ActionPrinter by EPSON®
T-750

User's Manual

FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

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

- Reorient the receiving antenna
- Relocate the printer with respect to the receiver
- Plug the printer into a different outlet so that the printer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"Television Interference Handbook."

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00450-7.

WARNING

The connection of a non-shielded printer interface cable to this printer will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

Contents

Introduction

The ActionPrinter™ T-750 combines all the well-known virtues of previous Epson 9-pin printers with many features normally exclusive to costly 24-pin printers.

- The speed of draft printing is 240 characters per second in draft elite and 200 in draft pica. When you have perfected a document, you can switch to one of two Near Letter Quality fonts-Roman or Sans Serif.

  Draft printing is extremely fast.
  NLQ Roman is **clear** and typewriter-like.
  NLQ Sans Serif is crisp and distinctive.

- The SelecType feature gives you access to Near Letter Quality (NLQ) and condensed print. All you have to do is press the button for the style you want. While the T-750 is printing, the SelecType panel shows you what choices it's using.

- If you are using software designed for an IBM@ printer, you have the choice of using the T-750 in Epson mode or IBM printer emulation mode. Even better, you can combine the best of both worlds; the powerful Epson mode commands can now print character graphics like those used by IBM printers and computers.

- Loading paper is now easier than ever. Single sheets can be loaded by just moving a lever, and the tractor lets you load a wide range of widths of continuous-feed paper, including labels.

- For headings and other emphasis, you can use double-high and double-wide printing.

About This Manual

To make it easier to set up your new T-750, this manual includes a lo-step guide. This guide, which is printed on the inside of the back flap, summarizes the first chapter's setting up instructions.

Chapters 2 through 5 cover the basic and advanced functions, and the appendixes contain reference information, including all the details you need to use any of the printer's commands, and some advice on solving problems.

Finally, there is a glossary of printer terms, a comprehensive index, and inside the back of the manual is a pull-out Quick Reference card containing the information you need most.

Where to Get Help

For technical assistance with your T-750 printer, just call the toll-free Epson number: l-800-421-5426 (7 AM to 5 PM PST).

For warranty repairs and to find out the location of your nearest Authorized Epson Customer Care Center, call l-800-922-8911 (24 hours a day, seven days a week).

To purchase accessories, check with the store where you purchased your printer or call I-800-922-8911 for the location of your nearest Authorized Epson Dealer.

Chapter 1

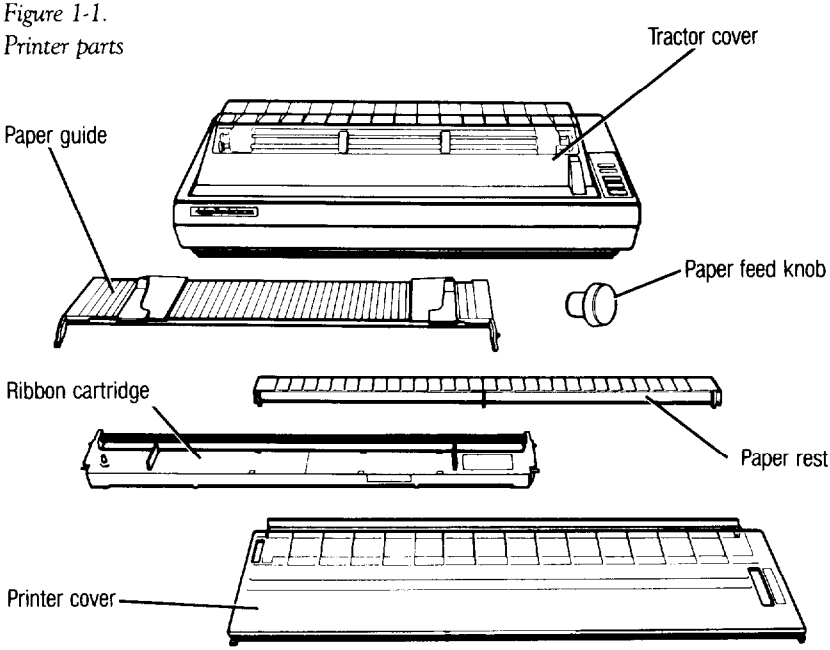
Setting Up Your T-750 Printer

Setting up your new T-750 is easy. Simply follow the steps in this chapter.

1 Unpacking Your Printer

First, remove the printer from the box and take off all outside plastic covering and foam supports. Make sure you have received all the parts shown in the illustration below.

Figure 1-1.
Printer parts

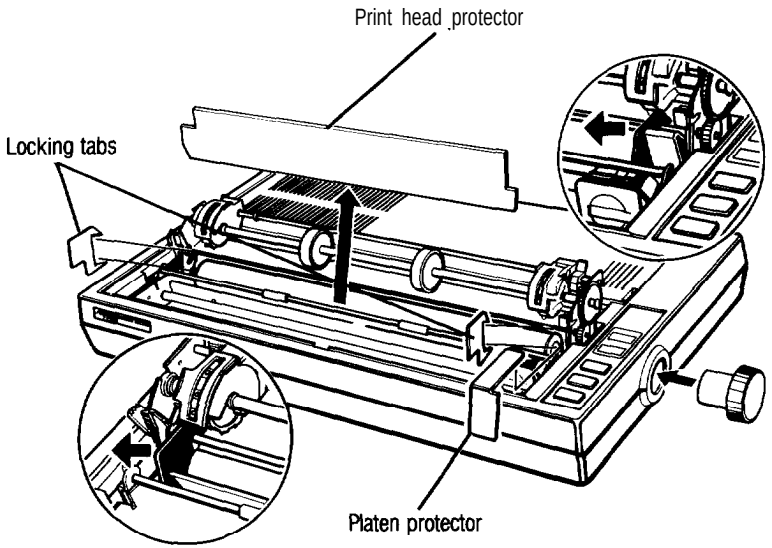


Tilt the tractor cover up and remove the two foam pads underneath it. (These pads protect the tractor unit during shipping; be sure to save them.)

WARNING
The printer is protected by a print head protector, a platen protector and two locking tabs during shipping. These protective items must be removed before you turn on the printer. Follow the steps in Figure 1-2.

Also, you should install the paper feed knob. To install the knob, simply push it onto the shaft on the right side of the printer as shown in Figure 1-2.

Figure I-2.
Protective items



1. Remove the left locking tab.
2. Remove the print head protector.
3. Move the print head to the left.
4. Remove the right locking tab and the platen protector.

2 Selecting the Right Location

The most important consideration in choosing a location for your printer is that it be close enough to connect a cable to your computer. But also keep the following tips in mind:

- Place the printer or printer stand on a solid and level foundation. Avoid setting it on carpet or on unstable surfaces such as chairs.
- Use a grounded outlet-one that has three holes to match the power plug on the printer. Don't use an adapter plug.
- Avoid using electrical outlets that are controlled by wall switches. If you accidentally turn off a switch, you could wipe out valuable information and stop your printing.
- Keep your printer and computer away from base units for cordless telephones.
- Avoid using an outlet on the same circuit breaker with large electrical machines or appliances that might disrupt the flow of power to your printer.
- Choose a place that is clean and away from moisture, dust, and excessive heat (such as a heater or direct sunlight).

If you are going to use continuous-feed paper, clear enough space around the printer so that the paper has an unobstructed path in and out of the printer. There are three common methods of arranging a printer and continuous paper:

- Using a printer stand with the paper stacked underneath it.
- Using a desk or table as a stand, with the printer near the rear edge and the paper on the floor or on a shelf.
- Putting the printer on a desk or table and stacking the paper behind the printer.

3 Installing the Ribbon

To install the ribbon, follow the directions below:

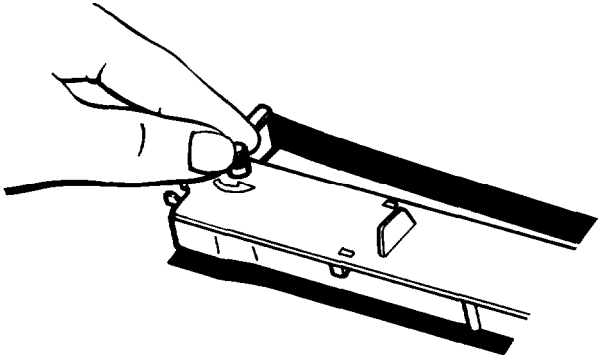
1. Remove the tractor cover that comes installed on the printer. To remove it, simply pull the back of the cover toward you until the cover is vertical. Then lift it up and off the printer.
2. Manually moved the print head to the middle of the platen.

WARNING

The power must be OFF when you move the print head. Moving the print head when the power is ON may damage your printer. If you've been using your printer just before changing the ribbon cartridge, be careful not to touch the print head because it becomes hot during use.

3. Before installing the ribbon cartridge, turn the small knob on top in the direction of the arrow to tighten the ribbon as shown in Figure l-3.

Figure 1-3.
Tightening the ribbon



4. Hold the cartridge by the two plastic tabs. Lower the cartridge into the printer, guiding the two pins on each end of the cartridge into the slots in the printer frame, as shown in Figure 1-4. Press firmly on each end of the cartridge to make sure the pins are firmly seated in the slots,

5. Now use the point of a pencil to guide the ribbon into place between the ribbon guide and the print head as shown in Figure l-5. (There is also a diagram on the top of the ribbon cartridge itself.)

6. With the cartridge in place, again turn the ribbon knob in the direction of the arrow to tighten the ribbon.

And that's it-the ribbon is now installed.

Figure 1-4.
Installing **the** ribbon cartridge

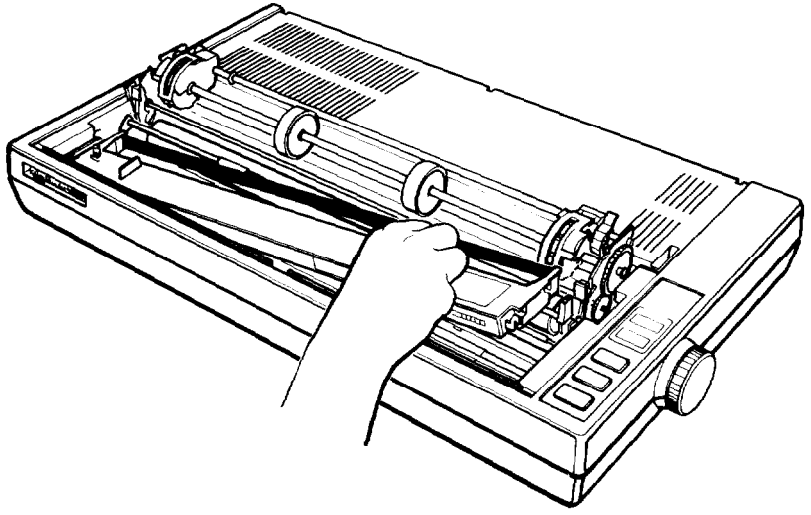
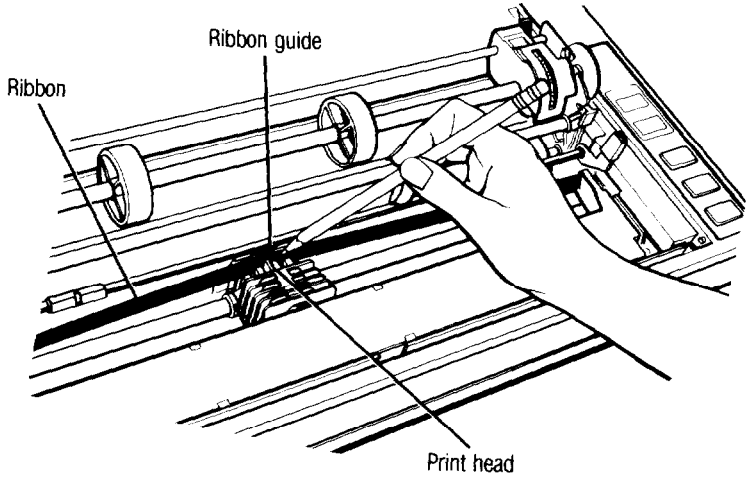


Figure l-5.
Positioning the *ribbon*



Replacing the ribbon...

When buying new ribbon cartridges for the T-750, be sure you get a ribbon specifically for Epson T-750 or FX series printers. Ribbon cartridges for other Epson printers, such as the L-1000 or LQ series, closely resemble T-750 ribbons, but their use can cause poor print quality. Also, the Epson ribbon replacement pack #7755 should not be used as a replacement ribbon.

The T-750 uses a continuous-loop, inked fabric ribbon (#8755). When your printing becomes too light, replace the ribbon with a fresh cartridge. To replace the ribbon, just pull up on the two plastic tabs on the ribbon cartridge and lift it out of the printer. To install a new ribbon, follow the preceding steps.

4 Loading Continuous-feed Paper

When you receive your T-750, it is set up to print on continuous-feed paper. If you plan to use single-sheet paper, turn to Chapter 2 for instructions on setting up the printer for single sheets. If you have bought the optional automatic sheet feeder, complete the remainder of the setup steps before you install the automatic sheet feeder (which has its own manual).

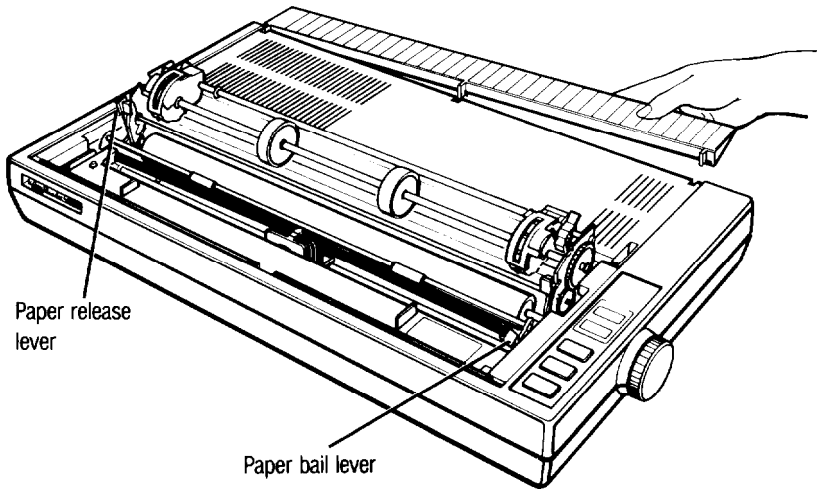
The T-750 tractor units are adjustable to accommodate different widths of paper, from 4 to 16 inches. Before you load continuous-feed paper, prepare the printer in the following manner:

1. Make sure the printer is turned off.

2. Remove the tractor cover that comes installed on the printer. To remove it, simply pull the back of the cover toward you until it is vertical. Then lift the cover up and off the printer.

3. Install the paper rest as shown in Figure l-6. This part helps prevent the paper from catching on the printer cable.

Figure 1-6.
Installing the paper rest

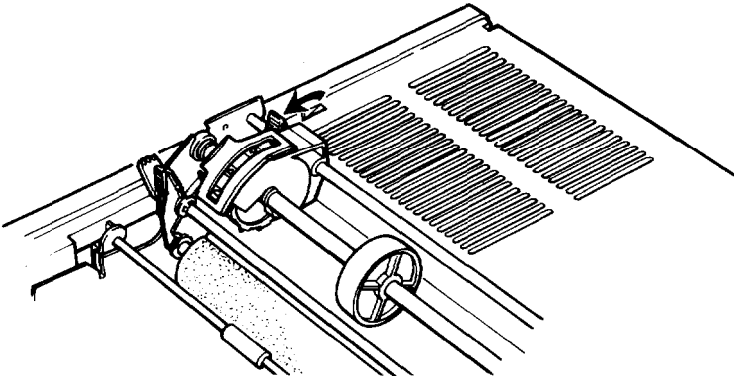


4. Pull both the paper release lever and the paper bail lever toward the front of the printer. (Figure 1-6 shows where these levers are.)

Now you are ready to load the continuous-feed paper. Just follow the steps below:

1. Using Figure 1-7 as a guide, pull the locking levers on the pin-feed holders forward so that you can move the holders to the left and right.

Figure 1-7.
Pin-feed locking levers

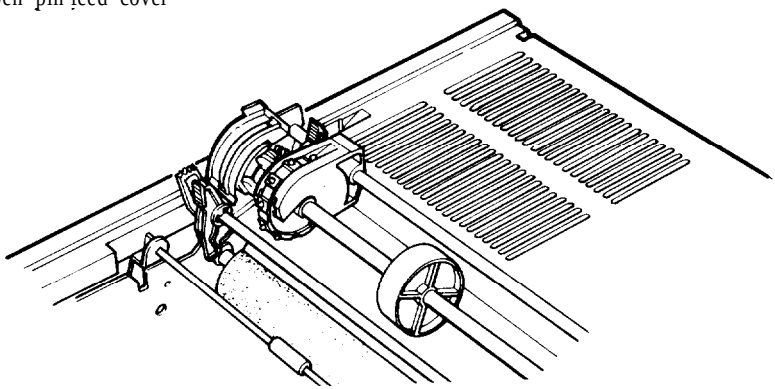


2. Move the left holder so that the locking lever is about l/4 inch from the left side and push the locking lever back to lock that holder in place. Leave the right holder unlocked.

3. Open the pin-feed covers as shown in Figure l-8.

WARNING
Do not use the pin-feed covers to move the pin-feed holders,

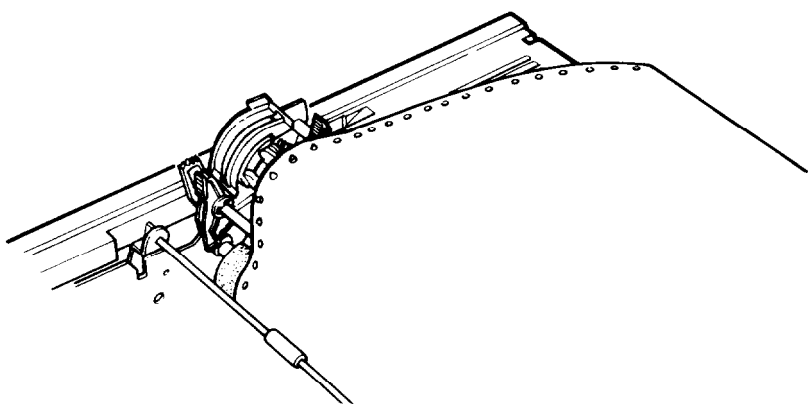
Figure 1-8.
Open pin-feed cover



4. Guide the paper into the paper slot, and push it through until it comes up between the ribbon guide and the platen. (Moving the paper with a side-to-side motion makes it easier to push the paper through.)

5. Pull the paper up until the top is above the pin-feed holders. Fit the holes on the left side of the paper over the pins in the left holder (as shown in Figure l-9) and close the cover.

Figure **1-9.**
Fitting the paper over the *pin feeds*



6. Fit the right side of the paper into the right holder, moving the holder as needed to match the width of the paper.

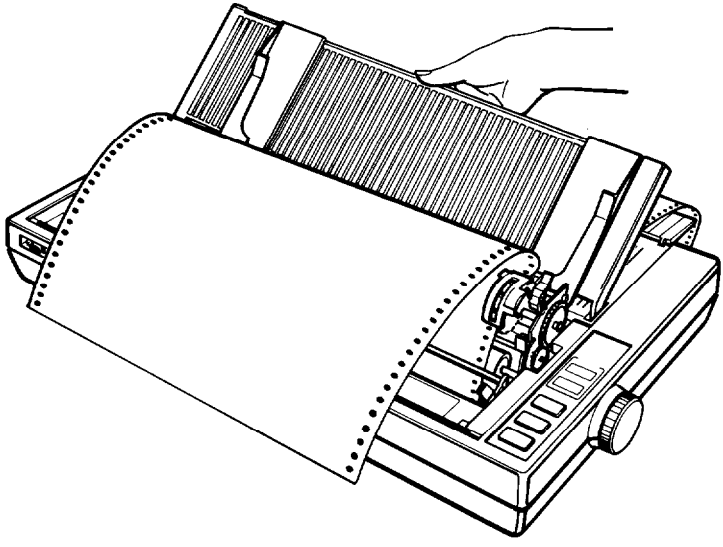
7. Close the right cover, making sure the paper has **no** dips or wrinkles and lock the right holder in place.

Now that you have loaded the continuous-feed paper, prepare the printer for printing.

1. Push the paper bail lever back.

2. Hold the paper guide above the printer. Insert the right hinge tab into the right tab slot, as shown in Figure l-10. Then insert the left tab into the left slot and push the guide back so that it is horizontal.

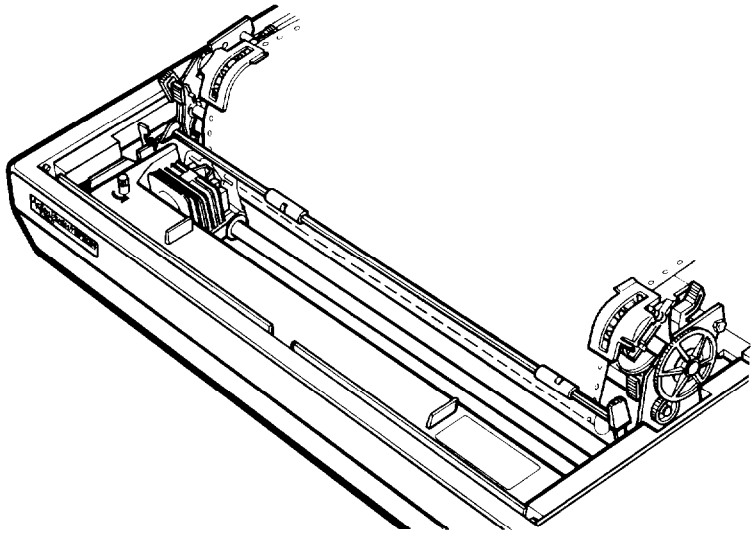
Figure 1-10.
Installing the paper guide



This guide keeps paper that is coming out of the printer from interfering with the paper going in. The guide is also used in the upright position for printing on single sheets of paper.

3. With the printer turned OFF, advance the paper with the paper feed knob on the right side of the printer until the first row of perforations is about even with the top of the ribbon. (See Figure 1-11.)

Figure 1-11.
Setting top of form



This is the top of form position. It makes your printed pages end where you want them to and prevents the printer from printing on the perforations. The paper should be in this position when the power is turned on or when software initializes the printer or sets the page length.

4. Replace the tractor cover.

Loading single-sheet paper...

The T-750 can also accommodate single-sheet paper. It can be loaded one sheet at a time as shown in Chapter 2 or by using the optional automatic sheet feeder. Chapter 2 also contains information on how to remove and reinstall the tractor feed unit. The printer cover that comes packaged with the T-750 is for use with single-sheet paper.

5 Turning On the Printer

Before plugging in the power cord, see that the power switch near the back of the left side of the printer is turned off; then plug the power cord into a properly grounded socket.

WARNING
Before turning on the printer, be absolutely sure you have removed all packing materials. Turning on the printer when the print head cannot move may seriously damage the mechanism.

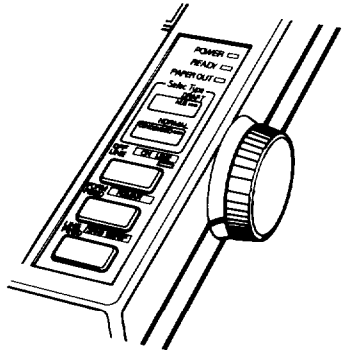
Now, turn the power ON with the switch on the left side of the printer. When you turn on the printer, three things happen:

- The print head moves back and forth and stops at the left side of the printer; this is the home position.
- The printer is initialized and set to certain default settings (which are fully described in Appendix D).
- The green power light on the control panel comes on.

6 Operating the Control Panel

The control panel is shown in Figure l-12.

Figure **1-12.**
The T-750 control panel



The three buttons nearest the front of the printer control advancing the paper and communication with the computer. The four indicator lights show when the printer is turned on and when it is ready to use.

The buttons

There are three large buttons on the control panel.

OFF LINE/ ON LINE	The green light next to this button indicates that the printer is able to receive and print data from the computer. When the light is off, the printer is off line and cannot receive any data. Press the button to change from on line to off line or from off line to on line. The printer automatically goes off lined when you try to print without paper in the printer. Pressing the button then has no effect until you load paper.
FORM FEED/ ROMAN	When the printer is off line, this button ejects a single sheet of paper or advances continuous paper to the next top of form. When the printer is on line and in NLQ mode, pressing the button selects the Roman font.
LINE FEED/ SANS SERIF	When the printer is off line, this button advances the paper one line each time you press it or continuously if you hold it down. When the printer is turned on, use this button to advance paper. When the printer is on line and in NLQ mode, pressing the button selects the Sans Serif font.

Note

Use the paper feed knob on the right side of the printer only when the printer is turned OFF. Using it when the printer is on can damage the printer mechanism.

The indicator lights

In addition to the **ON LINE** light, the printer has three other lights.

POWER	This comes on to show that the printer is connected to the power and is turned on.
READY	This comes on when the printer is on line and ready to print. It normally flickers during printing.

PAPER OUT This comes on when the printer is out of paper.

Also on the control panel are two touch switches that let you choose the print style and size. These are the SelecType buttons, which are described in the next section.

7 SelecType

The SelecType feature consists of two buttons on the control panel. These buttons select the most used printing features-Near Letter Quality (NLQ) and condensed.

With the two SelecType buttons, you can produce any of the four typestyles shown below:

Draft printing is extremely fast.
NLQ is clear and typewriter-like.
Draft can be condensed.
NLQ can also be condensed for more characters on a line.

Draft is for fast printing and NLQ for higher-quality work. In the condensed mode all characters are about 60% of their normal width.

Two NLQ fonts are available: Roman and Sans Serif. You select them by using the **FORM FEED** and **LINE FEED** buttons while the printer is on line. The **FORM FEED** button selects Roman, and the **LINE FEED** button selects Sans Serif. A software command to change the NLQ typeface is also available in the Epson mode.

NLQ Roman is clear and typewriter-like.
NLQ Sans Serif is crisp and distinctive.

If you want NLQ printing, simply press the **NLQ** button. If you want condensed printing, simply press the **CONDENSED** button.

When you press either SelecType button, it beeps twice and its orange indicator light turns on to show that you have selected it. If you

want to turn off either mode, press its button again. It beeps once and the indicator light turns off to show that the mode is cancelled.

As you can see, SelecType makes it easy to choose either NLQ or condensed, and the indicator lights always tell you which modes you've selected.

Trying out SelecType is a simple three-step process:

1. Create a short sample document or file with your favorite application program.

2. Press either or both of the SelecType buttons.

3. Print the document or file using your application program's print command.

If SelecType does not work

Some applications programs are designed to control all typestyle functions. Before each printing operation, these programs cancel all previous typestyle settings by sending a signal (INIT) or by sending specific control codes to cancel certain typestyles. These signals or control codes may cancel your SelecType settings.

One reset signal, however, does not affect your SelecType settings. This is the ESC @ command.

You can see whether your program is changing your settings by watching the buttons when printing starts. If the lights change, the program is controlling the typestyles.

If your application program changes your SelecType settings, you have two choices:

1. Use the program's setup procedure (which could be called by another name, such as install) to remove the codes that interfere with your SelecType settings.

2. Use the print control codes for your application program instead of SelecType to control your printing. Most programs that cancel SelecType settings also have sophisticated print control commands that give the same results that SelecType does. The manual for your program should explain the necessary commands.

Note
Also remember that control codes in your document will override the SelecType settings. Therefore, if you have a code for NLQ in your document and you press the **DRAFT** SelecType button, your printing will still be in NLQ.

8 Running the Self Test

The T-750 has a built-in self test that prints out the characters in its memory so that you can see that the printer is working properly.

The self test also prints the settings of the printer's DIP switches. You'll use this part of the printout in the last section of this chapter.

Before running the self test, make sure that the power is OFF and paper is loaded in the printer. (Use wide paper to avoid printing on the platen.)

To run the self test in the Near Letter Quality (NLQ) mode, hold down the **FORM FEED** button at the same time you turn the printer on. When the printing starts, release the **FORM FEED** button.

The self test first prints the version number of the printer and several lines of settings that are explained in the last section of this chapter. Then it prints the characters from its memory. The test continues until you turn the printer off. Part of a typical self test is shown below.

```
Character mode      Normal            1-1 OFF
Shape of zero       0 (Unslashed)     1-2 OFF
CG Table            Italics           1-3 OFF
Protocol mode       ESC/P             1-4 OFF
Print Quality       Draft             1-5 OFF
Country             U.S.A.            1-6 ON 1-7 ON 1-8 ON
Page Length         11 inch           2-1 OFF
CSF Mode            Invalid           2-2 OFF
Skip Perforation    None              2-3 OFF
Auto LF             Depend on I/F     2-4 OFF
 !"#$%&´()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[
!"#$%&´()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
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&´()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`a
´()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abc
```

To run the same test in the draft mode, hold down the **LINE FEED** button instead of the **FORM FEED** button while you turn the printer on. The T-750 cannot print a draft self test, however, if the NLQ DIP switch is on. Therefore, if the Print Quality line of the self test printout says NLQ, you cannot print a draft test without changing a DIP switch.

9 Connecting the Printer to Your Computer

Your T-750 printer communicates with your computer through a Centronics® compatible parallel interface. If your computer uses this type of interface and you have a suitable cable, you can connect your computer immediately. (Be sure that your cable is a shielded cable.)

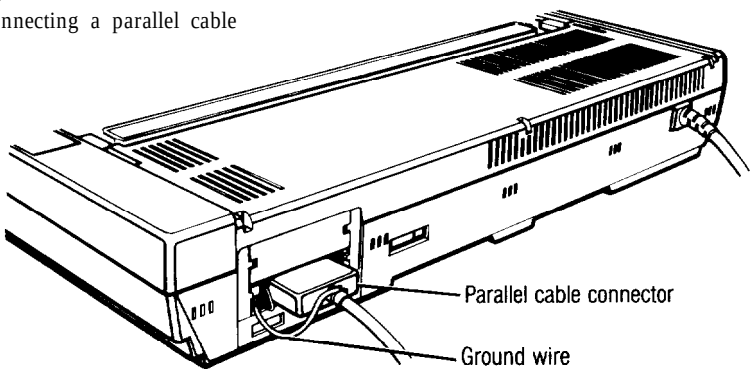
If you do not know what kind of interface your computer requires, consult its manual. For further information on the standard interface, see Appendix E.

The parallel interface

Before connecting a parallel interface cable, see that both the printer and computer are turned off. Then plug the connector into the printer. Next squeeze the clips gently and click them into place.

Some parallel cables have a ground wire. Connect this wire to the ground screw on the printer to protect data from interference. Then plug the other end of the cable into the computer and connect the ground wire on the computer end of the cable if it has one. Figure 1-13 shows a properly connected parallel cable.

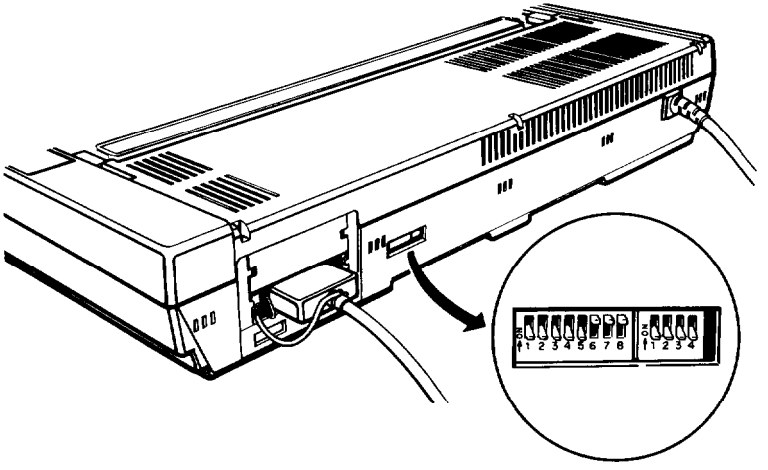
Figure 1-13.
Connecting a parallel cable



10 Choosing the Operating Mode with DIP Switches

The T-750 has 12 switches that allow you to change many of the printer's settings to suit your individual needs. You may need to change one or two of them now. These switches, known as DIP (Dual In-line Package) switches, are in the back of the printer. See Figure 1-14.

Figure 1-14.
DIP switch location



The switches are in two groups and are numbered, as shown in Figure 1-14. As you can see in the example below, the first part of the self test shows the settings of the switches. You will find your own self test printout helpful as you use this section.

```
Character  mode      Normal            1-1 OFF
Shape  of  zero      0  (Unslashed)    1-2 OFF
CG  Table            Italics           1-3 OFF
Protocol  mode       ESC/P             1-4 OFF
Print  Quality       Draft             1-5 OFF
Country              U.S.A.            1-6 ON 1-7 ON 1-8 ON
Page  Length         11 inch           2-1 OFF
CSF  Mode            Invalid           2-2 OFF
Skip  Perforation    None              2-3 OFF
Auto  LF             Depend  on  I/F    2-4 OFF
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
```

Before you change any **DIP** switch settings, turn the printer around to give you easy access to the switches. Then you can easily turn the switches on and off with a thin pointed object, such as a small screwdriver or the cap of a ballpoint pen. The switches are ON when they are UP and OFF when they are DOWN.

Note
When you change a DIP switch setting, turn off the power, reset the switch or switches, then turn on the power again. The printer checks and recognizes new settings only at the time you turn the power on.

The operating mode

The T-750 has two operating modes, ESC/P® and IBM printer emulation mode. ESC/P stands for Epson Standard Code for Printers, a powerful set of commands developed by Epson and supported by almost all application software for personal computers. This is the mode that you should find the most useful and valuable for your printing. The rest of this manual refers to the ESC/P mode simply as the Epson mode.

The IBM printer emulation mode is for software that is designed only for IBM printers. It is not necessary to use this mode for your T-750 to be compatible with IBM computers. As you can see from the list of Epson and IBM printer emulation mode commands in Appendix A, the Epson mode has more commands and many more capabilities.

There are only two cases in which you may want to use the IBM printer emulation mode:

1. Your software lists only IBM printers in its printer selection menu.

2. You need to use the following characters and your application software will not print them in the Epson mode:

If you select IBM printer emulation mode with the DIP switch and choose an IBM printer in your software's printer selection menu, your T-750 will behave as an IBM printer does. You can use most software that supports IBM printers, but you will notice that the commands do not allow you access to all the features of your Epson printer.

DIP switch 14 controls the choice of operating modes. Turning the switch OFF selects Epson mode, and turning it ON selects IBM printer emulation mode.

The Epson character graphics set

Half of the characters used by IBM PCs and compatibles are special character graphics and international characters. Most previous Epson printers printed italics instead of these characters. With the T-750, however, you can print the character graphics without losing italics or any of the power of the Epson commands.

DIP switch l-3 controls the choice between the italic and the character graphic table (called CG table in the DIP switch printout). Turning the switch ON selects the character graphic table, and turning it OFF selects the italic table. Remember that italics are available even if you select the character graphic table.

Making the choice

The decision you make about the operating mode and the character graphics set depends upon the software you use. For most applications, choose the Epson mode and the Character Graphics set (DIP switch l-4 OFF and **DIP** switch 1-3 ON). That way you can set up your software for an Epson printer and have the full power of the Epson commands.

If you have trouble printing italics, change DIP switch 1-3 to OFF to choose italics instead of character graphics. On the other hand, if you have trouble printing character graphics, change the printer to IBM printer emulation mode by setting **DIP** switch l-4 ON and set your software to match.

WARNING

You must always be careful to set up your printer and software to match. Although the IBM commands are based on some of the Epson commands, important differences affect much software. These differences can cause erratic printing. In particular, line spacing and page layout are likely to be wrong, and extra characters may appear.

Other DIP switch settings

Appendix D summarizes all the DIP switch settings in a group of tables. See that appendix for reference and further information.

Chapter 2

Choosing and Loading Paper

The T-750 printer can accommodate many different sizes and types of paper, using either its automatic single-sheet loading feature or its adjustable tractor.

The easy-to-use tractor can handle a wide range of paper widths, and the automatic single-sheet loading feature handles individual sheets quickly and easily. For greater efficiency with individual sheets you can add an optional automatic sheet feeder.

Choosing Paper

Without any accessories, you can use single-sheet paper from 7¼ to 14½ inches wide and continuous paper from 4 to 16 inches wide, including the perforated edge strips.

Carbon copies

If you use multi-part forms or carbon copies in the T-750, use no more than three sheets or parts at a time, with a total thickness of no more than 0.17 mm. Also change the paper thickness setting as described at the end of this chapter.

Using Single-sheet Paper

The automatic sheet loading feature of the T-750 gives you short printing times by combining fast loading with fast printing.

If you print large amounts on single sheets of paper, however, you may find it more convenient to use an automatic sheet feeder. This is an optional device that holds a stack of paper and inserts a new sheet whenever required, making single sheets as easy and convenient to use as continuous paper. The automatic sheet feeder has its own user's manual.

Before you load single-sheet paper the first time, you must prepare the printer by removing the tractor unit and installing the paper guide, as described in the next five steps. (If you have previously loaded continuous-feed paper, you have already done some of the steps.)

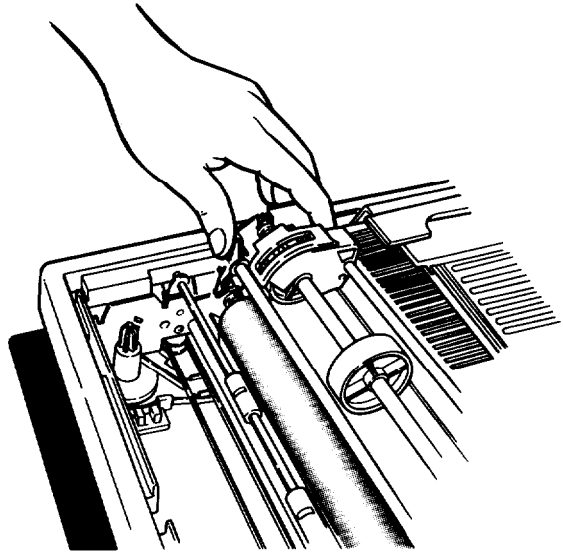
Preparing the printer

1. Remove the tractor cover that comes installed on the printer. To remove it, simply pull the back of the cover toward you until it is vertical. Then lift the cover up and off the printer.

2. Be sure that you have removed the protective items as described on page l-2.

3. Remove the tractor unit. Simply press the release levers (shown in Figure 2-1) with your thumbs, rock the tractor unit back, and lift it off the printer.

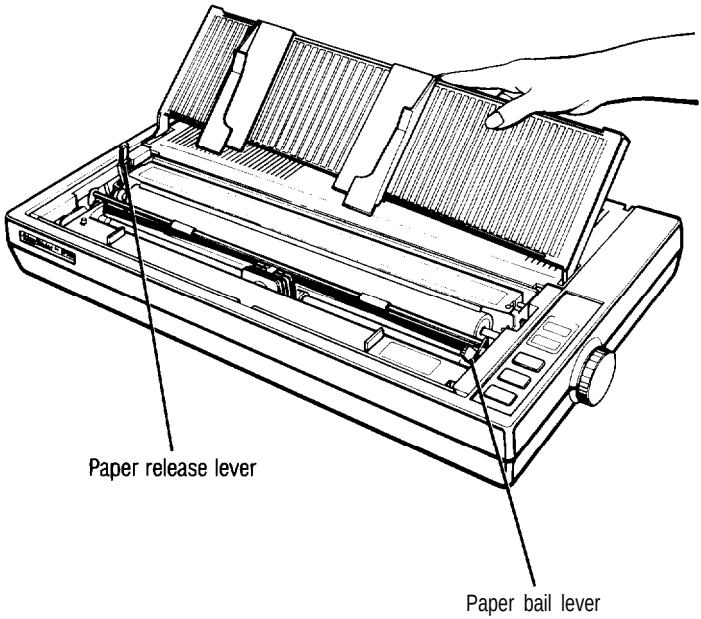
Figure **2-1.**
Removing the *tractor unit*



4. Move the edge guides on the paper guide to accommodate the width of the sheet of paper.

5. Hold the paper guide above the printer. Insert the right hinge tab into the right tab slot, as shown in Figure 2-2. Next, insert the left tab into the left slot. When both tabs are in the slots, push the guide back so that it is horizontal, and then pull it toward you until it stops at an angle (about 45 degrees).

Figure 2-2.
Installing the paper guide



Loading the paper

Now you are ready to load single-sheet paper. Just follow the steps below:

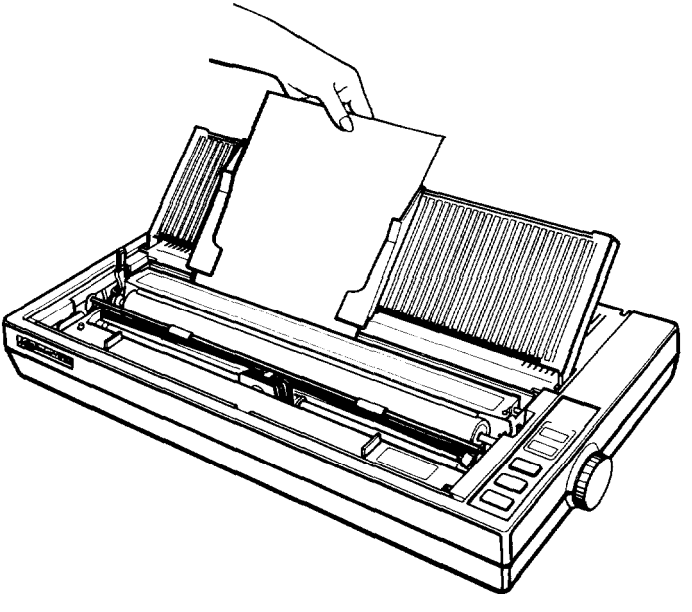
1. Turn the printer ON first. Do not put the paper in the printer before you turn it on.

2. Push both the paper release lever and the paper bail lever toward the back of the printer. (Figure 2-2 shows where these levers are.)

3. Make sure the **ON LINE** light is OF% If it is ON, press the **ON LINE** button once.

4. Place the paper on the paper guide as shown in Figure 2-3 below. Push the paper firmly into the printer; then let go of it.

Figure 2-3.
Inserting the paper

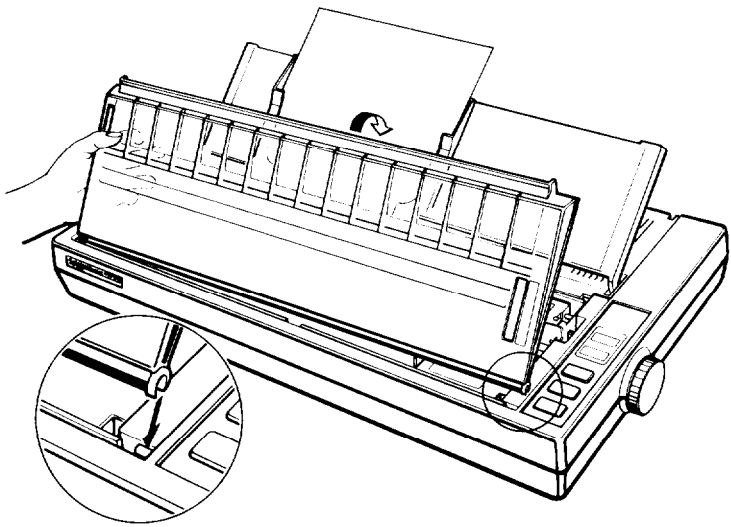


5. Pull the paper bail lever forward. This makes the paper feed into the printer.

6. When the paper stops, push the paper bail lever back.

7. Hold the printer cover vertically and fit the notches in its front corners over the pins at the front of the printer case (as shown in Figure 24). Then tilt the cover back into place.

Figure 2-4.
Installing the *printer cover*



When you have learned this procedure, you'll probably leave the cover on when you load single-sheet paper. If you wish, you can raise the cover to the vertical position while you're loading the paper. The two icons (small pictures) on the printer cover will help you remember the correct positions of the levers.

Now you are ready to print on single-sheet paper.

If the paper does not load

If the platen (the black roller) turns but the paper does not load, remove the paper from the printer and try again, starting at Step 2. This time press the paper a little more firmly into place.

If nothing happens at all, see that the printer is ON and that the **ON LINE** light is off. Then remove the paper and try again.

Reloading during printing

When you print a document more than one page long using single sheets of paper, there are two different ways your software can allow you to load a new sheet at the end of a page.

- If your software sends characters in a continuous stream, the printer stops printing when it reaches the bottom of the paper and sounds the beeper. When this happens, the **ON LINE** light goes off automatically.
- If your software handles printing page by page, it probably stops sending characters at the end of a page and prompts you to insert more paper. In this case the **ON LINE** light probably remains on, and the first thing you should do is press the **ON LINE** button once to turn it off.

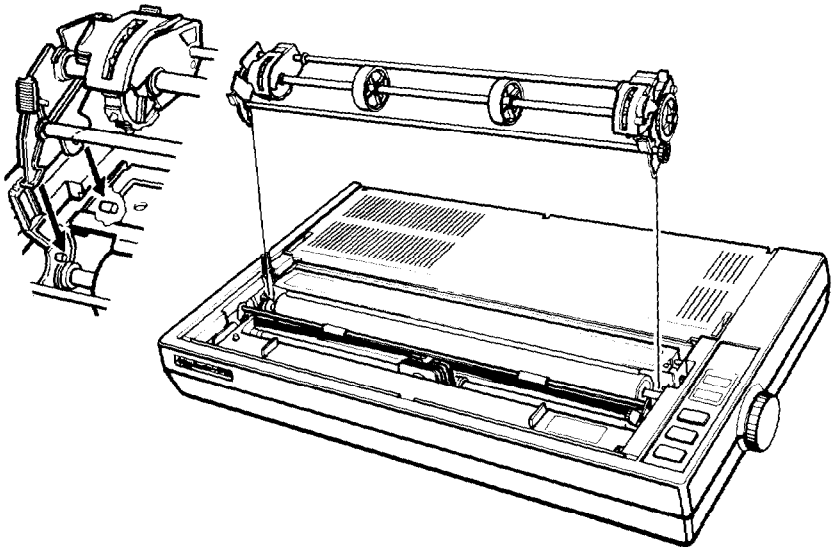
Once the **ON LINE** light is off, remove the sheet that has just been printed and load a new sheet in the same way as before.

Reinstalling the Tractor Unit

When you want to switch from single-sheet to continuous-feed paper, you need to reinstall the tractor unit.

1. Remove the printer cover.
2. Hold the tractor with the gears to the right and fit the rear notches on the tractor unit over the rear mounting pins on the printer, as shown in Figure 2-5.
3. Tilt the tractor unit toward you until the front latches click in place over the front mounting pins on the printer.

Figure 2-5.
Reinstalling the tractor unit



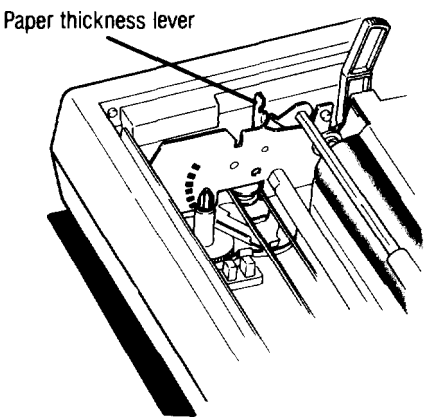
The Paper Thickness Lever

You can adjust the T-750 to accommodate different thicknesses of paper. You need to do this when you print carbon copies.

Before moving the paper thickness lever, always turn off the power, open the printer cover or the tractor cover, and move the print head to the middle of the printer.

The paper thickness lever (shown in Figure 2-6) has six positions.

Figure 2-6.
Paper thickness lever



If you want to change or check the lever, push it toward the platen (the black roller) until it stops. This is the first position. Then pull the lever toward you. You will feel three more click stops. The table below shows which position you should use.

Table 2-1. Paper thickness lever *positions*

Paper thickness	Lever position
Single	2nd
With 1 copy	3rd
With 2 copies	4th

*Maximum total thickness is 0.17 mm

Position 1 is for thinner paper, and positions 5 and 6 are for thicker paper. These positions should rarely be used. If they are, the printing quality will not necessarily be as good as on paper as specified in the technical specifications.

Always return the lever to the second position when you resume printing on normal paper.

Chapter 3

Using the T-750 with Application Programs

Now that you've set up and tested the printer, you need to start using it with your application programs.

Printer Selection Menus

Most application programs let you specify the type of printer you're using so that the program can take full advantage of the printer's features. Many programs provide an installation or setup procedure that presents a list of printers to choose from. The T-750 uses the same command set as the Epson FX-286e. If the menu does not list this printer, choose one of the following. They are listed in order of preference.

FX-86e
EX-1000 or EX-800
FX-286
FX-185 or FX-85
FX-lOO+ or FX-80+
FX-100 or FX-80
FX
LX
Epson printer
Draft printer

If you plan to use the IBM printer emulation mode, choose IBM Proprinter XL, IBM Proprinter, IBM Graphics printer, or IBM printer, in that order of preference.

A quick test

After setting up your application program, print a sample document to be sure the program and the T-750 are communicating properly. If the document doesn't print correctly, recheck the program's printer selection and installation procedure. If you're still having trouble printing, consult the troubleshooting section in Appendix C.

Computer - Printer Communication

Computers and printers communicate by using codes to represent characters and commands. To be sure the two devices use the same codes, almost all manufacturers of computers, printers, and software use the American Standard Code for Information Interchange, which is usually referred to by its abbreviation, ASCII.

The ASCII standard includes codes for printable characters (letters, punctuation marks, numerals, and mathematical symbols) and 33 other codes called control codes. The control codes are for such functions as sounding the beeper and performing carriage returns. Because the 33 control codes are not enough to control all possible printer functions, most printer commands are actually a sequence of two or more codes.

One of the 33 control codes, the escape code, signals the beginning of a sequence of codes. Therefore, most printer commands are sequences of codes, the first of which is the escape code. This manual uses the ASCII abbreviation ESC for this code.

When using control codes to select printer functions for an application program or programming language, check the manual for the program or language to find the appropriate method of inserting the code into the program. Further details on the methods to use are in the rest of this chapter.

Naming and using commands

The most common way of naming codes or commands is with one of two numbering systems, decimal or hexadecimal.

The decimal system is the standard numbering system based on units of ten, using the numerals O-9.

The hexadecimal, or hex, system is based on units of 16 and is often used by programmers. Instead of using only the numerals 0 through 9, the hex system also uses the letters A through F. For example, the decimal numbers 9, 10, 11, and 12 are 09, 0A, 0B, and 0C in hex.

Since the most frequently used hexadecimal numbers are between 0 and FF hex (0 to 255 in decimal), it's common to write hexadecimal numbers that are less than 16 with a zero in front, as shown above.

In this book, hex numbers are distinguished from decimal numbers by the word hex after them (for example, 1B hex). Other common ways of denoting a hexadecimal number are the following:

1BH $lB &1B &H1B <lB>H

The Command Summary and the Quick Reference card give both the decimal and hex numbers for each command.

Word Processors

In many ways, word processors demand the most from your printer. When you create and print a document, you may use many print styles and fonts, add headers and footers, and use bold, italic, and other effects.

Once you have installed your word processor by using the list on page 3-1, you can ordinarily use a fixed set of printer features by using a word processor command to place markers around the text to be altered. When the document is printed, the markers are recognized and translated into suitable commands for your printer. On your screen some programs show the markers; others display the text as it will appear-for example, in bold or italics.

This method is normally restricted to features that can be found on almost all printers, such as bold and underlining.

Some programs also provide a way of placing complete printer commands in the text. These commands may or may not be visible on your screen. This method has the advantage of allowing you to use any printer command, not just a limited set. To make use of it, however, you need to understand how to use the printer's commands.

Check the manual for your word processor to see if you can place printer commands in your text. If this is possible, use the Command Summary (Appendix A) in this manual to find the command, and use the manual for your word processor to find how to assign the command.

If your T-750 is not printing correctly, check both the printer and your word processor and do the following:

- Make sure you've selected the correct printer.
- Carefully read the printer setup and installation information in your word processor's manual.
- Check the printer options that may be part of the installation or setup section.
- Make sure your word processor is capable of sending the proper commands to your printer.

If you're still having difficulty printing, check the troubleshooting section in your word processor's manual and Appendix C of this manual.

Spreadsheets

Although spreadsheets seldom use as many printing styles as word processors, they do have some very specific requirements.

Installation and column width

If your spreadsheet program provides a list of printers, use the list on page 3-l to find the proper selection. If your spreadsheet doesn't have a printer setup routine, carefully read the program's manual for information on printing.

A major concern for printing spreadsheets is the width of the printer. The T-750 is a 136-column printer. You can, however, increase the number of characters on a line by using one of the modes in Table 3-l. You can turn on condensed with a button on the control panel (see SelecType in Chapter l), and the other modes are explained in Chapter 4.

Table 3-1. Characters per *line*

	T-750
Normal	136
Elite	163
Condensed	233
Condensed Elite	272

Therefore, if your spreadsheet asks the number of columns your printer can print, decide which mode you will use and supply the appropriate number from Table 3-1.

Printer commands

Unlike word processors, spreadsheet programs usually don't let you change printer commands within a spreadsheet. Instead, one style or mode of printing is used for the whole spreadsheet. With the T-750, there are two main ways of sending commands to control the printing of a spreadsheet.

First, almost all spreadsheets have the capability of sending commands to a printer. Look in the manual for your spreadsheet to find out how to send printer commands. Then look in the Command Summary (Appendix A) in this manual to find the proper codes to send.

For example, your spreadsheet might use a "setup string" to send printer commands. To prepare a setup string for condensed elite, you would look up the proper command in the Command Summary.

The command for elite is ESC M, and the command for condensed is SI. because most spreadsheets use the decimal equivalent for the commands, (also given in the Command Summary), a setup string for condensed elite might look like this:

/027/077/015

The number 027 is for the escape code, 077 is for M, and 015 is for SI (condensed).

The second method to choose condensed is one of the SelecType control panel buttons. The use of this button is described in Chapter 1.

If your spreadsheet is not printing correctly, be sure you have selected the correct printer if the program asks you to select one.

If you're using the program's print facility, recheck the T-750's Command Summary to make sure you're sending the correct commands.

If you're still having difficulty printing, check the troubleshooting section in your spreadsheet program's manual or Appendix C of this manual.

Graphics Programs

The T-750 is capable of producing finely detailed graphic images. Although Chapter 5 gives specific information on the graphics commands, the easiest way to take advantage of the printer's capabilities is with one of the many graphics programs available.

When buying graphics software, always make sure it has a suitable option to allow printouts on Epson FX series printers. Any program with an option for Epson FX series printers should give excellent results, using different dot densities to produce a realistic scale of grays.

Most graphics programs have a printer selection procedure, in which case you should check the list on page 3-l to find the proper selection.

Programming Languages

Most users rely on application programs to send commands to the printer. An awareness of programming languages, however, can be helpful in exploring a printer's potential or troubleshooting a printing problem.

For example, if you want to set up your application program to send a command for italic printing, you can use a programming language, such as BASIC or Pascal, to do a quick printout before setting up the program.

If, on the other hand, you've set up a program to send a certain command to the printer, but it's not printing correctly, you can send the same command with a programming language to find whether the problem lies with your application program, the command, or the printer.

Sending printer commands with BASIC

You can send printer commands with any programming language. The examples in this manual are written in BASIC, because BASIC is included with most computer systems.

In most forms of BASIC, and in particular Microsoft@ BASIC, the normal method of producing printed output is to use the LPRINT statement followed by the text to be printed enclosed in quotation marks, as shown below:

```
100 LPRINT "This text will be printed."
```

Individual printer control codes can be sent by using the CHR$ function with the LPRINT statement:

```
100 LPRINT CHR$(27);CHR$(69);
```

This line sends ASCII codes 27 and 69 to the printer, selecting emphasized printing.

Most versions of BASIC permit the ASCII codes in the CHR$ function to be given in either decimal (as above) or hexadecimal. Also, if the code corresponds to a printable character, the character itself can be used in quotation marks in the LPRINT statement. The command shown above could therefore be given in two other forms:

```
LPRINT  CHR$(27);"E"
LPRINT   CHR$(&H1B);CHR$(&H145)
```

As you can see, Microsoft BASIC uses &H to denote hexadecimal numbers.

If you have another version of BASIC or a different programming language, consult the manual for the language to find the correct formats for these commands.

Chapter 4

T-750 Printer Features

You can obtain many different printing effects with the T-750 printer, from arranging the printout on the paper to giving extra emphasis to particular words and phrases. This chapter shows you the features you may want to select with your software. Once you have read about the features, you can find their commands in the Command Summary.

SelecType, as you know, controls the printing style of a whole document. Software commands, on the other hand, can change anything from a single character to the entire document.

Quality and Fonts

The most fundamental changes you can make to printing on the T-750 are in the print quality and NLQ fonts.

The printer has two levels of print quality: draft and NLQ (Near Letter Quality). Draft printing is fast, making it ideal for drafts and other preliminary work. NLQ printing takes a little longer, but it produces more fully-formed characters for presentation-quality documents.

The printout below shows the differences between draft, NLQ Roman, and NLQ Sans Serif so that you can compare the different styles and densities:

```
Draft printing is extremely fast.
NLQ Roman is clear and typewriter-like.
NLQ Sans Serif is crisp and distinctive.
```

SelecType gives you an easy way of changing the print quality and NLQ font, but if you prefer to print in NLQ Roman most of the time, you can select it with a DIP switch (see Appendix D). You can also choose the print quality and NLQ font with software commands.

Print Size and Character Width

To add greater variety to your documents, the T-750 has two pitches as well as proportional spacing and condensed, double-wide and double-high printing. All can be selected with a software command, and condensed can be selected with SelecType.

Pitches and Proportional Spacing

The two pitches are pica and elite. Pica is 10 characters per inch (cpi) and elite is 12 cpi. The printout below shows the difference between the two.

```
 Pica:  ABCDEFGHIJKLMnopqrstuvwxyz
Elite:  ABCDEFGHIJKLMnopqrstuvwxyz
```

Another mode is proportional. In this mode the width of the characters varies. Therefore, a narrow letter like i receives less space than a wide letter like W, as you can see in the printout below:

```
          Pica:  ABCDEFGHIJKLMnopqrstuvwxyz
Proportional:  ABCDEFGHIJKLMnopqrstuvwxyz
```

The character tables in Appendix B list the widths of all proportional characters.

Double-wide, double-high, and condensed

In addition to the basic pitches and the proportional mode, the T-750 offers three other modes that change the size of your printing. These modes are double-wide, double-high, and condensed.

The double-wide mode doubles the width of any size of characters. This mode is useful for such purposes as emphasizing headings in reports and making displays, but is usually not suitable for large amounts of text.

D o u b l e - w i d e p i c a
D o u b l e - w i d e e l i t e

Another mode for headings and other special uses is double-high, which is shown below.

This is double-high printing

Because of its height you must leave a blank line above a line of double-high. Otherwise the double-high letters will overlap the letters on the previous line.

Pica and elite can be reduced to about 60% of their normal width with the condensed mode. This mode is particularly useful for printing wide spreadsheets because condensed elite allows you up to 272 characters per line on wide computer paper.

Condensed can be selected with SelecType, by setting a DIP switch (see Appendix D), or with a software command. Even if you turn condensed on with the DIP switch, you can still turn it off with SelecType or the software command.

Condensed pica gives more characters on a line.
Condensed elite gives you even more.

Widening or narrowing the characters also widens or narrows the spaces between words and letters. Because word processors usually create a left margin by printing spaces, you may need to change the number of characters on a line to keep the margins correct if you change widths. For example, a left margin of five pica characters is the same as one of six elite characters.

Special Effects and Emphasis

The T-750 offers two ways of emphasizing parts of your text and also allows you to use underlining, superscripts, and subscripts. These features can be controlled only by software commands, but many application programs can produce them if they are properly installed.

Emphasized and double-strike modes both slow the printer down slightly to produce bolder text. In emphasized mode, the T-750 prints each character twice as the print head moves across the paper, with the second slightly to the right of the first. This produces darker, more fully-formed characters.

In double-strike mode, the T-750 prints each line twice, with the second slightly below the first. This makes the characters bolder. While NLQ is in use, however, double-strike is ignored because NLQ characters are already formed by two passes of the print head.

This is normal NLQ printing
This is emphasized NLQ printing

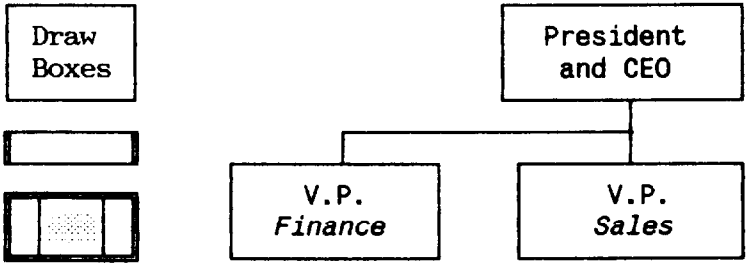
Superscripts and subscripts are valuable for such purposes as printing footnote numbers or parts of mathematical formulas, and the underline mode provides an automatic way of underlining fully any piece of text. It underlines spaces, subscripts, and superscripts without a break.

The example below shows underlining with text and combined with superscripts and subscripts in a mathematical formula.

$$\text{average} = \frac{(a_1 + a_2 + \ldots\ldots + an)}{n}$$

Using Different Character Sets

The T-750 incorporates a new character set: Epson Character Graphics. This set allows you to take advantage of the power of the Epson mode commands and still print out the character graphics used by IBM and compatible computers and by much application software. For example, if your word processor can include the characters to draw boxes and shade areas, you can produce some very professional effects.



You can select the Epson Character Graphics set with your software or by setting DIP switch l-3 ON. For many applications it is best to use the DIP switch instead of the software command because the character graphics are then available as soon as you turn the printer on.

The other important change you can make to the standard character set is to change some characters for ones commonly used in other languages-chiefly European and Scandinavian-such as accented characters and symbols. In Epson mode, eight international character sets can be selected by setting DIP switches l-6 to l-8: USA, French, German, UK, Danish, Swedish, Italian, and Spanish. See Appendix D for the DIP switch settings.

In Epson mode, these eight, and five more, can also be selected by a software command. The additional character sets are the following: Norwegian, a second Danish set, Japanese, a second Spanish set, and Latin American. A complete list of these characters is in Appendix B.

Also, all text characters can be printed in italics in Epson mode. You can use this typestyle for special emphasis or as an alternative typeface.

Italics give ***emphasis*** to words.
They are an attractive alternative style.

Page Layout and Other Commands

The remaining commands in the Command Summary are not normally needed when using application software. You may need some of them if you are using a printer installation program provided with an application package, but most deal with features (such as tabs, margins, and line spacing) that are provided directly by application programs and are therefore only useful to you if you want to program the printer using a programming language such as BASIC.

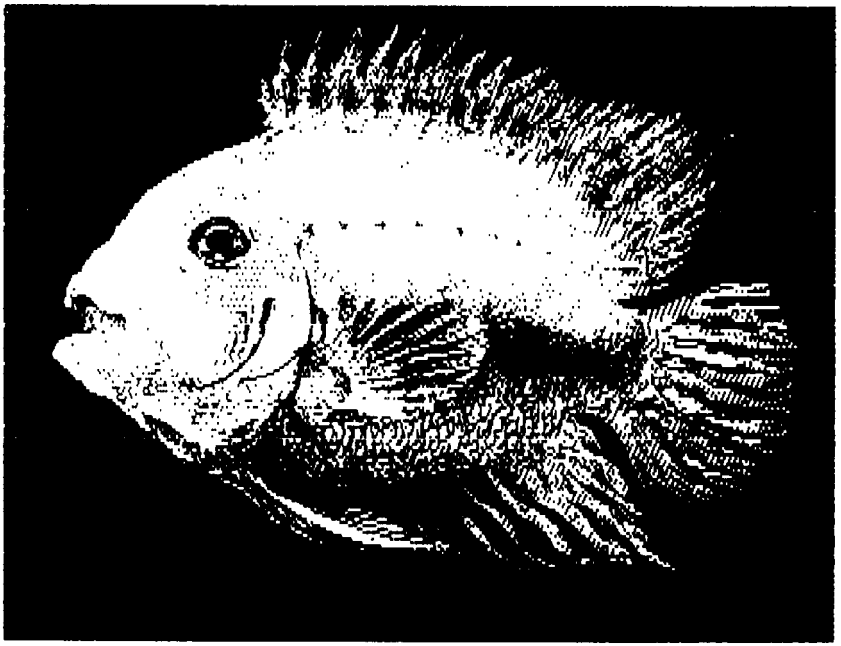
Chapter 5

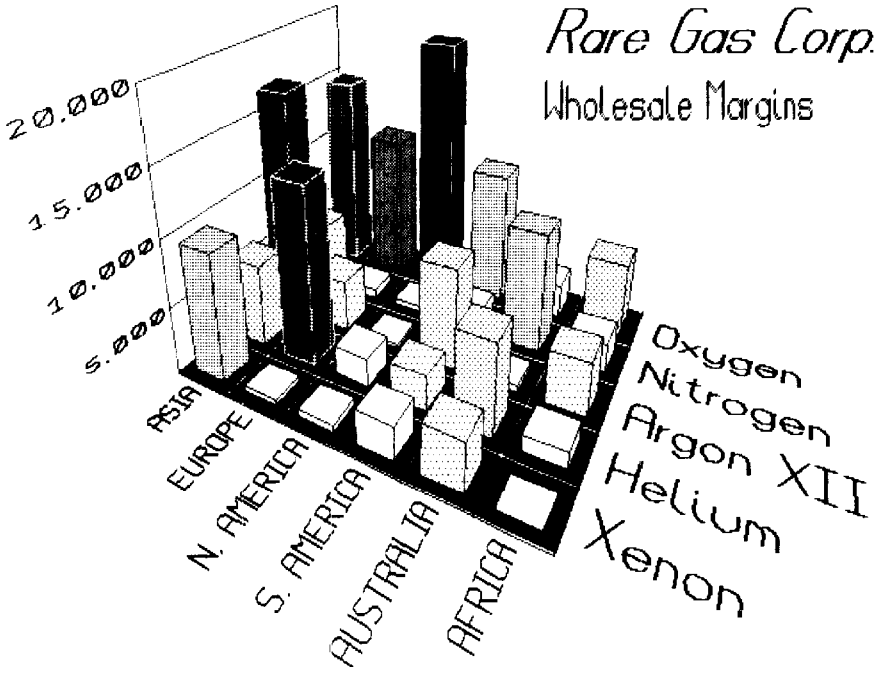
Graphics and User-defined Characters

The dot graphics mode allows your T-750 to produce pictures, graphs, charts, or almost any other pictorial material you can devise, and the user-defined character feature allows you or an application program to put special characters in the printer's memory so that it can print them just as if they were ordinary letters.

because many application programs use graphics, you may be able to print pictures and graphs like the ones on this page and the next by simply giving your software a few instructions.

The quickest and easiest way to print graphics on your T-750 is to use an application graphics program. With such programs you usually create an image on your monitor and then give a command to send the image to the printer.





If you use application software that produces graphics, all you need to know about dot graphics is how to use the software. If, on the other hand, you wish to do your own programming or merely wish to understand how the T-750 prints graphics, read on.

The Print Head

To understand dot graphics you need to know a little about how the T-750's print head works.

The printer's print head has nine pins. As it moves across the page, electrical impulses cause the pins to fire. Each time a pin fires, it strikes the inked ribbon and presses it against the paper to produce a small dot. As the head moves across the paper, the pins fire time after time in different patterns to produce letters, numbers, or symbols.

Dot patterns

The T-750's print head is able to print graphics in addition to text because graphic images are formed on the printer about the same way that pictures in newspapers and magazines are printed.

If you look closely at a newspaper photograph, you can see that it is made up of many small dots. The T-750 also forms its images with patterns of dots, as many as 240 dot positions per inch horizontally and 72 dots vertically. The images printed by the T-750 can, therefore, be as finely detailed as the one on the first page of this chapter.

In its main graphics mode the T-750 prints one column of dots for each code it receives, and it uses only the top eight of the nine pins. Therefore, your graphics program must send codes for dot patterns, one number for each column in a line. For each of those columns the print head prints the pattern of dots you have specified.

To print figures taller than eight dots, the print head makes more than one pass. The printer prints one line, then advances the paper and prints another, just as it does with text.

To keep the print head from leaving gaps between the graphics lines as it does between the text lines, the line spacing must be changed to eliminate the space between lines. With a change in line spacing, the T-750 can print finely detailed graphic images that give no indication that they are made up of separate lines, each no more than 8/72nds of an inch tall.

Each pass of the print head prints one piece of the total pattern, which can be as tall or short and as wide or narrow as you desire. You don't have to fill the whole page or even an entire line with your graphics figures. In fact, you can use as little or as much space as you like for a figure and put it anywhere on the page.

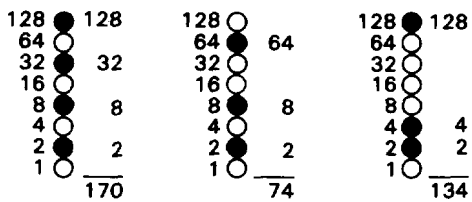
Pin Labels

The graphics mode requires a method to tell the printer which pins to fire in each column. Since there are 256 possible combinations of eight pins, you need a numbering system that allows you to use a single number to specify which of the 256 possible patterns you want. This numbering system is shown in Figure 5-1 on the next page.

To fire any one pin, you send its number. To fire more than one pin at the same time, add up the numbers of the pins and send the sum to the printer. Therefore, with these labels for the pins, you fire the top pin by sending 128. To fire the bottom pin, you send 1. If you want to fire only the top and bottom pins, you simply add 128 and 1, then send 129.

By adding the appropriate label numbers together, you can fire any combination of pins. Figure 5-1 shows three examples of how to calculate the number that fires a particular pattern of pins.

Figure 5-1.
Pin numbering system



With this numbering system, any combination of the eight pins adds up to a decimal number between 0 and 255, and no numbers are duplicated. Before you can put these numbers in a graphics program, however, you need to know the format of the graphics commands.

Graphics Commands

The graphics mode commands are quite different from most other commands. For most of the other modes, such as emphasized and double-wide, one command turns the mode on and another turns it off. For graphics, the command is more complicated because the command that turns on a graphics mode also specifies how many columns of graphics will be printed. After the printer receives this command, it interprets the next numbers as pin patterns and prints them on the paper.

The graphics command format

There are several different graphics commands giving different horizontal dot densities and printing speeds. Because the format is almost the same for all the commands, however, the example here keeps things simple by using only the single-density graphics command, ESC K. In single-density graphics, there are 60 dots per inch horizontally.

The command to enter single-density graphics mode is ESC K nl n2. In BASIC the command is given in this format:

```
LPRINT  CHR$(27);"K";CHR$(n1);CHR$(n2);
```

ESC K specifies single-density graphics, and the next two numbers (n1 and n2) specify the number of columns reserved for graphics.

Column reservation numbers

Even in single-density graphics mode, one 8-inch line can accommodate 480 columns of graphics; in quadruple-density, almost 2000 columns can fit on the same 8-inch line. Since the printer does not use decimal numbers larger than 255, the graphics commands use two numbers for reserving columns.

Because the commands are set up for two numbers, you must supply two even if you need only one. When you need fewer than 256 columns, it is easy to determine n1 and n2: nl is the number of columns you are reserving and n2 is zero. For example, to send data for 200 columns of graphics, *n1* is 200 and n2 is 0.

For more than 256 columns of graphics data, n2 is the number of complete groups of 256 columns, and nl is the number of columns to complete the line. For example, to send 1632 columns of graphic data, n1 is 96 and *n2* is 6 because 96 + (6 x 256) = 1632.

You can calculate both nl and *n2* by dividing the total number of columns by 256. The quotient is n2 and the remainder is *n1. If you* are using a programming language with MOD (modulus) and INT (integer) functions, you can use the following formulas, in which n is the total number of columns.

n1 = n MOD 256
n2 = INT (n / 256)

Graphics data

After receiving a graphics command such as ESC K nl n2, the printer prints the number of codes specified by nl and n2 as graphics data, no matter what codes they are. This means that you must be sure to supply exactly the right amount of graphics data. If you supply too little, the printer will stop and wait for more data and will seem to be locked. The next data sent will then be printed as graphics, even if it is really text. On the other hand, if you supply too much graphics data, the excess will be printed as regular text.

Simple Graphics Programming

The first example in this section shows how a graphics command, column reservation numbers, and data can be used to print a single line of graphics. The example is a BASIC program. If you prefer another programming language, the principles are exactly the same. Therefore, you can easily adapt the program to the language you prefer.

The first line of the program specifies single-density graphics for 40 columns:

```
100 LPRINT CHR$(27);"K";CHR$(40);CHR$(0);
```

The second line is the data that is printed as pin patterns. It uses the number 74 to produce one of the patterns shown in Figure 5-1. The FOR-NEXT loop sends 40 columns of data.

```
200 FOR X=1 TO 40: LPRINT CHR$(74);: NEXT X
```

That is the whole program. In BASIC, semicolons at the ends of the lines are very important; they prevent the computer from sending other codes after the ones you specify. In other languages you may have to use a special command to send a single code at a time. Run the program to see the result below. Although it is not as interesting as the examples at the beginning of this chapter, it shows exactly how the mode works.

WIDTH statements

Some software (including most versions of BASIC) automatically inserts carriage return and line feed codes after every 80 or 130 characters. This is usually no problem with text, but it can spoil your graphics. Two extra columns of graphics are printed in the middle of the ones you send, and are left over and printed as text.

In some versions of BASIC you can prevent unwanted control codes in graphics by putting a WIDTH statement at the beginning of all graphics programs. The format in many forms of BASIC is either WIDTH "LPT1:", 255 or WIDTH LPRINT 255. Check your software manual for the proper format.

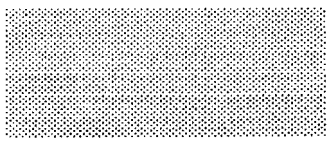
Printing taller patterns

The next example shows how several lines of graphics can be formed into a figure taller than eight dots. It uses programming techniques for producing textured or repetitive patterns.

The program is listed below. The lines inside each pair of FOR and NEXT statements have been indented so that you can see how the program works; the spaces are not needed for the program to run.

```
100 WIDTH "LPT1:", 255
110 LPRINT CHR$(27);"A";CHR$(8);
120 FOR R = 1 TO 6
130 LPRINT   CHR$(27);"K";CHR$(100);CHR$(0);
140   FOR X = 1 to 50
150      LPRINT CHR$(170);CHR$(85);
160   NEXT X: LPRINT
170 NEXT R
180 LPRINT CHR$(27);"@"
```

If you run the program, you will see how it combines six print lines into a pattern.



There are five basic steps that the program goes through to produce this kind of pattern.

1. The computer is prevented from adding any extra characters by the WIDTH statement (line 100).

2. The line spacing is changed to 8/72 of an inch-the height of the dot patterns used in the program (line 110).

3. The program goes through the graphics commands the required number of times (lines 120 and 170).

4. A new graphics command is used for each line printed (lines 130-160). This part of the program is similar to the last example, but two columns are printed each time through the loop making a total of 100.

5. The last important thing to do is to reset the printer to its default settings, including the normal line spacing (line 180).

Notice that the graphics command (ESC K) can be in effect for only one print line. To print more than one line of graphics, the graphics command must be issued before each line.

Density Varieties

Although all the examples so far in this chapter have been in the single-density graphics mode, there are six other eight-pin densities and two that use all nine pins. Nine-pin graphics is not necessary for most uses, but you can find the command (ESC ^) in the Epson mode command summary.

The four most common eight-pin modes are available in both Epson and IBM printer emulation modes. Their commands are ESC K, ESC L, ESC Y, ESC Z. In Epson mode, there is also a general-purpose command for any of the eight-pin graphics modes: ESC *. This command is used in the same way as the individual commands, except that before nl and *n2* you must send the code for the graphics mode required. The different modes are summarized in the table on the next Page.

The following example shows how to use the ESC * command to reserve 40 columns for single-density graphics. This uses mode number 0 from the table to achieve exactly the same effect as the first example using ESC K.

```
LPRINT  CHR$(27);"*";CHR$(0);CHR$(40);CHR$(0);
```

Table 5-1. Graphics modes

Option	Alternate Code	*m*	Horiz. density (dots/in.)
Single-density	ESC K	0	60
Double-density	ESC L	1	120
High-speed double-density*	ESC Y	2	120
Quadruple-density*	ESC Z	3	240
CRT I	none	4	80
Plotter (1:1)	none	5	72
CRT II	none	6	90
Double-density plotter	none	7	144

*Adjacent dots cannot be printed in this mode.

Modes 4-7 in the table are special modes that alter the horizontal density to give proportions of a computer monitor (the CRT modes), or to match the vertical density so as to give round circles (the plotter modes).

In two modes, high-speed double-density and quadruple-density, the print head cannot print two consecutive dots with the same pin, so that it can print dots in only half the possible dot positions in any one row. The higher density means that the resolution of the pattern is better than in single-density mode. When you design patterns in these two modes, however, you must see that no dots overlap.

Reassigning a graphics mode

Another graphics command lets you assign a different eight-pin graphics mode to one of the specific eight-pin graphics commands. You can use it with graphics software programs to quickly change the density and proportions of your printouts. Changing the graphics option changes the width without changing the height.

The command for reassigning a graphics mode is ESC ? c m. In this command, c is a letter designating one of the four alternate graphics codes (K, L, Y, or Z) and m is the mode number of the new mode, as listed in Table 5-1.

For example, to change the ESC K command to select the CRT I screen graphics mode, the command in BASIC would be the following:

```
LPRINT CHR$(27);"?K";CHR$(4);
```

A little experimentation should tell you whether the reassigning code can improve your graphics printouts.

Designing Your Own Graphics

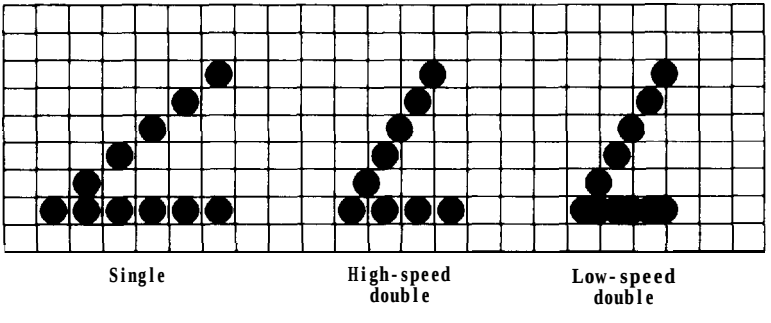
This section takes you through the development of a graphics program. The example is not especially complicated, but it does include the same steps you would use for a more complex figure.

You should plan your figure with dots on graph paper, but before beginning to place the dots, you must decide which graphics density you want. Figure 5-2 shows the differences between three common modes so that you can choose the one you want.

In this figure you can see the main rules for graphic design in the three densities:

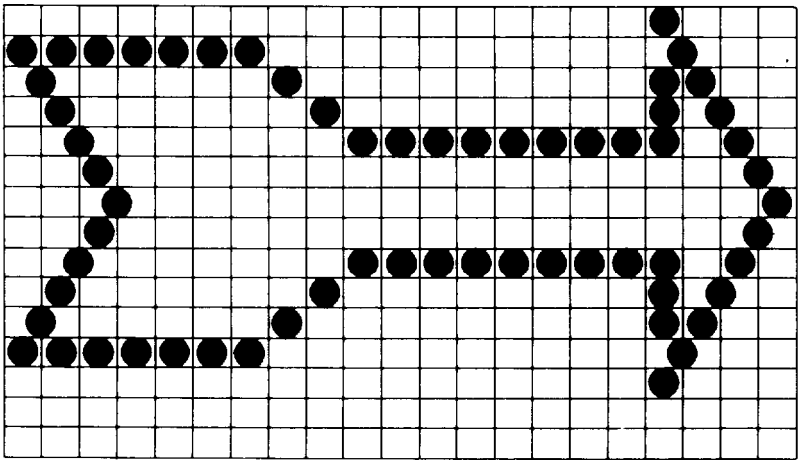
- In single-density no dots can be placed on vertical lines.
- In high-speed double-density, dots can be placed on vertical lines, but no dots can overlap.
- In low-speed double-density, dots can be placed on vertical lines, and they can overlap.

Figure 5-2.
Designing *in* different densities



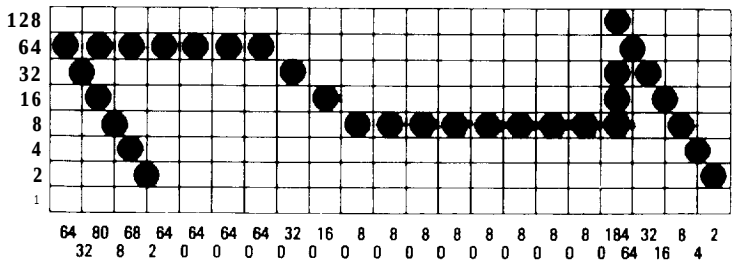
Now look at the high-speed double-density design in Figure 5-3. It should point you in the right direction for your own work.

Figure 5-3.
Arrow design



After plotting the dots on a grid, you calculate the numbers for each pin pattern by dividing the design grid into separate print lines. For the arrow design, the grid was divided into two lines, each seven dots high. Then each column was examined to calculate the graphics data. The results for the first line are shown in Figure 5-4. The pin values are on the left and the sums at the bottom of each column.

Figure 5-4.
Calculating data



The numbers for the second line were calculated in the same way. Once the numbers for the pin patterns are calculated, they are put in the program in DATA statements, separated by commas.

The program works in a similar way to the last example. This time it selects 7/72-inch line spacing because only seven pins are used. Because the data is not repetitive, each column of graphics data is read from the DATA statements and sent to the printer. The design is 41 dot positions wide. Therefore both lines 130 and 140 use the number 41.

```
100 WIDTH "LPT1:", 255
110 LPRINT  CHR$(27);"A";CHR$(7);
120 FOR ROW = 1 TO 2
130 LPRINT  CHR$(27);"Y";CHR$(41);CHR$(0);
140   FOR COLUMN = 1 TO 41
150      READ N
160      LPRINT CHR$(N);
170   NEXT  COLUMN
180 LPRINT
190 NEXT ROW
200 END
210 DATA  64,32,80,8,68,2,64,0,64,0
220 DATA  64,0,64,0,32,0,16,0,8,0
230 DATA 8,0,8,0,8,0,8,0,8,0,8,0,8,0,8,0
240 DATA  184,64,32,16,8,4,2
250 DATA  8,16,40,64,136,0,8,0,8,0
260 DATA  8,0,8,0,16,0,32,0,64,0,64,0
270 DATA  64,0,64,0,64,0,64,0,64,0,64,0
280 DATA  116,8,16,32,64,128,0
```

When you run this program, it produces the following printout:

If you want to see the figure in other densities, change the Y in line 130 to L or 2.

User-defined Characters

The T-750 has a command that allows you to define and print characters of your own design. You can design an entirely new alphabet or typeface, create mathematical or scientific symbols, or create graphic patterns to serve as building blocks for larger designs. These user-defined characters work only in draft mode.

Also, you can buy application programs that assist you in creating characters or supply you with sets of characters already created. In addition, some popular application packages make use of the user-defined character function to enhance printouts. (These characters are called download characters in some programs.)

The printout below shows a few user-defined characters to give you an idea of what can be done, but remember that you can create what you need or want.

When you define a character of your own, the definition is stored in temporary memory (RAM). The original character with the same code remains in the printer's permanent memory (ROM) and you can print either of them when needed.

Design grids

The process of defining a character is much like printing dot graphics because you send the printer precise instructions on where you want each dot printed. In fact, planning a user-defined character is like planning a small dot graphics pattern.

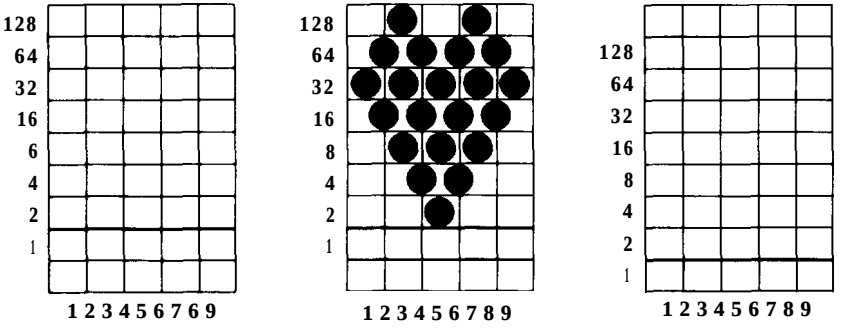
To design a character you use a grid that has nine rows and eleven columns. Figure 5-5 on the next page shows three of these grids. Most characters do not use the two rows below the heavy line. Those rows are only for characters with descenders, like y and g. Also, even though you can use up to 11 columns, it is best to leave the last two blank for the space between characters.

The grid in the middle of Figure 5-5 shows a plan for a character. Although there are nine pins in the T-750 print head, you can use only eight of them in a single user-defined character. The design in

Figure 5-5 uses the top eight, but you can also use the bottom eight by using the grid on the right as explained later in this section.

Once the character is planned on the grid, you simply add the pin values for each column together, just as you do for graphics. Then, the next step in defining a character is to send this information to the printer.

Figure 5-5.
Design grids



Sending the character definition

The command to define characters is complex:

ESC & 0 n1 n2 a1 dl . . . *d n*

You can define more than one character with a single command. The values nl and *n2* are the ASCII codes of the first and last characters you are defining. If you are defining only one character, nl and *n2* are the same. You can use any codes between 32 and 127 or 161 and 254 decimal for nl and *n2,* but it is best not to define decimal 32, which is the code for a space. You can also use other codes by using the ESC 6 and ESC I commands (see the Command Summary).

An example will show how to specify *n1* and n2. If, for instance, you want to redefine the characters A to Z, nl is A (or ASCII code 65) and n2 is Z (or ASCII code 90). So the command ESC & 0 AZ (followed by the appropriate data) would replace the entire alphabet of capital letters.

Following the specification of the range of characters to be defined in this command is one number (al) that specifies the width of the character and whether it uses the top eight pins or the bottom eight pins.

The last part of the character definition is the actual data that defines the dot patterns for each column of each character. Since a character can use up to eleven columns, you must supply eleven data numbers for each character even if some of the columns are blank.

An example character definition program should make the process clear:

```
100 LPRINT CHR$(27);"x0";
110 LPRINT CHR$(27);"&";CHR$(0);
120 LPRINT "@@";
130 LPRINT CHR$(136);
140 FOR I = 1 to 11
150    READ A: LPRINT CHR$(A);
160 NEXT I
170 LPRINT "@ @ @ @ @"
180 LPRINT CHR$(27);"%";CHR$(1);
199 LPRINT "@ @ @ @ @"
200 LPRINT CHR$(27);"%";CHR$(0);
218 LPRINT "@ @ @ @ @"
220 END
230 DATA 32,80,168,84,42,84,168,80,32,0,0
```

In line 100, the ESC x 0 command selects draft style printing. The actual character definition starts in line 110. The two at signs (@) in line 120 are nl and *n2,* the range of characters being defined (in this case, a range of one). Line 130 contains al.

The information about the character design (which is contained in the data statements at the end of the program) is sent to the printer in the loop between lines 140 and 160.

This example program defines a heart and places it in the area of RAM reserved for ASCII code 64, which corresponds to the at sign in the characters in the ROM. The next part of the program (lines 170-210) prints out a three-line sample. The first and third lines contain at signs; the second line contains the heart that was defined.

Run the program to see the printout below:

As you can see, both sets of characters (the original ROM characters that the printer normally uses and the user-defined character set) remain in the printer available for your use. The command to switch between the two sets is used in lines 180 and 200 and has the following format:

ESC % n

If *n* is 0, the normal ROM character set is selected. (This is the default.) If n is 1, the user-defined character set is selected.

You can switch between character sets at any time, even in the middle of a line. To try it, place semicolons at the end of lines 170 and 190 in the program above.

Copying ROM to RAM

After running the program above, if you select the user-defined character set and try to print other characters, the only one that will print is the heart. If you send the code for a character that is not defined, it is printed as a space.

In many cases, you will want to redefine only a few of the characters, leaving the rest of the alphabet as it is. As you have seen, it is possible to switch back and forth between the normal character set and the user-defined character set. Normally, it is more convenient to copy all of the standard characters from ROM to the area of RAM that holds the user-defined character set. The format of the command to do this is as follows:

ESC : 0 0 0

If you use this command at the beginning of a program, then define the special characters you want to change, you can then select the user-defined character set and use it as your normal character set. There is then no need to switch back and forth between sets.

Note

This command will cancel any user-defined characters you have already created. You must send this command to the printer before you define characters.

Specifying the width and height

The example program uses 136 for al (in line 130 of the definition program), but you can use other values. The number al specifies two things: the width of the character and its position on the grid. The width is used when the character is printed in proportional mode.

If you want a character to use the bottom eight pins, use the third grid in Figure 5-5.

A value of 136 is suitable for all characters that use the top eight pins and start in column 1 and finish in column 9. For a character the same width, but printed with the bottom eight pins, al should be 8. For any other character follow these rules to calculate al:

1. If you design a character narrower than nine columns, you can balance the number of empty columns on either side with the following method: Starting with a1 equal to 8, subtract 1 for every blank column on the right and add 16 for every blank column on the left.

2. If the character should be printed with the top eight pins, add 128.

For example, if a character uses the top eight pins and starts in column 3 and ends in column 7, the calculation is as follows:

- start with al = 8
- subtract 2 for two blank columns on the right, giving al = 6
- add 32 for two blank columns on the left, giving al = 38
- add 128 to print with the top eight pins, so that al = 166.

Mixing print styles

The user-defined characters can be used in combination with most print styles (except NLQ, of course). For example, emphasized and double-wide work well with user-defined characters.

The sample below shows the heart character printed in two different styles.

Other considerations

Keep in mind that user-defined characters are stored in RAM, which is not permanent. Whenever the printer power is turned off or your computer sends an initialization (INIT) signal, all of the user-defined characters are lost. For example, some computers send an INIT signal each time BASIC is loaded or when certain application programs start up, and most computers do it if you have to reset them. If the program resets the printer with the ESC @ command, the ROM set is selected, but the user-defined characters are not lost.

The IBM printer emulation mode has a different method of defining characters. See page A-45 in the Command Summary if you are interested.

Appendix A

Command Summary

This appendix lists and describes all the commands, both Epson (ESC/P) mode and IBM printer emulation mode, available on the T-750.

The first part of this appendix lists all commands in numerical order and gives the page number where each is fully described. If you know which command you are looking for, consult the numerical list to find the page number where it is described.

The Quick Reference card at the end of the book also contains a list of the commands divided by topic, with page number references that direct you to full explanations of the commands. The numerical list and the Quick Reference card also show the differences between the Epson mode and the IBM printer emulation mode.

The second part of this appendix lists and describes Epson mode commands and IBM printer emulation mode commands separately; the commands are divided into the following subjects:

- Printer Operation
- Data Control
- Vertical Motion
- Horizontal Motion
- Overall Printing Style
- Print Size
- Print Enhancement
- Word Processing
- Character Sets
- User-defined Characters
- Graphics

Each command has a format section and a comment section. The format section gives the ASCII, decimal, and hexadecimal values for the command; the comment section describes the effect of the command and gives any additional information necessary for using it.

All three formats are equivalent, and it should be easy to pick the one most suited to your purpose.

Note
Some application programs can use control key sequences. See the Control Key chart on page A-3 for information on using these.

For the following commands that use only 0 or 1 for the variable, either the ASCII codes 1 and 0 or the characters 1 and 0 can be used:

ESC s, **ESC U, ESC** x, **ESC** p, **ESC W, ESC S, ESC** - , and **ESC %**

For example, in BASIC you can turn on double-wide with either of these statements:

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

The simplest type of command consists of a single character to be sent to the printer. For instance, to print in condensed mode the code format is:

ASCII code:	SI
Decimal:	**15**
Hexadecimal:	0 **F**

This code can be sent from a program by sending the code 15 directly

More complex commands consist of two or more character codes. For example, to print in proportional mode the code format is the following:

ASCII code:	**ESC**	p	*n*
Decimal:	**27**	**112**	*n*
Hexadecimal:	**1B**	**70**	*n*

In this case *n* can be either 1 or 0, to begin or end proportional printing. You can use either of the following commands to turn ON proportional print from BASIC:

```
LPRINT CHR$(27);CHR$(112);CHR$(1)
LPRINT CHR$(27);"p";CHR$(1)
```

Control key chart

Some application programs can use control key codes for decimal values O-27. The table below gives you the proper values. The Control Key column indicates that you press the control key at the same time you press the key for the letter or symbol in that column. For example, you press the control key and A at the same time to send the value 1.

Some programs that use this system cannot use control-@, and many programs use the control keys for other purposes.

Dec.	Hex.	Control Key
0	00	@
1	01	A
2	02	B
3	03	C
4	04	D
5	05	E
6	06	F
7	07	G
8	08	H
9	09	I
10	0A	J
11	0B	K
12	0C	L
13	0D	M
14	0E	N
15	0F	O
16	10	P
17	11	Q
18	12	R
19	13	S
20	14	T
21	15	U
22	16	V
23	17	W
24	18	X
25	19	Y
26	1A	Z
27	1B	[

Commands in Numerical Order

This section lists all the T-750 commands, with their decimal and hexadecimal values. The numbers in the columns on the right are the paged numbers in this appendix where a complete description of the command can be found. If the Epson and IBM printer emulation mode page numbers are the same, the command is the same in both modes and is described only in the Epson mode section.

ASCII	Decimal	Hexadecimal	Description	Epson Mode	IBM Printer Emulation Mode
BEL	7	07	Beeper	A-11	A-11
BS	8	08	Backspace	A-19	A-19
HT	9	09	Tab horizontally	A-20	A-20
LF	10	0A	Line feed	A-14	A-14
VT	11	0B	Tab vertically	A-17	A-17
FF	12	0C	Form feed	A-13	A-13
CR	13	0D	Carriage return	A-12	A-12
SO	14	0E	Select double-wide (1 line)	A-24	A-24
S I	15	0F	Select condensed mode	A-23	A-23
DC1	17	11	Select printer	A-7	A-7
DC2	18	12	Cancel condensed mode	A-24	
DC2	18	12	Cancel condensed/elite		A-42
DC3	19	13	Deselect printer	A-8	
DC4	20	14	Cancel double-wide (1 line)	A-25	A-25
CAN	24	18	Cancel line	A-12	A-12
DEL	127	7F	Delete character	A-12	
ESC SO	14	0E	Select double-wide (1 line)	A-24	A-24
ESC SI	15	0F	Select condensed mode	A-24	A-24
ESC EM	25	19	Automatic sheet feeder on/off	A-10	
ESC SP	32	20	Set intercharacter space	A-29	
ESC !	33	21	Master select	A-22	
ESC #	35	23	Cancel MSB control	A-11	
ESC $	36	24	Set absolute print position	A-19	
ESC %	37	25	Select user-defined set	A-31	
ESC &	38	26	Define user-defined characters	A-3 1	
ESC *	42	2A	Select graphics mode	A-34	
ESC -	45	2D	Turn underlining on/off	A-28	A-28

ASCII	Decimal	Hexadecimal	Description	Epson Mode	IBM Printer Emulation Mode
ESC /	47	2F	Select vertical tab channel	A-18	
ESC 0	48	30	Select l/&inch line spacing	A-15	A-15
ESC 1	49	31	Select 7/72-inch line spacing	A-15	A-15
ESC 2	50	32	Select l/6-inch line spacing	A-15	
ESC 2	50	32	Select programmable line spacing		A-38
ESC 3	51	33	Select n/216-inch line spacing	A-16	A-16
ESC 4	52	34	Select italic mode	A-30	
ESC 4	52	34	Set top of form		A-38
ESC 5	53	35	Cancel italic mode	A-30	
ESC 5	53	35	Turn automatic line feed on/off		A-39
ESC 6	54	36	Printable code area expansion	A-32	
ESC 6	54	36	Select international character set		A-43
ESC 7	55	37	Cancel ESC 6	A-32	
ESC 7	55	37	Select standard character set		A-43
ESC 8	56	38	Disable paper-out sensor	A-9	A-9
ESC 9	57	39	Enable paper-out sensor	A-9	A-9
ESC :	58	3A	Copy ROM into RAM	A-31	
ESC :	58	3A	Select elite pitch		A-41
ESC <	60	3C	Select unidirectional mode (l-line)	A-8	
ESC =	61	3D	Set MSB to 0	A-10	
ESC =	61	3D	Define user-defined characters		A-45
ESC >	**62**	**3E**	Set MSB to 1	A-11	
ESC ?	63	3F	Reassign graphics mode	A-35	
ESC @	64	40	Initialize printer	A-7	
ESC A	65	41	Select n/72-inch line spacing	A-16	
ESC A	65	41	Set n/72-inch line spacing		A-37
ESC B	66	42	Set vertical tabs	A-17	A-17
ESC C	67	43	Set page length in lines	A-13	A-13
ESC CO	67	43	Set page length in inches	A-13	A-13
ESC D	68	44	Set horizontal tabs	A-21	A-40
ESC E	69	45	Select emphasized mode	A-26	A-26
ESC F	70	46	Cancel emphasized mode	A-26	A-26
ESC G	71	47	Select double-strike mode	A-26	A-26
ESC H	72	48	Cancel double-strike mode	A-27	A-27
ESC I	73	49	Printable code area expansion	A-32	
ESC I	73	49	Select font		A-40

ASCII	Decimal	Hexadecimal	Description	Epson Mode	IBM Printer Emulation Mode
ESC J	74	4A	Perform n/216-inch line feed	A-16	A-38
ESC K	75	4B	Select singledensity graphics	A-33	A-33
ESC L	76	4C	Select double-density graphics	A-33	A-33
ESC M	77	4D	Select elite pitch	A-23	
ESC N	78	4E	Set skip-over-perforation	A-14	A-14
ESC 0	79	4F	Cancel skip-over-perforation	A-14	A-14
ESC P	80	50	Select pica pitch	A-22	
ESC P	80	50	Turn proportional on/off		A-41
ESC Q	81	51	Set right margin	A-18	
ESC Q22	81	51	Deselect printer		A-37
ESC R	82	52	International character set	A-30	
ESC R	82	52	Restore default tab settings		A-40
ESC SO	83	53	Select superscript mode	A-27	A-27
ESC Sl	83	53	Select subscript mode	A-27	A-27
ESC T	84	54	Cancel superscript/subscript	A-27	A-27
ESC U	85	55	Turn unidirectional mode on/off	A-9	A-9
ESC W	87	57	Turn double-wide on/off	A-25	A-25
ESC X	88	58	Set left and right margins		A-39
ESC Y	89	59	High-speed dbl-density graphics	A-33	A-33
ESC Z	90	5A	Quadruple-density graphics	A-34	A-34
ESC [@	91	5B	Turn double-high on/off		A42
ESC \	92	5C	Set relative position	A-20	
ESC 1	92	5C	Print characters from symbol set		A-44
ESC ^	94	5E	Select 9-pin graphics	A-35	
ESC ^	94	5E	Print 1 character from symbol set		A-44
ESC _	95	5F	Turn overscore on/off		A-43
ESC a	97	61	NLQ justification	A-28	
ESC b	98	62	Set vertical tabs in channels	A-17	
ESC k	107	6B	Select NLQ font	A-21	
ESC 1	108	6C	Set left margin	A-18	
ESC p	112	70	Turn proportional mode on/off	A-23	
ESC s	115	73	Turn half-speed mode on/off	A-8	
ESC t	116	74	Select character table	A-29	
ESC w	119	77	Turn double-high on/off	A-25	
ESC x	120	78	Select NLQ or draft	A-21	

Epson (ESC/P) Commands

The following section lists and describes all the Epson (ESC/P) commands.

Printer Operation

Initialization

ESC @ — **Initialize Printer**

Format:

ASCII code:	**ESC**	@
Decimal:	2	64
Hexadecimal:	**1B**	**40**

Comments:

Resets the printer mode and clears the buffer of printable data on the print line preceding the command.

Selection

DC1 — **Select Printer**

Format:

ASCII code:	**DC1**
Decimal:	**17**
Hexadecimal:	**11**

Comments:

Returns the printer to the selected state if it has been deselected by the printer deselect code (DC3). Does not select the printer if it has been switched off line by pressing the **ON LINE** button.

DC3 — Deselect Printer

Format:

ASCII code:	**DC3**
Decimal:	19
Hexadecimal:	**13**

Comments:

Puts the printer into the deselected state until select printer code (DCl) is received. The printer cannot be reselected with the **ON LINE** button.

Speed

ESC s — Turn Half-speed Mode On/Off

Format:

ASCII code:	**ESC**	s	**n**
Decimal:	27	**115**	**n**
Hexadecimal:	**1B**	**73**	*n*

Comments:

The following values can be used for n:

1: Mode is turned ON. (The characters "0" and "1"
0: Mode is turned OFF. can also be used.)

Printing direction

ESC < — Select Unidirectional Mode (one line)

Format:

ASCII code:	**E S C**	**<**
Decimal:	27	60
Hexadecimal:	**1B**	3C

Comments:

Printing is normally bidirectional. This command selects unidirectional printing for one line only. (It is cancelled by a carriage return.) The print head moves to the extreme left (home) position, and printing takes place from left to right.

ESC U — Turn Unidirectional Mode On/Off

Format:

ASCII code:	**ESC**	**U**	**n**
Decimal:	**27**	**85**	**n**
Hexadecimal:	**1B**	**55**	*n*

Comments:

The following values can be used for n:

1: Mode is turned ON. (The characters "0" and "1"
0: Mode is turned **OFF.** can also be used.)

Text printing is normally bidirectional. This command selects unidirectional printing for more accurate positioning.

ESC 8 — Disable Paper-out Sensor

Format:

ASCII code:	**ESC**	**8**
Decimal:	27	56
Hexadecimal:	**1B**	**38**

Comments:

Turns off the paper-out sensor so that you can print to the end of a single sheet of paper.

ESC 9 — Enable Paper-out Sensor

Format:

ASCII code:	**ESC**	**9**
Decimal:	27	57
Hexadecimal:	**1B**	**39**

Comments:

Cancels ESC 8. Therefore, the printer beeper sounds and printing stops when the printer reaches a point approximately 3/4 of an inch from the end of the paper.

ESC EM — Turn Automatic Sheet Feed Mode On/Off

Format:

ASCII code:	**ESC**	**EM**	*n*
Decimal:	27	25	*n*
Hexadecimal:	1B	**19**	**n**

Comments:

The following values can be used for *n:*
4: Mode is turned ON.
0: Mode is turned OFF.

The variables are the characters "0" (48 decimal or 30 hex) and "4" (52 decimal or 34 hex). Do not use 1 decimal, 01 hex, 4 decimal, or 04 hex.

The command should not be used unless the automatic sheet feeder is installed. It is ignored if any value other than "0" or "4" is used for n. The command overrides the setting of DIP switch 2-2.

MSB control

Note: MSB is the Most Significant Bit. MSB control (ESC = , ESC > , and ESC #) is not valid for graphics or user-defined characters.

ESC = (equal) — Set MSB to 0

Format:

ASCII code:	**ESC**	**=**
Decimal:	27	61
Hexadecimal:	**1B**	**3D**

Comments:

Sets the MSB of all incoming data to 0. Some computers always send data with the MSB set to 1, which means that italics or character graphics will always be printed. ESC = can overcome this problem.

ESC > **Set MSB to 1**

Format:

ASCII code:	**ESC**	**>**
Decimal:	27	62
Hexadecimal:	**1B**	**3E**

Comments:

Sets the MSB bit of all incoming data as 1.

ESC # **Cancel MSB Control**

Format:

ASCII code:	**ESC**	**#**
Decimal:	27	35
Hexadecimal:	**1B**	**23**

Comments:

Cancels the MSB control set by ESC = or ESC >.

Beeper

BEL **Beeper**

Format:

ASCII code:	**BEL**
Decimal:	7
Hexadecimal:	07

Comments:

Sounds the printer's beeper.

Data Control

CR — Carriage Return

Format:

ASCII code: CR
Decimal: **13**
Hexadecimal: **0 D**

Comments:

Prints the data in the buffer and returns the print position to the left margin. A line feed may be added if DIP switch 24 is ON or the AUTO PEED XT line on the parallel interface is held LOW.

CAN — Cancel Line

Format:

ASCII code: **CAN**
Decimal: **24**
Hexadecimal: **18**

Comments:

Removes all text on the print line, but does not affect control codes.

DEL — Delete Character

Format:

ASCII code: **DEL**
Decimal: **127**
Hexadecimal: **7F**

Comments:

Removes the last text character on the print line but does not affect control codes.

Vertical Motion

Form feeding

FF — **Form Feed**

Format:

ASCII code:	**FF**		
Decimal:	12		
Hexadecimal:	0C		

Comments:

Prints the data in the print buffer and advances the paper to the top of the next form according to the current page length.

ESC C — **Set Page Length in Lines**

Format:

ASCII code:	**ESC**	**C**	**n**
Decimal:	27	67	n
Hexadecimal:	**1B**	43	*n*

Comments:

Sets the page length to n lines in the current line spacing. The value of n must be from l-127. The top of form position is set to the current line.

ESC C 0 — **Set Page Length in Inches**

Format:

ASCII code:	**ESC**	**C**	**NUL**	*n*
Decimal:	27	67	0	*n*
Hexadecimal:	**1B**	**43**	**00**	*n*

Comments:

Sets the page length to n inches. The value of n must be from l-22. The top of form position is set to the current line.

ESC N **Set Skip-over-perforation**

Format:

ASCII code:	**ESC**	**N**	*n*
Decimal:	**27**	**78**	*n*
Hexadecimal:	**1B**	**4E**	**n**

Comments:

The variable n is the number of lines skipped between the last line printed on one page and the first line on the next page. For example, with the standard settings for line spacing (l/6-inch), and page length (66 lines), ESC N 6 causes the T-750 to print 60 lines and then skip 6. DIP switch 2-3 performs the same function. This setting is cancelled by ESC 0 and also by ESC C or ESC C NUL. The value of n must be from 1-127.

ESC O **Cancel Skip-over-perforation**

Format:

ASCII code:	**ESC**	**0**
Decimal:	**27**	**79**
Hexadecimal:	**1B**	**4F**

Comments

Cancels the skip-over-perforation set by ESC N. Overrides the setting of DIP switch 2-3.

Line feeding

LF **Line Feed**

Format:

ASCII code:	**LF**
Decimal:	**10**
Hexadecimal:	**0 A**

Comments:

When this command is received, the data in the print buffer is printed and the paper advances one line in the current line spacing.

ESC 0 — Select 1/84-inch Line Spacing

Format:

ASCII code:	**ESC**	**0**
Decimal:	27	48
Hexadecimal:	**1B**	**30**

Comments:

Sets the line spacing to l/8 of an inch for subsequent line feed commands. The 0 is the character zero and not ASCII code 0.

ESC 1 — Select 7/72-inch Line Spacing

Format:

ASCII code:	**ESC**	**1**
Decimal:	27	49
Hexadecimal:	**1B**	**31**

Comments:

Sets the line spacing to 7/72 of an inch for subsequent line feed commands. The 1 is the character one and not lowercase L or ASCII code 1.

ESC 2 — Select l/6-inch Line Spacing

Format:

ASCII code:	**ESC**	**2**
Decimal:	27	50
Hexadecimal:	**1B**	**32**

Comments:

Sets the line spacing to l/6 of an inch for subsequent line feed commands. The "2" is the character two and not ASCII code 2. This is the default at power on.

ESC 3 — Select n/216-inch Line Spacing

Format:

ASCII code:	**ESC**	**3**	**n**
Decimal:	**27**	**51**	*n*
Hexadecimal:	**1B**	*33*	*n*

Comments:

Sets the line spacing to n/216 of an inch for subsequent line feed commands. The "3" is the character three and not ASCII code 3. The value of n must be from 0-255.

ESC A — Select n/72-inch Line Spacing

Format:

ASCII code:	**ESC**	**A**	*n*
Decimal:	**27**	**65**	*n*
Hexadecimal:	**1B**	**41**	*n*

Comments:

Sets the line spacing to n/72 of an inch for subsequent line feed commands. The value of n must be from O-85.

ESC J — Perform n/216-inch Line Feed

Format:

ASCII code:	**ESC**	**J**	*n*
Decimal:	**27**	**74**	*n*
Hexadecimal:	**1B**	**4A**	**n**

Comments:

Advances the paper *n/216* of an inch. The value of n must be from O-255. This command produces an immediate line feed but does not affect subsequent line spacing and does not produce a carriage return.

Vertical tabbing

VT — Tab Vertically

Format:

ASCII code:	VT
Decimal:	**11**
Hexadecimal:	**0B**

Comments:

Advances the paper to the next tab setting in the channel selected by ESC /. If no channel has been selected, channel 0 is used. If no vertical tabs have been selected, the paper advances one line.

ESC B — Set Vertical Tabs

Format:

ASCII code:	**ESC**	**B**	*n1 n2 . . .* **NUL**
Decimal:	**27**	**66**	*n1 n2 . . . 0*
Hexadecimal:	**1B**	**42**	*n1 n2 . . . 00*

Comments:

Sets up to 16 vertical tabs in the current line spacing. Tab settings are not affected by subsequent changes in line spacing. The tab settings are entered as nl, n2, etc., all from l-255, in ascending order. The NUL character indicates the end of the command. All settings are stored in channel 0 (see ESC b). **ESC** B NUL clears the tab settings.

ESC b — Set Vertical Tabs in Channels

Format:

ASCII code:	**ESC**	**b**	**c**	*n1 n2 . . .* **NUL**
Decimal:	**27**	*98*	*c*	*n1 n2 . . . 0*
Hexadecimal:	**1 B**	**62**	*c*	*n1 n2 . . . 00*

Comments:

Functions the same as ESC B, except that the variable c selects a channel for the vertical tabs, which must be between O-7. Therefore, up to eight sets of vertical tabs can be set. The channels are selected by **ESC** /. To clear the tabs in channel c use ESC b c NUL.

ESC / — Select Vertical Tab Channel

Format:

ASCII code:	**ESC**	**/**	**c**
Decimal:	27	47	c
Hexadecimal:	1B	**2F**	**c**

Comments:

This command is used to select the vertical tab channel, with the value of c from O-7. All subsequent VT commands use the channel selected by this command.

Horizontal Motion

Margins

ESC 1 — Set Left Margin

Format:

ASCII code:	**ESC**	**1**	*n*
Decimal:	**27**	**108**	*n*
Hexadecimal:	**1B**	**6C**	**n**

Comments:

Sets the left margin to *n* columns in the current pitch. Settings made in the proportional mode are treated as pica. This command clears previous tab settings and all previous characters in the print line. Use lowercase 1 (for left), not the numeral one. The minimum space between the margins is the width of one double-wide pica character.

ESC Q — Set Right Margin

Format:

ASCII code:	**ESC**	**Q**	*n*
Decimal:	27	81	*n*
Hexadecimal:	**1 B**	51	*n*

Comments:

Sets the right margin to *n* columns in the current pitch. Settings made in the proportional mode are treated as pica. This command clears previous tab settings and all previous characters in the print line. The minimum space between the margins is the width of one double-wide pica character.

Print head movement

BS — Backspace

Format:

ASCII code: BS
Decimal: 8
Hexadecimal: 08

Comments:

Prints out data in the print buffer, then moves the print position one space to the left. Backspacing can be performed up to, but not beyond, the left margin setting. The BS code is also ignored if ESC a, 2, or 3 has been sent. In Epson mode, if this code is received immediately after graphics printing, the print position of subsequent data is moved back to the point at which graphics printing started.

ESC $ — Set Absolute Print Position

Format:

ASCII code:	**ESC**	**$**	*n1*	*n2*
Decimal:	**27**	**36**	*n1*	*n2*
Hexadecimal:	**1B**	**24**	*n1*	*n2*

Comments:

This sequence specifies the distance from the currently set left margin that subsequent characters are to be printed, using this formula: total number of dots = nl + (n2 **x** 256). Each unit equals 1/60th of an inch. The sequence is ignored and the previous setting remains effective if the position specified is beyond the right margin.

ESC ** **Set Relative Position

Format:

ASCII code:	**ESC**	****	**n1**	*n*	*2*
Decimal:	**27**	*92*	*n1*	**n**	**2**
Hexadecimal:		**1B**	**5C**	*n1*	*n2*

Comments:

Determines the position (relative to the current position) at which printing of following data will start. To find *n1* and n2, first calculate the displacement required in l/120ths of an inch. If the displacement is to the left, subtract it from 65536. Send the resulting number using this formula: total number of dots = nl + (n2 **x** 256). The command is ignored if it would move the print position outside the current margins.

Horizontal tabbing

HT **Tab Horizontally**

Format:

ASCII code: HT
Decimal: 9
Hexadecimal: 09

Comments:

Advances the print position to the next horizontal tab setting. The default settings are at intervals of eight characters in the default pitch, and tab positions are not affected by subsequent changes in character pitch.

ESC D **Set Horizontal Tabs**

Format:

ASCII code:	**ESC**	**D**	*n1*	*n2*	.	.	**NUL**		
Decimal:	**27**	**68**	*n1*	*n2*	.	.	.	*0*	
Hexadecimal:	**1B**	**44**	*n1*	*n2*	.	.	.	*00*	

Comments:

This command allows setting of up to 32 horizontal tabs, which are entered as *n1*, *n2*, n3, etc. (from 1-137) with the NUL character or any value less than the previous one terminating the command. ESC D NUL clears all tabs. The settings on power up or after an ESC @ command are every eight characters. The tab settings do not change if the character pitch is changed, and for proportional printing the size of pica characters determines the tab positions.

Overall Printing Style

ESC x **Select NLQ or Draf**

Format:

ASCII code:	**ESC**	*x*	*n*
Decimal:	**27**	**120**	*n*
Hexadecimal:	**1B**	**78**	*n*

Comments:

The following values can be used for n:

0: Selects the draft mode.

1: Selects the Near Letter Quality (NLQ) mode.

(The characters "0" and "1" can also be used.)

ESC k **Select NLQ Font**

Format:

ASCII code:	**ESC**	**k**	*n*
Decimal:	**27**	**107**	*n*
Hexadecimal:	**1B**	**6B**	*n*

Comments:

This command affects only Near Letter Quality typestyle, not draft.

The following values can be used for *n:*

0 = Roman

1 = Sans Serif

Format:

ASCII code:	**ESC**	**!**	*n*
Decimal:	27	33	*n*
Hexadecimal:	**1B**	**21**	*n*

Comments:

Selects any valid combination of the modes in the table below. The variable *n* is determined by adding together the values of the desired modes from the table.

Table A-l. Master Select numbers

Mode	Dec	Hex
Pica	0	00
Elite	1	01
Proportional	2	02
Condensed	4	04
Emphasized	8	08
Double-strike	16	10
Double-wide	32	20
Italic	64	40
Underline	128	80

Pica cannot be combined with elite, and proportional cannot be condensed. If both proportional and condensed are selected, proportional overrides condensed.

Print Size and Character Width

ESC P Select Pica Pitch

Format:

ASCII code:	**ESC**	**P**
Decimal:	27	80
Hexadecimal:	**1 B**	**50**

Comments:

Selects pica pitch (10 characters per inch). Because pica is the default pitch, this command is normally used to cancel elite.

ESC M — Select Elite Pitch

Format:

ASCII code:	**ESC**	**M**
Decimal:	27	77
Hexadecimal:	**1B**	**4D**

Comments:

Selects elite pitch (12 characters per inch).

ESC p — Turn Proportional Mode On/Off

Format:

ASCII code:	**ESC**	*p*	*n*
Decimal:	27	112	*n*
Hexadecimal:	**1B**	**70**	*n*

Comments:

The following values can be used for *n:*

1: Mode is turned ON. (The characters "0" and "1"
0: Mode is turned OFF. can also be used.)

The width of proportional characters varies from character to character. Therefore, a narrow letter like i receives less space than a wide letter like W. The proportional widths are given in the character tables, which appear in Appendix B. This command overrides condensed.

SI — Select Condensed Mode

Format:

ASCII code:	SI
Decimal:	**15**
Hexadecimal:	**0F**

Comments:

Prints characters at about 60 percent of their normal width. For example, the condensed pica mode has 17 characters per inch. Proportional mode cannot be condensed, and proportional will override condensed.

ESC SI — Select Condensed Mode

Format:

ASCII code:	ESC	SI
Decimal:	27	15
Hexadecimal:	1B	0F

Comments:

Duplicates the SI command.

DC2 — Cancel Condensed Mode

Format:

ASCII code:	DC2
Decimal:	18
Hexadecimal:	12

Comments:

Cancels condensed printing set by SI, ESC SI, SelecType, or DIP switch l-l.

SO — Select Double-wide Mode (one line)

Format:

ASCII code:	SO
Decimal:	14
Hexadecimal:	0E

Comments:

Double-wide mode doubles the width of all characters. This mode is cancelled by a carriage return or DC4.

ESC SO — Select Double-wide Mode (one line)

Format:

ASCII code:	ESC	SO
Decimal:	27	14
Hexadecimal:	1B	0E

Comments:

Duplicates the SO command.

DC4 — Cancel Double-wide Mode (one line)

Format:

ASCII code:	**DC4**
Decimal:	20
Hexadecimal:	**1 4**

Comments:

Cancels one-line double-wide printing selected by SO or ESC SO, but not double-wide printing selected by ESC W or ESC !.

ESC W — Turn Double-wide Mode On/Off

Format:

ASCII code:	**ESC**	**W**	*n*
Decimal:	**27**	**87**	**n**
Hexadecimal:	**1B**	**57**	*n*

Comments:

The following values can be used for n:

1: The mode is turned ON. (The characters "0" and "1"
0: The mode is turned OFF. can also be used.)

Double-wide mode doubles the width of all characters.

ESC W — Turn Double-high Mode On/Off

Format:

ASCII code:	**ESC**	*w*	*n*
Decimal:	**27**	**119**	*n*
Hexadecimal:	**1B**	**77**	*n*

Comments:

The following values can be used for n:

1: The mode is turned ON. (The characters "0" and "1"
0: The mode is turned OFF. can also be used.)

Double-high mode doubles the height of all characters. Superscript, subscript, and condensed modes are not valid in the double-high mode.

Print Enhancement

ESC E — Select Emphasized Mode

Format:

ASCII code:	**ESC**	**E**
Decimal:	27	69
Hexadecimal:	**1B**	**45**

Comments:

Makes text bolder by printing each dot twice, with the second dot slightly to the right of the first.

ESC F — Cancel Emphasized Mode

Format:

ASCII code:	**ESC**	**F**
Decimal:	27	70
Hexadecimal:	**1B**	**46**

Comments:

Cancels emphasized, the mode selected by ESC E.

ESC G — Select Double-strike Mode

Format:

ASCII code:	**ESC**	**G**
Decimal:	**27**	**71**
Hexadecimal:	**1B**	**47**

Comments:

Makes text bolder by printing each line twice, with the second printing slightly below the first. In NLQ the mode is not available but is not cancelled.

ESC H — Cancel Double-strike Mode

Format:

ASCII code:	**ESC**	**H**
Decimal:	27	72
Hexadecimal:	**1B**	**48**

Comments:

Turns off the double-strike mode selected by ESC G.

ESC SO — Select Superscript Mode

Format:

ASCII code:	**ESC**	**S**	**NUL**
Decimal:	27	83	0
Hexadecimal:	**1B**	53	00

Comments:

Prints characters about two-thirds of the normal height in the upper part of the character space. The ASCII code 0 or the character "0" can be used in this command. It is cancelled with ESC T.

ESC S1 — Select Subscript Mode

Format:

ASCII code:	**ESC**	**S**	**SOH**
Decimal:	27	83	**1**
Hexadecimal:	**1B**	**53**	**01**

Comments:

Prints characters about two-thirds of the normal height in the lower part of the character space. The ASCII code 1 or the character "1" can be used in this command. It is cancelled with ESC T.

ESC T — Cancel Superscript/Subscript

Format:

ASCII code:	**ESC**	**T**
Decimal:	27	84
Hexadecimal:	**1B**	**54**

Comments:

Cancels either superscript or subscript.

ESC - Turn Underlining Mode On/Off

Format:

ASCII code:	**ESC**	**-**	*n*
Decimal:	**27**	**45**	*n*
Hexadecimal:	**1B**	*2D*	*n*

Comments:

The following values can be used for n:

1: Mode is turned ON. (The *characters* "0" and "1"
0: Mode is turned OFF. can also be used.)

This mode provides continuous underlining, including spaces.

Word Processing

ESC a NLQ Justification

Format:

ASCII code:	**ESC**	*a*	*n*
Decimal:	**27**	**97**	**n**
Hexadecimal:	**1B**	**61**	*n*

Comments:

The following values can be used for n:

0: Selects left justification.
1: Selects centering.
2: Selects right justification.
3: Selects full justification.

The default setting is *n* = 0. Full justification (n = 3) is performed when the buffer becomes full or when one of the following is received: CR, VT, LF, FE The commands HT and BS are invalid except in *n* = 0 mode. For n = 3 there must be no carriage returns within a paragraph. Justification can be used in NLQ only, not draft.

ESC SP (space) **Set Intercharacter Space**

Format:

ASCII code:	**ESC**	**SP**	**n**
Decimal:	**27**	**32**	**n**
Hexadecimal:	**1B**	**20**	**n**

Comments:

Sets the amount of space added to the right of each character, in addition to the space already allowed in the design of the character. The number of units of space is equal to n, which should be from O-63. Each unit of space is 1/120th of an inch.

Character Sets

ESC t **Select Character Table**

Format:

ASCII code:	**ESC**	**t**	**n**
Decimal:	**27**	**116**	**n**
Hexadecimal:	1B	**74**	**n**

Comments:

The following values can be used for *n:*

0: Selects italics.

1: Selects Epson Character Graphics.

Selects the character table used by codes 128-255. Selecting Epson Character Graphics does not disable italic printing. Italic printing can still be selected by ESC 4. Duplicates the function of DIP switch 1-3. Note that the value of n must equal 00 hex or 01 hex; the characters "0" and "1" cannot be used.

Format:

ASCII code:	**ESC**	**4**
Decimal:	27	52
Hexadecimal:	**1B**	**34**

Comments:

Causes characters from the italic character set to be printed. This command is valid even if the Epson Character Graphics set has been selected by ESC t or the DIP switch 1-3, but character graphics cannot be italicized.

ESC 5 Cancel Italic Mode

Format:

ASCII code:	**ESC**	**5**
Decimal:	27	53
Hexadecimal:	1B	**35**

Comments:

Cancels the mode selected by ESC 4.

ESC R Select an International Character Set

Format:

ASCII code:	**ESC**	**R**	*n*
Decimal:	**27**	**82**	*n*
Hexadecimal:	**1B**	**52**	**n**

Comments:

See Appendix B for full information on international character sets. The following values can be used for n:

0 = USA	**5** = Sweden	**9 =** Norway
1 = France	6 = Italy	l0 = Denmark II
2 = Germany	7 = Spain I	11 = Spain II
3 = UK	8 = Japan	12 = Latin America
4 = Denmark I		

User-defined Characters

Note: See Chapter 5 for sample programs and full information on this topic.

ESC & — Define User-defined Characters

Format:

ASCII code:	**ESC**	**&**	**NUL**	**d1**	**d2**	**.**	**.**	**dn**
Decimal:	**27**	*38*	*0*	*d1*	*d2*	*.*	*.*	*dn*
Hexadecimal:	**1B**	**26**	**00**	*d1*	*d2*	*.*	*.*	*dn*

Comments:

This command allows characters to be redefined in the currently selected mode.

ESC: — Copy ROM into RAM

Format:

ASCII code:	**ESC**	**:**	**NUL**	**NUL**	**NUL**
Decimal:	**27**	**58**	**0**	**0**	**0**
Hexadecimal:	**1B**	**3A**	**00**	**00**	**00**

Comments:

This code copies the characters in the ROM into RAM so that specific characters can be redefined.

ESC % — Select User-defined Set

Format:

ASCII code:	**ESC**	**%**	*n*
Decimal:	**27**	**37**	*n*
Hexadecimal:	**1B**	**25**	*n*

Comments:

ESC & is required to define the character set. The following values can be used for n:

0: Selects the normal set.

1: Selects the user-defined set.

ESC 6 — Printable Code Area Expansion

Format:

ASCII code:	**ESC**	**6**
Decimal:	27	54
Hexadecimal:	**1B**	**36**

Comments:

Enables the printing of codes 128 through 159 (decimal) as characters, not control codes. This allows the use of these characters for user-defined characters.

ESC 7 — Cancel ESC 6

Format:

ASCII code:	**ESC**	**7**
Decimal:	**27**	**55**
Hexadecimal:	**1B**	**37**

Comments:

This code causes codes 128 through 159 to be treated as control codes. This is the default.

ESC I — Printable Code Area Expansion

Format:

ASCII code:	**ESC**	**I**	**n**
Decimal:	**27**	**73**	*n*
Hexadecimal:	1B	**49**	*n*

Comments:

ASCII codes 0 to 31 and 128 to 159 are usually not printable. These codes become printable upon input of the ESC I code if n = 1, which allows the use of these codes for user-defined characters. If n = 0, this command returns 0 to 31 and 128 to 159 to non-printable codes.

Graphics

Note: See Chapter 5 for sample graphics programs.

ESC K — Select Single density Graphics Mode

Format:

ASCII code:	**ESC**	**K**	*n1*	*n2*
Decimal:	**27**	**75**	*n1*	*n2*
Hexadecimal:	**1B**	**4B**	*n1*	*n2*

Comments:

Turns on eight-pin single-density graphics mode (60 dots per inch). The total number of columns = nl + *(n2* **x** *256).*

ESC L — Select Double-density Graphics Mode

Format:

ASCII code:	**ESC**	**L**	*n1*	*n2*
Decimal:	**27**	**76**	*n1*	*n2*
Hexadecimal:	**1B**	**4C**	*n1*	*n2*

Comments:

Turns on eight-pin low-speed double-density graphics mode (120 dots per inch), The total number of columns = nl + (n2 **x** 256).

ESC Y — Select High-speed Double-density Graphics Mode

Format:

ASCII code:	**ESC**	**Y**	*n1*	*n2*
Decimal:	**27**	*89*	*n1*	*n2*
Hexadecimal:	**1B**	**59**	*n1*	*n2*

Comments:

Turns on eight-pin high-speed double-density graphics mode (120 dots per inch). The total number of columns = *n1* + (n2 **x** 256).

ESC Z — Select Quadruple-density Graphics Mode

Format:

ASCII code:	**ESC**	**Z**	*n1*	*n2*
Decimal:	**27**	*90*	*n1*	*n2*
Hexadecimal:	**1B**	**5A**	*n1*	*n2*

Comments:

Turns on eight-pin quadruple-density graphics mode (240 dots per inch). The total number of columns = nl + *(n2 x* **256).**

ESC * — Select Graphics Mode

Format:

ASCII code:	**ESC**	*****	**m**	*n1*	*n2*
Decimal:	**27**	**42**	*m*	*n1*	*n2*
Hexadecimal:	**1B**	**2A**	*m*	**n1**	*n 2*

Comments:

Turns on graphics mode *m.* See the table below for **details on the** available modes. The total number of columns = *n1* + *(n2 x* **256).**

Table A-2. Graphics Modes

Option	Alternate Code	*m*	Horiz. density (dots/in.)
Single-density	ESC K	0	60
Double-density	ESC L	1	120
High-speed double-density*	ESC Y	2	120
Quadruple-density*	ESC Z	3	240
CRT I	none	4	80
Plotter (1:1)	none	5	72
CRT II	none	6	90
Double-density plotter	none	7	144

*Adjacent dots cannot be printed in this mode.

ESC ? — Reassign Graphics Mode

Format:

ASCII code:	**ESC**	**?**	**s**	**n**
Decimal:	**27**	**63**	*s*	*n*
Hexadecimal:	1B	**3F**	*s*	*n*

Comments:

Changes one graphics mode to another. The variable s is a character (K, L, Y or Z), which is reassigned to a mode n (0-7).

ESC ^ — Select 9-Pin Graphics Mode

Format:

ASCII code:	**ESC**	**^**	*m*	*n1*	*n2*
Decimal:	**27**	*94*	*m*	*n1*	*n2*
Hexadecimal:	**1B**	**5E**	*m*	**n1**	*n 2*

Comments:

Turns on 9-pin Graphics Mode. For this command the variable m defines density of print (0 for single and 1 for double). The total number of columns = nl + (n2 x 256). This mode requires two data items for each column of print.

IBM Printer Emulation Mode Commands

The Epson mode and the IBM printer emulation mode share many of the same commands. Therefore, this part of the summary merely lists and **does** not describe the commands already described in the Epson mode command summary. The commands that are different are described in detail.

Commands that Duplicate Epson Commands

Printer Operation

DC1, ESC U, ESC 8, ESC 9, BEL

Data Buffer Control

CR, CAN

Paper Feed Control

FF. ESC C. ESC C 0, ESC N, ESC 0, LF, ESC 0, ESC 1, ESC 3, VT,' ESC B

Print Head Control

BS, HT

Print Size/Character Width

SI, ESC St, SO, ESC SO, DC4, ESC W, ESC E, ESC F, ESC G, ESC H, ESC SO, ESC S1, ESC T, ESC -

Graphics

ESC K, ESC L, ESC Y, ESC Z

Note that IBM printer emulation mode graphics are the same as Epson mode graphics except that ESC *, ESC ?, and ESC ^ are not available.

Commands that Are Different from Epson Commands

Printer Operation

ESC Q22 — **Deselect Printer**

Format:

ASCII code:	**ESC**	**Q**	**SYN**
Decimal:	**27**	**81**	**22**
Hexadecimal:	**1 B**	**51**	**16**

Comments:

Places the printer in an off line state until the printer is turned off and back on or until it receives a DC1 code.

Vertical Motion

ESC A — **Set n/72-inch Line Spacing**

Format:

ASCII code:	**ESC**	**A**	*n*
Decimal:	**27**	**65**	*n*
Hexadecimal:	**1B**	**41**	*n*

Comments:

Sets the line spacing to n/72 of an inch. This value is stored in memory until the printer receives the ESC 2 command to put it into effect. The value of *n* must be from O-85.

ESC 2 — Select Programmable Line Spacing

Format:

ASCII code:	**ESC**	**2**
Decimal:	27	50
Hexadecimal:	**1B**	**32**

Comments:

Executes the line spacing stored in memory by ESC A. If no ESC A command has been sent, ESC 2 sets the line spacing to l/6 of an inch. (The 2 is the character two and not ASCII code 2.)

ESC J — Perform n/216-inch Line Feed

Format:

ASCII code:	**ESC**	**J**	*n*
Decimal:	**27**	**74**	*n*
Hexadecimal:	**1B**	**4A**	*n*

Comments:

Advances the paper by one line at a spacing of n/216 of an inch. The value of n must be from O-255. This command produces an immediate line feed but does not affect subsequent line spacing. It does not produce a carriage return unless DIP switch 1-3 is OFF.

ESC 4 — Set Top of Form

Format:

ASCII code:	**ESC**	**4**
Decimal:	**27**	**52**
Hexadecimal:	**1 B**	**34**

Comments:

Sets the current position as top of form.

ESC 5 — Turn Automatic Line Feed On/Off

Format:

ASCII code:	**ESC**	**5**	*n*
Decimal:	**27**	**53**	*n*
Hexadecimal:	**1B**	**35**	*n*

Comments:

The following values can be used for n:
1: Mode is turned ON.
0: Mode is turned OFF.

If the mode is on, the printer adds a line feed to each carriage return. If the mode is off, it does not. This command duplicates the function of DIP switch 2-4.

Horizontal Motion

ESC X — Set Left and Right Margins

Format:

ASCII code:	**ESC**	**X**	*n1*	*n2*
Decimal:	**27**	**88**	**n1**	*n 2*
Hexadecimal:	**1B**	**58**	*n1*	*n2*

Comments:

The left margin column is set to *n1* in the current pitch, ignoring double-wide, and the right margin column is set to n2. The minimum distance between the two margins is l/2 inch. The first column is number 1, not number 0.

ESC D **Set Horizontal Tabs**

Format:

ASCII code:	**ESC**	**D**	*n1 n2 . . .* **N U L**
Decimal:	**27**	**68**	*n1 n2 . . . 0*
Hexadecimal:	**1 B**	**44**	*n1 n2 . . . 00*

Comments:

This command allows setting of up to 32 horizontal tabs, which are entered as *n1, n2,* n3, etc. (in the range 1 to 137) with the NUL character terminating the command. The tab settings must be entered in ascending order. ESC D NUL clears all tabs. The settings on power up are every eight characters. The tab settings change if the character pitch is changed, except that double-wide has no effect on the tab positions.

ESC R **Restore Default Tab Settings**

Format:

ASCII code:	**ESC**	**R**
Decimal:	**27**	**82**
Hexadecimal:	**1B**	**52**

Comments:

Resets all vertical and horizontal tab settings (set by **ESC** B and ESC D) to their defaults.

Overall Printing Style

ESC I **Select Font**

Format:

ASCII code:	**ESC**	**I**	*n*
Decimal:	**27**	**73**	*n*
Hexadecimal:	**1 B**	*49*	*n*

Comments:

When n=0, the standard draft font is selected; when n=2, the standard NLQ font is selected. When n=4, a user-defined font is selected; when n=6, a user-defined NLQ font is selected.

Print Size/Width/Enhancements

Four modes in the IBM printer emulation mode are incompatible with each other. These modes are pica, elite, condensed, and proportional. Therefore, if you select any one of these, you cancel all the others.

ESC: Select Elite Pitch

Format:

ASCII code:	**ESC**	**:**
Decimal:	27	58
Hexadecimal:	**1B**	**3A**

Comments:

Elite pitch has 12 characters per inch.

ESC P Turn Proportional Mode On/Off

Format:

ASCII code:	**ESC**	**P**	*n*
Decimal:	**27**	**80**	*n*
Hexadecimal:	**1B**	**50**	**n**

Comments:

The following values can be used for n:

1: Mode is turned ON.	(The *characters* "0" and "1"
0: Mode is turned OFF.	can also be used.)

The width of proportional characters varies from character to character. Therefore, a narrow letter like i receives less space than a wide letter like W. The proportional widths are given in the character tables, which appear in Appendix B. This command overrides condensed, pica, and elite.

DC2 Cancel Condensed/Elite/Proportional

Format:

ASCII code: **DC2**
Decimal: **18**
Hexadecimal: **12**

Comments:

Cancels condensed, elite, and proportional printing and selects pica printing. The command does not cancel double-wide.

ESC [@ Select Double-high Printing

Format:

ASCII code: **ESC [@** *n1 n2 m1 m2 m3 m4*
Decimal: *27* **91 64 n1 n2** *m1 m2 m3 m4*
Hexadecimal: **1B 5B 40** *n1 n2 m1 m2 m3 m4*

Comments:

The following values must be used: *n1* = 4, n2 = 0, ml = 0, and m2 = 0. The value of m3 affects both character height and line feed as shown below:

m3	Char height	Line feed
1	Standard	Unchanged
2	Double-high	Unchanged
16	Unchanged	Single
17	Standard	Single
18	Double-high	Single
32	Unchanged	Double
33	Standard	Double
34	Double-high	Double

The value of *m4* selects the width of the characters.

1: Standard
2: Double-wide

ESC - Turn Overscore On/Off

Format:

ASCII code:	**ESC**	_	**n**
Decimal:	27	95	*n*
Hexadecimal:	**1B**	5F	*n*

Comments:

The following values can be used for n:
1: Mode is turned OFF.
0: Mode is turned ON.

Character Sets

ESC 6 Select International Character Set

Format:

ASCII code:	**ESC**	**6**
Decimal:	27	54
Hexadecimal:	**1B**	**36:**

Comments:

Selects the international character set (Table 2). See the character set tables in Appendix B.

ESC 7 Select Standard Character Set

Format:

ASCII code:	**ESC**	**7**
Decimal:	27	55
Hexadecimal:	**1 B**	37

Comments:

Selects standard character set (Table 1) if international character set (Table 2) has been previously selected. See the character set tables in Appendix B.

ESC \ — Print Characters from Symbol Set

Format:

ASCII code:	**ESC**	****	**n1**	*n2 data*
Decimal:	27	*92*	*n1*	*n2 data*
Hexadecimal:	**1B**	**5C**	*n1*	*n2 data*

Comments:

Prints a number of characters from the symbol set. The number of characters = nl + *(n2* x *256). See* the character tables in Appendix B for the symbol set and the codes to use for data.

ESC" — Print One Character from Symbol Set

Format:

ASCII code:	**ESC**	**^**	**c**
Decimal:	27	94	c
Hexadecimal:	**1B**	**5E**	**c**

Comments:

Prints a single character (c) from the symbol set. See the character tables in Appendix B for the symbol set and the codes to use for c.

User-Defined Characters

ESC = Define User-defined Characters

Format:

ASCII code:	**ESC**	**=**	*n1*	*n2*	.	.	.	*nk*
Decimal:	**27**	**61**	*n1*	*n2*	.	.	.	*nk*
Hexadecimal:	**1B**	**3D**	*n1*	*n2*	.	.	.	*nk*

Comments:

If C is the total number of characters to be defined,
B = (C x 13) + 2
nl = B MOD 256
n2 = INT(B/256)
n3 = 20 in all cases
n4 = the code of the first character to be defined
n5 = 0 if the top 8 pins are used; n5 = 128 for the bottom 8
n6 = 0 in all cases
n7 through nk are the data numbers that define the characters, with 11 data numbers for each character

The data numbers for each character are determined as shown on the grid for the Epson mode in Figure 5-5. To print a user-defined character, you must use ESC I, which is described on page A-40.

Appendix B

Character Tables

This appendix contains tables of the complete Epson mode character set, including the extra characters for the 13 Epson international character sets, and the IBM printer emulation mode character sets. The tables give a printout of each character, the codes in decimal and hexadecimal, and the proportional width of each character.

Epson Mode

The first half of the Epson mode table covers the standard ASCII character codes from 0 to 127. The remainder of the table shows two characters for each code: one from the standard italic character table and one from the Epson character graphics table. The Epson character graphics are selected by ESC t or DIP switch l-3. Where appropriate, two proportional widths are shown, one for the normal character and one for the italic form.

Table B-1. Epson mode charmers

Decimal	Hex	Character	ASCII name
0	00	NUL	null
1	01	SOH	start of heading
2	02	STX	start of text
3	03	ETX	end of text
4	04	EOT	end of transmission
5	05	ENQ	enquiry
6	06	ACK	acknowledge
7	07	BEL	bell
8	08	BS	backspace
9	09	HT	tab horizontally
10	0A	LF	line feed
11	0B	VT	tab vertically
12	0C	FF	form feed
13	0D	CR	carriage return
14	0E	s o	shift out
15	0F	SI	shift in
16	10	DLE	data link escape
17	11	DC1	device control 1
18	12	DC2	device control 2
19	13	DC3	device control 3
20	14	DC4	device control 4
21	15	NAK	negative acknowledge
22	16	SYN	synchronous idle
23	17	ETB	end of transmitted block
24	18	CAN	cancel line
25	19	EM	end of medium
26	1A	SUB	substitute
27	1B	ESC	escape
28	1C	FS	file separator
29	1D	GS	group separator
30	1E	RS	record separator
31	1F	US	unit separator

Table B-I, continued

Dec	Hex	Character	Width	Dec	Hex	Character	Width
32	20	SP	12	64	40	@	12
33	21	!	5	65	41	A	12
34	22	"	8	66	42	B	12
35	23	#	12	67	43	C	12
36	24	$	12	68	44	D	12
37	25	%	12	69	45	E	12
38	26	&	12	70	46	F	12
39	27	'	5	71	47	G	12
40	28	(	6	72	48	H	12
41	29	)	6	73	49	I	8
42	2A	*	12	74	4A	J	11
43	2B	+	12	75	4B	K	12
44	2C	,	7	76	4C	L	12
45	2D	-	12	77	4D	M	12
46	2E	.	6	78	4E	N	12
47	2F	/	10	79	4F	0	12
48	30	0	12	80	50	P	12
49	31	1	8	81	51	Q	12
50	32	2	12	82	52	R	12
51	33	3	12	83	53	S	12
52	34	4	12	84	54	T	12
53	35	5	12	85	55	U	12
54	36	6	12	86	56	V	12
55	37	7	12	87	57	W	12
56	38	8	12	88	58	X	10
57	39	9	12	89	59	Y	12
58	3A	:	6	90	5A	Z	10
59	3B	;	6	91	5B	[	8
60	3C	<	10	92	5C	\	
61	3D	=	12	93	5D	]	8
62	3E	>	10	94	5E	^	12
63	3F	?	12	95	5F	-	12

Table B-1, *continued*

Dec	Hex	Character	Width
96	60	`	5
97	61	a	12
98	62	b	11
99	63	c	11
100	64	d	11
101	65	e	12
102	66	f	10
103	67	g	11
104	68	h	11
105	69	i	8
106	6A	j	10
107	6B	k	10
108	6C	l	8
109	6D	m	12
110	6E	n	11
111	6F	o	12
112	70	p	11
113	71	q	11
114	72	r	11
115	73	s	12
116	74	t	11
117	75	u	12
118	76	v	12
119	77	w	12
120	78	x	10
121	79	y	12
122	7A	z	10
123	7B	{	9
124	7C	¦	9
125	7D	}	9
126	7E	~	12
127	7F	DEL	

Table B-1, continued

Decimal	Hex	Character	Graphics character	Widths: normal	italic
128	80	**NUL**	Ç	12	12
129	81	**SOH**	ü	11	12
130	82	**STX**	é	10	11
131	83	**ETX**	â	12	12
132	84	**EOT**	ä	12	11
133	85	**ENQ**	à	12	11
134	86	**ACK**	å	12	11
135	87	**BEL**	ç	11	11
136	88	**BS**	ê	12	12
137	89	**HT**	ë	12	11
138	8A	**LF**	è	12	11
139	8B	**VT**	ï	8	10
140	8C	**FF**	î	10	11
141	8D	**CR**	ì	8	8
142	8E	**SO**	Ä	12	12
143	8F	**SI**	Å	12	12
144	90	**DLE**	É	12	12
145	91	DC1	æ	12	12
146	92	DC2	Æ	12	12
147	93	DC3	ô	10	12
148	94	DC4	ö	10	11
149	95	NAK	ò	10	11
150	96	SYN	û	11	11
151	97	**ETB**	ù	11	11
152	98	**CAN**	ÿ	12	11
153	99	**EM**	Ö	12	12
154	9A	**SUB**	Ü	12	12
155	9B	**ESC**	¢	11	11
156	9C	**FS**	£	12	12
157	9D	**GS**	¥	12	12
158	9E	**RS**	₧	12	12
159	9F	**US**	ƒ	11	12

Table B-1, continued

Decimal	Hex	Italic character	Width	Graphics character	Widths: normal	italic
160	A0	SP	12	á	12	11
161	Al	!	10	í	8	10
162	A2	"	10	ó	10	12
163	A3	#	12	ú	11	11
164	A4	$	11	ñ	11	12
165	A5	%	12	Ñ	12	12
166	A6	&	12	ª	12	11
167	A7	'	5	º	12	12
168	A8	(	8	¿	12	11
169	A9	)	8	⌐	12	12
170	AA	*	12	¬	12	12
171	AB	+	12	½	12	12
172	AC	,	8	¼	12	12
173	AD	–	12	¡	5	10
174	AE	.	10	«	12	12
175	AF	/	10	»	12	12
176	BO	0	12	▒	12	
177	Bl	1	9	▒	12	
178	B2	2	12	▓	12	
179	B3	3	12	│	12	
180	B4	4	12	┤	12	
181	B5	5	12	╡	12	
182	B6	6	11	╢	12	
183	B7	7	12	╖	12	
184	B8	8	12	╕	12	
185	B9	9	11	╣	12	
186	BA	:	8	║	12	
187	BB	;	9	╗	12	
188	BC	<	10	╝	12	
189	BD	=	11	╜	12	
190	BE	>	9	╛	12	
191	BF	?	11	┐	12	

Table B-l, continued

Decimal	Hex	Italic character	Width	Graphics character	Widths: normal	italic
192	**C0**	*@*	12	└	12	
193	Cl	*A*	12	┴	12	
194	C2	*B*	12	┬	12	
195	C3	*C*	12	├	12	
196	C4	*D*	12	─	12	
197	C5	*E*	12	┼	12	
198	C6	*F*	12	╞	12	
199	C7	*G*	12	╟	12	
200	C8	*H*	12	╚	12	
201	C9	*I*	10	╔	12	
202	CA	*J*	12	╩	12	
203	CB	*K*	12	╦	12	
204	CC	*L*	10	╠	12	
205	CD	*M*	12	═	12	
206	CE	*N*	12	╬	12	
207	CF	*O*	12	╧	12	
208	D0	*P*	12	╨	12	
209	D1	*Q*	12	╤	12	
210	D2	*R*	12	╥	12	
211	D3	*S*	12	╙	12	
212	D4	*T*	12	╘	12	
213	D5	*U*	12	╒	12	
214	D6	*V*	11	╓	12	
215	D7	*W*	12	╫	12	
216	D8	*X*	12	╪	12	
217	D9	*Y*	12	┘	12	
218	DA	*Z*	12	┌	12	
219	DB	*[*	11		12	
220	DC	\	7		12	
221	DD	*]*	11		12	
222	DE	^	10		12	
223	DF	_	12		12	

Table B-1, *continued*

Decimal	Hex	Italic character	Width	Graphics character	Widths: normal	italic
224	E0	·	5	α	12	12
225	El	*a*	11	ß	11	11
226	E2	*b*	11	Γ	10	12
227	E3	*c*	11	π	12	12
228	E4	*d*	12	Σ	10	12
229	E5	*e*	11	σ	11	12
230	E6	*f*	12	µ	11	12
231	E7	*g*	11	τ	12	12
232	E8	*h*	11	Φ	10	12
233	E9	*i*	9	Θ	12	12
234	EA	*j*	10	Ω	12	12
235	EB	*k*	11	δ	12	11
236	EC	*l*	9	∞	12	12
237	ED	*m*	11	ø	12	12
238	EE	*n*	10	∈	10	10
239	EF	*o*	11	∩	10	12
240	F0	*p*	11	≡	12	12
241	Fl	*q*	11	±	12	12
242	F2	*r*	10	≥	10	10
243	F3	*s*	11	≤	10	10
244	F4	*t*	10	⌠	12	12
245	F5	*u*	11	⌡	12	12
246	F6	*v*	10	÷	12	12
247	F-7	*w*	12	≈	12	12
248	F8	*x*	12	°	8	8
249	F9	*y*	11	•	6	6
250	FA	*z*	12	·	6	6
251	FB	*{*	10	√	12	12
252	FC	*|*	9	ⁿ	8	8
253	FD	*}*	10	²	8	8
254	FE	~	12	■	8	8
255	FF		12		12	12

Epson International Character Sets

Twelve character codes between 35 and 126 can represent more than one character each, depending upon the international character set you select. You can make the choice either by setting DIP switches l-6 through 1-8 or by using the ESC R command.

The table below shows all 13 character sets, together with the number to use with ESC R to select each one. The DIP switch combinations to select any of the first eight character sets are in Appendix D.

Note that once a character set has been selected, italic versions of these characters can also be printed by using the ESC 4 command.

Table B-2. ***Epson*** international characters

	35	36	64	91	92	93	94	96	123	124	125	126
0 USA	#	$	@	[	\	]	^	`	{	¦	}	~
1 France	#	$	à	°	ç	§	^	`	é	ù	è	¨
2 Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3 UK	£	$	@	[	\	]	^	`	{	¦	}	~
4 Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5 Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6 Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
7 Spain I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8 Japan	#	$	@	[	¥	]	^	`	{	¦	}	~
9 Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10 Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11 Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12 Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú

Table B-3. Proportional *widths of international characters*

Characters	Widths: **Normal**	**Italic**	Characters	Widths: Normal	Italic
à	12	11	§	10	12
è	12	11	ß	11	11
ù	11	11	Æ	12	12
ò	10	11	æ	12	12
ì	8	8	Ø	12	12
°	8	8	ø	12	11
£	12	12	¨	8	9
¡	5	10	Ä	12	12
¿	12	11	Ö	12	12
Ñ	12	12	Ü	12	12
ñ	11	12	ä	12	11
¤	12	12	ö	10	11
Pt	12	12	ü	11	12
Å	12	12	É	12	12
å	12	11	é	12	11
ç	11	11	¥	12	12

IBM Printer Emulation Mode

This section shows the characters available in IBM printer emulation mode.

There are two main character tables: standard (CC Table 1) and international (CC Table 2). The standard table is selected when DIP switches 1-6 to 1-8 are all UP; the international table is selected by any other setting of these three switches. You can also switch between the two tables using the ESC 6 and ESC 7 commands.

To print characters from the symbol set use either the ESC ^ command or ESC \. For example, to print the symbol 1 in BASIC the command is as follows:

```
LPRINT   CHR$(27);"^";CHR$(20);
```

If you use ESC ^ or ESC \ to send a non-printable code, a blank is printed.

All three tables are the same for codes from 32 to 127, and the symbol table is identical to the international table from 128 to 255.

Table B-4. IBM printer emulation mode characters

Decimal	Hex	Standard (CG Table 1)	International (CG Table 2)	Symbol set	Width
0	00	NUL	NUL	⌀	12
1	01	SOH	SOH	☺	12
2	02	STX	STX	☻	12
3	03	ETX	♥	♥	12
4	04	EOT	♦	♦	10
5	05	ENQ	♣	♣	12
6	06	ACK	♠	♠	12
7	07	BEL	BEL	•	12
8	08	BS	BS	◘	12
9	09	HT	HT	○	12
10	0A	LF	LF	◙	12
11	0B	VT	VT	♂	12
12	0C	FF	FF	♀	12
13	0D	CR	CR	♪	12
14	0E	SO	SO	♫	12
15	0F	SI	SI	✹	12
16	10	DLE	DLE	►	12
17	11	DC1	DC1	◄	12
18	12	DC2	DC2	↕	12
19	13	DC3	DC3	‼	12
20	14	DC4	DC4	¶	12
21	15	NAY	§	§	12
22	16	SYN	SYN	▬	12
23	17	ETB	ETB	↨	12
24	18	CAN	CAN	↑	12
25	19	EM	EM	↓	12
26	1A	SUB	SUB	→	12
27	1B	ESC	ESC	←	12
28	1C	FS	FS	∟	12
29	1D	GS	GS	↔	12
30	1E	RS	RS	▲	12
31	1F	US	US	▼	12

Table B-4, continued

Dec	Hex	Character	Width	Dec	Hex	Character	Width
32	20	**SP**	12	64	40	@	12
33	21	!	5	65	41	A	12
34	22	"	8	66	42	B	12
35	23	#	12	67	43	C	12
36	24	$	12	68	44	D	12
37	25	%	12	69	45	E	12
38	26	&	12	70	46	F	12
39	27	'	6	71	47	G	12
40	28	(	6	72	48	H	12
41	29	)	6	73	49	I	8
42	2A	*	12	74	4A	J	12
43	2B	+	12	75	4B	K	12
44	2C	,	6	76	4C	L	12
45	2D	-	12	77	4D	M	12
46	2E	.	6	78	4E	N	12
47	2F	/	10	79	4F	O	12
48	30	0	12	80	50	P	12
49	31	1	8	81	51	Q	12
50	32	2	12	82	52	R	12
51	33	3	12	83	53	S	12
52	34	4	12	84	54	T	12
53	35	5	12	85	55	U	12
54	36	6	12	86	56	V	12
55	37	7	12	87	57	W	12
56	38	8	12	88	58	X	10
57	39	9	12	89	59	Y	12
58	3A	:	6	90	5A	Z	12
59	3B	;	6	91	5B	[	8
60	3C	<	10	92	5C	\	10
61	3D	=	12	93	5D	]	8
62	3E	>	10	94	5E	^	12
63	3F	?	10	95	5F	_	12

*Table B-4, **continued***

Dec	Hex	Character	Width
96	**60**		**6**
97	61	a	**12**
98	62	b	**11**
99	63	c	**11**
100	64	d	**11**
101	65	e	**12**
102	66	f	**12**
103	67	g	**11**
104	68	h	**12**
105	69	i	**8**
106	6A	j	**8**
107	6B	k	**10**
108	6C	1	**8**
109	6D	m	**12**
110	6E	n	**12**
111	6F	o	**11**
112	70	p	**11**
113	71	q	**11**
114	72	r	**11**
115	73	s	**12**
116	74	t	**10**
117	75	u	**12**
118	76	v	**12**
119	77	w	**12**
120	78	x	**10**
121	79	y	**12**
122	7A	z	**10**
123	7B	{	**9**
124	7C	|	**4**
125	7D	}	**9**
126	7E	~	**12**
127	7F		**12**

Table B-4, continued

Decimal	Hex	Standard (CG Table 1)	International (CG Table 2)	Width
128	80	**NUL**	Ç	12
129	81	**SOH**	ü	12
130	82	**STX**	é	12
131	83	**ETX**	â	12
132	84	**EOT**	ä	12
133	85	**ENQ**	à	12
134	86	**ACK**	å	12
135	87	**BEL**	ç	12
136	88	**BS**	ê	12
137	89	**HT**	ë	12
138	8A	**LF**	è	12
139	8B	**VT**	ï	9
140	8C	**FF**	î	10
141	8D	**CR**	ì	8
142	8E	**SO**	Ä	12
143	8F	**SI**	Å	12
144	90	**DLE**	É	12
145	91	**DC1**	æ	12
146	92	**DC2**	Æ	12
147	93	**DC3**	ô	11
148	94	**DC4**	ö	11
149	95	**NAK**	ò	11
150	96	**SYN**	û	12
151	97	**ETB**	ù	12
152	98	**CAN**	ÿ	11
153	99	**EM**	Ö	11
154	9A	**SUB**	Ü	12
155	9B	**ESC**	¢	12
156	9c	**FS**	£	12
157	9D	**GS**	¥	12
158	9E	**RS**	₧	12
159	9F	**u s**	ƒ	12

Table **B-4,** continued

Decimal	Hex	Standard (CG Table 1)	International (CG Table 2)	Width
160	**A0**	á	á	12
161	Al	í	í	12
162	A2	ó	ó	12
163	A3	ú	ú	12
164	A4	ñ	ñ	12
165	A5	Ñ	Ñ	12
166	A6	ª	ª	12
167	A7	º	º	12
168	A8	¿	¿	12
169	A9	⌐	⌐	12
170	AA	¬	¬	12
171	AB	½	½	12
172	AC	¼	¼	12
173	AD	¡	¡	12
174	AE	«	«	12
175	AF	»	»	12
176	B0	▒		12
177	Bl	▒		12
178	B2	▒		12
179	B3	┤	┤	12
180	B4	┤	┤	12
181	B5	╡	╡	12
182	B6	╢	╢	12
183	B7	╖	╖	12
184	B8	╕	╕	12
185	B9	╣	╣	12
186	BA	║	║	12
187	BB	╗	╗	12
188	BC	╝	╝	12
189	BD	╜	╜	12
190	BE	╛	╛	12
191	BF	┐	┐	12

Table B-4, continued

Decimal	Hex	Standard (CG Table 1)	International (CG Table 2)	Width
192	**co**			12
193	Cl			12
194	C2			12
195	C3			12
196	C4			12
197	C5			12
198	C6			12
199	C7			12
200	C8			12
201	C9			12
202	CA			12
203	CB			12
204	CC			12
205	CD			12
206	CE			12
207	CF			12
208	DO			12
209	D1			12
210	D2			12
211	D3			12
212	D4			12
213	D5			12
214	D6			12
215	D7			12
216	D8			12
217	D9			12
218	DA			12
219	DB			12
220	DC			12
221	DD			12
222	DE			12
223	DF			12

Table B-4, concluded

Decimal	Hex	Standard (CG Table 1)	International (CG Table 2)	Width
224	E0	α	α	12
225	El	ß	ß	12
226	E2	Γ	Γ	11
227	E3	π	π	12
228	E4	Σ	Σ	12
229	E5	σ	σ	12
230	E6	µ	µ	12
231	E7	τ	τ	11
232	E8	Φ	Φ	12
233	E9	Θ	Θ	12
234	EA	Ω	Ω	12
235	EB	δ	δ	12
236	EC	∞	∞	12
237	ED	ø	ø	12
238	EE	∈	∈	10
239	EF	∩	∩	12
240	F0	≡	≡	12
241	F1	±	±	12
242	F2	≥	≥	10
243	F3	≤	≤	10
244	F4	⌠	⌠	12
245	F5	⌡	⌡	12
246	F6	÷	÷	12
247	F7	≈	≈	11
248	F8	°	°	8
249	F9	∙	∙	6
250	FA	·	·	6
251	FB	√	√	12
252	FC	ⁿ	ⁿ	10
253	FD	²	²	8
254	FE	■	■	8
255	FF			12

Appendix C

Problem Solving and Maintenance

This appendix presents solutions for possible problems, explanations of the T-750's advanced features, tips on maintaining and transporting your printer, and instructions on replacing the print head.

General Troubleshooting

Problem	Recommendation
Printer does not print	Make sure that the printer is turned on and is on line. Both the POWER and ON LINE lights should be on.
	Make sure that the printer and computer are connected. Be certain you are using the correct cable.
	Make sure the printer is connected to only one interface.
	If the program you are using allows you to choose between screen output and printer output, see that you have selected printer output.
	If the printer still does not print, try the self test prccedure (see Chapter 1). If the self test works correctly, the printer is all right, and the problem lies elsewhere. If the self test doesn't work, call the Epson 1 toll-free number for assistance.

Problem	Recommendation
Printing is patchy faint, uneven, or intermittent	Check that the ribbon is seated correctly and moves freely in the cartridge. If you have been using the ribbon for a long time or for a large amount of printing, it may need to be replaced. The print head can also wear out if the printer is used frequently and for long periods at a time. See page C-6 for instructions on replacing the print head.
All the text is printed on the same line or text is printed with an extra blank line between	This can usually be corrected by changing the setting of DIP switch 2-4. If that does not solve the problem, you may need a different cable.
Some of the characters printed do not match those in the file	If they are international characters, check the settings of DIP switches I-6 to I-8. If they are graphics characters, see that your software is correctly installed and that you have correctly set DIP switches 1-3 and 1-4.
Paper feeding problems	See Chapter 2 for specific instructions on loading paper.
Regular gaps appear in printouts	Check the settings of DIP switches 2-l and 2-3 to ensure that you've selected the correct paper size and that skip-over-perforation is OFF
Self test pattern is garbled	If the test pattern did not print as shown in Chapter 1, the printer is faulty Call the Epson toll-free number for assistance. If the pattern is printed but is patchy or faint, check that the ribbon is installed correctly.
Beeper sounds and printer stops	Turn the printer off and see that it is not out of paper and that the paper is loaded correctly Then turn the printer back on and try again. If the printer beeps and does not print again, call the Epson toll-free number for the location of the nearest Authorized Epson Customer Care Center.

Troubleshooting Graphics Problems

Problem	Recommendation
Strange dot patterns appear in graphics printouts	Many computers have problems sending one or more of the codes between 0 and 13. Try to avoid these characters. Be sure that no other commands or carriage returns come between the graphics command and its data.
Printer freezes when printing graphics	If the printer freezes in graphics mode, you have probably not sent enough data.
Text appears as random graphics characters	If you interrupt the computer while it is printing in graphics mode, for example during a screen dump, it may not reset the printer to text mode. If not, the next text printed will be interpreted by the printer as graphics data. Turn off the printer and turn it back on again to reset.

Data Dump Mode

The T-750 has a special feature that makes it easy for experienced printer users to find the causes of problems. The hexadecimal (hex) or data dump mode gives a printout of exactly what codes reach the printer.

Enter this mode by turning on the printer while holding down the FORM FEED and **LINE** FEED buttons at the same time. Then, when you run a program, either an application program or one you have written in any programming language, the T-750 prints all the codes being sent to the printer in hexadecimal format.

If the characters are printable, they appear in the column on the right as their true ASCII characters, as shown below. Non-printable codes, such as control codes, are shown in this column as a dot. The far left column of the table contains four-digit line numbers.

```
Data Dump Mode
0000 1B 40 1B 52 00 1B 74 01 1B 36 12 1B 50 1B 70 00   .@.R..t..6..P.p.
0001 07 0D 41 70 70 65 6E 64 69 78 20 44 0D 1B 33 24   ..Appendix D..3$
0002 0A 53 6F 6C 76 69 6E 67 20 50 72 6F 62 6C 65 6D   .Solving Problem
0003 73 0D 0A 0D 0A 54 68 69 73 20 41 70 70 65 6E 64   s....This Append
0004 69 78 20 65 78 70 6C 61 69 6E 73 20 77 68 61 74   ix explains what
0005 20 79 6F 75 20 63 61 6E 20 64 6F 20 69 66 20 79    you can do if y
```

The data dump on the previous page was made while writing an earlier version of this appendix. By comparing the column of characters at the right with the printout of hex codes, you can see that the capital A (for Appendix) in the third row, was printed as 41. You can use the table of character codes (Appendix B) to find out what character corresponds to each code.

If you look at the first character of the dump, you can see that the ESC character appears in hex as lB, and in the character column as a dot. To find the command, look at the next character, 40 hex (@), and refer to the numerical list of commands in Appendix A.

In this way you can quickly determine that prior to printing, the word processor sent seven commands to set up the printer followed by a BEL character to sound the beeper.

Command	Function
ESC @	Initialize printer
ESC R 0	Select USA character set
ESC t l	Select Epson Character Graphics
ESC 6	Printable code expansion
DC2	Cancel condensed mode
ESC P	Select pica
ESC p 0	Cancel proportional
BEL	Sound beeper

If you find codes in your data dump that you did not enter in your program or codes you did not expect your application program to send, your computer may be changing the codes before sending them to the printer.

Data dump mode can be turned off by turning off the printer; it is also cancelled by an INIT signal from the computer.

IBM PC BASIC Solutions

IBM PC BASIC inserts a carriage return and line feed (CR-LF) after each 80 characters you send it. It also adds a line feed to each carriage return included explicitly in an LPRINT statement. Use the BASIC statement WIDTH LPRINT 255 to remove this problem. The 255 is a special number that prevents the computer system from inserting a CR-LF into the line unless there is one in your program.

The extra line feed character is usually no problem, unless you want to send ASCII code 13 on its own as part of a graphics statement or a character definition. To do this, use the OPEN statement to assign a file number to the printer (LPT1:) and use the PRINT # statement in place of LPRINT. You also need to use a slightly different WIDTH statement. To prepare the printer in this way, use a line like this:

```
100 OPEN "LPT1: AS #1 : WIDTH #l, 255
```

A third problem exists with IBM PC BASIC release 2.0. This version cannot send ASCII code 26 (IA hex) either with LPRINT or with PRINT #. Try to avoid including this code in your programs.

Maintaining Your Printer

Always keep the printer in a clean and safe place. Keep it away from dust, grease, moisture and any source of heat, including direct sunlight. A safe temperature range is 40°F to 95°F (5” C to 35°C).

If the outer case is dirty, clean it with a soft, clean cloth dampened with mild detergent dissolved in water. Keep the printer or tractor cover in place to prevent any water from getting inside the printer. Do not use a hard brush or cloth, and never use alcohol or a thinner to clean the printer because it could damage the print head and the case.

Do not spray the inside of the printer with oil: unsuitable oils can damage the mechanism. If lubrication is needed, call the Epson toll-free number for the location of the nearest Authorized Epson Customer Care Center.

The print head

Be particularly careful with the print head. Never move it when the printer is turned on. When the printer is printing, the print head becomes hot. If you need to change the ribbon or load continuous paper, turn the printer off and wait for a few minutes while the print head cools down.

The print head should last for about 100 million characters (assuming an average of 14 dots per character). When it fails, one or more of the pins may fire erratically or stop firing completely, making the printout patchy. If this happens suddenly or long before the expected lifetime is over, the problem is almost certainly connected with another component of the printer.

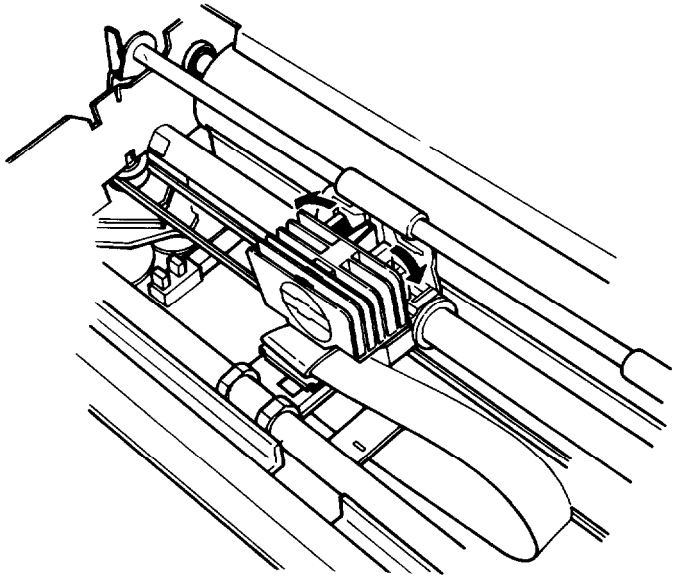
Replacing the print head

As soon as the print head fails, stop using the printer and call the Epson toll-free number for the location of the nearest Authorized Epson Customer Care Center for a replacement head. The print head catalog number is #8731.

To replace the head, follow these steps:

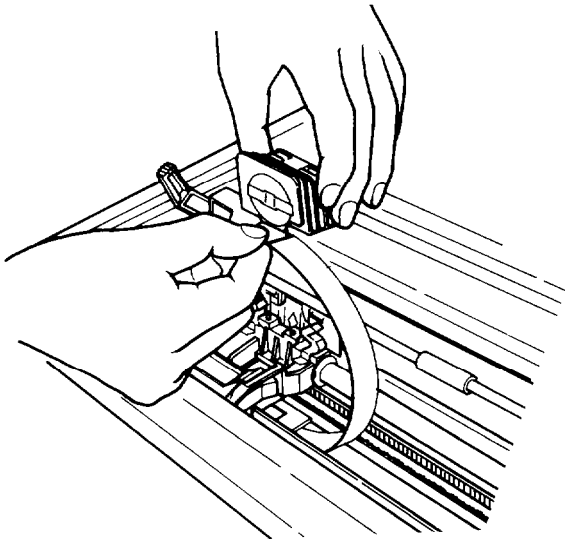
1. Turn the printer OFF.
2. If the printer has been recently used, the print head will be hot. Let it cool.
3. Open the printer or tractor cover.
4. Remove the ribbon.
5. Release the head lock levers. (See Figure C-l.)

Figure C-I.
Replacing the print head



6. Lift the print head from its position and carefully disconnect the flat cable from the print head, as shown in Figure C-2.

Figure C-2.
Disconnecting the *cable*



7. Connect the new print head to the flat cable, place the new print head in the head mount, and move the head lock levers back to their original positions.

   Now your new print head is ready to use.

Transporting the Printer

There are several precautions you should take when packing the printer for transportation:

- Remove the ribbon.
- Move the print head to the right, pull the paper bail forward, and replace the print head protector and the locking tabs.

- Remove the paper rest and paper guide and pack them separately.
- Fix the tractor cover in place with tape.
- Pack the printer in the original foam packing supports and box.

Appendix D

Defaults and DIP Switches

This appendix lists all of the default settings and lists and explains the settings of all the DIP switches.

Default and Initialization Settings

The T-750 can be initialized (returned to a fixed set of conditions) in three different ways: when it is turned on, when it receives an INIT signal at the parallel interface (pin 31 becomes LOW), and when it receives the ESC @ command.

The following conditions are always reset:

- The print head returns to the home position.
- Interface signals are reset, and the printer is put on line.
- The current print line is cleared.
- Margins and vertical tab settings are cleared, line spacing is set to 1/6-inch, horizontal tabs are set at every eighth position and vertical tab channel 0 is selected.
- The page length and skip-over-perforation are set according to DIP switches 2-1 and 2-3, and the top of form position is set to the current line.
- The ROM characters are selected, and the Epson mode character table and international character set are reset according to DIP switches l-3 and 1-6 to 1-8.

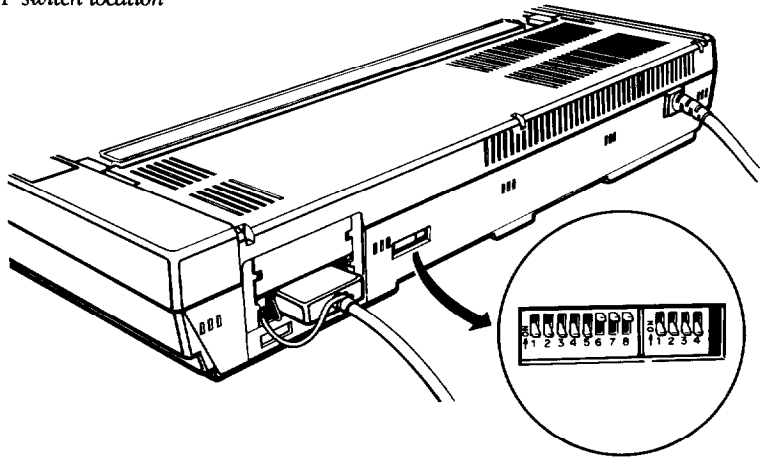
In addition, when the printer is initialized by turning on the power or by an INIT signal, the data buffer is cleared of all text.

ESC @ resets the typestyle to the current SelecType settings, but the other two methods reset the typestyle according to the DIP switches. Also, ESC @ does not check whether any DIP switches have been altered since the printer was turned on; instead it uses the old settings.

DIP Switch Settings

The T-750 has twelve DIP (Dual In-line Package) switches that allow you to change many of the printer's settings to suit your individual needs. The DIP switches are in two groups, mounted on the back panel, as shown in Figure D-1.

Figure D-1.
DIP switch location



Each individual switch is numbered so that DIP switch 1-1 is the switch at the far left side and the one at the far right is DIP switch 2-4. You can easily reset the switches with a thin, pointed object such as a small screwdriver or the cap of a ballpoint pen.

Note
When you change a DIP switch setting, turn off the power, reset the switch or switches, then turn on the power again. The printer checks and recognizes new settings only at the time the power is turned on.

The following tables describe the switches and their functions.

Table D-I. DIP *switch group 1*

Switch number	Function	Action when ON	Action when OFF
I-I	Select condensed or normal characters	Condensed	Normal
1-2	Select slashed or unslashed zero	0	0
1-3	Select character table*	Graphics	Italics
1-4	Select printer commands	IBM printer emulation mode	ESC/P
1-5	Select print quality	NLQ	Draft
I-6 I-7 1-8	Select international character set	See Table D-3	

In IBM printer emulation mode, a CR is added to an 1 or ESC J if this switch is OFF

Table D-2. DIP switch group 2

Switch number	Function	Action when ON	Action when OFF
2-1	1 Select page length	12 inch	11 inch
2-2	Select automatic sheet feeder mode	Selected	Not selected
2-3	1 Skip-over-perforation	1 inch	None
2-4	1 Add line feed after carriage return	CR + LF	CR only

Note: The factory setting for all switches except I-6, I-7, and I-8 is OFF

International Character Sets

Thirteen international character sets are available in Epson mode. Eight of these are selected by DIP switches l-6 to l-8 and the remaining five (Japan, Norway, Denmark II, Spain II and Latin America) can be selected with the ESC R command, which is described in the Command Summary. For the characters available in each character set, see Appendix B.

In IBM printer emulation mode, you can select only two character sets; the standard character set (Table 1) and the international character set (Table 2). You can see the differences by looking at the IBM character tables in Appendix B. There is also a command to let you print any of the characters in the international character set and several additional characters. Together these form the symbol set. The

symbol set cannot be selected permanently because it causes printer commands to be ignored.

The DIP switch settings to select the different character sets are shown in Table D-3.

Table D-3. International settings

E son mode character set	DIP switch settings 1-6	1-7		IBM printer emulation mode
USA	O N	ON	O N	Standard
French	O N	O N	OFF	International
German	ON	OFF	ON	International
UK	ON	OFF	OFF	International
Danish	OFF	ON	ON	International
Swedish	OFF	ON	OFF	International
Italian	OFF	OFF	ON	International
Spanish	OFF	OFF	OFF	International

Appendix E

Technical Specifications

This appendix contains the specifications for the T-750 including the built-in parallel interface.

Printing

Printing method
Impact dot matrix

Printing speed
240 characters per second in draft elite
200 characters per second in draft pica
40 characters per second in Near Letter Quality pica

Printing direction
Bidirectional logic-seeking for text printing
Unidirectional for graphics and available by software command for text

Character sizes
All except superscript and subscript are 3.1 mm high. The widths and characters per inch (CPI) are given below:

Mode	Width (mm)	CPI	Mode	Width (mm)	CPI
Pica	2.1	10	Condensed Pica	1.05	17
Elite	2.1	12	Condensed Elite	1.05	20

Line spacing
1/6-inch, or programmable in increments of 1/216th of an inch

Paper

Number of copies
Total thickness not to exceed 0.17 mm

Paper width

Continuous feed	4" to 16"
Single-sheet	7.15" to 14.4"

Mechanical

Ribbon
Cartridge, exclusive to T-750 or Epson FX series printers, black #8755

Life expectancy (in characters, at 14 dots/character): 3 million

MCBF
5 million lines (excluding the print head)

Print head Life
100 million characters, at 14 dots/character

Dimensions and Weight

Height (including tractor):	5.6 in.
Width (with paper feed knob):	21.3 in.
Depth:	13.4 in.
Weight (including tractor):	22.2 lbs.

Electrical

Voltage:
120V AC

Consumption
120 VA

Frequency
49.5 Hz - 60.5 Hz

Insulation resistance
10 Mohms between AC power line and chassis

Dielectric strength
Can withstand 1 kV rms applied between AC line and chassis for 1 minute, or 1.25 kV rms for 1 second

Environment

Temperature
Operation: 40°F to 95°F (5C° to 35C°)
Storage: -25°F to 150°F (-30C° to 65C°)

Humidity
Operation: 10% to 80% without condensation
Storage: 5% to 85% without condensation

Shock
Operation: Up to 1 G within 1ms
Storage: Up to 2 G within 1ms

Vibration
Operation: Up to 0.25 G at up to 55Hz
Storage: Up to 0.5 G at up to 55Hz

Parallel Interface

Connector pin assignments and a description of respective interface signals are shown in Table E-l.

Table E-l. Pins and signals

Signal Pin	Return Pin	Signal	Direction	Description
1	19	STROBE	IN	STROBE pulse to read data in. Pulse width must be more than 0.5 microseconds at the receiving terminal.
2	20	DATA 1	IN	These signals represent information of the 1st to 8th bits of parallel data, respectively Each signal is at HIGH level when data is logical 1 and LOW when it is logical 0.
3	21	DATA 2	IN	
4	22	DATA 3	IN	
5	23	DATA 4	IN	
6	24	DATA 5	IN	
7	25	DATA 6	IN	
8	26	DATA 7	IN	
9	27	DATA 8	IN	
10	28	ACKNLG	Text	Approximately, 12-microsecond pulse. LOW indicates that data has been received and that the printer is ready to accept more data.

Table E-l. Pins and signals continued

Signal Pin	Return Pin	Signal	Direc-tion	Description
11	29	BUSY	OUT	A HIGH signal indicates that the printer cannot receive data. The signal goes HIGH in the following cases: 1) During data entry (ea. char. time) 2) During printing 3) When Off-Line 4) During printer-error state
12	30	PE	OUT	A HIGH signal indicates that the printer is out of paper.
13	—	—	—	Pulled up to +5 volts through 3.3K ohm resistance.
14	—	$\overline{\text{AUTO FEED XT}}$	IN	When this signal is LOW, the paper is automatically fed 1 line after printing. (The signal level can be fixed to this by setting DIP switch 2-4 to ON.)
15	—	NC	—	Unused.
16	—	0V	—	Logic ground level.
17	—	CHASSIS GND	—	Printer's chassis ground, which is isolated from the logic ground.
18	—	NC	—	Unused.
19 - 30	—	GND	—	Twisted-pair return signal ground level.
31	—	$\overline{\text{INIT}}$	IN	When this level becomes LOW, the printer controller is reset to its power-up state and the print buffer is cleared. This level is usually HIGH; its pulse width must be more than 50 microseconds at the receiving terminal.
32	—	$\overline{\text{ERROR}}$	OUT	This level becomes LOW when the printer is in: 1) Paper-end state. 2) Off-line. 3) Error state.
33	—	GND	—	Same as for Pins 19 - 30.
34	—	NC	—	Unused.
35	—	—	—	Pulled up to +5V through 3.3K ohm resistance.
36	—	$\overline{\text{SLCT IN}}$	IN	The DC1/DC3 code is valid only when this signal is "HIGH".

Notes:

1. The column heading "Direction" refers to the direction of signal flow as viewed from the printer.

2. "Return" denotes the twisted-pair return, to be connected at signal ground level. For the interface wiring, be sure to use a twisted-pair cable for each signal and to complete the connection on the return side. To prevent noise, these cables should be shielded and connected to the chassis of the host computer or the printer but not at both ends.

3. All interface conditions are based on TTL level. Both the rise and the fall times of each signal must be less than 0.2 microseconds.

4. Data transfer must be carried out by observing the ACKNLG or BUSY signal. (Data transfer to this printer can be carried out only after receipt of the ACKNLG signal or when the level of the BUSY signal is LOW.)

Data Transfer Sequence

Interface timing

Figure E-l shows the timing for the parallel interface.

Printing enabled/disabled signals and control conditions

Table E-2 on the next page shows the relationship between printing being enabled or disabled, and the on-line/off-line condition, the printer select signal (SLCT IN), and the receipt of data on/off control character, DCl/DC3.

Figure E-1.
Parallel interface timing

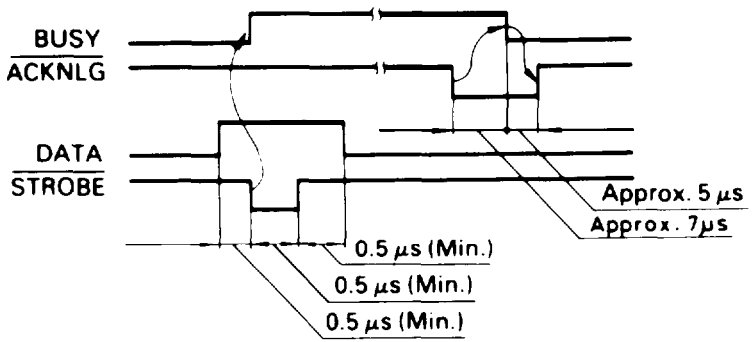


Table E-2. Printing enabled/disabled signals and control conditions

On-Line (Indicator on)	SLCT IN	**DC1/DC3** (Data on/off contr.)	**ERROR**	**BUSY**	**$\overline{\text{ACKNLG}}$**	**Printing** (Disabled/enabled)
ON-LINE	LOW (interface)	DC1 /DC3 (no effect)	HIGH	HIGH/LOW	PULSED EA. CHAR.	ENABLED (normal cond.)
ON-LINE	HIGH	DC1 RECV'D	HIGH	HIGH/LOW	PULSED EA. CHAR.	ENABLED
ON-LINE	HIGH	DC3 RECV'D	HIGH	HIGH/LOW	PULSED EA. CHAR.	*DISABLED
OFF-LINE	HIGH/LOW (no effect)	DC1 /DC3 (no effect)	LOW	HIGH	NOT GENERATED	DISABLED

'Even though printing is disabled, data characters are received and acknowledged, since the printer is looking for another DC1 character, which would allow it to resume printing.

Glossary

Note that these definitions apply specifically to printers. If a word is italicized, see that topic for more information.

application program
A program that helps you carry out a particular task, such as word processing or financial planning.

ASCII
American Standard Code for Information Interchange.
A standardized coding system for assigning numerical codes to letters and symbols.

auto line feed
When this feature is enabled using a DIP switch, each carriage return code (CR) is automatically accompanied by a line feed (LF) code.

baud rate
A measure of the speed of data transmission. Usually equivalent to bits per second.

bidirectional printing
Printing in which the print head goes from left to right only on every other line. On the other lines, it goes from right to left. This increases the speed of printing because the head prints in both directions.

binary
See *number systems.*

bit
A binary digit (0 or I), which is the smallest unit of information used by a printer or computer. See also *number systems.*

byte
A unit of information consisting of eight bits.

buffer
See memory.

carriage return
The control code that returns the print position to the left margin. When issued together with a line feed, the print position moves to the left margin of the next line. In bidirectional printing, the print head may not actually move to the left margin.

condensed
Printing in which each character is approximately 60% of the width of standard characters. Useful for fitting wide tables or spreadsheets onto the paper.

continuous paper
Paper which has sprocket-feed holes on each side, is perforated between pages, and is supplied in a folded stack. Also called fanfold paper.

control code
Besides the codes for printable characters, the ASCII standard also includes 33 other codes which are called control codes. These control codes perform such functions as sounding the beeper and performing a carriage return or line feed.

cut sheet feeder (CSF)
An optional, detachable device which automatically feeds single sheets of paper into the printer.

data dump
A troubleshooting feature. When the printer is in data dump mode, each code that it receives is printed in hexadecimal notation as well as the ASCII codes that stand for the characters. Sometimes called hex dump.

decimal.
See number systems.

default
A value or setting that takes effect when the equipment is turned on, reset, or initialized.

DIP switches
Small switches in a printer that control various printer functions and set the default status of the printer when it is turned on or initialized. DIP stands for Dual In-line Package.

dot graphics
A graphic design formed by patterns of dots.

dot matrix
A method of printing in which each letter or symbol is formed by a pattern (matrix) of individual dots.

double-high printing
Printing in which each character is twice as high as normal.

double-strike printing
A way of producing bolder characters. Each character is printed twice; the second time, the dots are printed slightly below the original dots. Can only be used in draft mode.

double-wide printing
A print width in which each character is twice as wide as normal characters. (Double-wide was formerly known as expanded.)

draft
One of two print qualities available on your printer. Draft uses a minimum number of dots per character for high-speed printing. See also Near Letter *Quality.*

emphasized printing
A way of producing darker characters. Each character is printed twice, with the second slightly to the right of the first.

Epson Extended Graphics
The Epson Extended Graphics character table contains international accented characters, Greek characters, and character graphics for printing lines, corners, and shaded areas.

ESC (escape)
A special control code used to begin most printer commands.

ESC / P
Abbreviation for Epson Standard Code for Printers. The system of commands lets you perform software control of your printer from your computer. It is standard for all Epson printers and supported by most applications software for personal computers.

15 pitch
A pitch in which the characters are slightly narrower and shorter than those of 10 or 12 pitch, so that there are 15 characters per inch across the page.

font
A font is a style of type designated by a family name.

form
In printer terminology, a form is normally the equivalent of a page.

form feed
A control code and a panel button that advances the paper to the next top of form.

hexadecimal (hex)
See number systems.

intialize
To establish the initial default status of the printer by turning the printer on or sending an INIT signal.

interface
The connection between the computer and the printer. A parallel interface transmits data one character or code at a time, and a serial interface transmits data one bit at a time.

italic
A typestyle in which the characters slant. This sentence is italicized.

line feed
A control code and a panel button that advances the paper one line space.

memory
The printer, like a computer, has a memory. When you print a file from a computer, the contents of the file are transferred quickly from the computer's memory to the printer's memory The printer then prints information from its own memory at a much slower rate. This way of printing frees the computer to do other work while the printer is still working. The printer memory is sometimes called the buffer.

Near Letter Quality (NLQ)
One of two print qualities available on your printer. Near Letter Quality reduces the print speed and increases the number of dots per character to increase the print quality Draft uses a minimum number of dots per character for high-speed printing.

number systems
Three number systems are commonly used with printers:

decimal is base 10 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. (This is the most familiar system.)

hexadecimal (hex) is base 16 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 9, A, B, C, D, E, and F. This is frequently used by programmers. Any decimal number between 0 and 255 can be expressed by a two-digit hex number.

binary is base 2 and uses only the digits 0 and 1. All information in computer systems in handled in binary form to represent electrical signals that are on or off. A binary digit is often called a bit; any decimal number between 0 and 255 can be expressed by an eight-bit binary number.

on line
When the printer is on line, it is in communication with the computer connected to it.

paper-out sensor
A small switch behind the platen that sends a signal when it is not in contact with paper, causing the **PAPER OUT** light to go on.

parallel interface
See interface.

parity
Parity is a method for a computer and printer to check the reliability of data transmission.

pitch
Indicates the number of characters per inch (cpi). The standard is 10 pitch.

platen
The black roller that provides a backing for the printing.

print quality
Your printer has two types of print quality: draft and Near Letter Quality. Draft is for high-speed, draft quality jobs; Near Letter Quality is for final, polished documents.

proportional printing
Printing in which the width of the character varies from character to character. For example, a capital W receives much more space than a lowercase i. The result looks more like a typeset book than a typewritten draft.

pull tractor
A detachable device that moves continuous paper through the printer.

RAM
Random Access Memory. The portion of the printer's memory used as a buffer and for storing user-defined characters. All data stored in RAM is lost when the printer is turned off.

reset
To return a printer to its defaults, by either a command, an INIT signal, or by turning the printer off and on.

self test
A method of checking the operation of the printer. When the self test is run, the printer prints out its current DIP switch settings and the characters that are stored in its ROM.

10 pitch
A pitch with 10 characters per inch. This is often the standard or default pitch. Also referred to as pica.

top of form position
The position on the paper which the printer recognizes as the first printable line. For single sheets, this is the position to which the paper is automatically loaded. For continuous paper, this position can set to the current paper position by turning the printer off and on.

12 pitch
A pitch in which each character is slightly narrower than normal, so that there are 12 characters per inch across the page. Also referred to as elite.

user-defined characters
Characters that are defined and stored in the printer by the user. Also known as download characters.

Index

Command descriptions are not indexed here. For page references for specific commands, see pages **A-4** - 6 or the Quick Reference card.

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