turn the printer on.
Does not print. FAILURE indicator is blinking.	Simple failure condition.	Turn the printer off. Check that the print head carriage is free to move and verify that no foreign objects are in the path of the print head. Rotate the paper knob and turn the printer on. If the trouble persists, call Customer Support.
Does not print. FAILURE indicator is ON.	Failure condition.	Turn the printer off and call your dealer.
Printing does not start at top of form (Sprocket).	Improper setting of the form length. Improper position of the top of form.	Most times, the top of the page and the print head are not aligned properly. Realign the page at the print head. The form length may not be the proper size for the pages you are using. If not, you must perform the Set Up procedure as explained in Chapter 5 for the Commodore 64/128 and Chapter 6 for the Amiga, Commodore PC (and compatibles).

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Paper fed sloppily or wrinkled.	Improper position of the paper release lever.	Check the position of the paper release lever.
Faded printing.	Inked ribbon improperly mounted or needs to be replaced.	Replace the ribbon cartridge and check it is positioned properly.
Does not print in "Condensed" mode.	The "Emphasized" or "Pica" print mode previously selected has not been cleared.	Clear the "Emphasized" or "Pica" print mode: neither is compatible with the "Condensed" mode.
Horizontal tab stops are not working.	Margins improperly set.	Set the margins before the horizontal tab stops.
Changing the print pitch causes the horizontal tab stops to be wrong.	The tab stops are to be repositioned whenever the print pitch is changed.	Clear the previous print pitch, select the new pitch and set the tab stops.



 **Commodore**®
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Commodore Business Machines, Inc.
1200 Wilson Drive • West Chester, PA 19380

Commodore Business Machines, Inc.
3470 Pharmacy Avenue • Agincourt, Ontario M1W 3G3