CHAPTER 8

CARING FOR YOUR PRINTER

Subjects covered in Chapter 8 include -

- Cleaning the printer
- Replacing the ribbon
- Replacing the print head

Dust and heat will make any mechanism wear more quickly. The best maintenance is preventative, 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 comfortable 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

The printer uses an endless-type ribbon cartridge, meaning that the ribbon is recycled automatically. In time however, when the print becomes to 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 flat-bladed screwdriver to unhook the tabs holding the two sections of the cartridge together. See Figure 8-1.

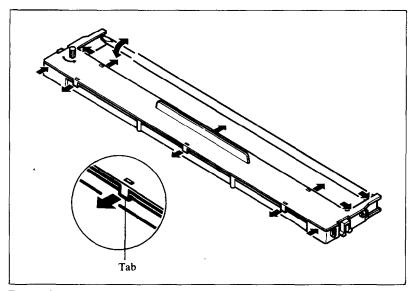


Figure 8-1. Unhook tabs to open the cartridge.

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.

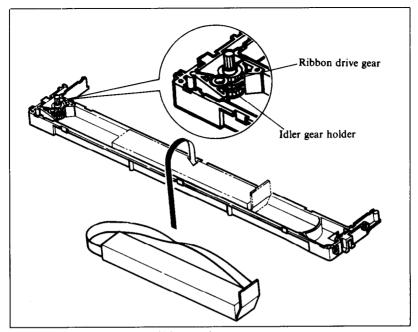


Figure 8-2. Replace the ribbon sub-cassette.

- 3. Clean the inside of the cartridge, especially around the vicinity of the two gears.
- 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.

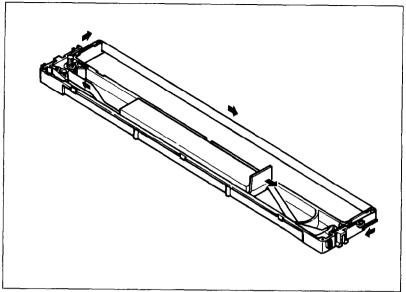


Figure 8-3. Make sure that the ribbon is not twisted when you thread it through its path.

REPLACING THE PRINT HEAD

The dot matrix print head has an extremely long life, around 100,000,000 characters, 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 ribbon cartridge.
- 2. Move the print head left along the carriage, until you can see the connector cover. Remove the cover from the printer frame; for details, see Figure 8-4. Unplug the print head cable from the head cable board.

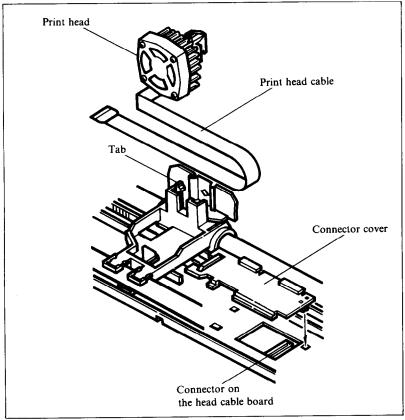


Figure 8-4. Replacement of the print head

- 3. Hold back the tab that locks the print head into place, and remove the print head.
 - 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.
 - 5. Replace the connector cover, and feed the cable under the support tab on the top of the cover.
 - 6. Fit the new print head into its support, while holding the tab back. Make sure that the print head is inserted into its guides as far as it can go, and that the tab locks the print head into place.

MEMO

APPENDIX A

DIP SWITCH SETTINGS

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, each of the two DIP switches has eight 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 black protective plastic film, which you fold back for access.

DIP switch 1 is the one on the right as you look at the printer from the front. The individual switches of DIP switch 1 are named (left to right) from 1-1 to 1-8; similarly, the switches of DIP switch 2 are 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. DIP switch settings stay in effect until changed. A new setting becomes the new default or standard setting.

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

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 the power on again to use the new settings.

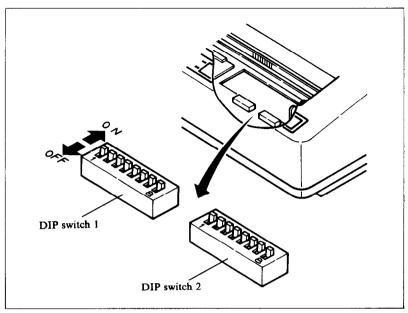


Figure A-1. The DIP switches are located under the printer cover.

Table A-1
DIP switch settings

| Switch | ON | OFF |
|--------|------------------------------------|------------------------------------|
| | Swit | tch 1 |
| 1-1 | Paper-out detected | Paper-out not detected |
| 1-2 | Set SELECT IN signal to LOW | Not fixed |
| 1-3 | Ignore download characters | Enable download characters |
| 1-4 | 1/6 inch line feed | 1/8 inch line feed |
| 1-5 | LF from host | Auto LF with CR |
| 1-6 | No bottom margin | Set bottom margin to 1 inch |
| 1-7 | 10 CPI (pica pitch) | 17 CPI (condensed pitch) |
| 1-8 | Print "normal zero" | Print "slash zero" |
| | Swit | tch 2 |
| 2-1 | Draft character set | NLQ character set |
| 2-2 | Set Standard mode | Set IBM mode |
| 2-3 | Set IBM-P mode | Set IBM-G mode |
| 2-4 | Set 1/216 inch or character set #1 | Set 1/144 inch or character set #2 |
| 2-5 | Auto CR with line feed | CR from host |
| 2-6 | | |
| 2-7 | International character set sel- | ection — see Table A-2. |
| 2-8 | | |

SWITCH FUNCTIONS

| Switch | Function |
|--------|---|
| 1-1 | This switch disables the paper-out detector. If the switch is on, the printer will signal the computer when it runs out of paper and printing will stop. If the switch is off, the printer will ignore the paper-out detector and will continue printing. 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 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 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 |
| 1-4 | factory. 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. |
| 1-5 | When this switch is on, the computer must send a line feed command each time to advance the paper. When this switch is off, the printer will automatically advance the paper one line every time it receives a carriage return. (For example, most BASIC's send a line feed with every carriage return; in this case, this switch should be on.) This |
| 1-6 | switch is set on at the factory. 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 |
| 1-7 | switch is set on at the factory. 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.

1-8 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.

2-1 This switch selects the default character style. If this switch is on, the default character style is normal draft characters. If this switch is off, near letter quality (NLQ) characters become the default characters. This switch is set on at the factory.

2-2 This switch selects the active control codes. Turn this switch on to use the "Standard" mode, which emulates the Epson FX-85 printer. Turn this switch off to use the "IBM" compatible mode. This switch is set on at the factory.

2-3 This switch selects emulation between the IBM printers when DIP switch 2-2 is set off.

Turn this switch on to use the "IBM-P" mode, which emulates the IBM Proprinter. Turn this switch off to use the "IBM-G" mode, which emulates the IBM Graphics printer.

2-4 This switch sets two different functions depending on the setting of DIP switch 2-2.

When DIP switch 2-2 is set on and this switch is set on, the minimum line feed value is set to 1/216 inch. When this switch is set off while DIP switch 2-2 is set on, the minimum line feed value is set to 1/144 inch. When DIP switch 2-2 is set off, character set #1 is set when this switch is on, and the character set #2 is set when this switch is off. 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 to 2-8 These switches determine the default international character set, as shown in Table A-2. These switches are all set on at the factory.

Table A-2
International character sets

| Switch | USA | France | Germany | England | Denmark | Sweden | Italy | Spain |
|--------|-----|--------|----------------|---------|---------|--------|-------|-------|
| 2-6 | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| 2-7 | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| 2-8 | ON | ON | ON | ON | OFF | OFF | OFF | OFF |

MEMO

APPENDIX B

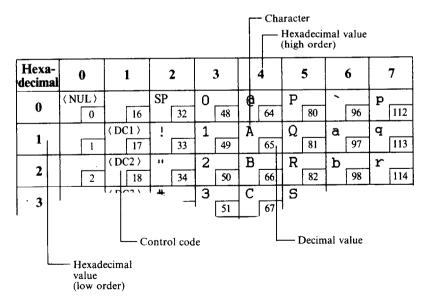
ASCII CODES AND CONVERSION CHART

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.

[Sample]



STANDARD MODE CHARACTERS

| Hexa- decimal | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|--------------|---------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 0 | 〈NUL〉 0 | 16 | 32 | 0 48 | @ 64 | P 80 | 96 | p 112 |
| 1 | 1 | 〈DC1 〉 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 |
| 2 | 2 | 〈DC2 〉 | 34 | 2 50 | B 66 | R 82 | b 98 | r 114 |
| 3 | 3 | 〈DC3 〉 | # 35 | 3 51 | C 67 | S 83 | C 99 | S |
| 4 | 4 | 〈 DC4 〉 20 | \$ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 |
| 5 | 5 | 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 |
| 6 | 6 | 22 | & 38 | 6 54 | F 70 | V 86 | f 102 | V 118 |
| 7 | 〈BEL〉 | 23 | 39 | 7 55 | G 71 | W 87 | g 103 | W 119 |
| 8 | ⟨BS⟩ | 〈CAN〉 24 | (40 | 8 56 | H 72 | X 88 | h 104 | X 120 |
| 9 | (HT) | 25 |) 41 | 9 57 | I 73 | Y 89 | i 105 | Y 121 |
| A | 〈 LF 〉 | 26 | * 42 | : 58 | J 74 | Z 90 | j 106 | Z 122 |
| В | 〈VT 〉 [1] | (ESC) | + 43 | ; 59 | K 75 | [91 | k 107 | { 123 |
| C , | 〈FF 〉 12 | 28 | , 44 | 〈 60 | L 76 | 92 | 1 108 | 124 |
| D | ⟨CR⟩ 13 | 29 | 45 | = 61 | M 77 | 93 | m 109 | } |
| E | (SO) | 30 | . 46 | > 62 | N 78 | 94 | n 110 | ~ 126 |
| F | ⟨SI⟩ 15 | 31 | 47 | ? 63 | O 79 | 95 | 0 111 | 〈DEL 〉 127 |

| Hexa- decimal | 8 | 9 | A | В | C | D | E | F |
|------------------|----------------|----------------|---------------|-----------|----------|----------|------------|----------------|
| 0 | 〈 NUL 〉 128 | 144 | 160 | O 176 | @ 192 | P 208 | 224 | P 240 |
| 1 | 129 | ⟨DC1⟩ 145 | ! 161 | 1 177 | A 193 | Q 209 | a 225 | 9 241 |
| 2 | 130 | 〈 DC2 〉 146 | 162 | 2 178 | B 194 | R 210 | b 226 | r 242 |
| 3 | 131 | 〈 DC3 〉 | # 163 | 3 179 | C 195 | S 211 | C 227 | S 243 |
| 4 | 132 | (DC4) 148 | \$ 164 | 4 180 | D 196 | T 212 | d 228 | t 244 |
| 5 | 133 | 149 | % 165 | 5 181 | E 197 | U 213 | e 229 | u 245 |
| 6 | 134 | 150 | & 166 | 6 182 | F 198 | V 214 | f 230 | V 246 |
| 7 | 〈 BEL 〉 135 | 151 | 167 | 7 183 | G 199 | W 215 | g 231 | W 247 |
| 8 | ⟨BS⟩ 136 | (CAN) 152 | 168 | 8 184 | H 200 | X 216 | h 232 | X 248 |
| 9 | 〈HT〉 137 | 153 |) 169 | 9 185 | I 201 | Y 217 | i 233 | У 249 |
| A | 〈 LF 〉 138 | 154 | * 170 | : 186 | J 202 | Z 218 | j 234 | Z 250 |
| В | 〈 VT 〉 139 | 〈 ESC 〉 155 | + 171 | ; 187 | K 203 | [219 | k 235 | { 251 |
| , C | 〈FF 〉 140 | 156 | 172 | 188 | L 204 | 220 | 1 236 | 252 |
| D | ⟨CR⟩ 141 | 157 | – 173 | = 189 | M 205 |] 221 | m 237 | } 253 |
| E | ⟨SO⟩ 142 | 158 | . 174 | ン 190 | N 206 | 222 | n 238 | ~ 254 |
| F | ⟨SI⟩ 143 | 159 | 175 | ? [191 | O 207 | | O 239 | 〈 DEL 〉 255 |

IBM MODE CHARACTERS

■ Character set #1

| Hexa- decimal | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|------------|---------------|-------------|--------|-----------------|-------------|-------------|----------------|
| 0 | 〈NUL〉 0 | 16 | 32 | 0 48 | @ ₆₄ | P 80 | 96 | p 112 |
| 1 | 1 | 〈DC1 〉 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 |
| 2 | 2 | 〈DC2 〉 18 | 34 | 2 50 | B 66 | R 82 | b 98 | r 114 |
| 3 | 3 | 〈 DC3 〉 | # 35 | 3 51 | C 67 | S 83 | C 99 | ສ 115 |
| 4 | 4 | 〈 DC4 〉 20 | \$ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 |
| 5 | 5 | 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 |
| 6 | 6 | 22 | & 38 | 6 54 | F 70 | V 86 | f 102 | 118 |
| 7 | 〈BEL〉 | 23 | 39 | 7 55 | G 71 | W 87 | gr 103 | W 119 |
| 8 | ⟨BS⟩ 8 | 〈CAN〉 | (40 | 8 56 | H 72 | X 88 | h 104 | X 120 |
| 9 | (HT) | 25 |) 41 | 9 57 | I 73 | Y 89 | i 105 | Y 121 |
| A | 〈LF〉 10 | 26 | * 42 | : 58 | J 74 | Z 90 | ј 106 | Z 122 |
| В, | ⟨VT⟩ 11 | ⟨ESC⟩ 27 | + 43 | ; 59 | K 75 | [91 | k 107 | { 123 |
| С | (FF) | 〈FS〉 28 | , 44 | 60 | L 76 | 92 | 1 108 | 124 |
| D | 〈 CR 〉 | 29 | - 45 | = 61 | M 77 | 93 | m 109 | } |
| E | (SO) | 30 | . 46 | > . 62 | N 78 | 94 | n 110 | ~ 126 |
| F | ⟨SI⟩ 15 | 31 | 47 | ? 63 | O 79 | 95 | 0 | (DEL) 127 |

| Hexa- decimal | 8 | 9 | A | В | С | D | E | F |
|------------------|----------------|----------------|-----------------|--------------|------------------|--------------|--------------|--------------|
| 0 | 〈 NUL 〉 128 | 144 | á | 176 | L 192 | 208 | α 224 | ≡ 240 |
| 1 | 129 | 〈DC1 〉 145 | 1 | # 177 | 193 | 7 209 | β 225 | ± 241 |
| 2 | 130 | 〈 DC2 〉 146 | ဝ 162 | 178 | T 194 | 1 210 | Γ 226 | ≥ 242 |
| 3 | 131 | 〈DC3 〉 147 | ú 163 | 179 | | LL 211 | π 227 | <u>≤</u> 243 |
| 4 | 132 | 〈 DC4 〉 148 | ñ 164 | 180 | - 196 | 212 | Σ 228 | 244 |
| 5 | 133 | 149 | Ñ 165 | 181 | † 197 | F 213 | σ 229 | J 245 |
| 6 | 134 | 150 | <u>a</u> 166 | 182 | 198 | T 214 | μ 230 | ÷ 246 |
| 7 | ⟨BEL⟩ 135 | 151 | Q 167 | 1 183 | 199 | # 215 | τ 231 | ≈ 247 |
| 8 | 〈 BS 〉 136 | (CAN) 152 | ذ 168 | 184 | 200 | † 216 | Ф 232 | 248 |
| 9 | 〈HT 〉 137 | 153 | 169 | 185 | F 201 | 217 | Θ 233 | 249 |
| A | 〈 LF 〉 | 154 | 「 170 | 186 | 202 | r 218 | Ω 234 | 250 |
| 4 B | 〈 VT 〉 | 〈 ESC 〉 155 | 34 171 | 1 187 | 17 203 | 219 | δ 235 | √ 251 |
| С | 〈FF 〉 140 | 〈FS 〉 156 | 172 | 188 | - 204 | 220 | 236 | n 252 |
| D | (CR) | 157 | i 173 | 189 | 205 | 221 | Ø 237 | 253 |
| E | 〈SO 〉 142 | 158 | ≪ 174 | 190 | # ₂₀₆ | 222 | € 238 | 254 |
| F | (SI) 143 | 159 | » . 175 | 1 191 | 207 | 223 | 239 | 255 |

■ Character set #2

| Hexa- decimal | 0 | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 |
|------------------|----------|---------------|------|-----|----|----|---|----|---|----|---|----|---|-----|------|------|
| 0 | ∢ NUI | 0 | | 16 | | 32 | 0 | 48 | @ | 64 | Р | 80 | _ | 96 | p | 112 |
| 1 | | 1 | ⟨ DC | 17 | ! | 33 | 1 | 49 | Α | 65 | Ω | 81 | a | 97 | q | 113 |
| 2 | | 2 | ⟨DC | 18 | 11 | 34 | 2 | 50 | В | 66 | R | 82 | b | 98 | r | 114 |
| 3 | V | 3 | 〈 DC | 19 | # | 35 | 3 | 51 | С | 67 | S | 83 | С | 99 | ຮ | 115 |
| 4 | • | 4 | ⟨D(| 20 | \$ | 36 | 4 | 52 | D | 68 | Т | 84 | đ | 100 | t | 116 |
| 5 | * | 5 | \$ | 21 | % | 37 | 5 | 53 | Ε | 69 | U | 85 | е | 101 | u | 117 |
| 6 | • | 6 | | 22 | & | 38 | 6 | 54 | F | 70 | V | 86 | f | 102 | ٧ | 118 |
| 7 | ⟨BEL | , > | | 23 | • | 39 | 7 | 55 | G | 71 | W | 87 | g | 103 | W | 119 |
| 8 | 〈BS〉 | 8 | ⟨ CA | N > | (| 40 | 8 | 56 | Н | 72 | Χ | 88 | h | 104 | × | 120 |
| 9 | 〈HT) | 9 | | 25 |) | 41 | 9 | 57 | I | 73 | Y | 89 | i | 105 | У | 121 |
| A | 〈LF〉 | 10 | | 26 | * | 42 | : | 58 | J | 74 | Z | 90 | j | 106 | z | 122 |
| В | ⟨VT ː | 11 | 〈 ES | C > | + | 43 | ; | 59 | K | 75 | [| 91 | k | 107 | { | 123 |
| C, | 〈FF〉 | 12 | 〈FS | 28 | , | 44 | < | 60 | L | 76 | \ | 92 | 1 | 108 | ; | 124 |
| D | ⟨CR |) 13 | | 29 | _ | 45 | = | 61 | M | 77 |] | 93 | m | 109 | } | 125 |
| E | (SO) | 14 | | 30 | • | 46 | > | 62 | N | 78 | ` | 94 | n | 110 | ~ | 126 |
| F | ⟨SI⟩ | 15 | | 31 | / | 47 | ? | 63 | 0 | 79 | | 95 | 0 | 111 | 〈 D: | EL > |

| Hexa- decimal | | 8 | | 9 | 4 | 4 |] | В | | C | | D | | E | | F |
|------------------|---|-----|---|-----|----------|-----|-----|-----|----------|-----|----|-----|--------|-----|-------------|-----|
| 0 | Ç | 128 | É | 144 | á | 160 | ₩ | 176 | L | 192 | ш | 208 | α | 224 | Ш | 240 |
| 1 | ü | 129 | æ | 145 | í | 161 | * | 177 | T | 193 | Ŧ | 209 | β | 225 | ± | 241 |
| 2 | é | 130 | Æ | 146 | Ó | 162 | *** | 178 | Т | 194 | π | 210 | Γ | 226 | 2 | 242 |
| 3 | â | 131 | ô | 147 | ú | 163 | - | 179 | F | 195 | Ш | 211 | π | 227 | <u><</u> | 243 |
| 4 | ä | 132 | ö | 148 | ñ | 164 | 4 | 180 | 1 | 196 | F | 212 | Σ | 228 | ſ | 244 |
| 5 | à | 133 | ò | 149 | Ñ | 165 | 4 | 181 | + | 197 | F | 213 | σ | 229 | J | 245 |
| 6 | â | 134 | a | 150 | ₫ | 166 | 1 | 182 | F | 198 | ſΓ | 214 | μ | 230 | ÷ | 246 |
| 7 | Ç | 135 | ù | 151 | Ω | 167 | π | 183 | ╟ | 199 | # | 215 | τ | 231 | * | 247 |
| 8 | ê | 136 | ÿ | 152 | į | 168 | 7 | 184 | L | 200 | ‡ | 216 | Φ | 232 | • | 248 |
| 9 | ë | 137 | Ö | 153 | _ | 169 | 1 | 185 | IF | 201 | Ţ | 217 | Θ | 233 | • | 249 |
| A | è | 138 | Ü | 154 | 7 | 170 | 11 | 186 | ᄟ | 202 | г | 218 | Ω | 234 | - | 250 |
| В | ï | 139 | ¢ | 155 | 1/2 | 171 | 11 | 187 | īī | 203 | | 219 | δ | 235 | 4 | 251 |
| С | î | 140 | £ | 156 | ¥ | 172 | ī | 188 | lĥ | 204 | - | 220 | 8 | 236 | C | 252 |
| D | ì | 141 | ¥ | 157 | i | 173 | П | 189 | = | 205 | 1 | 221 | Ø | 237 | 2 | 253 |
| E | Ä | 142 | R | 158 | « | 174 | ٦ | 190 | # | 206 | ı | 222 | € | 238 | • | 254 |
| F | Å | 143 | £ | 159 | » | 175 | ٦ | 191 | <u>+</u> | 207 | - | 223 | n | 239 | | 255 |

■ All character set (IBM-P mode only)

| Hexa- decimal | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| 0 | 0 | 16 | 32 | 0 48 | @ 64 | P 80 | 96 | p 112 |
| 1 | 1 | 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 |
| 2 | 2 | 18 | 34 | 2 50 | B 66 | R 82 | b 98 | r 114 |
| 3 | ▼ 3 | 19 | # 35 | 3 51 | C 67 | S 83 | C 99 | s |
| 4 | ♦ 4 | ¶ 20 | \$ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 |
| 5 | ♣ 5 | \$ 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 |
| 6 | • 6 | 22 | & <u>38</u> | 6 54 | F 70 | V 86 | f 102 | V 118 |
| 7 | 7 | 23 | 39 | 7 55 | G 71 | W 87 | g 103 | W 119 |
| 8 | 8 | 24 | (40 | 8 56 | H 72 | X 88 | h 104 | X 120 |
| 9 | 9 | 25 |) 41 | 9 57 | I 73 | Y 89 | i 105 | Y 121 |
| A | 10 | → <u>26</u> | * 42 | : 58 | J 74 | Z 90 | j 106 | Z 122 |
| В | 11 | ← 27 | 43 | ; 59 | K 75 | 91 | k 107 | 123 |
| C | 12 | 28 | 44 | 60 | L 76 | 92 | 1 108 | 124 |
| D | 13 | 29 | 45 | = 61 | M 77 | 93 | m 109 | } 125 |
| E | 14 | 30 | 46 | > 62 | N 78 | 94 | n 110 | 126 |
| F | 15 | 0 31 | 47 | ? 63 | O 79 | 95 | 0 111 | 127 |

| Hexa- decimal | | 8 | | 9 | ı | A |] | В | | C | | D | | E | | F |
|------------------|---|-----|---|-----|----------|------|-----|-----|----|-----|----|-----|--------|-----|-------------|-----|
| 0 | Ç | 128 | É | 144 | á | 160 | *** | 176 | L | 192 | IT | 208 | α | 224 | # | 240 |
| 1 | ü | 129 | æ | 145 | í | !61 | *** | 177 | T | 193 | Ŧ | 209 | β | 225 | ± | 241 |
| 2 | é | 130 | Æ | 146 | Ó | 162 | 叢 | 178 | Т | 194 | π | 210 | Г | 226 | 2 | 242 |
| 3 | a | 131 | 8 | 147 | ú | 163 | ١ | 179 | F | 195 | 旺 | 211 | π | 227 | <u><</u> | 243 |
| 4 | ä | 132 | ö | 148 | ñ | 164 | 1 | 180 | - | 196 | F | 212 | Σ | 228 | ſ | 244 |
| 5 | à | 133 | Ò | 149 | Ñ | 165 | 4 | 181 | + | 197 | F | 213 | σ | 229 | J | 245 |
| 6 | å | 134 | ۵ | 150 | <u>a</u> | 166 | 1 | 182 | F | 198 | П | 214 | μ | 230 | ÷ | 246 |
| 7 | Ç | 135 | ù | 151 | Ω | 167 | π | 183 | # | 199 | # | 215 | au | 231 | * | 247 |
| 8 | ê | 136 | ÿ | 152 | خ | 168 | 3 | 184 | L | 200 | + | 216 | Φ | 232 | ٠ | 248 |
| 9 | ë | 137 | Ö | 153 | _ | 169 | 1 | 185 | F | 201 | Ţ | 217 | θ | 233 | • | 249 |
| A | è | 138 | Ü | 154 | 7 | 170 | Ħ | 186 | 뀨 | 202 | г | 218 | Ω | 234 | - | 250 |
| В | ï | 139 | ¢ | 155 | 1/2 | 171 | 7 | 187 | īF | 203 | | 219 | δ | 235 | 4 | 251 |
| C | î | 140 | £ | 156 | 14 | 172 | Ŧ | 188 | ŀ | 204 | - | 220 | 8 | 236 | n | 252 |
| D | ì | 141 | ¥ | 157 | i | 173 | П | 189 | = | 205 | 1 | 221 | Ø | 237 | 2 | 253 |
| E | Ä | 142 | R | 158 | « | 174. | ٩ | 190 | 計 | 206 | J | 222 | € | 238 | • | 254 |
| F | A | 143 | £ | 159 | » | 175 | ٦ | 191 | _ | 207 | | 223 | \cap | 239 | | 255 |

| 1 | Decimal | Binary | Hexa- decimal | Decimal | Binary | Hexa- decimal | Decimal | Bianry | Hexa- decimal |
|---|---------|--|------------------|---------|----------|------------------|---------|----------|------------------|
| 2 | 0 | 00000000 | 00 | 59 | 00111011 | 3B | 118 | 01110110 | 76 |
| 3 | 1 | 00000001 | 01 | 60 | 00111100 | 3C | 119 | 01110111 | 77 |
| 4 | 2 | 00000010 | 02 | 61 | 00111101 | 3D | 120 | 01111000 | 78 |
| S | 3 | 00000011 | 03 | 62 | 00111110 | 3E | 121 | | 79 |
| 6 00000110 06 655 010000010 41 124 01111100 7 7 00000101 07 66 01000010 42 125 01111101 7 8 00001001 09 68 01000101 43 126 01111110 7 9 00001001 0A 69 01000101 45 128 100000001 3 11 00001100 OA 69 01000110 46 129 100000001 3 12 00001100 OC 71 01000110 46 129 100000001 3 13 0000110 OD 72 01001000 48 131 110000010 3 14 40001110 OE 73 01001001 4A 133 10000101 3 15 0001000 10 75 0100101 4B 134 10000101 3 18 0001000 11 76 <td>4</td> <td>00000100</td> <td>04</td> <td>63</td> <td>00111111</td> <td>3F</td> <td>122</td> <td>01111010</td> <td>7A</td> | 4 | 00000100 | 04 | 63 | 00111111 | 3F | 122 | 01111010 | 7A |
| 6 00000110 06 65 010000010 41 124 01111100 7 7 00000101 07 66 01000010 42 125 01111101 7 8 00001001 09 68 01000101 43 126 01111110 7 9 00001001 0A 69 01000110 46 129 10000000 11 10000011 0B 70 0100110 46 129 10000000 13 11 10000110 0D 72 01001000 48 131 10000001 3 14 4 0001110 0D 72 01001000 49 132 10000100 3 14 4 0001110 0D 73 0100101 4A 133 10000101 3 14 10000101 4A 133 10000101 3 14 10000101 4B 134 10000101 4B 134 10000101 4B 134 10000101 | 5 | 00000101 | 05 | 64 | 01000000 | 40 | 123 | 01111011 | 7B |
| 7 | 6 | 00000110 | 06 | 65 | 01000001 | 41 | 124 | | 7C |
| 8 00001000 08 67 010000101 43 126 01111110 79 10 00001001 09 68 01000100 44 127 01111111 70 10111111 70 10111111 70 10111111 70 10111111 70 10100110 44 128 10000000 13 128 100000001 45 128 100000001 31 100000101 47 130 10000001 31 100000101 47 10001000 48 131 10000010 31 14 00001110 0E 73 01001001 44 133 10000010 31 16 0001000 10 75 01001011 4B 134 10000110 31 16 00010001 11 76 0100101 4D 135 1000101 31 18 0001001 12 77 01001101 4B 137 10001001 32 10001010 48 137 10001010 48 | 7 | 00000111 | 07 | 66 | 01000010 | 42 | 125 | | 7D |
| 9 | 8 | 00001000 | 08 | 67 | 01000011 | 43 | 126 | | 7E |
| 10 | 9 | 00001001 | 09 | 68 | 01000100 | 44 | 127 | 01111111 | 7F |
| 12 | 10 | 00001010 | 0A | 69 | 01000101 | 45 | 128 | 10000000 | 80 |
| 12 | 11 | 00001011 | 0 B | 70 | 01000110 | 46 | 129 | 10000001 | 81 |
| 13 | 12 | 00001100 | 0C | 71 | 01000111 | 47 | 130 | | 82 |
| 15 | 13 | 00001101 | 0D | 72 | 01001000 | 48 | 131 | 10000011 | 83 |
| 16 | 14 | 00001110 | 0E | 73 | 01001001 | 49 | 132 | 10000100 | 84 |
| 16 | 15 | 00001111 | 0F | 74 | 01001010 | 4A | 133 | 10000101 | 85 |
| 17 | 16 | 00010000 | 10 | 75 | | 1 | | | 86 |
| 18 | 17 | 00010001 | 11 | 76 | | 4C | 135 | | 87 |
| 19 | | | | | | | | | 88 |
| 21 | 19 | | 13 | 78 | | 4E | | | 89 |
| 21 | | | | | | | | | 8A |
| 22 | 21 | | 15 | 80 | | 50 | | | 8 B |
| 23 00010111 17 82 01010010 52 141 10001101 8 24 00011000 18 83 0101001 53 142 10001110 8 25 00011010 1A 85 0101010 55 144 10010000 9 26 00011011 1B 86 0101011 55 144 10010000 9 27 0001101 1C 87 0101011 56 145 10010001 9 28 0001110 1D 88 0101100 57 146 1001001 9 29 0001110 1E 89 0101100 5A 149 1001010 5 31 0001111 1F 90 0101101 5A 149 1001010 5 31 0010000 20 91 0101101 5B 150 1001010 5 32 00100000 20 91 0 | | | | | | | | | 8C |
| 24 00011000 18 83 01010011 53 142 10001110 88 25 00011001 19 84 01010100 54 143 10001111 88 26 00011010 1A 85 01010011 55 144 10010000 52 27 00011010 1C 87 01010111 56 145 10010001 52 28 00011101 1D 88 01011000 58 147 10010011 52 29 00011101 1D 88 01011000 58 147 10010011 53 30 00011110 1E 89 01011001 59 148 10010100 53 31 00010000 20 91 01011010 5A 149 1001010 53 32 00100000 20 91 0101110 5D 152 10011000 50 151 10010111 53 16011010 | 23 | | 17 | | | i | ! ! | | 8D |
| 25 00011001 19 84 01010100 54 143 10001111 8 26 00011010 1A 85 01010101 55 144 10010000 9 27 00011010 1C 87 0101011 57 146 10010010 9 28 00011101 1D 88 01011000 58 147 1001001 9 30 00011101 1E 89 01011001 59 148 10010100 53 31 00010111 1F 90 01011010 5A 149 1001010 53 32 00100000 20 91 0101101 5B 150 1001011 53 33 0010001 22 93 0101110 5D 152 10011000 5C 151 10010101 53 34 0010001 23 94 0101111 5F 153 10011001 59 35 | 24 | | 18 | | | | | | 8E |
| 26 00011010 1A 85 01010101 55 144 10010000 5 27 00011011 1B 86 0101011 56 145 10010001 5 28 00011101 1D 87 01010101 56 147 10010011 5 29 00011101 1D 88 01011000 58 147 10010011 5 30 00011101 1E 89 01011001 59 148 10010101 5 31 00010000 20 91 0101101 5A 149 1001010 5 32 00100000 20 91 0101101 5D 152 10011010 5 34 0010001 22 93 01011101 5D 152 10011000 5 35 0010010 24 95 01011111 5F 154 1001101 9 37 0010010 25 96 | | | | | | | | | 8F |
| 27 00011011 1B 86 01010110 56 145 10010001 52 28 00011100 1C 87 0101011 57 146 10010010 52 29 00011101 1D 88 01011000 58 147 10010011 53 30 00011110 1E 89 01011001 59 148 10010100 53 31 00010000 20 91 0101101 5A 149 10010101 53 32 0010000 20 91 0101101 5B 150 10010110 53 33 0010001 21 92 0101110 5D 152 10011000 53 34 0010001 22 93 0101111 5F 154 10011010 59 35 0010010 24 95 01011111 5F 154 10011010 9 37 0010010 25 96 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>90</td> | | | | | | | | | 90 |
| 28 00011100 1C 87 01010111 57 146 10010010 9 29 00011101 1D 88 01011000 58 147 10010011 59 30 00011110 1E 89 01011001 59 148 10010100 53 31 00100000 20 91 0101101 5A 149 1001010 53 32 0010000 20 91 0101101 5A 149 1001010 53 33 0010001 21 92 01011100 5C 151 10010111 53 34 0010001 22 93 0101110 5D 152 10011000 53 36 0010010 24 95 01011111 5F 154 10011010 9 37 0010010 26 97 01100000 60 155 10011011 9 38 0010011 26 97 | | | | | | | | | 91 |
| 29 00011101 1D 88 01011000 58 147 10010011 30 30 00011110 1E 89 01011001 59 148 10010100 59 31 00010000 20 91 01011010 5A 149 10010101 53 32 00100000 20 91 01011010 5C 151 10010111 53 33 00100010 22 93 01011101 5D 152 10011000 55 34 0010010 22 93 0101111 5E 153 10011010 55 36 0010010 24 95 0101111 5F 154 10011010 9 37 0010010 26 97 01100000 60 155 10011011 9 38 0010011 27 98 01100010 62 157 1001110 9 40 0010100 28 99 <td>28</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>92</td> | 28 | | | | | 1 | | | 92 |
| 30 | 29 | | | 88 | | | | | 93 |
| 31 00011111 1F 90 0101010 5A 149 10010101 5B 32 00100000 20 91 0101101 5B 150 1001011 5B 33 00100001 21 92 01011100 5C 151 10010111 5B 34 0010010 22 93 0101110 5D 152 10011000 5C 35 0010010 24 95 0101111 5F 154 10011010 9B 36 0010010 25 96 01100000 60 155 10011011 9B 37 0010011 25 96 01100000 60 155 10011010 9B 39 0010011 27 98 01100010 62 157 10011101 9B 40 00101000 28 99 01100011 63 158 10011111 9B 41 0010101 2A 101 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>94</td> | | | | | | | | | 94 |
| 32 00100000 20 91 01010101 5B 150 10010110 5B 33 00100001 21 92 01011100 5C 151 10010111 5B 34 00100011 23 94 0101110 5D 152 10011000 5C 35 0010010 24 95 01011111 5F 154 10011010 9B 37 0010010 25 96 01100000 60 155 10011011 9B 38 0010011 27 98 01100010 62 157 1001110 9B 40 0010100 28 99 01100011 63 158 10011111 9B 41 00101001 2A 101 01100100 64 159 10011111 9B 42 0010101 2A 101 0110010 64 159 10011111 9B 42 0010101 2A 10 | | | | | | | | | 95 |
| 33 00100001 21 92 01011100 5C 151 10010111 5G 34 00100010 22 93 01011101 5D 152 10011000 5G 35 0010010 24 95 01011111 5F 154 10011010 9G 37 0010010 25 96 01100000 60 155 1001101 9G 38 0010011 26 97 01100001 61 156 1001110 9G 39 0010011 27 98 0110001 62 157 1001110 9G 40 0010100 28 99 01100010 63 158 10011110 9G 41 00101001 2A 101 01100100 64 159 10011111 9G 42 0010101 2A 101 0110010 65 160 10100000 AG 43 0010101 2B 102 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>96</td> | | | | | | 1 | | | 96 |
| 34 00100010 22 93 01011101 5D 152 10011000 93 35 0010001 23 94 01011110 5E 153 10011001 93 36 0010010 24 95 0101111 5F 154 10011010 93 37 0010010 26 97 01100001 61 156 10011100 93 39 0010011 27 98 01100010 62 157 10011101 94 40 00101001 28 99 01100101 63 158 10011110 94 41 00101001 2A 101 01100100 64 159 100110110 94 42 00101010 2A 101 01100100 65 160 10100000 44 43 0010100 2C 103 01100111 67 162 10100010 45 5 00101101 2E <t< td=""><td>33</td><td></td><td>21</td><td>92</td><td></td><td>,</td><td></td><td></td><td>97</td></t<> | 33 | | 21 | 92 | | , | | | 97 |
| 35 00100011 23 94 01011110 5E 153 10011001 9 36 00100100 24 95 01011111 5F 154 10011010 9 37 00100101 26 97 01100000 60 155 10011101 9 38 00100110 26 97 01100001 62 157 10011101 9 40 00101000 28 99 01100011 63 158 10011110 9 41 00101001 2A 101 0110010 64 159 10011111 9 42 0010101 2A 101 0110010 65 160 1010000 A 43 0010101 2B 102 01100110 66 161 10100001 A 45 0010110 2C 103 01100111 67 162 10100010 A 45 0010110 2E 105 <td>34</td> <td></td> <td>22</td> <td>93</td> <td></td> <td>5D</td> <td></td> <td></td> <td>98</td> | 34 | | 22 | 93 | | 5D | | | 98 |
| 36 00100100 24 95 01011111 5F 154 10011010 9 37 00100101 25 96 01100000 60 155 10011011 9 38 00100110 26 97 01100001 61 156 10011110 9 40 00101000 28 99 01100011 63 158 10011110 9 41 00101001 29 100 01100100 64 159 10011111 9 42 0010101 2A 101 0110010 65 160 10100000 A 43 0010101 2B 102 0110011 67 162 10100001 A 45 0010101 2D 104 01101000 68 163 10100001 A 46 0010110 2E 105 01101001 69 164 10100100 A 47 0010111 2F 106 <td>35</td> <td>00100011</td> <td>23</td> <td>94</td> <td>01011110</td> <td>5E</td> <td>153</td> <td>10011001</td> <td>99</td> | 35 | 00100011 | 23 | 94 | 01011110 | 5E | 153 | 10011001 | 99 |
| 38. 00100110 26 97 01100001 61 156 10011100 9 39. 00100111 27 98 01100010 62 157 10011101 9 40. 00101000 28 99 01100010 63 158 10011110 9 41. 00101001 29 100 01100100 64 159 10011111 9 42. 00101010 2A 101 01100101 65 160 101000000 A 43. 0010101 2B 102 01100110 66 161 10100001 A 45. 0010110 2C 103 01101000 68 163 10100001 A 46. 00101101 2E 105 01101000 68 163 10100001 A 47. 00101111 2F 106 01101001 6A 165 1010010 A 48. 00110000 30 | 36 | | 24 | 95 | | | | | 9A |
| 39 00100111 27 98 01100010 62 157 10011101 9 40 00101000 28 99 01100010 63 158 10011110 9 41 00101001 29 100 01100100 64 159 1001001111 9 42 00101010 2A 101 0110010 65 160 101000000 A 43 0010101 2B 102 01100110 66 161 10100001 A 45 0010110 2D 104 01101000 68 163 10100011 A 46 0010110 2E 105 0110100 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110010 32 <td< td=""><td>37</td><td>00100101</td><td>25</td><td>96</td><td></td><td>60</td><td>1</td><td></td><td>9B</td></td<> | 37 | 00100101 | 25 | 96 | | 60 | 1 | | 9B |
| 39 00100111 27 98 01100010 62 157 10011101 9 40 00101000 28 99 01100010 63 158 10011110 9 41 00101001 29 100 01100100 64 159 1001001111 9 42 00101010 2A 101 0110010 65 160 101000000 A 43 0010101 2B 102 01100110 66 161 10100001 A 45 0010110 2D 104 01101000 68 163 10100011 A 46 0010110 2E 105 0110100 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110010 32 <td< td=""><td>38.</td><td>00100110</td><td>26</td><td>97</td><td>01100001</td><td>61</td><td>156</td><td>10011100</td><td>9C</td></td<> | 38. | 00100110 | 26 | 97 | 01100001 | 61 | 156 | 10011100 | 9C |
| 40 00101000 28 99 01100011 63 158 10011110 9 41 00101001 29 100 01100100 64 159 10011111 9 42 0010101 2A 101 0110010 65 160 10100000 A 43 0010101 2B 102 01100110 66 161 10100001 A 44 0010110 2C 103 01100111 67 162 10100001 A 45 0010110 2E 105 01101001 69 164 10100100 A 46 0010111 2F 106 01101001 6A 165 10100101 A 47 0010111 2F 106 01101001 6A 165 10100101 A 48 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 | 39 | 00100111 | 27 | 98 | 01100010 | 62 | 157 | 10011101 | 9D |
| 41 00101001 29 100 01100100 64 159 10011111 9 42 00101010 2A 101 01100101 65 160 10100000 A 43 0010100 2C 103 01100110 66 161 101000010 A 45 00101101 2D 104 01101000 68 163 10100011 A 46 0010110 2E 105 01101001 69 164 10100100 A 47 00101111 2F 106 01101001 6A 165 10100101 A 48 00110000 30 107 01101010 6C 167 10100110 A 50 00110010 32 109 01101101 6D 168 10101001 A 51 00110011 33 110 01101110 6E 169 1010101 A 52 00110100 34 < | 40 | 00101000 | | 99 | 01100011 | 63 | 158 | 10011110 | 9E |
| 43 00101011 2B 102 01100110 66 161 10100001 A 44 00101100 2C 103 01100111 67 162 10100010 A 45 00101101 2D 104 01101000 68 163 10100001 A 46 00101110 2E 105 01101001 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 0110110 6D 168 10101000 A 51 0011010 34 111 01101111 6F 170 10101010 A 52 0011010 34 <t< td=""><td>41</td><td>00101001</td><td>29</td><td>100</td><td>01100100</td><td>64</td><td></td><td>10011111</td><td>9F</td></t<> | 41 | 00101001 | 29 | 100 | 01100100 | 64 | | 10011111 | 9F |
| 44 00101100 2C 103 01100111 67 162 10100010 A 45 00101101 2D 104 01101000 68 163 10100011 A 46 00101110 2E 105 01101001 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101001 70 171 10101010 A 54 0011010 36 | 42 | 00101010 | 2A | 101 | 01100101 | 65 | | | A0 |
| 44 00101100 2C 103 01100111 67 162 10100010 A 45 00101101 2D 104 01101000 68 163 10100011 A 46 00101110 2E 105 01101001 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 0110111 6F 170 10101010 A 54 0011010 36 < | 43 | 00101011 | 2B | 102 | 01100110 | 66 | 161 | | A 1 |
| 45 00101101 2D 104 01101000 68 163 10100011 A 46 00101110 2E 105 01101001 69 164 10100100 A 47 0010111 2F 106 01101011 6B 165 10100101 A 48 00110000 30 107 0110101 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101011 6F 170 10101010 A 53 0011010 35 112 01110000 70 171 10101010 A 54 00110110 36 <t< td=""><td>44</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>A2</td></t<> | 44 | | | | | | | | A2 |
| 46 00101110 2E 105 01101001 69 164 10100100 A 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110001 30 107 01101011 6B 166 10100110 A 49 00110001 32 109 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 112 01110000 70 171 10101011 A 54 0011010 36 113 01110001 71 172 10101100 A 55 00110100 38 | 45 | | 2D | | | | | | A3 |
| 47 00101111 2F 106 01101010 6A 165 10100101 A 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 0011010 33 110 01101110 6E 169 10101001 A 52 0011010 34 111 01101111 6F 170 10101010 A 53 0011010 35 112 01110000 70 171 10101011 A 54 0011010 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 0011000 38 | | | | | | | | | A4 |
| 48 00110000 30 107 01101011 6B 166 10100110 A 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 112 01110000 70 171 10101011 A 54 0011010 36 113 01110001 71 172 10101100 A 55 0011011 37 114 01110010 72 173 10101101 A 56 0011000 38 115 01110011 73 174 10101110 A | 47 | 1 1 | 2F | | | 6A | | | A5 |
| 49 00110001 31 108 01101100 6C 167 10100111 A 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 113 01110000 70 171 10101011 A 54 00110110 36 113 01110001 71 172 10101100 A 55 0011011 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | | | | 1 | | : | | | A6 |
| 50 00110010 32 109 01101101 6D 168 10101000 A 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 112 01110000 70 171 10101011 A 54 00110110 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | 49 | | 31 | | | | | | A 7 |
| 51 00110011 33 110 01101110 6E 169 10101001 A 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 112 01110000 70 171 10101011 A 54 00110110 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | 50 | 00110010 | 32 | 109 | 01101101 | 6D | 168 | | A8 |
| 52 00110100 34 111 01101111 6F 170 10101010 A 53 00110101 35 112 01110000 70 171 10101011 A 54 00110110 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | 51 | | 33 | 110 | | 6E | | | A9 |
| 54 00110110 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | | | | | | | | | AA |
| 54 00110110 36 113 01110001 71 172 10101100 A 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | | | 35 | | | | | | AB |
| 55 00110111 37 114 01110010 72 173 10101101 A 56 00111000 38 115 01110011 73 174 10101110 A | 54 | | | 113 | | | | | AC |
| 56 00111000 38 115 01110011 73 174 10101110 A | | 1 | | | | | | | AD |
| | | | | | | | | | AE |
| | 57 | 00111001 | 39 | 116 | 01110100 | 74 | 175 | 10101111 | AF |
| | - 1 | L. Carrier and Car | | | | | | | В0 |

| Decimal | Binary | Hexa- decimal | Decimal | Binary | Hexa- decimal | Decimal | Bianry | Hexa- decimal |
|---------|----------|------------------|---------|----------|------------------|----------|-----------|------------------|
| 177 | 10110001 | B1 | 204 | 11001100 | CC | 231 | 11100111 | E7 |
| 178 | 10110010 | B2 | 205 | 11001101 | CD | 232 | 11101000 | E8 |
| 179 | 10110011 | B3 | 206 | 11001110 | CE | 233 | 11101001 | E9 |
| 180 | 10110100 | B4 | 207 | 11001111 | CF | 234 | 11101010 | EA |
| 181 | 10110101 | B5 | 208 | 11010000 | D0 | 235 | 11101011 | EB |
| 182 | 10110110 | В6 | 209 | 11010001 | D1 | 236 | 11101100 | EC |
| 183 | 10110111 | B 7 | 210 | 11010010 | D2 | 237 | 11101101 | ED |
| 184 | 10111000 | B8 | 211 | 11010011 | D3 | 238 | 11101110 | EE |
| 185 | 10111001 | В9 | 212 | 11010100 | D4 | 239 | 11101111 | EF |
| 186 | 10111010 | BA | 213 | 11010101 | D5 | 240 | 11110000 | F0 |
| 187 | 10111011 | BB | 214 | 11010110 | D6 | 241 | 11110001 | FI |
| 188 | 10111100 | BC | 215 | 11010111 | D7 | 242 | 11110010 | F2 |
| 189 | 10111101 | BD | 216 | 11011000 | D8 | 243 | 11110011 | F3 |
| 190 | 10111110 | BE | 217 | 11011001 | D9 | 244 | 11110100 | F4 |
| 191 | 10111111 | BF | 218 | 11011010 | DA | 245 | 11110101 | F5 |
| 192 | 11000000 | C0 | 219 | 11011011 | DB | 246 | 11110110 | F6 |
| 193 | 11000001 | Cl | 220 | 11011100 | DC | 247 | 11110111 | F7 |
| 194 | 11000010 | C2 | 221 | 11011101 | DD | 248 | 11111000 | F8 |
| 195 | 11000011 | C3 | 222 | 11011110 | DE | 249 | 11111001 | F9 |
| 196 | 11000100 | C4 | 223 | 11011111 | DF | 250 | 11111010 | FA |
| 197 | 11000101 | C5 | 224 | 11100000 | E0 | 251 | 11111011 | FB |
| 198 | 11000110 | C6 | 225 | 11100001 | El | 252 | 111111100 | FC |
| 199 | 11000111 | C7 | 226 | 11100010 | E2 | 253 | 11111101 | FD |
| 200 | 11001000 | C8 | 227 | 11100011 | E3 | 254 | 111111110 | FE |
| 201 | 11001001 | C9 | 228 | 11100100 | E4 | 255 | 11111111 | FF |
| 202 | 11001010 | CA | 229 | 11100101 | E5 | | | |
| 203 | 11001011 | СВ | 230 | 11100110 | E6 | <u>L</u> | | |

MEMO

APPENDIX C

FUNCTION CODES

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 Tells what the function code does.

MODE Indicates the valid emulation mode.

CODE Control code mnemonic (decimal ASCII) ASCII decimal equivalent Hexadecimal equivalent

REMARKS Briefly describes how the command is used.

SEE 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

| PURPOSE | Selects italic characters. |
|---|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-G <esc> "4" 27 52 1B 34</esc> |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P <fs> "4" 28 52 IC 34</fs> |
| REMARKS | This command causes all subsequent characters to be printed in italics until italic printing is cancelled. |
| SEE | Chapter 4 |
| | |
| PURPOSE | Cancels italic characters. |
| PURPOSE MODE CODE (decimal ASCII) (hex ASCII) | Cancels italic characters. Standard, IBM-G < ESC > "5" 27 53 IB 35 |
| MODE CODE (decimal ASCII) | Standard, IBM-G < ESC > "5" 27 53 |
| MODE CODE (decimal ASCII) (hex ASCII) MODE CODE (decimal ASCII) | Standard, IBM-G < ESC > "5" 27 |

| PURPOSE | Selects an | internati | ional character set. |
|--------------------------------|-------------------|--------------|----------------------|
| MODE CODE | Standard, < ESC > | IBM-G "R" | n |
| (decimal ASCII) (hex ASCII) | 27 1B | 82 52 | n n |
| MODE | IBM-P | | |
| CODE | < FS > | "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:

| n | Character set | n | Character set |
|---|---------------|----|---------------|
| 0 | U.S.A | 6 | Italy |
| 1 | France | 7 | Spain |
| 2 | Germany | 8 | Japan |
| 3 | England | 9 | Norway |
| 4 | Denmark I | 10 | Denmark II |
| 5 | Sweden | | |

You can select a specific international character set (except Japan, Norway, and Denmark type II), as a power-on default by adjusting the settings of DIP switches 2-6, 2-7, and 2-8.

SEE

Chapter 6

| PURPOSE | Selects cha | racter set #2 |
|-----------------|-------------|---------------|
| MODE | IBM-P, IB | |
| CODE | < ESC > | "6" |
| (decimal ASCII) | 27 . | 54 |
| (hex ASCII) | 1 B | 36 |

REMARKS

This command selects character set #2 when the DIP switch 2-2 is set off. You can select character set #2 as the power-on default by turning DIP switch 2-4 off.

SEE

Chapter 6

SEE

| PURPOSE | Selects character set #1. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P, IBM-G < ESC > "7" 27 55 1B 37 |
| REMARKS | This command cancels character set #2 and selects character set #1 when the DIP switch 2-2 is set off. You can select character set #1 as the power-on default by turning DIP switch 2-4 on. |
| SEE | Chapter 6 |
| PURPOSE | Selects NLQ characters. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "x" 1 27 120 1 1B 78 01 |
| REMARKS | This command causes the printer to print near letter quality (NLQ) characters until the NLQ mode is cancelled. You can select NLQ characters as the power-on default by turning DIP switch 2-1 off. This command is ignored when the "Panel" mode is selected at power-on. Note: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |

Chapter 4

PURPOSE Cancels NLO characters. MODE Standard, IBM-P, IBM-G < ESC > "x" CODE 0 (decimal ASCII) 27 120 0 (hex ASCII) 78 00 1B This command cancels NLQ printing and REMARKS returns the printer to the draft mode. You can select draft characters as the power-on default by turning DIP switch 2-1 on. This command is ignored when the "Panel" mode is selected at power-on. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. Chapter 4 SEE Selects NLQ characters. **PURPOSE** MODE IBM-P "I" CODE <ESC> 73 2 (decimal ASCII) 27 49 02 (hex ASCII) 1B This command causes the printer to print REMARKS near letter quality (NLQ) characters until NLO mode is cancelled. You can select NLQ characters as the power-on default by turning DIP switch 2-1 off. This command is ignored when the "Panel" mode is selected at power-on. Note: The character "2" (decimal code 50, hexadecimal code 32) can be used instead

of ASCII 2.

Chapter 4

SEE

| PURPOSE | Selects dra | ft cha | racters. | |
|--|---|--|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < ESC > 27 1B | "I" 73 49 | 0 0 00 | |
| REMARKS | returns the can select default by command is selected Note: The | e print draft of turning is igno at power chara al cod | er to the charact ng DIP red who wer-on. | NLQ printing and the draft mode. You ters as the power-on switch 2-1 on. This ten the "Panel" mode of the decimal code 48, the can be used instead |
| SEE | Chapter 4 | | | |

■ Print pitch controls

| PURPOSE | Sets the print pitch to pica. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "P" 27 80 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 pica pitch as the power-on default by turning DIP switch 1-7 on. This command is ignored when the "Panel" mode is selected at power-on. |
| SEE | Chapter 4 |

PURPOSE Sets the print pitch to elite.

MODE Standard, IBM-P, IBM-G 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 "Panel" mode is selected at power-on.

SEE Chapter 4

PURPOSE Sets the print pitch to elite.

MODE IBM-P
CODE <ESC> ":"
(decimal ASCII) 27 58
(hex ASCII) 1B 3A

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 "Panel" mode is selected

at power-on.

SEE Chapter 4

| PURPOSE | Sets the printer to condensed print. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < SI > 15 0F |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> <si> 27 15 1B 0F</si></esc> |
| REMARKS | This command causes printing to be done in condensed pitch, with 233 characters per line for pica condensed, and 272 characters per line for elite condensed (NLQ characters are not printed in condensed pitch). You can select the pica condensed pitch with the control panel, but you cannot select the elite condensed pitch manually This command is ignored when the "Panel" mode is selected at power-on. Note: Only with the IBM-P mode this command sets the printer to pica condensed print. |
| SEE | Chapter 4 |
| PURPOSE | Cancels condensed print |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-G < DC2 > 18 12 |
| REMARKS | This command cancels condensed printing |

and returns the printer to the normal print pitch. This command is ignored when the "Panel" mode is selected at power-on.

SEE Chapter 4

| | 133 |
|--|---|
| PURPOSE | Sets the print pitch to pica. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < DC2> 18 12 |
| REMARKS | This command cancels condensed printing and returns the printer to the normal pica pitch. This commands is ignored when the "Panel" mode is selected at power-on. |
| SEE | Chapter 4 |
| PURPOSE | Sets the printer to proportional print. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "p" 1 27 112 1 1B 70 01</esc> |
| REMARKS | This command causes all subsequent characters to be printed with proportional spacing until proportional printing is cancelled. This command is ignored when the |

of ASCII 1.

Chapter 4

SÉE

"Panel" mode is selected at the power-on.

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

SEE

| PURPOSE | Cancels proportional print. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "p" 0 27 112 0 1B 70 00</esc> |
| REMARKS | This command cancels proportional printing and returns to "fixed pitch" printing. This command is ignored when the "Panel" mode is selected at the power-on. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 4 |
| PURPOSE | Sets the printer to expanded print. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "W" 1 27 87 1 1B 57 01 |
| 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. |

Chapter 4

| PURPOSE | Cancels expanded print. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "W" 0 27 87 0 1B 57 00</esc> |
| REMARKS | This command resets the character pitch to what it was before expanded printing was set. |
| | Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 4 |
| PURPOSE | Sets the printer to expanded print for the remainder of the current line. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <so> 14 0E</so> |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > < SO > 27 14 1B 0E |
| REMARKS | This command causes characters to be printed twice as wide as normally until a carriage return is sent. It can also be cancelled with < DC4>. |
| SEE | Chapter 4 |
| PURPOSE | Cancels one line expanded print. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < DC4 > 20 14 |
| REMARKS | This command cancels one line expanded print set with $\langle SO \rangle$ or $\langle ESC \rangle \langle SO \rangle$. |
| SEE | Chapter 4 |

Special print modes

| PURPOSE | Sets | the | master | print | mode. |
|---------|------|-----|--------|-------|-------|
|---------|------|-----|--------|-------|-------|

MODE Standard, IBM-P, IBM-G CODE < ESC > "!" n (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, emphasizing, boldface, italics, underlining, or any combination of these, as determined by n, a number from 0 to 255. (See Table 4-10 for details.)

SEE

Chapter 4

PURPOSE Selects emphasized printing.

MODE Standard, IBM-P, IBM-G CODE < ESC > "E"

(decimal ASCII) 27 69 (hex ASCII) 1B 45

REMARKS This command causes characters to be em-

phasized until is cancelled.

SEE Chapter 4

PURPOSE Cancels emphasized printing.

MODE Standard, IBM-P, IBM-G

CODE <ESC> "F" (decimal ASCII) 27 70 (hex ASCII) 1B 46

REMARKS This command cancels emphasized printing.

SEE Chapter 4

| PURPOSE | Selects boldface printing. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "G" 27 71 1B 47 |
| REMARKS | This command causes characters to be printed in boldface until cancelled. Boldface cannot be used with superscripts or subscripts. |
| SEE | Chapter 4 |
| | |
| PURPOSE | Cancels boldface printing. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "H" 27 72 1B 48 |
| REMARKS | This command turns off boldface printing and returns the printer to normal printing. |
| SEE | Chapter 4 |
| | |
| PURPOSE | Selects underlining. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "—" 1 27 45 1 1B 2D 01 |
| REMARKS | This command underlines the following characters until cancelled. Note: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |

Chapter 4

SEE

| PURPOSE | Cancels underlining. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "—" 0 27 45 0 1B 2D 00 |
| REMARKS | This command stops underlining. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 4 |
| | |
| PURPOSE | Selects overlining. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "_" 1 27 95 1 1B 5F 01</esc> |
| REMARKS | This command prints a line above the following characters until cancelled. Note: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |
| SEE | Chapter 4 |
| | |
| PURPOSE | Cancels overlining. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "_" 0 27 95 0 1B 5F 00</esc> |
| 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < 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 printed from left to right only and in boldface. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 4 |
| PURPOSE | Selects subscripts. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "S" 1 27 83 1 1B 53 01</esc> |
| 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "T" 27 84 1B 54</esc> |
| REMARKS | This command stops printing of super- scripts or subscripts and sets normal printing. It also cancels uni-directional printing and boldface, which are set au- tomatically for superscripts and subscripts. |
| 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

| PURPOSE | Advances the paper one line (line feed). |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <lf> 10 0A</lf> |
| REMARKS | The actual distance of the line feed is set through various codes (see below). When DIP switch 1-5 is "off" a line feed is automatically generated whenever the printer receives a carriage return. |
| SEE | Chapter 5 |

| PURPOSE | Reverses the paper one line. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > < LF > 27 |
| 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). Note: You cannot reverse the paper more than one inch when the optional automatic sheet feeder is installed. |

| | 163 |
|--|--|
| PURPOSE | Sets line spacing to 1/8 inch. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "0" 27 48 1B 30 |
| REMARKS | 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 1-4 off. |
| SEE | Chapter 5 |
| PURPOSE | Sets line spacing to 1/6 inch. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard <esc> "2" 27 50 1B 32</esc> |
| REMARKS | 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 1-4 on. |
| SEE | Chapater 5 |
| PURPOSE | Sets line spacing to 7/72 inch. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "1" 27 49 1B 31</esc> |

REMARKS This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 7/72 inch.

| PURPOSE | Sets line spacing to $n/216$ inch. |
|---|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "3" n 27 51 n 1B 33 n |
| REMARKS | This command sets the actual distance the paper advances or reverses during all subsequent line feeds to $n/216$ inch $(n/144$ inch when DIP switch 2-4 is set off with the Standard mode). The value of n must be between 0 and 255. |
| SEE | Chapter 5 |
| PURPOSE | Sets line spacing to $n/72$ inch. |
| MODE CODE (decimal ASCII) (hex ASCII) REMARKS | Standard < ESC > "A" n 27 65 n 1B 41 n This command sets the actual distance the |
| | paper advances or reverses during all subsequent line feeds to $n/72$ inch. The value of n must be between 0 and 85. |
| SEE | Chapter 5 |
| PURPOSE | Defines line spacing to $n/72$ inch. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P, IBM-G < ESC > "A" n 27 65 n 1B 41 n |
| REMARKS | This command defines the actual distance the paper advances or reverses during all subsequent line feeds to $n/72$ inch. The value of n must be between 0 and 255. This command must be used in conjunction with $\langle ESC \rangle$ "2" which activates the $\langle ESC \rangle$ "A" definition. |

PURPOSE Uses < ESC > "A" definition.

| MODE | IBM-P, | IBM-G |
|-----------------|---------|-------|
| CODE | < ESC > | "2" |
| (decimal ASCII) | 27 | 50 |
| (hex ASCII) | 1B | 32 |

REMARKS

This command activates the line spacing defined in the <ESC> "A" command. If the <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/216 inch.

| MODE | Standard, | IBM-P, | IBM-G |
|-----------------|------------|--------|-------|
| CODE | < ESC > | "J" | n |
| (decimal ASCII) | 27 | 74 | n |
| (hex ASCII) | 1 B | 4A | n |

REMARKS

This command causes the printer to advance the paper n/216 inch (n/144) inch when DIP switch 2-4 is set off with the Standard mode). 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

Sends a one-time reverse feed of n/216 inch.

| MODE | Standard, | IBM-P, | IBM-C |
|-----------------|-----------|------------|-------|
| CODE | < ESC > | "j" | n |
| (decimal ASCII) | 27 | 106 | n |
| (hex ASCII) | 1B . | 6 A | n |

REMARKS

This command causes the printer to reverse the paper n/216 inch (n/144) inch when DIP switch 2-4 is set off with the Standard mode). 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

| PURPOSE | Sets print position to n lines. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "f" 1 n 27 102 1 n 1B 66 01 n |
| REMARKS | This command sets the next print position to the <i>n</i> 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < FF > 12 0C |
| REMARKS | The actual length of a page ejected by a form feed is set either by the switch on the control panel 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-P, IBM-G <ESC> <FF> CODE (decimal ASCII) 27 12 (hex ASCII) 0C1 B

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

Chapter 5 SEE

Sets page length to n inches. **PURPOSE** Standard IDM D IDM C MODE

| MODE | Standard | , IDIVI- | r, idiv | l-U |
|-----------------|----------|----------|---------|-----|
| CODE | < ESC > | "C" | 0 | n |
| (decimal ASCII) | 27 | 67 | 0 | n |
| (hex ASCII) | 1B | 43 | 00 | n |

REMARKS This command sets the length of all subsequent pages to n inches. The value of n

must be between 1 and 22 (127 for IBM modes). You can select a power-on default form length by the switch on the control panel. This command is ignored when the

optional automatic sheet feeder is installed.

SEE. Chapter 5

PURPOSE Sets page length to n lines.

| MODE | Standard, | , IBM-F | P, IBM-G |
|-----------------|------------|---------|----------|
| CODE | < ESC > | "C" | n |
| (decimal ASCII) | 27 | 67 | n |
| (hex ASCII) | 1 B | 43 | n |

This command sets the length of all sub-REMARKS sequent pages to n lines. The value of nmust be between 1 and 255. This command is ignored when the optional automatic

sheet feeder is installed.

| PURPOSE | Sets the top of form to the current position. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < ESC > "4" 27 52 1B 34 |
| REMARKS | This command sets the top of form to the current position. |
| SEE | Chapter 5 |
| PURPOSE | Sets the print position to n characters. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "f" 0 n 27 102 0 n 1B 66 00 n</esc> |
| REMARKS | This command sets the next print position to <i>n</i> columns from the left margin. The value of <i>n</i> 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 |

■ Top/bottom margins and vertical tabs.

| PURPOSE | Sets the to | op marg | in. |
|--|---|---------------------------|-------------|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, < ESC > 27 1B | IBM-P "r" 114 72 | n n 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. | | |
| SEE | Chapter 5 | ; | |

| | 169 |
|--|---|
| PURPOSE | Sets the bottom margin. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "N" n 27 78 n 1B 4E 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 255. |
| SEE | Chapter 5 |
| PURPOSE | Cancels top and bottom margins. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "O" 27 79 1B 4F |
| REMARKS | This command cancels both the top margin and the bottom margin. |
| SEE | Chapter 5 |
| PURPOSE | Advances paper to the next vertical tab position. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < VT > 11 0B |
| REMARKS | 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 |

SEE Chapter 5

command.

| 170 | |
|--|---|
| PURPOSE | Sets vertical tab positions. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "B" |
| REMARKS | This command cancels all current vertical tab positions and sets those defined at lines n1, n2, n3 etc. 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 |
| PURPOSE | Selects vertical channels. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "/" n0 27 47 n0 1B 2F n0 |
| REMARKS | This command selects one of the multiple vertical channels determined by the value of $n\theta$. The value of $n\theta$ must be between 0 and 7. |

| PURPOSE | Sets vertical tab positions in a channel. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "b" n0 n1 n2 n3 0 27 98 n0 n1 n2 n3 0 1B 62 n0 n1 n2 n3 00 |
| REMARKS | This command cancels all current vertical tab positions in channel $n\theta$ and sets those defined at lines $n1$, $n2$, $n3$, 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 $n\theta$ must be between 0 and 7. |
| SEE | Chapter 5 |
| PURPOSE | Sets vertical tab position every n lines. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "e" 1 n 27 101 1 n 1B 65 01 n</esc> |
| REMARKS | This command cancels all current vertical tab positions and sets those every <i>n</i> lines. Note: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |
| SEE | Chapter 5 |
| DUDDOGE | |
| PURPOSE | Cancels vertical tab positions. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P <esc> "R" 27 82 1B 52</esc> |
| RFMARKS | This command cancels the vertical tab positions. This command also sets the horizontal tab positions every 8 characters. |

CONTROLLING THE HORIZONTAL PRINT POSI-TION

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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < CR > 13 0D |
| REMARKS | This command returns the print head to the left margin. If DIP switch 1-5 has been set off, 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 automat- ically. |
| SEE | Chapter 5 |
| | |
| PURPOSE | Sets carriage return function with a line feed. |
| MODE CODE (decimal ASCII) (hex ASCII) | Sets carriage return function with a line feed. IBM-P <esc> "5" 1 27 53 1 1B 35 01</esc> |

Sets carriage return function without a line PURPOSE feed. MODE IBM-P **"5"** < ESC > CODE 0 (decimal ASCII) 27 53 0 (hex ASCII) 35 00 1B This command sets the carriage return REMARKS 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. This command overrides the setting of DIP switch 1-5. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. SEE Chapter 5 PURPOSE Sets the left margin. MODE Standard, IBM-P, IBM-G <ESC> "[" CODE (decimal ASCII) 27 108 n (hex ASCII) 6C 1 B 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.

| PURPOSE | Sets the | right ma | ırgin. |
|-----------------|----------|----------|--------|
| MODE | Standard | | G |
| CODE | < ESC > | "Q" | n |
| (decimal ASCII) | 27 | 81 | n |
| (hex ASCII) | 1B | 51 | n |
| MODE | IBM-P | | |
| CODE | < FS > | "Q" | n |
| (decimal ASCII) | 28 | 81 | n |
| (hex ASCII) | IC | 51 | n |

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 values of n must be between 1 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

PURPOSE

Sets the left and right margins.

| MODE |
|-----------------|
| CODE |
| (decimal ASCII) |
| (hex ASCII) |

| Standard, | IBM. | -P, IBM | [-G |
|------------|------|---------|-----------|
| < ESC > | "X" | n1 | <i>n2</i> |
| 27 | 88 | n1 | <i>n2</i> |
| 1 B | 58 | n1 | <i>n2</i> |

REMARKS

This command sets the left margin to n1 characters and the right margin to n2. The values of n1 and n2 must between 1 and 255, and n2 should be greater than n1. 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

positions on the page.

SEE

PURPOSE Moves the print head to the next horizontal tab position.

MODE Standard, IBM-P, IBM-G CODE < HT >

(decimal ASCII) 9 (hex ASCII) 09

REMARKS

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).

SEE Chapter 5

PURPOSE Sets horizontal tab positions.

MODE Standard, IBM-P, IBM-C CODE < ESC > "D" n1 n2 n3 ... 0 (decimal ASCII) 27 68 n1 n2 n3 ... 0 (hex ASCII) 1B 44 n1 n2 n3 ... 00

REMARKS This command cancels all current hori-

zontal 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 order.

| PURPOSE | Sets horizontal tab position every n characters. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "e" 0 n 27 101 0 n 1B 65 00 n |
| REMARKS | This command cancels all current horizontal tab positions and sets those every <i>n</i> characters. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 5 |
| PURPOSE | Sets horizontal tab positions every 8 characters. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < ESC > "R" 27 82 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "\$" n1 n2 27 36 n1 n2 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-G < ESC > "\" n1 n2 27 92 n1 n2 1B 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, in inches, is determined by the formula $(n1 + n2 \times 256)/120$. To move to the left, add 64 to the calculated value of $n2$. The maximum distance is 13.6 inches. 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 CODE (decimal ASCII) (hex ASCII) REMARKS | Standard <esc> "space" n 27 32 n 1B 20 n This command increases the space between NLQ characters by n dots. The value of n must be between 0 and 127.</esc> |

Chapter 6

SEE

| PURPOSE | Moves the print head back one print position (backspace). |
|---|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <bs> 8 08</bs> |
| 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 MODE CODE (decimal ASCII) (hex ASCII) | Sets alignment, or centering. Standard, IBM-P, IBM-G <esc> "a" n 27 97 n 1B 61 n</esc> |
| REMARKS | This command causes the printer to format text as follows: n Text formatting 0 Left justified (ragged right margin) 1 Centered 2 Right justified 3 Right and left justified |

DOWNLOAD CHARACTER COMMANDS

| PURPOSE | Defines of | downlo | ad cl | haracters into RAM. |
|-----------------|------------------|--------|-------|---|
| MODE CODE | Standard < ESC > | , | | BM-G n1 n2 m0 m1 m11 |
| (decimal ASCII) | 27 | 38 | 0 | [m12 m46] n1 n2 m0 m1 m11 |
| (hex ASCII) | 1 B | 26 | 00 | [m12 m46] n1 n2 m0 m1 m11 [m12 m46] |

REMARKS

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 n1 and n2 specify the range of positions in RAM that the characters are to occupy. Valid character positions are any number between 0 and 255 (except the area of block graphics characters with the IBM modes). Following n2 the printer expects character data bytes for each character to be defined. The first byte, m0, is the attribute byte, for it specifies whether the character is a descender (if the first bit is 0), and the proportional width of the draft character (starting and ending dot columns are defined by the low order seven bits). m1 through m11 determine which dots form the draft character. In case of NLQ download characters, ml through m46 determine which dots form the character.

Note: This command is ignored when the DIP switch 1-3 is set on.

PURPOSE

Defines download characters into RAM.

MODE CODE (Decimal ASCII) (hex ASCII)

<ESC > " = " n1 n2 < DC4 > n3 m0 0 m1 m2 ... m11 27 61 n1 n2 20 n3 m0 0 m1 m2 ... m11 1B 3D n1 n2 14 n3 m0 00 m1 m2 ... m11

REMARKS

This command is used to set up 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 n1 and n2 indicate how many bytes will follow this command. The value of n3 specifies the start range of positions in RAM that the characters are to occupy. Following n3 the printer expects character data bytes for each character to be defined. The first byte, m0, specifies the attribute data. The attribute describ whether the character is ascending or descending. If m0 = 1, the character prints with the bottom eight pins of the print head (descending character). If $m\theta = \theta$, the character prints with the top eight pins of the print head (ascending character). through m11 determine which dots form the character.

Note: This command is ignored when the DIP switch 1-3 is set on.

SEE 4

Chapter 7

IBM-P

| PURPOSE | Copies sta RAM. | andard | charac | ter RC | OM font into |
|--|---|----------------------------|------------------------|-------------------------|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, < ESC > 27 IB | IBM-6 ":" 58 3A | G 0 0 00 | 0 0 00 | 0 0 00 |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < FS > 28 IC | ":" 58 3A | 0 0 0 | 0 0 0 | 0 0 0 00 |
| REMARKS | characters character existing trange. | s to the RAM user-de | area. fined nand i | spondii This ocharac | he standard ng download destroys any ters in that red when the |
| SEE | Chapter 7 | 7 | | | |
| PURPOSE | Selects dr | aft dov | vnload | charac | ter set. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, < ESC > 27 1B | | P, IBM 1 1 01 | 1-G | |
| REMARKS | the draft Note: The | downlo chara nal cod | oad chacter "1 | aracter " (deci | nter to select set. mal code 49, used instead |

Chapter 7

SEE

| PURPOSE | Selects draft download character set. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P < ESC > "I" 4 27 73 4 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 NLQ download character set. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P <esc> "I" 6 27 73 6 1B 49 06</esc> |
| REMARKS | This command causes the printer to select the NLQ download character set. Note: The character "6" (decimal code 54, hexadecimal code 36) can be used insteasd of ASCII 6. |
| SEE | Chapter 7 |
| PURPOSE | Cancels download character set. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "%" 0 27 37 0 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 |

DOT GRAPHICS COMMANDS

PURPOSE Prints normal-density graphics.

MODE Standard, IBM-P, IBM-G
CODE <ESC> "K" n1 n2 m1 m2
(decimal ASCII) 27 75 n1 n2 m1 m2
(hex ASCII) 1B 4B n1 n2 m1 m2

REMARKS

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

SEE

Chapter 7

PURPOSE Prints double-density graphics.

 MODE
 Standard, IBM-P, IBM-G

 CODE
 < ESC > "L" n1 n2 m1 m2

 (decimal ASCII)
 27 76 n1 n2 m1 m2

 (hex ASCII)
 1B 4C n1 n2 m1 m2

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

| PURPOSE | Prints double-density graphics at double-speed. |
|---------|---|
| MODE | Standard, IBM-P, IBM-G |

| MODE | Standard | , IBM- | -P, IBM-G |
|-----------------|------------|--------|-------------|
| CODE | < ESC > | "Y" | n1 n2 m1 m2 |
| (decimal ASCII) | 27 | 89 | n1 n2 m1 m2 |
| (hex ASCII) | 1 B | 59 | n1 n2 m1 m2 |

REMARKS

This command selects 120 dots-per-inch, column-scan, bit-image graphics mode at double-speed. The values of nl and n2 are the same as in normal-density graphics. The correct number of graphics data bytes (ml, m2, etc.) must follow n2. The ASCII values of these bytes determine which pins are fired for each character.

SEE Chapter 7

PURPOSE Prints quadruple-density graphics.

| MODE | Standard | , IBM- | ·P, IBM-G |
|-----------------|----------|--------|---------------------------|
| CODE | < ESC > | "Z" | $n1 \ n2 \ m1 \ m2 \dots$ |
| (decimal ASCII) | 27 | 90 | $n1 \ n2 \ m1 \ m2 \dots$ |
| (hex ASCII) | 1 R | 5 A | n1 n2 m1 m2 |

REMARKS

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

PURPOSE

Selects graphics modes.

MODE CODE (decimal ASCII) (hex ASCII)

Standard, IBM-P, IBM-G <ESC>

n0 n1 n2 m1 m2 27 42 $n0 \ n1 \ n2 \ m1 \ m2 \dots$ 1 B 2.A $n0 \ n1 \ n2 \ m1 \ m2 \dots$

REMARKS

This command selects one of seven 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 must be between 0 and 6 as shown below.

| n | Graphics mode |
|---|--------------------------------|
| 0 | Normal-density |
| 1 | Double-density |
| 2 | Double-density at double-speed |

- 3 Quadruple-density
- 4 CRT graphics

Graphics mode

- 5 Plotter graphics
- CRT graphics type II 6

SEE

Chapter 7

PURPOSE

Prints 9-pin graphics.

| MODE |
|-----------------|
| CODE |
| (decimal ASCII) |
| (hex ASCII) |

Standard, IBM-G

<ESC> $n0 \ n1 \ n2 \ m1 \ m2 \dots$ n0 n1 n2 m1 m2 27 94 $n0 \ n1 \ n2 \ m1 \ m2 \dots$ 1B 5E

REMARKS

This command selects, column-scan, 9-pin bit-image graphics mode. The value of n0 determines the print density. The values of n1 and n2 are the same as in normaldensity graphics. The correct number of graphics data bytes (m1, m2, etc.) must follow n2. The ASCII values of these two bytes determine which pins are fired for each character.

Chapter 7

SEE

| PURPOSE | Redefines | the gra | phics 1 | node. |
|--|--|--|---|--|
| MODE CODE (decimal ASCII) (hex ASCII) | | IBM-P "?" 63 3F | P, IBM n0 n0 n0 | nI n1 |
| REMARKS | ternate grades < ESC > "Z" - as on numbers w | aphics 'L", < one of t with the is "K" | codes ESC > he sev < ESO , "L", | es one of the 4 al- - < ESC > "K", "Y", or < ESC > en graphics density C > "*" command, "Y", or "Z" and |
| SEE | Chapter 7 | | | |

MACRO INSTRUCTION COMMANDS

| PURPOSE | Defines macro instruction. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "+" <rs> 27 43 30 1B 2B 1E</rs></esc> |
| REMARKS | This command cancels any existing macro instructions, and replaces it with the defined instruction. The maximum number of characters allowed in the macro instruction is 16. The <rs> character marks the end of the macro definition.</rs> |
| SEE | Chapter 6 |
| PURPOSE | Executes macro instruction. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "+" 1 27 43 1 1B 2B 01 |
| REMARKS | This command executes a previously defined macro instruction. |
| SEE | Chapter 6 |

OTHER COMMANDS

PURPOSE Sets the value of the eighth data bit to logical

1.

MODE Standard, IBM-P, IBM-G

CODE <ESC> ">"
(decimal ASCII) 27 62
(hex ASCII) 1B 3E

REMARKS 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.

SEE Chapter 6

PURPOSE Sets the value of the eighth data bit to logical

0.

MODE Standard, IBM-G CODE < ESC > "=" 27 61

(decimal ASCII)2761(hex ASCII)1B3D

MODE CODE STATE ST

REMARKS 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 codes.

| PURPOSE | Accepts the value of the eighth data bit as is. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "#" 27 35 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 |
| PURPOSE | Prints "slash zero". |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "~" 1 27 126 1 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. |
| SEĘ | Chapter 6 |
| PURPOSE | Prints "normal zero". |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "~" 0 27 126 0 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. |

PURPOSE Deletes the last character sent.

MODE Standard, IBM-P, IBM-G

CODE (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-P, IBM-G

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

REMARKS This command causes the printer to go off line, disregarding all subsequent characters and function codes, with the ex-

ception of $\langle DC1 \rangle$, 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 lamp is not lit, the printer

will not respond to < DC1 >.

| 190 | |
|--|---|
| PURPOSE | Sets printer on line. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < DC1 > 17 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 One Line key. When the On Line lamp is not lit, the printer will not respond to < DC1 >. |
| SEE | Chapter 6 |
| PURPOSE | Sounds the printer bell. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < BEL > 7 07 |
| REMARKS | This command causes the buzzer to sound for about a quarter of a second. |
| SEE | Chapter 6 |
| PURPOSE | Disables paper-out detector. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "8" 27 56 1B 38</esc> |
| REMARKS | This command causes the printer to dis- regard the signal sent by the paper-out |

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 1-1 can also be set to disable the paper-out detector.

| PURPOSE | Enables paper-out detector. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "9" 27 57 1B 39 |
| REMARKS | This command restores the function of the paper-out detector. |
| SEE | Chapter 6 |
| PURPOSE | Selects uni-directional printing. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "U" 1 27 85 1 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 |
| PURPOSE | Cancels uni-directional printing. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "U" 0 27 85 0 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 CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > " < " 27 60 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 in part; cancels same. |
| MODE CODE (decimal ASCII) (hex ASCII) REMARKS | Standard, IBM-P, IBM-G < ESC > "h" n 27 104 n 1B 68 n 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 3 Double-high, double-wide (Lower half only) 4 Double-high, double-wide (Upper half only) 5 Quadruple-high, quadruple-wide (Lower half only) 6 Quadruple-high, quadruple-wide (Upper half only) |

| PURPOSE | Expands the printable area. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard < ESC > "6" 27 54 1B 36 |
| REMARKS | This command causes the printer to use the high-order control code area as a printable character area. |
| SEE | Chapter 6 |
| PURPOSE | Cancels the expansion of printable area. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard <esc> "7" 27 55 1B 37</esc> |
| REMARKS | This command cancels the expansion of the printable character area and restores the high-order control code area. |
| SEE | Chapter 6 |
| PURPOSE | Prints characters in the undefined control code area. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-G < ESC > "I" 1 27 73 1 1B 49 01 |
| REMARKS | This command causes the printer to print the characters in the undefined control code area. Note: The character "1" (decimal code 49, hexadecimal code 31) can be used instead of ASCII 1. |
| SEE | Chapter 6 |

| PURPOSE | Selects undefined codes as control codes. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-G <esc> "I" 0 27 73 0 1B 49 00</esc> |
| REMARKS | This command cancels printing the characters in the undefined control codes and restores them as control codes. Note: The character "0" (decimal code 48, hexadecimal code 30) can be used instead of ASCII 0. |
| SEE | Chapter 6 |
| PURPOSE | Prints characters from all character sets. |
| MODE CODE (decimal ASCII) (hex ASCII) | IBM-P <esc> "\" n1 n2 27 92 n1 n2 1B 5C n1 n2</esc> |
| 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 $nl + (n2 \times 256)$. |

Prints a character from all character sets. **PURPOSE** MODE IBM-P 66 A 22 CODE <ESC>n (decimal ASCII) 27 94 n (hex ASCII) 5E 1 B n This command prints one character de-REMARKS fined 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. Standard, IBM-P, IBM-G MODE CODE <ESC> ";" 1 (decimal ASCII) 27 105 (hex ASCII) 1**B** 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. Chapter 6

SEE

| PURPOSE | Cancels immediate print mode. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > "i" 0 27 105 0 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 | Selects half-speed printing. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < 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. |
| PURPOSE | Cancels half-speed printing. |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G <esc> "s" 0 27 115 0 1B 73 00</esc> |
| REMARKS | This command cancels half-speed printing mode, and restores normal printing. |

mode, and restores normal printing.

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

PURPOSE Resets the printer MODE Standard, IBM-P, IBM-G CODE <ESC> "@" (decimal ASCII) 27 64 (hex ASCII) 1 R 40 This command reinitializes the printer. REMARKS The print buffer is cleared, and the form length, bottom margin, and international character set are all reset to the values defined by their respective DIP switches. The main difference between the <ESC> "@" command and turning the printer off and back on again is that download characters and macro instructions are preserved with this command. Chapter 6 SEE PURPOSE Selects auto feed mode. Standard, IBM-P, IBM-G MODE CODE <ESC>4 (decimal ASCII) 27 25 4 (hex ASCII) 1 R 19 04 Standard, IBM-P, IBM-G MODE "(" "(" "4" ")" ")" CODE (decimal ASCII) 40 40 52 41 41 (hex ASCII) 28 28 34 29 29 REMARKS This command causes the printer to select

the auto sheet feeding mode. This command is ignored when the optional auto-

matic sheet feeder is not mounted.

Chapter 6

SEE

| PURPOSE | Cancels auto feed mode. |
|--|--|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > < EM > 0 27 25 0 1B 19 00 |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G "(" "(" "0" ")" ")" 40 |
| REMARKS | This command causes the printer to cancel the auto sheet feeding mode. This com- mand is ignored when the optional auto- matic sheet feeder is not mounted. |
| SEE | Chapter 6 |
| PURPOSE | Supplies paper |
| | Supplies paper. |
| MODE CODE | Standard, IBM-P, IBM-G <esc> 1</esc> |
| (decimal ASCII) | 27 25 1 |
| (hex ASCII) | 1B 19 01 |
| MODE | Standard, IBM-P, IBM-G |
| CODE | "(" "(" "1" ")" ")" |
| (decimal ASCII) | 40 40 49 41 41 |
| (hex ASCII) | 28 28 31 29 29 |
| REMARKS | This command causes the printer to supply paper under non-auto sheet feeding mode. This command is ignored when the optional automatic sheet feeder is not mounted. |
| SEE | |

| PURPOSE | Ejects paper. |
|--|---|
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G < ESC > < EM > "R" 27 |
| MODE CODE (decimal ASCII) (hex ASCII) | Standard, IBM-P, IBM-G "(" "(" "R" ")" ")" 40 |
| REMARKS | This command causes the printer to eject paper. This command is ignored when the optional automatic sheet feeder is not mounted. |
| SEE | Chapter 6 |

MEMO

APPENDIX D

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 FX-85 printer.

| Control code | Function |
|---------------------------------|--|
| CHR\$(7) | Sounds the printer bell |
| CHR\$(8) | Moves the print head back one print position (backspace) |
| CHR\$(9) | Moves the print head to the next horizontal tab position |
| CHR\$(10) | Advances the paper one line (line feed) |
| CHR\$(11) | Advances paper to the next vertical tab position |
| CHR\$(12) | Advances the paper to the top of the next page (form feed) |
| CHR\$(13) | Returns print head to the left margin (carriage return) |
| CHR\$(14) | Sets the printer to expanded print for the remainder of the current line |
| CHR\$(15) | Sets the printer to condensed print |
| CHR\$(17) | Sets printer on line |
| CHR\$(18) | Cancels condensed print |
| CHR\$(19) | Sets printer off line |
| CHR\$(20) | Cancels one line expanded print |
| CHR\$(24) | Cancels a line |
| CHR\$(127) | Deletes the last character sent |
| $\langle ESC \rangle CHR\$(10)$ | Reverses the paper one line |

| <esc></esc> | CHR\$(12) | Reverses the paper to the top of the current page |
|---|--|---|
| < FSC > | CHR\$(14) | Sets the printer to expanded print |
| \LSC > | CIIK\$(14) | for the remainder of the current line |
| <esc></esc> | CHR\$(15) | Sets the printer to condensed print |
| | CHR\$(25) 0 | Cancels auto feed mode |
| | CHR\$(25) 1 | Supplies paper |
| | CHR\$(25) 4 | Selects auto feed mode |
| | CHR\$(25) "R" | Ejects paper |
| | CHR\$(32) n | Adds <i>n</i> dot spaces between charac- |
| | | ters |
| < 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 > | | Selects download character set |
| < ESC > | "&" CHR\$(0) n | 11 n2 m0 m1 |
| | | Defines download characters into |
| | | Beimes de wineda enaracters inte |
| | | RAM |
| < ESC > | "*" n0 n1 n2 m. | RAM 1 m2 |
| | | RAM l m2 Selects graphics modes |
| | "*" n0 n1 n2 m. "+" CHR\$(| RAM 1 m2 Selects graphics modes 30) |
| < ESC > | "+" CHR\$(| RAM 1 m2 Selects graphics modes 30) Defines macro instruction |
| < ESC > < ESC > | "+" CHR\$(3 | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction |
| <esc></esc> | "+" CHR\$("+" 1 "-" 0 | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining |
| <esc> <esc> <esc> <esc></esc></esc></esc></esc> | "+" 1 "-" 0 "-" 1 | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining |
| < ESC > | "+" 1 "-" 0 "-" 1 "/" n0 | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(: "+" 1 "-" 0 "-" 1 "/" n0 "0" | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(3 "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Selects italic characters |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Sets line spacing to characters Cancels italic characters |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(3 "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" "6" | RAM l m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Selects italic characters Cancels italic characters Expands the printable area |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(3 "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" "6" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Sets line spacing to n/216 inch Sets line spacing to n/216 inch Selects italic characters Cancels italic characters Expands the printable area Cancels the expansion of printable |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(3 "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" "6" "7" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Sets line spacing to m/216 inch Sets line spacing to m/216 inch Selects italic characters Cancels italic characters Expands the printable area Cancels the expansion of printable area |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "+" CHR\$(3 "+" 1 "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" "6" "7" | RAM I m2 Selects graphics modes 30) Defines macro instruction Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Sets line spacing to 1/6 inch Sets line spacing to n/216 inch Sets line spacing to n/216 inch Sets line spacing to n/216 inch Selects italic characters Cancels italic characters Expands the printable area Cancels the expansion of printable |

| < ESC > | ":" CHR\$(0) C | HR\$(0) CHR\$(0) |
|-------------|----------------|-------------------------------------|
| | | Copies standard character 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 $n/72$ inch |
| < ESC > | "B" n1 n2 n3 | CHR\$(0) |
| | | Sets vertical tab positions |
| < ESC > | "C"CHR\$(0) n | Sets page length to <i>n</i> inches |
| < ESC > | | 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 > | | Selects undefined codes as control |
| | | codes |
| < ESC > | "I" 1 | Prints characters in the undefined |
| | | control code area |
| \leq ESC> | "J" n | Sends a one-time paper feed of |
| | | n/216 inch |
| < ESC > | "K" n1 n2 m1 n | n2 |
| | | Prints normal-density graphics |
| < ESC > | "L" n1 n2 m1 m | <i>12</i> |
| | | Prints double-density graphics |
| <esc></esc> | "M" | Sets the print pitch to elite |
| < ESC > | "N" n | Sets the bottom margin |
| < ESC > | "O" | Cancels top and bottom margins |
| < ESC > | | Sets the print pitch to pica |
| <esc></esc> | "Q" n | Sets the right margin |
| <esc></esc> | "R" n | Selects an international character |
| | | set |
| < ESC > | "S" 0 | Selects superscripts |
| | | |

| < ESC > | "S" 1 | Selects subscripts |
|----------------|--|--|
| < ESC > | | Cancels a superscript or subscript |
| <esc></esc> | | Cancels uni-directional printing |
| <esc></esc> | | Selects uni-directional printing |
| < ESC > | | Cancels expanded print |
| <esc></esc> | "W" 1 | Sets the printer to expanded print |
| | "X" n1 n2 | Sets the left and right margins |
| | "Y" n1 n2 m1 n | |
| | | Prints double-density graphics at double-speed |
| <esc></esc> | "Z" n1 n2 m1 m | |
| | | Prints quadruple-density graphics |
| <esc></esc> | "\" n1 n2 | Moves the print head to a specified |
| | , | horizontal position |
| <esc></esc> | "^" n0 n1 n2 m | |
| | | Prints 9-pin graphics |
| < ESC > | " <u> " </u> | Cancels overlining |
| < ESC > | " 1 | Selects overlining |
| < ESC > | "a" <i>n</i> | 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 <i>n</i> | Sets vertical tab positions every n |
| | | lines |
| < ESC > | | Sets the print postion to n characters |
| < ESC > | | Sets print position to <i>n</i> lines |
| < ESC > | "h" <i>n</i> | Enlarges characters in whole or in |
| | | part; cancels same |
| < ESC > | | Cancels immediate print mode |
| < ESC > | | Sets immediate print mode |
| < ESC > | "j" <i>n</i> | Sends a one-time reverse feed of |
| | | n/216 inch |
| < ESC > | | Sets the left margin |
| <esc></esc> | | Cancels proportional print |
| < ESC > | "p" l | Sets the printer to proportional |
| . | // ** | print |
| <esc></esc> | | Sets the top margin |
| < ESC > | "s" 0 | Cancels half-speed printing |

| < ESC > "s" 1 | Selects half-speed printing |
|-------------------|-----------------------------|
| <esc> "x" 0</esc> | Cancels NLQ characters |
| < ESC > "x" 1 | Selects NLQ characters |
| <esc> "∼" 0</esc> | Prints "normal zero" |
| <esc> "∼" 1</esc> | Prints "slash zero" |
| "((0))" | Cancels auto feed mode |
| "((1))" | Supplies paper |
| "((4))" | Selects auto feed mode |
| "((R))" | Ejects paper |

■ IBM-P mode

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

| Control code | Function |
|-------------------|---|
| CHR\$(7) | Sounds the printer bell |
| CHR\$(8) | Moves the print head back one print position (backspace) |
| CHR\$(9) | Moves the print head to the next horizontal tab position |
| CHR\$(10) | Advances the paper one line (line feed) |
| CHR\$(11) | Advances paper to the next vertical tab position |
| CHR\$(12) | Advances the paper to the top of the next page (form feed) |
| CHR\$(13) | Returns print head to the left margin (carriage return) |
| CHR\$(14) | Sets the printer to expanded print for the remainder of the current line |
| CHR\$(15) | Sets the printer to condensed print |
| CHR\$(17) | Sets printer on line |
| CHR\$(18) | Sets the print pitch to pica |
| CHR\$(20) | Cancels one line expanded print |
| CHR\$(24) | Cancels a line |
| 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 |
|---|--|---|
| < ECC > | CHD¢(15) | for the remainder of the current line Sets the printer to condensed print |
| | CHR\$(15) | <u>. </u> |
| | CHR\$(25) 0 | Cancels auto feed mode |
| | CHR\$(25) 1 | Supplies paper |
| | CHR\$(25) 4 | Selects auto feed mode |
| | CHR\$(25) "R" | Ejects paper |
| < ESC > | | 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 > | | Selects download character set |
| < ESC > | "&" CHR\$(0) n | 11 n2 m0 m1 |
| | | Defines download characters into |
| | | RAM |
| < ESC > | "*" n0 n1 n2 m. | 1 m2 |
| | | Selects graphics modes |
| <esc></esc> | "+" CHR\$(| |
| | ` | |
| | | Defines macro instruction |
| <esc></esc> | "+" 1 | |
| <esc><esc></esc></esc> | | Executes macro instruction |
| <esc></esc> | "-"0 | Executes macro instruction Cancels underlining |
| <esc></esc> | "-" 0 "-" 1 | Executes macro instruction |
| <esc><esc><esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels |
| <esc><esc><esc><esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch |
| <esc><esc><esc><esc><esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <</esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition |
| < ESC > < ESC | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <</esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current |
| < ESC > < ESC | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position |
| < ESC > < ESC | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function with- |
| < ESC > < ESC | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed |
| < ESC > < ESC | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with |
| <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with a line feed |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" 0 | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with a line feed Selects character set #2 |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" 0 "5" 1 | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with a line feed Selects character set #2 Selects character set #1 |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" 0 "5" 1 "6" "7" "8" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with a line feed Selects character set #2 Selects character set #1 Disables paper-out detector |
| <esc> <esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc></esc> | "-" 0 "-" 1 "/" n0 "0" "1" "2" "3" n "4" "5" 0 "5" 1 "6" "7" "8" "9" | Executes macro instruction Cancels underlining Selects underlining Selects vertical channels Sets line spacing to 1/8 inch Sets line spacing to 7/72 inch Uses < ESC > "A" definition Sets line spacing to n/216 inch Sets the top of form to the current position Sets carriage return function without a line feed Sets carriage return function with a line feed Selects character set #2 Selects character set #1 |

```
< ESC > " < "
                        Selects one-line uni-directional
                        printing
< ESC > "=" n1 n2 CHR$(20) n3 m0 CHR$(0) m1 m2 ...
                        Defines download characters into
                        RAM
                        Sets the value of the eighth data
<ESC> ">"
                        bit to logical 1
                        Redefines the graphics mode
< ESC > "?" n0 n1
< ESC > "@"
                        Resets the printer
<ESC> "A" n
                        Defines line spacing to n/72 inch
< ESC > "B" n1 n2 n 3 ... 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> "I" 0
                        Selects draft characters
< ESC > "I" 2
                        Selects NLQ characters
                        Selects draft download character
< ESC > "I" 4
                        set
< ESC > "I" 6
                        Selects NLQ download character
                        set
                        Sends a one-time paper feed of
<ESC> "J" n
                        n/216 inch
< ESC > "K" n1 n2 m1 m2 ...
                        Prints normal-density graphics
< ESC > "L" n1 n2 m1 m2 ...
                        Prints double-density graphics
< ESC > "M"
                        Sets the print pitch to elite
<ESC> "N" n
                        Sets the bottom margin
                        Cancels top and bottom margins
<ESC> "O"
< ESC > "P"
                        Sets the print pitch to pica
<ESC> "Q" 3
                        Sets printer off line
< ESC > "R"
                        Cancels tabs to the default values
<ESC> "S" 0
                        Selects superscripts
<ESC> "S" 1
                        Selects subscripts
```

| < ESC > | "T" | Cancels a superscript or subscript |
|-------------|-----------------|---|
| <esc></esc> | | Cancels uni-directional printing |
| <esc></esc> | | Selects uni-directional printing |
| <esc></esc> | | Cancels expanded print |
| <esc></esc> | | Sets the printer to expanded print |
| | "X" n1 n2 | Sets the left and right margins |
| | "Y" n1 n2 m1 m | |
| | | Prints double-density graphics at |
| | | double-speed |
| < ESC > | "Z" n1 n2 m1 n | <u>-</u> |
| | | Prints quadruple-density graphics |
| <esc></esc> | "\" n1 n2 | Prints characters from all character |
| | | sets |
| < ESC > | "^" n | Prints a character from all character |
| | | sets |
| < ESC > | " <u> </u> | Cancels overlining |
| < ESC > | " _" 1 | Selects overlining |
| < ESC > | | 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 <i>n</i> | Sets vertical tab positions every n |
| | | lines |
| < ESC > | | Sets the print postion to <i>n</i> characters |
| < ESC > | | Sets print position to <i>n</i> lines |
| < ESC > | "h" <i>n</i> | Enlarges characters in whole or in |
| | | part; cancels same |
| <esc></esc> | | Cancels immediate print mode |
| <esc></esc> | | Sets immediate print mode |
| < ESC > | "j" n | Sends a one-time reverse feed of |
| · maa | 44133 | n/216 inch |
| <esc></esc> | | Sets the left margin |
| <esc></esc> | | Cancels proportional print |
| < ESC > | "p" I | Sets the printer to proportional |
| < D00 - | 66 22 | print Sate the ten manain |
| <esc></esc> | | Sets the top margin |
| <esc></esc> | | Cancels half-speed printing |
| < ESC > | S I | Selects half-speed printing |

| $\langle ESC \rangle$ "x" 0 | Cancels NLQ characters |
|-----------------------------|------------------------------------|
| < ESC > "x" 1 | Selects NLQ characters |
| < ESC > "∼" 0 | Prints "normal zero" |
| <esc> "∼" 1</esc> | Prints "slash zero" |
| <fs> "4"</fs> | Selects italic characters |
| <fs> "5"</fs> | Cancels italic characters |
| <fs> ":" CHR\$(0) CH</fs> | R\$(0) CHR\$(0) |
| | Copies standard character ROM |
| | font into RAM |
| <fs> "="</fs> | Sets the value of the eighth data |
| | bit to logical 0 |
| < FS > "Q" n | Sets the right margin |
| < FS > "R" n | Selects an international character |
| | set |
| "((0))" | Cancels auto feed mode |
| "((1))" | Supplies paper |
| "((4))" | Selects auto feed mode |
| "((R))" | Ejects paper |
| | |

■ IBM-G mode

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

| Control code | Function |
|--------------|--|
| CHR\$(7) | Sounds the printer bell |
| CHR\$(8) | Moves the print head back one print position (backspace) |
| CHR\$(9) | Moves the print head to the next horizontal tab position |
| CHR\$(10) | Advances the paper one line (line feed) |
| CHR\$(11) | Advances paper to the next vertical tab position |
| CHR\$(12) | Advances the paper to the top of the next page (form feed) |
| CHR\$(13) | Returns print head to the left margin (carriage return) |
| CHR\$(14) | Sets the printer to expanded print for the remainder of the current line |
| CHR\$(15) | Sets the printer to condensed print |

| CHR\$(17) | Sets printer on line |
|--------------------------------|---------------------------------------|
| CHR\$(18) | Cancels condensed print |
| CHR\$(19) | Sets printer off line |
| CHR\$(20) | Cancels one line expanded print |
| CHR\$(24) | Cancels a line |
| CHR\$(127) | Deletes the last character sent |
| <esc> CHR\$(10)</esc> | Reverses the paper one line |
| <esc> CHR\$(12)</esc> | Reverses the paper to the top of the |
| | current page |
| <esc> CHR\$(14)</esc> | 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) 0</esc> | Cancels auto feed mode |
| <esc> CHR\$(25) 1</esc> | Supplies paper |
| < ESC > CHR\$(25) 4 | Selects auto feed mode |
| <esc> CHR\$(25) "R"</esc> | 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) n</esc> | 1 n2 m0 m1 |
| , | Defines download characters into |
| | RAM |
| <e\$c> "*" n0 n1 n2 m1</e\$c> | 1 m2 |
| | Selects graphics modes |
| <esc> "+" CHR\$(3</esc> | |
| | Defines macro instruction |
| < ESC > "+" 1 | Executes macro instruction |
| <esc> "-" 0</esc> | Cancels underlining |
| <esc> "-" 1</esc> | Selects underlining |
| <esc> "/" n0</esc> | 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"</esc> | Cancels italic characters |

| < ESC > | "6" | Selects character set #2 |
|-------------|----------------|-------------------------------------|
| < ESC > | " 7" | Selects character set #1 |
| < ESC > | "8" | Disables paper-out detector |
| < ESC > | "9" | Enables paper-out detector |
| <esc></esc> | ":" CHR\$(0) C | HR\$(0) CHR\$(0) |
| | | Copies standard character ROM |
| | | font into RAM |
| < ESC > | "<" | Selects one-line uni-directional |
| | | printing |
| < ESC > | "=" | Sets the value of the eighth data |
| | | bit to logical 0 |
| <esc></esc> | ">" | Sets the value of the eighth data |
| | | bit to logical 1 |
| <esc></esc> | "?" n0 n1 | Redefines the graphics mode |
| <esc></esc> | | Resets the printer |
| <esc></esc> | | Defines line spacing to $n/72$ inch |
| | "B" n1 n2 n 3. | |
| | | Sets vertical tab positions |
| <esc></esc> | "C"CHR\$(0) n | Sets page length to <i>n</i> inches |
| <esc></esc> | | Sets page length to n lines |
| | "D" n1 n2 n3 | . CHR\$(0) |
| | | Sets horizontal tab positions |
| <esc></esc> | "E" | Selects emphasized printing |
| <esc></esc> | "F" | Cancels emphasized printing |
| <esc></esc> | | Selects boldface printing |
| < ESC > | "H" | Cancels boldface printing |
| , < ESC > | "I" 0 | Selects undefined codes as control |
| | | codes |
| <esc></esc> | "I" 1 | Prints characters in the undefined |
| | | control code area |
| < ESC > | "J" n | Sends a one-time paper feed of |
| | | n/216 inch |
| <esc></esc> | "K" n1 n2 m1 n | <i>n2</i> |
| | | Prints normal-density graphics |
| <esc></esc> | "L" n1 n2 m1 n | |
| | | Prints double-density graphics |
| < ESC > | | Sets the print pitch to elite |
| <esc></esc> | | Sets the bottom margin |
| < ESC > | | Cancels top and bottom margins |
| < ESC $>$ | "P" | Sets the print pitch to pica |

| < ESC > | "O" n | Sets the right margin |
|-------------|-----------------|--|
| <esc></esc> | | Selects an international character |
| 200 | | set |
| < ESC > | "S" 0 | Selects superscripts |
| <esc></esc> | | Selects subscripts |
| <esc></esc> | | Cancels a superscript or subscript |
| < ESC > | | Cancels uni-directional printing |
| <esc></esc> | | Selects uni-directional printing |
| <esc></esc> | | Cancels expanded print |
| <esc></esc> | | Sets the printer to expanded print |
| | "X" n1 n2 | Sets the left and right margins |
| | "Y" n1 n2 m1 n | - |
| | | Prints double-density graphics at |
| | | double-speed |
| < ESC > | "Z" n1 n2 m1 m | <i>12</i> |
| | | Prints quadruple-density graphics |
| < ESC > | "\" n1 n2 | Moves the print head to a specified |
| | | horizontal position |
| < ESC > | "^" n0 n1 n2 m | 1 m2 |
| | | Prints 9-pin graphics |
| < ESC > | " <u> </u> | Cancels overlining |
| < ESC > | | Selects overlining |
| < ESC > | | Sets alignment, or centering |
| < ESC > | "b" n0 n1 n2 n3 | CHR\$(0) |
| | | Sets vertical tab positions in a |
| | | channel |
| < ESC > | "e" 0 n | Sets horizontal tab positions every |
| | | n characters |
| < ESC > | "e" 1 <i>n</i> | Sets vertical tab positions every n |
| | | lines |
| < ESC > | | Sets the print postion to n characters |
| < ESC > | | Sets print position to n lines |
| < ESC > | "h" <i>n</i> | Enlarges characters in whole or in |
| | | part; cancels same |
| < ESC > | | Cancels immediate print mode |
| <esc></esc> | | Sets immediate print mode |
| < ESC > | "j" n | Sends a one-time reverse feed of |
| | // 4.0 | n/216 inch |
| < ESC > | | Sets the left margin |
| < ESC > | "p" 0 | Cancels proportional print |

| <esc> "p" 1</esc> | Sets the printer to proportional |
|-----------------------------|----------------------------------|
| • | print |
| < ESC $>$ "r" n | Sets the top margin |
| $\langle ESC \rangle$ "s" 0 | Cancels half-speed printing |
| <esc> "s" 1</esc> | Selects half-speed printing |
| <ESC $>$ "x" 0 | Cancels NLQ characters |
| <ESC $>$ "x" 1 | Selects NLQ characters |
| $<$ ESC $>$ " \sim " 0 | Prints "normal zero" |
| <esc> "~" 1</esc> | Prints "slash zero" |
| "((0))" | Cancels auto feed mode |
| "((1))" | Supplies paper |
| "((4))" | Selects auto feed mode |
| "((R))" | Ejects paper |

мемо

APPENDIX E

TECHNICAL SPECIFICATIONS

Printing

Printing method

Serial impact dot matrix

Printing speed

180 characters per second (in Draft pica) 45 characters per second (in NLO mode)

12.6KB

Print buffer Paper feed

2.7 inches/second (for form feeding)

Tractor and Friction feed

Printing direction

Bi-directional, logic seeking

Uni-directional in dot graphics modes

Character set

Draft characters

96 standard ASCII characters

33 international characters [11 sets]

87 IBM special characters

50 IBM block graphics characters

96 italic ASCII characters

33 italic international characters [11 sets]

87 italic IBM special characters

NLQ characters

96 standard ASCII characters

33 international characters [11 sets]

87 IBM special characters 96 italic ASCII characters

33 italic international characters [11 sets]

87 italic IBM special characters

Other characters

255 downloadable characters

Character matrix

Draft characters
NLQ characters
Block graphics

 $9 \text{ dot } \times 11 \text{ dot}$ $18 \text{ dot } \times 23 \text{ dot}$

Dot graphics

12 dot \times 11 dot 8 or 9 dot \times 60 dots/inch

8 or 9 dot \times 120 dots/inch

| | 8 dot × 240 dots/inch | Į. |
|---------------------|--|-----------------------------|
| | $8 \text{ dot} \times 72 \text{ dots/inch}$ | |
| | 8 dot × 80 dots/inch | |
| | $8 \text{ dot } \times 90 \text{ dots/inch}$ | |
| Line spacing | 1/6 inch standard | |
| | 1/8, $n/72$, $n/144$, or $n/$ | 216 inch program- |
| | mable | |
| Column width | 10-inch type | 15-inch type |
| Normal pica | 80 | 136 |
| Normal elite | 96 | 163 |
| Condensed pica | 137 | 233 |
| Condensed elite | 160 | 272 |
| Expanded pica | 40 | 68 |
| Expanded elite | 48 | 81 |
| Expanded conden | sed pica 68 | 116 |
| Expanded conden | sed elite 80 | 136 |
| Proportional space | ing Variable | Variable |
| Special features | Near Letter Quality ch | naracters |
| | Automatic single sheet | |
| | Short form tear-off | |
| | Easy access format sw | itches |
| | Self-test and hex dump | p |
| | Downloadable charact | ters |
| | Ultra hi-resolution bit | image graphics |
| | Vertical and horizonta | ıl tabs |
| | Skip over perforation | |
| 4 | 15.5" carriage (15-inch | type only) |
| | Automatic sheet feede | r (option) |
| | | |
| Paper | 10 1 1 | |
| Single sheets | 10-inch type | |
| Width | | $6 \sim 14.5$ inches |
| Thickness | $0.07 \sim 0.10 \text{ mm}$ | $0.07 \sim 0.10 \text{ mm}$ |
| Sprocket-feed paper | | 4 1661 1 |
| Width | | $4 \sim 15.5$ inches |
| Thickness | $0.07 \sim 0.10$ mm, one- | • |
| | Max 0.28 mm, 3-part | iorm |
| | | |

| - | • . |
|---|--------|
| ν | rinter |
| | iime |

| Dimensions | 10-inch type | 15-inch type |
|-------------|---|-----------------|
| Height | 105 mm | 105 mm |
| C | (4.1 inches) | (4.1 inches) |
| Width | 400 mm | 542 mm |
| | (15.7 inches) | (21.3 inches) |
| Depth | 360 mm | 360 mm |
| • | (14.1 inches) | (14.1 inches) |
| Weight | 8.2 kg | 10.7 kg |
| • | (18.1 pounds) | (23.6 pounds) |
| Power | $120 \text{ VAC} \pm 10\%, 60 \text{H}$ | Z. |
| | $220 \text{ VAC} \pm 10\%, 50/6$ | б0Hz. |
| | $240 \text{ VAC} \pm 10\%, 50/6$ | б0Hz. |
| Environment | Temperature: 5 to 40°C | C (41 to 104°F) |
| | Humidity: 10 to 80%. | non condensing |

Ribbon
Life

Ribbon
Life

Black cloth ribbon in special cartridge
2 million draft characters (10-inch type)
3 million draft characters (15-inch type)

Print head life 100 million draft characters

Parallel interface

Interface Centronics-compatible, 7 or 8 bit
Synchronization By external supplied Strobe pulses
Handshaking By ACK or BUSY signals

Logic level TTL

Connector 57-30360 Amphenol

Serial interface (option)

Interface Asynchronous RS-232C/20mA current

loop

Bit rate 150, 300, 600, 1200, 2400, 4800, 9600,

19200 baud

Word length 1 start bit

7 or 8 data bits

Odd, even or no parity

1 or 2 stop bits

Handshaking Serial BUSY, 1 byte mode

Serial BUSY, 1 block mode

ACK mode

XON/XOFF mode

МЕМО

APPENDIX F

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 F-1.

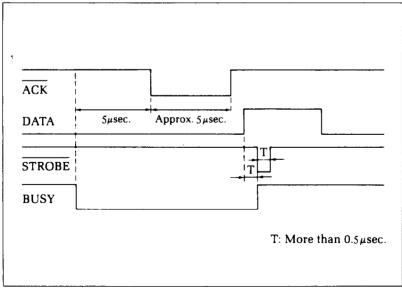


Figure F-1. The interface timing diagram.

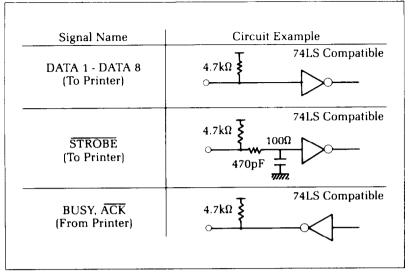


Figure F-2. Typical interface circuit.

Table F-1
Parallel interface pin functions

| Pin No | Signal Name | Direc- tion | Function |
|--------|----------------|----------------|--|
| 1 | STROBE | IN | Signals when data is ready to be read. Signal goes from HIGH to LOW (for at least 0.5 microseconds) when data is available. |
| 2 | DATA1 | IN | |
| 3 | DATA2 | IN | |
| 4 . | DATA3 | IN | 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. |
| 5 | DATA4 | IN | of the first to eighth bits of parallel data. |
| 6 | DATA5 | IN | 1 and at a LOW level for a logical 0. |
| 7 | DATA6 | IN | |
| 8 | DATA7 | IN | |
| 9 | DATA8 | IN | |
| 10 | ACK | OUT | A 5 microsecond LOW pulse acknowledges receipt of data. |
| 11 | BUSY | OUT | When this signal goes LOW the printer is ready to accept data. |
| 12 | PAPER OUT | OUT | 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 1-1 off. |
| 13 | SELECTED | OUT | This signal is HIGH when the printer is on-line. |
| 14-15 | N/C | | Unused |

| Pin No. | Signal Name | Direc- tion | Function |
|---------|----------------|----------------|---|
| 16 | SIGNAL GND | | Signal ground. |
| 17 | CHASSIS GND | | Printer's chassis ground, isolated from logic ground. |
| 18 | + 5VDC | OUT | External supply of + 5VDC. |
| 19-30 | GND | | Twisted pair return signal ground level. |
| 31 | RESET | IN | When this signal goes LOW the printer is reset to its power-on condition. |
| 32 | ERROR | OUT | This signal is normally HIGH. This signal goes LOW to signal that the printer cannot print due to an error condition. |
| 33 | EXT GND | | External ground. |
| 34, 35 | N/C | | Unused. |
| 36 | SELECT IN | | Data entry to the printer is possible only when this level is LOW. |

■ 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 5 microseconds. This signal acknowledges the receipt of the data and so is called the \overline{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 1-1 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 G 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 G-1.

Table G-1 Serial interface pin functions

| Pin No | Signal Name | Direc- tion | Function | |
|--------|----------------|----------------|--|--|
| 1 | GND | - | Printer's chassis ground. | |
| 2 | TXD | OUT | This pin carries data from the printer. | |
| 3 | RXD | IN | This pin carries data to the printer. | |
| 4 | RTS | OUT | This is ON when the printer is ready to receive data. | |
| 5 | CTS | IN | This pin is ON when the computer is ready to send data. | |
| 6 | DSR | IN | This pin is ON when the computer is ready to send data. The printer does not check this pin. | |
| 7 | GND | | Signal ground. | |
| 8 | DCD | IN | This pin is ON when the computer is ready to send data. The printer does not check this pin. | |
| 9 | TTY TXDR | | This pin is the return path for data transmitted from the printer on the 20mA current loop. | |
| 10 | TTY TXD | OUT | This pin carries data from the printer on the 20mA current loop. | |
| 11 | RCH | OUT | 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. | |
| 12 | N/C | | Unused. | |
| 13 | GND | _ | Signal ground. | |
| 14-16 | N/C | | Unused. | |
| 17 | TTY TXDR | | This pin is the return path for data transmitted from the printer on the 20mA current loop. | |
| 18 | TTY RXDR | _ | This pin is the return path for data transmitted to the printer on the 20mA current loop. | |
| 19 | TTY RXD | IN | This pin carries data to the printer on the 20mA current loop. | |
| 20 | DTR | OUT | The printer turns this pin ON when it is ready to receive data. | |
| 21-22 | N/C | | Unused. | |
| 23 | TTY RXDR | | This pin is the return path for data transmitted to the printer on the 20mA current loop. | |
| 24 | TTY TXD | OUT | This pin carries data from the printer on the 20mA current loop. | |
| 25 | TTY RXD | IN | This pin carries data to the printer on the 20mA current loop. | |

CONFIGURING THE SERIAL INTERFACE

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

Table G-2
DIP switch on serial board

| Switch | ON | OFF | |
|--------|-------------------------------------|-------------|--|
| 1 | 7 data bits | 8 data bits | |
| 2 | Parity checked | No parity | |
| 3 | Handshaking protocols—see Table G-3 | | |
| 4 | | | |
| 5 | Odd parity Even parity | | |
| 6 | | | |
| 7_ | Data transfer rate—see Table G-4 | | |
| 8 | | | |

Table G-3
Handshaking protocols

| Protocol | Switch 3 | Switch 4 |
|--------------------------|----------|----------|
| Serial busy, 1 byte mode | OFF | OFF |
| Serial busy 1 block mode | ON | OFF |
| ACK mode | OFF | ON |
| XON/XOFF mode | ON | ON |

Table G-4
Data transfer rates

| Baud rate | Switch 6 | Switch 7 | Switch 8 |
|-----------|----------|----------|----------|
| 150 | OFF | OFF | OFF |
| 300 | OFF | OFF | ON |
| 600 | OFF | ON | OFF |
| 1200 | OFF | ON | ON |
| 2400 | ON | OFF | OFF |
| 4800 | ON | OFF | ON |
| 9600 | ON | ON | OFF |
| 19200 | ON | ON | ON |

THE SERIAL PROTOCOLS

This printer has four serial protocols, selected by DIP switches 3 and 4. Figure G-1 shows a typical byte of serial data and Figure G-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 cannot 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 (ASCII6) on TXD (pin 2) each time that it is prepared to receive a byte of data

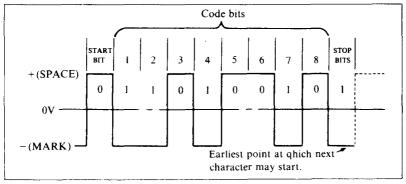


Figure G-1. Typical data byte on the serial interface.

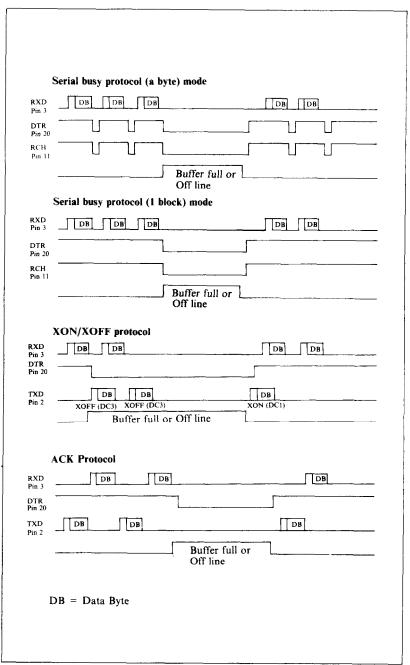


Figure G-2. Serial protocol timing charts.

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