NOTICE

NOTE:
To prevent damage during shipping, several pieces of protective material are packed with your printer. You must remove these before you assemble your printer.

HINWEIS:

ATTENTION:
Afin d’éviter tout dommage durant le transport, des matériaux de protection ont été emballés avec l’imprimante. Veillez à bien les retirer avant de l’installer.

NOTA:
L’imballaggio della vostra stampante contiene molti elementi protettivi, per prevenire danni durante il trasporto. Non dimenticate di toglierli prima di iniziare a utilizzare la stampante.

NOTA:
Para evitar daños durante el transporte, su impresora viene protegida por varias piezas de material protector. Debe retirar estas piezas antes de montar su impresora.

Please also read the back of this sheet.
Lesen Sie bitte auch die Rückseite dieses Hinweissblattes.
Lire attentivement le recto de cette feuille.

Por favor lea también el dorso de esta hoja.
Leggete anche il retro di questo foglio.
NOTE:

☐ Do not lift or carry this printer alone. Make sure that two people carry it, lifting from the bottom as shown here.

☐ Do not try to remove the elastic cord from either front or rear tractors. It is not a protective material.

HINWEIS:

☐ Heben bzw. tragen Sie den Drucker nicht allein. Der Drucker sollte von zwei Personen angehoben und getragen werden, wie in der Abbildung gezeigt.

☐ Bitte NICHT das Spannseil am vorderen und hinteren Traktor entfernen. Diese gehören nicht zum Verpackungsmaterial.

ATTENTION:

☐ Ne soulevez pas ou ne transportez pas cette imprimante tout seul. Mettez-vous à deux personnes pour la transporter ou la soulever, comme indiqué ci-dessus.

☐ Ne pas essayer d’enlever le cordon élastique des tracteurs avant ou arrière. Ce n’est pas un matériau de protection.

NOTA:

☐ Si tiene que mover o transportar esta impresora, no lo haga sólo, levántela con ayuda de otra persona, sujetándola por la base tal como se indica en la ilustración.

☐ No intente retirar el cable elástico del tractor frontal ni del tractor posterior. No es material de protección.

NOTA:

☐ Non sollevate o trasportate questa stampante da soli. Siate sicuri che la stampante venga trasportata da due persone, sollevandola dal basso, come mostrato in figura.

☐ Non togliete gli elasticci dal trattore posteriore e frontale. Non fanno parte del materiale di protezione.
FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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 or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

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FOR CANADIAN USERS

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n’emette pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrits dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

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IMPORTANT SAFETY INSTRUCTIONS

1. Read all of these instructions and save them for later reference.

2. Follow all warnings and instructions marked on the product.

3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

4. Do not use this product near water.

5. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.

6. Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.

8. This product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.

9. Do not locate this product where the cord will be walked on.
10. If an **extension cord** is used **with this** product, make sure that the total of the ampere ratings on the products **plugged** into the extension cord does not **exceed the** extension cord ampere rating. Also, make sure that the total **of** all products plugged into the wall outlet does not exceed **15** amperes.

11. Never **push** objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

12. Except as specifically explained in the User’s Manual, do not attempt to service this product yourself. Opening or removing those covers that are marked ‘Do Not **Remove**’ may expose you to dangerous voltage points or other risks. Refer all servicing **in** those compartments to service personnel.

13. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
   
   A. When the power cord or **plug** is damaged or frayed.
   
   B. If liquid has been spilled into the product.
   
   C. If the product has been exposed to rain or water.
   
   D. If the **product does** not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
   
   E. If the product has been dropped or the **cabinet** has been damaged.
   
   F. If the product exhibits a distinct change in performance, indicating a need for service.
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About This Manual

This user’s manual provides fully-illustrated, step-by-step instructions for setting up and operating the Epson DFX-8000 printer. It also includes information that you will need for your daily use of the printer.

- Chapter 1 shows you how to unpack, set up, test, and connect the printer. Be sure to read and follow the instructions in this chapter first. Inside the back cover of this manual are illustrations that identify the parts of the printer. You may want to unfold the cover and refer to these illustrations as you set up and operate the printer.

- Chapters 2 and 3 describe loading paper and using the printer. This information is necessary for the day-to-day operation of your printer.

- Chapter 4 provides information on enhancing your printing, using software commands and graphics, and creating your own user-defined characters. Chapter 9 contains a summary of printer commands.

- Chapter 7 contains troubleshooting information. If the printer does not operate properly or the printed results are not what you expect, see Chapter 7 for a list of possible problems and recommended solutions.

- Other chapters contain information on printer options, general maintenance, and specifications. You will also find an appendix with reference tables, a glossary of printer terms, and an index.

- At the back of this manual is a handy Quick Reference card that lists DIP switch settings and printer commands.
About This Manual

Conventions used in this manual

**WARNINGS** must be followed carefully to avoid damage to your printer and computer.

**CAUTIONS** must be followed to ensure that your printer operates correctly.

Notes contain important information and useful tips on the operation of your printer.

Where to Get Help

Customer support and service for Epson products are provided by a network of authorized Epson dealers and Customer Care Centers throughout the United States. Epson America provides product information and support to its dealers and Customer Care Centers. Therefore, we ask that you contact the business where you purchased your Epson product to request assistance. If the people there do not have the answer to your question, they can obtain it through our dealer support program.

Epson is confident that this policy will provide you with the assistance you need. Call the Epson Consumer Information Center at **1-800-922-8911** for the following:

- The location of the nearest Epson dealer
- The location of the nearest Customer Care Center
- Information on Epson User Groups.
Introduction

The Epson DFX-8000 printer is an advanced dot matrix printer designed for business applications. The printer combines high performance and reliability with a wide range of features, including high speed printing and automatic paper handling.

Features

In addition to the high-quality printing and ease of operation you expect from Epson printers, the DFX-8000 offers the following:

- Extra-fast printing speeds of up to 1066 characters per second at 10 cpi (characters per inch) or 960 characters per second at 12 cpi.
- Two built-in push tractors (front and rear) for convenient paper handling. This dual system lets you switch between types of continuous paper quickly and easily. The printer remembers separate top of form positions for each tractor.
- An automatic paper back-out feature that allows you to switch between paper loaded on the front or rear tractor without removing either paper supply.
- A short tear-off feature that saves paper. When a sheet of continuous paper is torn off at the end of a printout, the printer reverse-feeds the remaining paper so that printing can begin at the top of the next sheet.
- A paper memory feature that produces high quality printing on your multi-part forms by using stored paper format and thickness information to adjust the print head.
- A width detection feature that automatically adjusts the printing to match the width of the paper loaded in the printer. This prevents the printer from printing directly on the platen, which damages the print head.
Introduction

- A micro-adjustment feature that allows you to feed the paper forward or backward to finely adjust the top of form, loading, and short tear-off positions.
- An improved control panel design that lets you select almost any feature with a single button.
- Compatibility with the Epson ESC/P® commands used by FX-850/1050 and DFX-5000 printers.
- An IBM® emulation mode that provides compatibility with application programs written specifically for IBM printers.

Options

The following options are available for use with your DFX-8000 printer. For detailed information on installing and using these options, see Chapter 5.

- Pull Tractor (#8309)
  This option improves the handling of heavy multi-part forms and labels. It also enhances printing alignment on preprinted forms.
• **Paper Cutter** *(C815001)*
  
  This option allows you to handle continuous paper more easily by cutting off printed documents for you.

• **Interface Boards**
  
  You can use several optional interface boards to supplement the printer’s built-in parallel and serial interfaces. Chapter 5 provides guidelines for choosing the right interface and instructions for installing an interface board.
Coax and Twinax interface boards

Two interface boards (Coax and Twinax) let you use the DFX-8000 as a local printer for an IBM mainframe or minicomputer. These boards connect directly to the printer and allow it to function as a local IBM printer without the addition of any other circuitry or components.
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Setting Up the Printer

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Unpacking the Printer

Because the printer weighs approximately 64 lbs. (29 kg), you should not lift or carry it alone. Two people should carry it by the bottom, as shown here:
Unpacking the Printer

Checking the parts
When you unpack the printer, make sure that you have all the parts shown below and that none have been damaged during transportation.

In some locations, the power cable may be attached to the printer.
Unpacking the Printer

**WARNING:** There are several different versions of the printer designed for different electrical standards. The power supply voltage is shown on the label on the back of the printer. If the voltage shown is not correct for your country, contact your dealer. It is not possible to adjust the printer for use with different voltages.

After you unpack the printer, save the packaging materials in case you ever need to transport your printer.

**Removing the protective materials**

The printer is protected during shipping by two brackets, a carriage guide support bar, and a plastic print head protector. Your printer may also be protected by several pieces of foam packaging. These protective items must be removed before you turn on the printer. After removing the protective materials as described below, store them with the other packaging material.

1. Open the top cover by lifting its front edge up and away from you. Remove any packing materials in the printer.
2. Use the enclosed cross-head screwdriver to remove the five screws and the two transport locking brackets from the inside of the printer.

3. Remove the print head protector, as shown below. Then lift up the paper bail and remove the piece of foam packing underneath it.
Unpacking the Printer

4. Using the enclosed cross-head screwdriver, remove the carriage guide support bar.

WARNING: Be sure to remove all protective materials before you turn on the printer.
Choosing a Place for the Printer

When you select a location for your printer, keep the following in mind:

- Place the printer on a flat, stable surface.
- Place the printer close enough to the computer for the printer cable to reach.
- Leave plenty of room around the printer for your front and rear stacks of continuous paper as well as your printed output.
- Use a grounded outlet; do not use an adapter plug.

**WARNING:** Avoid locations that are subject to direct sunlight, excessive heat, moisture, or dust.

- Avoid using electrical outlets that are controlled by wall switches or automatic timers. Accidental interruption of power can wipe out information in your computer’s and your printer’s memory.
- Avoid using outlets on the same circuit with large motors or electrical appliances that might cause fluctuations in line voltage.
- Keep the entire computer system away from potential sources of electromagnetic interference; such as loudspeakers or the base units of cordless telephones.
Choosing a Place for the Printer

The illustration below shows a good printer location.

**Notes:** If you plan to use a printer stand, follow these guidelines to select and set up the stand:

The stand should be able to support at least 128 lbs. (58 kg), which is twice the weight of the DFX-8000 printer.

Never use a stand that supports the printer at an angle. The printer should always be kept level.

If you keep your paper supply underneath the printer stand, be sure there is enough clearance to prevent the paper from catching on the underside of the stand. Also, check to see that the distance between the stand supports is wide enough to accommodate the paper you will be using.

Position your printer’s power cable and interface cable so that they do not interfere with paper feeding. If possible, fasten the cables to the printer stand to keep them away from the paper.
Assembling the Printer

After you’ve decided on the best place to set up your printer, you need to install the ribbon cartridge.

Installing the ribbon cartridge

Before installing the ribbon cartridge, make sure that the printer is not plugged into an electrical outlet. Remove the ribbon cartridge from its box and plastic wrapper and then follow these steps to install the ribbon cartridge:

1. Open the top cover by lifting its front edge up and away from you.
2. Slide the print head to the exposed part of the paper bail as shown below.

3. Remove the separator from the middle of the ribbon cartridge and discard it. Then detach the ribbon guide from the ribbon cartridge (but not from the ribbon) and turn the ribbon-tightening knob in the direction of the arrow to take up any slack in the ribbon.
4. Hold the ribbon cartridge with both hands and lower it into the printer. Pulling the cartridge toward you, slide the hooks in the sides of the cartridge over the two corresponding pins in the printer. Then push the cartridge down into position until the other two hooks snap into place over the mounting pins in the printer.

Note: Press lightly on both sides of the cartridge to make sure the hooks are properly connected.

5. Insert the ribbon guide over the metal pins on each side of the print head. The smaller end of the guide should be on top, with its angled edge toward the platen. Turn the ribbon-tightening knob again to remove any slack in the ribbon.
Assembling the Printer

6. Slide the print head from side to side to make sure that it moves smoothly and that the ribbon is not twisted or creased.

7. Close the top cover.
Testing the Printer

Now that your printer is fully assembled, you can use its built-in self test function to be sure the printer is working correctly before you connect it to a computer. You should perform this test to make sure that your printer was not damaged during shipping and that the ribbon is correctly installed.

Before performing the self test, you need to plug in your printer and load paper.

Plugging in the printer

1. Make sure that the printer is turned off.

2. Check the label on the printer’s back panel to make sure the voltage required by the printer matches that of your electrical outlet.
Testing the Printer

**WARNING:** If the rated voltage and your outlet voltage do not match, contact your Epson dealer. Do not plug in the power cable.

3. If necessary, connect the power cable to the AC inlet on the printer’s rear panel.

4. Plug the power cable into a properly grounded electrical outlet.

**WARNING:** Whenever you turn off the power, wait at least five seconds before turning it back on. Rapidly switching the power on and off can damage the printer.
Running the self test

The self test can be run in draft or Near Letter Quality (NLQ) mode, depending on which button you hold down as you turn on the printer.

1. Be sure the printer is turned off.

2. Open the front cover by lifting its bottom edge up and toward you.
Testing the Printer

3. Release the sprocket lock levers on both the right and sprocket units by pulling each lever down.

4. Slide the left sprocket unit all the way to the left. Lock it in place by pushing the sprocket lock lever up.
5. Now slide the right sprocket unit to approximately match the width of your paper. (Do not lock it in place yet.)

6. Slide the two paper supports so that they are spaced evenly between the two sprocket units.
7. Open both sprocket covers.

8. Be sure your paper has a clean, straight edge, and then fit the first four holes in the paper over the pins of both sprocket units. Then close the sprocket covers. (The side of the paper that you want to print on should be facing you.)
Testing the Printer

9. Slide the right sprocket unit so that the paper is straight and has no wrinkles. Lock the sprocket unit in place by pushing the sprocket lock lever up.

CAUTION: Be sure the sprocket units are not too far apart. If they pull your paper too tightly or if they tear the edges of the paper holes, a paper jam may result. To remove any excess tension in your paper, release the right sprocket once and lock it again.

10. Close the front cover.
Testing the Printer

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

11. While holding down the LINE FEED button (for draft mode) or the FORM FEED button (for NLQ mode), turn on the printer. The POWER and PAPER OUT lights come on. Also, either the front or rear tractor arrow on the PAPER SELECT indicate lights up.

Notes:
- When NLQ mode is selected using DIP switch 1-5, the self test runs in the NLQ mode even if you press the LINE FEED button.
- If you open the top cover while the DFX is printing, the printer beeps four times, goes off line, and stops printing. To resume printing, close the top cover and press the ON LINE button.
12. Press the **LINE FEED/LOAD** button to load your paper. (If the paper does not load, the front tractor may not be selected. Press the **FRONT/REAR** button to select the front tractor. This loads the paper automatically.)

13. Press the **ON LINE** button to start the self test. (The **ON LINE** light does not go on.) A list of your printer’s DIP switch settings is printed first, followed by a series of characters. The self test continues until the paper runs out or you press the **ON LINE** button.

14. If the test results are satisfactory and you wish to stop the test, press the **ON LINE** button. If the test results are not satisfactory, see page 1-24 for possible causes and solutions.

**Note:** To resume the test, press the **ON LINE** button again.
Testing the Printer

15. Press the FORM FEED button to advance the paper. Then open the paper separator cover (the back flap of the top cover) and tear off the paper at the perforation.

16. Turn off the printer.

WARNING: Whenever you turn off the power, wait at least five seconds before turning it back on. Rapidly switching the Power on and off can damage the printer.
Testing the Printer

Here are parts of typical self test printouts:

### High-speed draft mode

<table>
<thead>
<tr>
<th>Character pitch</th>
<th>Normal</th>
<th>SW1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape of zero</td>
<td>Not slashed</td>
<td>SW1</td>
</tr>
<tr>
<td>CG table (80H–OFFH)</td>
<td>Italic</td>
<td>SW1</td>
</tr>
<tr>
<td>Protocol mode</td>
<td>ESC/P mode</td>
<td>SW1</td>
</tr>
<tr>
<td>Print mode</td>
<td>Draft</td>
<td>SW1</td>
</tr>
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### Normal draft mode

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<th>Character pitch</th>
<th>Normal</th>
<th>SW1</th>
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<td>Shape of zero</td>
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<td>Protocol mode</td>
<td>ESC/P mode</td>
<td>SW1</td>
</tr>
<tr>
<td>Print mode</td>
<td>Draft</td>
<td>SW1</td>
</tr>
</tbody>
</table>

**Note:** Your printer’s default setting is high-speed draft mode. If you want to run the self test in normal draft mode, you need to select normal draft mode using DIP Switch 2-2. See the section on setting DIP switches in Chapter 3 for instructions.
### NLQ mode

<table>
<thead>
<tr>
<th>Character Ditch</th>
<th>Normal</th>
<th>SW1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape of zero</td>
<td>Not</td>
<td>slashed</td>
</tr>
<tr>
<td>CG table (80H- OFFH)</td>
<td>Italic</td>
<td>SW1:</td>
</tr>
<tr>
<td>ASCII (0..+,-/.0123456789)</td>
<td>ESC/P mode</td>
<td>SW1:</td>
</tr>
<tr>
<td><code>*</code>,**,-/.0123456789</td>
<td>Draft</td>
<td>SW1:</td>
</tr>
<tr>
<td><code>&amp;</code>,**,-/.0123456789</td>
<td>;&lt;&gt;?@ABCDEFHIJKLMNOPQ</td>
<td></td>
</tr>
</tbody>
</table>

### Solving any self test problems

If the self test does not print properly, check the list of possible problems and solutions below. Also be sure there are no packing materials remaining inside the printer.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The paper is jammed.</td>
<td>Turn off the printer, remove the jammed paper, and then load fresh paper. See page l-15.</td>
</tr>
</tbody>
</table>

The printer does not print.

The printer sounds like it is printing, but nothing is printed.

The ribbon cartridge may not be installed properly. Turn off the printer and remove the ribbon cartridge. Then reinstall it and take up any slack in the ribbon.

See page 1-9.

The ribbon may be worn out. Replace the ribbon cartridge. See page 6-4.

The test did not print when you pressed the ON LINE button.

Turn off the printer and follow the steps under **Running** the Self Test again. Be sure to hold down the FORM FEED or LINE FEED button longer while you turn on the printer. See page 1-20.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The printout is faint or uneven.</td>
<td>The printout is faint.</td>
</tr>
<tr>
<td></td>
<td>Parts of printed characters are missing, as shown here: ABCD</td>
</tr>
<tr>
<td></td>
<td>The bottom parts of printed characters are missing as shown here: ABCD</td>
</tr>
<tr>
<td></td>
<td>A blank line runs through your characters, as shown here: ABCD</td>
</tr>
<tr>
<td></td>
<td>If the printer still does not print the self test correctly, contact your Epson dealer.</td>
</tr>
<tr>
<td></td>
<td>The ribbon may be worn out. A worn ribbon can damage the print head and should be replaced.</td>
</tr>
<tr>
<td></td>
<td>There is either too much slack in the ribbon or the ribbon is caught on something.</td>
</tr>
<tr>
<td></td>
<td>The ribbon cartridge may not be installed properly.</td>
</tr>
<tr>
<td></td>
<td>The print head is damaged. Stop printing and contact your Epson dealer to have the print head</td>
</tr>
<tr>
<td></td>
<td>replaced.</td>
</tr>
<tr>
<td></td>
<td>Make sure the cartridge hooks are inserted securely into the printer.</td>
</tr>
</tbody>
</table>

Setting Up the Printer 1-25
Connecting the Printer to Your Computer

If the self test printed correctly, you are now ready to connect your printer to the computer.

Your DFX printer has two separate interface connections: a parallel interface and an RS-232C compatible serial interface. If you are not sure which one is required by your computer, check your computer manual.

If you have a suitable shielded cable, you should be able to connect the printer to most computers immediately. If your computer requires another type of interface, you need to use an optional interface board. See the section on interface boards in Chapter 5.

The parallel interface is the printer’s default setting. If you need to use the built-in serial interface, be sure to change the DIP switch settings as shown in Chapter 3.
The parallel interface

Follow these steps to connect the parallel interface cable to the printer:

1. Turn off both the printer and computer.

2. Open the rear cover by grasping it by the handholds on each side and pulling it out and down.
3. Plug the cable connector securely into the parallel interface (the socket on the left).

**WARNING:** Do not plug more than one interface cable into the printer at one time. This may damage the printer.

4. Squeeze the wire clips together until they lock in place on either side of the connector.
5. If your cable has a ground wire, connect it to the ground connector.

6. Open the plastic clamp to the right of the parallel and serial interfaces by pressing down on its top tab. Insert the cable in the plastic clamp and close the clamp.
Connecting the Printer to Your Computer

7. Close the rear cover.

CAUTION: Always close the rear cover before using the printer.

8. Plug the other end of the cable into the computer. (If there is a ground wire at the computer end of the cable, attach it to the ground connector at the back of the computer.)
The serial interface

Follow these steps to connect the serial interface cable to the printer:

1. Turn off both the printer and computer.

2. Open the rear cover by grasping it by the handholds on each side and pulling it out and down.
Connecting the Printer to Your Computer

3. **Plug** the cable connector securely into the serial **interface** (the socket on the right).

![Diagram of printer]

**WARNING:** Do not plug more than one interface cable into the printer at one time. This may damage the printer.

4. If your cable connector has screws that you need to tighten using a screwdriver, open the top cover of the printer.

![Diagram of open printer cover]
5. Insert a screwdriver through the hole in the rear paper guide and fasten the screws of the cable connector.

Note: If the screws that come with the cable do not fit into the connector lock nuts on the interface, replace the lock nuts with the optional lock nuts provided with the printer.

6. Close the top cover.
7. If your cable has a ground wire, connect it to the printer’s ground connector.

8. Open the plastic clamp to the right of the parallel and serial interfaces by pressing down on its top tab. Insert the cable in the plastic clamp and close the clamp.
9. Close the rear cover.

CAUTION: Always close the rear cover before using the printer.

10. Plug the other end of the cable into the computer. (If there is a ground wire at the computer end of the cable, attach it to the ground connector at the back of the computer.)
### Setting Up Your Application Software

Now that you have set up and tested the DFX-8000, you can start using it with your application software programs.

Most software programs let you specify the type of printer you are using so that the program can take full advantage of the printer’s features. If your application program has an installation or setup procedure that lets you select your printer from a list of printers, choose the Epson DFX-8000 printer. If the list does not include the DFX-8000, choose one of the following printers, listed in order of preference:

- DFX-5000
- FX-1050 (FX-850)
- FX-286e (FX-86e)
- Ex-1000 (EX-800)
- FX-185 (FX-85)
- FX-100+ (FX-80+)
- FX-100 (FX-80)

If these printers are not listed, select one of the following printers, listed in order of preference:

- FX
- EX
- LX
- RX
- MX
- Epson printer
- 9-pin printer
- Standard printer
- Draft printer
If you plan to use IBM emulation mode, select one of the following printers, listed in order of preference:

IBM Proprinter XL
IBM Graphics printer
IBM Printer

Note: To use all the features of the DFX-8000, it is best to use a program with the DFX-8000 on its menu. If your software program does not list the DFX-8000, contact the software manufacturer to see if an update is available.
Chapter 2

Paper Handling

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  Loading paper onto the front tractor ............................. 2-4
  Loading paper onto the rear tractor .............................. 2-11

Switching between Front and Rear Tractors ...................... 2-20

Changing the paper ....................................................... 2-24

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Using the Two-Tractor System

The DFX-8000’s paper handling system consists of a front and a rear push tractor. Both tractors are easy to load and operate, and both accommodate a wide variety of paper types, including labels and multi-part forms. The printer automatically adjusts to the thickness of your loaded paper, so you don’t need to set the paper thickness manually. You can use any width continuous paper, from 4 inches (101 mm) to 16 inches (406 mm) wide. Your printer also senses the paper width automatically.

If you plan to use more than two types of paper, it is best to load the paper you use most often onto the rear tractor. That way you can use the front tractor, which is easier to reach, for paper you change more often.

Positioning the paper supply

Since the DFX-8000 can be loaded with continuous paper from both the front and the rear, be sure to leave enough room around the printer for two stacks of fresh paper and a third stack of printed output. It is also important to keep your stacks of fresh paper aligned with the paper loaded in the tractor so that the paper feeds smoothly into the printer.

The following illustration shows three ways to position your printer and paper: with the front tractor loaded, with the rear tractor loaded, and with both tractors loaded.
CAUTION: Make sure that your stack of printed pages does not interfere with the rear tractor’s paper supply.

CAUTION: Be sure your printed output folds properly as it comes out of the printer. It should fold at the perforation between pages.
Using the Two-Tractor System

Loading paper onto the front tractor

The following steps show you how to load paper onto the front tractor.

1. Turn off the printer.

2. Open the front cover by lifting its bottom edge up and toward you.
3. Release the sprocket lock levers on both the right and left sprocket units by pulling each lever down.

4. Slide the left sprocket unit all the way to the left. Lock it in place by pushing the sprocket lock lever up.
Using the Two-Tractor System

5. Now slide the right sprocket unit to approximately match the width of your paper. (Do not lock it in place yet.)

6. Slide the two paper supports so that they are spaced evenly between the two sprocket units.
7. Open both sprocket covers.

8. Fit the first four holes in the paper over the pins of both sprocket units. (The side of the paper that you want to print on should be facing you.). Then close the sprocket covers.

**CAUTION:** Make sure your paper has 'a clean, straight edge before inserting it into the printer.
Using the Two-Tractor System

9. Slide the right sprocket unit so that the paper is straight and has no wrinkles. Then lock the sprocket unit in place by pushing the sprocket lock lever up.

**CAUTION:** Be sure the sprocket units are not too far apart. If they pull your paper too tightly or tear the edges of the paper holes, a paper jam may result. To remove any excess tension in your paper, release the right sprocket and lock it again.

10. Close the front cover. The paper is now loaded to the standby position.
11. Turn **on** the printer. The **POWER** and **PAPER OUT** lights go on. Also, either the front or rear tractor **arrow** on the **PAPER SELECT** indicator lights up, depending on **which** tractor was selected when the printer was turned off last,

![Printer Diagram]

12. Check the **PAPER SELECT** indicator to see which tractor is **selected**:

- If the front tractor arrow is lit up, press the **LINE FEED/LOAD** button to load the paper.

![Printer Diagram]
Using the Two-Tractor System

- If the rear tractor arrow is lit up, make sure the printer is **off line and then** press the **FRONT/REAR** button to switch to the front tractor. When the printer switches tractors, it also loads the paper automatically.

13. Press the **ON LINE** button to put the printer on line so it is ready to print. The paper is now loaded to the top of form position. If it looks like the printing will start too high or low on the page, see the section on **adjusting the** top of form position in Chapter 3.
Notes:
- Before you begin printing, be sure to check the page length and skip over perforation settings, and readjust the settings if necessary. See the sections on page length and skip over perforation in Chapter 3.
- If you open the top cover while the DFX is printing, the printer beeps four times, goes off line, and stops printing. To resume printing, close the top cover and press the ON LINE button.

Loading paper onto the rear tractor

The following steps show you how to load paper onto the rear tractor. You can load paper onto the rear tractor without removing the paper from the front tractor.

1. Turn off the printer.
Using the Two-Tractor System

2. Open the top cover by lifting its front edge up and away from you.

3. Open the rear flap at the back of the top cover.
Using the Two-Tractor System

release the sprocket lock levers

4. **Facing the** front of the printer, on the rear tractor’s right and left sprocket units by Pushing each lever back.

5. Slide the left sprocket unit all the way to the left. Lock it in place by pulling the sprocket lock lever forward.
6. Now slide the right sprocket unit to approximately match the width of your paper. (Do not lock it in place yet.)

7. Slide the two paper supports so that they are spaced evenly between the two sprocket units.
8. Open both sprocket covers.

9. With the side of the paper you want to print on facing down, insert the paper through the opening at the rear of the printer. You may find it easier to load the paper by standing to the side of the printer. That way, you can feed the paper through the rear opening with one hand and pull it through with the other.
CAUTION: Make sure your paper has a clean, straight edge before inserting it into the printer.

10. Fit the first four holes in the paper over the pins of the sprocket units. Then close the sprocket covers.

11. Slide the right sprocket unit so that the paper is straight and has no wrinkles. Then lock the sprocket unit in place by pulling the sprocket lock lever forward.
CAUTION: Be sure the sprocket units are not too far apart. If they pull your paper too tightly or tear the edges of the paper holes, a paper jam may result. To remove any excess tension in your paper, release the right sprocket and lock it again.

12. Close the top cover and the rear flap. The paper is now loaded to the standby position.

13. Turn on the printer. The **POWER** and **PAPER OUT** lights go on. Also, either the front or rear tractor arrow on the **PAPER SELECT** indicator lights up, depending on which tractor was selected when the printer was turned off last.
Using the Two-Tractor System

14. Check the PAPER SELECT indicator to see which tractor is selected:

If the rear tractor arrow is lit up, press the LINE FEED/LOAD button to load the paper.

- If the front tractor arrow is lit up, make sure the printer is off line and then press the FRONT/REAR button to switch to the rear tractor. When the printer switches tractors, it also loads the paper automatically.
Using the Two-Tractor System

15. Press the **ON LINE** button to put the printer on line so it is ready to print. The paper is now loaded to the top of form position. If it looks like the printing will start too high or low on the page, see the section on adjusting the top of form position in Chapter 3.

**Notes:**
- Before you begin printing, be sure to check the page length and skip over perforation settings, and readjust the settings if necessary. See the section on page length and skip over perforation in Chapter 3.
- If you open the top cover while the DFX is printing, the printer beeps four times, goes off line, and stops printing. To resume printing, close the top cover and press the **ON LINE** button.
Switching between Front and Rear Tractors

You can easily switch between paper loaded on the front tractor and paper loaded on the rear tractor with the FRONT/REAR button.

The following steps describe the procedure for switching from the front tractor to the rear tractor, but you can follow the same steps to switch from the rear tractor to the front tractor. (To switch tractors when the optional pull tractor is installed, see Chapter 5.)

**WARNING:** Never switch between tractors when labels are loaded in the printer or a paper jam may result. Instead, completely remove the labels first by tearing off the fresh supply below the tractor and pressing the FORM, FEED or LINE FEED button to eject the remaining labels.

Before you start, make sure the printer is turned on and that the front tractor is selected. (The front tractor arrow on the PAPER SELECT indicator should be lit up.) If you are in the middle of printing a document, wait for the printer to finish printing before you switch tractors. Then follow these steps.

1. If the printer is on line, press the ON LINE button to take it off line.
2. If there is no paper loaded in the rear tractor, load paper to the standby position. (See the section on loading paper onto the rear tractor in this chapter for instructions.)

3. Open the paper separator cover at the back of the top cover.

4. If you have a printed document still in the printer, or excess paper that has been fed through the printer, use the short tear-off feature described in Chapter 3 to tear off the document or excess paper.
Switching between Front and Rear Tractors

**WARNING:** Always tear off the printed document and any excess paper that has been fed through the printer before switching tractors. Never feed more than one page backward through the printer.

5. Close the paper separator cover.

6. Make sure the top cover is closed and then press the **FRONT/REAR** button to switch to the rear tractor. The printer feeds the front-loaded paper back to the standby position and advances the rear-loaded paper to the top of form position.
7. Press the ON LINE button to put the printer on line so it is ready to print.

**Note:** If you open the top cover while the DFX is printing, the printer beeps four times, goes off line, and stops printing. To resume printing, close the top cover and press the ON LINE button.
Changing the Paper

The following steps describe the procedure for changing paper on the front tractor, but you can follow the same steps when you change the paper on the rear tractor. Before you start, make sure the printer is turned on and the front tractor is selected. (If you are changing the paper on the rear tractor, the rear tractor should be selected instead.)

**WARNING:** Never change paper using the following procedure if labels are already loaded in the printer. Instead, completely remove the labels first by tearing off the fresh supply below the tractor and pressing the FORM FEED or LINE FEED button to eject the remaining labels. Then load new paper as described in this chapter.

1. If the printer is on line, press the ON LINE button to take it off line.
2. If you **have a** printed document still in the printer, or excess paper that has been fed through the printer, use the short tear-off feature described in Chapter 3 to tear off the document or excess paper.

![Image of printer](image)

**WARNING:** Always tear off printed documents before changing the paper. Never feed more than one page backward through the printer.

3. Press the **FRONT/REAR** button to switch to the rear tractor. The front-loaded paper automatically feeds back to the standby position.

![Image of printer with FRONT/REAR button](image)
Changing the Paper

4. Open the front cover. (To change the rear-loaded paper, open the top cover and the rear flap.)

5. Open the sprocket covers and remove the paper from the tractor.
6. Load the new paper onto the front tractor as described in the section on loading paper onto the front tractor in this chapter. (If you are loading paper onto the rear tractor, see the section on loading paper onto that tractor.)

7. Close the front cover (or close the top cover and the rear flap).
Changing the Paper

8. Press the **FRONT/REAR** button to switch to the front (or rear) tractor and load the paper to the top of form position. Then press the **ON LINE** button -to- put the printer on line so it is ready to print.

Note: If you open the top cover while the DFX is printing, the printer beeps four times, goes off line, and stops printing. To resume printing, close the top cover and press the **ON LINE** button.
Printing on Special Paper

The DFX-8000 can print on various types of paper, including multi-part forms and labels. It can also handle a variety of paper thicknesses, from thin paper to six-part forms. The printer automatically adjusts to the thickness and width of your paper.

When you print on multi-part forms and labels, the positioning of your text on the page can be critical. For more information on aligning your text, see the sections on adjusting the top of form and printing positions in Chapter 3. You should also check both your printer and your software page length settings before you load labels or forms. See the section on page length in Chapter 3.

If you are using labels or preprinted or multi-part forms, you may want to use the optional pull tractor. See Chapter 5.

**WARNING:** When printing on multi-part forms or labels, make sure that your printing stays within the printable area of the paper to prevent damage to the print head. For more information on the printable area, see page 8-6.

Copy mode

If the printing on the last pages of your multi-part forms is too faint, you can use the DFX-8000’s copy mode to print clearer, darker characters on each page. In copy mode, which is available only for draft, not NLQ, the DFX-8000 prints at half the normal speed.

To select or cancel copy mode, press the FORM FEED/COPY button when the ON LINE light is on. When you select copy mode, the printer beeps twice; when you cancel copy mode, the printer beeps once.
Printing on Special Paper

Multi-part forms

You can use continuous multi-part forms with up to four sheets, including the original, on the rear tractor. On the front tractor, you can use forms with up to six sheets.

Be sure to use multi-part forms that meet the requirements listed in the section on paper in Chapter 8.

WARNING: Never use multi-part forms that have metal staples.

You load continuous multi-part forms the same way as you load any other type of continuous paper. Before loading multi-part forms, make sure that the paper has a clean straight edge and does not separate or tear apart. See the sections on loading paper earlier in this chapter.
When you use the paper memory feature described in Chapter 3, the DFX-8000 can print on multi-part forms that vary in thickness, such as forms with labels on them or forms that overlap slightly where they are glued together. These forms are thicker in the label area and in the places where they overlap and are joined together, as shown below.

CAUTION: Be sure to use the paper memory feature before you print on multi-part forms that vary in thickness. See Chapter 3 for instructions.

When you print on these forms, make sure that the printing fits within the printable area and the top of form position is set properly. The printable area is shown in Chapter 8.
Printing on Special Paper

Labels
When using labels, always choose the type mounted on a continuous backing sheet with sprocket holes for use with a tractor. Labels should be used in the front tractor only. You load labels the same way that you load continuous paper. See the section on loading paper onto the front tractor earlier in this chapter.

WARNING: Never use the TEAR OFF, FRONT/REAR, or reverse-feeding (bottom) MICRO FEED button when labels are loaded in the printer. Labels must never be fed backward through the printer because they can easily come off the backing and jam the printer.

Although you must never feed labels backward through the printer, you can still use the DFX-8000’s automatic paper handling features if you follow these precautions:

- Instead of using the TEAR OFF button to remove printed labels, take the printer off line and press the FORM FEED or LINE FEED button until the last printed label is at the point where you can tear it off easily.

- Before using the FRONT/REAR button to switch tractors, or change paper, remove the entire supply of labels. To remove labels, always tear off the fresh supply at a perforation below the tractor and then press the FORM FEED or LINE FEED button to eject the remaining labels.

- When you adjust the top of form or printing position, use only the forward-feeding (top) MICRO FEED button.
Before you print a large number of labels, print only one page of labels to make sure all the text is printed within the label area.

**WARNING:** Since labels are especially sensitive to extreme temperature and humidity, always use them under normal operating conditions.
Chapter 3
Using the Printer

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Operating the Control Panel

The DFX-8000’s control panel gives you access to several powerful features. The control panel buttons let you control paper loading, primer settings, and more. The control panel indicator lights give you status information such as which mode the printer is in, which tractor is loaded with paper, and which tractor is ready to print. The following sections describe the functions of the control panel’s lights and buttons.

The indicator lights on the control panel let you check the current status of the printer. Below is an illustration of the control panel lights and a description of their functions.

Lights

![Control Panel Lights Diagram]

**POWER** (green)
On when the power switch is on and **power is supplied** to the printer.

**READY** (green)
On when the printer is on line and ready to receive data from your computer. This light flickers during printing.
Operating the Control Panel

PAPER OUT (red)
On when the printer is out of paper. This light goes on whenever there is no paper positioned behind the print head, even if there, is paper loaded on the tractors in the standby position. (The printer also beeps when it is out of paper.)

ON LINE (green)
On when the printer is on line and ready to receive and print data from the computer. Also, when the print head overheats, the ON LINE light blinks. The printer stops printing, waits several minutes while the print head cools, and then resumes printing.

TEAR OFF (green)
On when the printer is in tear-off mode.

TOP OF FORM (green)
On when the printer is in top of form mode. When this light blinks, you can adjust the loading and top of form positions.

PAPER SELECT (red/green)
The front tractor arrow goes on when the front tractor is selected. The rear tractor arrow goes on when the rear tractor is selected. The light is green when paper is loaded, even if the paper is in the standby position, and red when the tractor is completely out of paper.
Operating the Control Panel

Buttons
The control panel buttons let you perform printer operations quickly and easily. Below is an illustration of the control panel buttons and a description of their functions.

<table>
<thead>
<tr>
<th>POWER</th>
<th>ON LINE</th>
<th>FORM FEED/COPY</th>
<th>LINE FEED LOAD</th>
<th>TEAR OFF</th>
<th>MICRO FEED</th>
<th>TOP OF FORM</th>
<th>PAPER SELECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>READY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAPER OUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ON LINE
This button controls the printer’s on line status. Press this button to put the printer on line or take it off line. When the printer is on line, the ON LINE light is on and the printer can receive and print data from the computer.

When the printer is in top of form mode, you can press the ON LINE button to exit the mode without setting a new top of form position. You can also press the ON LINE button to exit tear-off mode. See the sections on adjusting the top of form position and using short tear-off in this chapter.

FORM FEED/COPY
When the printer is off line, press this button to advance the paper to the top of the next page. To adjust the position the paper is fed to, see the section on adjusting the top of form position in this chapter. When the printer is on line, press this button to select or cancel copy mode. See the section on printing on special paper in Chapter 2 for more information.
LINE FEED/LOAD
When the printer is off line, you use this button to load paper or to advance the paper after you load it. To advance the paper one line, press this button once. To advance the paper continuously, hold down the button.

TEAR OFF
The TEAR OFF button feeds the paper to the printer’s tear-off edge so you can tear off your document without losing the paper, normally lost between printing jobs. To use this feature, take the printer off line after your document finishes printing and press the TEAR OFF button. The printer feeds the paper to the printer’s tear-off edge. After you tear off the document, press the TEAR OFF or ON LINE button to feed the paper back to the top of form position.

If the perforation of your paper does not align exactly with the printer’s tear-off edge, you can use the MICRO FEED buttons to adjust the tear-off position. See the section on using short tear-off in this chapter.

WARNING
Never use the TEAR OFF button with labels. Press the FORM FEED or LINE FEED button instead to feed the printed labels to a point where you can tear them off.

MICRO FEED
When the printer is off line, the two MICRO FEED buttons advance or reverse the loaded paper in 1/216th-inch increments. You can use these buttons to adjust the paper memory, top of form, loading, printing, and tear-off positions. For more information, see the sections on using the paper memory and short tear-off features and adjusting the top of form and printing positions in this chapter.

TOP OF FORM
When the printer is off line, press this button to enter or exit top of form mode. You can also use this button to enter paper memory settings. For more information, see the sections on adjusting the top of form position and using the paper memory feature in this chapter.
Operating the Control Panel

FRONT/REAR
When the printer is off line, press this button to select the front or rear tractor. If you have been using paper loaded on one tractor, first remove the printed output before switching to the other tractor. When you switch tractors, the printer feeds the paper that is already loaded backward to the standby position and loads paper on the newly selected tractor.

![WARNING: Never use the FRONT/REAR button when labels are loaded in the printer. Also, be sure to remove any printed documents before switching tractors. Never feed more than one page backward through the printer.]

Other control panel features
The control panel also gives you access to several special functions.

Self test: You can run the self test to check whether your printer operates properly. The self test prints the current DIP switch settings and the characters in the printer’s ROM (Read Only Memory). Your printer offers both draft and NLQ self tests. To start the self test, hold down the LINE FEED or FORM FEED button and turn on the printer. See the section on running the self test in Chapter 1 for more information.

Data dump: To enter data dump mode, hold down the LINE FEED and FORM FEED buttons and turn on the printer. This feature prints the codes that are sent to the printer so that advanced users can determine the cause of communication problems between the computer and printer. See the section on data dump mode in this chapter for more information.
Setting the DIP Switches

The DFX-8000 has three sets of DIP (Dual Inline Package) switches located under a small cover below the front tractor. By changing the settings of these switches, you can control various printer features, such as the character set, the page length, and the printing speed. The DIP switch tables starting on page 3-11 describe the functions of the DIP switches.

Because the factory (default) settings are designed to accommodate the needs of most users, you probably won’t change DIP switch settings very often. When you do need to set a DIP switch, follow the steps below. Be sure to turn off the printer before you start and turn it on again when you are done. New DIP switch settings take effect only after you turn on or reset the printer.

Changing a DIP switch setting

To change a DIP switch setting, follow these steps:

1. Turn off the printer.
Setting the **DIP Switches**

2. Open the front cover. If there is paper loaded on the front tractor, remove it.

3. Open the DIP switch cover as shown below.
4. Use a pointed instrument, such as the tip of a pen or pencil; to turn a switch on or off, a DIP switch is on when it is up, and off when it is down.

**CAUTION:** Always make sure the printer is turned off before you change the DIP switch settings.

5. Close the DIP switch cover.
6. Replace the paper and close the front cover.

The new DIP switch settings take effect when you turn on the printer.

**The DIP switch tables**

The tables on the next page describe the functions of the DIP switches. The shaded boxes show the default or factory settings. See the page numbers listed on the right for more information about each feature.
### DIP Switch 1

<table>
<thead>
<tr>
<th>SW</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Condensed mode on/off</td>
<td>Condensed</td>
<td></td>
<td>3-46</td>
</tr>
<tr>
<td>1-2</td>
<td>Slashed zero on/off</td>
<td>Slashed</td>
<td></td>
<td>3-14</td>
</tr>
<tr>
<td>1-3</td>
<td>Character table*</td>
<td>Graphics</td>
<td>Italics</td>
<td>3-49</td>
</tr>
<tr>
<td></td>
<td>(in Epson ESC/P mode)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Printer mode**</td>
<td>IBM emulation</td>
<td></td>
<td>3-14</td>
</tr>
<tr>
<td>1-5</td>
<td>NLQ or draft mode</td>
<td>NLQ</td>
<td></td>
<td>3-43</td>
</tr>
<tr>
<td>1-6</td>
<td>International character set</td>
<td>See the international character set table on the next page.</td>
<td>3-47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(available only in Epson ESC/P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>mode)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DIP Switch 2

<table>
<thead>
<tr>
<th>SW</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Default character set (in Epson ESC/P mode)</td>
<td>User-defined</td>
<td></td>
<td>3-14</td>
</tr>
<tr>
<td>2-2</td>
<td>Draft printing speed</td>
<td>Normal</td>
<td></td>
<td>3-14</td>
</tr>
<tr>
<td>2-3</td>
<td>Bit length for serial interface</td>
<td>7 bits</td>
<td></td>
<td>3-15</td>
</tr>
<tr>
<td>2-4</td>
<td>Auto line feed</td>
<td>ON</td>
<td></td>
<td>3-15</td>
</tr>
<tr>
<td>2-5</td>
<td>Interface type/parity</td>
<td>See table on page 3-13.</td>
<td>3-15</td>
<td></td>
</tr>
<tr>
<td>2-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>Baud rate</td>
<td>See table on page 3-13.</td>
<td>3-16</td>
<td></td>
</tr>
</tbody>
</table>

* The default setting for DIP switch 1-3 varies depending on the country.

** When DIP switch 1-4 is on and the printer is in IBM emulation mode, the functions of DIP switches 1-3, 1-6, 1-7, 1-8 and 2-1 differ from those listed in this table. See the table on page 3-13 for their functions in IBM emulation mode.
Setting the DIP Switches

DIP Switch 3

<table>
<thead>
<tr>
<th>SW</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Input buffer</td>
<td>Invalid</td>
<td></td>
<td>3-16</td>
</tr>
<tr>
<td>3-2</td>
<td>Page length</td>
<td>12 inches</td>
<td>11 inches</td>
<td>3-17</td>
</tr>
<tr>
<td>3-3</td>
<td>l-inch skip over perforation</td>
<td>ON</td>
<td></td>
<td>3-18</td>
</tr>
<tr>
<td>3-4</td>
<td>Paper memory</td>
<td>Memory 2</td>
<td></td>
<td>3-20</td>
</tr>
<tr>
<td>3-5</td>
<td>Overlapping multi-part forms</td>
<td>Valid</td>
<td></td>
<td>3-20</td>
</tr>
<tr>
<td>3-6</td>
<td>Multi-part forms with labels</td>
<td>Valid</td>
<td></td>
<td>3-20</td>
</tr>
<tr>
<td>3-7</td>
<td>Skip over binding</td>
<td>ON</td>
<td></td>
<td>3-16</td>
</tr>
<tr>
<td>3-8</td>
<td>Handshaking protocol</td>
<td>X-on/X-off</td>
<td></td>
<td>3-15</td>
</tr>
</tbody>
</table>

- The default setting for DIP switch 3-2 varies depending on the country.

International character set

<table>
<thead>
<tr>
<th>Country</th>
<th>SW 1-8*</th>
<th>SW 1-7*</th>
<th>SW 1-8*</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>France</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Germany</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Denmark</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Sweden</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Italy</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Spain</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

* The default settings for these DIP switches vary depending on the country.
Setting the DIP Switches

Interface/Parity selection

<table>
<thead>
<tr>
<th>Interface/Parity</th>
<th>SW 2-5</th>
<th>SW 2-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial/odd</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Serial/even</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial/none</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

Baud rate selection

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>SW 2-7</th>
<th>SW 2-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600 bps</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>1200 bps</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>300 bps</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

When you select IBM emulation mode by turning on DIP switch 1-4, DIP switches 1-3, 1-6, 1-7, 1-8, and 2-1 function differently than they do in Epson ESC/P mode. The tables below show the functions of these switches in IBM emulation mode.

DIP switch functions in IBM emulation mode

<table>
<thead>
<tr>
<th>SW</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Automatic <em>carriage</em> return</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>1-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td>Default character table</td>
<td></td>
<td>See table below.</td>
</tr>
<tr>
<td>1-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>FF command at the top of form position</td>
<td>Invalid</td>
<td>Valid</td>
</tr>
</tbody>
</table>

IBM emulation mode character tables

<table>
<thead>
<tr>
<th>Default character table</th>
<th>SW 1-6</th>
<th>SW 1-7</th>
<th>SW 1-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 2*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Table 2 is selected when any one of these switches is turned off.

* The Appendix shows the characters included in each character table.
Setting the DIP Switches

The DIP switch functions
This section describes the different features you can control with the printer’s DIP switches.

Slashed zero
When DIP switch 1-2 is on, the printer prints slashed zeros (0). When the DIP switch is off, the printer prints open zeros (0). This feature is useful for clearly distinguishing between uppercase 0 and zero when printing documents such as program lists.

Printer mode
When DIP switch 1-4 is on, the printer operates in IBM emulation mode. When the DIP switch is off, the printer operates in Epson ESC/P mode. The functions of DIP switches 1-3, 1-6, 1-7, 1-8, and 2-1 in IBM emulation mode differ from their functions in Epson ESC/P mode. The tables on the previous page describe the special functions of these DIP switches in IBM emulation mode.

Default character set
When DIP switch 2-1 is on, the user-defined character set is the default. User-defined characters are maintained in the printer’s memory even when the power is turned off, so you can select the user-defined character set simply by turning on this DIP switch. However, when the switch is on, you cannot define new user-defined characters. The setting of this DIP switch takes effect only if DIP switch 1-4 is set for Epson ESC/P mode. See Chapter 4 for more information on user-defined characters.

Draft printing speed
When DIP switch 2-2 is off, high-speed draft mode is selected. When the switch is on, normal draft mode is selected. This switch only affects the printer if DIP switch 1-5 is set for draft mode (turned off) or if draft mode is selected through your software. In high-speed draft mode, the DFX-8000 can print up to 1066 characters per second at 10 cpi (characters per inch). In normal...
draft mode, the DFX-8000 prints up to 800 characters per second at 10 cpi. Normal draft mode produces characters that are more fully formed than characters produced in high-speed draft mode.

Note: High-speed draft mode is available only for 10 cpi printing. Also, underlining and double-wide are the only print enhancements that work in high-speed draft mode. If you use a feature such as *emphasized*, `double-strike`, or italics in **high-speed** draft mode, the printer temporarily slows to the normal draft speed until the feature is turned off. This allows you to use any print enhancement without cancelling **high-speed draft mode**.

**Bit length for serial interface**

When DIP switch 2-3 is on, the bit length for the serial interface is set to 7 bits. When the DIP switch is off, the bit length is set to 8 bits.

**Auto line feed**

*When DIP, switch 2-4 is on, the printer adds a line feed (LF) command to every carriage return (CR) code sent by the application program.* When the switch is off, line feeds occur only *when the* software sends line feed commands to the printer. Since most computers and application programs automatically add line feeds to carriage returns, you should use this feature only if your text is printing all on one line.

**Interface parity**

If your computer is set up for serial communication, you need to change DIP switches 2-5 and 2-6 so that your printer and computer can communicate properly. These DIP switches control the interface type and parity. (You may also need to select a different baud rate as described in the next section.)

The table on page 3-13 shows the DIP switch settings for a parallel interface and a **serial** interface with odd, even, or no parity. If you
Setting the DIP Switches

don’t know what type of interface your computer requires, check your computer manual. A&o check your computer manual to make sure your computer and printer have the same parity settings.

Baud rate

If your computer is set up for serial communication, you may need to set the baud rate in addition to selecting serial interface and setting the parity. The baud rate is the rate at which the printer receives data from the computer.

DIP switches 2-7 and 2-8 control the baud rate. The table on page 3-13 shows the DIP switch settings for the printer's four baud rate settings. Check your computer or application program manual for the correct baud rate setting. Your computer and printer should always be set to the same baud rate.

Input buffer

The printer’s input buffer provides additional memory to free up the computer while you print large amounts of text or graphics. The input buffer is enabled when DIP switch 3-1 is off. To disable the buffer, turn on DIP switch 3-1.

Skip over binding

When DIP switch 3-7 is on, the print head avoids the binding area along the right and left edges of multi-part forms during paper feeding. Using this feature helps avoid paper jams when you use multi-part forms.

Handshaking protocol

If your computer is set up for serial communication, you may need to select the handshaking protocol.

When DIP switch 3-8 is on, the printer uses X-on/X-off handshaking protocol. When the switch is off, the printer uses DTR (Data Terminal Ready) handshaking protocol.
Page Length

When DIP switch 3-2 is off, the page length is set to **11 inches** (27.94 cm). When the DIP switch is on, the page length is 12 inches (30.48 cm). Be sure to set the page length to match the paper you plan to use.

Other page lengths can be set with the ESC C and ESC CO commands. See the Command Summary in Chapter 9.
Skip Over Perforation

When DIP switch 3-3 is on, the printer inserts a one-inch margin between the last line printed on one page and the first line printed on the next page. You can change the margin size with the ESC N command. See the Command Summary in Chapter 9.

By adjusting your loading position, you can get half the margin at the bottom of one page and half at the top of the next page, as shown here:

skip over perforation off (DIP switch 3-3 off)

```
0123456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
123456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
23456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
3456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
56789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
6789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
89:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
9:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

skip over perforation on (DIP switch 3-3 on)

```
0123456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
123456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
23456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
3456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
456789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
56789:;<>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
```
Note: Because most application programs insert their own top and bottom margins, you should use the skip over perforation feature only if your program does not provide them.
Using the Paper Memory Feature

When you use multi-part forms that vary in thickness, use the paper memory feature so that the printer can compensate for the variations to produce high quality printing. Multi-part forms that vary in thickness include forms that have labels on them and forms that overlap slightly where they are glued together. Examples of these forms are shown below.

![Overlapping multi-part forms](image1)

![Multi-part forms with labels](image2)

You can save paper format and thickness information for up to two multi-part forms on the printer’s paper memory areas. When you tell the printer it is using a certain form, the printer automatically adjusts the gap between the print head and the platen to provide maximum printing quality on that particular form. The paper memory feature is available only for forms loaded on the front tractor.
WARNING: When you use multi-part forms that vary in thickness, do not press the TEAR OFF, FRONT/REAR, or reverse-feeding (bottom) MICRO FEED button or a paper jam may result. To remove these forms, tear off the fresh supply at a perforation below the front tractor, take the printer off line, and press the FORM FEED or LINE FEED button to eject the remaining forms.

Note: To use the paper memory feature, you need to reset some DIP switches. See the section on changing a DIP switch setting in this chapter for instructions on how to set a DIP switch.

Saving paper format and thickness information

The following sections describe how to save paper format and thickness information for different types of multi-part forms.

Saving information for overlapping multi-part forms

To save paper format and thickness information for multi-part forms that overlap slightly where they are joined together, follow the steps below.

1. Turn off the printer.

2. Use DIP switch 3-4 to select the memory area where you want the printer to store the paper format and thickness information. Memory area 1 is selected when DIP switch 3-4 is off. (This is the printer’s default setting.) To select memory area 2, turn on the switch.

<table>
<thead>
<tr>
<th>Paper memory</th>
<th>DIP SW 3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory 1</td>
<td>OFF</td>
</tr>
<tr>
<td>Memory 2</td>
<td>ON</td>
</tr>
</tbody>
</table>
Using the Paper Memory Feature

Note: Be sure to remember or write down the memory area you use for each form.

3. Use DIP switch 3-2 to set the page length. If you plan to use forms of a different page length, use software commands to set the page length after you finish saving the overlapping form information.

<table>
<thead>
<tr>
<th>Page length</th>
<th>DIP SW 3-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 inches</td>
<td>OFF</td>
</tr>
<tr>
<td>12 inches</td>
<td>ON</td>
</tr>
</tbody>
</table>

4. Turn on DIP switch 3-5 and turn off DIP switch 3-6. This tells the printer you want to save information for multi-part forms that overlap slightly where they are joined together.

<table>
<thead>
<tr>
<th>Overlapping multi-part forms</th>
<th>DIP SW 3-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multi-part forms with labels</th>
<th>DIP SW 3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>ON</td>
</tr>
</tbody>
</table>

Note: Whenever DIP switch 3-5 is on, the skip over perforation feature is valid, regardless of DIP switch 3-3's setting.
5. Hold down both MICRO FEED buttons and turn on the printer. The printer saves the overlapping form information in the memory area you selected. When the information is saved, the printer beeps and goes off line.

You can print on these forms even if you turn the printer off and then back on. To use other types of paper, see the section on loading paper format information from memory later in this chapter.

**CAUTION:** When you print on these forms, make sure that the printing fits within the printable area and the top of form position is set properly. The printable area is shown in Chapter 8.
Using the Paper Memory Feature

Saving information for multi-part forms with labels

To save paper format and thickness information for multi-part forms with labels on them, follow the steps below.

1. Load the forms with labels onto the front tractor. (See the section on loading paper onto the front tractor in Chapter 2.)

2. Turn off the printer. Be sure to close the top cover.

3. Use DIP switch 3-4 to select the memory area where you want the printer to store the paper format and thickness information. Memory area 1 is selected when DIP switch 3-4 is off. (This is the printer’s default setting.) To select memory area 2, turn on the switch.

<table>
<thead>
<tr>
<th>Paper memory</th>
<th>DIP SW 3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory 1</td>
<td>OFF</td>
</tr>
<tr>
<td>Memory 2</td>
<td>ON</td>
</tr>
</tbody>
</table>

4. Use DIP switch 3-2 to set the page length. If you plan to use forms of a different page length, use software commands to set the page length after you finish saving the form’s information.

<table>
<thead>
<tr>
<th>Page length</th>
<th>DIP SW 3-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 inches</td>
<td>OFF</td>
</tr>
<tr>
<td>12 inches</td>
<td>ON</td>
</tr>
</tbody>
</table>

5. Turn off DIP switch 3-5 and turn on DIP switch 3-6. This tells the printer you want to save information for multi-part forms with labels on them.

<table>
<thead>
<tr>
<th>Overlapping multi-part forms</th>
<th>DIP SW 3-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multi-part forms with labels</th>
<th>DIP SW 3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid</td>
<td>OFF</td>
</tr>
</tbody>
</table>
6. Hold down both **MICRO FEED** buttons and turn on the printer. The printer beeps. Press the **LINE FEED/LOAD** button to load the forms. The printer loads and checks the forms. When the check is finished, the printer beeps continuously until you open the top cover in **the** next step.

![Image](image-url)

**CAUTION:** Do not go on to the next step before **the** printer beeps to tell you the check is finished.

7. Open the top cover.
Using the Paper Memory Feature

**CAUTION:** Complete all the following steps before attempting any other operations, such as adjusting the top of form position.

8. Use the **MICRO FEED** buttons to adjust your paper’s position so that the top edge of the label is aligned with the horizontal red line on the clear plastic ribbon mask.

9. Move the print head by hand to align the vertical red line on the ribbon mask with the left edge of the label. Now the intersection of the red lines on the ribbon mask should be in the upper left corner of the label.
10. Press the **TOP OF FORM** button. The printer beeps once.

11. Use the **MICRO FEED** buttons to adjust your paper’s **position** so that the bottom edge of the label is aligned with the horizontal red line on the ribbon mask.
12. Move the print head by hand to align the vertical red line on the ribbon mask with the right edge of the label. Now the intersection of the red lines on the ribbon mask should be in the lower right corner of the label.

13. Press the TOP OF FORM button. The printer beeps twice. This tells the printer the label's location on the form.

Note: If the label’s location is still not correct, repeat the above procedure from step 8 on page 3-26. Be sure that you set both the upper left and lower right corners of the label when performing this procedure.
14. Close the top cover. The printer checks your paper’s thickness at various points and saves this information. (This takes the printer a certain amount of time to complete.) When it is done, the printer beeps and advances the form one page. The printer then goes off line.

Notes:
- If you close the top cover before setting the label’s location, the printer beeps several times to let you know an error has occurred.
- In step 14, the printer advances the form one page, according to the setting of DIP switch 3-2. If your form has a different page length, set the correct page length with software commands and adjust the top of form position accordingly.

You can print on these forms even if you turn the printer off and then back on. To use other types of paper, see the section on loading paper format information from memory later in this chapter.

**CAUTION:** When you print on these forms, make sure that the printing fits within the printable area. The printable area is shown in Chapter 8.


**Using the Paper Memory Feature**

**Saving information for overlapping multi-part forms with labels**

To save paper format and thickness information for multi-part forms that overlap slightly and have labels on them, follow the steps below.

1. Load the overlapping multi-part forms with labels onto the front tractor. (See the section on loading paper onto the front tractor in Chapter 2.)

2. Turn off the printer.

3. Use DIP switch 3-4 to select the memory area where you want the printer to store the paper format and thickness information. Memory area 1 is selected when DIP switch 3-4 is off. (This is the printer’s default setting.) To select memory area 2, turn on the switch.

4. Use DIP switch 3-2 to set the page length. The page length is 11 inches when DIP switch 3-2 is off and 12 inches when the switch is on. If you plan to use forms of a different page length, use software commands to set the page length after you finish saving the form’s information.

5. Turn on DIP switches 3-5 and 3-6. This tells the printer you want to save information for multi-part forms that overlap slightly and have labels on them.

<table>
<thead>
<tr>
<th>Overlapping multi-part forms</th>
<th>DIP SW 3-5</th>
<th>Multi-part forms with labels</th>
<th>DIP SW 3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid</td>
<td>OFF</td>
<td>Invalid</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Note: Whenever DIP switch 3-5 is on, the skip over perforation feature is valid, regardless of DIP switch 3-3’s setting.

6. Follow steps 6 through 14 on pages 3-25 through 3-29.
Loading paper format information **from memory**

After you save the information for your multi-part forms, you can load the forms you want to use, select the paper memory feature, and start printing. When you select the paper memory feature, the printer loads your form’s information from its memory. To select the paper memory feature, follow the steps below.

1. Load the multi-part forms you want to use onto the front tractor.

2. Turn off the printer.

3. Now load the paper format and thickness information for the multi-part forms you want to use.

   To load the information from memory area 1, hold down the top MICRO FEED button and turn on the printer.
Using the Paper Memory Feature

To load the information from memory area 2, hold down the bottom MICRO FEED button and turn on the printer.

Note: After you load the information, the printer uses this information as the default setting when you turn on the printer. To use regular continuous paper after using multi-part forms that vary in thickness, hold down the FRONT/REAR button and turn on the printer.

CAUTION: While the paper memory feature is selected and your multi-part form’s format and thickness information is loaded, do not use other types of paper.
Adjusting the Top of Form Position

The top of form position is the position the printer feeds the paper to when it loads the paper or performs a form feed. This position is important because it determines where the printing begins on each page.

If the printing is too high or low on the page, you can reset the top of form position by following the steps below. The printer remembers the new top of form position even after the printer is turned off, reset, or initialized. (The printer remembers separate top of form positions for the front and rear tractors.)

To temporarily change the top of form position, you can adjust the position when the printer is not in top of form mode or you change the printing position in the middle of a page as described in the next section. The printer remembers the temporary top of form position until the next time you load paper or switch tractors.

You can set the top of form position, from 0.1 inches (2.6 mm) to 22 inches (558.8 mm) below the top edge of paper. The factory setting is the 0.2 inches (5.8 mm) position below the top edge of paper.

**WARNING:** When labels are loaded in the printer, do not enter top of form mode as described in this section. To adjust the top of form position when you are using labels, use only the forward-feeding (top) MICRO FEED button. Labels must never be fed backward through the printer. See the section on adjusting the printing position in this chapter.

**CAUTION:** While using the paper memory feature to save the format information about your multi-part forms, do not try to adjust the top of form position.
Adjusting the Top of Form Position

1. Make sure that the printer is tuned on and that it is off line. Also be sure the desired tractor is selected (the corresponding tractor arrow should be lit).

2. Press the TOP OF FORM button to enter top of form mode. The printer beeps, the TOP OF FORM light goes on, and the printer advances the paper slightly.

CAUTION: Whenever you press the TOP OF FORM button and the TOP OF FORM light goes on, the printer sets a new top of form position. If you press the TOP OF FORM button by mistake, you can press the ON LINE button to cancel the new setting and exit top of form mode,
3. Open the top cover.

4. On the clear plastic ribbon mask, there is a red line that shows you where the printer will print the bottom edge of your first line of text. This position is based on the first printable line of text. If your software inserts a top margin of five lines, your text will actually be printed five lines below the top of form position. Using the red line as a reference, press the MICRO FEED buttons to feed the paper to the desired top of form position. Press the top or bottom MICRO RED button once to feed the paper forward or backward 1/216th of an inch, or hold down the button to move the paper continuously.

Note: The red line on the ribbon mask shows you where the printer will print your first line of text only when the printer is in top of form mode.
Adjusting the Top of Form Position

5. To exit top of form mode and save your new top of form position, press the **TOP OF FORM** button again. The printer beeps, the **TOP OF FORM** light goes off, and the printer feeds the paper backward to the printing position. (If you want to exit top of form mode without saving your new top of form setting, press the **ON LINE** button instead of the **TOP OF FORM** button.) Close the top cover.

6. Press the **ON LINE** button to put the printer on line.

**Note:** If you enter top of form mode right after loading paper, the **TOP OF FORM** light blinks. While the **TOP OF FORM** light is blinking you can set the loading and top of form positions at the same time.
Adjusting the Printing Position

If you need to adjust the printing position in the middle of a page or document or adjust the top of form position when using labels, follow the steps below.

When you move the printing position, you temporarily change the top of form position by the same amount. For example, if you adjust the printing in the middle of a page so that it falls a half-inch lower, the next page also begins a half-inch lower. The printer remembers this temporary top of form position until the next time you switch tractors or load paper.

1. Press the **ON LINE** button to take the printer off line.
Adjusting the Printing Position

2. Open the top cover.

3. Press the top or bottom **MICRO FEED** button once to feed the paper forward or backward 1/216th of an inch, or hold down the button to move the paper continuously.

WARNING: If you are using labels, use only the forward-feeding (top) **MICRO FEED** button.
4. When you are finished, close the top cover and press the **ON LINE** button to put the printer on line.
Using Short Tear-Off

When you are finished printing, you can use the short tear-off feature to feed the perforation of your paper to the printer’s tear-off edge. Then you can easily tear off the last printed sheet. When you resume printing, the printer feeds the paper backward to the top of form position. This saves the paper normally lost between documents. The steps below describe how to use the short tear-off feature.

The following steps also show you how to adjust the position of the perforation so that it meets the printer’s tear-off edge if you need to. If you set a new tear-off position, the printer remembers the new setting even after the printer is turned off, reset, or initialized. (The printer remembers separate tear-off positions for front and rear tractors.)

![Diagram of printer](image)

WARNING: Never use the TEAR OFF button with labels, or when the optional pull tractor is installed.

1. Make sure that the printer is turned on and that it is off line. Also be sure the desired tractor is selected (the corresponding tractor arrow should be lit).

2. Open the paper separator cover (the flap on the top part of the printer’s top cover). This exposes the printer’s tear-off edge.
3. Press the TEAR OFF button to enter tear-off mode. The TEAR OFF light goes on and the printer feeds the paper’s perforation to the printer’s tear-off edge.

4. If you need to adjust the position of the perforation so that it meets the printer’s tear-off edge, use the MICRO FEED buttons. You can press the top or bottom MICRO FEED button once to feed the paper forward or backward $\frac{1}{216}$th of an inch, or hold down the button to feed the paper continuously.

**Note:** You can reset the tear-off position only when you are in tear-off mode (after you have pressed the TEAR OFF button once and the TEAR OFF light is on).
5. Tear off the page using the **tear-off edge** on the printer’s top cover.

6. Press the **TEAR OFF** button to feed the paper back to the top of form position. Then press the **ON LINE** button to put the printer on line so it is ready to print. (Or instead, just press the **ON LINE** button to feed the **paper** back and put your printer on line **at the same time.**)

**WARNING:** Always tear off the printed document before you feed the paper back to the top of form position. Never feed paper backward more than one page.
Selecting Typestyles

You can produce a wide range of typestyles by combining different character fonts, widths, and other enhancements. You can select typestyles using the DIP switches or software commands. For information on the available features, see the section on enhancing your printing in Chapter 4.

Character fonts

The DFX-8000’s draft font produces lower-resolution characters with fewer dots per character for high-speed printing. It is ideal for rough drafts and editing work. To select the draft font, turn off DIP switch 1-5. The DFX-8000 can print the draft font at two speeds. The draft font printing speed is high when DIP switch 2-2 is off and normal when the switch is on.

NLQ mode produces high quality text characters at a slower printing speed. The DFX-8000 offers two NLQ fonts, Roman and Sans Serif. To select NLQ mode, turn on DIP switch 1-5 In Epson ESC/P mode (which is selected when DIP switch 1-4 is off), Roman is the default font selected when DIP switch 1-5 is on. You can select Sans Serif with the software command ESC k. (In IBM emulation mode, Sans Serif is the default font selected when DIP switch 1-5 is on.)

The following samples show the characters for each font.

**high-speed draft**

"%$%/(.
!0123456789:;<=?ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abcdefghijklmnopqrstuvwxyz`{|}~

We've just seen your excellent ad for miniature zebras in a recent back issue of Trader's Times. What is the price schedule for quantities over one gross?
We've just seen your excellent ad for miniature zebras in a recent back issue of *Trader's Times*. What is the price schedule for quantities over one gross?

---

3-44 Using the Printer
Character spacing

In normal draft and NLQ mode, you can select proportional spacing or a character spacing: of 10 or 12 characters per inch (cpi) with software commands. In high-speed draft mode, only 10 cpi printing is available. (Ten cpi is the printer’s default character spacing.)

In the 10 and 12 cpi modes, each character gets an equal amount of space. In proportional mode, the spacing varies from character to character. A narrow letter like the lowercase i receives less space than the uppercase W.

The printout below compares the different types of spacing:

10 cpi

This is 10 CPI printing.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

12 cpi

This is 12 CPI printing.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

proportional spacing

This is proportional printing.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
Selecting **Typestyles**

**Condensed mode**

Condensed mode reduces the size of characters to approximately 60% of their normal width, in condensed mode more characters fit on a line, which is useful for **spreadsheets and** other applications where you need to print the maximum amount of information on a page. Both 10 and 12 cpi **printing** can be condensed, but proportional printing cannot. To select condensed mode, turn on DIP switch 1-1.

The printout below compares normal 10 and 12 cpi printing with condensed 10 and 12 cpi printing.

This is 10 cpi printing.
This is **condensed** 10 cpi printing.
This is 12 cpi printing.
This is **condensed** 12 cpi printing.
Selecting an International Character Set

International character sets provide you with the characters and symbols used in other languages. In Epson ESC/P mode (which is selected when DIP switch 1-4 is off), you can select one of eight international character sets by setting DIP switches 1-6, 1-7, and 1-8 according to the table below. The table also shows the characters that differ in each international character set.

<table>
<thead>
<tr>
<th>Country</th>
<th>23</th>
<th>24</th>
<th>40</th>
<th>5B</th>
<th>5C</th>
<th>SD</th>
<th>5E</th>
<th>60</th>
<th>7B</th>
<th>7C</th>
<th>7D</th>
<th>7E</th>
<th>DIP SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A.</td>
<td>#</td>
<td>$</td>
<td>@</td>
<td>[</td>
<td>\</td>
<td>]</td>
<td>^</td>
<td>~</td>
<td>{</td>
<td>!</td>
<td>}</td>
<td>~</td>
<td>ON</td>
</tr>
<tr>
<td>France</td>
<td>#</td>
<td>$</td>
<td>à</td>
<td>°</td>
<td>ç</td>
<td>$</td>
<td>^</td>
<td>~</td>
<td>6</td>
<td>ù</td>
<td>6</td>
<td>~</td>
<td>ON</td>
</tr>
<tr>
<td>Germany</td>
<td>#</td>
<td>$</td>
<td>A</td>
<td>Ø</td>
<td>Ü</td>
<td>^</td>
<td>~</td>
<td>ä</td>
<td>ö</td>
<td>ü</td>
<td>ß</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>£</td>
<td>$</td>
<td>@</td>
<td>[</td>
<td>\</td>
<td>]</td>
<td>^</td>
<td>~</td>
<td>{</td>
<td>!</td>
<td>}</td>
<td>~</td>
<td>ON</td>
</tr>
<tr>
<td>Denmark I</td>
<td>#</td>
<td>$</td>
<td>Â</td>
<td>Ø</td>
<td>A</td>
<td>^</td>
<td>~</td>
<td>ø</td>
<td>ø</td>
<td>A</td>
<td>~</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>#</td>
<td>$</td>
<td>A</td>
<td>Ø</td>
<td>A</td>
<td>Ü</td>
<td>é</td>
<td>à</td>
<td>ö</td>
<td>ä</td>
<td>ü</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>#</td>
<td>$</td>
<td>@</td>
<td>*</td>
<td>\</td>
<td>é</td>
<td>^</td>
<td>ù</td>
<td>à</td>
<td>ò</td>
<td>ì</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Spain I</td>
<td>Pt</td>
<td>$</td>
<td>@</td>
<td>i</td>
<td>ñ</td>
<td>^</td>
<td>~</td>
<td>&quot;</td>
<td>&quot;</td>
<td>ñ</td>
<td>}</td>
<td>~</td>
<td>OFF</td>
</tr>
</tbody>
</table>

CAUTION: Always be sure to turn off the printer before you change a DIP switch setting. After you set the DIP switches, turn on the printer to initialize the new settings.
In addition to the eight character sets, you can select with DIP switches, you can select the five international character sets shown below using the ESC R software command. See the Command Summary in Chapter 9 for more information.

<table>
<thead>
<tr>
<th>Country</th>
<th>ASCII code (hex)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23 24 40 5B 5C 5D 5E 60 7B 7C 7D 7E</td>
</tr>
<tr>
<td>5 Japan</td>
<td># $ @ [ ] ^ ` { ] } ~</td>
</tr>
<tr>
<td>9 Norway</td>
<td># ö E Æ Ø A Ü é æ ø å ù</td>
</tr>
<tr>
<td>10 Denmark II</td>
<td># $ ö E Æ Ø A Ü é æ ø å ù</td>
</tr>
<tr>
<td>11 Spain II</td>
<td># $ á i Ñ ç ó ` í ñ ó í ó ü</td>
</tr>
<tr>
<td>12 Latin America</td>
<td># $ á i Ñ ç ó ` í ñ ó í ó ü</td>
</tr>
</tbody>
</table>

Two character sets are available in IBM emulation mode (which is selected when DIP switch 1-4 is on). The Appendix shows these character sets. To select the character set with international characters (character set 2), turn off DIP switch 1-6, 1-7, or 1-8. Character set 1 is selected when all three of these switches are on.
Choosing a Character Table

In Epson ESC/P mode (which is selected when DIP switch 1-4 is off), you can turn off DIP switch 1-3 to select the italics character table or turn on the switch to select the Epson Extended Graphics character table. The Epson Extended Graphics character table contains international accented characters, Greek characters, mathematical symbols, and graphics characters for printing lines, comers, and shaded areas.

If you have an IBM or IBM compatible computer, select the Epson Extended Graphics table to print graphics characters as they appear on the screen. Since the character table setting affects only half the character set, you can still print text when the Epson Extended Graphics table is selected. Also, with the proper software commands you can print italics or graphics characters no matter which character table you select. (See the Command Summary in Chapter 9.)

Although most software programs work better with the graphics table, some programs require the italics table. Try switching tables if you have trouble printing lines and other graphics characters or if the printer does not print italics. Keep in mind, however, that your software may not have the capability to select graphics or italics. See Chapter 4 for information on how to enhance your printing using software commands.

Sample italics and Epson Extended Graphics characters are shown below.

itals

àèùòîïæß&+0"#$%&'()*+,-./0123456789:;<=?>@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~0
Choosing a Character Table

Epson Extended Graphics

The Appendix provides the complete italics and Epson Extended Graphics character tables.

⚠️ CAUTION: Always be sure to turn off the printer before you change a DIP switch setting. After you set the DIP switches, turn on the printer to initialize the new settings.

Notes:
- The ESC 6 command tells the printer to print hex codes 80 to 9F and FF as characters—and the ESC 7 command tells the printer to use these hex codes as control codes. See the Command Summary in Chapter 9.
- In IBM emulation mode (which is selected when DIP switch 1-4 is on), DIP switch 1-3 is used to select or cancel the auto line feed feature. For information on using IBM emulation mode, see the Appendix.
Data Dump Mode

Data dump mode is a special feature that allows experienced users to find the cause of communication problems between the printer and application programs. In data dump mode, an exact printout of the codes reaching the printer is produced.

To use data dump mode, follow these steps:

1. Make sure that paper is loaded. (You can use the built-in tractor units or the optional pull tractor for printing in data dump mode.) If the printer is on, turn it off.

2. To enter data dump mode, hold down the FORM FEED and LINE FEED buttons and turn on the printer.
Data Dump Mode

3. Next, run either an application program or a program you have written in any programming language. Your printer prints all the codes it receives in hexadecimal format, as shown below.

Data Dump Mode

<table>
<thead>
<tr>
<th>0000</th>
<th>1B 40 1B 52 00 1B 74 01 1B 36 12 1B 50 20 20 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>20 20 54 68 69 73 20 69 73 20 61 6E 20 65 78 61</td>
</tr>
<tr>
<td>0002</td>
<td>6D 70 6C 6F 6F 20 61 20 64 61 74 61 20 64 61</td>
</tr>
<tr>
<td>0003</td>
<td>75 6D 70 20 70 09 65 74 6F 76 20 54 66 65 73 20</td>
</tr>
<tr>
<td>0004</td>
<td>69 73 20 66 66 61 74 76 20 6D 61 6B 65 73 20</td>
</tr>
<tr>
<td>0005</td>
<td>69 73 20 65 61 73 79 20 60 6F 72 20 6D 61 6B 65 73 20</td>
</tr>
</tbody>
</table>

4. To turn off data dump mode, press the **ON LINE** button to take the printer off line and then turn off the printer.

Look at the data dump shown in step 3. By comparing the characters printed in the right column with the printout of the hexadecimal codes, you can check what codes are being sent to the printer. If characters are printable, they appear as their true ASCII characters. Nonprintable codes, such as control codes, are represented by dots.
As an example of how to interpret a data dump printout, look at the first three hex codes on the second line of the printout sample (20 20 54). Each hex code 20 represents a space; the hex code 54 represents the letter T. Check the second line of the right column and you will find the letter T preceded by two spaces.

The chart below interprets the first six nonprintable codes.

<table>
<thead>
<tr>
<th>Hex codes</th>
<th>Command</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B 40</td>
<td>ESC @</td>
<td>Initialize printer</td>
</tr>
<tr>
<td>1B 52 00</td>
<td>ESC R 0</td>
<td>Select USA character set</td>
</tr>
<tr>
<td>1B 74 01</td>
<td>ESC t 1</td>
<td>Select Epson Extended Graphics character table</td>
</tr>
<tr>
<td>1B 36</td>
<td>ESC 6</td>
<td>Enable printable characters</td>
</tr>
<tr>
<td>12</td>
<td>DC2</td>
<td>Cancel condensed mode</td>
</tr>
<tr>
<td>1B 50</td>
<td>ESC P</td>
<td>Select 10 cpi</td>
</tr>
</tbody>
</table>
Chapter 4
Software and Graphics

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Enhancing Your Printing

You can obtain a wide variety of printing effects with the DFX-8000 printer, from changing the number of characters printed per inch to using special effects or adding emphasis to selected words and phrases. This section gives you a sampling of the features you may want to select with your software.

For software control of these features, see the instructions for your application program or look up their specific commands in the Command Summary in Chapter 9.

Print quality and fonts

The most fundamental changes you can make to printing on the DFX-8000 are in the print quality and fonts.

The DFX-8000 has three levels of print quality: high-speed draft, normal draft, and NLQ (Near Letter Quality). High-speed draft is ideal for rough drafts and large documents or reports that you need to print quickly. Normal draft is a bit slower, but offers higher resolution characters. Finally, NLQ takes a little longer but produces darker, more fully-formed characters suitable for presentation-quality documents. For NLQ printing, the DFX-8000 offers two fonts—Roman and Sans Serif.

The printout below shows the difference between high-speed draft, normal draft, NLQ Roman, and NLQ Sans Serif so that you can compare the different styles and densities.

- High-speed draft is even faster.
- Draft printing is fast.
- NLQ Roman is clear and typewriter-like.
- NLQ Sans Serif is crisp and distinctive.
You can choose the print quality and NLQ fonts with software commands or DIP switches. However, high-speed draft can be selected only by setting DIP switch 2-2. (See the section on setting DIP switches in Chapter 3.)

Note: High-speed draft is available only when 10 cpi printing is selected: The only print enhancements that can be combined with high-speed draft are underline and double-wide. If other enhancements or character sizes are selected, high-speed draft is ignored and replaced by normal draft.

**Character spacing**

To add greater variety to your documents, the DFX-8000 has two fixed character spacings and proportional spacing. Each one can be selected with a software command.

For two of the built-in fonts, normal draft and NLQ, you can choose a character spacing of 10 cpi (characters per inch), 12 cpi, or proportional spacing. The printout below compares the two types of character spacing.

This is 10 cpi printing.
This is 12 cpi printing.

In 10 and 12 cpi, each character is given the same amount of space. The width of proportional spacing, however, varies from character to character. Therefore, a narrow letter like i receives less space than a wide letter like W. The width of each proportional character is given in the Appendix.
Enhancing Your Printing

The following printout compares 10 cpi spacing with proportional spacing.

This is 10 cpi printing.
This is proportional printing.

Note: High-speed draft is available only in 10 cpi. If you select 12 cpi or proportional spacing, the print speed temporarily switches to normal draft until 12 cpi or proportional spacing is turned off.

Character size

In addition to the two fixed spacings and proportional spacing, the DFX-8000 offers three other modes that can 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 characters, while the double-high mode doubles the height of any size characters. These modes are useful for emphasizing headings in reports and making displays, but are usually not suitable for large amounts of text. These modes can also be combined to obtain even more impressive printing results.

This is normal 10 cpi printing.
This is double-wide.
This is double-high.
This is double-wide and double-high.

Both 10 and 12 cpi printing can be reduced to about 60% of their normal width using condensed mode. This mode is particularly useful for printing wide spreadsheets because condensed 12 cpi allows you to print up to 160 characters on an g-inch line and 272 characters on a 13.6-inch line.
Condensed can be selected with software commands or a DIP switch. (See the section on setting DIP switches in Chapter 3.) Even if you turn on condensed with the DIP switch, you can still turn it off with a software command.

Condensed 10 cpi gives you more characters on a line.
Condensed 12 cpi gives you even more.

Notes:
- Both 10 and 12 cpi can be condensed, but proportional spacing cannot.
- When condensed is selected in NLQ, NLQ is replaced by normal draft.

Widening or narrowing the characters also widens or narrows the space 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.

special effects and emphasis

The DFX-8000 offers two ways of emphasizing parts of your text and also allows you to use underlining, superscripts, subscripts, and italics. These features can be controlled directly by software commands. Many application programs can also produce these effects if they are properly installed. See the instructions for your application program for details.
Enhancing Your Printing

**Emphasized and double-strike printing:**

Emphasized and double-strike printing can give text added distinction. In emphasized mode, the DFX-8000 prints each character twice as the print head moves across the paper, with the second character printed slightly to the right of the first. This process produces darker, more fully-formed characters.

In double-strike mode, the print head goes over each line twice, making the text bolder. For even greater boldness, you can combine emphasized and double-strike. 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 draft printing.
This is emphasized draft printing.
This is double-strike in draft mode.
This is double-strike and emphasized combined.

**Italic printing**

You can use italics for special emphasis or as an alternative typeface.

This is Roman printing.
This is italicized Roman printing.
Underlining

The underline mode provides an automatic way of fully underlining any piece of text. **This mode underlines** spaces, superscripts, and subscripts without a break. Most word processors take advantage of this feature, but some programs use the underline character instead. If this happens, check your program for an underlining option.

**This is continuous underlining.**

Superscripts and subscripts

Superscripts and subscripts can be used for printing footnote numbers and mathematical formulas. The example below `shows underlining and subscripts combined in a mathematical formula.

\[
\text{average} = \frac{(a_1 + a_2 + \ldots + a_n)}{n}
\]
Selecting typestyles with Master Select

Your printer has a special ESCape code called Master Select that allows you to choose many combinations of nine different printing modes:

- 10 cpi
- 12 cpi
- proportional
- condensed
- emphasized
- double-strike
- double-wide
- italics
- underline

For more information on sending ESCape codes to your printer, see Chapter 9.

The format of the Master Select code is shown below:

<table>
<thead>
<tr>
<th>ASCII:</th>
<th>ESC</th>
<th>1</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal</td>
<td>27</td>
<td>33</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>21</td>
<td>n</td>
</tr>
</tbody>
</table>

The variable $n$ is a number that identifies the typestyle or combination. To find the value of $n$, refer to the table below and add up either the decimal or hexadecimal numbers for the features you want.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Dec.</th>
<th>Hex.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 cpi</td>
<td>0</td>
<td>00</td>
</tr>
<tr>
<td>12 cpi</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>proportional</td>
<td>2</td>
<td>02</td>
</tr>
<tr>
<td>condensed</td>
<td>4</td>
<td>04</td>
</tr>
<tr>
<td>emphasized</td>
<td>8</td>
<td>08</td>
</tr>
<tr>
<td>double-strike</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>double-wide</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>italics</td>
<td>64</td>
<td>40</td>
</tr>
<tr>
<td>underline</td>
<td>128</td>
<td>80</td>
</tr>
</tbody>
</table>
For example, to print a title you may want to use double-wide 12 cpi characters and print them in double-strike mode. You would-add these three decimal numbers together to calculate the value of \( n \).

\[
\begin{align*}
12 \text{ cpi} & \quad 1 \\
\text{Double-strike} & \quad 16 \\
\text{Double-wide} & \quad 32 \\
\hline
n & = 49
\end{align*}
\]

After calculating the value of \( n \), you would use the Master Select command to send the value to the printer.

<table>
<thead>
<tr>
<th>ASCII:</th>
<th>ESC</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>33</td>
<td>49</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>21</td>
<td>31</td>
</tr>
</tbody>
</table>

Print quality and font selection are not part of Master Select and must be set separately, using the ESC x and ESC k commands. The draft font printing speed must be set using DIP switch 2-2. (See the section on 'setting DIP switches in Chapter 3.)

There are four more things to consider when using the Master Select command:

- Master Select cancels any of the listed features that you do not set. For example, if you have already set 12 cpi, and you try to use Master Select to set emphasized double-strike cpi, only the character spacing is reset to 10 cpi.
- Proportional spacing overrides 10 cpi, 12 cpi, and condensed.
- Only 10 cpi, underline, and double-width are available in high-speed draft mode.
- When emphasized and condensed are selected, emphasized is ignored.
Graphics

The dot graphics mode allows your printer to produce pictures, graphs, charts, or almost any other pictorial material you can think of.

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

The quickest and easiest way to print graphics on your printer is to use a commercial graphics program. With such a program you usually create an image on your monitor and then give a command to send the image to the printer. If you use commercial 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 printer prints graphics, read on.
The print head

To understand dot graphics you need to know a little about how your printer's print head works.

As the print head 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 page, the pins fire time after time in different patterns to produce letters, numbers, or symbols.

Dot patterns

The DFX’s print head is able to print graphics as well as 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. Your printer 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 printer can, therefore, be as finely detailed as the one on page 4-10.

In its main graphics mode, your printer 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, your printer can print finely detailed graphic images that give no indication that they are made of separate lines, each no more than 8/72nds of an inch tall.
Pin labels

To tell the printer which pins to fire in each column, you need a numbering system that separately identifies each of the eight pins. Since there are 256 possible combinations of the eight pins in each section, you use the numbering system shown below.

```
128
  64
  32
  16
   8
   4
   2
   1
```

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. 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, and send 129.

By adding the appropriate label numbers together, you can fire any combination of pins. Below are three examples of how to calculate the number that will fire a particular pattern of pins.
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.

The graphics commands

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

Your printer has one command that allows you to use any of the eight graphics options. The format of the command is:

```
ESC * m n1 n2 data
```

In this command, \( m \) selects the graphics option and \( n1 \) and \( n2 \) specify the number of columns to reserve for graphics. The available graphics options are listed below.

<table>
<thead>
<tr>
<th>Option</th>
<th>( m )</th>
<th>Horiz. density (Win.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-density</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Double-density</td>
<td>1</td>
<td>120</td>
</tr>
<tr>
<td>High-speed double-density*</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>Quadruple-density*</td>
<td>3</td>
<td>280</td>
</tr>
<tr>
<td>CRT I</td>
<td>4</td>
<td>72</td>
</tr>
<tr>
<td>CRT II</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>Double-density plotter</td>
<td>7</td>
<td>144</td>
</tr>
</tbody>
</table>

*Adjacent dots cannot be printed in this mode.*
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 &inter does not use decimal numbers larger than 255, the graphics mode command uses two numbers for reserving columns.

To figure \( n_1 \) and \( n_2 \), divide the total number of columns by 256. The result is \( n_2 \); the remainder is \( n_1 \). Since the command is set up for two numbers, you must supply two even if you need only one. When you need fewer \( \frac{256}{n_2} \) columns, just make \( n_1 \) the number of columns you are reserving and make \( n_2 \) a zero. For example, if you wish to reserve 1632 columns of graphics data; \( n_1 \) should be 96 and \( n_2 \) should be 6 because 1632 = 96 + (6 \times 256).

If you are using a programming language with MOD (modulus) and INT (integer) functions, you can use the following formulas to calculate \( n_1 \) and \( n_2 \), in which \( n \) is the total number of columns:

\[
\begin{align*}
  n_1 &= n \operatorname{MOD} 256 \\
  n_2 &= \operatorname{INT}(n/256)
\end{align*}
\]

The printer will interpret the number of bytes determined by \( n_1 \) and \( n_2 \) as graphics data, no matter what codes they are. This means that you must be sure to supply enough bytes of graphics data or the printer will stop and wait for more data and will seem to be locked. If, on the other hand, you supply too much graphics data, the excess will be interpreted and printed as regular text.

Printing simple patterns

The first example is just a program to show you how the graphics command, column reservation numbers, and data can be used in a BASIC program.
Type and run the following program; be especially careful to include all semicolons. The program produces the printout you see below.

```
10 WIDTH"LPT1:".255
20 LPRINT CHR$(27):"**":CHR$(0);CHR$(40);CHR$(0);
30 FOR X=1 TO 40
40 LPRINT CHR$(170):
50 NEXT X
```

Line 20 specifies single-density graphics mode and also reserves 40 columns for graphics. Line 30 begins a loop to supply 40 bytes of data. Line 40 contains the number 170, which produces the first pin pattern shown in the section on pin labels, and line 50 finishes the loop.

Note: Some software programs (including most versions of BASIC) automatically insert 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 two data numbers 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 BASIC versions is either WIDTH "LPT1:", 255 or WIDTH LPRINT 255. Check your software manual for the proper format.
Graphics

**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.

In the following program, the lines inside each pair of FOR and NEXT statements are indented so that you can see how the program works; the spaces are not needed for the program to run.

```basic
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 (line 120 and 170).
4. A new graphics command is used for each line printed (lines 130 to 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 initial 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.

**Designing your own graphics**

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

First you must decide which graphics density you want. The figure below shows the difference between three common modes so that you can choose the one you want. See page 4-13 for a list of available graphics densities.

![Graphics densities comparison](image)
In the figure on the previous page, you can see the main rules for graphics design in the three densities:

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

After choosing the desired density, you design your figure by plotting dots on graph paper.

The high-speed double-density design shown below should point you in the right direction for your own work.

![High-speed double-density design](image)

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 the figure on the next page. The pin values are on the left and the sums at the bottom of each column.
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 following program is similar to the example on page 4-16. This program 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
240 DATA 184,64,32,16,8,4,2
250 DATA 8,16,64,14,36,0,8,0,8,0
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
```
Graphics

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 Z.

Individual graphics commands

There are four individual graphics commands that are very much the same as the ESC * command, but each one works for only one graphics option. Note that these commands contain one less variable than the ESC * command because they do not need to, select a graphics option.

They are shown below:

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>ESC * Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC K</td>
<td>Single-density</td>
<td>ESC * 0</td>
</tr>
<tr>
<td>ESC L</td>
<td>Double-density</td>
<td>ESC * 1</td>
</tr>
<tr>
<td>ESC Y</td>
<td>Double-density, high-speed</td>
<td>ESC * 2</td>
</tr>
<tr>
<td>ESC Z</td>
<td>Quadruple-density</td>
<td>ESC * 3</td>
</tr>
</tbody>
</table>

The reassignment command

The DFX-8000 has a command that allows you to change the graphics option assigned to any of the four individual graphics options commands.

The command looks like this:

\[ \text{ESC} \ ? \ s \ m \]
The letter $s$ represents the command that you wish to change the assignment for ($K$, $L$, $Y$, or $Z$) and $m$ is the number of the graphics option that you want to assign to it. For example, to change the ESC $K$ command to use the CRT $I$ graphics option, the command in BASIC is:

\[
\text{LPRINT CHR$(27);$"I";"K";CHR$(4)}
\]

This is a quick way to change the aspect ratio of the design that you are printing. Changing the graphics option will change the width without changing the height.
User-defined Characters

With this printer, it is possible to define and print characters of your own design. You can design an entirely new alphabet or typeface, create characters for special applications such as mathematical or scientific symbols, or create graphic patterns with user-defined characters to serve as building blocks for larger designs.

Below, you can see samples of typefaces created with the user-defined character function.

ฆ ร -widget

You can make the task of defining characters easier by using a commercial software program that assists you in creating characters or simply supplies you with sets of characters already created. Also, some popular commercial software programs take advantage of the printer’s user-defined character function to enhance printouts. (These characters are called download characters in some programs.)

The standard characters are stored in the printer’s Read Only Memory (ROM), and the user-defined characters are stored in the printer’s Random Access Memory (RAM).

In Epson ESC/P mode, user-defined characters remain in the printer’s memory even after the printer is turned off. You can select the user-defined character set by turning on DIP switch 2-1 without defining the same characters again. However, in the IBM emulation mode, user-defined characters are cleared whenever the printer is turned off, including characters defined in Epson ESC/P mode.
Designing your characters

User-defined characters are like 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. In this mode, you treat the printer as if it had a single column of nine pins.

Design grids

To design a draft character you use a grid that has nine rows and eleven columns as shown below. The following figure 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 shows the design. You can use up to eight pins of your printer’s print head in a single user-defined character. The design above uses the top eight pins, but you can also use the bottom eight by using the grid on the right as explained later in this section.
User-defined Characters

Sending information to your printer

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

The command to define characters is relatively complex:

\[ \text{ESC} \& \; 0 \; n_1 \; n_2 \; a_1 \; d_1 \ldots d_n \]

You can define more than one character with a single command. The values \( n_1 \) and \( n_2 \) are the ASCII codes of the first and last characters you are defining. If you are defining only one character, \( n_1 \) and \( n_2 \) are the same. You can use any codes between 0 and 255 decimal for \( n_1 \) and \( n_2 \) except the following codes: 7, 8, 9, 10, 11; 12, 13, 14, 15, 18, 19, 20, 24, and 27 decimal. Also, it is best not to define decimal 32, which is the code for a space.

You can also use other codes by using the \( \text{ESC} \; 6 \) and \( \text{ESC} \; I \) commands. (See the Command Summary in Chapter 9.)

For example, if you wanted to redefine the characters A through Z, \( n_1 \) would be A (or ASCII code 65) and \( n_2 \) would be Z (or ASCII code 90). So the command \( \text{ESC} \& \; 0 \; A Z \) (followed by the appropriate data) would replace the characters A through Z.

Following the specification of the range of characters to be defined in this command is one number (\( a_1 \)) 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 command (\( d_1 \ldots d_n \)) 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 columns are blank.

Note: Be sure to turn off DIP switch 2-I before defining characters. The \( \text{ESC} \; \& \; \) command is invalid if this switch is on.
The following character definition program should help make this clear:

```
100 LPRINT CHR$(27);"x";CHR$(0);
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);
190 LPRINT "@@@@";
200 LPRINT CHR$(27);"%";CHR$(0);
210 LPRINT "@@@@"
220 END
230 DATA 32.80.168.84.42.84.168.80.32.0.0
```

The two at signs (@@) in line 120 (n1 and n2) represent the range of characters being defined (in this case, a range of one). Line 130 contains a1.

The information about the actual 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.

**Specifying the width and height**

The example program uses 136 for a1 (in line 130 of the definition program), but you can use other values. The number a1 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 to use the bottom eight pins, use the third grid in the illustration on page 4-23.
User-defined Characters

A value of 136 is suitable for all characters that use the top eight pins, start in column 1, and finish in column 9. For a character of the same width, but printed with the bottom eight pins, $a_1$ should be 8. For any other character, follow these rules to calculate $a_1$:

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 $a_1$ 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 uses the top eight pins, add 128.

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

- start with $a_1 = 8$
- subtract 2 for two blank columns on the left, giving $a_1 = 6$
- add 32 for two blank columns on the left, giving $a_1 = 38$
- add 128 to print with the top eight pins, so that $a_1 = 166$.

Printing user-defined characters

If you entered the example program on page 4-25 you defined a heart and placed it in the RAM location for ASCII code 64 (replacing the at sign). You can now print out-a three-line sample of your work. The first and third lines (printed by lines 170 and 210 of the program) print the normal at sign; the second line (line 190) prints the heart that you 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 line 180 and 200. It is:

\[ \text{ESC} \% n \]

If \( n \) is equal to 0, the normal ROM character set is selected. If \( n \) is equal to 1, the user-defined character set is selected. You can also select one of the two character sets with DIP switch 2-1. If you select the user-defined character set before you have defined any characters, the command is ignored and the ROM characters remain in use.

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

**Copying ROM characters to RAM**

After running the previous sample program, if you select the user-defined character set and try to print other characters, only the heart will print. Since no other characters are in the printer’s user-defined RAM area, other characters print as spaces.

In many cases, you will want to redefine only a few of the characters to suit your needs; the rest of the alphabet will work fine as it is. As you have seen, it is possible to switch back and forth at will between the normal character set and user-defined character set. It is, however, rather inconvenient.

Therefore, your printer has a command that allows you to copy all of the standard characters from ROM to the user-defined character set.

The command format is:

\[ \text{ESC} : 0 n 0 \]
User-defined Characters

Note: This command cancels any user-defined characters you have created. You must send this command to the printer before you define characters. Also, check that DIP switch 2-1 is off before sending this command to your printer.

If you use this command at the beginning of a program, then define your special characters and select the user-defined character set, you can print with the user-defined character set as your normal character set. You never need to switch back and forth between sets.

Mixing print styles

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

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

Normal: ♥♥♥♥♥♥
Double-wide: ♥♥♥♥♥♥

In IBM emulation mode, you use a different method to define characters. For more information, see page 9-50 in the Command Summary.
Chapter 5
Using the Printer Options

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- Paper handling ...................................................... 5-5
- Removing the pull tractor ........................................ 5-15

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Pull Tractor

The optional pull tractor (#8309) provides optimum continuous paper handling. The pull tractor is especially useful with continuous multi-part forms and labels. For best results, use the pull tractor along with one of the built-in push tractors, as described in this section.

Installing the pull tractor

To install the pull tractor, you need a cross-head screwdriver. The following steps show you how to install the pull tractor.

Note: If you plan to use the pull tractor with the built-in rear tractor, load paper onto the rear tractor before you install the pull tractor. See the section on loading paper onto the rear tractor in Chapter 2.

1. Turn off the printer and open the paper separator cover.
2. Use a cross-head screwdriver to remove the two screws securing the paper separator to the printer. Then lift the paper separator off the printer.

3. Using the two screws you just removed from the printer’s original paper separator, install the paper separator that comes with the pull tractor.
4. Close the paper separator cover and open the top cover.

5. Holding the pull tractor with its gears to the left, fit the tractor’s front notches over the mounting shaft in the printer.
6. Open the paper bail using the tab on its right side. Then tilt the pull tractor back until its rear latches click into place over the printer’s rear mounting pins.

7. Close the paper bail and then close the top cover.

**Paper handling**

If you are using labels or multi-part forms with more than four parts including the original, use the pull tractor with the built-in front tractor.

You can switch between the front and rear tractors at any time when you are using the pull tractor. Just press the FRONT/REAR button and then use the FORM FEED button to feed the paper the additional distance to the pull tractor. (Labels require special handling. see the section on labels in Chapter 2.)

**WARNING:** The short tear-off feature does not work when the pull tractor is installed. To remove a document, press the FORM FEED button to advance the paper to a point where you can tear it off.
Pull Tractor

**Using** the pull tractor with the front tractor

The steps below show you how to load paper when you use the optional pull tractor with the printer’s built-in front tractor.

1. **Load paper** to the loading position on the front tractor. (See the section on loading paper onto the front tractor in Chapter 2.) Then take the printer off line.

2. Open the top cover.
3. Press the **FORM FEED** or **LINE FEED** button to advance the paper over the pull tractor.

4. Release both sprocket lock levers on the pull tractor by pulling them toward you. Then open both sprocket covers.
5. Adjust the sprocket units to match the width of your paper.

6. Slide the two paper supports so that they are spaced \textit{evenly} between the two sprocket units.
7. Fit the paper's sprocket holes over the pins on the sprocket units and close the sprocket covers.

8. If there is slack in the paper, or if the paper's sprocket holes do not easily fit onto the tractor pins, press in the pull tractor knob and turn it to adjust the position of the paper.

**CAUTION:** Be sure the sprocket units of the built-in front tractor and the optional pull tractor are aligned.
9. Slide the sprocket units so that the paper is straight and smooth, and then lock them into place.

![Diagram of sprocket units]

**CAUTION** Be sure the sprocket units are not too far apart. If they pull your paper too tightly or tear the edges of the paper holes, a paper jam may result. To remove any excess tension in your paper, release the right sprocket unit and lock it again.

10. Adjust the top of form position as described in Chapter 3.

![Diagram of top of form position adjustment]

---

5-10 Using the Printer Options
11. Close the top cover. Make sure the edge of the first sheet emerges below the paper separator.

12. Press the **ON LINE** button to put the printer on line so it is ready to print.
Pull Tractor

Using the pull tractor with the rear tractor

This section describes how to load paper when you use the optional pull tractor with the built-in rear tractor. If paper is already loaded onto the rear tractor, follow steps 2 through 12 in the previous section to load paper onto the pull tractor. If paper is not loaded onto the rear tractor, follow the steps below to load paper onto the pull tractor.

1. Turn on the printer and take it off line. Then open the top cover.
2. Pull the levers on the pull tractor toward you to release the pull tractor.

3. Tilt the tractor forward with the front notches over the mounting shaft so that its sprocket pins rest on the metal frame of the printer.
4. **Load paper** onto the **rear tractor** as described on page 2-11.

5. Open the paper bail **using** the tab on its right side. Then tilt the pull tractor back until the rear latches click into place over the printer’s rear mounting pins.
6. Follow steps 3 through 12 in the previous section to load the paper onto the pull tractor.

Removing the pull tractor

Follow these steps to remove the pull tractor. You will need a cross-head screwdriver and the paper separator that originally was installed on the printer.

1. Turn off the printer. Then open the top cover and remove any paper loaded on the pull tractor.
Pull Tractor

2. Pull the levers on the pull tractor forward to release the pull tractor.

3. Tilt the pull tractor forward, and then lift it up and out of the printer.
4. **Close** the top cover and **open the paper separator cover.**

5. **Using** a cross-head screwdriver, remove the paper separator that came with the pull tractor.
6. Using the two screws you just removed from the paper separator that came with the pull tractor, reinstall the original paper separator.

7. Close the paper separator cover.
Paper Cutter

The optional paper cutter (C815001) makes using continuous paper easier by cutting off your printed documents for you. When you use the paper cutter, be sure to set the page length to match your paper.

Installing the paper cutter

The steps below show you how to install the paper cutter. You will need a cross-head screwdriver.

WARNING: Do not use multi-part forms that vary in thickness with the optional paper cutter. These forms include forms with labels on them and forms that overlap slightly where they are glued together.

Note: If you plan to use the paper cutter with the built-in rear tractor, it is best to load paper onto the rear tractor before you install the paper cutter. See the section on loading paper onto the rear tractor in Chapter 2.
1. Turn off the printer and open the paper separator cover.

2. Use a cross-head screwdriver to remove the two screws securing the paper separator to the printer. Then lift off the paper separator. Store the paper separator and screws for your later use.
3. Close the paper separator cover and open the top cover.

4. Hold the paper cutter by its handle with the connector facing to the right. Then lower the paper cutter into the space at the back of the printer, guiding the pins on the sides of the paper cutter into the notches in the printer.

5. After the paper cutter is in place, tilt the paper cutter handle forward. Then close the top cover.
6. Open the rear **flap and remove** it by lifting up to pull the pegs on the rear flap out of the notches at the back of the printer. Then plug the paper cutter’s connector securely into the connector inside the printer.

7. To replace the rear flap, fit the pegs on the rear flap into the notches **at** the back of the **printer. Then close the** rear flap.
**Paper handling**

This section describes how to use the paper cutter with your continuous paper. When you use the paper cutter, you need to set the page length to match your paper.

**Cutting off a printed document**

To cut off a printed document, follow the steps below:

1. Be sure that the printer is turned on and that it is off line.

2. Press the TEAR OFF button. The printer advances the paper so that the perforation at the end of the last printed page is near the cutting line of the paper cutter.
3. If you loaded new paper onto the current tractor since the last time you cut off a document, you may need to adjust the cutting position. Open the paper separator cover and use the MICRO FEED buttons to adjust the cutting position with the cutting line. Then close the paper separator cover.

Note: You can set the cutting position, from 0.1 inches (3.0 mm) to 1.0 inches (25.4 mm) below the perforation at the end of the last printed page. The factory setting of the cutting position is the 0.1 inches (3.0 mm) position below the perforation;

4. Press the TEAR OFF button. The printer cuts off your printed document and feeds the fresh paper back to the top of form position.
5. Press the **ON LINE** button to put the printer on line so that it is **ready** to print.

**Note:** The next printing position after cutting the paper depends on the cutting position and the top of form position, as described below.

When the cutting position is above the top of form position, the printer starts printing at the top of form position on the same page.
When the cutting position is below the top of form position, the printer starts printing at the top of form position on the next page.

**Switching tractors**

To switch tractors when the paper cutter is installed, follow the steps below:

1. Be sure that the printer is turned on and that it is off line.
2. Press the **FRONT/REAR** button to switch to the other tractor. The printer cuts off the printed document, feeds the paper on the tractor backward to the standby position, and then advances the paper on the other tractor to the loading position.

3. Press the **ON LINE** button to put the printer on line so that it is ready to print.
Note: You can use the ESC EM printer command to change tractors only when the paper cutter is installed. For more information about this command, see the Command Summary in Chapter 9.

CAUTION: When you load paper on the tractor, be sure that the first page is torn off exactly at the perforation, and the first four holes in the paper fit over the sprocket unit pins.

Removing the paper cutter

To remove the paper cutter, follow the steps below. After you remove the paper cutter, store it in its original box and packing materials.

1. Cut off any printed document in the printer as described in the section above on cutting off a printed document.

2. Turn off the printer.
3. Open the rear flap and remove it by lifting up to pull the pegs on the rear flap out of the notches at the back of the printer. Then unplug the paper cutter’s connector from the printer.

4. To replace the rear flap, fit the pegs on the rear flap into the notches at the back of the printer. Then close the rear flap.
5. Open the top cover. Grasp the handle on the paper cutter and lift the paper cutter up and out of the printer.

6. Close the top cover and open the paper separator cover.
7. Using a cross-head screwdriver, reattach the paper separator.

8. Close the paper separator cover.
Interface Boards

You can use optional interface boards to supplement your printer’s built-in serial and parallel interfaces. If you don’t know whether you need an optional interface or if you want to know more about interfaces, contact your Epson dealer.

Choosing an interface

Optional interface boards can be divided into three main categories:

- IEEE-488 interfaces that provide standardized connections, trouble-free operation, and the ability to connect computers, printers, and other devices on the same line so that they can share data freely.

- Coax and twinax interfaces that connect directly to the printer and communicate with an IBM minicomputer or mainframe via coax or twinax protocol. These interfaces allow you to use Epson printers as local IBM printers without adding any other circuitry or components.

- Serial interfaces, which are required only if you need an interface that conforms to the Current Loop standard instead of RS-232C or that provides X-on/X-off data communications protocol.
Compatible interfaces

The following table lists Epson interfaces that are compatible with the DFX-8000. Some of these interfaces may not be available in your country or region and some may be no longer available.

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>#8143</td>
<td>New Serial interface board*</td>
</tr>
<tr>
<td>#8148</td>
<td>Intelligent serial interface board</td>
</tr>
<tr>
<td>#8165</td>
<td>Intelligent IEEE-488 interface board</td>
</tr>
<tr>
<td></td>
<td>Coax interface board</td>
</tr>
<tr>
<td></td>
<td>Twinax interface board</td>
</tr>
</tbody>
</table>

- For more information on the New Serial interface (#8143), see page 5-39.

All Epson interface boards have the Epson name on them. If there is an identification code on the board, it should be one of the four-digit numbers in the table above.

Installing an interface board

The following steps explain how to install an optional interface board. Before you install an interface board, set the DIP switches or jumpers on the board according to the instructions in your computer and interface board manuals.

**Note:** Before you install an interface board, be sure your printer’s DIP switches are set for use with a parallel interface, even if you are installing a serial interface board. See the section on setting the DIP switches in Chapter 3.
Interface Boards

1. Turn off both your printer and computer.

2. Open the rear cover.
3. Disconnect the printer cable from the printer and the computer. Then unplug the power cable from the electrical outlet and from the back of the printer.

![Image of a printer with cables]

**CAUTION:** When you install an optional interface board, be sure to disconnect the printer cable from the printer’s built-in parallel or serial interface. Two printer cables must not be connected at the same time.

4. If the interface board comes with an FG (frame ground) wire that is not already attached to the board, attach the wire as shown below on the right.

![Image of interface boards with wires attached]
5. **Plug** the cable’s connector securely into the interface board. If the connector has tightening screws, use a screwdriver to secure the cable to the interface board. If the connector has **clamps** instead, squeeze them together to secure the cable to the interface board.

Note: If the cable’s connector does not have tightening screws, you do not need to plug the connector into the board before you install it.

6. Place the board in the option slot at the back of the printer, carefully inserting the interface boards pins into the option slot’s mating connector.
7. Use a cross-head screwdriver to secure the board with the four screws.

8. Remove the screw from the CG (chassis ground) connector on the printer. Then use the cross-head screwdriver to connect the round end of the FG wire from the interface board to the CG connector.
9. Plug a suitable cable securely into the interface board, if you have not done so already. (If the cable connector has screws, you need to plug the cable into the board before you install the board. See step 5 on page 5-36.)

10. Secure the cable using the plastic clamp on the left.
11. Close the rear cover.

**CAUTION:** Always be sure the rear cover is closed when you use the printer.

**#8143 New Serial interface board**

If you use an optional interface, you may need to change the communications protocol of the printer or the computer so that they can communicate properly. In most cases, you should see your optional interface manual or computer manual to match the computer with the interface.

To use the **#8143** interface board with the DFX-8000, see the sections below on selecting a baud rate, handshake timing, and error handling. For all other data transfer conventions, such as word structure and communications protocol, see the **#8143** optional interface board manual,
Selecting a baud rate

The range of baud rate settings for the #8143 interface depends on whether your printer’s input buffer is on or off.

You can select baud rates from 75 to 19,200 bps (bits per second). When you set the baud rate, use the bit rate selection table for printers with buffers in the #8143 interface manual.

Handshake timing

When the vacant area for data in the input buffer drops to 512 bytes, the printer outputs an X-OFF code or sets the DTR flag to '1' (MARK) to indicate that it cannot receive data.

When the vacant area for data in the buffer increases to 784 bytes, the printer outputs an X-ON code or sets the DTR flag to '0' (SPACE) to indicate that it is ready to receive data.

Error handling

When the printer detects a parity error, it prints an asterisk (*). The printer ignores all other errors, including framing and overrun errors.
Chapter 6
Maintenance

Cleaning the Printer .................................................. 6-2
Replacing the Ribbon.................................................. 6-4
Transporting the Printer.............................................. 6-9
Cleaning the Printer

To keep your printer operating at its best, you should clean it thoroughly several times a year.

The following steps show you how to clean the printer.

1. Turn off the printer and close all of its covers.

2. Using a soft brush, carefully remove all dust and dirt.
3. If the outer case is dirty or dusty, clean it with a soft, clean cloth dampened with mild detergent dissolved in water. Keep all of the covers closed to prevent water from getting inside the printer.

**WARNINGS:**

- Never use alcohols or thinners to clean the printer. These chemicals can damage the printer components as well as the case.

- Be careful not to get the printer mechanism or electronic components wet.

- Do not use a hard or abrasive brush.

- Do not spray the inside of the printer with lubricants. Unsuitable oils can damage the mechanism. Contact your Epson dealer if you think lubrication is needed.
Replacing the Ribbon

When your printing becomes too faint, you need to replace the ribbon. Use only the #8766 standard Epson replacement ribbon cartridge for the DFX-8000.

The steps below show you how to replace the ribbon.

1. If the printer is on line, press the ON LINE button to take it off line. Then turn off the printer and open the top cover.

Note: Make sure that the printer is off line before you turn it off. When you take the printer off line, the gap between the print head and the platen widens, making it easier for you to replace the ribbon.
2. Slide the print head to the exposed part of the paper bail, as shown below. Lift the ribbon guide off the print head.

3. Pull up on the inside edge of the ribbon cartridge to release it from the printer’s mounting pins. Then remove the cartridge by lifting it up and away from you.

\[\text{CAUTION: Be sure not to pull on the flat cable beneath the ribbon cartridge when you remove the cartridge.}\]
Replacing the Ribbon

4. After you unpack the new ribbon cartridge, remove the separator from the ribbon cartridge and discard it. Then detach the ribbon guide from its holder on the ribbon cartridge (but not from the ribbon). Turn the ribbon-tightening knob to remove any slack in the ribbon.

5. Hold the ribbon cartridge with both hands and lower it into the printer. Pulling the cartridge toward you, slide the hooks in the sides of the cartridge over the two corresponding pins in the printer. Then push the cartridge down into position so that the remaining two hooks snap into place over the mounting pins in the printer.

**Note:** Press lightly on both sides of the cartridge to make sure the hooks are properly connected.
6. Fit the plastic ribbon guide onto the metal pins on each side of the print head. The smaller end of the guide should be on top, with it angled edge toward the platen. Turn the ribbon-tightening knob to remove any slack in the ribbon.

7. Slide the print head from side to side to make sure that it moves smoothly. Also check that the ribbon is not twisted or creased.
Replacing the Ribbon

8. Close the top cover.
Transporting the Printer

If you need to transport your printer some distance, carefully pack it in the original box and packing materials. The steps below show you how to pack your printer.

1. Turn off the printer and remove any paper loaded in the printer. If any printer options are installed, remove them as described in Chapter 5.

![Power Button]

**WARNING:** Be sure to turn off the printer before you unplug the power cable in the next step.

2. Unplug the power cable from the electrical outlet and then from the back of the printer. Then coil the cable and tie it.
Transporting the Printer

3. Open the rear cover and disconnect the interface cable from the printer and the computer.

4. Close the rear cover.
5. Open the top cover and slide the print head to the exposed part of the paper bail, as shown below. Lift the ribbon guide off the print head, and then remove the ribbon cartridge.

6. Using a cross-head screwdriver, reattach the carriage guide support bar and the two locking brackets.
Transporting the Printer

7. Lift up the paper bail and place the piece of foam packing underneath it, as shown below. Then insert the plastic print head protector.

8. Close the top cover.

9. Replace the packing materials and put the printer in its box.

WARNING: Even when you need to carry the printer only a short distance, do not carry it by yourself. The printer should always be carried by two people holding the printer at the bottom.
Chapter 7

Troubleshooting

Problems and Solutions ......................................................... 7-2
Power Supply ........................................................................ 7-3
Printing .................................................................................. 7-4
Paper Handling ..................................................................... 7-13
Options ................................................................................. 7-18
Problems and Solutions

This chapter describes potential problems and their likely solutions. If you encounter a problem, look for it in the list below and see the appropriate page for the solution.

Power supply

- Power is not being supplied to the printer. See page 7-3.

Printing

- The printer does not print. See page 7-4.
- The printout is faint. See page 7-6.
- Parts of printed characters or graphics are missing. See page 7-6.
- Printed characters are not what you expect. See page 7-7.
- The printing position is incorrect. See page 7-9.

Paper handling

- The printer does not feed continuous paper properly. See page 7-13.
- The printer does not switch tractors properly. See page 7-17.

Options

- A pull tractor is installed and the printer does not feed continuous paper properly. See page 7-18.
- A paper cutter is installed and the printer does not feed continuous paper properly. See page 7-20.
- An optional interface board is installed and the printer does not work properly. See page 7-23.
## Power Supply

### Problem

<table>
<thead>
<tr>
<th>Power is not being supplied to the printer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The \textit{POWER} light does not go on.</td>
</tr>
<tr>
<td>The \textit{POWER} light comes on briefly and then goes off. The light stays off after you turn the printer off and then on again.</td>
</tr>
</tbody>
</table>

### Solution

| The power cable may not be fully plugged into the printer or the electrical outlet. Turn off the printer and see that the cable is fully plugged into the printer and the electrical outlet. |
| The power switch is off. Turn on the switch. |
| The electrical outlet may not be supplying power. Check if an outside switch or automatic timer controls the electrical outlet. If so, use a different outlet. |
| The electrical outlet may not work. Plug another electrical device into the outlet to check whether the outlet works. |
| The voltage supplied by the electrical outlet may not be correct for your printer. Check the label on the printer’s rear panel to see if the printer’s voltage rating matches that of your electrical outlet. If the voltages do not match, unplug the printer and contact your Epson dealer. Do not reconnect the power cable to an electrical outlet. See page 1-13. |
## Printing

You can solve many printing problems, including problems with line spacing and margins, by changing your application program’s settings. When you encounter a printing problem, check your software settings first. If this does not work, check the printer’s DIP switch settings next.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The printer does not print.</td>
<td>The printer may be off line. If so, it cannot receive and print data. Press the ON LINE button. The ON LINE light should go on. See page 3-3.</td>
</tr>
<tr>
<td>The ON LINE light is off.</td>
<td>Your software may not be set up correctly for the printer. Check your program’s printer settings and make any necessary changes. See page 1-36.</td>
</tr>
<tr>
<td>The ON LINE light is on.</td>
<td>The interface cable may be loose. Make sure the printer is connected securely to the computer. If you are using a parallel interface, secure the connector with the wire retaining clips. If you are using a serial interface with a cable connector that has screws, secure the cable connector using the screws. See page 1-26. You may not be using the correct interface cable. Make sure your interface cable meets the printer and the computer specifications. See page 8-11.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>The <strong>PAPER OUT</strong> light is on.</td>
<td>The printer may be out of paper. If so, load paper. Be sure the paper is properly loaded onto the printer’s sprocket pins. See pages 2-4 and 2-11.</td>
</tr>
<tr>
<td>The printer beeps four times and stops printing and the <strong>ON LINE</strong> light goes off,</td>
<td>The top cover may be open. To resume printing, close the top cover and press the <strong>ON LINE</strong> button.</td>
</tr>
<tr>
<td>The printer sounds like it is printing, but nothing is printed.</td>
<td>The ribbon cartridge may not be installed properly. Turn off the printer, reinstall the ribbon cartridge, and take up any slack in the ribbon. See page 1-9.</td>
</tr>
<tr>
<td>The printer makes a strange noise, beeps several times, and stops printing.</td>
<td>The ribbon <strong>may be</strong> worn. Replace the ribbon <strong>cartridge</strong>. See page 6-4.</td>
</tr>
<tr>
<td>The <strong>ON LINE</strong> light is flickering and the printer does not print.</td>
<td>Your printer is not working properly. Turn off the printer and check for paper jams or other problems. Make sure that all protective materials <strong>are</strong> removed. Then turn on the printer. If the printer still does not print correctly, contact your Epson dealer.</td>
</tr>
<tr>
<td></td>
<td>The print head is overheated. Wait several minutes until the printer head cools. Printing resumes when the head cools.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The printout is faint.</td>
<td>The ribbon may be worn out. A worn ribbon can damage the print head. Install a new ribbon cartridge as soon as possible. See page 6-4.</td>
</tr>
<tr>
<td>The printout is faint.</td>
<td>Use copy mode to print clearer, darker characters on the last pages of your multi-part forms. To select copy mode, press the FORM FEED/COPY button when the ON LINE light is on. The printer beeps twice to indicate it is in copy mode. See page 2-29.</td>
</tr>
<tr>
<td>The printing on the last pages of your multi-part forms is faint.</td>
<td>The ribbon cartridge may not be installed properly. Remove the ribbon cartridge and reinstall it. Make sure the cartridge hooks are securely connected to the printer. See page 1-9.</td>
</tr>
<tr>
<td>Parts of printed characters or graphics are missing.</td>
<td>The print head is damaged. Stop printing and contact your Epson dealer to have the print head replaced.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Parts of characters are missing, as shown here:</td>
<td>There is too much slack in the ribbon or the ribbon has caught on something. Stop printing, turn off the printer, and reinstall the ribbon cartridge. See page 1–9.</td>
</tr>
<tr>
<td>Printed characters are not what you expect.</td>
<td>Your software may not be set up correctly for the printer. Use the program’s setup (or install) procedure to check the printer settings, and change them if necessary.</td>
</tr>
<tr>
<td>The printer does not print the typestyle or characters set by the software.</td>
<td>The wrong font is selected. If your program accepts control codes, set the codes to the values below to select the fonts:</td>
</tr>
</tbody>
</table>
| You selected the Roman, Sans Serif, or draft font with your software, but characters are printed in a different font. | Roman: ESC k 0  
Sans Serif: ESC k 1  
Draft: ESC x 0  
See pages 3-43 and 9-23. |
| The printer prints italic characters instead of the graphic and line characters you selected. | The wrong character table is selected. If your application program can send control codes, specify the Epson Extended Graphics character table using ESC t 1.  
See page 9-34. |
<p>|                                                                        | You can also set a DIP switch to select the graphics character table. To do this, turn off the printer, turn on DIP switch 1-3, and then turn on the printer. See page 3-49. |</p>
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printed characters are not what you expect</td>
<td>The wrong character table is selected. If your application program can send control codes, specify the italic character table using ESC t 0. See page 9-34.</td>
</tr>
<tr>
<td>(continued).</td>
<td>You can also set a DIP switch to select the italic character table. To do this, turn off the printer, turn off DIP switch 1-3, and then turn on the printer. See page 3-49.</td>
</tr>
<tr>
<td>The printer prints graphic characters or lines</td>
<td>The wrong international character set is selected. If your application program can send control codes, specify the desired international character set using ESC R n. See page 9-34.</td>
</tr>
<tr>
<td>instead of the italic characters you selected.</td>
<td>You can also set a DIP switch to select an international character set. To do this, turn off the printer, set DIP switches 1-6, 1-7, and 1-8 to select the character set you want, and then turn on the printer. See page 3-47.</td>
</tr>
<tr>
<td>Printed characters are smaller than you expect.</td>
<td>Condensed mode may be selected. If your application program can send control codes, cancel condensed mode using DC2. See page 9-26.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution.</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>A series of strange characters is being printed.</td>
<td>You can also set a DIP switch to cancel condensed mode. To do this, turn off the printer, turn off DIP switch 1-1, and then turn on the printer. See page 3-46.</td>
</tr>
<tr>
<td>The printing position is incorrect.</td>
<td>Your printer and computer may not be communicating correctly. Make sure that you are using the correct interface cable, that the communication protocol is correct, and that the interface cable is securely plugged in. See pages 3-13 and g-11. See your computer manual for more information.</td>
</tr>
<tr>
<td>Printing starts too high or too low on the page.</td>
<td>The top of form position may be incorrect. Adjust the top of form position as described on page 3-33. If the problem persists, check your software program’s top margin setting and change it if necessary.</td>
</tr>
<tr>
<td>The line spacing is incorrect.</td>
<td>If your application program can send control codes, set the line spacing using ESC 0, ESC 1, ESC 2, ESC 3, or ESC A. See pages 9-15, 9-16, and 9-17.</td>
</tr>
<tr>
<td>One line of printing takes up two lines.</td>
<td>The margins may not be set correctly. If your application program can send control codes, set the left and right margins using ESC 1 or ESC Q. See pages 9-19 and 9-20.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The printing position is incorrect (continued).</td>
<td>In BASIC, enter one of the following statements:</td>
</tr>
<tr>
<td></td>
<td>WIDTH LPRINT 255 or WIDTH “LPT1:”, 255</td>
</tr>
<tr>
<td></td>
<td>If the printer still does not print properly, set the right margin to the maximum setting using ESC Q.</td>
</tr>
<tr>
<td>All the text is printed on the same line.</td>
<td>A line feed signal is not being sent at the end of each line. Turn on DIP switch 2-4 so that the printer adds a line feed code to each carriage return sent by the application program. See page 3-15.</td>
</tr>
<tr>
<td>The printer inserts extra blank lines between lines of text.</td>
<td>Extra line feed signals are being sent. Turn off DIP switch 2-4. See page 3-15.</td>
</tr>
<tr>
<td>The page length does not match the length of the paper.</td>
<td>The page length may be set incorrectly. Check your application program’s page length setting and change it if necessary. You can also turn off DIP switch 3-2 to set the page length to 11 inches (279.4 mm) or turn on the switch to set the page length to 12 inches (304.8 mm). See page 3-17. If your application program can send control codes to the printer, you can set the page size using ESC C or ESC C 0.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>The printout contains regular gaps.</strong></td>
<td>One inch skip over perforation may be set. Turn off DIP switch 3-3. If your application program allows you to use control codes, cancel skip over perforation using ESC O. See page 3-18.</td>
</tr>
<tr>
<td><strong>Skip over perforation is set, but the perforation does not fall in the center of the skip.</strong></td>
<td>The page length may be set incorrectly. Set DIP switch 3-2 to match your paper length. See page 3-17. If your application program allows you to use control codes, you can set the page length using ESC C or ESC C 0. See pages 9-13 and 9-14. The top of form position may be too high or too low. Adjust the top of form position so that the perforation is centered within the skip area. See page 3-33. Your application program may be setting the top and bottom margins. If so, turn off DIP switch 3-3 to cancel skip over perforation. See page 3-18.</td>
</tr>
<tr>
<td><strong>Vertical printed lines are not aligned.</strong></td>
<td>The printer may be set for bidirectional printing. This can cause a slight misalignment of graphics characters. If you need to print precisely aligned vertical lines, select unidirectional print mode by sending ESC U or ESC &lt; to the printer. See page 9-10.</td>
</tr>
</tbody>
</table>
Note: If you are still having printing problems after trying the solutions in this section, you can use data dump mode. This mode helps advanced users find the cause of communication problems between the printer and application programs. In data dump mode, the printer produces an exact printout of the codes reaching the printer. See the section on data dump mode in Chapter 3.

If the printer still does not print correctly, try the self test described in Chapter 1. If the self test works properly, the printer is all right, and the problem probably lies in the computer, the software, or the cable. If the self test does not work, contact your Epson dealer.
# Paper Handling

This section describes potential problems with handling continuous paper and their likely solutions. If you have problems using the optional pull tractor or paper cutter, see the section on options on page 7-18.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| The printer does not feed continuous paper properly. | The printer may be on line. If the **ON LINE** indicator is lit, press the **ON LINE** button to take the printer off line, and then try to feed the paper. After you feed the paper, press the **ON LINE** button again to put the printer on line. See page 3-3.  

The wrong tractor may be selected. Check if the correct tractor arrow is lit on the **PAPER SELECT** indicator. If the wrong tractor is selected;’ be sure paper is loaded to the **standby** position on the tractor you want to use. Then press the **FRONT/REAR** button to switch to that tractor. See pages 2-9 and 2-18.  

The printer may be out of paper. Load paper onto the tractor. The tractor arrow on the **PAPER SELECT** indicator should be green. See pages 2-4 and 2-11. |
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The <em>printer</em> does not <em>feed</em> continuous paper properly (continued).</td>
<td>There may be some obstacle, such as a cable, in the way of the paper or something on top of the paper supply. See page 2-2</td>
</tr>
<tr>
<td>The paper jams or does not feed smoothly into the printer.</td>
<td>The paper supply may be too far from the printer. Position your paper supply within 3.28 feet (1 meter) of the printer.</td>
</tr>
<tr>
<td></td>
<td>The paper supply may not be aligned with the front or rear tractor. See page 2-3.</td>
</tr>
<tr>
<td></td>
<td>The rear cover <em>may</em> be open. Close the rear cover before trying to feed the paper.</td>
</tr>
<tr>
<td></td>
<td>The paper may be caught on the paper separator. Be sure the edge of the first page emerges below the paper separator.</td>
</tr>
<tr>
<td></td>
<td>The paper may not be mounted on the sprockets correctly. Check the paper on the sprockets to be sure the paper’s sprocket holes fit correctly over the sprockets. Be sure the paper on the sprockets is not ripped or jammed. If something is wrong with the paper, tear off the paper below the tractor and press the FORM FEED button to eject the remaining paper. Then load fresh paper, making sure the first sheet has a clean, straight edge.</td>
</tr>
<tr>
<td></td>
<td>The holes on the sides of the paper may not be aligned with each other. Reposition the paper on the tractor pins. See pages 2-7 and 2-16.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>The sprocket units may not be positioned for the width of your paper. Move the right sprocket unit to the right to remove any slack in the paper, or to the left to remove any excess tension in the paper. See pages 2-8 and 2-17.</td>
<td></td>
</tr>
<tr>
<td>The sprocket covers may be open or the sprocket lock levers may be unlocked. Close the sprocket covers. Be sure the sprocket units are positioned to match the width of your paper. Then lock them in place by pressing the sprocket lock levers away from you. See pages 2-8 and 2-16.</td>
<td></td>
</tr>
<tr>
<td>The paper may not meet the specifications for the DFX-8000. Check that your paper is of the proper size, weight, and thickness. See pages 8-5 and 8-6.</td>
<td></td>
</tr>
<tr>
<td>The print head may be catching the binding area of your multi-part forms. Turn on DIP switch 3-7 to select the skip over binding function. See page 3-16.</td>
<td></td>
</tr>
</tbody>
</table>
| Skip over perforation may be selected. Turn off DIP switch 3-3. If your application program allows you to use control codes, cancel skip over perforation using ESC 0. See pages 3-18 and 9-15. | The printout contains regular gaps.
| You may have turned on DIP switch 3-3 when the printer was on. To make any new DIP switch settings effective, turn off the printer and then turn it back on. See page 3-7. | Skip over perforation does not work.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The printer does not feed continuous paper properly (continued).</td>
<td>Your application program may cancel the skip over perforation set by DIP switch 3-3. Check that your application program’s settings are correct.</td>
</tr>
<tr>
<td>Skip over perforation is set, but the perforation does not fall in the center of the skip.</td>
<td>The page length may be set incorrectly. Set DIP switch 3-2 to match your paper length. If your application program allows you to use control codes, you can set the page length using ESC C or ESC C 0. See pages 3-17, 9-13 and 9-14</td>
</tr>
<tr>
<td>The top of form position shifts slightly when you print several pages.</td>
<td>The top of form position may be too high or too low. Adjust the top of form position so that the perforation is centered within the skip area. See page 3-33.</td>
</tr>
<tr>
<td></td>
<td>The paper may be too heavy for the built-in tractor. When you require highly accurate paper feeding such as when you print carbon copies, use the optional pull tractor. See page 5-2.</td>
</tr>
</tbody>
</table>
### Problem
The printer does not switch tractors properly.

When you press the *FRONT/REAR* button to switch tractors, the paper jams or the printer does not feed the paper back to the standby position.

### Solution
The printer may have tried to reverse feed too many pages. Use the short tear off feature to tear off the printed document or any excess paper so that the printer needs to reverse feed only one page. Then press the *FRONT/REAR* button to switch tractors. See page 2-20.

You may be trying to switch tractors when labels are loaded in the printer. Labels jam when they are fed backward, so always remove any labels loaded in the printer before you switch tractors. To remove labels loaded in the printer, tear off the fresh supply below the tractor and press the FORM FEED or LINE FEED button to eject the remaining labels. See page 2-32.

The printer may be out of paper. Load paper onto the tractor. The tractor arrow on the *PAPER SELECT* indicator should be green. See pages 2-4 and 2-11.
Options

Problem | Solution
--- | ---
A pull tractor is installed and the printer does not feed continuous paper properly. | The printer may be on line. Before you press the FORM FEED or LINE FEED button, be sure the printer is off line (the ON LINE light is out). See page 3-4.
The pull tractor may not be correctly installed. Remove the pull tractor and then reinstall it, making sure the mounting notches and pins fit together properly. See page 5-2.

When you press the FORM FEED or LINE FEED button, the printer does not feed the paper. | The paper jams or does not feed smoothly into the printer. | There may be some obstacle, such as a cable, in the way of the paper supply or something on top of the paper supply. See page 2-2.
The paper supply may be too far from the printer. Position the paper supply within 3.28 feet (1 meter) of the printer.
The rear cover may be open. Close the rear cover before trying to feed the paper.
The paper may be caught on the paper separator. Be sure the edge of the first page emerges below the paper separator.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The printout contains regular gaps.</td>
<td>The pull tractor sprockets and the built-in tractor sprockets may not be aligned correctly. Align the pull tractor and built-in tractor sprockets.</td>
</tr>
<tr>
<td>Skip over perforation does not work.</td>
<td>The sprocket units may not be positioned for the width of your paper. Move the right sprocket unit to the right to remove any slack in the paper or to the left to remove any excess tension in the paper.</td>
</tr>
<tr>
<td></td>
<td>The paper may have too much slack along its length. Press in the pull tractor feed knob on the right and turn it to remove any excess slack. See page 5-9.</td>
</tr>
<tr>
<td></td>
<td>The paper may not meet the specifications for the DFX-8000. Check that your paper is of the proper size, weight, and thickness. See pages 8-5 and 8-6.</td>
</tr>
<tr>
<td></td>
<td>The print head may be catching the binding area of your multi-part forms. Turn on DIP switch 3-7 to select the skip over binding function. See page 3-16.</td>
</tr>
<tr>
<td></td>
<td>Skip over perforation may be set. Turn off DIP switch 3-3. See page 3-18.</td>
</tr>
<tr>
<td></td>
<td>You may have turned on DIP switch 3-3 when the printer was on. To make any new DIP switch settings effective, turn off the printer and then turn it back on. See page 3-7.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>A pull tractor is installed and the printer does not feed continuous</td>
<td>Your application program may cancel the skip over perforation set by DIP switch 3-3. Check that your application program’s settings are correct.</td>
</tr>
<tr>
<td>paper properly (continued).</td>
<td>The page length may be set incorrectly. Set DIP switch 3-2 to match your paper length. You can also set the page length using ESC C or ESC C 0. See pages 3-17, 9-13, and 9-14.</td>
</tr>
<tr>
<td>Skip over perforation is set, but the perforation does not fall in the</td>
<td>The top of form position may be too high or too low. Adjust the top of form position so that the perforation is centered within the skip area. See page 3-33.</td>
</tr>
<tr>
<td>center of the skip.</td>
<td>The paper cutter’s connector may not be plugged securely into the printer. Turn off the printer. Open the rear flap and check the paper cutter connector. See page 5-22.</td>
</tr>
<tr>
<td>The paper cutter is installed and the printer does not feed continuous</td>
<td></td>
</tr>
<tr>
<td>paper properly.</td>
<td></td>
</tr>
<tr>
<td>When you press the TEAR OFF or FRONTREAR button, the paper cutter does</td>
<td></td>
</tr>
<tr>
<td>not cut the paper.</td>
<td></td>
</tr>
</tbody>
</table>

7-20  Troubleshooting
<table>
<thead>
<tr>
<th>Problem</th>
<th>solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>When you press the FORM FEED or LINE FEED button, the printer does not feed the paper.</td>
<td>The printer may be on line. <strong>Before</strong> you press the FORM FEED or LINE FEED button to feed the paper, be sure the printer is off line (the ON LINE light is out). See page 3-4.</td>
</tr>
<tr>
<td>The paper jams or does not feed smoothly.</td>
<td>The paper cutter may not be correctly <strong>installed</strong>. Remove the paper cutter and then <strong>reinstall</strong> it, making sure the mounting notches and pins fit together properly. See page 5-19.</td>
</tr>
<tr>
<td></td>
<td>The paper cutter may cut the paper so that the perforation at the end of the last printed page remains with the paper loaded in the printer. This perforation may cause a paper jam. Use the MICRO FEED buttons to <strong>position</strong> the paper so that the perforation at the end of the last printed page is even with or just past the cutting <strong>line</strong>. Be sure to set the page length to match your paper. See page 5-24.</td>
</tr>
<tr>
<td></td>
<td>You may be using multi-part forms that vary in thickness with the paper cutter. Multi-part forms that vary in thickness include forms with labels on them and forms that overlap <strong>slightly</strong> where they are glued together. Do not use these forms when the paper cutter is installed. See page 5-19.</td>
</tr>
<tr>
<td></td>
<td>There may be some obstacle, such as a cable, in the way of the paper or something on top of the paper supply.</td>
</tr>
</tbody>
</table>
### Problem
The paper cutter is installed and the printer does not feed continuous paper properly (continued).

### Solution
- The paper supply may be too far from the printer. Position the paper supply within 3.28 feet (1 meter) of the printer.
- The rear cover may be open. Close the rear cover before trying to feed the paper.
- The paper may be caught on the paper separator. Be sure the edge of the first page emerges below the paper separator.
- The sprocket units may not be positioned for the width of your paper. Move the right sprocket unit to the right to remove any slack in the paper or to the left to remove any excess tension in the paper.
- The paper may not meet the specifications for the DFX-8000. Check that your paper is of the proper size, weight, and thickness. See pages 8-5 and 8-6.
- The print head may be catching the binding area of your multi-part forms. Turn on DIP switch 3-7 to select the skip over binding function. See page 3-16.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>An optional interface board is installed and the printer does not work properly.</td>
<td>The interface board may be loose or not properly connected. Check that the interface board is fully inserted into the connector on the back of the printer. See page 5-33.</td>
</tr>
<tr>
<td>The printer does not print or the printout is not what you expect.</td>
<td>You may not be using a compatible interface board. Check if you can use the interface with the DFX-8000. See page 5-33.</td>
</tr>
<tr>
<td></td>
<td>You may not be using the correct cable. Be sure the cable matches the interface specifications.</td>
</tr>
<tr>
<td></td>
<td>The DIP switches or jumpers on the interface board may not be set correctly. See the interface manual for the correct settings.</td>
</tr>
<tr>
<td></td>
<td>The computer and interface settings may not match. See the computer and the interface manual to find the proper settings.</td>
</tr>
</tbody>
</table>
Chapter 8
Technical Specifications

Printer Specifications ......................................................... 8-2
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  Mechanical ........................................................... 8-9
  Electrical .............................................................. 8-10
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Interface Specifications ...................................................... 8-11
  Parallel interface .................................................... 8-11
  Serial interface ...................................................... 8-15

Initialization ................................................................. 8-17
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Printer Specifications

Printing

**Printing method:** 9-pin impact dot matrix

Pin **configuration:** Two 9-pin columns

**Printing speed:**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Characters per inch</th>
<th>Character/second/line</th>
</tr>
</thead>
<tbody>
<tr>
<td>high-speed draft</td>
<td>10</td>
<td>1066</td>
</tr>
<tr>
<td>normal draft</td>
<td>10</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>960</td>
</tr>
<tr>
<td>NLQ</td>
<td>10</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>192</td>
</tr>
</tbody>
</table>

**Printing direction:** Bidirectional logic-seeking for text printing. Unidirectional for graphics (can also be switched to bidirectional using the proper software command).

**Line spacing:** 1/6-inch, 1/8-inch, or programmable in increments of 1/216th of an inch

**Paper feed speed:** Approx. 17 ms/line at 1/6-inch line spacing during continuous feeding 26 ms/line at 1/6-inch line spacing during intermittent feeding

**Printable columns:**

<table>
<thead>
<tr>
<th>Character sizes</th>
<th>Maximum printed characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 cpi</td>
<td>136</td>
</tr>
<tr>
<td>10 cpi condensed</td>
<td>233</td>
</tr>
<tr>
<td>12 cpi</td>
<td>163</td>
</tr>
<tr>
<td>12 cpi condensed</td>
<td>272</td>
</tr>
</tbody>
</table>
**Input buffer:**

3Kbyte

**Character fonts:**

<table>
<thead>
<tr>
<th>Font</th>
<th>Available sizes (characters per inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epson high-speed draft</td>
<td>10</td>
</tr>
<tr>
<td>Epson draft</td>
<td>10, 12, proportional</td>
</tr>
<tr>
<td>Epson NLQ Roman</td>
<td>10, 12, proportional</td>
</tr>
<tr>
<td>Epson NLQ Sans Serif</td>
<td>10, 12, proportional</td>
</tr>
</tbody>
</table>

**Characters:**

Standard ASCII character set with
96 characters (including italic characters)
13 international character sets
(including italic characters)
Epson Extended Graphics character set

**Paper**

**Paper type:**

Continuous-feed paper:
- The sprocket holes must be perfectly circular or circular and notched.
- The holes must be cleanly cut.
- The perforation between pages should not extend all the way to the edges of the paper, as shown below.

---

The edges of paper are not perforated.
Printer Specifications

- At the perforation between pages, the horizontal and vertical perforation cuts should not cross, as shown here:

```
---|---|---
---|---|---
---|---|---
```

Multi-part forms:
- It is best to use pressure-sensitive multi-part forms.
- The form sheets should be securely joined together along the left and right edges with crimping (crash impressions), spot-gluing, or tape-stitching. For the best printing quality, use multi-part forms joined with spot-gluing. Never use multi-part forms joined with metal staples.
- Crimping should be punched from the original sheet side and go completely through all copy sheets. Also, crimping should be double-sided; using single-sided crimping may cause the printer to jam.
- For multi-part forms joined with spot-gluing, be sure the spots of glue are spaced the same way on the left and right edges of the paper.
- The binding area should be flat and have no creases.
- Overlapping multi-part forms should be joined together at the top of the pages and not along the sides of the pages.
- The sprocket holes of all the form sheets should be aligned properly.

Labels:
- Labels should be securely attached to the backing sheet.
- The backing sheet should be covered with the label material, both in the label area and in the spaces between labels. (The backing sheet should not be exposed.)
- The corners of the labels should be rounded.
- The label surface should be flat.

**Paper width and length:**

<table>
<thead>
<tr>
<th>Paper</th>
<th>Width and length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous paper</td>
<td>Width: 101 to 406 mm</td>
</tr>
<tr>
<td>(including multi-part</td>
<td>(4.0 to 16.0&quot;)</td>
</tr>
<tr>
<td>forms)</td>
<td></td>
</tr>
<tr>
<td>Labels backing sheet</td>
<td>Width: 101 to 406 mm</td>
</tr>
<tr>
<td></td>
<td>(4.0 to 16.0&quot;)</td>
</tr>
<tr>
<td></td>
<td>Length: 88.9 mm (3.5&quot;)</td>
</tr>
<tr>
<td></td>
<td>minimum</td>
</tr>
<tr>
<td>label</td>
<td>63.5 x 23.8 mm (2.50 x 0.94&quot;) minimum</td>
</tr>
</tbody>
</table>
Printer Specifications

**Paper weight:**
Continuous paper: 14 to **22 lbs.**
(52.6 to 82.7 g/m²)
Multi-part forms: [11 to **15 lbs.**] x N
([41.1 to 56.4 g/m²] x N)
(N ≤ 6)

**Paper thickness:**
Continuous paper (including multi-part forms):
Front - up to **0.46 mm (0.018")**
Rear - up to **0.30 mm (0.012")**
Labels:
Up to **0.19 mm (0.0075")** including backing sheet
Overlapping area on overlapping multi-part forms:
Up to **0.70 mm (0.028")**

**Printable area:**
Continuous paper:

![Printable area diagram]

8-6  Technical Specifications
Printer Specifications

Labels:

Overlapping multi-part forms:
Multi-part forms with labels:

- Horizontal alignment may be irregular in the top 75 mm (3 inches) of the first page.
- When using the optional pull tractor, do not print on the top 120 mm (4.8 inches) of the first page.
- Any holes or binding materials should be outside the printable area.
**Number of copies:**
With continuous, multi-part forms only. Front - one original plus up to five copies. Total thickness must not exceed 0.46 mm (0.018”). Rear - one original plus up to three copies. Total thickness must not be exceed 0.30 mm (0.012 “).

**Mechanical**

**Paper feed methods:**
Push tractor
Pull tractor (optional)

**Ribbon:**
Cartridge ribbon, available in black only (#8766)
Life expectancy at 14 dots/character: 15 million characters

**MCBF:**
For all components excluding print head: **24,000,000** lines

**MTBF:**
6000 power-on hours (25% duty)

**Print head life:**
400 million characters at 14 dots/character

**Dimensions and weight:**
Height: 369 mm (14.5”)
Width: 700 mm (27.6”)
Depth: 382 mm (15.0”)
Weight: approx. 29 kg (63.9 lbs.)

**Optional paper cutter:**
Cutting position accuracy: ±3 mm (0.12”)
Available cutting area: 3.0 to 25.4 mm (0.12 to 1.00”) below the perforation at the end of page
## Printer Specifications

### Electrical

**Voltage:**
- 103.5 to 132.0 VAC (120V model)
- 198.0 to 264.0 VAC (220–240V model)

**Rated current:**
- 7A (120V model)
- 5A (220–240V model)

**Power consumption:**
200 watts (during self test printing in draft mode)

**Frequency:**
49.5 to 60.5 Hz

**Insulation resistance:**
10 M ohms minimum (between AC power line and chassis)

### Dielectric strength
*(between AC line and chassis):*

- 120V model can withstand 1.00 KV rms applied for one minute or 1.20 KV rms applied for one second
- 220–240V model can withstand 1.25 KV rms applied for one minute or 1.50 KV rms applied for one second

### Environment

**Temperature:**

- **Operation:** $+5^\circ$ to $+35^\circ$C
  ($+41^\circ$ to $+95^\circ$F)
- **Storage:** $-30^\circ$ to $+60^\circ$C
  ($-22^\circ$ to $+140^\circ$F)

**Humidity:**

- **Operation:** 10% to 80% RH without condensation
- **Storage:** 5% to 85% RH without condensation

**Operation angle:** $0^\circ$
Interface Specifications

This section provides specifications for the DFX8000’s parallel and serial interfaces. For specifications on optional interfaces, see their manuals.

WARNING: The DFX-8000 has a parallel interface, a serial interface, and a slot for an optional interface. To avoid damaging the printer, do not connect cables to the parallel interface and the optional interface at the same time. Also do not plug cables into all three interfaces at the same time. However, you can connect cables to the serial interface and the parallel interface or the serial interface and the optional interface at the same time.

Parallel interface

The following table provides the parallel interface connector pin assignments and describes their interface signals.

<table>
<thead>
<tr>
<th>Signal Pin</th>
<th>Return Pin</th>
<th>Signal</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>STROBE</td>
<td>IN</td>
<td>STROBE pulse to read data. Pulse width must be more than 0.5 microseconds at the receiving terminal.</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>DATA 1</td>
<td>IN</td>
<td>These signals represent information of the 1st to 8th bits of parallel data, respectively.</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>DATA 2</td>
<td>IN</td>
<td>Each signal is at HIGH level when data is logical 1 and LOW when it is logical 0.</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>DATA 3</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>DATA 4</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>DATA 5</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>25</td>
<td>DATA 6</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>26</td>
<td>DATA 7</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>27</td>
<td>DATA 6</td>
<td>IN</td>
<td></td>
</tr>
</tbody>
</table>
## Interface Specifications

<table>
<thead>
<tr>
<th>Signal Pin</th>
<th>Return Pin</th>
<th>Signal</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>28</td>
<td>ACKNLG</td>
<td>OUT</td>
<td>About a <strong>12-microsecond pulse</strong>. LOW indicates that data has been received and that the printer is ready to accept more data.</td>
</tr>
<tr>
<td>11</td>
<td>29</td>
<td>BUSY</td>
<td>OUT</td>
<td>A HIGH signal indicates that the printer cannot receive data. The signal goes <strong>HIGH</strong> in the following cases: 1) during data entry (ea. char. time) 2) when off line 3) during a printer error state 4) during printing</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
<td>PE</td>
<td>OUT</td>
<td>A HIGH signal indicates that the printer is out of paper.</td>
</tr>
<tr>
<td>13</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Pulled up to +5 volts through <strong>3.3K ohm</strong> resistance.</td>
</tr>
<tr>
<td>14</td>
<td>—</td>
<td>AUTO FEED XT</td>
<td>IN</td>
<td>When this signal is LOW, the paper is automatically fed one line after printing. <strong>(The signal level can be fixed to this by turning on DIP switch 2-4.)</strong></td>
</tr>
<tr>
<td>15</td>
<td>—</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
<tr>
<td>16</td>
<td>—</td>
<td>0V</td>
<td>—</td>
<td>Logic ground level.</td>
</tr>
<tr>
<td>17</td>
<td>—</td>
<td>CHASS GND</td>
<td>S</td>
<td>Printer’s chassis ground, which is isolated from the logic ground.</td>
</tr>
<tr>
<td>18</td>
<td>—</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
<tr>
<td>19-30</td>
<td>—</td>
<td>GND</td>
<td>—</td>
<td>Twisted-pair return signal ground level.</td>
</tr>
<tr>
<td>31</td>
<td>—</td>
<td>INIT</td>
<td>IN</td>
<td>When this level becomes LOW, the printer controller is reset to its power-up state and the print buffer is cleared. This level is <strong>usually</strong> <strong>HIGH</strong>; its pulse width must be more than <strong>50 microsecond</strong>s at the receiving terminal.</td>
</tr>
</tbody>
</table>

---

**8-12  Technical Specifications**
### Interface Specifications

<table>
<thead>
<tr>
<th>Signal Pin</th>
<th>Return Pin</th>
<th>Signal</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
</table>
| 32         | —          | ERROR  | OUT       | This level becomes LOW when the printer is:  
1) out of paper  
2) off line  
3) in a printer error state |
| 33         | —          | GND    | —         | Same as for pins 19 - 30. |
| 34         | —          | NC     | —         | Not used. |
| 35         | —          | —      | —         | Pulled up to +5V through 3.3K ohm resistance. |
| 36         | —          | SLCT IN| IN        | The DC1/DC3 signal is valid only when this signal is HIGH. (Internal fixing is possible with jumper J1.) |

- 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.

- Data transfer is carried out by observing the ACKNLG or BUSY signal. Data transfer to this printer occurs only after receipt of the ACKNLG signal or when the level of the BUSY signal is LOW.

- The column heading “Direction” refers to the direction of signal flow as viewed from the printer.

- “Return” denotes the twisted-pair return to be connected at signal ground level. For interface wiring, be sure to use a twisted-pair cable for each signal and to complete the connection on the return side. These cables should be shielded and connected to the chassis of the host computer and the printer.
Interface Specifications

Interface timing

The figure below shows the timing for the parallel interface.

![Parallel Interface Timing Diagram]

Printing enabled/disabled signals and control conditions

The table below shows the relationship between printing being enabled or disabled, the on line/off line status, and the receipt of the data on/off control characters, DC1 and DC3.

<table>
<thead>
<tr>
<th>On-line (indicator on)</th>
<th>SLCT IN</th>
<th>DC1/DC3 (data on/off control)</th>
<th>ERROR</th>
<th>BUSY</th>
<th>ACKNLG</th>
<th>Printing (disabled/enabled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-line</td>
<td>Low</td>
<td>DC1/DC3 (no effect)</td>
<td>High</td>
<td>High/Low</td>
<td>Pulsed ea. char.</td>
<td>Enabled (normal cond.)</td>
</tr>
<tr>
<td>On-line</td>
<td>High</td>
<td>DC1 recv'd</td>
<td>High</td>
<td>High/Low</td>
<td>Pulsed ea. char.</td>
<td>Enabled</td>
</tr>
<tr>
<td>On-line</td>
<td>High</td>
<td>DC3 recv'd</td>
<td>High</td>
<td>High/Low</td>
<td>Pulsed ea. char.</td>
<td>Enabled</td>
</tr>
<tr>
<td>Off-line</td>
<td>High/Low (no effect)</td>
<td>DC1/DC3 (no effect)</td>
<td>Low</td>
<td>High</td>
<td>Not generated</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

* While printing is disabled, the printer receives and acknowledges character data so that it can look for another DC1 character, which allows it to resume printing.

8-14 Technical Specifications
Serial interface

The DFX-8000’s built-in serial interface is an RS-232C asynchronous interface. It has the following characteristics:

**Data format:**

- 1 start bit

**Data word length:**

- 7 or 8 bit
  - Odd, even, or no parity
- 1 stop bit

**Baud rate:**

- 300, 1200, 9600, or 19200 bits per second

**Signal level:**

- Mark (1) –3 to –27V
- Space (0) +3 to +27V

**Handshaking:**

Handshaking by DTR signal or X-on/X-off

<table>
<thead>
<tr>
<th>Available bytes in the input buffer</th>
<th>Printer status</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreases to 512 bytes</td>
<td>Cannot receive input data</td>
<td>Sends X-OFF code or sets DTR to 1 (Mark)</td>
</tr>
<tr>
<td>Increases to 784 bytes</td>
<td>Can receive input data</td>
<td>Sends X-ON code or sets DTR flag to 0 (Space)</td>
</tr>
</tbody>
</table>

**Error handling:**

When a parity error is detected, the printer prints an asterisk (*). All other errors are ignored.

**Connector:**

- 25-pin EIA connector
## Interface Specifications

### Pin assignments for the serial interface:

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CG</td>
<td>—</td>
<td>Printer chassis ground.</td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>OUT</td>
<td>Transmits' data for X-on/X-off.</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
<td>IN</td>
<td>Receives data.</td>
</tr>
<tr>
<td>4-6</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
<tr>
<td>7</td>
<td>SG</td>
<td>—</td>
<td>Signal (logic) ground.</td>
</tr>
<tr>
<td>8-10</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
<tr>
<td>11</td>
<td>DTR</td>
<td>OUT</td>
<td>Indicates whether the printer is ready to receive input data. MARK level indicates printer is not ready to receive data.</td>
</tr>
<tr>
<td>12-19</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>OUT</td>
<td>Same as pin 11.</td>
</tr>
<tr>
<td>21-25</td>
<td>NC</td>
<td>—</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

- The column heading “Direction” refers to the direction of signal flow from the printer,
**Initialization**

The table below describes the three ways that the printer can be initialized (returned to a fixed set of conditions).

<table>
<thead>
<tr>
<th>Hardware initialization</th>
<th>Software initialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The printer is turned on.</td>
<td></td>
</tr>
<tr>
<td>• The printer receives an INIT signal at the parallel interface (pin 31 goes LOW).</td>
<td></td>
</tr>
<tr>
<td>• The software sends the ESC @ (initialize the printer) command.</td>
<td></td>
</tr>
</tbody>
</table>

**Default settings**

The following table shows the default conditions that become valid when the printer is initialized.

<table>
<thead>
<tr>
<th>Item</th>
<th>Default condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of form position</td>
<td>Last setting by TOP OF FORM button</td>
</tr>
<tr>
<td>Page <strong>length</strong></td>
<td>The current DIP switch setting</td>
</tr>
<tr>
<td>Left and right margins</td>
<td><strong>Cancelled</strong></td>
</tr>
<tr>
<td>Line spacing</td>
<td>1/6-inch line spacing</td>
</tr>
<tr>
<td>Vertical tab position</td>
<td><strong>Cleared</strong></td>
</tr>
<tr>
<td>Horizontal tab position</td>
<td>Every eight characters</td>
</tr>
<tr>
<td>VFU channel</td>
<td><strong>Channel 0</strong></td>
</tr>
<tr>
<td>Condensed mode</td>
<td>The current DIP switch setting</td>
</tr>
<tr>
<td>Justification</td>
<td>Left justification</td>
</tr>
<tr>
<td><strong>Special printing effects</strong></td>
<td>The current DIP switch settings where applicable. Other effects are <strong>cancelled</strong>.</td>
</tr>
<tr>
<td>Graphic mode assignment</td>
<td><strong>ESCK = ESC * 0, ESCL = ESC * 1, ESCY = ESC * 2, ESCZ = ESC * 3</strong></td>
</tr>
<tr>
<td>User-defined character set</td>
<td>Epson ESC/P mode: not cleared</td>
</tr>
<tr>
<td></td>
<td>IBM emulation mode: cleared</td>
</tr>
</tbody>
</table>
Initialization

Note: The data buffer is cleared only when the printer is initialized by turning on the power or by an INIT signal.
Chapter 9
Command Summary

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  Control key chart ......................................................... 9-4

Commands in Numerical Order ........................................... 9-5

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Using the Command Summary

This chapter lists and describes all the commands available on the DFX-8000. This chapter includes the commands available in both Epson ESC/P mode and IBM emulation mode.

Note: Epson ESC/P mode is selected when DIP switch 1-4 is turned off. To select IBM emulation mode, turn on DIP switch 1-4.

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

Note: The Quick Reference card at the end of this manual also lists the commands by topic with page numbers that direct you to full explanations of the commands. The numerical list and the Quick Reference card indicate which commands work differently in Epson ESC/P mode and IBM emulation mode.

The second part of this chapter describes the commands available in Epson ESC/P mode and the third part of this chapter describes the commands available in IBM emulation mode. These sections list and describe each command separately. The commands are divided into the following subjects:

- Printer operation
- Print enhancement
- Data control
- Word processing
- Vertical motion
- Character tables
- Horizontal motion
- User-defined characters
- Overall printing style
- Graphics
- Print size and character width

Command Summary
Each command description has a format section and a comment section. The format section gives the ASCII, decimal, and hexadecimal values for the command. These three formats are equivalent, and it should be easy to pick the one most suited to your purpose. The comment section describes the effect of the command and gives any additional information necessary for using it.

Note: Some application programs can use control key sequences. See the Control key chart on page 9-4 for information on using control keys.

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: OF

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 double-wide mode the code format is the following:

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

In this case n can be either 1 or 0, to begin or end double-wide printing. You can use either of the following commands to turn on double-wide printing from BASIC:

LPRINT CHR$(27):CHR$(87):CHR$(1)
LPRINT CHR$(27):"W":CHR$(1)
Using the Command Summary

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

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

For example, in BASIC you can select draft mode with either of these statements:

```
LPRINT CHR$(27);"x":CHR$(0)
LPRINT CHR$(27);"x":"0"
```

Control key chart

Some application programs can use control key codes for decimal values 0 through 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.

<table>
<thead>
<tr>
<th>Dec</th>
<th>Hex</th>
<th>control key</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00</td>
<td>@</td>
</tr>
<tr>
<td>1</td>
<td>01</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>02</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>03</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>04</td>
<td>D</td>
</tr>
<tr>
<td>5</td>
<td>05</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>06</td>
<td>F</td>
</tr>
<tr>
<td>7</td>
<td>07</td>
<td>G</td>
</tr>
<tr>
<td>8</td>
<td>08</td>
<td>H</td>
</tr>
<tr>
<td>9</td>
<td>09</td>
<td>I</td>
</tr>
<tr>
<td>10</td>
<td>0A</td>
<td>J</td>
</tr>
<tr>
<td>11</td>
<td>0B</td>
<td>K</td>
</tr>
<tr>
<td>12</td>
<td>0C</td>
<td>L</td>
</tr>
<tr>
<td>13</td>
<td>0D</td>
<td>M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dec</th>
<th>Hex</th>
<th>control key</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0E</td>
<td>N</td>
</tr>
<tr>
<td>15</td>
<td>0F</td>
<td>O</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
<td>P</td>
</tr>
<tr>
<td>17</td>
<td>11</td>
<td>Q</td>
</tr>
<tr>
<td>18</td>
<td>12</td>
<td>R</td>
</tr>
<tr>
<td>19</td>
<td>13</td>
<td>S</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
<td>T</td>
</tr>
<tr>
<td>21</td>
<td>15</td>
<td>U</td>
</tr>
<tr>
<td>22</td>
<td>16</td>
<td>V</td>
</tr>
<tr>
<td>23</td>
<td>17</td>
<td>W</td>
</tr>
<tr>
<td>24</td>
<td>18</td>
<td>X</td>
</tr>
<tr>
<td>25</td>
<td>19</td>
<td>Y</td>
</tr>
<tr>
<td>26</td>
<td>1A</td>
<td>Z</td>
</tr>
<tr>
<td>27</td>
<td>1B</td>
<td>[</td>
</tr>
</tbody>
</table>

Note: Many programs use the control keys for other purposes. Also, some programs do not use all these keys.
# Commands in Numerical Order

This section lists all the DFX commands, with their decimal and hexadecimal values. The numbers in the columns on the right are the page numbers in this chapter where you can find a complete description of the command. If the Epson ESC/P and IBM emulation mode page numbers are the same, the command is the same in both modes and is described only in the Epson ESC/P mode section.

<table>
<thead>
<tr>
<th>ASCII</th>
<th>Dec</th>
<th>Hex</th>
<th>Description</th>
<th>Epson ESC/P mode</th>
<th>IBM Emulation mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEL</td>
<td>7</td>
<td>07</td>
<td>Beeper</td>
<td>9-12</td>
<td>9-12</td>
</tr>
<tr>
<td>BS</td>
<td>8</td>
<td>08</td>
<td>Backspace</td>
<td>9-20</td>
<td>9-20</td>
</tr>
<tr>
<td>HT</td>
<td>9</td>
<td>09</td>
<td>Tab Horizontally</td>
<td>9-22</td>
<td>9-22</td>
</tr>
<tr>
<td>LF</td>
<td>10</td>
<td>0A</td>
<td>Line Feed</td>
<td>9-15</td>
<td>9-15</td>
</tr>
<tr>
<td>VT</td>
<td>11</td>
<td>0B</td>
<td>Tab Vertically</td>
<td>9-17</td>
<td>9-17</td>
</tr>
<tr>
<td>FF</td>
<td>12</td>
<td>0C</td>
<td>Form Feed</td>
<td>9-14</td>
<td>9-14</td>
</tr>
<tr>
<td>CR</td>
<td>13</td>
<td>0D</td>
<td>Carriage Return</td>
<td>9-12</td>
<td>9-12</td>
</tr>
<tr>
<td>s o</td>
<td>14</td>
<td>0E</td>
<td>Select Double-wide Mode</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(one line)</td>
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<tr>
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<td>DC1</td>
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<td>Delete Character</td>
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<td>Set Intercharacter Space</td>
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<td>Master Select</td>
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<td>Cancel MSB Control</td>
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<td>ESC</td>
<td>$</td>
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<td>Set Absolute Print Position</td>
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Command Summary 9-5
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<td>Define User-defined Characters</td>
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<td>ESC 0</td>
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<td>Select 7/72-inch Line Spacing</td>
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<td>Cancel Italic Mode</td>
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<td>Turn Automatic Line Feed On/Off</td>
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<td>Select International Character Set</td>
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<td>Enable Upper Control Codes</td>
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<td>Select Unidirectional Mode (one line)</td>
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<td>Set MSB to 0</td>
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<td>Define User-defined Characters</td>
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<td>-------------------------------------------------</td>
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<td>3F</td>
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<td>41</td>
<td>Set n/72-inch Line Spacing ........................</td>
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<td>Set Vertical Tabs ..................................</td>
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<td>set <strong>Page Length</strong> in Lines .....................</td>
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<td>9-13</td>
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<td>43</td>
<td>Set Page Length in Inches .......................</td>
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<td>68</td>
<td>44</td>
<td>Set Horizontal Tabs ...............................</td>
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<td><strong>Select</strong> Emphasized Mode .......................</td>
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<td>Cancel <strong>Emphasized</strong> Mode .......................</td>
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<td>73</td>
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<td>73</td>
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<td>Select Font ........................................</td>
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<td>Perform n/216-inch Line Feed .....................</td>
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<td>75</td>
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<td>ESC L</td>
<td>76</td>
<td>4C</td>
<td><strong>Select</strong> <strong>Double-density</strong> Graphics Mode ....</td>
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<td>ESC M</td>
<td>77</td>
<td>4D</td>
<td>Select <strong>12 cpi</strong> ................................</td>
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<td>ESC N</td>
<td>78</td>
<td>4E</td>
<td>Set Ship Over Perforation ........................</td>
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<td>79</td>
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<td>Cancel Ship Over Perforation ....................</td>
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<td>Select <strong>10 cpi</strong> ................................</td>
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<td>Turn Proportional Mode <strong>On/Off</strong> ...............</td>
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<td>ESC Q</td>
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<td>Set Right Margin ..................................</td>
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<td>51</td>
<td>Deselect <strong>Printer</strong> ............................</td>
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<td>ESC R</td>
<td>82</td>
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<td>Select an <strong>International</strong> Character Set .......</td>
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<td>ESC R</td>
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<td>Restore Default Tab Settings ....................</td>
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**Command Summary** 9-7
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<td>ESC SO</td>
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<td>Select Superscript Mode</td>
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<td>ESC S1</td>
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<td>Select Subscript Mode</td>
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<td>54</td>
<td>Cancel Superscript/Subscript Mode</td>
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<td>ESC U</td>
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<td>Set Left and Right Margins</td>
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<td>ESC W</td>
<td>87</td>
<td>57</td>
<td>Turn Double-wide Mode On/Off</td>
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<td>ESC Y</td>
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<td>Select High-speed Double-density Graphics Mode</td>
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<td>Select Quadruple-density Graphics Mode</td>
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<td>Set Double-high/Double-wide Printing</td>
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<td>5C</td>
<td>Set Relative Print Position</td>
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<td>ESC \</td>
<td>92</td>
<td>5C</td>
<td>Print Characters from Symbol Set</td>
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<td>ESC ^</td>
<td>94</td>
<td>5E</td>
<td>Select 9-pin Graphics Mode</td>
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<td>ESC ^</td>
<td>94</td>
<td>5E</td>
<td>Print One Character from Symbol Set</td>
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<td>Turn Overscoring Mode On/Off</td>
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<td>Select Justification</td>
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<td>Set Vertical Tabs in Channels</td>
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<td>Select Typestyle Family</td>
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<td>ESC t</td>
<td>116</td>
<td>74</td>
<td>Select Character Table</td>
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<td>ESC w</td>
<td>119</td>
<td>77</td>
<td>Turn Double-high Mode On/Off</td>
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<tr>
<td>ESC x</td>
<td>120</td>
<td>78</td>
<td>Select Near Letter Quality or Draft</td>
<td>9-23</td>
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</tr>
</tbody>
</table>
Epson ESC/P Commands Arranged by Topic

This section lists and describes all the commands available in Epson ESC/P mode.

Printer operation

ESC @ Initialize Printer

Format:

ASCII code:   ESC   @
Decimal:      27    64
Hexadecimal:  1B    40

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

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.
Epson ESC/P Commands Arranged by Topic

DC3

Deselect Printer

Format:

ASCII code: DC3
Decimal: 19
Hexadecimal: 13

Comments:
Puts the printer into the deselected state until the select printer code (DC1) is received. The printer cannot be reselected with the ON LINE button.

ESC <

Select Unidirectional Mode (one line)

Format:

ASCII code: ESC <
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.
0: Mode is turned off.

Text printing is normally bidirectional. This command selects unidirectional printing for more accurate positioning.
Note: **MSB** is the Most Significant Bit. **MSB** control (**ESC =**, **ESC >**, and **ESC #**) is not valid for graphics or user-defined character.

**ESC =** (equal)  
Set **MSB** to 0

Format:

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<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>=</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Hexadecimal</td>
<td>1B</td>
<td>3D</td>
</tr>
</tbody>
</table>

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 are always printed. **ESC =** can overcome this problem.

**ESC >**  
Set **MSB** to 1

Format:

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<th>ESC</th>
<th>&gt;</th>
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</tr>
<tr>
<td>Hexadecimal</td>
<td>1B</td>
<td>3E</td>
</tr>
</tbody>
</table>

Comments:
Sets the **MSB** bit of all incoming data as 1.

**ESC #**  
Cancel **MSB** Control

Format:

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<th>ASCII code</th>
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</thead>
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<td>35</td>
</tr>
<tr>
<td>Hexadecimal</td>
<td>1B</td>
<td>23</td>
</tr>
</tbody>
</table>

Comments:
Cancels the **MSB** control set by **ESC =** or **ESC >**.
<table>
<thead>
<tr>
<th>Command</th>
<th>Format</th>
<th>ASCII code</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ESC</strong> EM</td>
<td>Select Paper Path</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BEL</strong></td>
<td>Beeper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CR</strong></td>
<td>Carriage Return</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ESC EM

**Format:**

- **ASCII code:** ESC EM \( n \)
- **Decimal:** 27 25 \( n \)
- **Hexadecimal:** 1B 19 \( n \)

**Comments:**

The following values can be used for \( n \):

- **F**: Selects the front tractor.
- **B**: Selects the rear tractor.

Use this command only when the paper cutter is installed.

### BEL

**Format:**

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

**Comments:**

Sounds the printer’s beeper.

### Data control

### CR

**Format:**

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

**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 2-4 is on or the AUTO FEED XT line on the parallel interface is held LOW.
Epson ESC/P Commands Arranged by Topic

**CAN**  
**Format:**

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

**Comments:**
Removes all text on the print line but does not affect control codes.

**DEL**  
**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**

**ESC C**  
**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 1 to 127. The top of form position is set to the current line. Overrides the DIP switch page length setting.
**ESC C 0**  
Set Page Length in Inches

Format:

- **ASCII code:** ESC C 0 \( n \)
- **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 1 to 22. The top of form position is set to the current line.  
  Overrides the DIP switch page length setting.

**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 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 of the next page. For example, with the standard settings for line spacing (1/6-inch), and page length (66 lines), **ESC N 6** cause the **DFX-8000** to print 60 lines and then skip 6. DIP switch **3-3 performs** the same function. This setting is **cancelled** by **ESC 0** and also by **ESC C** or **ESC C 0**. The value of \( n \) must be from 1 to 127. Overrides the 1-inch skip over perforation setting of DIP switch **3-3**.
**ESC 0**  
**Cancel Skip Over Perforation**

**Format:**

- **ASCII code:** \textit{ESC} 0
- **Decimal:** 27 79
- **Hexadecimal:** 1B 4F

**Comments:**
Cancels the skip over perforation set by \texttt{ESC N}. Also overrides the 1-inch skip over perforation setting of DIP switch 3-3.

**LF**  
**Line Feed**

**Format:**

- **ASCII code:** \texttt{LF}
- **Decimal:** 10
- **Hexadecimal:** 0A

**Comments:**
When this command is received, the data in the print buffer is printed and the paper \texttt{advances} one line in the current line spacing.

**ESC 0**  
**Select 1/8-inch Line Spacing**

**Format:**

- **ASCII code:** \textit{ESC} 0
- **Decimal:** 27 48
- **Hexadecimal:** 1B 30

**Comments:**
Set the line spacing to 1/8 of an inch for subsequent line feed commands. \texttt{The 0} is the character zero \texttt{and} not ASCII code 0.
**Epson ESC/P Commands Arranged by Topic**

**ESC 1**

**Select 7/72-inch Line Spacing**

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>49</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>31</td>
</tr>
</tbody>
</table>

**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 1/6-inch Line Spacing**

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>32</td>
</tr>
</tbody>
</table>

**Comments:**
Sets the line spacing to 1/6 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:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>3</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>51</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>33</td>
<td>n</td>
</tr>
</tbody>
</table>

**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 to 255.
**ESC A** Select \( \frac{n}{72} \)-inch Line Spacing

Format:

- ASCII code: \( \text{ESC} \ A \ n \)
- Decimal: 27 65 \( n \)
- Hexadecimal: 1B 41 \( n \)

Comments:
Sets the line spacing to \( \frac{n}{72} \) of an inch for subsequent line feed commands. The value of \( n \) must be from 0 to 85.

**ESC J** Perform \( \frac{n}{216} \)-inch Line Feed

Format:

- ASCII code: \( \text{ESC} \ J \ n \)
- Decimal: 27 74 \( n \)
- Hexadecimal: 1B 4A \( n \)

Comments:
Advances the paper \( \frac{n}{216} \) of an inch. The value of \( n \) must be from 0 to 255. This command produces an immediate line feed but does not affect subsequent line spacing and does not produce a carriage return.

**VT** Tab Vertically

Format:

- ASCII code: \( \text{VT} \)
- Decimal: 11
- Hexadecimal: 0B

Comments:
Advances the paper to the next tab setting in the channel selected by \( \text{ESC} \ /. \) 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:**

<table>
<thead>
<tr>
<th>Format</th>
<th>ASCII code:</th>
<th>Decimal:</th>
<th>Hexadecimal:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ESC B n1 n2 . . . . . 0</td>
<td>27 66 n1 n2 . . . . . 0</td>
<td>1B 42 n1 n2 . . . . . 00</td>
</tr>
</tbody>
</table>

**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 \( n_1, n_2, \) etc., **all** from 1 to **255**, in ascending order. The 0 character indicates the end of the command. All settings are stored in channel **0** (see **ESC b**). **ESC B 0** clears the tab settings.

### ESC b  
**Set Vertical Tabs in Channels**

**Format:**

<table>
<thead>
<tr>
<th>Format</th>
<th>ASCII code:</th>
<th>Decimal:</th>
<th>Hexadecimal:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ESC b c n1 n2 . . . . . 0</td>
<td>27 98 c n1 n2 . . . . . 0</td>
<td>1B 62 c n1 n2 . . . . . 00</td>
</tr>
</tbody>
</table>

**Comments:**

Functions the same as **ESC B**, except that the variable **c** selects a channel for the vertical tabs, which must be between **0** and **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 0**.
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. The value of c must be from 0 to 7. All subsequent vertical tab commands use the channel selected by this command. If no channel has been selected, channel 0 is used.

Horizontal motion

ESC l
Set Left Margin

Format:

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

Comments:
Sets the left margin to n columns in the current character size. Settings made in proportional mode are treated as 10 cpi. This command clears previous tab settings and all previous characters in the print line. Use lowercase l (for left), not the numeral one. The ‘minimum space between the margins is the width of one double-wide 10 cpi character.'
ESC Q  Set Right Margin

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>Q</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>81</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>51</td>
<td>n</td>
</tr>
</tbody>
</table>

Comments:
Sets the right margin to \textit{n} columns in the current character size. Settings made in proportional mode are treated as \textbf{10 cpi}. 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 \textbf{10 cpi} character.

BS  Backspace

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>8</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>08</td>
</tr>
</tbody>
</table>

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. Do not use the \textbf{BS} code if \textbf{ESC a 2} or \textbf{a 3} has been sent. 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.
Epson ESC/P Commands Arranged by Topic

**ESC $**  
Set Absolute Print Position

Format:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>DEC</th>
<th>HEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC $ n1 n2</td>
<td>27 36</td>
<td>1B 24</td>
</tr>
</tbody>
</table>

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 \( = n1 + (n2 \times 256) \). Each unit equals \( \frac{1}{60} \)th 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:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>DEC</th>
<th>HEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC \ n1 n2</td>
<td>27 92</td>
<td>1B 5C</td>
</tr>
</tbody>
</table>

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 \( \frac{1}{120} \)ths 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 \( = n1 + (n2 \times 256) \). The command is ignored if it would move the print position outside the current margins.
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, character size, and tab positions are not affected by subsequent changes in character size.

ESC D

Set Horizontal Tabs

Format:

ASCII code: ESC D n1 n2 . . . . . 0
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 to 255) with the 0 character or any value less than the previous one terminating the command. ESC D 0 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 size is changed. For proportional printing, the size of 10 cpi characters determines the tab positions.
Overall printing style

**ESC x**  
Select NLQ or Draft

Format:

<table>
<thead>
<tr>
<th>ASCII code: ESC x n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal: 27 120 n</td>
</tr>
<tr>
<td>Hexadecimal: 1B 78 n</td>
</tr>
</tbody>
</table>

Comments:

The following values can be used for n:

0: Selects draft mode.
1: Selects near letter quality (NLQ) mode.

When NLQ is selected, the font used for printing is either Roman or Sans Serif, whichever is currently selected. Overrides the DIP switch setting.

**ESC k**  
Select Typestyle Family

Format:

<table>
<thead>
<tr>
<th>ASCII code: ESC k n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal: 27 107 n</td>
</tr>
<tr>
<td>Hexadecimal: 1B 6B n</td>
</tr>
</tbody>
</table>

Comments:

This command affects only the near letter quality typestyle, not the draft typestyle.

You can use the following values for n:

0 = Roman
1 = Sans Serif
ESC I

Master Select

Format:

ASCII code: \texttt{ESC \textasciitilde I \textasciinumeric{n}}

Decimal: \texttt{27 33 \textasciinumeric{n}}

Hexadecimal: \texttt{1B 21 \textasciinumeric{n}}

Comments:

Select any valid combination of the modes in the table below. The variable \texttt{n} is determined by adding together the values of the desired modes from the table.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Dec</th>
<th>Hex</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 cpi</td>
<td>0</td>
<td>00</td>
</tr>
<tr>
<td>12 cpi</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>Proportional</td>
<td>2</td>
<td>02</td>
</tr>
<tr>
<td>Condensed</td>
<td>4</td>
<td>04</td>
</tr>
<tr>
<td>Emphasized</td>
<td>8</td>
<td>08</td>
</tr>
<tr>
<td>Double-strike</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Double-wide</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>Italic</td>
<td>64</td>
<td>40</td>
</tr>
<tr>
<td>Underline</td>
<td>128</td>
<td>80</td>
</tr>
</tbody>
</table>

This command applies to both draft and NLQ. \texttt{10 cpi} cannot be combined with \texttt{12 cpi}, and proportional cannot be condensed. If both proportional and condensed are selected, proportional overrides condensed. If both emphasized and condensed are selected, emphasized is ignored. Double-strike is ignored in NLQ. For more information on selecting typestyles with Master Select, see Chapter 4.
Epson ESC/P Commands Arranged by Topic

Print size and character width

ESC P

Select 10 cpi

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27 80</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B 50</td>
</tr>
</tbody>
</table>

Comments:
Selects 10 cpi (characters per inch) printing. This command is normally used to cancel 12 cpi.

ESC M

Select 12 cpi

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27 77</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B 4D</td>
</tr>
</tbody>
</table>

Comments:
Selects 12 cpi (characters per inch) printing.

ESC p

Turn Proportional Mode On/Off

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC p n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27 112 n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B 70 n</td>
</tr>
</tbody>
</table>

Comments:
The following values can be used for n:
1: Mode is turned on.
0: Mode is turned off.
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 in the Appendix. This command overrides condensed.
Epson *ESC/P* Commands Arranged by Topic

### 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 10 cpi mode has 17 characters per inch. Proportional mode cannot be Condensed, **and proportional** overrides 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**, or DIP switch 1-1.
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: | 14 |

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:**  
You can use the following values for n:  
1: Mode is turned on.  
0: Mode is turned off.  
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 57 n  

**Comments:**  
You can use the following values for n:  
1: Mode is turned on.  
0: Mode is turned off.  
Double-high mode doubles the height of all characters. The superscript, subscript, and condensed modes do not work when double-high mode is selected.
Print enhancement

ESC E
Select Emphasized Mode

Format:

ASCII code: \texttt{ESC E}
Decimal: \texttt{27 69}
Hexadecimal: \texttt{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: \texttt{ESC F}
Decimal: \texttt{27 70}
Hexadecimal: \texttt{1B 46}

Comments:
Cancels emphasized, the mode selected by \texttt{ESC E} or \texttt{ESC I}.
Epson *ESC/P* Commands Arranged by Topic

**ESC G**
Select Double-strike Mode

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>71</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>47</td>
</tr>
</tbody>
</table>

Comments:
Makes text bolder by printing each line twice, with the second printing slightly below the first. Double-strike is not available in high-speed draft or NLQ mode.

**ESC H**
Cancel Double-strike Mode

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>72</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>48</td>
</tr>
</tbody>
</table>

Comments:
**Turns** off double-strike mode selected by ESC G or ESC !.

**ESC S 0**
Select Superscript Mode

Format:

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>S</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>83</td>
<td>0</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>53</td>
<td>00</td>
</tr>
</tbody>
</table>

Comments:
Prints characters about two-thirds of the normal height in the upper part of the character space. Superscript is cancelled with ESC T. It cannot be combined with double-high mode.
**ESC S 1**  
Select Subscript Mode

Format:

ASCII code:  \texttt{ESC S 1}  
Decimal:  \texttt{27 83 1}  
Hexadecimal:  \texttt{1B 53 01}  

Comments:
Prints characters about two-thirds of the normal height in the lower part of the character space. Subscript is cancelled with \texttt{ESC T}. It cannot be combined with double-high mode.

---

**ESC T**  
Cancel Superscript/Subscript

Format:

ASCII code:  \texttt{ESC T}  
Decimal:  \texttt{27 84}  
Hexadecimal:  \texttt{1B 54}  

Comments:
Cancels either superscript or subscript.

---

**ESC 4**  
Select Italic Mode

Format:

ASCII code:  \texttt{ESC 4}  
Decimal:  \texttt{27 52}  
Hexadecimal:  \texttt{1B 34}  

Comments:
Causes italic characters to be printed. This command is valid even if the Epson Extended Graphics character set has been selected by \texttt{ESC t} or DIP switch l-3, but character graphics (ASCII codes 176 to 223 and 240 to 254) cannot be italicized.
Epson ESC/P Commands Arranged by Topic

**ESC 5**

**Cancel Italic Mode**

Format:

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

**Comments:**
Cancels the mode selected by `ESC 4` or `ESC I`.

---

**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.
- **0:** Mode is **turned** off.

This mode provides continuous underlining, including spaces.
Word processing

**ESC a** (Select Justification)

Format:

- **ASCII code:** \(\text{ESC} \ a \ n\)
- **Decimal:** 27 97 9
- **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 a CR, VT, LF, or FF command is received. The commands DEL and BS are invalid in \(n=3\) mode. For \(n=3\) there must be no carriage returns within a paragraph.

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

Format:

- **ASCII code:** \(\text{ESC} \ SP \ n\)
- **Decimal:** 27 32 n
- **Hexadecimal:** 1B 20 n

**Comments:**

Set 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 0 to 127. Each unit of space is \(1/120\)th of an inch.
Character tables

ESC t

Format:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>t</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>116</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>74</td>
<td>n</td>
</tr>
</tbody>
</table>

Comments:

The following values can be used for \( n \):

- 0: Selects italic character set.
- 1: Selects Epson Extended Graphics character set. Selects the character table used by ASCII codes 128 through 255. Selecting Epson Extended Graphics does not disable italic printing. Italic printing can still be selected by ESC 4.
- Duplicates and overrides the function of DIP switch 1–3. Note that the value of \( n \) must equal 00 or 01 hex. See the Appendix for the character tables.

ESC R

Format:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>R</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>82</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>52</td>
<td>n</td>
</tr>
</tbody>
</table>

Comments:

The following values can be used for \( n \):

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

Overrides the DIP switch settings for international characters. See the section on international character sets in Chapter 3 for full information on international character sets.
Epson ESC/P Commands Arranged by Topic

**ESC 6**

Enable Printable Characters

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 is the default when the Epson **Extended Graphics character** table is selected by DIP switch l-3. See the Appendix for the characters that are printed with these codes.

**ESC 7**

Enable Upper Control Codes

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. When **the italic** character table is selected by DIP switch l-3, this is the default.
User-defined characters

**ESC &**

| Define User-defined Characters |

**Format:**

- **ASCII code:** \( \text{ESC} \ & \ 0 \ n1 \ n2 \ a1 \ d1 \ d2 \ \ldots \ \ldots \ dn \)
- **Decimal:** 27 38 0 n1 n2 a1 d1 d2 \ldots \ dn
- **Hexadecimal:** 1B 26 00 n1 n2 a1 d1 d2 \ldots \ dn

**Comments:**
- This command defines characters in the currently selected mode.
- This command does not work when DIP switch 2-1 is on.

**ESC :**

| Copy ROM into RAM |

**Format:**

- **ASCII code:** \( \text{ESC} \ ; \ 0 \ n \ 0 \)
- **Decimal:** 27 58 0 n 0
- **Hexadecimal:** 1B 3A 00 n 00

**Comments:**
- This command copies the characters in the ROM into RAM so that specific characters can be redefined. This command does not work when DIP switch 2-1 is on. One of the NLQ fonts is copied depending on the value specified for \( n \).
  - 0: Roman
  - 1: Sans Serif
ESC %

Select **User-defined** Set

Format:

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

Comments:

The following values can be used for `n`:

- **0:** Selects the normal set.
- **1:** Selects the **user-defined** set.

**ESC &** is required to define the character set.

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 when the **ESC I** command is received if `n=1`. When these codes are printable, they can be used for **user-defined** characters. If `n=0`, this command **returns** codes **0** to **31** and **128** to **159** to non-printable codes.
Epson ESC/P Commands Arranged by Topic

**Graphics**

See Chapter 4 for sample graphics programs. Also see the table under ESC * for graphics modes.

**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 = \( n1 + (n2 \times 256) \).

**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 = \( n1 + (n2 \times 256) \).

**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 = \( n1 + (n2 \times 256) \).
**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 = $n1 + (n2 \times 256)$.

**ESC ***

Select Graphics Mode

Format:

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

Comments:

Turns on graphics mode $m$. See the table below for information on the available modes. The total number of columns = $n1 + (n2 \times 256)$.

<table>
<thead>
<tr>
<th>Option</th>
<th>Alternate Code</th>
<th>$m$</th>
<th>Horiz. density (dots/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-density</td>
<td>ESC K</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Double-density</td>
<td>ESC L</td>
<td>1</td>
<td>120</td>
</tr>
<tr>
<td>High-speed double-density</td>
<td>ESC Y</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>Quadruple-density*</td>
<td>ESC Z</td>
<td>3</td>
<td>240</td>
</tr>
<tr>
<td>CRT I</td>
<td>none</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Plotter (1:1)</td>
<td>none</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>CRT II</td>
<td>none</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>Double-density plotter</td>
<td>none</td>
<td>17</td>
<td>144</td>
</tr>
</tbody>
</table>

* Adjacent dots cannot be printed in this mode.
Epson ESC/P Commands Arranged by Topic

**ESC ?**

Reassign Graphics Mode

Format:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>?</th>
<th>s</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>63</td>
<td>s</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>3F</td>
<td>s</td>
<td>n</td>
</tr>
</tbody>
</table>

Comments:
Changes from 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:

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>^</th>
<th>m</th>
<th>n1</th>
<th>n2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>94</td>
<td>m</td>
<td>n1</td>
<td>n2</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>5E</td>
<td>m</td>
<td>n1</td>
<td>n2</td>
</tr>
</tbody>
</table>

Comments:
Turns on 9-pin graphics mode. The variable \( m \) defines density of print: 0 for single (60 dpi) and 1 for double (120 dpi). The total number of columns = \( n1 + (n2 \times 256) \). This mode requires two data items for each column of print.
IBM Emulation Mode Commands Arranged by Topic

This section lists and describes the commands available in IBM emulation mode. Commands that are the same in IBM emulation and Epson ESC/P mode are listed here and described in the Epson ESC/P command section. Commands that have different functions in IBM emulation mode are fully described here.

Commands that duplicate Epson ESC/P commands
This section lists commands that are the same in IBM emulation and Epson ESC/P mode. See the section on Epson ESC/P commands for descriptions of the commands listed below.

**Printer operation:**
BEL, DC1, DC3, ESC U

**Data control:**
CR, CAN

**Vertical motion:**
LF, VT, FF, ESC 0, ESC 1, ESC 3, ESC C, ESC CO, ESC N, ESC 0

**Horizontal motion:**
BS, HT

**Print size and character width:**
SO, SI, DC4, ESC SO, ESC SI, ESC W

**Print enhancement:**
ESC -, ESC E, ESC F, ESC G, ESC H, ESC SO, ESC S1, ESC T

**Graphics:**
ESC K, ESC L, ESC Y, ESC Z

Command Summary 9-41
Notes:
- The **FF** command does not work at the top of form position when DIP switch 2–1 is off in IBM emulation mode.
- IBM **emulation** mode graphics are the **same** as Epson **ESC/P** mode graphics except that **ESC ***, **ESC ?**, and **ESC ^** are not **available**.

Commands that **differ** from Epson **ESC/P** commands

Printer operation:

**ESC Q22**

Deselect Printer

Format:

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

Comments:
Takes the printer off line until you turn the printer off and then back on or until the printer receives a **DC1** code.

**Vertical** motion:

**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 **1/6** of an inch.
**ESC 4**

Set Top of Form

Format:

| ASCII code: | ESC | 4 |
| Decimal:    | 27  | 52 |
| Hexadecimal:| 1B  | 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.

**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 1 to 85.
IBM Emulation Mode Commands Arranged by Topic

**ESC J**

**Perform \( \text{n/216-inch} \) 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 line spacing of \( \text{n/216} \) of an inch. The value of \( n \) must be from 0 to 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 B**

**Set Vertical Tabs**

Format:

- **ASCII code:** `ESC B n1 n2 . . . . 0`
- **Decimal:** 27 66 \( n1 \) \( n2 \) . . . . 0
- **Hexadecimal:** 1B 42 \( n1 \) \( n2 \) . . . . 00

Comments:

Sets up to 64 vertical tabs in the current line spacing. Tab settings are not affected by subsequent changes in line spacing. The tab settings are entered as \( n1, n2 \), etc., all from 1 to 255, in ascending order. The 0 character indicates the end of the command. **ESC B 0** clears the tab settings.
**Horizontal motion:**

**ESC D** Set Horizontal Tabs

Format:

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

Comments:
This command allows setting of up to 28 horizontal tabs, which are entered as `n1, n2, n3`, etc. (from 1 to 137) with the 0 character terminating the command. The tab settings must be entered in **ascending** order. **ESC D 0** clears all tabs. The tab settings on power up are every eight characters. The tab positions change if **the character size is changed. Only double-wide mode** does not affect 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.
**IBM Emulation Mode Commands Arranged by Topic**

### ESC X

**Set Left and Right Margins**

**Format:**

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>X</th>
<th>n1</th>
<th>n2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal</td>
<td>27</td>
<td>88</td>
<td>n1</td>
<td>n2</td>
</tr>
<tr>
<td>Hexadecimal</td>
<td>1B</td>
<td>58</td>
<td>n1</td>
<td>n2</td>
</tr>
</tbody>
</table>

**Comments:**

The left margin column is set to \(n1\) in the current character size, ignoring double-wide. The right margin column is set to \(n2\). The minimum-distance between the two margins is \(1/2\) inch. The first column is number 1, not number 0.

### ESC I

**Select Font**

**Format:**

<table>
<thead>
<tr>
<th>ASCII code</th>
<th>ESC</th>
<th>I</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal</td>
<td>27</td>
<td>73</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal</td>
<td>1B</td>
<td>49</td>
<td>n</td>
</tr>
</tbody>
</table>

**Comments:**

Sets the font according to the value you specify for \(n\). The value of \(n\) can be any one of the following:

- 0: Draft quality 10 cpi font
- 1: Draft quality 12 cpi font
- 2: Near letter quality Sans Serif font
- 3: Near letter quality Roman font
- 4: Draft quality 10 cpi user-defined font
- 5: Draft quality 12 cpi user-defined font
- 6: Near letter quality 10 cpi user-defined font
- 7: Near letter quality 12 cpi user-defined font

### Print size and character width:

In IBM emulation mode, four modes are incompatible with each other. These modes are 10 cpi, 12 cpi, condensed, and proportional. If you select any one of these, you cancel all the others.
**DC2**

*Select 10 cpi*

**Format:**

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

**Comments:**

Cancels condensed, 12 cpi, and proportional printing and selects 10 cpi printing. This command does not cancel double-wide.

---

**ESC :**

*Select 12 cpi*

**Format:**

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

**Comments:**

Selects 12 cpi (characters per inch) printing.

---

**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.
- **0:** Mode is turned off.

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 in the Appendix. This command overrides condensed, 10 cpi, and 12 cpi.
IBM Emulation Mode Commands Arranged by Topic

**ESC [@**

Set Double-high/Double-wide Printing

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>@</th>
<th>n1</th>
<th>n2</th>
<th>ml</th>
<th>m2</th>
<th>m3</th>
<th>m4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>91</td>
<td>64</td>
<td>n1</td>
<td>n2</td>
<td>ml</td>
<td>m2</td>
<td>m3</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>5B</td>
<td>40</td>
<td>n1</td>
<td>n2</td>
<td>m1</td>
<td>m2</td>
<td>m3</td>
</tr>
</tbody>
</table>

**Comments:**

You can use the following values: \( n1 = 4, n2 = 0, m1 = 0, \) and \( m2 = 0. \) The value of \( m3 \) affects character height and line feeds as shown below:

<table>
<thead>
<tr>
<th>m3</th>
<th>Character high</th>
<th>Line feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standard</td>
<td>Unchanged</td>
</tr>
<tr>
<td>2</td>
<td>Double-high</td>
<td>Unchanged</td>
</tr>
<tr>
<td>16</td>
<td>Unchanged</td>
<td>Single</td>
</tr>
<tr>
<td>17</td>
<td>Standard</td>
<td>Single</td>
</tr>
<tr>
<td>18</td>
<td>Double-high</td>
<td>Single</td>
</tr>
<tr>
<td>32</td>
<td>Unchanged</td>
<td>Double</td>
</tr>
<tr>
<td>33</td>
<td>Standard</td>
<td>Double</td>
</tr>
<tr>
<td>34</td>
<td>Double-high</td>
<td>Double</td>
</tr>
</tbody>
</table>

The value of \( m4 \) sets the character width.
1: Standard
2: Double-wide

**Print enhancement:**

**ESC __**

Turn Overscoring Mode On/Off

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>__</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>95</td>
<td>n</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>5F</td>
<td>n</td>
</tr>
</tbody>
</table>

**Comments:**

You can use the following values for \( n: \)
1: Mode is turned on.
2: Mode is turned off.
IBM Emulation Mode Commands Arranged by Topic

Character tables:

**ESC 6**  Select *International* Character Set

Format:

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

Comments:
Selects the international character set (character table 2). See the IBM emulation *mode* character tables in the Appendix.

---

**ESC 7**  Select Standard Character Set

Format:

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

Comments:
Selects the standard character set (character table 1). See the IBM emulation *mode* character tables in the Appendix.

---

**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 = \(n1 + (n2 \times 256)\). See the Appendix for the symbol set and the codes to use for data.
IBM Emulation Mode Commands Arranged by Topic

**ESC ^**

Print One Character from Symbol Set

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>^</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>94</td>
<td>c</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>5E</td>
<td>c</td>
</tr>
</tbody>
</table>

**Comments:**

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

**User-defined characters:**

**ESC =**

Define User-defined Characters

**Format:**

<table>
<thead>
<tr>
<th>ASCII code:</th>
<th>ESC</th>
<th>=</th>
<th>n1</th>
<th>n2</th>
<th>.</th>
<th>.</th>
<th>.</th>
<th>.</th>
<th>.</th>
<th>nk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal:</td>
<td>27</td>
<td>61</td>
<td>n1</td>
<td>n2</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>nk</td>
</tr>
<tr>
<td>Hexadecimal:</td>
<td>1B</td>
<td>3D</td>
<td>n1</td>
<td>n2</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>nk</td>
</tr>
</tbody>
</table>

**Comments:**

If C is the total number of characters to be defined,

B = (C × 13) + 2

n1 = 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 pins

n6 = 0 in all cases

The values n7 through nk are the data numbers that define the characters, with 11 data numbers for each character.

You determine the data numbers for each character as shown on the first grid for Epson ESC/P mode in the section on user-defined characters in Chapter 4. To print a user-defined character, you need to use the ESC I command, which is described on page 9-46.
Appendix

Proportional Width Table .................................................. A-2

Character Tables ............................................................ A-6
  Italic character table .................................................. A-7
  Epson Extended Graphics character table .......................... A-8
  IBM emulation ‘mode ................................................... A-9
Proportional Width Table

This table lists the widths of your printer’s proportional characters. The values given are in \textbf{120ths} of an inch. (For example, a value of \textbf{12} is \textbf{12/120ths} of an inch.) You may need to enter these widths into a special table for your word processing program so it can calculate the number of proportional characters that will fit on a line.

The characters with no code indicated are international characters or graphics. See the section on selecting an international character set in Chapter 3 and the descriptions of the \texttt{ESC R} and \texttt{ESC t} commands in Chapter 9 for information on how to use these characters.

The following width table shows each character, its ASCII code (hexadecimal), and its width. If there are two numbers in the width column, the second one is for the italic version of the character.

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<td>•</td>
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</tr>
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<td>•</td>
<td>6</td>
</tr>
<tr>
<td>FB</td>
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</tr>
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</tr>
<tr>
<td>FE</td>
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</tr>
<tr>
<td>F8</td>
<td>²</td>
<td>8/8</td>
</tr>
<tr>
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<td>²</td>
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</tr>
<tr>
<td>FA</td>
<td>²</td>
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</tr>
<tr>
<td>FB</td>
<td>²</td>
<td>12/12</td>
</tr>
<tr>
<td>FC</td>
<td>²</td>
<td>12/12</td>
</tr>
<tr>
<td>FD</td>
<td>²</td>
<td>12/11</td>
</tr>
<tr>
<td>FE</td>
<td>²</td>
<td>8/9</td>
</tr>
<tr>
<td>F8</td>
<td>²</td>
<td>10/12</td>
</tr>
</tbody>
</table>
Character Tables

You can select the character tables in this section by setting DIP switch 1-3 or using the ESC t software command.

In the tables, the first digit of each hex code is in the top row and the second digit is in the first column. The binary digits are in the second row and second column, and the decimal codes are in the rectangle next to the character. For example, for an uppercase A, the hex code is 41, the binary code is 01000001, and the decimal code is 65.

Note: The printer can print the characters in the shaded areas only if you send the ESC 6 command to the printer. If you do not send the ESC 6 command, the shaded areas contain the control codes in the range of 0 to 31 and 127.
Character Tables

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<thead>
<tr>
<th>Hex</th>
<th>Binary</th>
<th>Character</th>
</tr>
</thead>
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<td>0100</td>
<td>4</td>
</tr>
<tr>
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<td>0101</td>
<td>5</td>
</tr>
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<td>6</td>
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<td>9</td>
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<td>9</td>
</tr>
<tr>
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<td>A</td>
</tr>
<tr>
<td>B</td>
<td>1011</td>
<td>B</td>
</tr>
<tr>
<td>C</td>
<td>1100</td>
<td>C</td>
</tr>
<tr>
<td>D</td>
<td>1101</td>
<td>D</td>
</tr>
<tr>
<td>E</td>
<td>1110</td>
<td>E</td>
</tr>
<tr>
<td>F</td>
<td>1111</td>
<td>F</td>
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</tbody>
</table>
### Epson Extended Graphics character table

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<td>0</td>
<td>0</td>
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</table>

### Character Tables
IBM emulation mode

IBM emulation mode provides compatibility with application programs written specifically for IBM printers. To select IBM emulation mode, turn on DIP switch 1-4.

In IBM emulation mode, you can select a standard character set (character table 1) or an international character set (character table 2). To select character table 1, turn on DIP switches 1-6, 1-7, and 1-8. To select character table 2, turn off any one of these switches. You can also select character table 1 using the ESC 7 command or character table 2 using the ESC 6 command.

Character table 2 is shown below. To form character table 1, replace the characters in the shaded column with the characters for code 00 to 1F in the column on the left.

### IBM emulation mode character table 2

<table>
<thead>
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<th>CODE</th>
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<th>3</th>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
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<td>`</td>
<td>p</td>
<td>á</td>
<td>¡</td>
<td>µ</td>
<td>á</td>
<td>µ</td>
<td>α</td>
<td>±</td>
<td>±</td>
<td>±</td>
<td>±</td>
</tr>
<tr>
<td>1</td>
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<td>?</td>
<td>!</td>
<td>A</td>
<td>Q</td>
<td>q</td>
<td>á</td>
<td>¡</td>
<td>µ</td>
<td>á</td>
<td>µ</td>
<td>α</td>
<td>±</td>
<td>±</td>
<td>±</td>
<td>±</td>
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<td>B</td>
<td>R</td>
<td>r</td>
<td>ó</td>
<td>ñ</td>
<td>í</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
</tr>
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<td>C</td>
<td>S</td>
<td>s</td>
<td>ó</td>
<td>ñ</td>
<td>í</td>
<td>ñ</td>
<td>ñ</td>
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<td>d</td>
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<td>ñ</td>
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<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
</tr>
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<td>5</td>
<td>E</td>
<td>U</td>
<td>e</td>
<td>u</td>
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<td>ñ</td>
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<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
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<td>V</td>
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<td>v</td>
<td>ó</td>
<td>ñ</td>
<td>í</td>
<td>ñ</td>
<td>ñ</td>
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<td>í</td>
<td>ñ</td>
<td>ñ</td>
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<td>ñ</td>
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<td>ó</td>
<td>ñ</td>
<td>í</td>
<td>ñ</td>
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<td>ñ</td>
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<td>ó</td>
<td>ñ</td>
<td>í</td>
<td>ñ</td>
<td>ñ</td>
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<td>ñ</td>
<td>ñ</td>
</tr>
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<td>K</td>
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<td>{</td>
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<td>í</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
</tr>
<tr>
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<td>FF</td>
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<td>L</td>
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<td>l</td>
<td>ó</td>
<td>ñ</td>
<td>í</td>
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<td>í</td>
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<td>ñ</td>
<td>ñ</td>
<td>ñ</td>
</tr>
<tr>
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<td>s</td>
<td>o</td>
<td>.</td>
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<td>N</td>
<td>^</td>
<td>`</td>
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<td>í</td>
<td>ñ</td>
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<td>O</td>
<td>_</td>
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<td>ó</td>
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<td>ñ</td>
<td>ñ</td>
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<td>ñ</td>
</tr>
</tbody>
</table>
Symbol set

In IBM emulation mode, a symbol set in which all codes are printable can be used. To print symbol characters, use the ESC \ or ESC ^ command. (See pages 9-49 and 9-50.)

**IBM emulation mode symbol set**

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<th><strong>3</strong></th>
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<th><strong>6</strong></th>
<th><strong>7</strong></th>
<th><strong>8</strong></th>
<th><strong>9</strong></th>
<th><strong>A</strong></th>
<th><strong>B</strong></th>
<th><strong>C</strong></th>
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<th><strong>E</strong></th>
<th><strong>F</strong></th>
</tr>
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<td>É á</td>
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<td>L ·</td>
<td>µ α</td>
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<td>ü</td>
<td>æ i</td>
<td>s</td>
<td></td>
</tr>
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<td>!</td>
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<td>ü</td>
<td>æ i</td>
<td>s</td>
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<td>s</td>
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<td></td>
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</tr>
<tr>
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<td>J Z</td>
<td>j z</td>
<td>è</td>
<td>ū</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>j z</td>
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<td>ū</td>
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<td></td>
<td></td>
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</tr>
<tr>
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<td>j z</td>
<td>è</td>
<td>ū</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>j z</td>
<td>è</td>
<td>ū</td>
<td></td>
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A-10 Appendix
Glossary

The following definitions apply specifically to printers.

application program
A software 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 selected using a DIP switch, each carriage return code (CR) is automatically followed by a line feed (LF) code.

baud rate
A measure of the speed of data transmission. Usually expressed in bits per second (bps).

bidirectional printing
Printing in which the print head moves from left to right on every other line and from right to left on the others. This increases the printing speed.

binary
See number systems.

bit
A binary digit (0 or 1), which is the smallest unit of information used by a printer or computer. See also number systems.
buffer
See memory.

byte
A unit of information consisting of eight bits.

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 does not always move to the left margin.)

character set
A collection of letters, numbers, and symbols that provides you with the characters used in a particular language.

character table
A portion of the printer’s standard ASCII character set that can be used for graphic symbols or italic characters. See also Epson Extended Graphics character table and italic.

characters per inch (cpi)
A measure of the size of text characters. 10 cpi is the printer’s default setting.

condensed
Printing in which each character is approximately 60% of the width of standard characters. Condensed printing is useful when printing wide tables or spreadsheets.

continuous paper
Paper that has sprocket-feed holes on each side, is perforated between pages, and comes in a folded stack. Also called fanfold paper.
control code
In addition to the codes for printable characters, the ASCII coding system includes 33 codes called control codes. These control codes perform such functions as sounding the beeper and performing a carriage return or line feed.

copy mode
A feature that causes the printer to print clearer, darker characters on each page of your multi-part forms.

cpi
See characters per inch.

data dump
A troubleshooting feature that helps advanced users find the cause of communication problems between the printer and the computer. When the printer is in data dump mode, it prints each code it receives in hexadecimal notation and ASCII code. Also 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. Also called bit image graphics.
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 tall as normal.

double-strike printing
A way of producing bolder characters. Each character is printed twice, with the second character printed slightly below the first.

double-wide printing
Printing in which each character is twice its normal width.

draft (normal draft)
One of three print qualities available on your printer. Draft uses less dots per character for faster printing. See also high-speed draft and near letter quality.

emphasized printing
A way of producing darker characters. Each character is printed twice, with the second character printed 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, a system of commands that lets you control your printer using your computer’s software. The system is standard for all Epson printers and supported by most application software for personal computers.
font
A style of type designated by a family name, such as Epson Roman or Epson Sans Serif.

form
In printer terminology, a form normally refers to a page.

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

front tractor
The built-in push tractor that lets you load paper from the front of the printer. This tractor features bottom feeding, which is especially useful for labels and multi-part forms.

front tractor arrow
The arrow-shaped light on the PAPER SELECT indicator that lights up when the front tractor is selected. The arrow is green when paper is loaded in the tractor, even if the paper is in the standby position, and red when the tractor is out of paper.

FRONT/REAR button
A control panel button that lets you switch tractors automatically.

hexadecimal (hex)
See number systems.

high-speed draft
One of three print qualities available on your printer. High-speed draft uses a minimum number of dots per character to produce extremely high-speed printing. See also draft and near letter quality.

initialize
To establish the initial default status of the printer by turning on the printer or sending an INIT signal.
input buffet
See memory

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.

italics
A typestyle in which the characters slant. This sentence is italicized. Also, a character table that contains italicized characters and symbols.

line feed
A control code that advances the paper one line space.

LINE FEED/LOAD button
A control panel button that advances the paper one line or automatically loads paper.

loading position
The position to which the paper is automatically loaded. It can be adjusted using the micro-adjustment feature.

memory
The printer, like a computer, has a memory. When you print a file from the 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. This frees the computer to do other work while the printer is printing. The printer memory is sometimes called the buffer or the input buffer.

micro-adjustment
A feature you can use to adjust the top of form, short tear-off, loading, and printing positions.
near letter quality (NLQ)

One of three print qualities available on your printer. Near letter quality reduces the print speed and increases the number of dots per character to produce high-resolution characters. See also draft and high-speed draft.

number systems

Three number systems are commonly used with printers:

Decimal is base 10 and uses the digits 0 through 9. (This is the most familiar system.)

Hexadecimal (hex) is base 16 and uses the digits 0 through 9 and the letters A through F. Programmers frequently use this numbering system. 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 is 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 can communicate with the computer connected to it; The ON LINE button controls the printer’s on line/off line status.

paper bail

The part of the printer that holds the paper flat.

paper cutter

An optional device that automatically cuts off printed documents.

paper memory

A feature that produces high quality printing on your multi-part forms by using stored paper format and thickness information to adjust the print head.
**paper-out sensor**
A small switch on the tractors that sends a signal when it is not in contact with paper, causing the PAPER OUT light to go on.

**paper select indicator**
The printer icon on the control panel that contains the front and rear tractor arrows. These arrows light up to show which tractor is selected. See also front tractor arrow and rear tractor arrow.

**parallel interface**
A type of connection between the computer and the printer. A parallel interface transmits data one character or code at a time.

**parity**
A method for a computer and printer to check the reliability of data transmission.

**platen**
The silver plate behind the paper bail that provides a backing for the printing.

**print quality**
Your printer has three types of print quality: draft, high-speed draft, and near letter quality (NLQ). Draft and high-speed draft are for high-speed, draft-quality jobs; NLQ is for final, polished documents.

**proportional printing**
Printing in which the amount of space given to each character varies. For example, an uppercase W receives much more space than a lowercase i. The result looks more like a typeset book than a typewritten draft.

**pull tractor**
An optional paper feeder that is useful when printing on preprinted or multi-part forms.
push tractor
A device that feeds continuous paper through the printer. Both the front and rear built-in tractors are push tractors; they push the paper through the printer to the print head.

RAM
Random Access Memory. The portion of the printer’s memory that is used as a buffer and as a place for storing user-defined characters.

rear tractor
The built-in push tractor that feeds paper from the rear of the printer.

rear tractor arrow
The arrow-shaped light on the PAPER SELECT indicator that lights up when the rear tractor is selected. The arrow is green when paper is loaded in the tractor, even if the paper is in the standby position, and red when the tractor is out of paper.

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

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

serial interface
A type of connection between the computer and the printer. A serial interface transmits data one bit at a time.

short tear-off
A feature that feeds the paper’s perforation to the tear-off position and then feeds the paper back to the loading position. You can change the tear-off position using the micro-adjustment feature.
**standby position**
The position the paper is in after you manually load it onto the first few pins of the tractor sprockets. When the printer switches tractors, it feeds the paper on the previously selected tractor back to this position.

**subscripts**
Printing in which each character is printed at about two-thirds the normal height in the lower part of the character space.

**superscripts**
Printing in which each character is printed at about two-thirds the normal height in the upper part of the character space.

**10 cpi**
A character spacing with 10 characters per inch. This is the printer’s default character spacing.

**TEAR OFF button**
A button that lets you use the short tear-off feature. See short tear-off.

**tear-off position**
The position the printer feeds the paper to when you press the TEAR OFF button. Using the micro-adjustment feature, you can adjust this position so that the paper’s perforation meets the printer’s tear-off edge.

**top of form position**
The position on the paper that the printer recognizes as the first printable line. The printer feeds the paper to this position when it loads the paper. You can change this position using the micro-adjustment feature.

**tractor**
The part of the printer that feeds continuous paper through the printer by gripping the holes along the paper’s sides.
12 cpi
A character spacing in which each character is slightly narrower than normal, so that there are 12 characters per inch.

unidirectional printing
Printing in one direction only. Unidirectional printing is useful for printing graphics because it allows more precise vertical alignment than bidirectional printing.

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

This section lists all the DFX commands. The numbers in the columns on the right are the page numbers in Chapter 9 where you can find a complete description of the command. If the Epson ESC/P and IBM emulation mode page numbers are the same, the command is the same in both modes and is described only in the Epson ESC/P mode section. Variables are not included in this quick reference. For those codes that contain variables, such as ESC Q n for setting the right margin, see Chapter 9.

## Printer operation

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<th>ASCII</th>
<th>Dec</th>
<th>Hex</th>
<th>Description</th>
<th>ESC/P page</th>
<th>IBM page</th>
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<td>19</td>
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<td>ESC Q22</td>
<td>81</td>
<td>51</td>
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<td>ESC &lt;</td>
<td>60</td>
<td>3C</td>
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<td>55</td>
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<td>ESC =</td>
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<td>Set MSB to 0</td>
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<td>3E</td>
<td>Set MSB to 1</td>
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<td>ESC #</td>
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<th>IBM page</th>
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<td>CR</td>
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<td>0D</td>
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<td>9-12</td>
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<td>Cancel Line</td>
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<td>DEL</td>
<td>127</td>
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<td>Delete Character</td>
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## Vertical motion

<table>
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<tr>
<td>FF</td>
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<td>ESC C</td>
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<td>Set Page Length in Lines</td>
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<td>ESC C0</td>
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<td>43</td>
<td>Set Page Length in Inches</td>
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<td>ESC N</td>
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<tr>
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<td>Select 1/8-inch Line Spacing</td>
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<td>31</td>
<td>Select 7/72-inch Line Spacing</td>
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<td>Perform n/216-inch Line Feed</td>
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<td>Turn Automatic Line Feed On/Off</td>
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<td>9-17</td>
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<td>VT</td>
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<td>OB</td>
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<td>62</td>
<td>Set Vertical Tabs in Channels</td>
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<td>ESC l</td>
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<td>Select Vertical Tab Channel</td>
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### Horizontal motion

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<td>Set Right Margin</td>
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<td>58</td>
<td>Set Left and Right Margins</td>
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<td>BS</td>
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<td>08</td>
<td>Backspace</td>
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<td>ESC $</td>
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<td>24</td>
<td>Set Absolute Print Position</td>
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<td>ESC \</td>
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<td>Set Relative Print Position</td>
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<td>09</td>
<td>Tab Horizontally</td>
<td>9-22</td>
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<td>ESC D</td>
<td>68</td>
<td>44</td>
<td>Set Horizontal Tabs</td>
<td>9-22</td>
<td>9-45</td>
</tr>
<tr>
<td>ESC R</td>
<td>82</td>
<td>52</td>
<td>Restore Default Tab Settings</td>
<td>9-22</td>
<td>9-45</td>
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### Overall printing style

<table>
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<th>IBM page</th>
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<tr>
<td>ESC x</td>
<td>120</td>
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<td>Select Letter Quality or Draft</td>
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<td>ESC k</td>
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<td>Select Typestyle Family</td>
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<td>33</td>
<td>21</td>
<td>Master Select</td>
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<tr>
<td>ESC l</td>
<td>73</td>
<td>49</td>
<td>Select Font</td>
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### Print size and character width

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<th>IBM page</th>
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<tr>
<td>ESC P</td>
<td>80</td>
<td>50</td>
<td>Select 10 cpi</td>
<td>9-25</td>
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<tr>
<td>ESC M</td>
<td>77</td>
<td>4D</td>
<td>Select 12 cpi</td>
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<tr>
<td>DC 2</td>
<td>18</td>
<td>12</td>
<td>Select 10 cpi</td>
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<td>3A</td>
<td>Select 12 cpi</td>
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<td>ESC p</td>
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<td>70</td>
<td>Turn Proportional Mode On/Off</td>
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<td></td>
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<td>50</td>
<td>Turn Proportional Mode On/Off</td>
<td>9-47</td>
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<tr>
<td>SI</td>
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<td>0F</td>
<td>Select Condensed Mode</td>
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<td>DC2</td>
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<td>12</td>
<td>Cancel Condensed Mode</td>
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<tr>
<td>SO</td>
<td>14</td>
<td>0E</td>
<td>Select Double-wide Mode (one line)</td>
<td>9-27</td>
<td>9-27</td>
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<tr>
<td>ESC SO</td>
<td>14</td>
<td>0E</td>
<td>Select Double-wide Mode (one line)</td>
<td>9-27</td>
<td>9-27</td>
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<td>Cancel Double-wide Mode (one line)</td>
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<td>9-27</td>
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<tr>
<td>ESC w</td>
<td>87</td>
<td>57</td>
<td>Turn Double-wide Mode On/Off</td>
<td>9-28</td>
<td>9-28</td>
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<tr>
<td>ESC w</td>
<td>119</td>
<td>77</td>
<td>Turn Double-high Mode On/Off</td>
<td>9-28</td>
<td>9-28</td>
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<tr>
<td>ESC [ @</td>
<td>91</td>
<td>5B</td>
<td>Set Double-high/Double-wide Printing</td>
<td>9-48</td>
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### Print enhancement

<table>
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<tr>
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<th>IBM page</th>
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<td>ESC E</td>
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<td>9-30</td>
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<td>83</td>
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<td>Select Superscript Mode</td>
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<td>54</td>
<td>Cancel Superscript/Subscript Mode</td>
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<td>9-31</td>
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<td>Select Italic Mode</td>
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<td>Cancel Italic Mode</td>
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<td>ESC -</td>
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<td>2D</td>
<td>Turn Underline Mode On/Off</td>
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<td>9-32</td>
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<tr>
<td>ESC _</td>
<td>95</td>
<td>5F</td>
<td>Turn Overscoring Mode On/Off</td>
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## Word processing

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<th>IBM page</th>
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<tr>
<td>ESC a</td>
<td>97</td>
<td>61</td>
<td>Select Justification</td>
<td>9-33</td>
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</tr>
<tr>
<td>ESC SP</td>
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<td>20</td>
<td>Set Intercharacter Space</td>
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## Character tables

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<th>IBM page</th>
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<td>82</td>
<td>52</td>
<td>Select an International Character Set</td>
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<td>Enable Printable Characters</td>
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<tr>
<td>ESC 7</td>
<td>55</td>
<td>37</td>
<td>Enable Upper Control Codes</td>
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<td>ESC 6</td>
<td>54</td>
<td>36</td>
<td>Select International Character Set</td>
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<td>ESC 7</td>
<td>55</td>
<td>37</td>
<td>Select Standard Character Set</td>
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<td>ESC \</td>
<td>92</td>
<td>5C</td>
<td>Print Character from Symbol Set</td>
<td>9-49</td>
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<tr>
<td>ESC *</td>
<td>94</td>
<td>5E</td>
<td>Print One Character from Symbol Set</td>
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## User-defined characters

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<th>IBM page</th>
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<td>38</td>
<td>26</td>
<td>Define User-defined Characters</td>
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<td>Copy ROM to RAM</td>
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<td>25</td>
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<td>ESC I</td>
<td>73</td>
<td>49</td>
<td>Printable Code Area Expansion</td>
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## Graphics

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<th>Description</th>
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<th>IBM page</th>
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<tr>
<td>ESC K</td>
<td>75</td>
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<td>Select Single-density Graphics Mode</td>
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<td>9-38</td>
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<td>ESC L</td>
<td>76</td>
<td>4C</td>
<td>Select Double-density Graphics Mode</td>
<td>9-38</td>
<td>9-38</td>
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<td>ESC Y</td>
<td>89</td>
<td>59</td>
<td>Select High-speed Double-density</td>
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<td>9-38</td>
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<td>90</td>
<td>5A</td>
<td>Select Quadruple-density Graphics Mode</td>
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<td>9-39</td>
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<td>ESC *</td>
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<td>Select Graphics Mode</td>
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<td>3F</td>
<td>Reassign Graphics Mode</td>
<td>9-40</td>
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<td>ESC ^</td>
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<td>5E</td>
<td>Select 9-pin Graphics Mode</td>
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# DIP Switch Settings

## DIP switch 1

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<td>1-1</td>
<td>Condensed mode on/off</td>
<td>Condensed</td>
<td>Normal</td>
</tr>
<tr>
<td>1-2</td>
<td>Slashed zero on/off</td>
<td>Slashed</td>
<td>Not slashed</td>
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<tr>
<td>1-3</td>
<td>Character table (in Epson ESC/P mode)</td>
<td>Graphics</td>
<td>Italics</td>
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<tr>
<td>1-4</td>
<td>Printer mode</td>
<td>IBM emulation</td>
<td>Epson ESC/P</td>
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<tr>
<td>1-5</td>
<td>NLQ or draft mode</td>
<td>NLQ</td>
<td>Draft</td>
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<td>1-6</td>
<td>International character set</td>
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<td>1-7</td>
<td>See table to the right.</td>
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## DIP switch 2

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<tr>
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<td>Default character set (fin Epson ESC/P mode)</td>
<td>User-defined</td>
<td>ROM</td>
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<td>Draft printing speed</td>
<td>Normal</td>
<td>High</td>
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<td>Bit length for serial interface</td>
<td>7 bits</td>
<td>8 bits</td>
</tr>
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<td>2-4</td>
<td>Auto line feed</td>
<td>ON</td>
<td>OFF</td>
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<tr>
<td>2-5</td>
<td>Interface type/parity</td>
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## DIP switch 3

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<td>Input buffer</td>
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<td>Valid</td>
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<td>3-2</td>
<td>Page length</td>
<td>12 inches</td>
<td>11 inches</td>
</tr>
<tr>
<td>3-3</td>
<td>I-inch skip over perforation</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>3-4</td>
<td>Paper memory</td>
<td>Memory 2</td>
<td>Memory 1</td>
</tr>
<tr>
<td>3-5</td>
<td>Overlapping multi-part forms</td>
<td>Valid</td>
<td>Invalid</td>
</tr>
<tr>
<td>3-6</td>
<td>Multi-part forms with labels</td>
<td>Valid</td>
<td>Invalid</td>
</tr>
<tr>
<td>3-7</td>
<td>Skip over binding</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>3-8</td>
<td>Handshaking protocol</td>
<td>X-on/X-off</td>
<td>DTR</td>
</tr>
</tbody>
</table>
**International character set**

<table>
<thead>
<tr>
<th>Country</th>
<th>SW 1-6</th>
<th>SW 1-7</th>
<th>SW 1-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>France</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Germany</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Denmark</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Sweden</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Italy</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Spain</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**interface/Parity selection**

<table>
<thead>
<tr>
<th>Interface/Parity</th>
<th>SW 2-5</th>
<th>SW 2-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial/odd</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Serial/even</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial/none</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Baud rate selection**

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>SW 2-7</th>
<th>SW 2-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>19200 bps</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>9600 bps</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>1200 bps</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>300 bps</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**DIP switch functions in IBM emulation mode** (DIP switch 1-4 on)

<table>
<thead>
<tr>
<th>SW</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Automatic carriage return</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>1-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td>Default character table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>FF command at the top of form position</td>
<td>Invalid</td>
<td>Valid</td>
</tr>
</tbody>
</table>

**IBM emulation mode character tables**

<table>
<thead>
<tr>
<th>Default character table</th>
<th>SW 1-6</th>
<th>SW 1-7</th>
<th>SW 1-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1 (standard)</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 2 (international)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 is selected when any one of these switches is turned off.