Subjects covered in Chapter 8 include—
• Cleaning the printer
• Changing the ribbon
• Replacing the print head

Dust and heat will make any mechanism wear more quickly. The best maintenance is preventive, so the first step in any maintenance program is correct location of the printer. This is covered in greater detail in Chapter 1, but in general a normal office environment is best for both the computer and the printer.

CLEANING THE PRINTER

Cleaning the printer regularly will prolong its service life. Use a damp cloth on the exterior every week or so. For stubborn dirt, you may moisten the cloth with alcohol or water containing a mild detergent, but be careful not to spill any liquid into the interior of the printer or onto the print mechanism.

Use a soft brush to remove paper dust and lint from the interior. A small vacuum cleaner can also make this task easier — but be very careful not to bend or injure any electronic parts or wiring. The printer contains delicate electronic parts, so only clean those places where you have easy access.

REPLACING THE RIBBON

This printer uses an endless-type ribbon cartridge, meaning
that the ribbon is recycled automatically. In time, however, when the print becomes too faint to read clearly, you will need to change either the whole cartridge or the ribbon inside it.

Changing the whole cartridge is the simplest method, and because you don't need to touch the ribbon itself, it is the cleanest way too. To remove the old cartridge, remove the printer cover, grasp the ribbon cartridge with both hands, and pull straight up gently until the holder springs release. To fit the new cartridge, refer to Chapter 1, Installing the ribbon cartridge.

A more economical method is to only replace the ribbon itself. First, obtain the correct type of replacement sub-cassette from your dealer. Use the following procedure to change the ribbon.

1. Place the cartridge on a flat surface, and use a flatbladed screwdriver to unhook the tabs holding the two sections of the cartridge together. See Figure 8-1.

2. After opening the cartridge, take a moment to notice how the ribbon is threaded. Then press a finger against the idler gear holder (it is held in position by spring pressure), and make enough space to remove the ribbon from between the two gears. See Figure 8-2.
3. Clean the inside of the cartridge, especially around the vicinity of the two gears.

![Diagram of cartridge gears and idler](image)

**Figure 8-2.** Replace the ribbon sub-cassette.

4. Take the new ribbon and holder out of the wrapper, remove the adhesive tape on the joint on the holder, and place it into the cassette as shown in Figure 8-2.

5. Pull sufficient ribbon out of the holder, and thread it as shown in Figure 8-3. Be careful that the half-twist in the ribbon is positioned in the right-hand section of the ribbon cartridge, between the two guide posts. Make sure that no twists occur anywhere else.

6. Again press on the idler gear holder and thread the ribbon between both gears.

7. Remove the top and bottom of the ribbon holder, and replace the cartridge top cover. Snap all tabs back into place.

8. When you’ve completed the installation, remount the cartridge to the printer.

**Note:** You should replace the whole cartridge after replacing the ribbon five times.
REPLACING THE PRINT HEAD

The dot matrix print head has an extremely long life, around 200 million dots per wire, or years of normal use. However, when printing is too light even after replacing the ribbon, you’ll know that the print head has reached the end of its service life.

Turn off the power, unplug the power cord, and use the following procedure to replace the print head. **Warning:** The print head becomes hot during operation. If you have been using the printer, let it stand for a while so that the print head can cool off.

1. Remove the printer cover and the ribbon cartridge.
2. Remove the two screws fastening the print head.
3. Holding the print head and the head cable board securely, unplug the head cable.
4. Making sure that the new print head is facing the correct direction, carefully plug the cable into the connector on the head cable board. Make sure that this connection is secure, and that the cable is inserted far enough into the connector.
Figure 8-4. Replacement of the print head.

5. Fit the new print head into its support, and fasten it with screws. Make sure that the print head is inserted correctly.
The DIP (Dual In-line Package) switches control many of the functions of the printer. A DIP switch contains a number of small switches, and in this printer, one DIP switch has 10 individual switches and the another has 8 individual switches.

Both DIP switches are easily accessible from the top of the printer. Remove the ribbon cartridge, and you will see the two DIP switches underneath a sheet of protective plastic film, which you fold back for access. DIP switch 1 is the one on the left as you look at the printer from the front. The individual switches of DIP switch 1 are named from 1-1 to 1-10; similarly, the switches of DIP switch 2 go from 2-1 to 2-8.

To change a setting, turn the power OFF, and use a ball-point pen or similar to move any of the small white switches to the front or back of the printer. The “on” position for all switches is towards the back of the printer, and “off” is to the front. Figure A-1 shows the location of the printer’s DIP switches.

Figure A-1. The DIP switches are located under the printer cover.
**Caution:** Never change the setting of any of the DIP switches when the power is on. The printer only reads the DIP switch settings at the moment the power is turned on. Turn off power to both the computer and the printer when changing settings, and turn on again to use the new settings.

Table A-1 shows a summary of DIP switch functions.

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON Description</th>
<th>OFF Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>10 CPI (Normal pica)</td>
<td>17 CPI (Condensed pica)</td>
</tr>
<tr>
<td>1-2</td>
<td>Set SELECT IN signal to LOW</td>
<td>Not fixed</td>
</tr>
<tr>
<td>1-3</td>
<td>Select internal characters</td>
<td>Select optional characters</td>
</tr>
<tr>
<td>1-4</td>
<td>No bottom margin</td>
<td>Set bottom margin to 1 inch</td>
</tr>
<tr>
<td>1-5</td>
<td>Character set #1</td>
<td>Character set #2</td>
</tr>
<tr>
<td>1-6</td>
<td>International character set selection — see Table A-2.</td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td>(Not used)</td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td>(Not used)</td>
<td></td>
</tr>
<tr>
<td>1-9</td>
<td>(Not used)</td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>(Not used)</td>
<td></td>
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</table>

**Switch 2**

<table>
<thead>
<tr>
<th>Switch</th>
<th>Function Description</th>
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<tbody>
<tr>
<td>2-1</td>
<td>Print mode selection — see Table A-3.</td>
</tr>
<tr>
<td>2-2</td>
<td>Paper-out detected</td>
</tr>
<tr>
<td>2-3</td>
<td>Ignore download characters</td>
</tr>
<tr>
<td>2-4</td>
<td>Auto CR with line feed</td>
</tr>
<tr>
<td>2-5</td>
<td>LF from host</td>
</tr>
<tr>
<td>2-6</td>
<td>Print “normal zero”</td>
</tr>
<tr>
<td>2-8</td>
<td>1/6 inch line feed</td>
</tr>
</tbody>
</table>

**SWITCH FUNCTIONS**

Switch **1-1**  This switch selects the default character pitch. If this switch is on, the default pitch is normal pica pitch (10 CPI). If this switch is off, the default pitch
is condensed pica pitch (17 CPI). This switch is set on at the factory.

1-2
This switch controls the status of the SELECT IN signal of the parallel interface. If this switch is on, this signal is held to LOW. If this switch is off, the signal goes HIGH when the printer cannot get data. This switch is set on at the factory.

1-3
This switch selects the default character set. If this switch is on, the internal character set is selected as the default. If this switch is off, the optional character set mounted on the Font slot is selected. (If the cartridge is not mounted, the internal character set is selected.) This switch is set on at the factory.

1-4
This switch determines the default bottom margin. When this switch is on, the bottom margin is not set at power-on. When this switch is off, the bottom margin is automatically set to 1 inch. This switch is set on at the factory.

1-5
This switch selects the default character set with the IBM modes. If this switch is on, the default character set is character set #1. If this switch is off, the default character set is character set #2. If the print mode is not set to IBM modes, this switch have no effect. This switch is set on at the factory.

1-6～1-8
These switches determine the default international character set, as shown in Table A-2. These switches are all set on at the factory.

<table>
<thead>
<tr>
<th>Switch</th>
<th>U.S.A.</th>
<th>France</th>
<th>Germany</th>
<th>England</th>
<th>Denmark</th>
<th>Sweden</th>
<th>Italy</th>
<th>Spain</th>
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<tbody>
<tr>
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<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
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<td>OFF</td>
</tr>
<tr>
<td>1-7</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>1-8</td>
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<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
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</tbody>
</table>

2-1～2-2
These switches select the active control codes, as shown in Table A-3. The “Standard” mode
emulates the Epson LQ-1000 printer. The “IBM-P” mode emulates the IBM Proprinter, and the “IBM-G” mode emulates the IBM Graphics printer. These switches are set on at the factory.

### Table A-3
Print mode selection

<table>
<thead>
<tr>
<th>Switch</th>
<th>Standard mode</th>
<th>IBM-P mode</th>
<th>IBM-G mode</th>
<th>Not used</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2-2</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

2-3 This switch controls the RAM. When this switch is on, the download character definitions are ignored and the RAM is used as a print buffer. When this switch is off, the download character definitions are enabled and the print buffer is set to a one line buffer. This switch is set on at the factory.

2-4 This switch disables the paper-out detector. If this switch is on, the printer will signal the computer when it runs out of paper and printing will stop. If this switch is off, the printer will ignore the paper-out detector and will continue printing. This switch is set on at the factory.

2-5 This switch sets the status of the print head after the paper is advanced. When this switch is on, the print head returns to the left margin after the paper is advanced. When this switch is off, the print head does not return to the left margin after the paper is advanced. This switch is set on at the factory.

2-6 When this switch is on, the computer must send a line feed command every time the paper is to advance. When this switch is off, the printer will automatically advance the paper one line every time it receives a carriage return. (Most BASICs send a line feed with every carriage return, therefore, this switch should usually be on.) This switch is set on at the factory.
2-7 This switch selects the print style of zeroes. If this switch is on, normal zeroes are printed. If this switch is off, slashed zeroes are printed. This switch is set on at the factory.

2-8 This switch sets the default line spacing. When this switch is on, the default line spacing is set to 1/6 inch. This means that the printer will advance the paper 1/6 inch each time it receives a line feed. When this switch is off, the default line spacing is 1/8 inch. This switch is set on at the factory.
# APPENDIX B

## ASCII CODE

### CONVERSION CHART

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<th>Binary</th>
<th>Hexadecimal</th>
<th>Decimal</th>
<th>Binary</th>
<th>Hexadecimal</th>
<th>Decimal</th>
<th>Binary</th>
<th>Hexadecimal</th>
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<td>00101110</td>
<td>2E</td>
<td>92</td>
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</tr>
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The purpose of this Appendix is to provide a quick reference for the relationship between the characters available on this printer and the decimal or hexadecimal values.

For example, when you refer the character “A”, it sits in the “4” column and the “1” row. So its hexadecimal value is “41”. Similarly, it is written “65” close to the character, which shows the decimal value.

When you refer the table, there are many control codes, which are written inside broken brackets.

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The purpose of this Appendix is to provide a quick reference for the various functions available on this printer. Codes are described in the following format.

**PURPOSE**
**MODE**
**CODE** (decimal ASCII)
**(hex ASCII)**
**REMARKS**
**SEE**

**Tells what the function code does.** Indicates the valid print emulation mode. Control code mnemonic

ASCII decimal equivalent

Hexadecimal equivalent

Briefly describes how the command is used.

Tells where any additional details of the command may be found.

Several commands require you to specify a value or values. In these cases, we have used an "n" or "m" to indicate a variable. You should insert the ASCII code for the proper value here.

**COMMANDS TO CONTROL PRINT STYLE**

These commands are used to control the font style, the print pitch, and special effects.
Font style controls

Selects italic characters.

**PURPOSE**  

Selects italic characters.

**MODE**  

Standard, IBM-G

**CODE**  

\( \langle \text{ESC} \rangle \) "4"

(Decimal ASCII)  

27 52

(Hex ASCII)  

1B 34

**MODE**  

IBM-P

**CODE**  

\( \langle \text{FS} \rangle \) "4"

(Decimal ASCII)  

28 52

(Hex ASCII)  

1C 34

**REMARKS**  

This command causes all subsequent characters to be printed in italics until italic printing is cancelled. This command is ignored when the Type Style Panel mode is selected at power-on.  

**NOTE:** In some cases, a character is chipped at the right end of a line with 10-inch type.

**SEE**  

Chapter 4

Cancels italic characters.

**PURPOSE**  

Cancels italic characters.

**MODE**  

Standard, IBM-G

**CODE**  

\( \langle \text{ESC} \rangle \) "5"

(Decimal ASCII)  

27 53

(Hex ASCII)  

1B 35

**MODE**  

IBM-P

**CODE**  

\( \langle \text{FS} \rangle \) "5"

(Decimal ASCII)  

28 53

(Hex ASCII)  

1C 35

**REMARKS**  

This command causes the printer to cancel italic printing and selects the standard roman characters. This command is ignored when the Type Style Panel mode is selected at power-on.

**SEE**  

Chapter 4
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects a character set.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “k” n</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 107 n</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 6B n</td>
</tr>
</tbody>
</table>

REMARKS
This command selects one of the character sets mounted on the printer depending the value of the $n$. When the value of $n$ is 0 then the character set is selected the internal character set. When $n$ is 1 it is selected the character set mounted on the Font 1 slot. When $n$ is 2 it is selected the character set mounted on the Font 2 slot for the 15-inch type printer. This command is ignored when the Type Style Panel mode is selected at power-on.

SEE
Chapter 4
PURPOSE

Selects an international character set.

MODF

CODE

Standard, IBM-G

\(<PTK>\, \text{"R"} \, n\)

(Decimal ASCII) 27 82 n

(Hex ASCII) 1B 52 n

MODE

CODE

IBM-P

\(<FS>\, \text{"R"} \, n\)

(Decimal ASCII) 28 82 n

(Hex ASCII) 1C 52 n

REMARKS

This command selects the international character set according to the value of n as shown in the table below:

<table>
<thead>
<tr>
<th>n</th>
<th>Character set</th>
<th>n</th>
<th>Character set</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>U.S.A.</td>
<td>7</td>
<td>Spain</td>
</tr>
<tr>
<td>1</td>
<td>France</td>
<td>8</td>
<td>Japan</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>9</td>
<td>Norway</td>
</tr>
<tr>
<td>3</td>
<td>England</td>
<td>10</td>
<td>Denmark I</td>
</tr>
<tr>
<td>4</td>
<td>Denmark I</td>
<td>11</td>
<td>Spain II</td>
</tr>
<tr>
<td>5</td>
<td>Sweden</td>
<td>12</td>
<td>Latin America</td>
</tr>
<tr>
<td>6</td>
<td>Italy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You can select a specific international character set (except Japan, Norway, Denmark type II, Spain type II, and Latin America), as a power-on default by adjusting the settings of DIP switches 1-6, 1-7, and 1-8.

SEE

Chapter 6
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects character set #2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>( \text{ESC} ) &quot;6&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 54</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 36</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command selects character set #2 when the IBM mode is selected. You can select character set #2 as the power-on default by turning DIP switch 1-5 off while the IBM mode is selected.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects character set #1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>( \text{ESC} ) &quot;7&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 55</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 37</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels character set #2 and selects character set #1 when the IBM mode is selected. You can select character set #1 as the power-on default by turning DIP switch 1-5 on while the IBM mode is selected.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>
### Purposes

**Selects LQ Characters.**

**Mode**
- Standard, IBM-G, IBM-P

**Code**
- Decimal ASCII: 27 120 1
- Hex ASCII: 1B 78 01

**Remarks**
This command causes the printer to print letter quality (LQ) characters until the LQ mode is cancelled. This command is ignored when the Quality Panel mode is selected at power-on.

**Note:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

**See**
Chapter 4

---

**Cancels LQ Characters.**

**Mode**
- Standard, IBM-G, IBM-P

**Code**
- Decimal ASCII: 27 120 0
- Hex ASCII: 1B 78 00

**Remarks**
This command cancels LQ printing and returns the printer to the draft mode. This command is ignored when the Quality Panel mode is selected at power-on.

**Note:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**See**
Chapter 4
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects LQ characters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “I” 2</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 73 2</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 49 02</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the printer to print letter quality (LQ) characters until the LQ mode is cancelled. This command is ignored when the Quality Panel mode is selected at power-on. <strong>NOTE:</strong> The character “2” (decimal code 50, hexadecimal code 32) can be used instead of ASCII 2.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects draft characters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “I” 0</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 73 0</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 49 00</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels LQ printing and returns the printer to draft mode. This command is ignored when the Quality Panel mode is selected at power-on. <strong>NOTE:</strong> The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>
Font pitch controls

**PURPOSE**
Sets the print pitch to pica.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(ESC) “P”
(decimal ASCII) 27 80
(hex ASCII) 1B 50

**REMARKS**
This command causes printing to be done in pica pitch, with 80 characters per line on the 10-inch type and 136 characters per line on the 15-inch type. You can select the pica pitch as the power-on default by turning DIP switch 1-1 on. This command is ignored when the Print Pitch Panel mode is selected at power-on.

**SEE**
Chapter 4

**PURPOSE**
Sets the print pitch to elite.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(ESC) “M”
(decimal ASCII) 27 77
(hex ASCII) 1B 4D

**REMARKS**
This command causes printing to be done in elite pitch, with 96 characters per line on the 10-inch type and 163 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.

**SEE**
Chapter 4
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the print pitch to elite.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “:”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 58</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 3A</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes printing to be done in elite pitch, with 96 characters per line on the 10-inch type and 163 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the print pitch to semi-condensed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “g”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 103</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 67</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes printing to be done in semi-condensed pitch, with 120 characters per line on the 10-inch type and 204 characters per line on the 15-inch type. This command is ignored when the Print Pitch Panel mode is selected at power-on.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Sets the printer to condensed print.</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>15</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>0F</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes printing to be done in condensed pitch, with 137 characters per line or 233 characters per line for pica condensed, and 160 characters per line or 272 characters per line for elite condensed. You can select the pica condensed pitch as the power-on default by turning DIP switch 1-1 off. This command is ignored when the Print Pitch Panel mode is selected at power-on. <strong>NOTE:</strong> This command sets the printer to pica condensed print only with the IBM-P mode.</td>
</tr>
</tbody>
</table>

**SEE** Chapter 4

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the printer to condensed print.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 15</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 0F</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Same as (SI), above.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>
PURPOSE  
Cancels condensed print.

MODE  
Standard, IBM-G, IBM-P

CODE
〈DC2〉

(decimal ASCII)  
18

(hex ASCII)  
12

REMARKS  
This command cancels condensed printing and returns the printer to the normal print pitch. This command is ignored when the Print Pitch Panel mode is selected at power-on.

SEE  
Chapter 4

PURPOSE  
Sets the printer to proportional print.

MODE  
Standard, IBM-G, IBM-P

CODE
〈ESC〉  "p"  1

<decimal ASCII>  
27  112  1

<hex ASCII>  
1B  70  01

REMARKS  
This command causes all subsequent characters except draft characters to be printed with proportional spacing until proportional printing is cancelled. This command is ignored when the Print Pitch Panel mode is selected at power-on.

NOTE: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE  
Chapter 4
### Cancels proportional print.

**PURPOSE**
Cancels proportional print.

**MODE**
Standard, IBM-G, IBM-P

**CODE**

<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>112</td>
</tr>
<tr>
<td>1B</td>
<td>70</td>
</tr>
</tbody>
</table>

**REMARKS**
This command cancels proportional printing and returns to “fixed pitch” printing. This command is ignored when the Print Pitch Panel mode is selected at power-on.

NOTE: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**SEE**
Chapter 4

### Sets the printer to expanded print.

**PURPOSE**
Sets the printer to expanded print.

**MODE**
Standard, IBM-G, IBM-P

**CODE**

<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>87</td>
</tr>
<tr>
<td>1B</td>
<td>57</td>
</tr>
</tbody>
</table>

**REMARKS**
This command causes characters to be printed twice as wide as normal (half the current pitch) until expanded printing is cancelled.

NOTE: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

**SEE**
Chapter 4
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Cancels expanded print.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{\textless ESC\textgreater } &quot;W&quot; 0)</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  87  0</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B  57  00</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command resets the character pitch to what it was before expanded printing was set.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the printer to expanded print for the remainder of the current line.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{\textless SO\textgreater })</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>14</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>0E</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes characters to be printed twice as wide as normally until a carriage return is sent. It can also be cancelled with (\text{\textless DC4\textgreater }).</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the printer to expanded print for the remainder of the current line.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{\textless ESC\textgreater } \text{\textless SO\textgreater })</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  14</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B  0E</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Same as (\text{\textless SO\textgreater }), above.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 4</td>
</tr>
</tbody>
</table>
PURPOSE  Cancels one line expanded print.

MODE       Standard, IBM-G, IBM-P
CODE       (decimal ASCII) 20
           (hex ASCII) 14
REMARKS    This command cancels one line expanded print set with \SO or \ESC \SO.

SEE        Chapter 4

■ Special print modes

PURPOSE  Sets the master print mode.

MODE       Standard, IBM-G, IBM-P
CODE       (decimal ASCII) 27 33 n
           (hex ASCII) 1B 21 n
REMARKS    This is a powerful command that allows the user to set several printing characteristics at one time: print pitch, condensed print, expanded print, boldface, italics, underlining, or any combination of these, as determined by n, a number from 0 to 255. (See Table 4-11 for details.)

SEE        Chapter 4

PURPOSE  Selects emphasized printing.

MODE       Standard, IBM-G, IBM-P
CODE       (decimal ASCII) 27 69
           (hex ASCII) 1B 45
REMARKS    This command causes characters to be printed in emphasized until cancelled.

SEE        Chapter 4
### Cancels emphasized printing.

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancels emphasized printing.</td>
<td>Standard, IBM-G, IBM-P</td>
<td>(\text{ESC}j \text{ &quot;F&quot;})</td>
<td>This command cancels emphasized printing and returns the printer to normal printing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selects boldface printing.</td>
<td>Standard, IBM-G, IBM-P</td>
<td>(\text{ESC} \text{ &quot;G&quot;})</td>
<td>This command causes characters to be printed in boldface until cancelled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancels boldface printing.</td>
<td>Standard, IBM-G, IBM-P</td>
<td>(\text{ESC} \text{ &quot;H&quot;})</td>
<td>This command turns off boldface printing and returns the printer to normal printing.</td>
</tr>
</tbody>
</table>

### Selects boldface printing.

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selects boldface printing.</td>
<td>Standard, IBM-G, IBM-P</td>
<td>(\text{ESC} \text{ &quot;G&quot;})</td>
<td>This command causes characters to be printed in boldface until cancelled.</td>
</tr>
</tbody>
</table>

### Cancels boldface printing.

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancels boldface printing.</td>
<td>Standard, IBM-G, IBM-P</td>
<td>(\text{ESC} \text{ &quot;H&quot;})</td>
<td>This command turns off boldface printing and returns the printer to normal printing.</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Selects underlining.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{ESC} \text{ &quot;-&quot; } 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 45 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 2D 01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| REMARKS | This command underlines the following characters until cancelled.  
\textbf{NOTE:} The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Cancels underlining.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{ESC} \text{ &quot;-&quot; } 0)</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 45 0</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 2D 00</td>
</tr>
</tbody>
</table>
| REMARKS | This command stops underlining.  
\textbf{NOTE:} The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Selects overlining.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(\text{ESC} \text{ &quot;-&quot; } 1)</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 95 1</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 5F 01</td>
</tr>
</tbody>
</table>
| REMARKS | This command prints a line above the following characters until cancelled.  
\textbf{NOTE:} The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |

| SEE | Chapter 4 |
PURPOSE: Cancels overlining.

MODE: Standard, IBM-G, IBM-P
CODE: (ESC) "_" 0  
       27 95 0  
       1B 5F 00
REMARKS: This command stops overlining.

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE: Chapter 4

PURPOSE: Selects superscripts.

MODE: Standard, IBM-G, IBM-P
CODE: (ESC) "S" 0  
       27 83 0  
       1B 53 00
REMARKS: This command raises the following characters and prints them as superscripts until cancelled. Superscripts are not printed as condensed pitch.

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE: Chapter 4
PURPOSE Selects subscripts.

MODE Standard, IBM-G, IBM-P
CODE (ESC) “S” 1
(decimal ASCII) 27 83 1
(hex ASCII) 1B 53 01

REMARKS This command lowers the following characters and prints them as subscripts until cancelled. All conditions applicable to superscripts also apply to subscripts. 

NOTE: The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 4

PURPOSE Cancels a superscript or subscript.

MODE Standard, IBM-G, IBM-P
CODE (ESC) “T”
(decimal ASCII) 27 84
(hex ASCII) 1B 54

REMARKS This command stops printing of superscripts or subscripts and returns to the normal printing previously set.

SEE Chapter 4
CONTROLLING THE VERTICAL PRINT POSITION

These commands are used to move the paper relative to the print head. By moving the paper up or down, the print head, in effect, moves the opposite direction (down or up) on the page.

■ Line feed and reverse line feed controls
PURPOSE  Advances the paper one line (line feed).

<table>
<thead>
<tr>
<th>MODE</th>
<th>Standard, IBM-G, IBM-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE</td>
<td>⟨LF⟩</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>10</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>0A</td>
</tr>
</tbody>
</table>

REMARKS  The actual distance advanced by the line feed is set either through DIP switch 2-8 or through various codes which can be sent (see below). When the DIP switch 2-6 is off, a line feed is automatically generated whenever the printer receives a carriage return.

SEE  Chapter 5

PURPOSE  Reverses the paper one line.

<table>
<thead>
<tr>
<th>MODE</th>
<th>Standard, IBM-G, IBM-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ ⟨LF⟩</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 10</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 0A</td>
</tr>
</tbody>
</table>

REMARKS  This command causes the printer to reverse the paper (in effect moving the print head up on the sheet) one line. The actual distance travelled is set through various codes (see below). You cannot reverse the paper more than one inch when the optional automatic sheet feeder is installed.

SEE  Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets line spacing to 1/8 inch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “0”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  48</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B   30</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 1/8 inch. You can select 1/8 inch line spacing as the power-on default by turning DIP switch 2-8 off.</td>
</tr>
</tbody>
</table>

**SEE**  Chapter 5

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets line spacing to 1/6 inch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “2”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  50</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B   32</td>
</tr>
<tr>
<td>MODE</td>
<td>IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨FS⟩ “2”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>28  50</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1C   32</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 1/6 inch. You can select 1/6 inch line spacing as the power-on default by turning DIP switch 2-8 on.</td>
</tr>
</tbody>
</table>

**SEE**  Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets line spacing to 7/60 inch or 7/72 inch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “1”</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  49</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B   31</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 7/60 inch with the Standard mode, or 7/72 inch with the IBM modes.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets line spacing to n/180 inch or n/216 inch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “3” n</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  51 n</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B   33 n</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the actual distance the paper advances or reverses during all subsequent line feeds to n/180 inch with the Standard mode or n/216 inch with the IBM modes. The value of n must be between 1 and 255.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Sets line spacing to ( n/60 ) inch or ( n/72 ) inch.</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>MODE</td>
<td>Standard</td>
</tr>
<tr>
<td>CODE</td>
<td>( \langle \text{ESC} \rangle \quad \text{&quot;A&quot;} \quad n )</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 65 ( n )</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 41 ( n )</td>
</tr>
<tr>
<td>MODE</td>
<td>IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>( \langle \text{FS} \rangle \quad \text{&quot;A&quot;} \quad n )</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>28 65 ( n )</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1C 41 ( n )</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the actual distance the paper advances or reverses during all subsequent line feeds to ( n/60 ) inch with the Standard mode or ( n/72 ) inch with the IBM modes immediately. The value of ( n ) must be between 0 and 255.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>

**PURPOSE**

Sets line spacing to \( n/60 \) inch or \( n/72 \) inch.

**MODE**

IBM-G, IBM-P

**CODE**

\( \langle \text{ESC} \rangle \quad \text{"A"} \quad n \)

(decimal ASCII) 27 65 \( n \)

(hex ASCII) 1B 41 \( n \)

**REMARKS**

This command defines the actual distance the paper advances or reverses during all subsequent line feeds to \( n/72 \) inch. This command must be used in conjunction with \( \langle \text{ESC} \rangle \text{"2"} \) which activates the \( \langle \text{ESC} \rangle \text{"A"} \) definition. The value of \( n \) must be between 1 and 85.

**SEE**

Chapter 5
PURPOSE  Uses \( \text{ESC} \) “A” definition.

MODE  IBM-G, IBM-P

CODE  \( \text{ESC} \) “2”

(Decimal ASCII)  27  50

(Hex ASCII)  1B  32

REMARKS  This command activates the line spacing defined in the \( \text{ESC} \) “A” command. If the \( \text{ESC} \) “A” command has not been defined, the line spacing is changed to 1/6 inch.

SEE  Chapter 5

PURPOSE  Sends a one-time paper feed of \( n/180 \) inch or \( n/216 \) inch.

MODE  Standard, IBM-G, IBM-P

CODE  \( \text{ESC} \) “J” \( n \)

(Decimal ASCII)  27  74  \( n \)

(Hex ASCII)  1B  4A  \( n \)

REMARKS  This command causes the printer to advance the paper \( n/180 \) inch with the Standard mode or \( n/216 \) inch with the IBM modes. It does not change the current value of line spacing and it does not cause a carriage return. The value of \( n \) must be between 0 and 255.

SEE  Chapter 5
**PURPOSE**

Sets print position to \( n \) lines.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>106</td>
</tr>
<tr>
<td>1B</td>
<td>6A</td>
</tr>
</tbody>
</table>

**REMARKS**

This command sets the next print position to the \( n \)th line from the top of the current page.

**NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

**SEE**

Chapter 5
**Form feed and related commands**

**PURPOSE**
Advances the paper to the top of the next page (form feed).

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(FF)

**CODE** (decimal ASCII)
12

**CODE** (hex ASCII)
0C

**REMARKS**
The actual length of a page ejected by a form feed is set either by setting of the control panel key or through various codes (see below). This command works as the paper eject command when the optional automatic sheet feeder is installed.

**SEE**
Chapter 5

**PURPOSE**
Reverses the paper to the top of the current page.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(ESC) (FF)

**CODE** (decimal ASCII)
27 12

**CODE** (hex ASCII)
1B 0C

**REMARKS**
This command causes the printer to reverse the paper to the top of the current printing page (or form). This command is ignored when the optional automatic sheet feeder is installed.

**SEE**
Chapter 5
Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.

**PURPOSE**

Sets page length to $n$ inches.

**PURPOSE**

Sets page length to $n$ lines.

**PURPOSE**

Sets the top of form to the current position.
Top/Bottom margins and vertical tabs

**PURPOSE**

Sets the top margin.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\(\text{ESC} \quad "r" \quad n\)

\(27 \quad 114 \quad n\)

\(1B \quad 72 \quad n\)

**REMARKS**

This command sets the top margin to \(n\) lines. Printing begins on the \((n + 1)\)th line on the page. This command is ignored when the optional automatic sheet feeder is installed. The value of \(n\) must be between 1 and 255.

**SEE**

Chapter 5

---

**PURPOSE**

Sets the bottom margin.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\(\text{ESC} \quad "N" \quad n\)

\(27 \quad 78 \quad n\)

\(1B \quad 4E \quad n\)

**REMARKS**

This command sets the bottom margin to \(n\) lines. The printer will generate a form feed whenever there are \(n\) lines left on the page. This command is ignored when the optional automatic sheet feeder is installed. The value of \(n\) must be between 1 and 127.

**SEE**

Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Cancels top and bottom margins.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(decimal ASCII) 27 79 (hex ASCII) 1B 4F</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels both the top margin and the bottom margin.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Advances paper to the next vertical tab position.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(decimal ASCII) 11 (hex ASCII) 0B</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the paper to be advanced to the next vertical tab position, or the top of the next page, whichever is first. If the vertical tab positions are not set, this command works as a line feed command.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>
Sets vertical tab positions.

**PURPOSE**
Sets vertical tab positions.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
\(\text{ESC} \quad \text{"B"} \quad n1 \ n2 \ n3 \ldots \quad 0\)

(DECIMAL ASCII)
27 66 n1 n2 n3 ... 0

(Hex ASCII)
1B 42 n1 n2 n3 ... 00

**REMARKS**
This command cancels all current vertical tab positions and sets those defined at lines \(n1, n2, n3, \ldots\). The maximum number of vertical tab positions allowed is 16. The ASCII 0 character is used as a command terminator. Each vertical tab position must be specified in ascending order.

**SEE**
Chapter 5

Selects vertical channels.

**PURPOSE**
Selects vertical channels.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
\(\text{ESC} \quad \text{"/"} \quad n0\)

(DECIMAL ASCII)
27 47 n0

(Hex ASCII)
1B 2F n0

**REMARKS**
This command selects one of the multiple vertical channels determined by the value of \(n0\). The value of \(n0\) must be between 0 and 7.

**SEE**
Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets vertical tab positions in a channel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>&lt;ESC&gt; &quot;b&quot; (n0 n1 n2 n3 \ldots 0)</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 98 (n0 n1 n2 n3 \ldots 0)</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 62 (n0 n1 n2 n3 \ldots 00)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels all current vertical tab positions in channel (n0) and sets those defined at lines (n1, n2, n3, \ldots), etc. The maximum number of vertical tab positions for each channel allowed is 16. The ASCII 0 character is used as a command terminator. Each vertical tab position must be specified in ascending order. The vertical channel (n0) must be between 0 and 7.</td>
</tr>
</tbody>
</table>

**SEE** Chapter 5

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets vertical tab positions every (n) lines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>&lt;ESC&gt; &quot;e&quot; (1 \ldots n)</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 101 (1 \ldots n)</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 65 (01 \ldots n)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels all current vertical tab positions and sets those every (n) lines. <strong>NOTE:</strong> The character &quot;1&quot; (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.</td>
</tr>
</tbody>
</table>

**SEE** Chapter 5
PURPOSE | Cancels vertical tab positions.
---|---
MODE | IBM-P
CODE | \( \text{ESC} \) “R”
(Decimal ASCII) | 27 82
(Hex ASCII) | 1B 52
REMARKS | This command cancels the vertical tab positions. This command also sets the horizontal tab positions every 8 characters.
SEE | Chapter 5

CONTROLLING THE HORIZONTAL PRINT POSITION

This section described commands that move the print head and restrict its printing range (such as setting margins and tabs).

PURPOSE | Returns print head to the left margin (carriage return).
---|---
MODE | Standard, IBM-G, IBM-P
CODE | \( \text{CR} \)
(Decimal ASCII) | 13
(Hex ASCII) | 0D
REMARKS | This command returns the print head to the left margin. If DIP switch 2-6 has been set off, then this command will also cause a line feed character to be generated after the carriage return, thereby advancing to the beginning of the next print line automatically.
SEE | Chapter 5
### PURPOSE
Sets carriage return function with a line feed.

### MODE
IBM-P

### CODE
<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>1B</td>
</tr>
<tr>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>01</td>
</tr>
</tbody>
</table>

### REMARKS
This command sets the carriage return function with a line feed. When the \(\text{\textbackslash{CR}}\) command is sent to the printer after this command has been sent, the printer automatically advances the paper one line.

**NOTE:** The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

### SEE
Chapter 5

### PURPOSE
Sets carriage return function without a line feed.

### MODE
IBM-P

### CODE
<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>1B</td>
</tr>
<tr>
<td>53</td>
<td>35</td>
</tr>
<tr>
<td>0</td>
<td>00</td>
</tr>
</tbody>
</table>

### REMARKS
This command sets the carriage return function without a line feed. After this command has been sent to the printer, the print head returns to the left margin of the current line every time it receives a carriage return.

**NOTE:** The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

### SEE
Chapter 5
Sets the left and right margins.

**PURPOSE**
Sets the left and right margins.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(Decimal ASCII) 27 88 \( n_1 \) \( n_2 \)
(Hex ASCII) 1B 58 \( n_1 \) \( n_2 \)

**REMARKS**
This command sets the left margin to \( n_1 \) characters and the right margin to \( n_2 \). The values of \( n_1 \) and \( n_2 \) must be between 0 and 255, and \( n_2 \) should be greater than \( n_1 \). You can set the left and right margins manually on the control panel.

**NOTE:** Changing the print pitch after the margins have been set does not change the margins — they stay in exactly the same place on the page.

**SEE**
Chapter 5

---

Sets the left margin.

**PURPOSE**
Sets the left margin.

**MODE**
Standard, IBM-G, IBM-P

**CODE**
(Decimal ASCII) 27 108 \( n \)
(Hex ASCII) 1B 6C \( n \)

**REMARKS**
This command sets the left margin to \( n \) characters. Each line will begin in the \((n + 1)\)th character position from the left edge. The value of \( n \) must be between 0 and 255. You can set the left margin manually on the control panel.

**NOTE:** Changing the print pitch after the left margin has been set does not change the margin — it stays in exactly the same place on the page.

**SEE**
Chapter 5
**PURPOSE**

Sets the right margin.

**MODE**

Standard, IBM-G

**CODE**

<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 81 n</td>
<td>1B 51 n</td>
</tr>
</tbody>
</table>

**MODE**

IBM-P

**CODE**

<table>
<thead>
<tr>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 81 n</td>
<td>1C 51 n</td>
</tr>
</tbody>
</table>

**REMARKS**

This command sets the right margin to \( n \), which is the last character position that will be printed in a line. After execution of this command, any attempt to print beyond print position \( n \) will cause the printer to automatically generate a carriage return and a line feed before printing the remainder of the line. The value of \( n \) must be between 2 and 255. You can set the right margin manually on the control panel.

**NOTE:** Changing the print pitch after the right margin has been set does not change the margin — it stays in exactly the same position on the page.

**SEE**

Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Moves the print head to the next horizontal tab position.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨HT⟩</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>9</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>09</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the print head to advance to the next horizontal tab position. The horizontal tab positions are set at power-on to print positions 8, 16, 24, etc. (to the maximum print position).</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>

### HORIZONTAL TAB POSITIONS

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets horizontal tab positions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ “D” ( n1 ) ( n2 ) ( n3 ) ... 0</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 68 ( n1 ) ( n2 ) ( n3 ) ... 0</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 44 ( n1 ) ( n2 ) ( n3 ) ... 00</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command cancels all current horizontal tab positions and sets those defined at print positions ( n1 ), ( n2 ), ( n3 ), etc. The maximum number of horizontal tab positions allowed is 28. The ASCII 0 character is used as a command terminator. Each horizontal tab position must be specified in ascending tab position.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>
Sets horizontal tab positions every $n$ characters.

**Mode**

Standard, IBM-G, IBM-P

**Code**

(Decimal ASCII) 27 101 0 $n$

(Hex ASCII) 1B 65 00 $n$

**Remarks**

This command cancels all current horizontal tab positions and sets those every $n$ characters.

**Note:** The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**See**

Chapter 5

Sets the horizontal tab positions to every 8 characters.

**Mode**

IBM-P

**Code**

(Decimal ASCII) 27 82

(Hex ASCII) 1B 52

**Remarks**

This command cancels all current horizontal tab positions and sets those every 8 characters. This command also cancels the vertical tab positions.

**See**

Chapter 5
**PURPOSE**

Moves the print head to an absolute horizontal position.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\[
\text{\{ESC\}} \, \text{"$"} \quad n1 \quad n2
\]

(Decimal ASCII)

27 36  \(n1\)  \(n2\)

(Hex ASCII)

1B 24  \(n1\)  \(n2\)

**REMARKS**

This command causes the printer to move the print head to an absolute horizontal position. The position, in inches, is determined by the formula \((n1 + n2 \times 256)/60\).

**SEE**

Chapter 5

---

**PURPOSE**

Moves the print head to a specified horizontal position.

**MODE**

Standard, IBM-G

**CODE**

\[
\text{\{ESC\}} \, \text{"\"} \quad n1 \quad n2
\]

(Decimal ASCII)

27 92  \(n1\)  \(n2\)

(Hex ASCII)

1B 5C  \(n1\)  \(n2\)

**MODE**

IBM-P

**CODE**

\[
\text{\{FS\}} \, \text{"\"} \quad n1 \quad n2
\]

(Decimal ASCII)

28 92  \(n1\)  \(n2\)

(Hex ASCII)

1C 5C  \(n1\)  \(n2\)

**REMARKS**

This command causes the printer to move the print head to a specified horizontal position. It can move the print head either left or right. The distance is determined by the formula \((n1 + n2 \times 256)\) dots.

To move to the left, add 64 to the calculated value of \(n2\). The command will be ignored if you try to move to a position outside the current margins.

**SEE**

Chapter 5
**PURPOSE**

Adds *n* dot spaces between characters.

**MODE**

Standard

**CODE**

(ESC) "space"  *n*

(Decimal ASCII)  
27  32  *n*

(Hex ASCII)  
1B  20  *n*

**REMARKS**

This command increases the space between characters by *n* dots. The value of *n* must be between 0 and 127.

**SEE**

Chapter 6

**PURPOSE**

Sets the print position to *n* characters.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

(ESC) "f"  0  *n*

(Decimal ASCII)  
27  102  0  *n*

(Hex ASCII)  
1B  66  00  *n*

**REMARKS**

This command sets the next print position to *n* columns from the left margin. The value of *n* must be between 0 and 127.

**NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**SEE**

Chapter 5
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets alignment, or centering.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>( \langle \text{ESC} \rangle , &quot;a&quot; , n )</td>
</tr>
<tr>
<td></td>
<td>(decimal ASCII) 27 97 ( n )</td>
</tr>
<tr>
<td></td>
<td>(hex ASCII) 1B 61 ( n )</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the printer to format text as follows:</td>
</tr>
<tr>
<td></td>
<td>( n ) Text formatting</td>
</tr>
<tr>
<td></td>
<td>0 Left justified (ragged right margin)</td>
</tr>
<tr>
<td></td>
<td>1 Centered</td>
</tr>
<tr>
<td></td>
<td>2 Right justified</td>
</tr>
<tr>
<td></td>
<td>3 Right and left justified</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>
## DOWNLOAD CHARACTER COMMANDS

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Defines download characters into RAM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G</td>
</tr>
<tr>
<td>CODE</td>
<td>(decimal ASCII) (\text{ESC}) &quot;$&quot; 0 (nl\ n2\ m0\ m1\ m2\ d1\ d2\ \ldots\ dx)</td>
</tr>
<tr>
<td></td>
<td>(hex ASCII) 27 38 0 (nl\ n2\ m0\ m1\ m2\ d1\ d2\ \ldots\ dx)</td>
</tr>
<tr>
<td></td>
<td>IBM-P (\text{ESC}) &quot;=&quot; 0 (nl\ n2\ m0\ m1\ m2\ d1\ d2\ \ldots\ dx)</td>
</tr>
<tr>
<td>CODE</td>
<td>(decimal ASCII) 27 61 0 (nl\ n2\ m0\ m1\ m2\ d1\ d2\ \ldots\ dx)</td>
</tr>
<tr>
<td></td>
<td>(hex ASCII) 1B 3D 00 (nl\ n2\ m0\ m1\ m2\ d1\ d2\ \ldots\ dx)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command is used to define one or more user-defined characters and to store them into RAM for later use. RAM is cleared when the power is turned off. The values of (nl) and (n2) specify the range of positions in RAM that the characters are to occupy. Valid character positions are any number between 32 and 126 or between 160 and 255. Following (n2) the printer expects character data bytes for each character to be defined. The first byte, (m0), specifies the left hand space of the download character. The second byte, (m1), specifies the character width. And the third byte, (m2), specifies the right hand space of the character. (d1) through (dx) determine which dots form the character. <strong>NOTE:</strong> This command is ignored when the DIP switch 2-3 is set on.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 7</td>
</tr>
</tbody>
</table>
### PURPOSE
Copies standard character ROM font into RAM.

<table>
<thead>
<tr>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard, IBM-G</td>
<td>This command copies all the standard characters to the corresponding download character RAM area. This destroys any existing user-defined characters in that range. <strong>NOTE:</strong> This command is ignored when the DIP switch 2-3 is set on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IBM-P</td>
<td>This command causes the printer to select the download character set. <strong>NOTE:</strong> The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODE</th>
<th>CODE</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard, IBM-G, IBM-P</td>
<td>This command causes the printer to select the download character set.</td>
</tr>
</tbody>
</table>

### SEE
Chapter 7
PURPOSE

Cancels download character set.

MODE

Standard, IBM-G, IBM-P

CODE

〈ESC〉  “%”  0

(decimal ASCII)  27  37  0

(hex ASCII)  1B  25  00

REMARKS

This command cancels the download character set and selects the previous character set.

NOTE: The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE

Chapter 7

PURPOSE

Selects draft download character set.

MODE

IBM-P

CODE

〈ESC〉  “I”  4

(decimal ASCII)  27  73  4

(hex ASCII)  1B  49  04

REMARKS

This command causes the printer to select the draft download character set.

NOTE: The character “4” (decimal code 52, hexadecimal code 34) can be used instead of ASCII 4.

SEE

Chapter 7
PURPOSE
Selects LQ download character set.

MODE
IBM-P

CODE
(ESC) "I" 6
27 73 6
1B 49 06

REMARKS
This command causes the printer to select the LQ download character set.
NOTE: The character “6” (decimal code 54, hexadecimal code 36) can be used instead of ASCII 6.

SEE
Chapter 7

DOT GRAPHICS COMMANDS

PURPOSE
Prints 8-dot normal-density graphics.

MODE
Standard, IBM-G, IBM-P

CODE
(ESC) "K" n1 n2 m1 m2 ....
27 75 n1 n2 m1 m2 ....
1B 4B n1 n2 m1 m2 ....

REMARKS
This command selects 60 dots-per-inch, column-scan, bit-image graphics mode. The values of n1 and n2 represent the number of graphics characters to be printed, where the total number of characters = n2 times 256 + n1. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character.

SEE
Chapter 7
PURPOSE  Prints 8-dot double-density graphics.

MODE  Standard, IBM-G, IBM-P
CODE  ⟨ESC⟩ "L"  n1 n2 m1 m2 ..... (decimal ASCII)
       27  76  n1 n2 m1 m2 ..... (hex ASCII)
REMARKS  This command selects 120 dots-per-inch, column-scan, bit-image graphics mode. The values of n1 and n2 are the same as in normal-density graphics. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character.

SEE  Chapter 7

PURPOSE  Prints 8-dot double-density graphics at double-speed.

MODE  Standard, IBM-G, IBM-P
CODE  ⟨ESC⟩ "Y"  n1 n2 m1 m2 ..... (decimal ASCII)
       27  89  n1 n2 m1 m2 ..... (hex ASCII)
REMARKS  This command selects 120 dots-per-inch, column-scan, bit-image graphics mode at double-speed. The values of n1 and n2 are the same as in normal-density graphics. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character.

SEE  Chapter 7
PURPOSE

Prints 8-dot quadruple-density graphics.

MODE

Standard, IBM-G, IBM-P

CODE

(ESC) "Z" n1 n2 m1 m2 ..... (decimal ASCII)

27 90 n1 n2 m1 m2 ..... (hex ASCII)

REMARKS

This command selects 240 dots-per-inch, column-scan, bit-image graphics mode. The values of n1 and n2 are the same as in normal-density graphics. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character.

SEE

Chapter 7

PURPOSE

Selects graphics modes.

MODE

Standard, IBM-G, IBM-P

CODE

(ESC) "*" n0 n1 n2 m1 m2 ..... (decimal ASCII)

27 42 n0 n1 n2 m1 m2 ..... (hex ASCII)

REMARKS

This command selects one eleven possible graphics modes, depending on the value of n0. The values of n1 and n2 are the same as normal-density graphics mode. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character. The value of n0 and its related graphics modes are shown below.

n Graphics mode

0 8-dot normal-density (60 dots per inch)
1 8-dot double-density (120 dots per inch)
2. 8-dot double-density at double-speed (120 dots per inch)
3. 8-dot quadruple-density (240 dots per inch)
4. 8-dot semi-double density (80 dots per inch)
6. 8-dot CRT graphics (90 dots per inch)
32. 24-dot normal-density (60 dots per inch)
33. 24-dot double-density (120 dots per inch)
38. 24-dot CRT graphics (90 dots per inch)
39. 24-dot triple-density (180 dots per inch)
40. 24-dot hexa-density (360 dots per inch)

SEE
Chapter 7

PURPOSE
Redefines the graphics mode.

MODE
Standard, IBM-G, IBM-P

CODE
(ESC) "?"  \( n0 \)  \( n1 \)
27  63  \( n0 \)  \( n1 \)
1B  3F  \( n0 \)  \( n1 \)

REMARKS
This command redefines one of the 4 alternate graphics commands — (ESC) “K”, (ESC) “L”, (ESC) “Y”, or (ESC) “Z” — as one of the eleven graphics density numbers with the (ESC) “*” command, where \( n0 \) is “K”, “L”, “Y”, or “Z” and \( n1 \) is 0, 1, 2, 3, 4, 6, 32, 33, 38, 39 or 40.

SEE
Chapter 7
## OTHER COMMANDS

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the value of the eighth data bit to logical 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ &quot;＞&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  62</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B  3E</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command forces the eighth data bit of each subsequent character sent to the printer to logical 1. This code allows users with a 7-bit interface to access those characters whose ASCII code is greater than 127. This code should not be used to transmit printer control codes.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets the value of the eighth data bit to logical 0.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G</td>
</tr>
<tr>
<td>CODE</td>
<td>⟨ESC⟩ &quot;＝&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27  61</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B  3D</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command forces the eighth data bit of each subsequent character sent to the printer to logical 0. This code should not be used to transmit printer control code.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>
Accepts the value of the eighth data bit as is.

MODE Standard, IBM-G
CODE \( \langle ESC \rangle \) "#"
(decimal ASCII) 27 35
(hex ASCII) 1B 23

REMARKS This command cancels either setting of the eighth data bit. The printer will use the value of the eighth data bit that is sent from the computer. This code allows users with a 7-bit interface to resume normal functions after accessing those characters whose ASCII code is greater than 127.

SEE Chapter 6

Prints "slash zero".

MODE Standard, IBM-G, IBM-P
CODE \( \langle ESC \rangle \) "~" 1
<decimal ASCII> 27 126 1
(hex ASCII) 1B 7E 01

REMARKS This command causes to print the zero character with a slash.

NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE Chapter 6
**PURPOSE**

Prints "normal zero".

**MODE**

Standard, IBM-G, IBM-P

**CODE**

(ESC) "～" 0

(Decimal ASCII) 27 126 0

(Hex ASCII) 1B 7E 00

**REMARKS**

This command cancels printing the slash zero and returns printing to the normal zero character.

**NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**SEE**

Chapter 6

**PURPOSE**

Moves the print head back one print position (backspace).

**MODE**

Standard, IBM-G, IBM-P

**CODE**

(BS)

(Decimal ASCII) 8

(Hex ASCII) 08

**REMARKS**

This command shifts the print head one column to the left. If the print head is at the left margin, the command is ignored. This command can be used to overstrike or combine characters.

**SEE**

Chapter 6
**PURPOSE**  
Deletes the last character sent.

**MODE**  
Standard, IBM-G, IBM-P

**CODE**  
(DEL)

(Decimal ASCII)  
127

(Hex ASCII)  
7F

**REMARKS**  
This command deletes the last character received. This command is ignored if the last character received has already been printed, or if the last character received was all or part of a function code.

**SEE**  
Chapter 6

---

**PURPOSE**  
Cancels a line.

**MODE**  
Standard, IBM-G, IBM-P

**CODE**  
(CAN)

(Decimal ASCII)  
24

(Hex ASCII)  
18

**REMARKS**  
This command deletes the last line in the print buffer at the time the command is used.

**SEE**  
Chapter 6
PURPOSE: Sets printer off line.

MODE: Standard, IBM-G
CODE: 〈DC3〉
(Decimal ASCII) 19
(Hex ASCII) 13

MODE: IBM-P
CODE: 〈ESC〉 “Q” 3
(Decimal ASCII) 27 81 3
(Hex ASCII) 1B 51 03

REMARKS: This command causes the printer to go off line, disregarding all subsequent characters and function codes, with the exception of 〈DC1〉, which will return the printer to the on line state. This is not the same as pushing the On Line key. When the On Line indicator is not lit the printer will not respond to 〈DC1〉.

SEE: Chapter 6

PURPOSE: Sets printer on line.

MODE: Standard, IBM-G, IBM-P
CODE: 〈DC1〉
(Decimal ASCII) 17
(Hex ASCII) 11

REMARKS: This command resets the printer to the on line state, allowing it to receive and process all subsequent characters and function codes. This is not the same as pushing the On Line key. When the On Line indicator is not lit the printer will not respond to 〈DC1〉.

SEE: Chapter 6
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sounds the printer bell.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td><strong>(BEL)</strong></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>7</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>07</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the buzzer to sound for about a quarter of a second.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th><strong>Disables paper-out detector.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td><strong>(ESC) “8”</strong></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 56</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 38</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the printer to disregard the signal sent by the paper-out detector. The paper-out signal normally sounds the printer bell and stops printing until paper is inserted and the printer is reset. DIP switch 2-4 can also set to disable the paper-out detector.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th><strong>Enables paper-out detector.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td><strong>(ESC) “9”</strong></td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 57</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 39</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command restores the function of the paper-out detector.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>
Selects uni-directional printing.

**PURPOSE**

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\[\text{〈ESC〉 "U" 1}\]

(decimal ASCII)

27 85 1

(hex ASCII)

1B 55 01

**REMARKS**

This command causes all subsequent printing to be done in uni-directional printing. Uni-directional printing is useful in printing tables or charts, since it ensures that vertical columns of characters will be aligned.

**NOTE:** The character “1” (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

**SEE**

Chapter 6

Cancels uni-directional printing.

**PURPOSE**

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\[\text{〈ESC〉 "U" 0}\]

(decimal ASCII)

27 85 0

(hex ASCII)

1B 55 00

**REMARKS**

This command cancels uni-directional printing and returns to the standard bi-directional printing, which is considerably faster.

**NOTE:** The character “0” (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**SEE**

Chapter 6
PURPOSE: Selects one-line uni-directional printing.

MODE: Standard, IBM-G, IBM-P
CODE: $\langle$ESC$\rangle$ "\" \n<decimal ASCII>: 27 60 \n<hex ASCII>: 1B 3C

REMARKS: This command immediately returns the print head to the left margin. The remainder of the line is printed from left to right. Normal (bi-directional) printing resumes following a carriage return.

SEE: Chapter 6

PURPOSE: Enlarges characters in whole or cancels same.

MODE: Standard, IBM-G, IBM-P
CODE: $\langle$ESC$\rangle$ "h" \(n\)
<decimal ASCII>: 27 104 \(n\) \n<hex ASCII>: 1B 68 \(n\)

REMARKS: This special command enlarges characters following the command until the enlargement is cancelled. The values of \(n\) have the following effects.

\(n\) Effect
0 Cancels enlargement
1 Double-high, double-wide
2 Quadruple-high, quadruple-wide

SEE: Chapter 6
PURPOSE
Prints characters from all character sets.

MODE
IBM-P

CODE
(ESC) “\” nl n2
(27 92 n1 n2)

(hex ASCII)
(1B 5C n1 n2)

REMARKS
This command allows the printing of all characters, including characters with an ASCII value below decimal 32. The printer normally recognizes the ASCII values less than decimal value 32 as control codes. This command allows the printer to print the special characters assigned to the ASCII control codes. If the printer receives a code value for an unassigned character, a space character prints.
The total number of characters is equal to n1 + (n2 × 256).

SEE
Chapter 6

PURPOSE
Prints a character from all character sets.

MODE
IBM-P

CODE
(ESC) “^” n
(27 94 n)

(hex ASCII)
(1B 5E n)

REMARKS
This command prints one character defined with the value of n from the whole character sets. You can use this command to print codes the printer normally recognizes as control codes.

SEE
Chapter 6
PURPOSE
Sets immediate print mode.

MODE
Standard, IBM-G, IBM-P

CODE
\(<\text{ESC}>\) "i" 1
(decimal ASCII) 27 105 1
(hex ASCII) 1B 69 01

REMARKS
This command selects the immediate print mode. In the immediate print mode the print head prints one character at a time, as you send it. The printer also moves the paper up so that you can see the current line and then down to continue printing. This kind of instant feedback can be especially helpful in telecommunications.

NOTE: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

SEE
Chapter 6

PURPOSE
Cancels immediate print mode.

MODE
Standard, IBM-G, IBM-P

CODE
\(<\text{ESC}>\) "i" 0
(decimal ASCII) 27 105 0
(hex ASCII) 1B 69 00

REMARKS
This command cancels the immediate print mode and returns the normal print mode.

NOTE: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

SEE
Chapter 6
**PURPOSE**

Sets half-speed printing.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\(\text{〈ESC〉 "s" 1}\)

27 115 1

1B 73 01

**REMARKS**

This command causes the printer to select half-speed printing. Half-speed printing reduces the noise of printing.

**NOTE:** The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1.

**SEE**

Chapter 6

**PURPOSE**

Cancels half-speed printing.

**MODE**

Standard, IBM-G, IBM-P

**CODE**

\(\text{〈ESC〉 "s" 0}\)

27 115 0

1B 73 00

**REMARKS**

This command cancels half-speed printing mode, and restores normal printing.

**NOTE:** The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0.

**SEE**

Chapter 6
PURPOSE

Selects auto feed mode.

MODE

Standard, IBM-G, IBM-P

CODE

(ESC) 〈EM〉 4

(DECIMAL ASCII) 27 25 4

(Hex ASCII) 1B 19 04

REMARKS

This command causes the printer to select the auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE

Chapter 6
**PURPOSE**

Selects **auto feed mode**.

**MODE**

Standard, IBM-G, IBM-P

“(" "(" "4" ")" ")"

**CODE**

(Decimal ASCII) 40 40 52 41 41

(Hex ASCII) 28 28 34 29 29

**REMARKS**

Same as <ESC><EM> 4, above.

**SEE**

Chapter 6

---

**PURPOSE**

Cancels **auto feed mode**.

**MODE**

Standard, IBM-G, IBM-P

＜ESC＞＜EM＞ 0

**CODE**

(Decimal ASCII) 27 25 0

(Hex ASCII) 1B 19 00

**REMARKS**

This command causes the printer to cancel the auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

**SEE**

Chapter 6

---

**PURPOSE**

Cancels **auto feed mode**.

**MODE**

Standard, IBM-G, IBM-P

“(" "(" "0" ")" ")"

**CODE**

(Decimal ASCII) 40 40 48 41 41

(Hex ASCII) 28 28 30 29 29

**REMARKS**

Same as <ESC><EM> 0, above.

**SEE**

Chapter 6
PURPOSE
Supplies paper from first bin.

MODE
Standard, IBM-G, IBM-P

CODE
〈ESC〉〈EM〉 1

(Decimal ASCII)
27 25 1

(Hex ASCII)
1B 19 01

REMARKS
This command causes the 15-inch type printer to supply paper from the first bin. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE
Chapter 6

Supplies paper from first bin.

MODE
Standard, IBM-G, IBM-P

CODE
〈ESC〉〈EM〉

(Decimal ASCII)
40 40 49 41 41

(Hex ASCII)
28 28 31 29 29

REMARKS
Same as 〈ESC〉〈EM〉 1, above.

SEE
Chapter 6

Supplies paper from second bin.

MODE
Standard, IBM-G, IBM-P

CODE
〈ESC〉〈EM〉

(Decimal ASCII)
27 25 2

(Hex ASCII)
1B 19 02

REMARKS
This command causes the 15-inch type printer to supply paper from the second bin. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.

SEE
Chapter 6
<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Supplies paper from second bin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>&quot;(&quot; &quot;2&quot; &quot;)&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>40 40 50 41 41</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>28 28 32 29 29</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Same as 〈ESC〉 〈EM〉 2, above.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Ejects paper.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>〈ESC〉 〈EM〉 &quot;R&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>27 25 82</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>1B 19 52</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command causes the printer to eject paper. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Ejects paper.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>&quot;(&quot; &quot;R&quot; &quot;)&quot;</td>
</tr>
<tr>
<td>(decimal ASCII)</td>
<td>40 40 82 41 41</td>
</tr>
<tr>
<td>(hex ASCII)</td>
<td>28 28 52 29 29</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Same as 〈ESC〉 〈EM〉 &quot;R&quot;, above.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Sets print start position.</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>(&lt;\text{ESC}&gt;) (&lt;\text{EM}&gt;) “T” (n)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>This command sets the print start position to the (n/6) inches at the top of the page. This command is ignored when the optional automatic sheet feeder is not mounted on the printer.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>Sets print start position.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>Standard, IBM-G, IBM-P</td>
</tr>
<tr>
<td>CODE</td>
<td>“(“ “(“ “T” “)” “)” (n)</td>
</tr>
<tr>
<td>REMARKS</td>
<td>Same as (&lt;\text{ESC}&gt;) (&lt;\text{EM}&gt;) “T” (n), above.</td>
</tr>
<tr>
<td>SEE</td>
<td>Chapter 6</td>
</tr>
</tbody>
</table>
# APPENDIX E

## COMMAND SUMMARY IN NUMERIC ORDER

The purpose of this Appendix is to provide a quick reference of each mode for the various function codes in numeric order.

### Standard mode

The following functions take effect under the Standard mode, which emulates the Epson LQ-1000 printer.

<table>
<thead>
<tr>
<th>Control code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHR$7</td>
<td>Sounds the printer bell</td>
</tr>
<tr>
<td>CHR$8</td>
<td>Moves the print head back one print position (backspace)</td>
</tr>
<tr>
<td>CHR$9</td>
<td>Moves the print head to the next horizontal tab position</td>
</tr>
<tr>
<td>CHR$10</td>
<td>Advances the paper one line (line feed)</td>
</tr>
<tr>
<td>CHR$11</td>
<td>Advances paper to the next vertical tab position</td>
</tr>
<tr>
<td>CHR$12</td>
<td>Advances the paper to the top of the next page (form feed)</td>
</tr>
<tr>
<td>CHR$13</td>
<td>Returns print head to the left margin (carriage return)</td>
</tr>
<tr>
<td>CHR$14</td>
<td>Sets the printer to expanded print for the remainder of the current line</td>
</tr>
<tr>
<td>CHR$15</td>
<td>Sets the printer to condensed print</td>
</tr>
<tr>
<td>CHR$17</td>
<td>Sets printer on line</td>
</tr>
<tr>
<td>CHR$18</td>
<td>Cancels condensed print</td>
</tr>
<tr>
<td>CHR$19</td>
<td>Sets printer off line</td>
</tr>
<tr>
<td>CHR$20</td>
<td>Cancels one line expanded print</td>
</tr>
</tbody>
</table>
CHR$(24) Cancels a line
CHR$(27) Escape (indicated as (ESC) below)
CHR$(127) Deletes the last character sent
〈ESC〉 CHR$(10) Reverses the paper one line
〈ESC〉 CHR$(12) Reverses the paper to the top of the current page
〈ESC〉 CHR$(14) Sets the printer to expanded print for the remainder of the current line
〈ESC〉 CHR$(15) Sets the printer to condensed print
〈ESC〉 CHR$(25) CHR$(0) Cancels auto feed mode
〈ESC〉 CHR$(25) CHR$(1) Supplies paper from first bin
〈ESC〉 CHR$(25) CHR$(2) Supplies paper from second bin
〈ESC〉 CHR$(25) CHR$(4) Selects auto feed mode
〈ESC〉 CHR$(25) “R” Ejects paper
〈ESC〉 CHR$(32) n Adds n dot spaces between characters
〈ESC〉 “!” n Sets the master print mode
〈ESC〉 “#” Accepts the value of the eighth data bit as is
〈ESC〉 “$” n1 n2 Moves the print head to an absolute horizontal position
〈ESC〉 “%” 0 Cancels download character set
〈ESC〉 “%” 1 Selects download character set
〈ESC〉 “&” CHR$(0) n1 n2 m0 m1 m2 d1 d2 ... dx Defines download characters into RAM
〈ESC〉 “*” n0 n1 n2 m1 m2 ... Selects graphics modes
〈ESC〉 “−” 0 Cancels underlining
〈ESC〉 “−” 1 Selects underlining
〈ESC〉 “/” n0 Selects vertical channels
〈ESC〉 “0” Sets line spacing to 1/8 inch
〈ESC〉 “1” Sets line spacing to 7/60 inch
〈ESC〉 “2” Sets line spacing to 1/6 inch
〈ESC〉 “3” n Sets line spacing to n/180 inch
(ESC) "4" Selects italic characters
(ESC) "5" Cancels italic characters
(ESC) "8" Disables paper-out detector
(ESC) "9" Enables paper-out detector
(ESC) ":" CHR$(0) CHR$(0) CHR$(0)
Copies standard ROM font into RAM
(ESC) "<" Selects one-line uni-directional printing
(ESC) "=" Sets the value of the eighth data bit to logical 0
(ESC) "\" Sets the value of the eighth data bit to logical 1
(ESC) "?" n0 n1 Redefines the graphics mode
(ESC) "@" Resets the printer
(ESC) "A" n Sets line spacing to n/60 inch
(ESC) "B" n1 n2 n3 ... CHR$(0)
Sets vertical tab positions
(ESC) "C" CHR$(0) n Sets page length to n inches
(ESC) "C" n Sets page length to n lines
(ESC) "D" n1 n2 n3 ... CHR$(0)
Sets horizontal tab positions
(ESC) "E" Selects emphasized printing
(ESC) "F" Cancels emphasized printing
(ESC) "G" Selects boldface printing
(ESC) "H" Cancels boldface printing
(ESC) "J" n Sends a one-time paper feed of n/180 inch
(ESC) "K" n1 n2 m1 m2 ...
Prints 8-dot normal-density graphics
(ESC) "L" n1 n2 m1 m2 ...
Prints 8-dot double-density graphics
(ESC) "M" Sets the print pitch to elite
(ESC) "N" n Sets the bottom margin
(ESC) "O" Cancels top and bottom margins
(ESC) "P" Sets the print pitch to pica
(ESC) "Q" n Sets the right margin
(ESC) "R" n Selects an international character set
(ESC) "S" 0 Selects superscripts
(ESC) "S" 1 Selects subscripts
(ESC) "T"  Cancels a superscript or subscript
(ESC) "U" 0  Cancels uni-directional printing
(ESC) "U" 1  Selects uni-directional printing
(ESC) "W" 0  Cancels expanded print
(ESC) "W" 1  Sets the printer to expanded print
(ESC) "X" n1 n2  Sets the left and right margins
(ESC) "Y" n1 n2 m1 m2 ... Prints 8-dot double-density graphics at double-speed
(ESC) "Z" n1 n2 m1 m2 ... Prints 8-dot quadruple-density graphics
(ESC) "\" n1 n2  Moves the print head to a specified horizontal position
(ESC) "-" 0  Cancels overlining
(ESC) "-" 1  Selects overlining
(ESC) "a" n  Sets alignment or centering
(ESC) "b" n0 n1 n2 n3 ... CIIR$(0) Sets vertical tab positions in a channel
(ESC) "e" 0 n  Sets horizontal tab positions every n characters
(ESC) "e" 1 n  Sets vertical tab positions every n lines
(ESC) "f" 0 n  Sets the print position to n characters
(ESC) "f" 1 n  Sets print position to n lines
(ESC) "g"  Sets the print pitch to semi-condensed
(ESC) "h" n  Enlarges characters in whole or cancels same
(ESC) "i" 0  Cancels immediate print mode
(ESC) "i" 1  Sets immediate print mode
(ESC) "j" n  Sends a one-time reverse feed of n/180 inch
(ESC) "k" n  Selects a character set
(ESC) "l" n  Sets the left margin
(ESC) "p" 0  Cancels proportional print
(ESC) "p" 1  Sets the printer to proportional print
(ESC) "r" n  Sets the top margin
(ESC) "s" 0  Cancels half-speed printing
(ESC) "s" 1  Sets half-speed printing
(ESC) "x" 0  Cancels LQ characters
(ESC) "x" 1  Selects LQ characters
(ESC) "~" 0  Prints "normal zero"
(ESC) "~" 1  Prints "slash zero"
"((0))"  Cancels auto feed mode
"((1))"  Supplies paper from first bin
"((2))"  Supplies paper from second bin
"((4))"  Selects auto feed mode
"((R))"  Ejects paper

IBM-G mode

The following functions take effect under the IBM-G mode, which emulates the IBM Graphics printer.

<table>
<thead>
<tr>
<th>Control code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHR$(7)</td>
<td>Sounds the printer bell</td>
</tr>
<tr>
<td>CHR$(8)</td>
<td>Moves the print head back one print position (backspace)</td>
</tr>
<tr>
<td>CHR$(9)</td>
<td>Moves the print head to the next horizontal tab position</td>
</tr>
<tr>
<td>CHR$(10)</td>
<td>Advances the paper one line (line feed)</td>
</tr>
<tr>
<td>CHR$(11)</td>
<td>Advances paper to the next vertical tab position</td>
</tr>
<tr>
<td>CHR$(12)</td>
<td>Advances the paper to the top of the next page (form feed)</td>
</tr>
<tr>
<td>CHR$(13)</td>
<td>Returns print head to the left margin (carriage return)</td>
</tr>
<tr>
<td>CHR$(14)</td>
<td>Sets the printer to expanded print for the remainder of the current line</td>
</tr>
<tr>
<td>CHR$(15)</td>
<td>Sets the printer to condensed print</td>
</tr>
<tr>
<td>CHR$(17)</td>
<td>Sets printer on line</td>
</tr>
<tr>
<td>CHR$(18)</td>
<td>Cancels condensed print</td>
</tr>
<tr>
<td>CHR$(19)</td>
<td>Sets printer off line</td>
</tr>
<tr>
<td>CHR$(20)</td>
<td>Cancels one line expanded print</td>
</tr>
<tr>
<td>CHR$(24)</td>
<td>Cancels a line</td>
</tr>
<tr>
<td>CHR$(27)</td>
<td>Escape (indicated as (ESC) below)</td>
</tr>
</tbody>
</table>
CHR$(127) Deletes the last character sent
(ESC) CHR$(10) Reverses the paper one line
(ESC) CHR$(12) Reverses the paper to the top of the current page
(ESC) CHR$(14) Sets the printer to expanded print for the remainder of the current line
(ESC) CHR$(15) Sets the printer to condensed print
(ESC) CHR$(25) CHR$(0) Cancels auto feed mode
(ESC) CHR$(25) CHR$(1) Supplies paper from first bin
(ESC) CHR$(25) CHR$(2) Supplies paper from second bin
(ESC) CHR$(25) CHR$(4) Selects auto feed mode
(ESC) CHR$(25) "R" Ejects paper
(ESC) "!" n Sets the master print mode
(ESC) "#" Accepts the value of the eighth data bit as is
(ESC) "$" n1 n2 Moves the print head to an absolute horizontal position
(ESC) "%" 0 Cancels download character set
(ESC) "%" 1 Selects download character set
(ESC) "&" CHR$(0) n1 n2 m0 m1 m2 d1 d2 ... dx Defines download characters into RAM
(ESC) "*" n0 n1 n2 m1 m2 ... Select graphics modes
(ESC) "-" 0 Cancels underlining
(ESC) "-" 1 Selects underlining
(ESC) "f" n0 Selects vertical channels
(ESC) "0" Sets line spacing to 1/8 inch
(ESC) "1" Sets line spacing to 7/72 inch
(ESC) "2" Uses (ESC) "A" definition
(ESC) "3" n Sets line spacing to n/216 inch
(ESC) "4" Selects italic characters
(ESC) "5" Cancels italic characters
(ESC) "6" Selects character set #2
(ESC) "7" Selects character set #1
\(\text{ESC}\) "8" Enables paper-out detector
\(\text{ESC}\) "9" Enables paper-out detector
\(\text{ESC}\) ":" \(\text{CHR}\$(0)\) \(\text{CHR}\$(0)\) \(\text{CHR}\$(0)\) Copies standard ROM font into RAM
\(\text{ESC}\) "\("" Selects one-line uni-directional printing
\(\text{ESC}\) "=" Sets the value of the eighth data bit to logical 0
\(\text{ESC}\) "\)" Sets the value of the eighth data bit to logical 1
\(\text{ESC}\) "?" \(n0\) \(n1\) Redefines the graphics mode
\(\text{ESC}\) "@" Resets the printer
\(\text{ESC}\) "A" \(n\) Defines line spacing to \(n/72\) inch
\(\text{ESC}\) "B" \(n1\) \(n2\) \(n3\) ... \(\text{CHR}\$(0)\) Sets vertical tab positions
\(\text{ESC}\) "C" \(\text{CHR}\$(0)\) \(n\) Sets page length to \(n\) inches
\(\text{ESC}\) "C" \(n\) Sets page length to \(n\) lines
\(\text{ESC}\) "D" \(n1\) \(n2\) \(n3\) ... \(\text{CHR}\$(0)\) Sets horizontal tab positions
\(\text{ESC}\) "E" Selects emphasized printing
\(\text{ESC}\) "F" Cancels emphasized printing
\(\text{ESC}\) "G" Selects boldface printing
\(\text{ESC}\) "H" Cancels boldface printing
\(\text{ESC}\) "J" \(n\) Sends a one-time paper feed of \(n/216\) inch
\(\text{ESC}\) "K" \(n1\) \(n2\) \(m1\) \(m2\) ... Prints 8-dot normal-density graphics
\(\text{ESC}\) "L" \(n1\) \(n2\) \(m1\) \(m2\) ... Prints 8-dot double-density graphics
\(\text{ESC}\) "M" Sets the print pitch to elite
\(\text{ESC}\) "N" \(n\) Sets the bottom margin
\(\text{ESC}\) "O" Cancels top and bottom margins
\(\text{ESC}\) "P" Sets the print pitch to pica
\(\text{ESC}\) "Q" \(n\) Sets the right margin
\(\text{ESC}\) "R" \(n\) Selects an international character set
\(\text{ESC}\) "S" 0 Selects superscripts
\(\text{ESC}\) "S" 1 Selects subscripts
\(\text{ESC}\) "T" Cancels a superscript or subscript
\(\text{ESC}\) "U" 0 Cancels uni-directional printing
\( \text{ESC} \) "U" 1 Selects uni-directional printing
\( \text{ESC} \) "W" 0 Cancels expanded print
\( \text{ESC} \) "W" 1 Sets the printer to expanded print
\( \text{ESC} \) "X" \( n1 \) \( n2 \) Sets the left and right margins
\( \text{ESC} \) "Y" \( n1 \) \( n2 \) \( m1 \) \( m2 \) ... Prints 8-dot double-density graphics at double-speed
\( \text{ESC} \) "Z" \( n1 \) \( n2 \) \( m1 \) \( m2 \) ... Prints 8-dot quadruple-density graphics
\( \text{ESC} \) "/" \( n1 \) \( n2 \) Moves the print head to a specified horizontal position
\( \text{ESC} \) "-" 0 Cancels overlining
\( \text{ESC} \) "-" 1 Selects overlining
\( \text{ESC} \) "a" \( n \) Sets alignment or centering
\( \text{ESC} \) "b" \( n0 \) \( n1 \) \( n2 \) \( n3 \) ... CHR$(0)$ Sets vertical tab positions in a channel
\( \text{ESC} \) "e" 0 \( n \) Sets horizontal tab positions every \( n \) characters
\( \text{ESC} \) "e" 1 \( n \) Sets vertical tab positions every \( n \) lines
\( \text{ESC} \) "f" 0 \( n \) Sets the print position to \( n \) characters
\( \text{ESC} \) "f" 1 \( n \) Sets print position to \( n \) lines
\( \text{ESC} \) "g" Sets the print pitch to semi-condensed
\( \text{ESC} \) "h" \( n \) Enlarges characters in whole or cancels same
\( \text{ESC} \) "i" 0 Cancels immediate print mode
\( \text{ESC} \) "i" 1 Sets immediate print mode
\( \text{ESC} \) "j" \( n \) Sends a one-time reverse feed of \( n/216 \) inch
\( \text{ESC} \) "k" \( n \) Selects a character set
\( \text{ESC} \) "l" \( n \) Sets the left margin
\( \text{ESC} \) "p" 0 Cancels proportional print
\( \text{ESC} \) "p" 1 Sets the printer to proportional print
\( \text{ESC} \) "r" \( n \) Sets the top margin
\( \text{ESC} \) "s" 0 Cancels half-speed printing
\( \text{ESC} \) "s" 1 Sets half-speed printing
Cancels LQ characters
Selects LQ characters
Prints "normal zero"
Prints "slash zero"
Sets line spacing to 1/6 inch
Sets line spacing to \( n/72 \) inch
Cancels auto feed mode
Supplies paper from first bin
Supplies paper from second bin
Selects auto feed mode
Ejects paper

### IBM-P mode

The following functions take effect under the IBM-P mode, which emulates the IBM Proprinter.

<table>
<thead>
<tr>
<th>Control code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHR$(7)</td>
<td>Sounds the printer bell</td>
</tr>
<tr>
<td>CHR$(8)</td>
<td>Moves the print head back one print position (backspace)</td>
</tr>
<tr>
<td>CHR$(9)</td>
<td>Moves the print head to the next horizontal tab position</td>
</tr>
<tr>
<td>CHR$(10)</td>
<td>Advances the paper one line (line feed)</td>
</tr>
<tr>
<td>CHR$(11)</td>
<td>Advances paper to the next vertical tab position</td>
</tr>
<tr>
<td>CHR$(12)</td>
<td>Advances the paper to the top of the next page (form feed)</td>
</tr>
<tr>
<td>CHR$(13)</td>
<td>Returns print head to the left margin (carriage return)</td>
</tr>
<tr>
<td>CHR$(14)</td>
<td>Sets the printer to expanded print for the remainder of the current line</td>
</tr>
<tr>
<td>CHR$(15)</td>
<td>Sets the printer to condensed print</td>
</tr>
<tr>
<td>CHR$(17)</td>
<td>Sets printer on line</td>
</tr>
<tr>
<td>CHR$(18)</td>
<td>Cancels condensed print</td>
</tr>
<tr>
<td>CHR$(20)</td>
<td>Cancels one line expanded print</td>
</tr>
<tr>
<td>CHR$(24)</td>
<td>Cancels a line</td>
</tr>
<tr>
<td>CHR$(27)</td>
<td>Escape (indicated as ( \text{ESC} ) below)</td>
</tr>
<tr>
<td>CHR$(127)</td>
<td>Deletes the last character sent</td>
</tr>
</tbody>
</table>
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(10)\) Reverses the paper one line
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(12)\) Reverses the paper to the top of the current page
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(14)\) Sets the printer to expanded print for the remainder of the current line
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(15)\) Sets the printer to condensed print
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(25)\text{\textbackslash{}CHR\$}(0)\) Cancels auto feed mode
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(25)\text{\textbackslash{}CHR\$}(1)\) Supplies paper from first bin
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(25)\text{\textbackslash{}CHR\$}(2)\) Supplies paper from second bin
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(25)\text{\textbackslash{}CHR\$}(4)\) Selects auto feed mode
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(25)\text{\textbackslash{}CHR\$}(R)\) Ejects paper
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(1n)\) Sets the master print mode
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\$n1\text{\textbackslash{}n}n2)\) Moves the print head to an absolute horizontal position
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\%0)\) Cancels download character set
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\%1)\) Selects download character set
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\ast n0\text{\textbackslash{}n}n1\text{\textbackslash{}n}n2\text{\textbackslash{}}ml\text{\textbackslash{}rnZ\textbackslash{}---})\) Selects graphics modes
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}-\textbackslash{}n}0)\) Cancels underlining
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}-\textbackslash{}n\textbackslash{}1})\) Selects underlining
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}f\textbackslash{}n0})\) Selects vertical channels
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}0})\) Sets line spacing to 1/8 inch
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}1})\) Sets line spacing to 7/72 inch
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}2})\) Uses \(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}A})\) definition
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}3\textbackslash{}n})\) Sets line spacing to \(n/216\) inch
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}4})\) Sets the top of form to the current position
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}5\textbackslash{}0})\) Sets carriage return function without a line feed
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}5\textbackslash{}1})\) Sets carriage return function with a line feed
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}6})\) Selects character set \#2
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}7})\) Selects character set \#1
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}8})\) Disables paper-out detector
\(\text{\textbackslash{}ESC}\text{\textbackslash{}CHR\$}(\text{\textbackslash{}9})\) Enables paper-out detector
\(<\text{ESC}>\) "::" Sets the print pitch to elite
\(<\text{ESC}>\) "<" Selects one-line uni-directional printing
\(<\text{ESC}>\) "-" CHR$(0) n1 n2 m0 m1 m2 d1 d2 ... dx Defines download characters into RAM
\(<\text{ESC}>\) "?" n0 n1 Redefines the graphics mode
\(<\text{ESC}>\) "@" Resets the printer
\(<\text{ESC}>\) "A" n Defines line spacing to \(n/72\) inch
\(<\text{ESC}>\) "B" n1 n2 n3 ... CHR$(0)
\(<\text{ESC}>\) "C" CHR$(0) n Sets vertical tab positions
\(<\text{ESC}>\) "C" n Sets page length to \(n\) inches
\(<\text{ESC}>\) "D" n1 n2 n3 ... CHR$(0)
\(<\text{ESC}>\) "E" Selects emphasized printing
\(<\text{ESC}>\) "F" Cancels emphasized printing
\(<\text{ESC}>\) "G" Selects boldface printing
\(<\text{ESC}>\) "H" Cancels boldface printing
\(<\text{ESC}>\) "I" 0 Selects draft characters
\(<\text{ESC}>\) "I" 2 Selects LQ characters
\(<\text{ESC}>\) "I" 4 Selects draft download character set
\(<\text{ESC}>\) "I" 6 Selects LQ download character set
\(<\text{ESC}>\) "J" n Sends a one-time paper feed of \(n/216\) inch
\(<\text{ESC}>\) "K" n1 n2 m1 m2 ... Prints 8-dot normal-density graphics
\(<\text{ESC}>\) "L" n1 n2 m1 m2 ... Prints 8-dot double-density graphics
\(<\text{ESC}>\) "M" Sets the print pitch to elite
\(<\text{ESC}>\) "N" n Sets the bottom margin
\(<\text{ESC}>\) "O" Cancels top and bottom margins
\(<\text{ESC}>\) "P" Sets the print pitch to pica
\(<\text{ESC}>\) "Q" CHR$(3) Sets printer off line
\(<\text{ESC}>\) "R" Cancels tabs to the default values
\(<\text{ESC}>\) "S" 0 Selects superscripts
\(<\text{ESC}>\) "S" 1 Selects subscripts
\(<\text{ESC}>\) "T" Cancels a superscript or subscript
\(<\text{ESC}>\) "U" 0 Cancels uni-directional printing
(ESC) "U" 1
Selects uni-directional printing

(ESC) "W" 0
Cancels expanded print

(ESC) "W" 1
Sets the printer to expanded print

(ESC) "X" n1 n2
Sets the left and right margins

(ESC) "Y" n1 n2 m1 m2...
Prints 8-dot double-density graphics at double-speed

(ESC) "Z" n1 n2 m1 m2...
Prints 8-dot quadruple-density graphics

(ESC) "\" n1 n2
Prints characters from all character sets

(ESC) "~" n
Prints a character from all character sets

(ESC) "_" 0
Cancels overlining

(ESC) "_" 1
Selects overlining

(ESC) "a" n
Sets alignment or centering

(ESC) "b" n0 n1 n2 n3 ...
Sets vertical tab positions in a channel

(ESC) "e" 0 n
Sets horizontal tab positions every n characters

(ESC) "e" 1 n
Sets vertical tab positions every n lines

(ESC) "f" 0 n
Sets the print position to n characters

(ESC) "f" 1 n
Sets print position to n lines

(ESC) "h" n
Enlarges characters in whole or cancels same

(ESC) "i" 0
Cancels immediate print mode

(ESC) "i" 1
Sets immediate print mode

(ESC) "j" n
Sends a one-time reverse feed of n/216 inch

(ESC) "k" n
Selects a character set

(ESC) "l" n
Sets the left margin

(ESC) "p" 0
Cancels proportional print

(ESC) "p" 1
Sets the printer to proportional print

(ESC) "r" n
Sets the top margin

(ESC) "s" 0
Cancels half-speed printing

(ESC) "s" 1
Sets half-speed printing
\(\text{\textbackslash ESC}\) "x" 0  
Cancels LQ characters

\(\text{\textbackslash ESC}\) "x" 1  
Selects LQ characters

\(\text{\textbackslash ESC}\) "\~{}" 0  
Prints "normal zero"

\(\text{\textbackslash ESC}\) "\~{}" 1  
Prints "slash zero"

\(\text{\textbackslash FS}\) "2"  
Sets line spacing to 1/6 inch

\(\text{\textbackslash FS}\) "4"  
Selects italic characters

\(\text{\textbackslash FS}\) "5"  
Cancels italic characters

\(\text{\textbackslash FS}\) ":\) CHR$(0)$ CHR$(0)$ CHR$(0)$  
Copies standard ROM font into RAM

\(\text{\textbackslash FS}\) "A" $n$  
Sets line spacing to $n/72$ inch

\(\text{\textbackslash FS}\) "Q" $n$  
Sets the right margin

\(\text{\textbackslash FS}\) "R" $n$  
Selects an international character set

\(\text{\textbackslash FS}\) "\textbackslash" $n1$ $n2$  
Moves the print head to a specified horizontal position

"((0))"  
Cancels auto feed mode

"((1))"  
Supplies paper from first bin

"((2))"  
Supplies paper from second bin

"((4))"  
Selects auto feed mode

"((R))"  
Ejects paper
MEMO
# APPENDIX F
## TECHNICAL SPECIFICATIONS

### Printing
- **Printing method**: Serial impact dot matrix
- **Printing speed**:
  - 216 characters per second (in Draft elite)
  - 72 characters per second (in LQ mode)
- **Print buffer**: 8 KB (5KB for 15-inch type)
- **Paper feed**: 2.2 inches/second (for form feeding)
- **Printing direction**:
  - Tractor and Friction feed
  - Bi-directional, logic seeking
  - Uni-directional in dot graphics modes
- **Character set**
  - **Draft characters**: 96 standard ASCII characters, 156 international characters [13 sets], 183 super and subscripts, 87 IBM special characters, 50 IBM block graphics characters
  - **LQ characters**: 96 standard ASCII characters, 156 international characters [13 sets], 233 super and subscripts, 87 IBM special characters, 50 IBM block graphics characters
  - **Other characters**: 35 downloadable characters
- **Character matrix**
  - **LQ characters**
    - Normal: 24 dot × 31 dot
    - Super/subscripts: 16 dot × 23 dot
    - Block graphics: 30 dot × 35 dot
  - **Draft characters**
    - Normal: 24 dot × 9 dot
    - Super/subscripts: 16 dot × 7 dot
Block graphics 30 dot $\times$ 11 dot
Dot graphics 8 dot $\times$ 60 dots/inch
8 dot $\times$ 80 dots/inch
8 dot $\times$ 90 dots/inch
8 dot $\times$ 120 dots/inch
8 dot $\times$ 240 dots/inch
24 dot $\times$ 60 dots/inch
24 dot $\times$ 90 dots/inch
24 dot $\times$ 120 dots/inch
24 dot $\times$ 180 dots/inch
24 dot $\times$ 360 dots/inch

Line spacing 1/6 inch or 1/8 inch standard
$n/60$ or $n/180$ inch programmable (Standard mode)
$n/72$ or $n/216$ inch programmable (IBM modes)

<table>
<thead>
<tr>
<th>Column width</th>
<th>10-inch type</th>
<th>15-inch type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal pica</td>
<td>80</td>
<td>136</td>
</tr>
<tr>
<td>Normal elite</td>
<td>96</td>
<td>163</td>
</tr>
<tr>
<td>Semi-condensed</td>
<td>120</td>
<td>204</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>137</td>
<td>233</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>160</td>
<td>272</td>
</tr>
<tr>
<td>Expanded pica</td>
<td>40</td>
<td>68</td>
</tr>
<tr>
<td>Expanded elite</td>
<td>48</td>
<td>81</td>
</tr>
<tr>
<td>Expanded semi-condensed</td>
<td>60</td>
<td>102</td>
</tr>
<tr>
<td>Expanded condensed pica</td>
<td>68</td>
<td>116</td>
</tr>
<tr>
<td>Expanded condensed elite</td>
<td>80</td>
<td>136</td>
</tr>
</tbody>
</table>

Proportional spacing Variable Variable

Special features
- Automatic single sheet insertion
- Prestige Letter Quality printing
- Short form tear-off
- Easy access format switches
- Self-test and hex dump
- Downloadable characters
- 7 or 8 bit selectable interface
- Ultra hi-resolution bit image graphics
- Vertical and horizontal tabs
- Skip over perforation
15.5" carriage (15-inch type only)
Automatic sheet feeder (option)
Various LQ character cartridges (option)
RAM cartridge (option)

**Paper**

<table>
<thead>
<tr>
<th></th>
<th>10-inch type</th>
<th>15-inch type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width</strong></td>
<td>5.5 – 8.5 inches</td>
<td>6 – 14.5 inches</td>
</tr>
<tr>
<td><strong>Thickness</strong></td>
<td>0.07 – 0.10 mm</td>
<td>0.07 – 0.10 mm</td>
</tr>
</tbody>
</table>

**Sprocket-feed paper**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width</strong></td>
<td>4 – 10 inches</td>
</tr>
<tr>
<td><strong>Thickness</strong></td>
<td>0.07 – 0.10 mm, one-part form, Max 0.28 mm, 3-part form</td>
</tr>
</tbody>
</table>

**Printer**

<table>
<thead>
<tr>
<th></th>
<th>10-inch type</th>
<th>10-inch type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>108mm</td>
<td>121mm</td>
</tr>
<tr>
<td></td>
<td>(4.3 inches)</td>
<td>(4.7 inches)</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>400mm</td>
<td>580mm</td>
</tr>
<tr>
<td></td>
<td>(15.7 inches)</td>
<td>(22.8 inches)</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>355 mm</td>
<td>383 mm</td>
</tr>
<tr>
<td></td>
<td>(14.0 inches)</td>
<td>(15.1 inches)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>12.8 kg</td>
<td>14.8 kg</td>
</tr>
<tr>
<td></td>
<td>(28.2 pounds)</td>
<td>(32.6 pounds)</td>
</tr>
</tbody>
</table>

**Power**

- 120 VAC ± 10%, 60Hz.
- 220 VAC ± 10%, 50/60Hz.
- 240 VAC ± 10%, 50/60Hz.

**Environment**

- Temperature: 5 to 40°C (40 to 104°F)
- Humidity: 10 to 80%, non condensing

**Ribbon**

- Black cloth ribbon in special cartridge
- Ribbon life: 4.5 million draft characters

**Print head life**

- 200 million strokes per wire

**Parallel interface**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interface</strong></td>
<td>Centronics-compatible, 7 or 8 bit</td>
</tr>
<tr>
<td><strong>Synchronization</strong></td>
<td>By external supplied Strobe pulses</td>
</tr>
<tr>
<td><strong>Handshaking</strong></td>
<td>By ACK or BUSY signals</td>
</tr>
<tr>
<td><strong>Logic level</strong></td>
<td>TTL</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>57-30360 Amphenol</td>
</tr>
</tbody>
</table>
### Serial interface (option)

<table>
<thead>
<tr>
<th>Interface</th>
<th>Asynchronous RS-232C/20mA current loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit rate</td>
<td>150, 300, 600, 1200, 2400, 4800, 9600, 19200 baud</td>
</tr>
<tr>
<td>Word length</td>
<td>1 start bit</td>
</tr>
<tr>
<td></td>
<td>7 or 8 data bits</td>
</tr>
<tr>
<td></td>
<td>Odd, even or no parity</td>
</tr>
<tr>
<td></td>
<td>1 or 2 stop bits</td>
</tr>
<tr>
<td>Handshaking</td>
<td>Serial BUSY, 1 byte mode</td>
</tr>
<tr>
<td></td>
<td>Serial BUSY, 1 block mode</td>
</tr>
<tr>
<td></td>
<td>ACK mode</td>
</tr>
<tr>
<td></td>
<td>XON/XOFF mode</td>
</tr>
</tbody>
</table>
APPENDIX G

THE PARALLEL INTERFACE

This printer has a parallel interface to communicate with the computer. The operating specifications of the parallel interface are as follows:

- **Data transfer rate**: 1,000 to 6,000 characters per second
- **Synchronization**: Via externally supplied STROBE pulses
- **Handshaking**: ACK and BUSY signals
- **Logic level**: Compatible with TTL level

The parallel interface connects to the computer by a 36 pin connector on the back of the printer. This connector mates with an Amphenol 57-30360 connector. The functions of the various pins are summarized in Table G-1.

**Functions of the Connector Signals**

Communications between the computer and the printer use many of the pins of the connector. To understand how the system of communications works, let’s look at the functions of the various signals carried by the pins of the interface connector.

Pin 1 carries the **STROBE** pulse signal from the computer to the printer. This signal is normally held high by the computer. When the computer has data ready for the printer it sets this signal to a low value for at least 0.5 microseconds. When the printer sees this pulse on the strobe pin, it reads the data that the computer supplies on pins 2 through 9. Each of these lines carries one bit of information. A logical “1” is represented by a high signal level, and a logical “0” is represented by a low signal level. The computer must maintain these signals for a period
beginning at least 0.5 microseconds before the strobe pulse starts and continuing for at least 0.5 microseconds after the strobe pulse ends.

When the printer has successfully received the byte of data from the computer it sets pin 10 low for approximately 9
## Table G-1
Parallel interface pin functions

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal Name</th>
<th>Direction</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STROBE</td>
<td>IN</td>
<td>Signals when data is ready to be read. Signal goes from HIGH to LOW (for at least 0.5 microseconds) when data is available.</td>
</tr>
<tr>
<td>2</td>
<td>DATA1</td>
<td>IN</td>
<td>These signals provide the information of the first to eighth bits of parallel data. Each signal is at HIGH level for a logical 1 and at a LOW level for a logical 0.</td>
</tr>
<tr>
<td>3</td>
<td>DATA2</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DATA3</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DATA4</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DATA5</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>DATA6</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>DATA7</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>DATA8</td>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>ACK</td>
<td>OUT</td>
<td>A LOW pulse acknowledges receipt of data.</td>
</tr>
<tr>
<td>11</td>
<td>BUSY</td>
<td>OUT</td>
<td>When this signal goes LOW the printer is ready to accept data.</td>
</tr>
<tr>
<td>12</td>
<td>PAPER</td>
<td>OUT</td>
<td>This signal is normally LOW. It will go HIGH if the printer runs out of paper. This signal can be held LOW permanently by turning DIP switch 2-4 off.</td>
</tr>
<tr>
<td></td>
<td>OUT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>SELECTED</td>
<td>OUT</td>
<td>This signal is HIGH when the printer is on-line.</td>
</tr>
<tr>
<td>14-15</td>
<td>N/C</td>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>16</td>
<td>SIGNAL</td>
<td></td>
<td>Signal ground.</td>
</tr>
<tr>
<td></td>
<td>GND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>CHASSIS</td>
<td></td>
<td>Printer’s chassis ground, isolated from logic ground.</td>
</tr>
<tr>
<td></td>
<td>GND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>+ 5VDC</td>
<td>OUT</td>
<td>External supply of + 5VDC.</td>
</tr>
<tr>
<td>19-30</td>
<td>GND</td>
<td></td>
<td>Twisted pair return signal ground level.</td>
</tr>
<tr>
<td>31</td>
<td>RESET</td>
<td>IN</td>
<td>When this signal goes LOW the printer is reset to its power-on condition.</td>
</tr>
<tr>
<td>32</td>
<td>ERROR</td>
<td>OUT</td>
<td>This signal is normally HIGH. This signal goes LOW to signal that the printer cannot print due to an error condition.</td>
</tr>
<tr>
<td>33</td>
<td>EXT GND</td>
<td></td>
<td>External ground.</td>
</tr>
<tr>
<td>34, 35</td>
<td>N/C</td>
<td></td>
<td>Unused.</td>
</tr>
<tr>
<td>36</td>
<td>SELECT IN</td>
<td>OUT</td>
<td>Data entry to the printer is possible only when this level is LOW.</td>
</tr>
</tbody>
</table>
microseconds. This signal acknowledges the receipt of the data and so is called the ACK (for “acknowledge”) signal.

Pin 11 reports when the printer is not able to receive data. The signal is called BUSY. When this signal is high, the printer cannot receive data. This signal will be high during data transfer, when the printer is off-line and when an error condition exists.

The printer will report that it has run out of paper by making the PAPER OUT signal on pin 12 high. This pin can be held low by turning DIP switch 2-4 off. When the printer is in the on-line state, pin 13 is held high. This signal (SELECTED) tells the computer that the printer is ready to receive data.

Pins 14, 15, 34 and 35 are not used, while pins 16, 17, 19-30 and 33 are grounded. Pin 18 is connected to the +5VDC supply in the printer.

Pin 31 can be used to reset the printer. If this signal (RESET) goes low the printer will reinitialize. Pin 32 is used to report error conditions in the printer. This signal (ERROR) is high during normal operation and goes low to report that the printer cannot print due to an error condition.
APPENDIX H
SERIAL INTERFACE SPECIFICATIONS

This printer provides a very flexible RS232C serial interface as an option. It can communicate at rates from 150 to 19,200 baud (bits per second) and supports four different kinds of handshaking. This interface can also function as a 20mA current loop interface. The operating specifications of the interface are as follows:

Data transfer rate: 150-19200
Word length: 1 start bit
7 or 8 data bits
Odd, even or no parity
1 or 2 stop bits
Signal levels: Mark or logical 1, -3 to -15 volts or current ON
Space or logical 0, +3 to +15 volts or current OFF
Handshaking: Serial BUSY, 1 byte mode
Serial BUSY, 1 block mode
ACK mode
XON/XOFF mode

NOTE: 19200 baud can be used only with an RS232C interface; it cannot be used with a 20mA current loop interface.

The optional board has a DB-25 female connector to connect to a computer. The functions of the pins are summarized in Table H-1.
### Table H-1
Serial interface pin functions

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal Name</th>
<th>Direction</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>—</td>
<td>Printer’s chassis ground.</td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>OUT</td>
<td>This pin carries data from the printer.</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
<td>IN</td>
<td>This pin carries data to the printer.</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>OUT</td>
<td>This is ON when the printer is ready to receive data.</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data.</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data. This printer does not check this pin.</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>—</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>8</td>
<td>DCD</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data. This printer does not check this pin.</td>
</tr>
<tr>
<td>9</td>
<td>TTY TXDR</td>
<td>—</td>
<td>This pin is the return path for data transmitted from the printer on the 20mA current loop.</td>
</tr>
<tr>
<td>10</td>
<td>TTY TXD</td>
<td>OUT</td>
<td>This pin carries data from the printer on the 20mA current loop.</td>
</tr>
<tr>
<td>11</td>
<td>RCH</td>
<td>OUT</td>
<td>This is the signal line for the serial busy protocols. This pin goes OFF when printer’s buffer fills, and ON when the printer is ready to receive data. In the busy protocols this line carries the same signal as pin 20.</td>
</tr>
<tr>
<td>12</td>
<td>N/C</td>
<td>—</td>
<td>Unused.</td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>—</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>14-16</td>
<td>N/C</td>
<td>—</td>
<td>Unused.</td>
</tr>
<tr>
<td>17</td>
<td>TTY TXDR</td>
<td>—</td>
<td>This pin is the return path for data transmitted from the printer on the 20mA current loop.</td>
</tr>
<tr>
<td>18</td>
<td>TTY RXDR</td>
<td>—</td>
<td>This pin is the return path for data transmitted to the printer on the 20mA current loop.</td>
</tr>
<tr>
<td>19</td>
<td>TTY RXD</td>
<td>IN</td>
<td>This pin carries data to the printer on the 20mA current loop.</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>OUT</td>
<td>The printer turns this pin ON when it is ready to receive data.</td>
</tr>
<tr>
<td>21-22</td>
<td>N/C</td>
<td>—</td>
<td>Unused.</td>
</tr>
<tr>
<td>23</td>
<td>TTY RXDR</td>
<td>—</td>
<td>This pin is the return path for data transmitted to the printer on the 20mA current loop.</td>
</tr>
</tbody>
</table>
CONFIGURING THE SERIAL INTERFACE

DIP switch on the serial interface board controls the configuration of the serial interface. Table H-2 describes the functions of the individual switches in DIP switch.

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7 data bits</td>
<td>8 data bits</td>
</tr>
<tr>
<td>2</td>
<td>Parity checked</td>
<td>No parity</td>
</tr>
<tr>
<td>3</td>
<td>Handshaking protocols — see Table H-3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Odd parity</td>
<td>Even parity</td>
</tr>
<tr>
<td>5</td>
<td>Data transfer rate — see Table H-4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table H-3
Handshaking protocols

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Switch 3</th>
<th>Switch 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial busy, 1 byte mode</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial busy, 1 block mode</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>ACK mode</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>XON/XOFF mode</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>
Table H-4
Data transfer rates

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>Switch 6</th>
<th>Switch 7</th>
<th>Switch 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>300</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>600</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>1200</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>2400</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>4800</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>9600</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>19200</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

THE SERIAL PROTOCOLS

This printer has four serial protocols selected by DIP switches 3 and 4. Figure H-1 shows a typical byte of serial data and Figure H-2 shows timing charts for the 4 protocols.

■ Serial busy protocols

In the serial busy protocols, this printer uses DTR (pin 20) and RCH (pin 11) to signal to the computer when it is able to accept data. These two pins go ON when the printer is ready to accept data. In the 1 byte mode they go OFF after each character is received. In the 1 block mode they only go OFF when the printer’s buffer approaches capacity. In both cases they will stay OFF if the buffer is too full to accept more data.

■ XON/XOFF protocol

The XON/XOFF protocol uses the ASCII characters (DC1) and (DC3) (sometimes called XON and XOFF, respectively) to communicate with the computer. When the printer’s buffer approaches capacity this printer will send a DC3 (ASCII 19) on TXD (pin 2) to tell the computer that it must stop sending data. When the printer is able to receive more data it sends a DC1 (ASCII 17) on TXD. The computer can then send more data until the printer sends another DC3.
ACK protocol

In the ACK protocol, this printer sends an ACK (ASCII 6) on TXD (pin 2) each time that it is prepared to receive a byte of data.

Figure H-1. Typical data byte on the serial interface.
Serial busy protocol (1 byte) mode

RXD
Pin 3

DTR
Pin 20

RCH
Pin 11

Buffer full or Off line

Serial busy protocol (1 block) mode

RXD
Pin 3

DTR
Pin 20

RCH
Pin 11

Buffer full or Off line

XON/XOFF protocol

RXD
Pin 3

DTR
Pin 20

TXD
Pin 2

Buffer full or Off line

ACK protocol

RXD
Pin 3

DTR
Pin 20

TXD
Pin 2

Buffer full or Off line

DB = Data Byte

Figure. H-2. Serial protocol timing charts.
INDEX

8-dot graphics, 120, 191
24-dot graphics, 120

Absolute tab, 79, 185
ACK protocol, 237
Adjusting paper gap, 20
Adjusting width of space, 91
Advance paper, 63, 167
Aligning text, 85, 187
Alternate graphics codes, 123
American Standard Code for Information Interchange, 45
ASCII code conversion chart, 137
ASCII codes, 45, 103
Auto carriage return, 132, 180
Auto feed mode, 206
Auto line feed, 64, 132
Automatic sheet feeder, 103, 206

Backspace, 89, 197
BASIC, 43, 44
<BEL> 88, 200
Bell, 88, 200
Bi-directional print, 93, 201
Big characters, 101, 202
Bit image graphics, 120
Block graphics, 95
Boldface print, 32, 35, 60, 163
Bottom margin, 132, 175
<BS>, 89, 197

<CAN>, 89, 198
Cancel, auto feed mode, 207
boldface print, 60, 163
emphasized print, 60, 163
expanded print, 55, 161
half-speed mode, 205
italics, 50, 150
LQ, 49, 154

margins, 73, 176
overlining, 52, 165
proportional print, 58, 160
superscripts and subscripts, 53, 166
text, 89, 198
underlining, 52, 164
vertical tabs, 179
Carriage return, 63, 179
Centering text, 85, 187
Changing line spacing, 65, 168
page length, 72, 174
Channels, vertical tab, 84, 177
Character code table, 139
Character graphics, 95
Character set #1, 95, 132, 142, 153
Character set #2, 95, 132, 144, 153
Character space, 111, 186
Character width, 30, 54
Characters in the control code area, 99
Chart, ASCII code, 137
Chart, character code, 139
character set #2, 96
CHR$ function, 45
CHR$(7), 200
CHR$(8), 197
CHR$(9), 77, 183
CHR$(10), 63, 167
CHR$(11), 81, 176
CHR$(12), 71, 173
CHR$(13), 63, 179
CHR$(14), 55, 161
CHR$(15), 57, 158
CHR$(17), 88, 199
CHR$(18), 57, 159
CHR$(19), 88, 199
CHR$(20), 56, 162
CHR$(24), 89, 198
CHR$(127), 89, 198
Clamp lever, 15, 18
Cleaning, 125
Clear print buffer, 42
Clearing margins, 73
Combining print modes, 61
Command summary, 211
IBM mode, 215, 219
standard mode, 211
Command syntax, 47
Commands, dot graphics, 191
download characters, 188
font pitch, 156
font style, 150
form feed, 173
horizontal position, 179
line feed, 167
print style, 149
vertical position, 167
Commercial software, 25
Computer paper, 18
Condensed print, 31, 38, 56, 61, 158
Connecting the printer, 21
Control code area, 99
Control codes, 45
Control key, 46
Control panel, 11
Copying characters to download
RAM, 115, 189
Cord, power, 9
Cover open detector, 6
Cover, interface, 10
mute, 6, 9
printer, 2, 9, 15
Covers, sprocket, 18
〈CR〉, 63, 179
CRT graphics, 120
〈DC1〉, 88, 199
〈DC2〉, 159
〈DC3〉, 88, 199
〈DC4〉, 162
Defining characters, 108, 188
〈DEL〉, 89, 198
Delete, 89, 198
Deselect printer, 88, 199
Detector, cover open, 6
paper-out, 88, 200
DIP switches, 14, 28, 64, 65, 95, 103,
131, 167, 168, 179, 200, 206, 235
Dot graphics, 120
Dot graphics commands, 191
Dot matrix, 107
Double density graphics, 120, 123,
192
Double-strike, 35
Download characters, 88, 108, 132,
188, 206
Draft download characters, 119, 190
Draft indicator, 12
EasyWriter II, 26, 29
Eighth bit controls, 94, 195, 167
Ejects paper, 209
Elite pitch, 31, 38, 54, 61, 156
Emphasized print, 32, 60, 61, 162
Enlarged characters, 101, 202
Environment, 1
Escape code, 27, 36, 47
〈ESC〉 "!" n, 162
〈ESC〉 "#", 95, 196
〈ESC〉 "$", 185
〈ESC〉 "%" 0, 115, 190
〈ESC〉 "%" 1, 115, 189
〈ESC〉 "&" CHR$(0), 113, 188
〈ESC〉 "*" n, 120, 193
〈ESC〉 "−" 0, 52, 164
〈ESC〉 "−" 1, 52, 164
〈ESC〉 "l", 84, 177
〈ESC〉 "0", 69, 168
\(\text{ESC} \times 1, 69, 169\)
\(\text{ESC} \times 2, 69, 168, 171\)
\(\text{ESC} \times 3 \ n, 69, 169\)
\(\text{ESC} \times 4, 50, 72, 150, 174\)
\(\text{ESC} \times 5, 50, 150\)
\(\text{ESC} \times 5 \ 0, 64, 180\)
\(\text{ESC} \times 5 \ 1, 64, 180\)
\(\text{ESC} \times 6, 95, 99, 153\)
\(\text{ESC} \times 7, 95, 99, 153\)
\(\text{ESC} \times 8, 200\)
\(\text{ESC} \times 9, 200\)
\(\text{ESC} \times \ , 54, 115, 157, 189\)
\(\text{ESC} \times <, 93, 202\)
\(\text{ESC} \times =, 95, 113, 195\)
\(\text{ESC} \times = \ \text{CHR}$0(0), 188\)
\(\text{ESC} \times >, 95, 195\)
\(\text{ESC} \times ?, 123, 194\)
\(\text{ESC} \times @, 28, 88, 206\)
\(\text{ESC} \times A \ n, 69, 170\)
\(\text{ESC} \times a \ n, 86, 187\)
\(\text{ESC} \times B, 81, 177\)
\(\text{ESC} \times b, 84, 178\)
\(\text{ESC} \times C, 72, 174\)
\(\text{ESC} \times CHRS(14), 55\)
\(\text{ESC} \times CHRS(15), 57\)
\(\text{ESC} \times CHRS(32), 186\)
\(\text{ESC} \times D, 78, 183\)
\(\text{ESC} \times E, 60, 162\)
\(\text{ESC} \times e \ 0, 184\)
\(\text{ESC} \times e \ 1, 178\)
\(\text{ESC} \times EM \ 0, 103, 207\)
\(\text{ESC} \times EM \ 1, 103, 208\)
\(\text{ESC} \times EM \ 2, 103, 208\)
\(\text{ESC} \times EM \ 4, 103, 206\)
\(\text{ESC} \times EM \times R, 103, 209\)
\(\text{ESC} \times F, 60, 163\)
\(\text{ESC} \times f \ 0, 186\)
\(\text{ESC} \times f \ 1, 172\)
\(\text{ESC} \times FF, 72, 173\)
\(\text{ESC} \times G, 60, 163\)
\(\text{ESC} \times g, 54, 157\)
\(\text{ESC} \times H, 60, 163\)
\(\text{ESC} \times h \ n, 101, 202\)
\(\text{ESC} \times I \ 0, 50, 155\)
\(\text{ESC} \times I \ 2, 50, 155\)
\(\text{ESC} \times I \ 4, 190\)
\(\text{ESC} \times I \ 6, 191\)
\(\text{ESC} \times i \ n, 91, 204\)
\(\text{ESC} \times J \ n, 69, 171\)
\(\text{ESC} \times j \ n, 69, 172\)
\(\text{ESC} \times K, 123, 191\)
\(\text{ESC} \times k \ n, 52, 151\)
\(\text{ESC} \times L, 123, 192\)
\(\text{ESC} \times LF, 64, 167\)
\(\text{ESC} \times M, 76, 181\)
\(\text{ESC} \times M, 54, 156\)
\(\text{ESC} \times N \ n, 74, 175\)
\(\text{ESC} \times O, 74, 176\)
\(\text{ESC} \times P, 54, 156\)
\(\text{ESC} \times p \ 0, 58, 160\)
\(\text{ESC} \times p \ 1, 58, 159\)
\(\text{ESC} \times Q \ 3, 88, 199\)
\(\text{ESC} \times Q \ n, 76, 182\)
\(\text{ESC} \times R, 179, 184\)
\(\text{ESC} \times R \ n, 152\)
\(\text{ESC} \times r \ n, 74, 175\)
\(\text{ESC} \times S \ 0, 53, 165\)
\(\text{ESC} \times S \ 1, 53, 166\)
\(\text{ESC} \times SI, 158\)
\(\text{ESC} \times SO, 161\)
\(\text{ESC} \times s \ 0, 205\)
\(\text{ESC} \times s \ 1, 205\)
\(\text{ESC} \times T, 53, 166\)
\(\text{ESC} \times U \ n, 93, 201\)
\(\text{ESC} \times U, 56, 161\)
\(\text{ESC} \times W \ 0, 56, 160\)
\(\text{ESC} \times W \ 1, 56, 161\)
\(\text{ESC} \times X \ n1 \ n2, 76, 181\)
\(\text{ESC} \times x \ 0, 28, 49, 154\)
\(\text{ESC} \times x \ 1, 28, 49, 154\)
\(\text{ESC} \times Y, 123, 192\)
〈ESC〉 "Z", 123, 193
〈ESC〉 "\"", 100, 185, 203
〈ESC〉 "", 100, 203
〈ESC〉 "-", 0, 52, 165
〈ESC〉 "--", 1, 52, 164
〈ESC〉 "~", 196
Expanded print, 32, 38, 55, 61, 160
Extra functions, 13, 38

Feeding paper, 14, 18
〈FF〉, 71, 173
Font cartridge, 8, 11, 51, 133, 151
Font pitch commands, 156
Font style commands, 150
Foreign language characters, 98, 132, 152
Form feed, 71, 173
Form feed commands, 173
Form feed, reverse, 72
Form length switch, 11
Forward micro-feed, 40
〈FS〉 "2", 168
〈FS〉 "4", 50, 150
〈FS〉 "5", 50, 150
〈FS〉 ":", 116, 189
〈FS〉 "A" n, 170
〈FS〉 "Q" n, 76, 182
〈FS〉 "R" n, 152
〈FS〉 "\", 185

Gap, adjusting, 20
Graphics, block, 95
CRT, 120
data, 121
double density, 120, 123
hexa density, 120
normal density, 120, 123
quadruple density, 120, 123
semi-double density, 120
triple density, 120

Grid for download characters, 110
Half-speed mode, 92, 205
Hex dump, 103
Hexa density graphics, 120
Hexadecimal, 46, 103
Horizontal position commands, 179
Horizontal tabs, 77, 183, 184
〈HT〉, 77, 183

IBM mode, 48, 64, 69, 72, 88, 95, 132, 142, 153
IBM mode command summary, 215, 219
Immediate print, 91, 204
Indicator, draft, 12
letter, 12
on line, 12, 39, 199
paper empty, 11, 17
power, 11
print pitch, 12
quality, 12
type style, 11

Initialize printer, 27, 31, 88, 206
Ink ribbon cartridge, 5, 125
Installation programs, 25
Interface board, 2, 7, 10
Interface cover, 10
Interface, parallel, 229
serial, 233

International characters, 98, 132, 152
Italics, 11, 32, 50, 61, 150

Key, on line, 12, 21, 40, 41, 42, 199
paper feed, 12, 21, 40, 103
print pitch, 12, 39, 41, 54
quality, 12, 39, 41, 103
top of form, 12, 39, 40, 41
type style, 12, 39, 42
Left and right margins, 41
Letter indicator, 12
Letter Quality (LQ) characters, 28, 31, 49, 154
Letter Quality (LQ) download characters, 119, 191
Lever, clamp, 15, 18
release, 14, 15, 18
\(\text{LF}\), 63, 167
Line feed, 63, 167
Line feed commands, 167
Line feed, reverse, 64, 167
Line spacing, 65, 132, 168
Listing programs, 44
LLIST, 44
Loading paper, 14, 15, 18
Location, 1
Lotus 1-2-3, 26, 36
LPRINT, 44
Maintenance, 125
Margins, left and right, 41, 76, 181
top and bottom, 73, 103, 175
Master print mode, 162
Master reset code, 27, 31, 88, 206
Micro-feed, forward, 40
reverse, 40
Mixing print modes, 61
Mute cover, 6, 9
Normal density graphics, 120, 123, 191
Normal zero, 90, 132, 197
Off line, 88, 199
On line, 88
On line indicator, 12, 39
On line key, 12, 21, 40, 41, 42, 199
One line expanded print, 55, 161
One-time tab, 79
One time uni-directional print, 93, 202
Overlining, 52, 164
Packing tube, 3
Page length, 72, 103, 132
Panel mode, 39, 88
print pitch, 39, 59, 156
quality, 39, 154
type style, 39, 150
Paper bail, 14, 15
Paper empty indicator, 11, 17
Paper feed key, 12, 21, 40, 103
Paper feeding, 14, 18
Paper gap, adjusting, 20
Paper guide, 9
Paper separator, 9, 20
Paper thickness, adjustment, 20
Paper-out, 132
Paper-out detector, 88
Parallel interface, 229
Pica pitch, 31, 54, 156
Pitch, 31
 elite, 54, 156
 pica, 54, 156
 semi-condensed, 54, 157
Pitch indicators, 12
Platen, 10
Platen knob, 4, 14
Power cord, 9
Power indicator, 11
Power switch, 14
Print buffer, 42
Print head, 9, 128
Print mode, 132
Print pitch, 31
Print pitch key, 12, 39, 41, 54
Print pitch panel mode, 39, 59, 156
Print position, 172, 186
Print start position, 40
Print style commands, 149
Printable area, 203
Printer cover, 2, 9, 15
Printer initialization, 27, 31, 88, 206
Printing download characters, 115, 189
Programs, listing, 44
Proportional print, 58, 61, 159
Protective tube, 3
Quadruple density graphics, 120, 123, 193
Quality indicators, 12
Quality key, 12, 39, 41, 103
Quality panel mode, 39, 154
RAM cartridge, 119
RAM characters, 109
Redefine dot graphics, 194
Relative tab, 79, 185
Release lever, 14, 15, 18
Reset code, 27, 31, 88, 206
Reverse form feed, 72, 173
Reverse line feed, 64, 167
Reverse micro-feed, 40
Reverse paper, 64, 72, 167, 173
Ribbon cartridge, 5, 125
ROM characters, 109
Select printer, 199
Self-test, 21
Semi-condensed pitch, 54, 157
Semi-double density graphics, 120
Serial busy protocol, 236
Serial interface, 233
Setting margins, 73, 76, 175, 181
Setting tabs, 77, 81, 183
Setup, 1
Seven bit interface, 94, 195
Sheet feeder, 17, 103
Shipment screws, 4
<SI>, 158
Single sheets, 15
Skip over perforation, 73
Slash zero, 90, 132, 196
<SO>, 161
Software mode, 48
Software, commercial, 25
Space, adjusting, 91
character, 186
Special symbols, 97
Specifications, 225
Sprocket covers, 18
Sprocket feed paper, 9, 18
Standard mode, 48, 91, 132, 140
Standard mode command summary, 211
Starting new line, 63
Subscripts, 32, 35, 53, 166
Superscripts, 32, 35, 53, 165
Supplies paper, 208
Switch, form length, 11
power, 14
Switches, DIP, 14, 15, 64, 65, 95, 103, 131, 167, 168, 179, 200, 235
Syntax, command, 47
Tab channel, 84
Tab, absolute, 79, 185
relative, 79, 185
Tabs, horizontal, 77, 183, 184
vertical, 81, 103, 176
Testing printer, 21
Thickness, adjusting gap, 20
Top and bottom margins, 103
Top of form, 41, 72, 174
Top of form key, 12, 39, 40, 41
Tractor feed unit, 9
Triple density graphics, 120
Type style indicators, 11
Type style key, 12, 39, 42
Type style panel mode, 39, 150

Underlining, 32, 35, 52, 61, 164
Uni-directional print, 93, 201
Unpacking, 1
User-defined characters, 88, 108

Vertical channels, 177
Vertical positions commands, 167
Vertical tab channels, 84
Vertical tabs, 81, 103, 176
\(\text{VT}\), 81, 176

Word processing, 26
WordStar, 26, 35

XON/XOFF protocol, 236

Zero, normal, 90, 132, 197
slash, 90, 132, 196